World Economic and Financial Surveys

Global Financial Stability Report

Getting the Policy Mix Right

APR 17

INTERNATIONAL MONETARY FUND

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Cover and Design: Luisa Menjivar and Jorge Salazar
Composition: AGS, An RR Donnelley Company

Cataloging-in-Publication Data

Joint Bank-Fund Library

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

ISBN 978-1-47556-456-3 (Paper)
978-1-47559-072-2 (ePub)
978-1-47559-073-9 (Mobipocket)
978-1-47559-080-7 (PDF)

Disclaimer: The *Global Financial Stability Report* (GFSR) is a survey by the IMF staff published twice a year, in the spring and fall. The report draws out the financial ramifications of economic issues highlighted in the IMF's *World Economic Outlook* (WEO). The report was prepared by IMF staff and has benefited from comments and suggestions from Executive Directors following their discussion of the report on April 4, 2017. 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. 2017. *Global Financial Stability Report: Getting the Policy Mix Right*. Washington, DC, April.

Please send orders to:
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ASSUMPTIONS AND CONVENTIONS

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

. . . to indicate that data are not available or not applicable;

— to indicate that the figure is zero or less than half the final digit shown or that the item does not exist;

– between years or months (for example, 2016–17 or January–June) to indicate the years or months covered, including the beginning and ending years or months;

/ between years or months (for example, 2016/17) to indicate a fiscal or financial year.

"Billion" means a thousand million.

"Trillion" means a thousand billion.

"Basis points" refers to hundredths of 1 percentage point (for example, 25 basis points are equivalent to ¼ of 1 percentage point).

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

Minor discrepancies between sums of constituent figures and totals shown reflect rounding.

As used in this report, the terms "country" and "economy" do not in all cases refer to a territorial entity that is a state as understood by international law and practice. As used here, the term also covers some territorial entities that are not states but for which statistical data are maintained on a separate and independent basis.

FURTHER INFORMATION AND DATA

This version of the *Global Financial Stability Report* (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.

PREFACE

The *Global Financial Stability Report* (GFSR) assesses key risks facing the global financial system. In normal times, the report seeks to play a role in preventing crises by highlighting policies that may mitigate systemic risks, thereby contributing to global financial stability and the sustained economic growth of the IMF's member countries.

The analysis in this report has been coordinated by the Monetary and Capital Markets (MCM) Department under the general direction of Tobias Adrian, Director. The project has been directed by 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, Adrian Alter, Sergei Antoshin, Nicolas Arregui, Luis Brandão-Marques, John Caparusso, Jorge Chan-Lau, Qianying Chen, Sally Chen, Yingyuan Chen, Fabio Cortes, Dimitris Drakopoulos, Martin Edmonds, Selim Elekdag, Jennifer Elliott, Caio Ferreira, Rohit Goel, Lucyna Gornicka, Thomas Harjes, Sanjay Hazarika, Geoffrey Heenan, Dyna Heng, Paul Hiebert, Eija Holttinen, Gee Hee Hong, Henry Hoyle, Viacheslav Ilin, Nigel Jenkinson, Andy Jobst, David Jones, Mitsuru Katagiri, Will Kerry, Oksana Khadarina, John Kiff, Robin Koepke, Romain Lafarguette, Frederic Lambert, Tak Yan Daniel Law, Yang Li, Sherheryar Malik, Rebecca McCaughrin, Naoko Miake, Win Monroe, Vladimir Pillonca, Thomas Piontek, Luca Sanfilippo, Dulani Seneviratne, Juan Solé, Ilan Solot, Nobuyasu Sugimoto, Jay Surti, Narayan Suryakumar, Laura Valderrama, Francis Vitek, Jeffrey Williams, Dmitry Yakovlev, and Kai Yan. Magally Bernal, Lilit Makaryan, Breanne Rajkumar, and Annerose Wambui Waithaka were responsible for word processing.

Gemma Diaz from the Communications Department led the editorial team and managed the report's production with support from Michael Harrup, Linda Kean, and Joe Procopio, and editorial assistance from Sherrie Brown, Christine Ebrahimzadeh, Susan Graham, Linda Long, Alastair McIndoe, Lucy Scott Morales, Nancy Morrison, Annerose Wambui Waithaka, Katy Whipple, Eric Van Zant, AGS, and Vector.

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

This GFSR reflects information available as of March 31, 2017. 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 4, 2017. 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

Financial Stability Has Improved

Financial stability has continued to improve since the October 2016 *Global Financial Stability Report* (GFSR). Economic activity has gained momentum, as outlined in the April 2017 *World Economic Outlook* (WEO), amid broadly accommodative monetary and financial conditions, spurring hopes for reflation. Longer-term interest rates have risen, helping to boost earnings of banks and insurance companies. Gains in many asset prices reflect a more optimistic outlook. Equity markets in the United States hit record highs in March on investors' hopes for tax reform, infrastructure spending, and regulatory rollbacks. Markets outside the United States have also risen steadily over the past six months, driven in part by stronger growth expectations and higher commodity prices. At the same time, risk premiums and volatility have declined.

How strong is the case for such optimism? To realize stronger growth and sustain the improvements in financial conditions, policymakers will need to implement the right mix of policies, including to (1) invigorate economic risk taking, especially in the United States, through policies that boost potential output, increase corporate investment, and avoid raising financial stability risks; (2) address domestic and external imbalances to enhance resilience in emerging market economies; and (3) respond more proactively to long-standing structural issues in European banking systems.

Policy Uncertainty Is a Key Downside Risk

New threats to financial stability are emerging from elevated political and policy uncertainty around the globe. In the United States, if the anticipated tax reforms and deregulation deliver paths for growth and debt that are less benign than expected, risk premiums and volatility could rise sharply, undermining financial stability. A shift toward protectionism in advanced economies could reduce global growth and trade, impede capital flows, and dampen market sentiment. In Europe, political tensions combined with a lack of progress on structural challenges in banking systems and high debt levels could reignite financial stability concerns. The potential for a broad rollback of financial regulations—or a loss of global cooperation—could undermine hard-won gains in financial stability. So far, markets have taken a relatively benign view of these downside risks, suggesting the potential for a swift repricing of risks in the event of policy disappointment.

Are U.S. Companies Strong Enough to Accelerate the Expansion Safely?

Policy proposals under discussion by the new U.S. administration in the areas of tax reform and deregulation could have a significant impact on the corporate sector. Healthy corporate balance sheets are a prerequisite for these policy proposals to gain traction and stimulate economic risk taking. Many nonfinancial firms do have the balance sheet capacity to expand investment, and reductions in corporate tax burdens could have a positive impact on their cash flow. But reforms could also spur increased financial risk taking and, in some sectors, could raise leverage from already-elevated levels. The sectors that have invested the most have the highest leverage, and financing additional investment with debt will increase their vulnerabilities. Under a scenario of rising global risk premiums, higher leverage could have negative stability consequences. In such a scenario, the assets of firms with particularly low debt service capacity could rise to nearly $4 trillion, or almost a quarter of corporate assets considered.

Emerging Market Economies Face Trying Times in Global Markets

Emerging market economies have continued to enhance their resilience by lowering corporate leverage and reducing external vulnerabilities. Their growth is expected to continue improving, driven by gains for commodity exporters and prospects for positive growth

spillovers from advanced economies. But overall financial stability risks remain elevated because global political and policy uncertainties are opening new channels for negative spillovers. A sudden reversal of market sentiment or a global shift toward inward-looking protectionist policies could reignite capital outflows and hurt growth prospects, testing the resilience of these economies.

Countries with strong international financial and trade links in particular could be challenged by tighter global financial conditions or adverse trade measures. These risks could exacerbate existing vulnerabilities in the corporate sector and could increase the debt at risk of the weakest firms by $130–$230 billion. A sharp turn away from the current supportive external environment could reinforce risks in countries whose weakest banks are challenged to maintain asset quality and adequately provision for bad loans after long credit booms.

China faces mounting risks to financial stability as credit continues to rise rapidly. China's bank assets are now more than triple its GDP, and other nonbank financial institutions also have heightened credit exposure. Many financial institutions continue to be overly dependent on wholesale financing, with sizable asset-liability mismatches and elevated liquidity and credit risks. Recent turbulence in money markets illustrates the vulnerabilities that remain in China's increasingly large, opaque, and interconnected system.

European Banking Systems Must Address Structural Challenges

Considerable progress has been made in the European banking sector over the past few years, and optimism about a cyclical upturn in advanced economies has helped boost European banks' equity prices. However, as assessed in the October 2016 GFSR, a cyclical recovery will likely be insufficient on its own to restore the profitability of persistently weak banks. Although many banks face profitability challenges, this is particularly true for domestic banks, which are most exposed to their home economies: almost three-quarters of these banks had weak returns in 2016 (defined as return on equity of less than 8 percent). This report examines the system-wide structural features that are compounding profitability challenges. One structural challenge is overbanking, which varies by nature and degree from country to country. Some examples include banking systems with assets that are large relative to the economy, with a long weak tail of banks, or with too many banks with a regional focus or a narrow mandate. These features can result in limited lending opportunities or a high number of branches relative to the assets in the banking system, adding to costs and reducing operational efficiencies. Although measures are being taken to address profitability concerns, more progress needs to be made in reducing overbanking in the countries with the biggest challenges.

System-wide headwinds are a problem not only within countries but can also affect the profitability of large, systemically important banks in Europe. These institutions find it difficult to keep up with their global competitors, and in some cases this may be partly due to profitability problems in their home countries. Until these structural impediments are addressed, a simple restructuring of their business models is unlikely to yield sufficient profitability. Left unresolved, a combination of weak profits, lack of access to private capital, and large bad debt burdens impedes recovery and could reignite systemic risks.

It Is Crucial to Get the Policy Mix Right

Securing and building on improvements in stability and market expectations will require concerted and careful efforts by policymakers at the national and global levels. Policymakers should adjust the policy mix to deliver a stronger path for long-term and inclusive growth while avoiding politically expedient but ultimately counterproductive inward-looking policies. In the United States, policymakers should vigilantly monitor increased leverage and deteriorating credit quality. Regulators should preemptively address excessive financial risk taking. Prudential and supervisory actions should be taken if policy stimulus leads to an increase in debt-financed investment and rising corporate vulnerabilities. Tax reforms that reduce incentives for debt financing could help attenuate risks of a further buildup in leverage, and possibly even encourage firms to lower existing tax-advantaged leverage.

In Europe, further actions should be taken to address bank profitability and legacy challenges. Banks have the primary responsibility for developing sustainable earnings by tackling business model problems through consolidation, branch rationalization, and investment in technology to increase medium-term efficiency. Encouragingly, supervisors are increasingly

emphasizing the examination of bank business models in their supervisory frameworks. To determine weak links in banking systems with significant asset quality challenges, consideration could be given to targeted asset quality reviews for banks that have not undergone such an exercise. Regulators should then take action to resolve unviable institutions to remove excess capacity. Authorities should also focus on removing system-wide impediments to profitability, including addressing nonperforming loans and developing frameworks that accelerate recovery.

Emerging market economies should address domestic vulnerabilities to enhance their resilience to external shocks. They should seek to preserve financial stability by taking further steps to strengthen supervision and bank governance while maintaining a robust macroprudential toolkit. Bank regulators should closely monitor vulnerabilities in countries with wide net foreign-currency positions or foreign-currency maturity gaps. Policymakers should focus on strengthening the health of corporates and the banking system by proactively monitoring and reducing vulnerabilities and improving restructuring mechanisms. In China, although the authorities have recognized the urgent need to deleverage the financial system and have undertaken substantive corrective measures, supervisory attention should concentrate on banks' emerging risks, especially fast asset growth among smaller banks, increasing reliance on wholesale funding, and risks from interconnections between shadow products and interbank markets. But staving off further bouts of market instability—and ultimately, macro instability—will require measures to address the policy tension between maintaining a high level of growth and the need for deleveraging.

The postcrisis reform agenda has strengthened oversight of the financial system, raised capital and liquidity buffers of individual institutions, and improved cooperation among regulators. Caution is needed when considering any future regulatory rollback. While regulation is never costless, neither is its removal; weakening regulatory standards comes at the cost of higher financial stability risks. Decisions to opt out of mutually established regulations in an uncoordinated or unilateral manner could result in financial fragmentation and could threaten to reignite a race to the bottom in regulatory standards. Completing the regulatory reform agenda is vital to ensure that weaknesses are addressed and to reduce uncertainty. Although there is scope to consider the impact and unintended consequences of reforms, such a review should not unravel the broad improvements achieved in buttressing the resilience of the global financial system.

This report also includes two thematic chapters analyzing the long-term implications of low growth and low interest rates for financial intermediation, and the ability of country authorities to influence domestic financial conditions in a financially integrated world.

A Long Period of Low Growth and Low Interest Rates Would Challenge Financial Intermediation

Advanced economies have experienced a prolonged episode of low interest rates and low growth since the global financial crisis. From a longer-term perspective, real interest rates have been on a steady decline over the past three decades. Despite recent signs of an increase in longer-term yields, particularly in the United States, Japan's experience suggests that an imminent and permanent exit from low rates is not necessarily guaranteed, especially in view of the prevalence of slow-moving structural factors, such as demographic aging in many advanced economies. Chapter 2 analyzes the potential long-term impact of a scenario of sustained low growth and low real and nominal rates for the business models of banks, insurers, and pension funds and for the products offered by the financial sector. It finds that yield curves would likely flatten, lowering bank earnings—particularly of smaller, deposit-funded, and less diversified institutions—and presenting long-lasting challenges for life insurers and defined-benefit pension funds. If bank deposit rates cannot drop (significantly) below zero, bank profits would be squeezed even further. Smaller, deposit-funded, and less diversified banks would be hurt most. As banks reach for yield, new financial stability challenges would arise in their home and host markets.

More generally, a "low-for-long" interest rate environment, driven by population aging, rising longevity, and stagnation in productivity, could fundamentally change the nature of financial intermediation. For example, credit demand would likely be lower in this scenario, whereas household demand for transaction services would likely rise. Consequently, bank business models in advanced economies may evolve toward fees-based and utility banking services. Demographic

changes would also increase demand for health and long-term-care insurance, and low asset returns would accelerate the transition to defined-contribution private pension plans. Demand would weaken for guaranteed-return, long-term savings products offered by insurers, and it would strengthen for passive index funds offered by asset managers. Policies could help ease the adjustment to such an environment. In general, prudential frameworks would need to provide incentives to ensure longer-term stability instead of falling prey to demands for deregulation to ease short-term pain.

Policymakers Challenged to Effectively Steer Domestic Financial Conditions amid Increased International Financial Integration

Chapter 3 shows that countries can retain influence over their domestic financial conditions in a globally integrated financial system. Although greater financial integration can complicate the management of domestic financial conditions, it need not result in a loss of control. The chapter develops financial conditions indices that make it possible to compare a large set of advanced and emerging market economies. It finds that global financial conditions account for 20 to 40 percent of the variation in countries' domestic financial conditions, with notable differences among economies. The importance of this global factor does not, however, seem to have increased much over the past two decades.

Despite the significant role of global financial shocks, countries seem to be able to influence their own financial conditions to achieve domestic objectives—specifically, through monetary policy. But because domestic financial conditions react strongly and rapidly to global financial shocks, countries may find it difficult to implement timely policy responses. Emerging market economies, which are more sensitive to global financial conditions, should prepare for tighter external financial conditions. Governments can promote domestic financial deepening to enhance resilience to global financial shocks. In particular, developing a local investor base, as well as fostering greater equity- and bond-market depth and liquidity, can help dampen the impact of such shocks.

IMF EXECUTIVE BOARD DISCUSSION SUMMARY

The following remarks were made by the Chair at the conclusion of the Executive Board's discussion of the Fiscal Monitor, Global Financial Stability Report, *and* World Economic Outlook *on April 4, 2017.*

Executive Directors broadly shared the assessment of global economic prospects and risks. They welcomed the positive developments since the second half of 2016: global economic activity has accelerated, headline inflation has generally risen following a rebound in commodity prices, and financial market sentiment has strengthened. Global growth is expected to pick up further in 2017–18, reflecting a stronger-than-expected recovery in many advanced economies and projected higher growth in many emerging market and developing economies, including from improved conditions in several commodity exporters. However, growth momentum is still modest and downside risks continue to dominate, with heightened policy uncertainty and persistent structural headwinds. Directors underscored the importance of using all policy tools at the national level and strengthening multilateral cooperative efforts to sustain a stronger recovery, ward off downside risks, safeguard hard-won gains in global integration and financial stability, and promote inclusion.

Directors noted that the balance of risks remain tilted to the downside, especially over the medium term. In advanced economies, while the ongoing cyclical recovery is encouraging, output remains below potential and unemployment above precrisis levels in many countries. Population aging, low labor productivity growth, and crisis legacies are weighing on growth potential. In emerging market and developing economies, medium-term prospects are closely linked to developments in commodity markets, global financial conditions, the ongoing economic transition in China, and progress in resolving domestic imbalances and structural challenges in some economies.

Directors observed that elevated political and policy uncertainties in many parts of the world pose difficult challenges to the economic outlook and financial stability. They cited, among other things, faster-than-expected normalization of interest rates; a rollback of financial regulation, which could spur excessive risk taking; and a potential rise in protectionist and inward-looking policies.

Against this backdrop, Directors emphasized the need for comprehensive, consistent, and well-communicated policy actions to achieve strong, sustainable, and balanced growth; enhance resilience; and ensure that the benefits of economic integration and technological progress are shared more widely. Policy priorities vary across individual economies depending on cyclical positions, structural challenges, and vulnerabilities facing them. Multilateral cooperation is as essential as ever to complement national efforts as well as tackle common challenges, including preserving a rules-based, open trading system; ensuring a level playing field in international taxation; and strengthening the global financial safety net. Multilateral efforts are also needed to address the withdrawal of correspondent banking relationships and the refugee crisis. Both deficit and surplus countries should implement appropriate policies to reduce persistent global excess imbalances.

Directors agreed that a common challenge across advanced economies is to boost potential output, through fiscal and structural reforms that target country-specific priorities, including to upgrade public infrastructure where needed; improve labor force participation and skills; eliminate product market distortions; and reform corporate income taxation to promote private investment, research and development, and resource reallocation to productive areas. Resisting a retreat from global economic integration must also be part of the agenda to secure strong, sustainable global growth.

Directors saw a need to tackle the adverse side effects of technological change and trade integration with appropriate policies. In this context, they noted the staff's finding that technological progress appears to be the main factor explaining the decline

in labor income share in advanced economies, while trade integration—which has contributed to significant improvements in living standards and poverty reduction around the world—seems to be the dominant driver in emerging market economies. Directors stressed that the design of inclusive fiscal policies, such as transfer and tax instruments, should strike the right balance between promoting redistribution and maintaining incentives to invest and work. They also emphasized the importance of improving education, training, health services, social insurance, and pension systems. In some cases, active labor market policies could be an effective tool in the short term.

Directors agreed that strengthening the recovery remains a priority in many economies, requiring support from both monetary and fiscal policies, combined with growth-enhancing structural reforms. Where core inflation is persistently low and/or the risk of deflation remains tangible, unconventional monetary policies remain appropriate to support economic activity and lift inflation expectations, while their potential negative consequences on financial stability should be closely monitored. Fiscal policy can play an important role, particularly when monetary policy has become less effective. Directors agreed that, as a general principle, fiscal policy should be countercyclical, be growth friendly, and promote inclusion, anchored in a credible medium-term framework that ensures debt sustainability. Depending on country-specific circumstances in terms of economic slack, fiscal space, and debt levels, policy choices range from discretionary fiscal support to budget recomposition and rebuilding of fiscal buffers.

Directors concurred that, while emerging market and developing economies can retain influence over their domestic financial conditions, many could face elevated risks that arise from external negative spillovers, including a sudden reversal of market sentiment and sharp volatility in capital flows and exchange rates. Directors urged policymakers in these countries to be prepared for less favorable external conditions. Specifically, it will be critical to maintain sound policies and strong frameworks, including exchange rate flexibility and a robust macroprudential toolkit, while capital flow management measures may be used temporarily as warranted, though not as a substitute for warranted macroeconomic adjustment. For many countries, priorities include proactively monitoring vulnerabilities and addressing weaknesses in the corporate and banking sectors, improving corporate governance, and reducing infrastructure bottlenecks and barriers to entry. These should be complemented by measures to enhance resilience, such as developing a local investor base, fostering depth and liquidity in the equity and bond markets, and upgrading the tax system to promote efficient use of resources.

Directors stressed that solidifying improvements in financial stability and market expectations requires concerted efforts across countries. In the United States, where tax reform and financial deregulation could have a significant impact on the financial and corporate sectors globally, authorities should be vigilant to the increase in leverage and deterioration in credit quality and should take preemptive measures against excessive risk taking. In Europe, where important progress has been achieved, further efforts are still needed to adjust bank business models, facilitate the disposal of nonperforming loans, and remove structural impediments to bank profitability. In China, where major reforms to the financial system are taking place, special attention should be paid to the rapid growth in assets among smaller banks, the increasing reliance on wholesale funding, and the close interconnections between shadow products and interbank markets. At the global level, completing the regulatory reform agenda remains important, and a rollback of regulatory standards should be resisted.

Directors observed that commodity-exporting low-income developing countries have faced a difficult adjustment process since the commodity cycle turned in 2014. In light of rising debt and weaker external positions in several of these economies, Directors called for intensified policy efforts to mobilize revenue, improve tax administration, enhance spending efficiency, and contain the buildup of debt. For many diversified countries, the priorities are to build fiscal buffers while growth remains relatively strong and to achieve a better balance between meeting social and developmental needs and securing debt sustainability. A common challenge across all low-income developing countries is to maintain progress toward attaining their sustainable development goals.

CHAPTER 1

GETTING THE POLICY MIX RIGHT

Financial Stability Overview

Financial stability has improved since the October 2016 Global Financial Stability Report *(GFSR). Growth is gaining momentum and reducing macroeconomic risks, rekindling hopes for reflation. Rising equity prices and steeper yield curves have mitigated some of the negative side effects of low interest rates for banks and insurance companies. Emerging market risks remain elevated but unchanged, as recovering commodity prices and modest deleveraging in some corporate sectors are offset by higher external financing risks and rising financial vulnerabilities in China. Despite these improvements, there are new downside risks and uncertainties around the policy outlook. A key risk is that U.S. policy imbalances could lead to tighter-than-expected financial conditions and a rise in volatility and risk aversion. A global shift toward protectionism could adversely affect trade and global growth. Thus, anchoring stability will depend heavily on policy choices at the national and global levels—it is crucial to get the policy mix right.*

Financial Stability Is Advancing

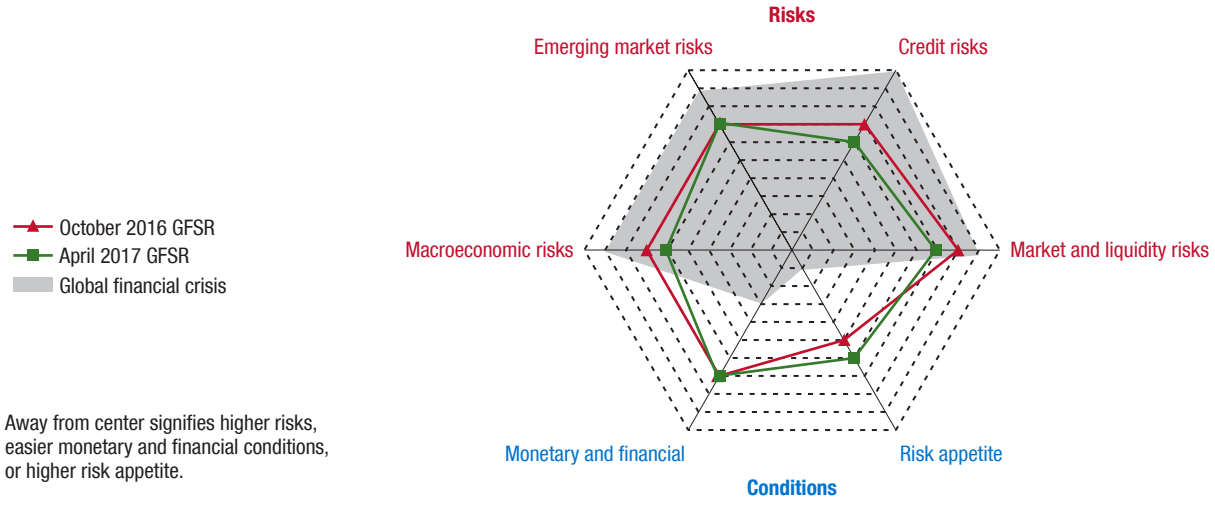
Better-than-expected incoming data and gathering growth momentum, as outlined in the April 2017 *World Economic Outlook* (WEO), have reduced near-term *macroeconomic risks* (Figures 1.1 and 1.2). Hopes for reflation have risen, as *monetary and financial conditions* remain highly accommodative, and anticipated U.S. fiscal measures and other reforms are expected to bolster growth. Reduced concerns about economic and financial stagnation have led to a shift in consensus and market-implied expectations toward higher growth, inflation, and long-term interest rates. Reflation expectations have taken hold across advanced economies (Figure 1.3).

Against this stronger economic backdrop, *risk appetite* has increased, as reflected in more buoyant investor confidence (Figure 1.2, panel 5). *Market and liquidity risks* have eased from elevated levels as risk premiums have fallen and volatility remains subdued. These trends in market indicators have been a global phenomenon, starting last September and accelerating following the U.S. elections (Figure 1.3, panel 3). Expectations for policy stimulus have also contributed to a stronger dollar and higher nominal and real U.S. Treasury security yields, spilling over to other advanced economy bond markets. Steeper yield curves have helped banks enhance profitability, while tighter corporate bond spreads, low rates, and ample market access have reduced refinancing risks, leading to a reduction in *credit risks*. Although emerging market economies have continued to enhance their resilience, higher inflation volatility in some countries and rising financial vulnerabilities in China have left *emerging market risks* unchanged.

Looking ahead, U.S. policy proposals under discussion aim to increase business confidence and investment, and the nonfinancial corporate sector is well positioned to benefit. But rising corporate leverage may challenge the capacity of some firms to expand investment without increasing stability risks. Growing signs of stretched valuations and the outperformance of certain sectors exposed to potential fiscal stimulus measures raise the risk that valuations may reflect overestimations of the potential benefits from policy initiatives and underestimations of downside risks (Figure 1.4). Policies should aim to enhance the effectiveness of proposed measures while safeguarding against the excesses of financial risk and market stability. These trade-offs and policies are examined in the section "Is the U.S. Corporate Sector Ready to Accelerate Expansion—Safely?"

Prepared by staff from the Monetary and Capital Markets Department (in consultation with other departments): Peter Dattels *(Deputy Director),* Matthew Jones *(Division Chief)*, Paul Hiebert *(Advisor)*, Ali Al-Eyd *(Deputy Division Chief)*, Will Kerry *(Deputy Division Chief)*, Sergei Antoshin, Magally Bernal, John Caparusso, Sally Chen, Yingyuan Chen, Fabio Cortes, Dimitris Drakopoulos, Martin Edmonds, Jesse Eiseman, Jennifer Elliott, Rohit Goel, Thomas Harjes, Sanjay Hazarika, Geoffrey Heenan, Dyna Heng, Henry Hoyle, Nigel Jenkinson, David Jones, Robin Koepke, Tak Yan Daniel Law, Yang Li, Lilit Makaryan, Rebecca McCaughrin, Aditya Narain, Vladimir Pillonca, Thomas Piontek, Luca Sanfilippo, Juan Solé, Ilan Solot, Narayan Suryakumar, Francis Vitek, and Jeffrey Williams.

Figure 1.1. Global Financial Stability Map: Risks and Conditions



Source: IMF staff estimates.
Note: The shaded region shows the global financial crisis as reflected in the stability map of the April 2009 *Global Financial Stability Report* (GFSR).

European bank equity prices have risen on optimism about a cyclical upturn in the economy and some further steps toward resolving weak banks. However, a cyclical recovery is unlikely to be sufficient to restore the profitability of persistently weak banks, and more needs to be done to improve resilience. The system-wide structural impediments—characterized by operational inefficiencies, weak business models, inefficient allocation of credit, excess capacity, and a large legacy of bad debt—pose challenges, particularly for domestically oriented banks. Large international banks are also affected by these system-wide challenges, and unless these impediments are removed, business model restructuring alone is likely to be insufficient. More systematic and comprehensive policies are needed to address these profitability and legacy challenges and to reduce financial stability risks, as discussed in the section "European Banking Systems: Addressing Structural Challenges."

Policy Uncertainty Is a Key Downside Risk

Despite these improvements in financial stability, elevated political and policy uncertainty pose significant challenges. In the United States, policies could increase fiscal imbalances and raise global risk premiums (see the April 2017 WEO and *Fiscal Monitor*). Such an outcome could generate negative spillovers to emerging markets, reigniting capital outflows and raising credit and funding risks for banks as the external environment deteriorates, which would expose vulnerabilities (Box 1.1). A shift toward protectionist policies in advanced economies could adversely affect global trade and growth, capital flows, and market sentiment, resulting in adverse spillovers to emerging markets. Many emerging market economies would face rising vulnerabilities in their weakest banks as a result of asset quality and provisioning challenges following long credit booms that facilitated rising corporate sector leverage. Emerging market resilience is assessed against this increasingly uncertain global policy mix in the section "Emerging Market Economies Face Trying Times in Global Markets."

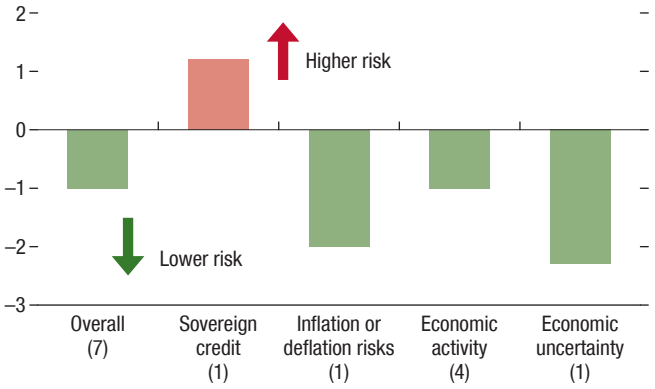
Getting the Policy Mix Right

Given these challenges, securing and building on improvements in financial stability and validating optimistic market expectations will require concerted and careful efforts by policymakers at the national and global levels. Policymakers need to adjust the policy mix to deliver a stronger path for long-term and inclusive growth while avoiding politically expedient but ultimately counterproductive inward-looking policies. Furthermore, the potential for a broad rollback of financial regulations—or a loss of global cooperation—could undermine hard-won gains in financial stability (Box 1.2).

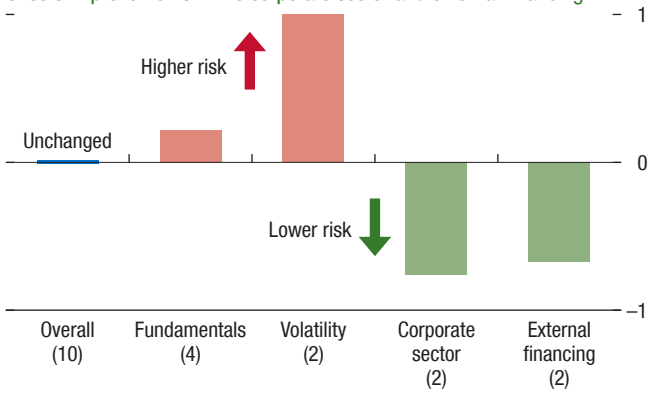
Figure 1.2. Global Financial Stability Map: Assessment of Risks and Conditions

(Notch changes since the October 2016 Global Financial Stability Report*)*

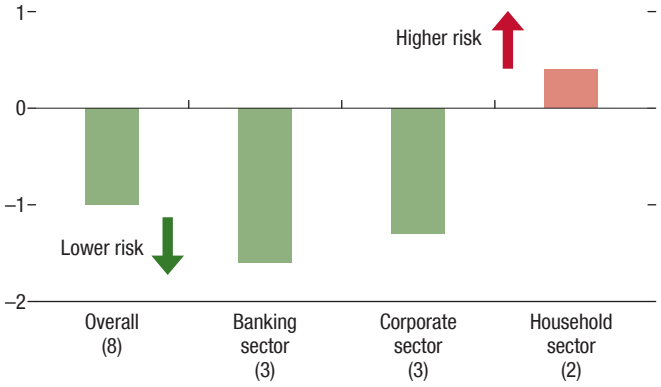
1. Macroeconomic risks have declined, driven by improving economic activity and lower inflation risks.



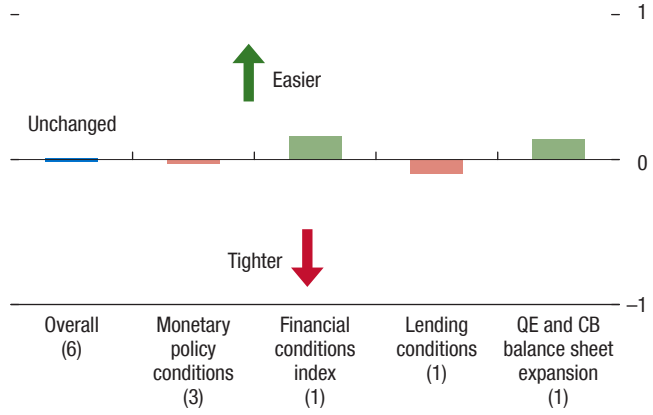
2. Emerging market risks remain elevated, as higher inflation volatility offsets improvements in the corporate sector and external financing.



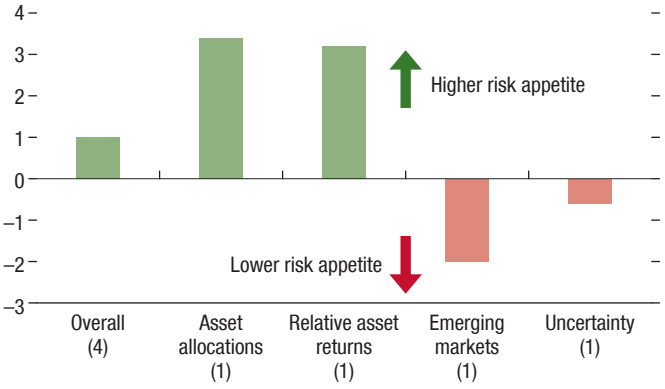
3. Credit risks have declined amid improvement in banks and the corporate sector.



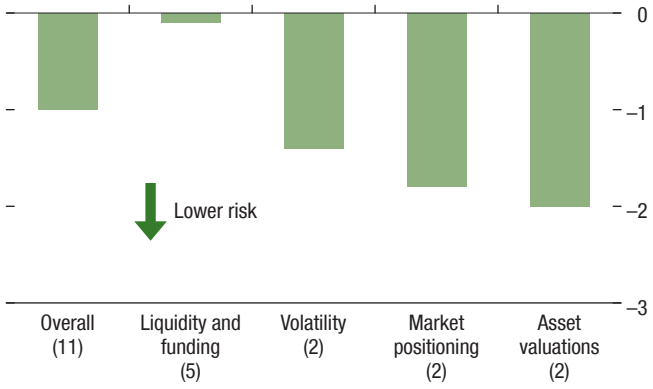
4. Monetary and financial conditions are unchanged, as tighter monetary policies are offset by easier financial conditions.



5. Risk appetite has strengthened as a result of improved confidence and gains in risk assets.



6. Market and liquidity risks have moderated from an elevated level against the backdrop of better liquidity conditions.



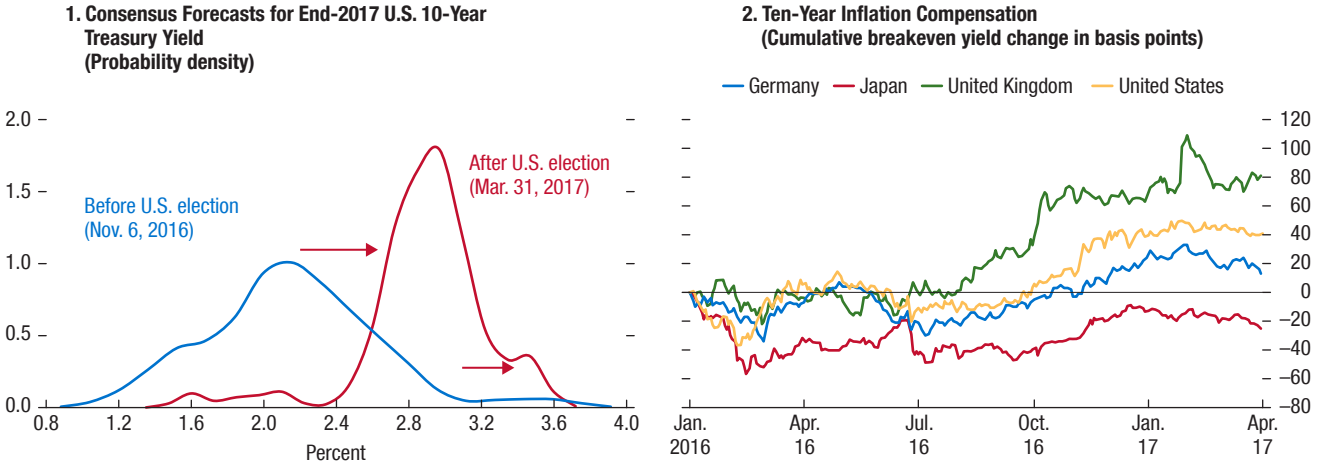
Source: IMF staff estimates.

Note: Changes in risks and conditions are based on a range of indicators, complemented by 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 in parentheses next to each category on the *x*-axis indicates the number of individual indicators within each subcategory of risks and conditions. For lending conditions, positive values represent a slower pace of tightening or faster easing. CB = central bank; QE = quantitative easing.

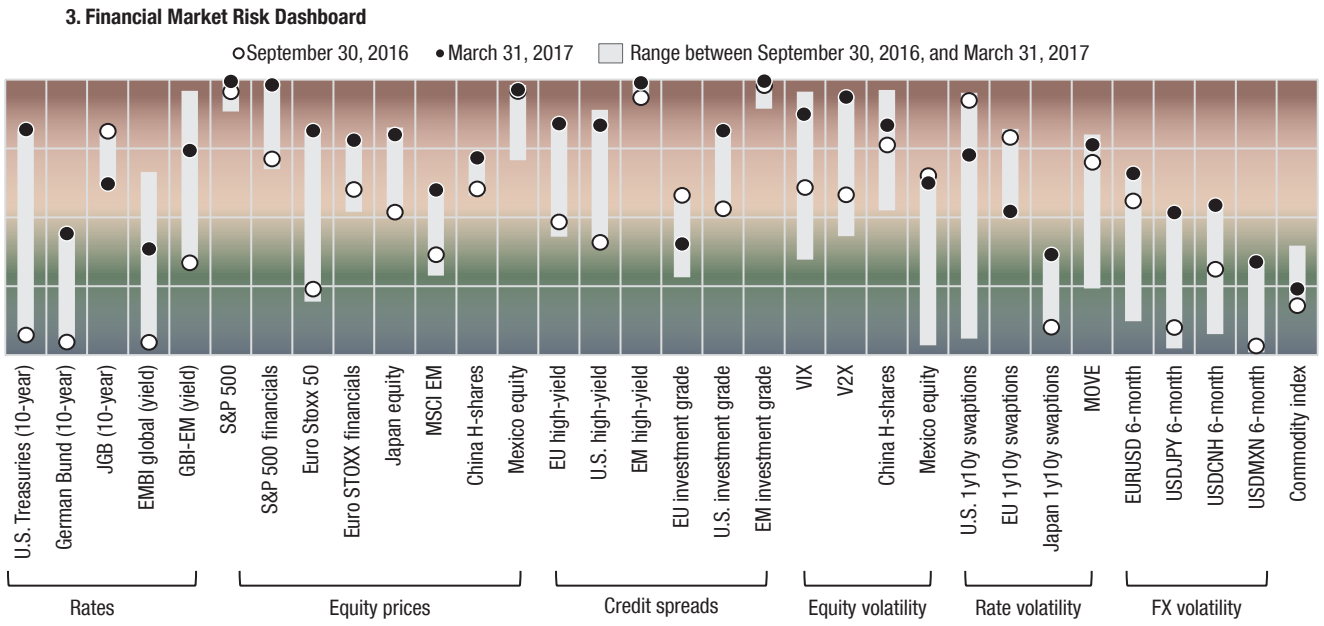
Figure 1.3. Reflation and Market Optimism

Market expectations for the U.S. economy and monetary policy normalization have improved ...

... and hopes are rising for reflation across advanced economies ...



... generating market optimism and a compression in volatility across a number of global markets.



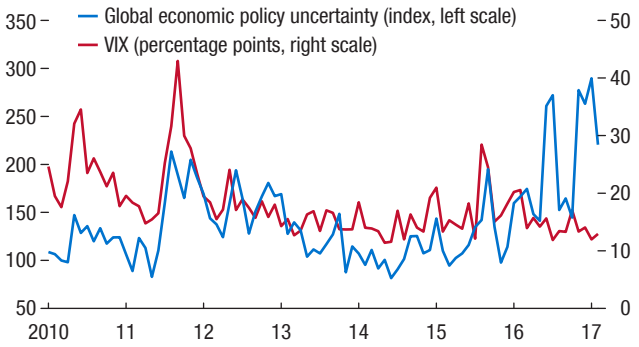
Sources: Bloomberg L.P.; Consensus Economics; and IMF staff estimates.
Note: In panel 3, each marker is a 30-day moving average of daily percentile rank in relation to the asset's three-year history. Closer to red represents higher prices and interest rates and lower spreads and volatility, and closer to blue is vice versa. EM = emerging market; FX = foreign exchange; GBI = Government Bond Index; JGB = Japanese Government Bond; MOVE = Merrill Lynch Option Volatility Estimate (a yield curve-weighted index of the normalized implied volatility on one-month Treasury options); MSCI = Morgan Stanley Capital International; V2X = Dow Jones Euro STOXX 50 Volatility Index; VIX = Chicago Board Options Exchange Market Volatility Index.

Figure 1.4. Assessments of U.S. Equity Valuations

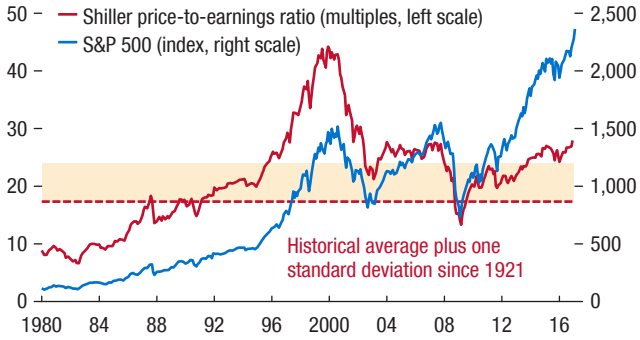
Despite greater policy uncertainty, implied volatility has declined to multiyear lows ...

... while U.S. equity valuations have become increasingly overvalued.

1. Policy Uncertainty and Implied Equity Volatility



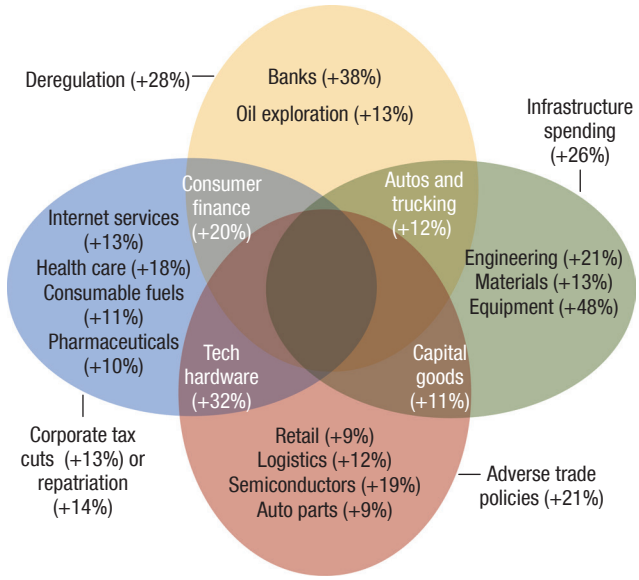
2. S&P 500 Index and Price-to-Earnings Ratio



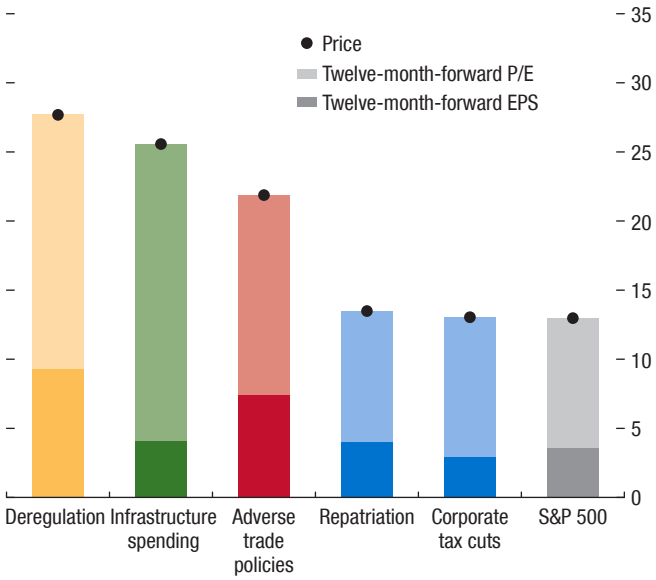
Some sectors have benefited disproportionately from the interplay of potential policies ...

... while expectations—not actual earnings—are driving valuations in sectors that would benefit from stimulus.

3. Performance of U.S. Equity Industry Subsectors (Percent change since U.S. election)



4. Valuation of U.S. Equities Exposed to Policy Shifts (Percent change since U.S. election)



Sources: Bloomberg L.P.; Haver Analytics; JPMorgan Chase & Co.; and IMF staff estimates.
Note: In panels 3 and 4, Corporate tax cuts = companies with high effective tax rates and domestic revenue exposures; Repatriation = companies with the largest total cash balances held by foreign subsidiaries; Adverse trade policies = trade-linked importers, outsourcers, and logistics firms; Infrastructure spending = firms that generate a significant portion of revenue from civil construction activities and revenue from within the United States; Deregulation = companies in sectors likely to experience regulatory relief, such as oil and gas, banks, consumer finance, and autos and trucking. EPS = earnings per share; P/E = price-to-earnings ratio; S&P = Standard and Poor's.

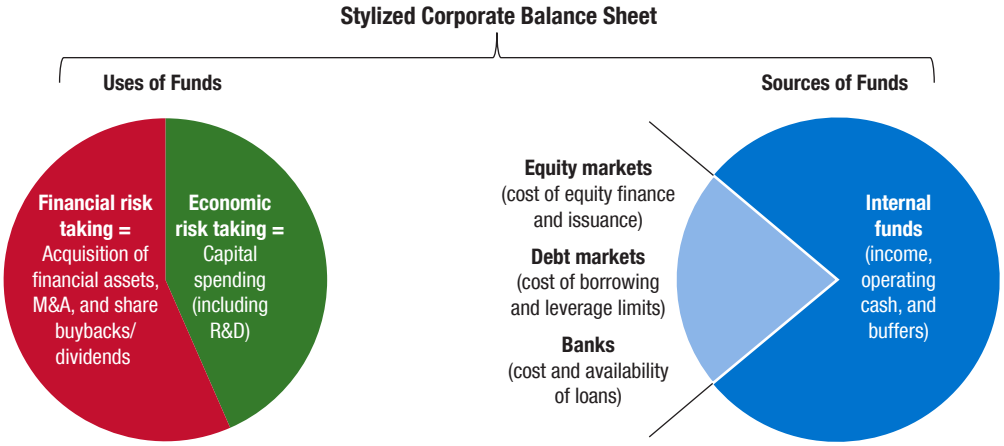
Figure 1.5. United States: Policies under Discussion and Financial Stability Risks

Key elements of policy stimulus proposals:

- **Corporate sector taxation**
  - –Potential reduction in corporate tax rate
  - –Interest deductibility/expensing investment
  - –Incentives for repatriation
- **Other** (infrastructure spending, deregulation, trade, and other policies)

Financial stability risks in the corporate sector:

- **Excessive financial risk taking**
- **Corporate leverage peaking**
- **Credit cycle maturing**
- **Heightened vulnerability to default risk**



Sources: S&P 500; and IMF staff.
Note: For more on the depicted breakdown of corporate balance sheets, see Figure 1.7, panel 5. Financial measures such as M&A and net payouts are included as financial risk taking. M&A = mergers and acquisitions; R&D = research and development.

Is the U.S. Corporate Sector Ready to Accelerate Expansion—Safely?

U.S. policies under discussion aim to increase economic growth. Healthy corporate balance sheets will be essential to facilitate the necessary increase in economic risk taking. Although the corporate sector has considerable balance sheet capacity to support an expansion, overall corporate leverage is elevated, leaving some segments vulnerable to higher financing costs. The sectors responsible for the most capital spending in recent years, such as energy, real estate, and utilities, may be challenged to expand investment without resorting to further debt financing. Policies should maximize the economic effectiveness of proposed measures while safeguarding against excesses of financial risk taking that could undermine financial stability.

U.S. Policies under Discussion and Economic Risk Taking

Policies under discussion by the new U.S. administration in the areas of tax reform and deregulation could significantly boost economic growth. Risk assets have rallied, and financial market sentiment has improved in anticipation of the stimulative elements of the policies being discussed. Such reforms could lead to a direct boost to the cash flow of firms and an indirect boost as a result of more favorable financial market sentiment.

The U.S. corporate sector will be a central conduit for such policies to gain traction and stimulate economic activity (Figure 1.5). Tax policy reforms, in particular, harbor the potential to boost *economic risk taking*—in the form of corporate capital spending—in two key ways. First, a cut in the statutory tax rate for corporations would directly boost corporate internal funds. The cash flow boost from such a tax cut could be amplified by policies to encourage the repatriation of foreign earnings. Second, eliminating interest deductibility of debt and immediate expensing capital expenditure could reduce the debt bias inherent in corporate financing decisions, putting equity finance on a more equal footing with debt financing.

Taken together, tax policy reforms under discussion could lay the groundwork for the corporate sector to support higher economic growth. Surveys capturing business sentiment have jumped to highs not seen in more than a decade (Figure 1.6, panel 1), suggesting an expected rise in corporate capital spending. This could help close a gap in corporate capital spending relative to higher historical growth by almost 2 percentage points of assets, or some $750 billion a year (Figure 1.6, panel 2).

Is the Corporate Sector Well Poised to Expand Economic Risk Taking?

One of the aims of tax policy stimulus is to help firms attain higher levels of capital expenditure. This transmission of policy stimulus through corporate balance sheets can be traced out in a scenario in which highly productive fiscal policy stimulus generates strong economic growth and boosts corporate cash flow, but with only a modest impact on interest rates.[1] Using sector level data, an illustrative exercise can provide estimates of three essential elements of the policy measures under discussion:

- A boost to operating cash flow from a 10 percentage point reduction in effective corporate tax rates, to proxy a *lower statutory corporate tax rate,* can be envisioned against the cash flow needed to reach the pre-2000 level of capital spending.
- The combined effect of expensing new capital expenditures and removing the tax deductibility of interest expenses.[2]
- The potential for a one-off *repatriation of retained foreign earnings,* including liquid funds held abroad.

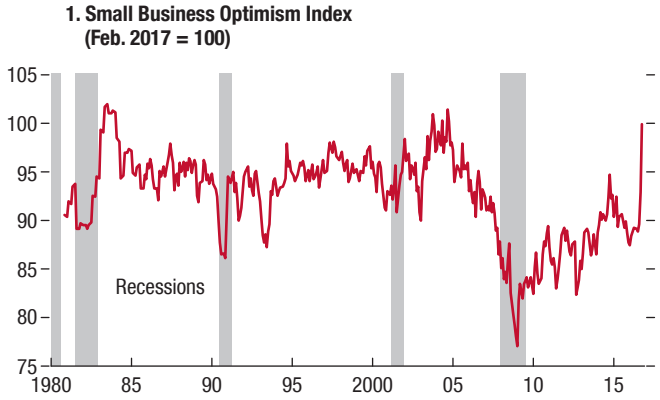
Results from these illustrative exercises suggest that with a benign policy mix, the nonfinancial corporate sector is ready to absorb stimulus and significantly boost capital expenditure. A cut to the *statutory tax rate* could provide a considerable cash flow impetus to Standard & Poor's (S&P) 500 firms, amounting to more than $100 billion a year, atop existing cash flow of more than $1 trillion. These tax-related windfalls could cover higher capital spending in seven of the ten main S&P 500 nonfinancial sectors (Figure 1.7, panel 1). The combined effect of *expensing investment* and the removal of *interest deductibility* would further increase cash flow in capital-intensive sectors—such as energy, real estate, and utilities (Figure 1.7, panel 2). *Repatriating liquid assets* held abroad by U.S. companies would also benefit the information technology and health care sectors, where 60 percent of the $2.2 trillion in unremitted foreign earnings held abroad is concentrated (Figure 1.7, panel 3).

[1]For more on scenario design, see Chapter 1, Scenario Box 1.1, of the April 2017 WEO. See also Chapter 1 of the April 2017 *Fiscal Monitor*.

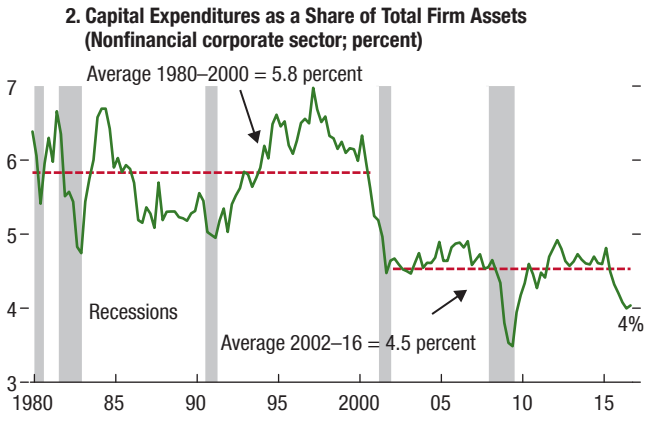
[2]Calculations assume (1) removal of the tax deductibility of interest on new debt—given that it will take some years for the policy to affect the whole stock of debt, it is approximated by taking half of the product of effective interest expenses and the statutory tax rate; and (2) full expensing of new capital expenditures, computed as an immediate tax gain on deductibility of new capital expenditures partly offset by lost tax gains on depreciation of these expenditures in later years.

Figure 1.6. United States: Business Confidence and Economic Risk Taking

Business optimism has spiked ...



... as policy signals favor a boost to capital expenditure.

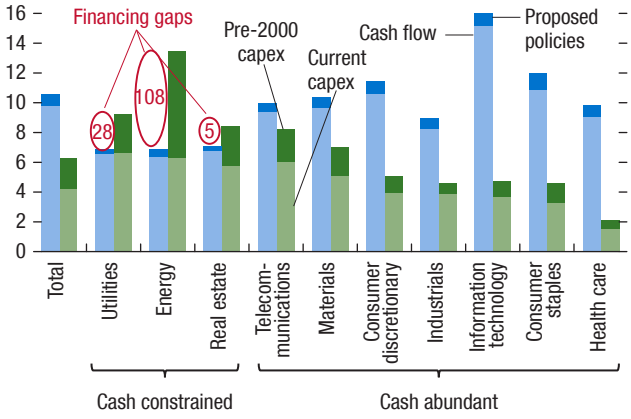


Sources: Federal Reserve; National Bureau of Economic Research; National Federation of Independent Business; and IMF staff estimates.
Note: Shaded areas indicate economic recessions.

Figure 1.7. Policy Stimulus and Corporate Balance Sheets

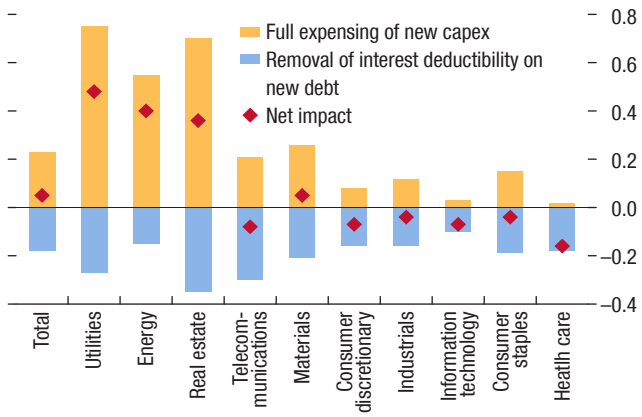
A tax cut of 10 percent could support higher investment but financing gaps remain.

1. Cash Flow versus Capital Expenditure for S&P 500 Firms, by Sector (Percent of assets)



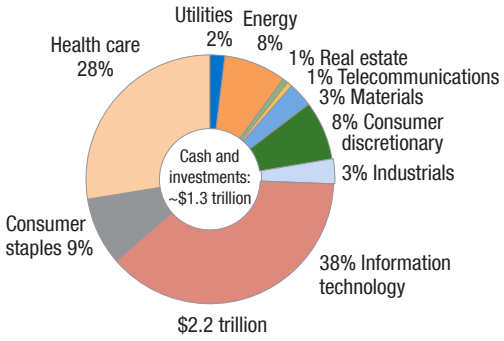
Additional tax measures may provide some benefit for capital intensive sectors.

2. Effects on Operating Cash Flows from Additional Tax Proposals on Deductibility and Expensing (Percent of assets)



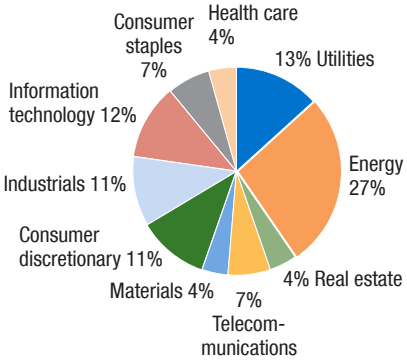
Cash windfalls from repatriation would likely accrue to cash abundant sectors.

3. Unrepatriated Income, by Sector (Total in U.S. dollars, sectoral shares in percent of total)



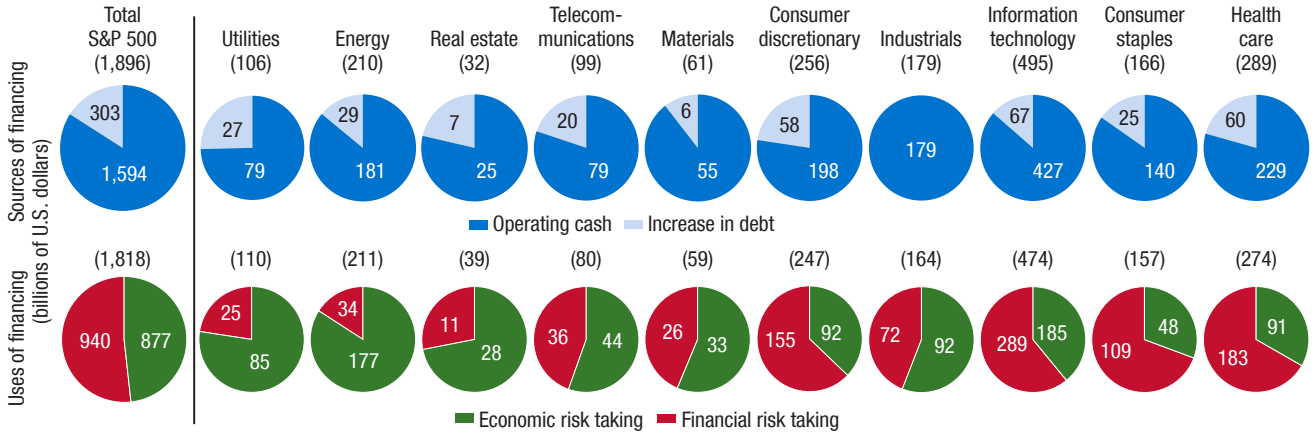
Three cash constrained sectors account for almost half of capital expenditure.

4. Capital Expenditures by S&P 500 Firms, by Sector (Share of total assets, 2012–16 average)



Debt has been used to finance both economic and financial risk taking.

5. Cash Flow Decomposition for S&P 500 Firms, by Sector (2012–16 average)



Sources: Bloomberg L.P.; S&P 500 company reports; Securities and Exchange Commission; and IMF staff estimates.
Note: See Figure 1.5 for more on the concepts underlying charts in panel 5. Capex = capital expenditures; S&P = Standard and Poor's.

While positive effects of tax stimulus on cash flow could be considerable, they would be insufficient for firms in a number of cash-constrained sectors to finance increased capital spending. These sectors—energy, utilities, and real estate—are particularly important as they have contributed to nearly half of overall capital spending among S&P 500 firms over the past few years (Figure 1.7, panel 4). The cash flow boost from a cut to the statutory tax rate may be insufficient to spur the nearly $140 billion needed to boost capital expenditure to the level prevailing before 2000 (Figure 1.7, panel 1). Adding in changes to tax treatments of interest expense and capital expenditures, along with repatriation, would attenuate—but likely not eliminate—financing needs for these sectors.

Perhaps more important, cash flow from tax reforms may accrue mainly to sectors that have engaged in substantial financial risk taking. Such risk taking is associated with intermittent large destabilizing swings in the financial system over the past few decades (Figure 1.11). It has averaged $940 billion a year over the past three years for S&P 500 firms, or more than half of free corporate cash flow (Figure 1.7, panel 5). At the sectoral level, such spending has been strongest in the health care and information technology sectors—where purchases of financial assets, mergers and acquisitions, and net payouts have been capturing more than half of free resources since 2012—amounting collectively to nearly $500 billion a year.

Where Are the U.S. Corporate Sector's Vulnerabilities?

The health of the corporate sector will be central not only to the economic effectiveness of fiscal policy reforms but also for financial stability (Figure 1.5). While U.S. corporate sector balance sheets are strong in aggregate, cash flow has tapered recently as corporate profits have come off peaks (Figure 1.8, panels 1 and 2).

The corporate sector has tended to favor debt financing, with $7.8 trillion in debt and other liabilities added since 2010 (Figure 1.8, panel 3). Bank lending to the corporate sector has continued to recover and could well rise further in response to more favorable market valuations (Figure 1.8, panel 4). In contrast, equity finance has traditionally been outstripped by share buybacks and has recently leveled off (Figure 1.8, panel 5). A drop in the cost of equity capital may stimulate equity financing, but it could coincide with higher corporate debt (Figure 1.8, panel 6)—particularly if additional share buybacks are financed through debt.

There has been a stronger reliance on debt financing as the credit cycle entered a mature phase. Corporate credit fundamentals have started to weaken (Figure 1.9, panel 1), creating conditions that have historically preceded a credit cycle downturn (Figure 1.9, panel 2). Asset quality—measured, for example, by the share of deals with weaker covenants—has deteriorated. At the same time, a rising share of rating downgrades suggests rising credit risks in a number of industries, including energy and related firms in the context of oil price adjustments and also in capital goods and health care.

Also consistent with this late stage in the credit cycle, corporate sector leverage has risen to elevated levels. Median net debt across S&P 500 firms—which collectively account for about one-third of the $36 trillion economy-wide corporate sector balance sheet—is close to a historic high of more than 1½ times earnings (Figure 1.9, panel 3). A look beyond the S&P 500, at a broader set of nearly 4,000 firms accounting for about half of the economy-wide corporate sector balance sheet, suggests a similar rise in leverage across almost all sectors to levels exceeding those prevailing just before the global financial crisis (Figure 1.9, panel 4). Leverage is uneven, though: the upward drift is limited by low debt in cash-rich sectors such as information technology, but debt is very high in the energy, real estate, and utilities sectors, ranging between four and six times earnings.

High Leverage Combined with Tighter Borrowing Conditions Could Affect Financial Stability

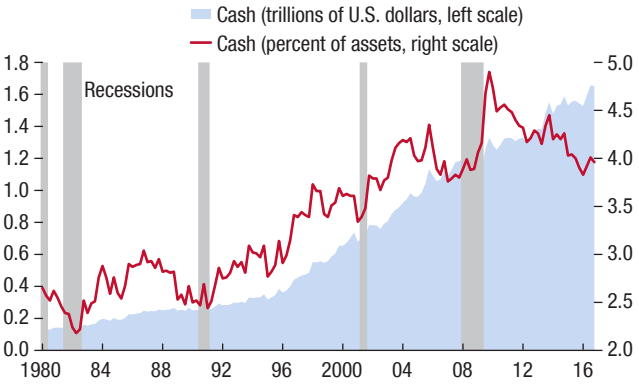
As leverage has risen, so too has the proportion of income devoted to debt servicing, notwithstanding low benchmark borrowing costs (Figure 1.10, panel 1). Although the absolute level of debt servicing as a proportion of income is low relative to what it was during the global financial crisis, the 4 percentage point rise has brought it to its highest level since 2010, which leaves firms vulnerable to tighter borrowing conditions. The average interest coverage ratio—a measure of the ability for current earnings to cover interest expenses—has fallen sharply over the past two years. Earnings have dropped to less than six times interest expense,

Figure 1.8. United States: Corporate Internal Funds and External Sources of Finance

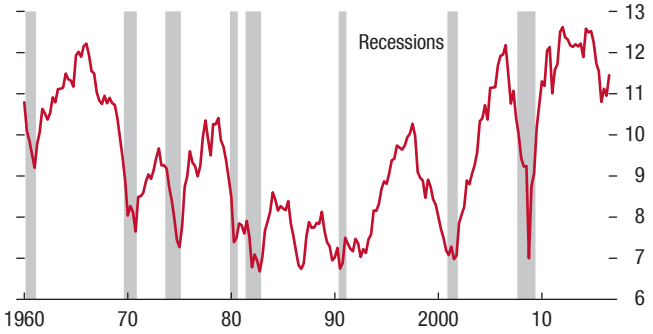
Corporate cash holdings are tapering ...

... as profits recede from a high level.

1. Corporate Cash Holdings on Balance Sheet



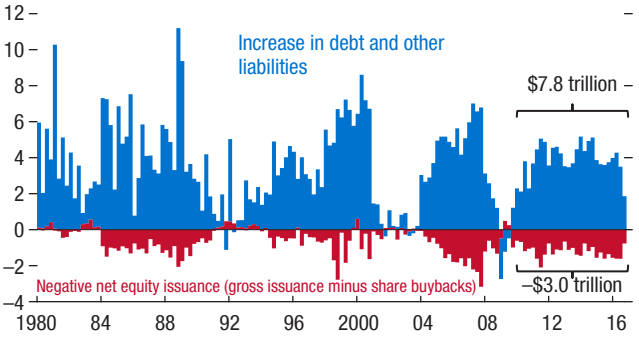
2. Corporate Profits (Percent of GDP)



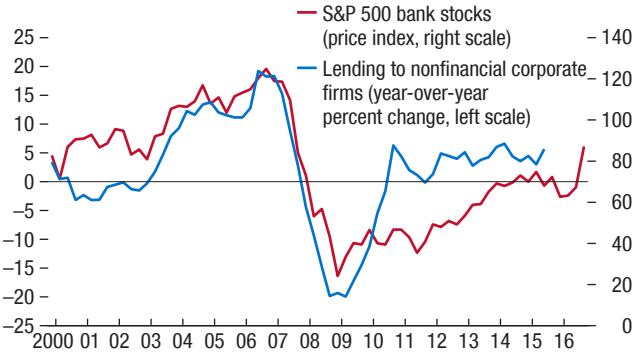
Net equity financing has been falling the past four decades, as debt finance has continued to rise.

A sharp improvement in bank equity valuations may portend stronger willingness to lend.

3. Corporate Liabilities and Net Equity Issuance (Percent of assets)



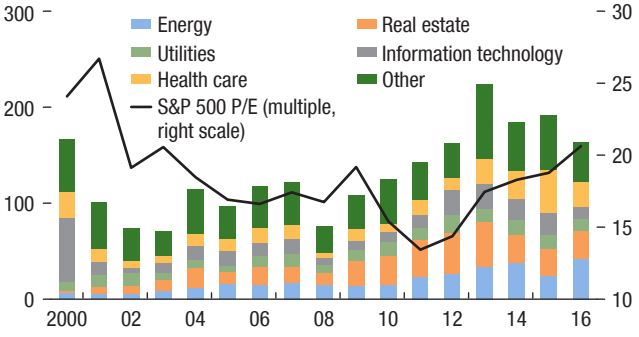
4. Bank Equities and Corporate Lending



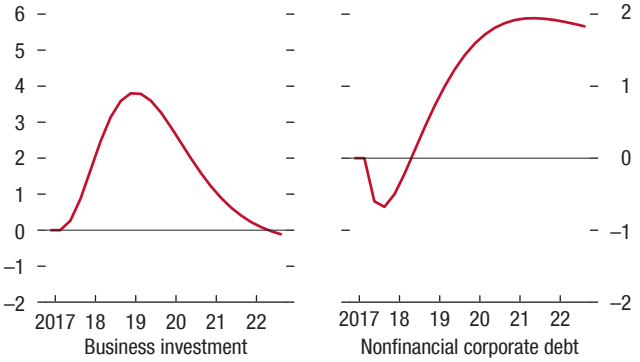
Gross equity issuance has abated, despite favorable valuations ...

... while a lower cost of equity capital could boost business investment (and, eventually, debt).

5. Corporate Sector Gross Equity Issuance (Billions of U.S. dollars, unless otherwise stated)



6. Illustrative Impacts of Improving Equity Sentiment (Percent deviation from baseline)

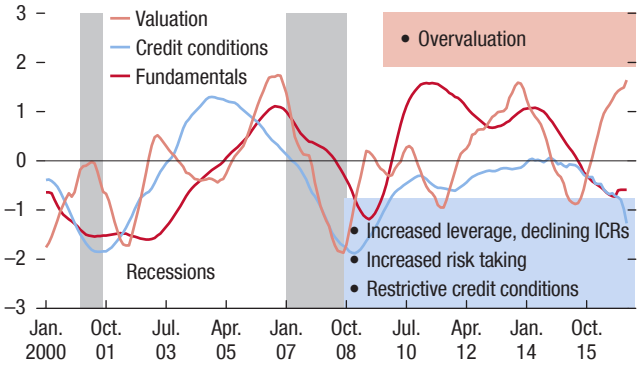


Sources: Bloomberg L.P.; Dealogic; Federal Reserve; Morgan Stanley Capital International; Standard and Poor's (S&P); Vitek 2017; and IMF staff estimates.
Note: In panel 4, the series for lending is lagged 12 months. Bank balance sheet improvements are modeled using an equivalent decrease in the share of bank capital devoted to lending, phased in over five years. Equity risk premium compression in panel 6 consists of a 10 percent increase in the real equity price, phased in over one year. Shaded areas represent economic recessions. P/E = price-to-earnings ratio.

Figure 1.9. Corporate Leverage and the Credit Cycle

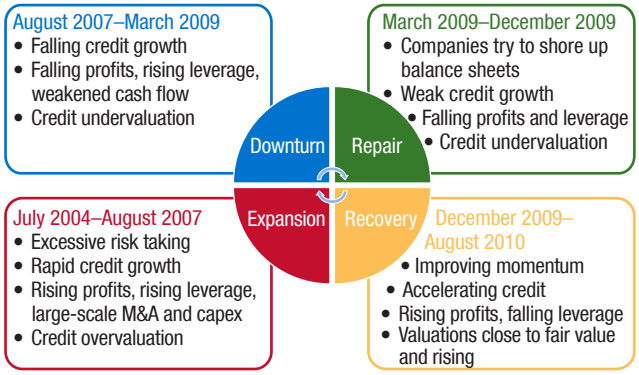
Deteriorating balance sheet fundamentals and credit conditions ...

1. Asset Valuations, Balance Sheet Fundamentals, and Credit Conditions (Unweighted average in percentile rank, normalized to zero)



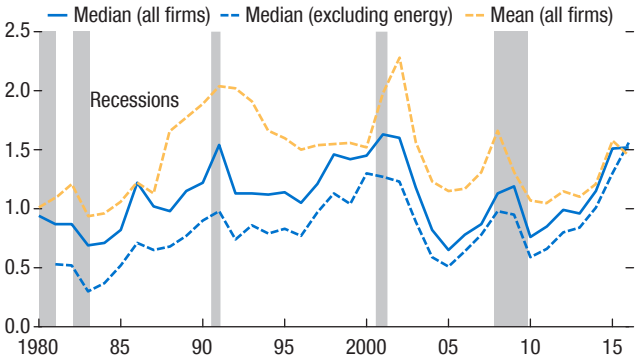
... signal a late stage of expansion in the credit cycle.

2. Stages of a Stylized Credit Cycle



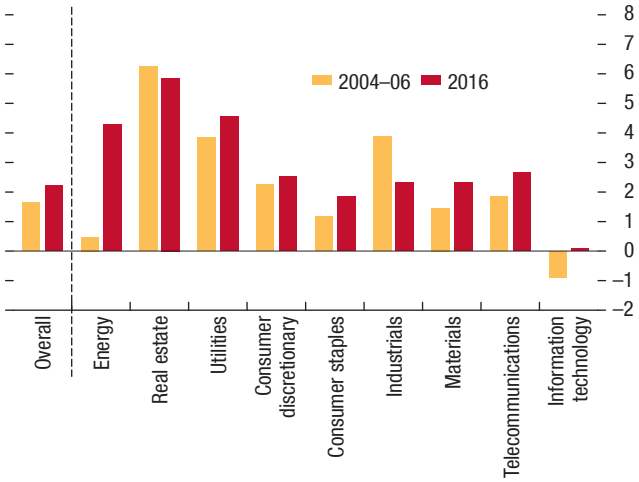
Median corporate leverage among big firms has grown steadily and is close to a historical peak.

3. Net Leverage of S&P 500 Companies (Ratio of net debt to EBITDA)



Eight out of ten sectors witness an increase in leverage across a broad set of firms.

4. Net Leverage by Sector (Ratio of net debt to EBITDA)

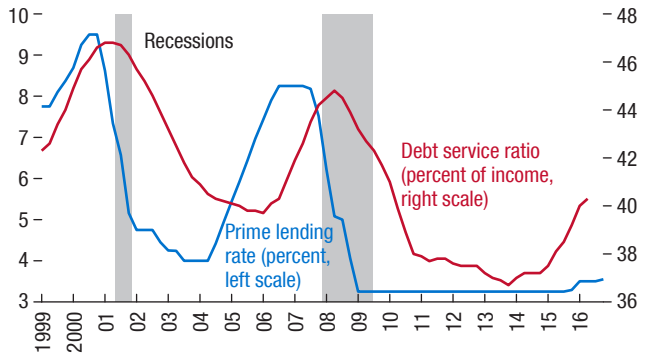


Sources: Bloomberg L.P.; National Bureau of Economic Research; S&P Capital IQ; Thomson Reuters Datastream; and IMF staff estimates.
Note: 2016 estimates refer to the first three quarters of the year, wherever full-year estimates are not available. Panel 1, Valuation = distress ratio, deviation in high-yield bond spreads from fair value. Fundamentals = capital expenditures, interest coverage, leverage, liquidity, profit margins. Credit conditions = bank credit, lending conditions, net bond issuance. Above zero represents an improvement in credit fundamentals (for example, high valuations, supportive credit conditions, rising profits, ample liquidity). Below zero represents a deterioration (for example, excessive risk taking, reduced access to credit, high leverage, diminishing profits, falling valuations) in fundamentals, credit conditions, and valuation. Shaded areas indicate economic recessions. Capex = capital expenditure; EBITDA = earnings before interest, taxes, depreciation, and amortization; ICR = interest coverage ratio; M&A = mergers and acquisitions; S&P = Standard & Poor's.

Figure 1.10. Debt Service, Interest Coverage Ratios, and Vulnerability to Higher Interest Rates

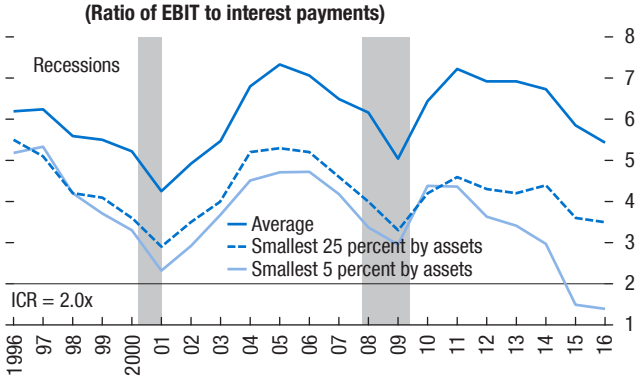
The debt service burden for the corporate sector as a whole has risen strikingly despite low rates.

1. Corporate Debt Service and Interest Rates



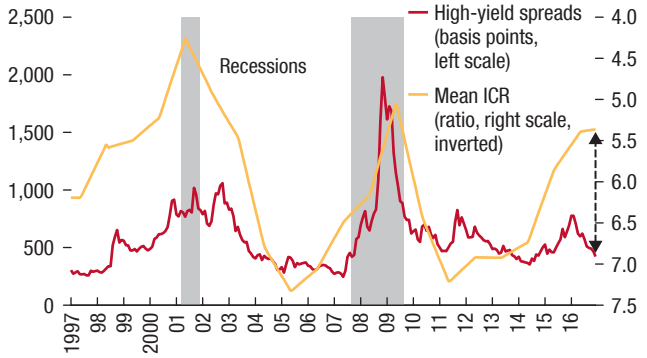
Interest coverage ratios have undergone a corresponding fall at the firm level, particularly for smaller companies.

2. Evolution of the Distribution of ICRs across Firms by Size (Ratio of EBIT to interest payments)



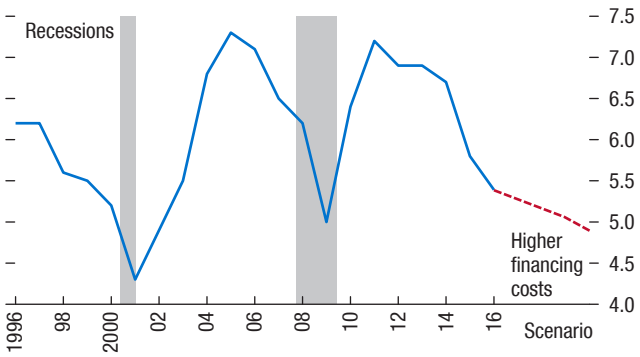
Market pricing of corporate risk has decoupled from the decline in interest coverage ratios.

3. High Yield Option-Adjusted Corporate Spread and Average Interest Coverage Ratios across Firms



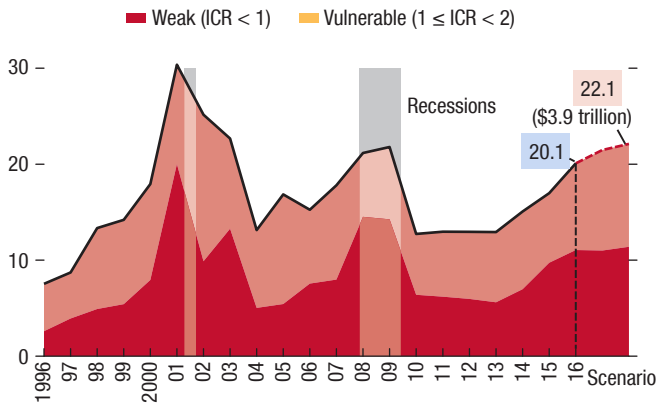
Higher financing costs could significantly weaken firms' interest coverage ratios ...

4. Average Interest Coverage Ratio (Ratio of EBIT to interest payments)



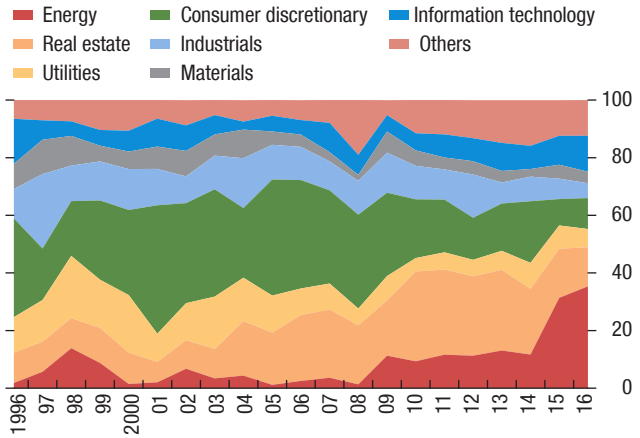
... resulting in a growing set of firms at risk of default.

5. Percentage of "Challenged" Firms (Percent of total assets)



The share of "challenged" firms has risen in the energy, real estate, and utilities sectors.

6. Evolution of "Challenged" Firms, by Sector (Share of total firms with ICR < 2)



Sources: Bank for International Settlements; Bloomberg L.P.; S&P Capital IQ; and IMF staff estimates.
Note: 2016 calculations reflect the first three quarters of the year, wherever full year estimates are not available. Shaded areas indicate economic recessions. EBIT = earnings before interest and taxes; ICR = interest coverage ratio.

close to the weakest multiple since the onset of the global financial crisis (Figure 1.10, panel 2). Historically, deterioration of the interest coverage ratio corresponds with eventual widening in credit spreads for risky corporate debt (Figure 1.10, panel 3). Declines in the interest coverage ratio have been concentrated mostly in smaller firms, which may have less access to capital market financing than their larger counterparts.

Under the adverse scenario in Scenario Box 1.1 of the WEO, an unproductive fiscal expansion could lead to a sharp rise in borrowing costs. Such a sharp rise in interest rates amid tepid earnings growth could further compromise the ability of firms to service their debt (Figure 1.10, panel 4).[3] Under this scenario, the combined assets of challenged firms could reach almost $4 trillion. The number of firms with very low interest coverage ratios—a common signal of distress—is already high: currently, firms accounting for 10 percent of corporate assets appear unable to meet interest expenses out of current earnings (Figure 1.10, panel 5). This figure doubles to 20 percent of corporate assets when considering firms that have slightly higher earnings cover for interest payments, and rises to 22 percent under the assumed interest rate rise.

The stark rise in the number of challenged firms has been mostly concentrated in the energy sector, partly as a result of oil price volatility over the past few years. But the proportion of challenged firms has broadened across such other industries as real estate and utilities. Together, these three industries currently account for about half of firms struggling to meet debt service obligations and higher borrowing costs (Figure 1.10, panel 6).

Policies Should Be Carefully Calibrated and Attuned to Stability Risks

Historical experience suggests that financial risk taking in the form of asset acquisition, mergers and acquisitions, and net payouts often follows tax policy changes (Figure 1.11). Tax cuts in the United States in the 1980s coincided with an increase in financial risk taking, abetted by a broad rollback of regulations. Similarly, a tax holiday for offshore unremitted profits in 2004, amid financial deregulation that started in the 1990s, was followed by a surge in financial risk taking. In general, increased financial risk taking is associated with pronounced leverage cycles that gradually build up and end abruptly in recessions, as for example in both 2001 and 2008.

Policymakers must balance the economic benefits of policy stimulus and tax reform against broader policy considerations and guard against financial stability risks. Authorities need to be vigilant to the increase in leverage and deteriorating credit quality. Tax measures now under discussion that reduce incentives for debt financing could help attenuate risks of a further buildup in leverage and may even encourage firms to unwind existing tax-advantaged debt. Existing leverage and a deterioration in interest coverage ratios may, nonetheless, still represent a risk. Tighter financial conditions could lead to distress for the weak tail of firms, with losses borne by banks, life insurers, mutual funds, pension funds, and overseas institutions.

To mitigate the financial stability risks, regulators should preemptively address any areas in which risk taking appears excessive. Additional financial prudential and supervisory action could be deployed should policy stimulus lead to an increase in debt-financed investment and a rise in medium-term corporate vulnerabilities, acknowledging lags and limits to scope.[4] The Comprehensive Capital Analysis and Review stress-testing exercise is already being used to identify where risks may have a meaningful impact on the balance sheets of systemic banks. A case can also be made for using stress testing to assess the risks to nonbank financial intermediary balance sheets from severe losses in nonfinancial corporate debt, taking into account likely associated liquidity strains and correlated risks in related sectors (such as commercial real estate).

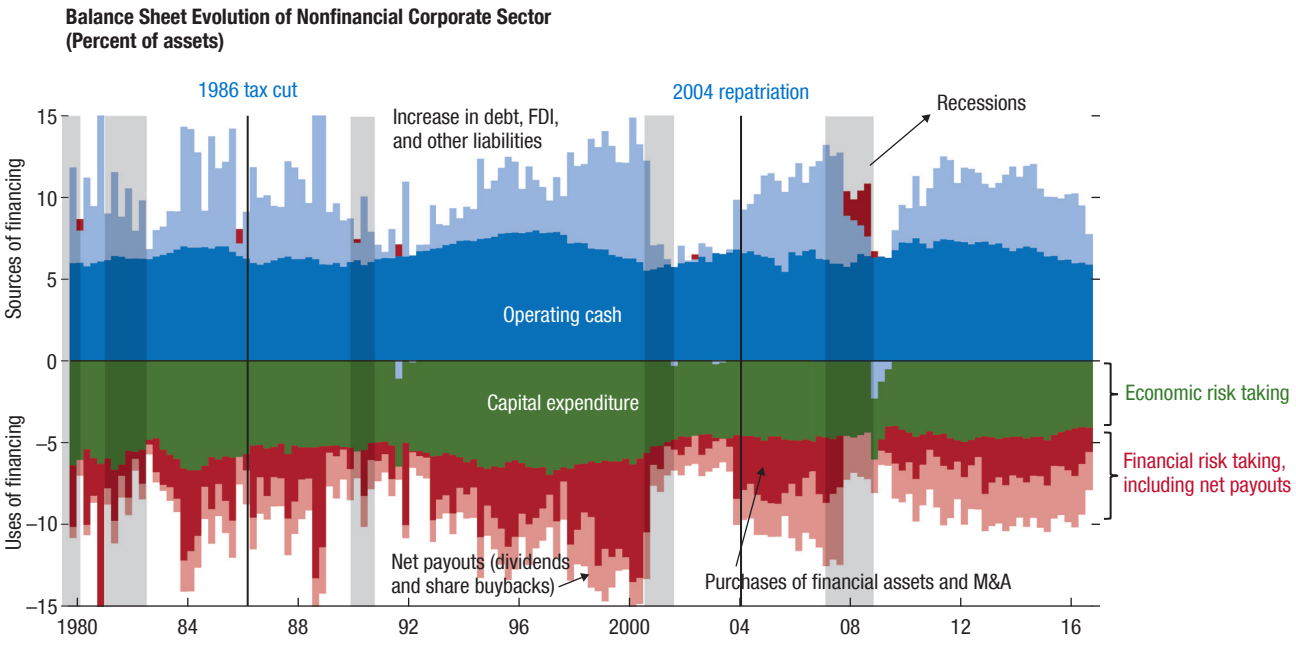
More generally, policymakers should resist efforts to weaken bank regulatory requirements that reduce resilience (Box 1.2). Although there is room to fine-tune existing regulations, policymakers should guard against wholesale dilution or backtracking on the important progress made in strengthening the

[3]Calculations capture partial sensitivity of the interest coverage ratio to an interest rate shock, based on a scenario with tighter financial conditions, assumed to pass through into higher effective interest rates based on an assumed loan maturity of five years. The number of firms considered in the analysis ranges from 1,800 to 4,000, depending on the availability of historical information from S&P Capital IQ data.

[4]For instance, after bank regulators instituted leverage caps in 2013, growth in leveraged lending eased, but more aggressive risk taking was evident in capital-market-based financing.

Figure 1.11. United States: A Retrospective on Economic versus Financial Risk Taking

Past corporate tax initiatives have been associated with a limited increase in economic risk taking.



Sources: Federal Reserve; and IMF staff estimates.
Note: Shaded areas indicate economic recessions. FDI = foreign direct investment; M&A = mergers and acquisitions.

resilience of the financial system, particularly at a time when balance sheet fundamentals are deteriorating for U.S. companies. The successful completion of the global regulatory reform agenda is vital to ensuring that the global financial system is safe and resilient and can continue to promote economic activity and growth.

Emerging Market Economies Face Trying Times in Global Markets

Emerging market economies have continued to enhance their resilience. Their macroeconomic outlook has improved due to stronger growth and lower corporate leverage, alongside prospects for positive growth spillovers from advanced economies. But overall financial stability risks remain elevated because political and policy uncertainty in advanced economies opens channels for negative spillovers. A sudden repricing of risk or a rise in protectionism could trigger capital outflows and hurt demand. This would exacerbate existing vulnerabilities in corporate sectors and raise risks in the weakest banking systems. To ensure resilience against an uncertain global policy mix, policymakers should continue to address corporate and bank vulnerabilities.

Emerging Market Economies: Resilience Tested

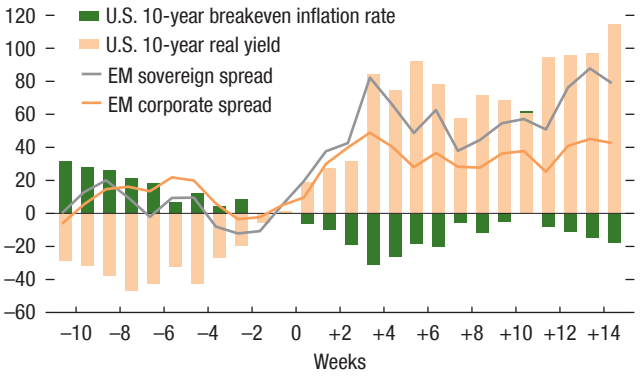
Faster Growth in Advanced Economies and Ongoing Adjustment in Emerging Market Economies Support Resilience

The world economy is gaining speed, boosting the appetite for risk, reinforcing the recovery in commodity prices, and supporting the rebound in emerging market economy asset prices. U.S. market interest rates have risen notably amid the improving outlook and expectations of fiscal stimulus and monetary tightening in the United States. The recent episode of rising rates has been marked by a combination of higher real yields and increased inflation compensation, portending stronger U.S. growth—in contrast to some previous periods of rising U.S. interest rates, such as during the 2013 taper tantrum. During that period, rising U.S. interest rates hit emerging market economies hard, particularly those with weak macroeconomic fundamentals (Figure 1.12, panels 1 and 2).

Figure 1.12. Emerging Market Economies: Asset Prices and Fundamentals

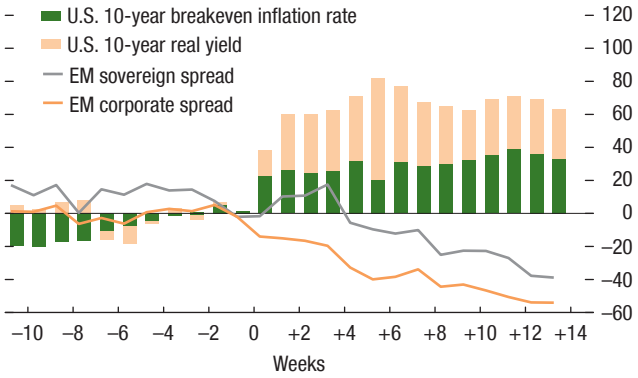
Emerging market assets were hurt during the taper tantrum in May 2013 as higher U.S. real yields did not signal higher U.S. growth.

1. U.S. Rates and Emerging Market Spreads
(Cumulative basis point change; May 22, 2013 = 0)



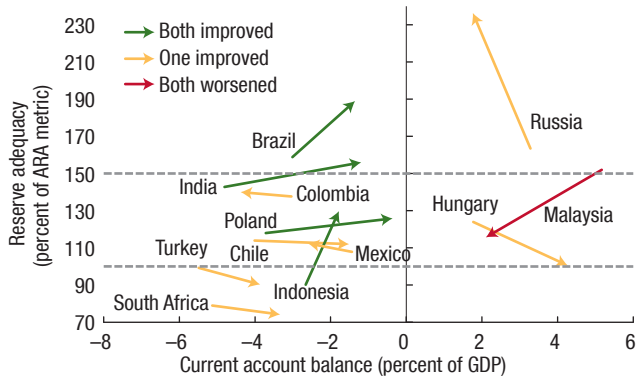
This time is different: a brighter U.S. outlook and reflation support the assets of emerging market economies.

2. U.S. Rates and Emerging Market Spreads
(Cumulative basis point change; Nov. 7, 2016 = 0)



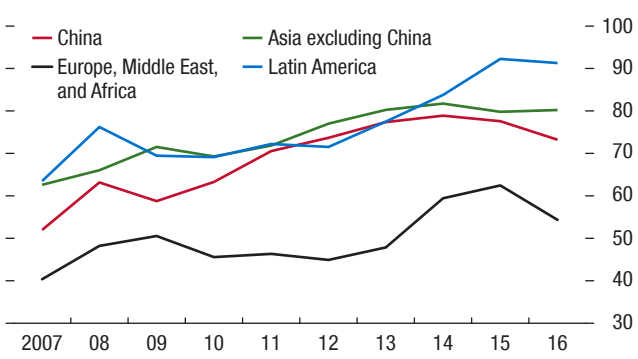
Emerging market external balances have improved since the taper tantrum, reinforcing positive financial market sentiment.

3. Current Account and Foreign Reserves Adequacy, Change 2012 to 2016



Emerging market corporate leverage has moderated but still remains elevated, especially in Latin America.

4. Emerging Market Economy Corporate Leverage, 2007–16
(Debt to equity, percent)



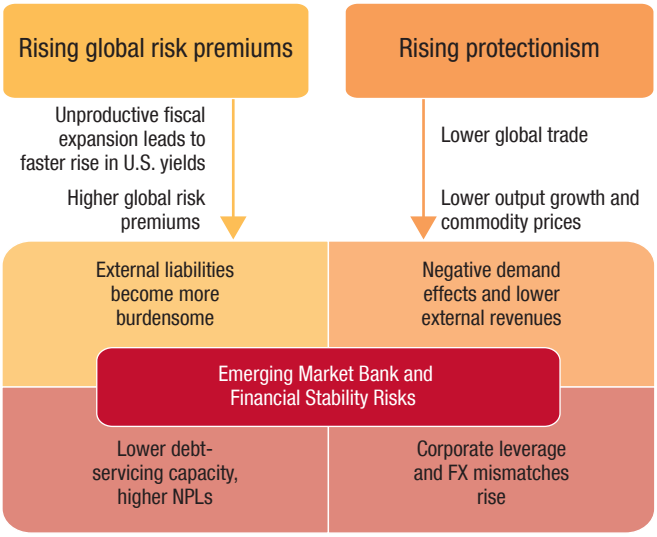
Sources: Bloomberg L.P.; Haver Analytics; IMF, World Economic Outlook database; JPMorgan Chase & Co.; S&P Capital IQ; and IMF staff calculations.
Note: ARA = Assessing Reserve Adequacy; EM = emerging market.

Since the taper tantrum in 2013, many emerging market economies have reduced external imbalances and strengthened policy buffers (Figure 1.12, panel 3). Furthermore, credit booms have begun to wane. At the same time, corporate leverage has started to decline, but remains elevated (Figure 1.12, panel 4). These developments have enhanced the resilience of emerging market economies, while their overall growth is projected to rise from 4.1 percent in 2016 to 4.5 percent in 2017. This increase is driven mainly by gains in commodity exporters, while a number of countries still face more challenging growth prospects (see the April 2017 WEO).

Political and Policy Uncertainty in Advanced Economies Opens Channels for Negative Spillovers

What would happen if current market optimism suddenly turned to pessimism because of concerns that U.S. policies could deliver a less benign path for growth and debt than expected? Financial markets would deliver faster normalization of the U.S. term premium, leading to higher worldwide term premiums (see Scenario Box 1.1 in the April 2017 WEO). As a result, emerging market economies could face rising risk premiums, increased asset price volatility, capital outflow pressures, a stronger U.S. dollar, and balance

Figure 1.13. Transmission of External Risks to Emerging Market Economies



Source: IMF staff.
Note: FX = foreign exchange; NPLs = nonperforming loans.

sheet stresses (Figure 1.13). Countries that are more sensitive to external financial conditions—including from large external financing needs, high corporate foreign-currency indebtedness, or a large foreign presence in local bond markets—would be most at risk, as would frontier market economy borrowers.

And what would happen if there were a shift toward protectionism in a number of countries? Emerging market economies with high trade openness would face rising risk premiums amid declining global trade and commodity prices (Figure 1.13). In turn, corporate earnings would suffer, especially for firms dependent on exports, placing strains on companies with high leverage and banking systems with weaker asset quality.

Rising Global Risk Premiums

If increases in U.S. interest rates push up global risk premiums and interest rates across emerging market economies, borrowing costs would increase for countries with external weaknesses or significant foreign exchange exposures. Emerging market currencies would come under pressure as capital flows reverse, limiting space for monetary policy to ease and keeping long-term interest rates high. Such an environment would reduce firms' debt-servicing capacity and could prompt institutional investors to undertake a more forceful and sustained shift away from emerging market economies, undermining a vital source of external financing (Figure 1.14, panels 1 and 2).

Such an outcome could also amplify asset price volatility induced by retail investors. Until recently, capital flow reversals were driven mainly by herd behavior on the part of retail investors, while continued buying by institutional investors helped offset some of the downward pressure on emerging market economy asset prices (Figure 1.14, panel 3). However, inflows from institutional investors have declined in recent quarters. The period following the U.S. election in November 2016 marked the first notable retrenchment by these investors since the global financial crisis (though flows rebounded in early 2017). Moreover, disruptions could stem from portfolio reallocations by large, opportunistic investment funds. For example, multisector bond funds have sizable holdings in many emerging markets, and a sharp unwinding of their positions could severely affect funding and liquidity conditions in some emerging market economies (Figure 1.14, panel 4).[5]

In a scenario of rising global risk premiums, the weak tail of emerging market economy firms would increase to over 16 percent of total nonfinancial corporate debt, which is an increase of $135 billion (Figure 1.15).[6,7] This would exceed the 15 percent peak in 2015 when the collapse in commodity prices hit corporate balance sheets. Brazil, China, and India experience the greatest impact in this scenario given their sensitivities to changes in earnings and corporate interest rates. A sustained reversal of capital inflows would put pressure on countries with high external financing requirements and/or low reserve adequacy (Table 1.1).

[5]For example, in 2016 the multisector bond funds of a single asset manager reduced their combined emerging market bond exposure by $15 billion. Almost $11 billion of that total was concentrated in a single country. This represented an estimated 13 percent of that country's total sovereign local and hard currency bonds.

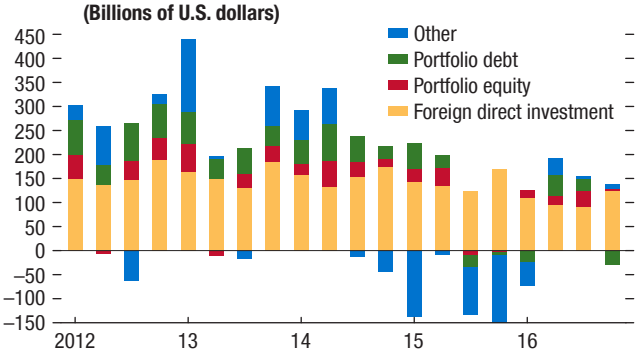
[6]The weak tail is defined as the proportion of all nonfinancial corporate debt that is issued by firms with interest coverage ratios less than 1; the interest coverage ratio is earnings before interest, tax, depreciation, and amortization (EBITDA) divided by interest expense.

[7]Corporate EBITDA is adjusted using the expected changes in a country's GDP output from the IMF's G20 model (G20MOD). Earnings changes are calculated using the historical relationship between a sector's earnings and the growth in the economy. Earnings of commodity-related firms are adjusted based on the model's expected change in commodity prices in the given shocks. Interest expenses are adjusted by the change in the corporate interest rate output from the model. Interest expenses are also adjusted using the expected change in the exchange rate, based on the proportion of a given country's nonfinancial corporate debt that is denominated in foreign currency.

Figure 1.14. Capital Flows to Emerging Market Economies

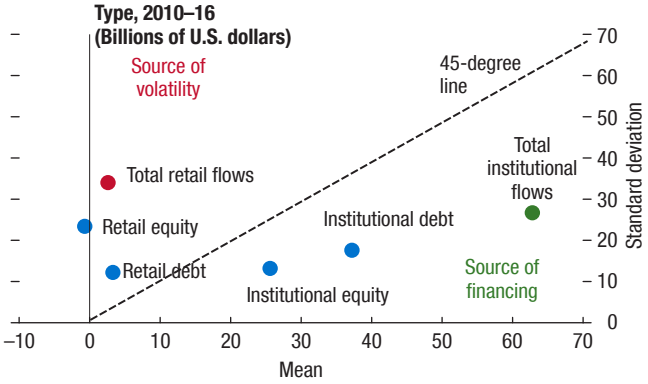
Capital flows to emerging market economies have been subdued in recent years.

1. Nonresident Capital Flows to Emerging Market Economies (Billions of U.S. dollars)



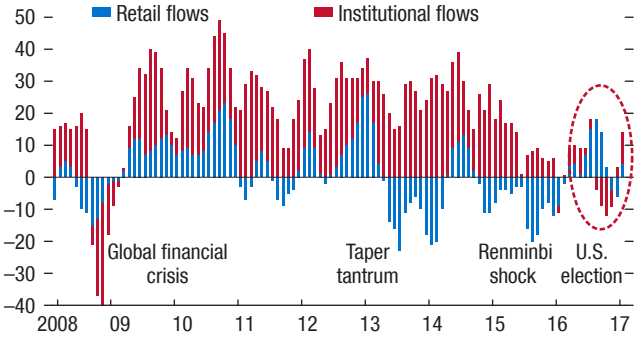
Retail investors represent a small source of financing but are a large source of volatility.

2. Emerging Market Quarterly Portfolio Flows by Investor Type, 2010–16 (Billions of U.S. dollars)



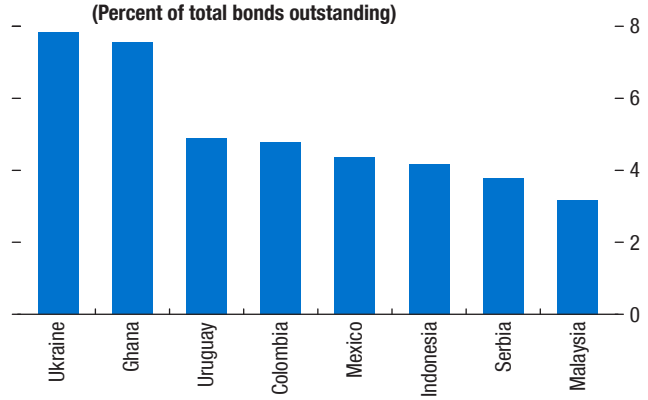
Most capital flow reversals are driven by retail investors.

3. Emerging Market Portfolio Flows by Investor Type (Billions of U.S. dollars, three-month moving average)



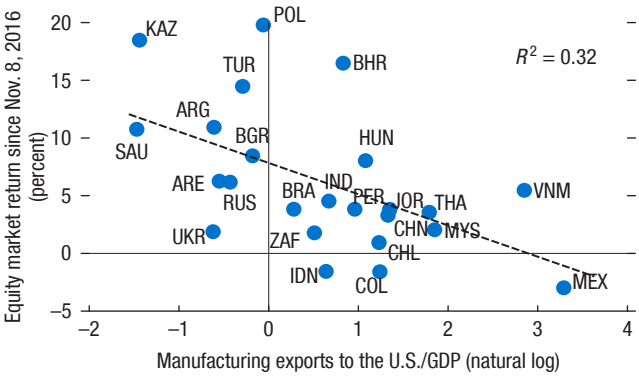
Individual fund families often own large portions of emerging market bonds in selected markets.

4. Concentration of Foreign Emerging Market Bond Holdings of Largest Fund Family Owner (Percent of total bonds outstanding)



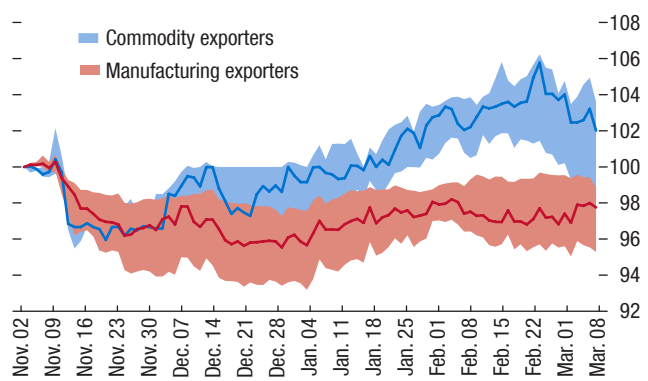
Equities of manufacturing exporters with high U.S. trade exposure have not performed as well as other emerging market equities ...

5. Emerging Market Equity Returns versus Gross Manufacturing Exports



... while currencies of manufacturing exporters have underperformed those of commodity exporters.

6. Emerging Market Exchange Rates (Median and 25th–75th percentiles, Index 100 = Nov. 1, 2016)

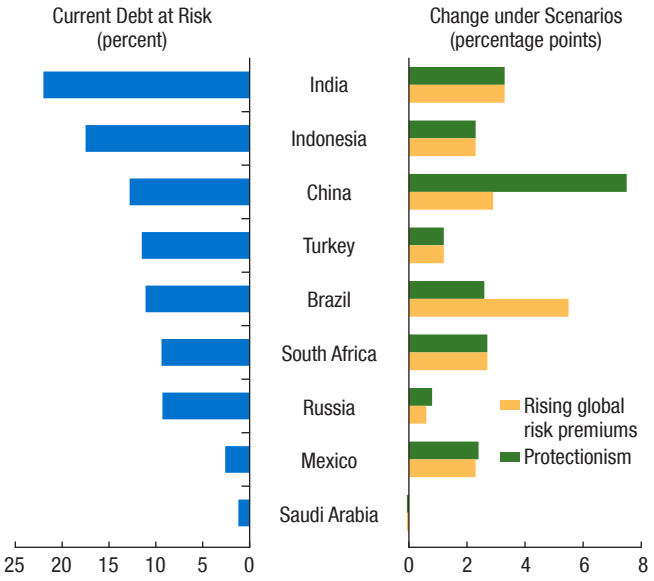


Sources: Bloomberg L.P.; EPFR Global; Institute of International Finance (IIF); UN Comtrade; and IMF staff calculations.
Note: Panels 2 and 3 show proxies for portfolio flows by institutional and retail investors, which are estimated using IIF portfolio flows data and EPFR data on flows into investment funds dedicated to emerging markets. IIF data capture flows by all types of investors, but fund flows are predominantly driven by retail investors. In panel 2, standard deviations are calculated as the average eight-quarter rolling standard deviation over the 2010–16 period. The country sample for IIF data encompasses 25 emerging market economies (used in panels 1, 2, and 3), while the country sample for EPFR data encompasses about 85 emerging and developing economies (used in panels 2 and 3). Other differences between the two datasets are discussed in Koepke and Mohammed 2014. In panel 5, data labels in the figure use International Organization for Standardization (ISO) country codes. In panel 6, commodity exporting countries include Brazil, Chile, Colombia, Indonesia, Kazakhstan, Malaysia, Peru, Russia, and South Africa. Manufacturing exporting countries include Bulgaria, China, Hungary, India, Malaysia, Mexico, Poland, Taiwan Province of China, Thailand, and Vietnam. EM = emerging market; FDI = foreign direct investment.

Figure 1.15. Emerging Market Corporate Debt under Rising Risk Premiums and Protectionism

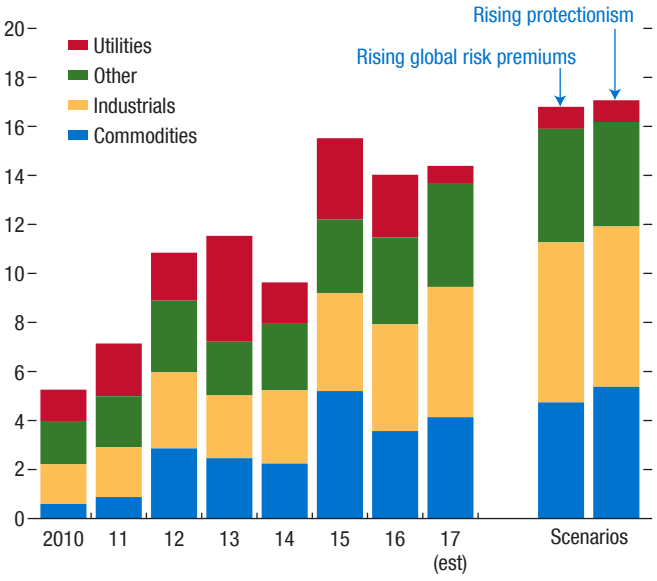
Emerging market economies would see an increase in the size of the weak tail of their corporate sectors.

1. Corporate Debt with Interest Coverage Ratio < 1



The weak tail of corporate debt rises significantly in a scenario of rising global risk premiums and rising protectionism.

2. Emerging Market Corporate Debt with Interest Coverage Ratio < 1 (Percent of total nonfinancial corporate debt)



Sources: S&P Capital IQ; and IMF staff estimates.
Note: Current represents last 12 months, except for India, which uses fiscal year 2016 data. Est = estimate.

Rising Protectionism

If protectionist pressures increase and start to affect global trade, emerging market economies closely integrated into global trade and capital markets will face lower external revenues and rising risk premiums.[8] The combination of declining global trade and growth would increase corporate vulnerability, especially for those with high leverage and large foreign exchange mismatches. The resulting higher corporate risk premiums and borrowing costs will increase financial stability risks in these economies.

Both direct and indirect transmission channels would come into play in such an environment, including through disruptions to principal trading partners. For example, manufacturing exports account for some 25 percent of Mexico's GDP, and 80 percent of all its goods exports are bound for the United States (Table 1.1). Some emerging market economies in Asia (for example, Malaysia, Thailand, and Vietnam) have high manufacturing exports as a share of GDP.[9] Similarly, a decline in Chinese exports would not only weaken China's growth and add to domestic vulnerabilities: it would also weigh on demand for imported intermediate and capital goods.

This would further affect exporters in Asia, as well as commodity exporters. The broader negative repercussions for emerging market economies underscore the potential for rising domestic vulnerability in China to drive higher global risk premiums.

Emerging market economy asset prices reflect some of these trade exposure risks. Equities in countries with substantial manufacturing exports to the United States (Mexico, Vietnam), or that form a part of major supply chains (Chile, Malaysia), have underperformed other emerging markets (Figure 1.14, panel 5). Commodity exporters' currencies have notably outperformed those of manufacturing exporters in recent months (Figure 1.14, panel 6). This performance likely reflects the boost from rising commodity prices, but it may also indicate less market concerns that protectionism would affect trade in commodities.

[8]Under rising protectionism, global tariff and nontariff barriers raise the effective cost of imports by 10 percent.

[9]Trade exposures of emerging market economies that are part of the European Union (Hungary, Poland, Romania) would be less affected given the improbability of intra-EU trade barriers.

Table 1.1. Emerging Market Economies: External and Trade Vulnerabilities

	Credit Spreads				External								Trade				
	Sovereign Credit Spread	Corporate Credit Spread	Sovereign Credit Spread	Corporate Credit Spread	Reserves		Current Account Balance		Total External Financing Requirement		Nonresident Holdings of Local Currency Government Bonds		Trade Openness	Goods Trade Balance with United States	Goods Trade Balance with China	Net Manufacturing Exports	Net Commodity Exports
	(*z*-score, five-year sample)		(basis points)		(percent of ARA metric)		(percent of GDP)		(percent of GDP)		(percent of total)		(percent of GDP)				
			Δ since October 2016		2016	Δ since 2012	2017E	Δ since 2012	2017E	Δ since 2012	2016:Q2	Δ since 2013:Q1	2016	2016	2016	2015	2015
Brazil	0.0	–0.4	–62	–179	190	31	–1.3	1.7	9	2	16	2	23	–0.1	0.6	–1.9	4.2
Chile	–0.9	–2.1	–47	–51	112	–2	–1.4	2.6	14	–6	3	–3	56	–0.7	1.2	–7.0	8.8
China	–1.3	–1.6	–8	–19	171	–82	1.3	–1.2	5	–2	3	3	37	2.3		10.0	–3.4
Colombia	–0.1	–0.7	–28	–91	140	2	–3.6	–0.6	13	4	22	13	34	–1.2	–2.3	–9.3	5.1
Hungary	–1.2	–1.7	–17	–57	100	–24	3.7	1.9	14	–22	21	–20	173	1.0	–3.5	11.4	–1.8
India	–1.1	–1.5	–10	–30	156	13	–1.5	3.3	10	–3	4	2	42	0.9	–2.3	0.0	–3.7
Indonesia	–1.5	–2.4	–39	–126	131	41	–1.9	0.8	7	0	39	7	35	0.9	–2.0	–1.7	3.8
Malaysia	–0.5	–1.4	–52	–9	115	–37	1.8	–3.4	40	6	34	3	128	2.0	–4.3	4.1	5.6
Mexico	0.6	–0.9	–39	–55	113	5	–2.5	–1.0	13	5	34	–3	78	10.7	–6.5	1.5	0.0
Peru	–0.7	–1.4	–8	–62	311	5	–1.9	0.9	8	0	33	–23	44	–0.6	0.1	–9.0	6.0
Philippines	–1.1	–2.0	–4	–43	227	–29	–0.1	–2.9	6	2	8	–6	58	0.5	–3.4	1.1	–3.2
Poland	–0.9		–6		126	8	–1.7	2.0	21	–11	34	–2	101	0.2	–2.9	3.6	–0.2
Russia	–1.1	–1.4	–58	–91	238	74	3.3	0.0	7	4	23	1	46	–0.1	–0.9	–4.1	16.3
Saudi Arabia					590	–114	1.5	–20.9	7	25			62	–0.7	0.1	–15.8	20.3
South Africa	0.2	–1.6	–22	–34	74	–5	–3.4	1.7	18	4	35	–3	61	0.1	–2.6	–2.3	1.7
Thailand		–1.5		–10	220	–5	9.7	10.1	7	–8	14	–3	124	3.0	–4.6	3.8	–0.3
Turkey	0.8	–0.2	–9	–43	90	–9	–4.7	0.8	31	9	18	–6	47	–0.5	–2.7	–1.4	–1.4
United Arab Emirates		–1.3		–43			3.5	–16.3					169	–4.3	–3.1	–14.1	10.6
Vietnam	–1.0		–19		70	–7	4.1	–1.9	4	3			182	13.1	–10.0	5.7	0.7
Median	–0.9	–1.4	–20	–47	136	–4	–1.3	0.8	9	2	22	–2	58	0.2	–2.6	–1.4	1.7

Sources: Sovereign investor base estimates by Arslanalp and Tsuda (2014, updated); Bloomberg L.P.; IMF, World Economic Outlook database; JPMorgan Chase & Co.; UN Comtrade; and IMF staff calculations.
Note: The UN Comtrade data on net exports comprise commodity codes 0 through 4 for commodities and codes 6 through 8 for manufacturing, using Revision 3 or 4. For details on the reserve adequacy metric (ARA), see IMF 2015d. E = estimate.

Table 1.2. Asset Quality and Capital Indicators for a Sample of Emerging Market Banks
(Data based on bank-reported financial statements; 2016 or latest available)

Country	Number of Banks	Tier 1 Capital Ratio (percent of RWA)		NPL and Problem Loan Ratio (percent of gross loans)	NPLs and Problem Loans over Buffers (percent)	Banks with Provision Needs in Excess of Profits (percent of assets)	Provision Needs Divided by Profits: Weakest Quartile (multiples)	Share of Banks with Tier 1 Ratio below 10 Percent	
		Sample	FSI					Current (percent of assets)	After Provisions (percent of assets)
			(1)	(2)	(3)	(4)	(5)	(6)	(7)
India	64	10.6	10.6	11.3	79	73	> 3	43	77
Russia	24	11.6	8.8	15.6	76	43	> 3	21	49
South Africa	8	12.8	14.2	7.1	51	22	1.4	0	74
Brazil	22	12.9	13.1	9.5	48	20	0.9	20	21
Poland	14	14.8	15.7	7.6	44	16	1.4	2	7
Indonesia	32	19.5	20.6	8.0	36	12	1.7	1	7
Mexico	12	14.9	13.2	2.5	13	4	0.9	0	5
Thailand	12	14.1	14.8	6.5	34	3	0.9	0	3
Turkey	15	12.1	13.2	6.6	36	2	0.4	13	14
China	42	11.0	11.1	4.8	30	1	0.4	45	45
United Arab Emirates	22	17.1	16.9	6.6	26	1	0.6	0	0
Malaysia	12	14.2	14.4	3.7	27	0	0.7	0	0
Colombia	3	8.4	11.9	7.1	55	0	0.4	100	100
Saudi Arabia	12	17.6	16.8	3.0	12	0	0.2	0	0

Sources: SNL Financial; IMF Financial Soundness Indicators (FSI); and IMF staff calculations.

Note: Indicators are based on GFSR sample data, unless otherwise indicated. The data are based on publicly available consolidated statements of a sample of domestic banks incorporated in their home country, and may differ from supervisory and the IMF's system-wide Financial Soundness Indicator data because of the sample coverage, consolidation basis, or treatment of foreign banks. The sample covers at least three-quarters of system assets in most countries, except for Mexico where the sample covers 30 percent of system assets because of a large presence of foreign banks that are excluded from this analysis. NPL = nonperforming loan; RWA = risk-weighted assets.

(1) Data are from the IMF's system-wide Financial Soundness Indicators data set.

(2) NPLs are those reported by banks and may differ from supervisory approaches. Supervisory definitions vary across countries. Problem loans are reported as doubtful by banks and are valid leading indicators of NPLs. Problem loans are defined as the prevailing category among special-mention loans, restructured but not impaired loans, 30 days or more past due but not impaired loans, and potential problem loans. Individual banks usually report one or two of these categories depending on their jurisdiction.

(3) NPLs and problem loans as a percent of Tier 1 capital and total (specific and general) loan loss provisions.

(4) Percentage of bank assets with provisioning needs greater than average annual net income, calculated as the three-year average return on assets multiplied by 2016 assets.

(5) Aggregate provisioning needs divided by average annual net income for the 25 percent of bank assets with the largest provisioning needs relative to assets.

(6) Percentage of bank assets with Tier 1 capital ratio of less than 10 percent based on 2016 or latest reporting results.

(7) Percentage of bank assets with Tier 1 capital ratio of less than 10 percent after provisioning needs are subtracted from equity.

In a scenario of rising protectionism, the size of the weak tail of firms would increase to 17 percent of total nonfinancial corporate debt, an increase of $235 billion, which is somewhat higher than under the case of rising global risk premiums (Figure 1.15, panel 1). The greatest deterioration in corporate balance sheets would occur in China, India, and South Africa. Commodity sectors especially would come under pressure because metal and oil prices would fall as a result of the sharp decline in global growth.

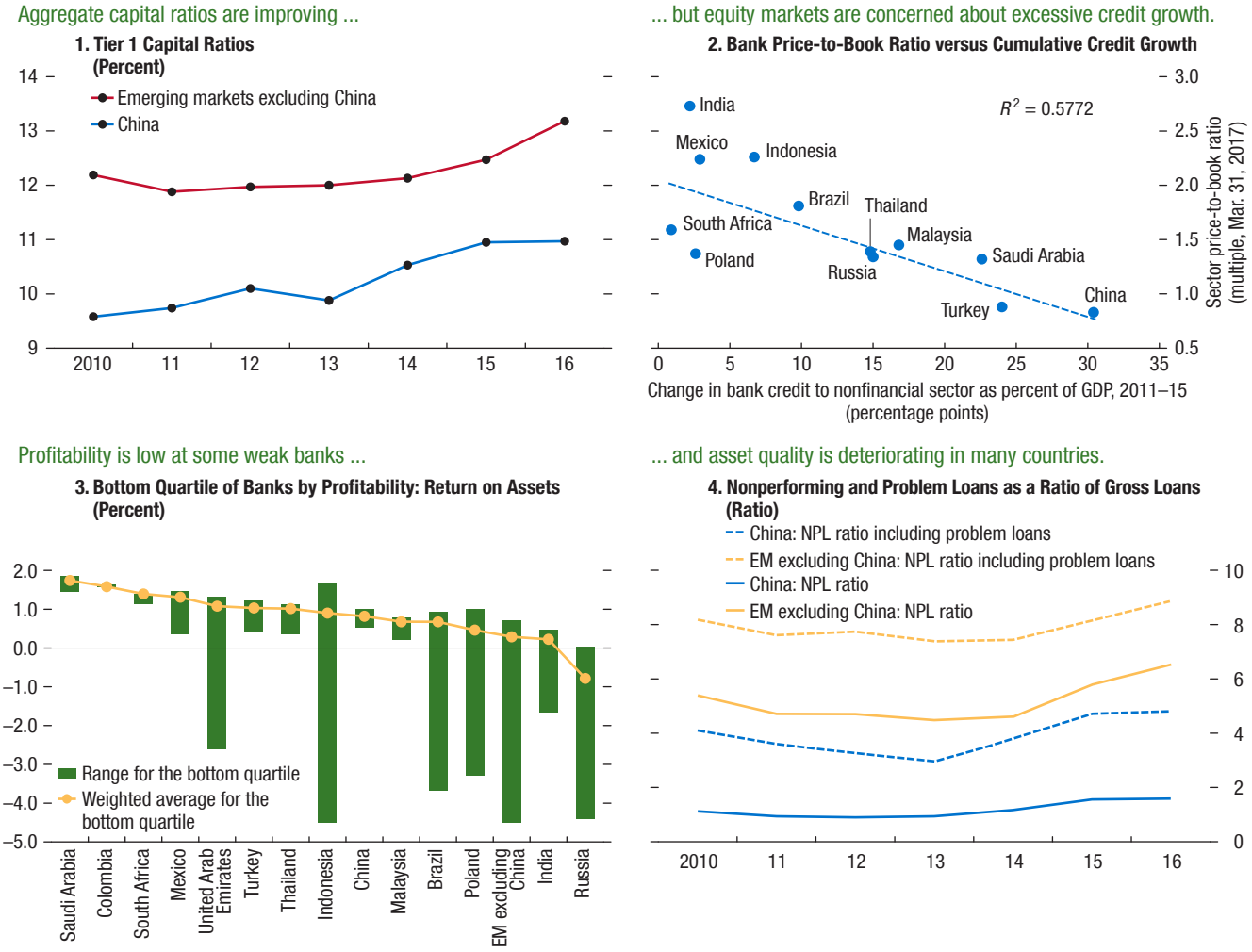
Are Emerging Market Banks' Capital Buffers Sufficient to Absorb Increased Corporate Stress?

Stronger external headwinds from tighter global financial conditions or increased trade protectionism could worsen corporate vulnerabilities in some emerging market economies and spill over to the banking system. This underscores the importance of ensuring the health of emerging market banking systems through swift and transparent recognition of nonperforming assets and by strengthening capital buffers.

On the positive side, bank capital ratios have been rising steadily over the past several years, with a sample of about 300 emerging market banks showing aggregate Tier 1 capital ratios now at comfortable levels (Table 1.2; Figure 1.16, panel 1).[10] Shrinking risk weightings have been a contributing factor, particularly

[10]Banking sector data in the remainder of this section are based on a 294-bank sample covering banks from 14 countries with $32 trillion in assets. Bank-level data are used instead of official Financial Soundness Indicator (FSI) data because they offer better granularity and allow for cross-sectional analysis.

Figure 1.16. Emerging Market Bank Capital and Asset Quality



Sources: Bank for International Settlements; Bloomberg L.P.; Morgan Stanley Capital International; SNL Financial; and IMF staff calculations.
Note: EM = emerging market; NPL = nonperforming loan.

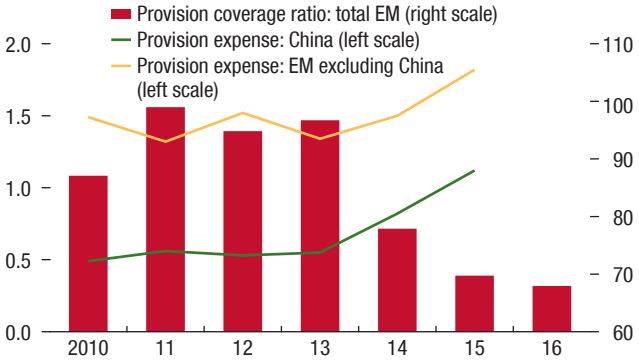
in Brazil, but banks in most markets have also actively reduced leverage. Lenders outside China have increased capital by 20 percent since the end of 2014, compared with 15 percent growth in assets over the same period, reflecting a combination of public recapitalization and banks' efforts in response to increased regulatory and market scrutiny. Nonetheless, asset quality concerns have not been fully addressed after several years of rapid growth in lending. Bank equity valuations are relatively weak in China and Turkey, where credit has grown rapidly relative to GDP (Figure 1.16, panel 2).

Although the profitability of banks in emerging market economies is generally strong—in particular compared with that in the United States and Europe—heavy credit losses continue to erode profits at many banks, notably in Russia and India (Figure 1.16, panel 3). Furthermore, nonperforming and problem loans have climbed in many countries, reflecting various challenges: economic weakness (Brazil, Russia), continued corporate leverage growth (China), and sector-specific downturns (India) (Figure 1.16, panel 4). Banks have raised provisioning levels in response, but not quickly enough to keep pace with bad loan formation (Figure 1.17, panel 1). As a result, the weak tail of banks with poor loss coverage (nonperforming and problem loans as a proportion of bank buffers)

Figure 1.17. Underprovisioning in the Weak Tail of Banks

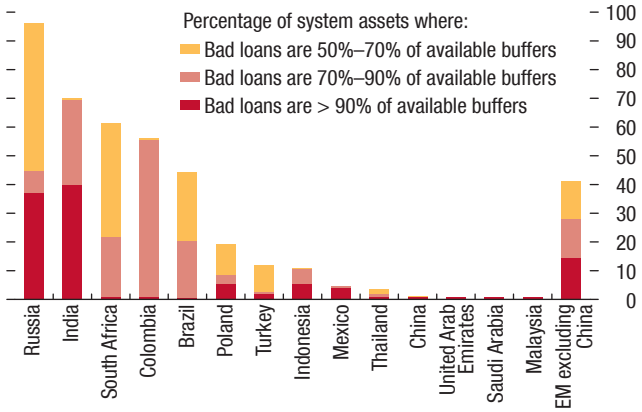
Provisioning has risen but not fast enough, as banks strain to maintain coverage ratios.

1. Provision Expense-to-Gross Loan Ratio and Problem Loan Provision Coverage Ratio (Percent)



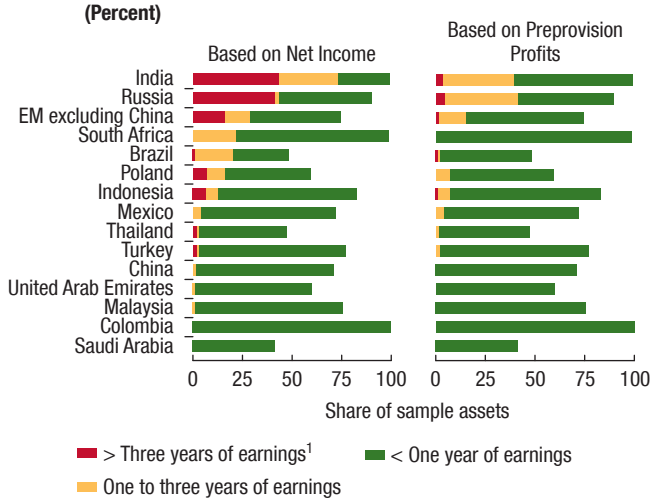
As a result, there is a large weak tail of banks with a high ratio of bad loans to buffers.

2. Percentage of Assets by the Ratio of Nonperforming and Problem Loans over Tier 1 Capital and Loan Loss Provisions, 2016



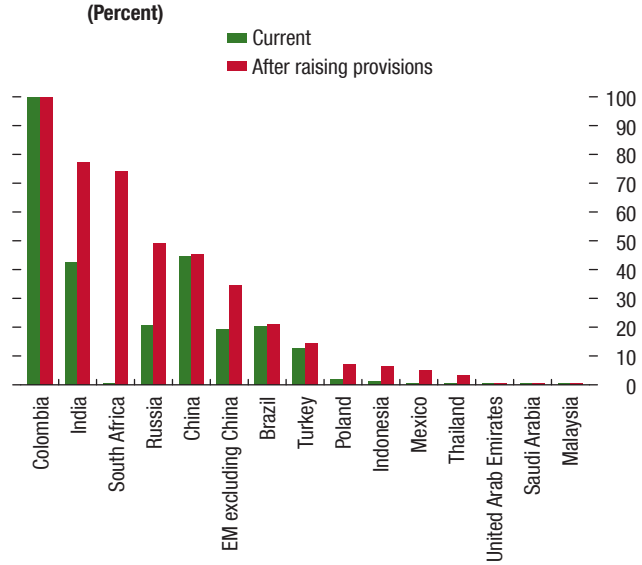
Provision needs exceed annual profits in 30 percent of emerging market banks outside China.

3. Number of Years to Absorb Additional Provisions through Earnings, by Share of Assets (Percent)



If provisions were deducted from equity, weak banks would jump up to 35 percent of assets.

4. Percentage of Assets with Tier 1 Ratio below 10 Percent (Percent)



Sources: SNL Financial; and IMF staff calculations.
Note: In panel 3, earnings are based on three-year averages. EM = emerging market.
[1] Banks with losses are included in this category.

has swelled in emerging market economies (excluding China) to about 40 percent of sample assets (Figure 1.17, panel 2).

Further Deterioration in Asset Quality Would Erode Capital Levels for Several Banks

Restoring provisioning coverage among the weakest banks is important to ensure the banking system has resilience to withstand further asset quality deterioration. In an illustrative exercise to assess the potential extent of underprovisioning of weaker banks, banks' provision coverage ratios are raised to at least 50 percent of nonperforming and problem loans, or to their country's average provision-to-loan ratio.[11] This exercise generates some $120 billion (5 percent of capital) in additional provisions, which would have to be fulfilled through retained earnings, existing capital, or new equity. More profitable banking systems such as those in Colombia and Indonesia would be well positioned to absorb such costs; however, for about 30 percent of emerging market bank assets (outside of China), additional provisions would exceed average annual net income (Figure 1.17, panel 3).[12] In more than a third of the banking systems in India and Russia, provisioning needs would amount to at least three years of net income, unless profits recover from cyclical lows. To account for cyclical weaknesses in some countries, which may reduce net income, provision needs can be compared with preprovision profits.[13] Based on this approach, some banks in India and Russia would still require more than one year of earnings to boost provisioning. If the provisioning needs were fulfilled with equity, the share of banks with Tier 1 capital ratios below 10 percent, excluding China, would jump from about 20 percent to 35 percent of total assets (Figure 1.17, panel 4). Many large banks could raise capital by tapping the equity market given generally favorable valuations.

[11]Problem loans are those reported by banks and are valid leading indicators of nonperforming loans. Problem loans are usually not defined by supervisors, but certain categories, such as restructured loans, receive increasing supervisory attention. Differences in coverage ratios may be driven by differences in reliance on collateral, so a coverage ratio of less than 50 percent of nonperforming and problem loans does not necessarily imply underprovisioning.

[12]Three-year average profits are used for the calculation, reflecting the current cyclical position of a country.

[13]For example, retained earnings may be reduced by higher provisions because of asset quality deterioration or more aggressive provisioning. The use of preprovision profits as a comparator assumes that banks do not need to set aside additional provisions for new nonperforming loans.

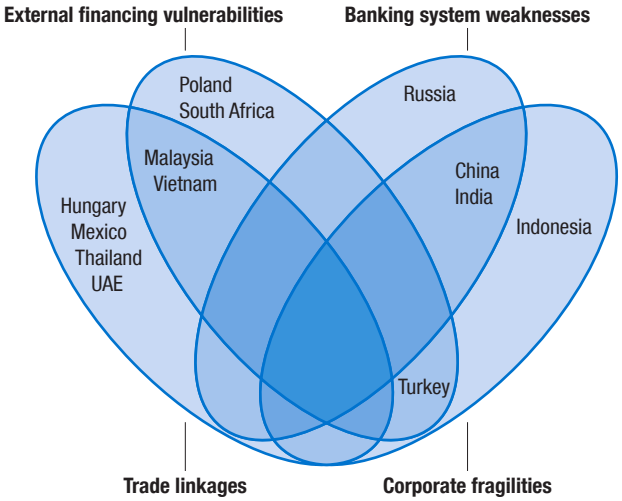
More Forceful Policy Action Is Needed to Ensure Resilience of Emerging Market Economies

Emerging market economies have become more resilient, benefiting from a recovery in global commodity prices and still-supportive external conditions. However, the preceding analysis highlights that these economies face challenges along several channels (Figure 1.18). Those reliant on trade openness (Hungary, Malaysia, Thailand, Vietnam, United Arab Emirates) or with large external financing needs (Malaysia, Poland) or low reserve adequacy (South Africa, Vietnam), or a combination (Turkey), would be challenged by tighter global financial conditions and unfavorable trade developments. Others, challenged in the corporate sector (China, India, Indonesia, Turkey) or banking sector (China, India, Russia), could face more broad-based risks.

Risks of an abrupt tightening in financial conditions and increased protectionism pose new challenges for policymakers. Therefore, policymakers should continue to address corporate and bank vulnerabilities to ensure resilience against an increasingly uncertain global environment.

- *Restoring the health of corporate balance sheets:* Authorities should prioritize improving corporate debt-restructuring mechanisms, including formal insolvency frameworks and out-of-court debt restructuring. Policymakers should develop an in-depth understanding of both the sources and composition of credit extended to nonfinancial firms and proactively monitor corporate vulnerability. Authorities should continue to monitor firms' foreign exchange exposure, and the extent to which foreign-currency debt is hedged, either naturally (through foreign exchange income) or through financial instruments. Moreover, authorities should stand ready to provide additional foreign exchange hedging tools to help firms absorb sharp currency movements without causing financial distress (as undertaken in Brazil and Mexico in recent years).
- *Strengthening the health of the banking system:* Bank supervisors in countries whose banks are characterized by weak balance sheets or have expanded rapidly should carry out comprehensive asset quality assessments to gauge the extent of unrecognized credit losses. These assessments should be followed

Figure 1.18. Emerging Market Economy Challenges



Source: IMF staff.
Note: Elevated risks for each category are defined as follows: Trade linkages = countries that rank in the top quartile among all countries for either trade openness or exports to the United States and the United Kingdom. Corporate fragilities = countries whose percentage of debt issued by firms with an interest coverage ratio below 1 rank in the top quartile of countries in Table 1.1. External financing vulnerabilities = countries with reserves as a percent of ARA metric below 100 percent in 2016 or projected external financing requirements above 15 percent of GDP in 2017, as shown in Table 1.1. Banking sectors = countries with Tier 1 capital ratios below 11.5, using Financial Soundness Indicators data as shown in Table 1.2. ARA = Assessing Reserve Adequacy; UAE = United Arab Emirates.

by concrete steps to cover the losses and—where applicable—ensuing capital needs. Capital needs should be tackled promptly while global financial conditions are favorable. This should be achieved preferably through private channels, including equity issuance and bail-ins. Public support should be used as a last resort, when issues are systemic and fiscal space is sufficient. In addition, bank regulators should monitor limits on foreign exchange open positions and assess the offsetting effect of foreign exchange hedging.

China: Rising Risks and Financial Vulnerabilities

While credit booms are waning in many emerging markets, credit continues to grow at a rapid pace in China (Figure 1.19, panel 1). Despite stabilization of the near-term growth outlook, policy efforts to contain leverage and financial risks remain constrained by the authorities' long-term growth objective: doubling the average income and size of China's economy by 2020. Achieving this requires ever increasing amounts of credit. Banks continue to play a major role in the provision of credit—total assets of China's banks are now more than triple the size of its GDP—with the fastest expansion from city commercial, joint-stock, and other smaller banks (Figure 1.19, panels 3 and 4). At the same time, other nonbank financial institutions have raised their credit exposure and leverage with the help of short-term wholesale funding, raising counterparty concerns, while the issuance of corporate bonds surged throughout 2016.

A large credit overhang has built up (the Bank for International Settlements calculates that the credit gap now stands at about 25 percent), and there is evidence that credit booms of this size are often dangerous (Figure 1.19, panel 2).[14] The likelihood of a financial crisis rises the longer a boom lasts and the larger it grows, especially if exchange rate flexibility is very limited (see IMF 2012).

Capital account pressures remain significant, with outflows picking up again in the second half of 2016, although they moderated substantially in the first two months of 2017. The People's Bank of China has continued foreign exchange interventions to maintain broad exchange rate stability (Figure 1.20, panels 1 and 2). Foreign asset purchases by Chinese residents account for most of the recent outflows, and Chinese firms have increased their investments in foreign companies abroad since late 2015. But foreign direct investment by overseas firms in China has also declined markedly over the past few quarters. Narrowing interest rate differentials and market expectations of bilateral depreciation versus the U.S. dollar have added to capital outflow pressures.

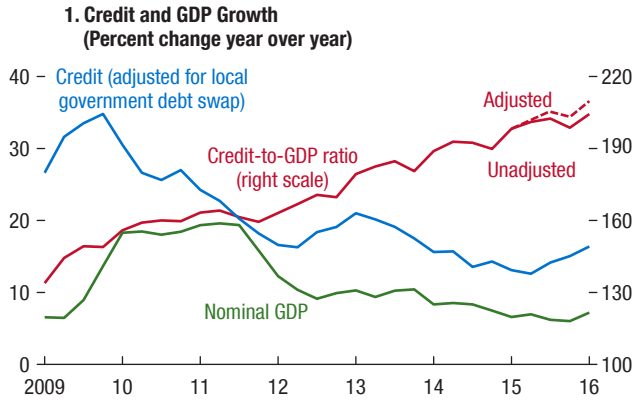
The Chinese authorities have continued to adjust policies to address rising vulnerabilities from rapid credit growth. In late 2016 they tightened monetary conditions. But the market turbulence that followed illustrates the risks that remain in China's increasingly large, opaque, and interconnected financial system.

- Tighter liquidity conditions in interbank and repo markets pushed up repo rates (Figure 1.21, panel 1), causing losses for financial institutions investing in bond market vehicles (Figure 1.21, panel 2). This caused leveraged investors to sell bonds, pushing up bond yields sharply (Figure 1.21, panel 3).

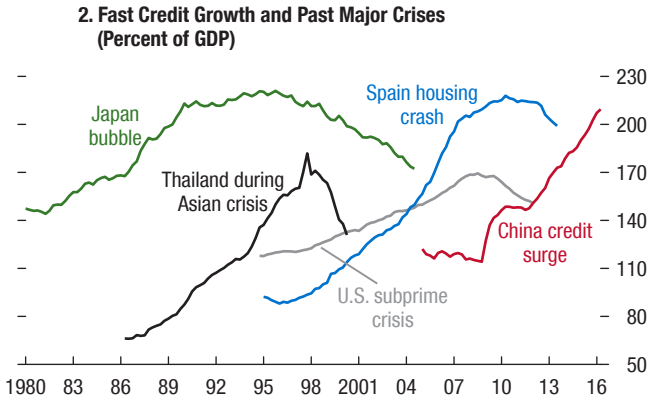
[14]A comprehensive discussion of China's credit boom and debt problem is provided by Maliszewski and others (2016).

Figure 1.19. China: Credit and Bank Balance Sheets

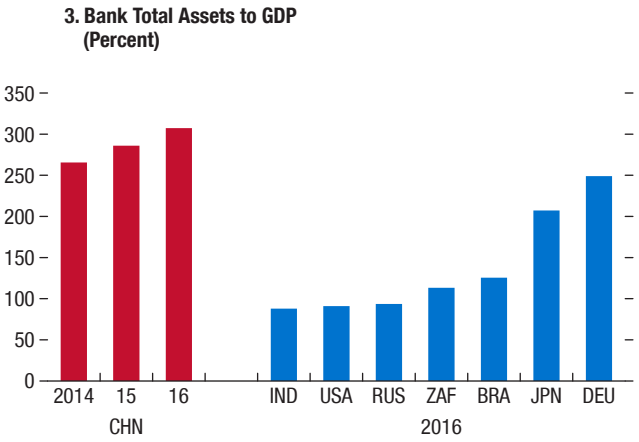
China's credit continues to rise faster than GDP ...



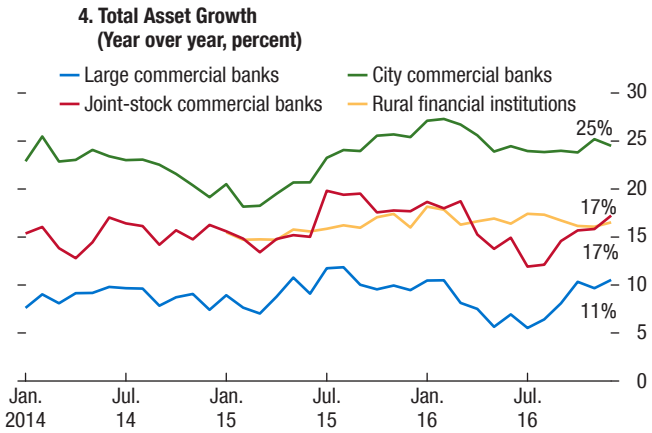
... and signals financial crisis risk, as suggested by international experience.



Chinese banks are now among the largest in the world, also relative to the size of the economy ...



... and smaller city commercial and joint-stock banks are still growing rapidly.



Sources: Bank for International Settlements; CEIC; Haver Analytics; IMF, World Economic Outlook database; and IMF staff calculations.
Note: Data labels use International Organization for Standardization (ISO) country codes. In panel 1, credit is total social financing stock (mainly private sector credit).

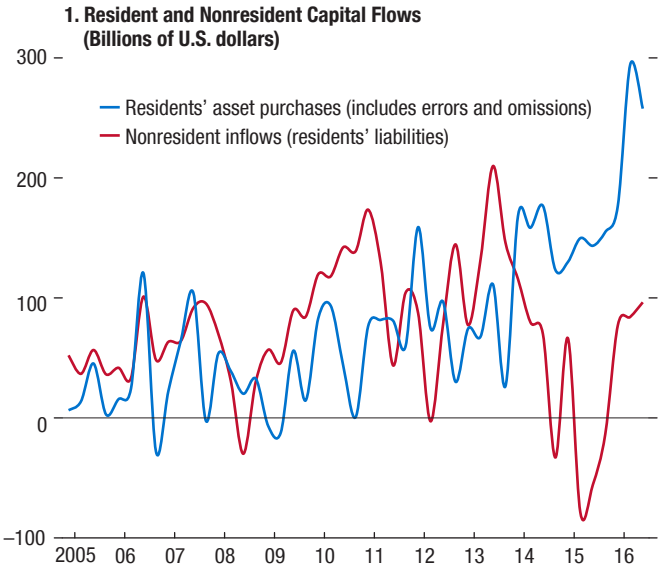
- Falling bond prices, rising global interest rates, and surging repo rates combined to cause distress in the informal repo market called the "entrusted bond market." This led to increased counterparty concerns in this largely unregulated market characterized by weak documentation standards, and segments of the repo market started to freeze up in mid-December (Figure 1.21, panel 1).
- To avoid systemic stress, the People's Bank of China instructed several large, state-owned banks to provide broad-based liquidity support through so-called X-repurchase agreements (whose counterparties are anonymous), in some cases to institutions that do not have access to the central bank's lending facilities, which calmed the markets and helped reduce yields in bond markets.

This episode highlights a number of pressure points that remain in the financial system:

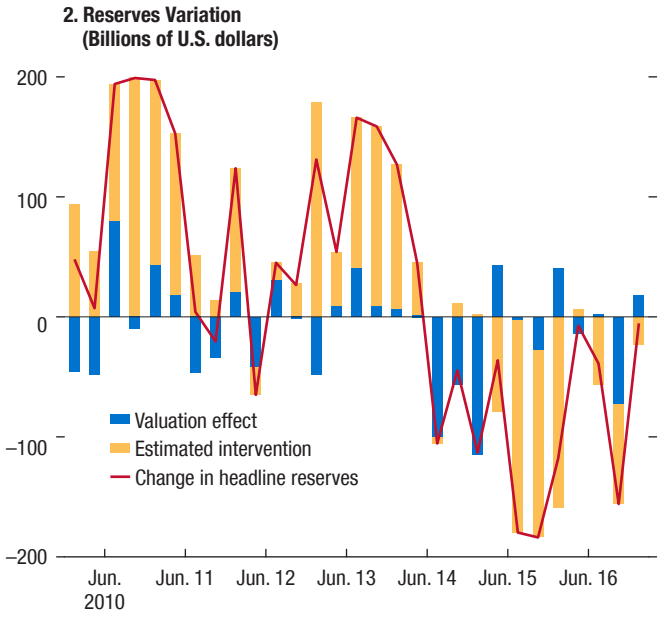
- *Many financial institutions continue to be overly dependent on wholesale financing with sizable asset-liability mismatches.* As emphasized in the October 2016 GFSR, the very short-term nature of China's repo funding implies that borrowers must roll over their liabilities on average almost daily, whereas funded credit products have much longer maturities. This maturity mismatch makes borrowers highly vulnerable to a sudden liquidity crunch, as evidenced in December.

Figure 1.20. China: Capital Flows and Foreign Exchange Reserves

Foreign asset purchases by Chinese residents have driven the recent pressure on capital outflows ...



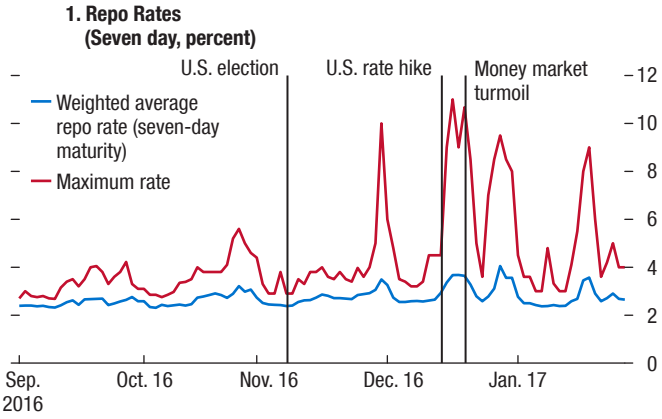
... triggering substantial foreign exchange interventions by the People's Bank of China to stabilize the exchange rate.



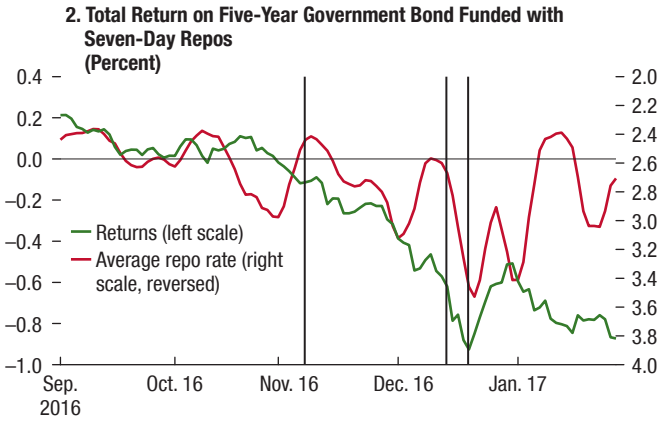
Sources: CEIC; People's Bank of China; State Administration of Foreign Exchange; and IMF staff estimates.

Figure 1.21. Recent Turmoil in Chinese Financial Markets

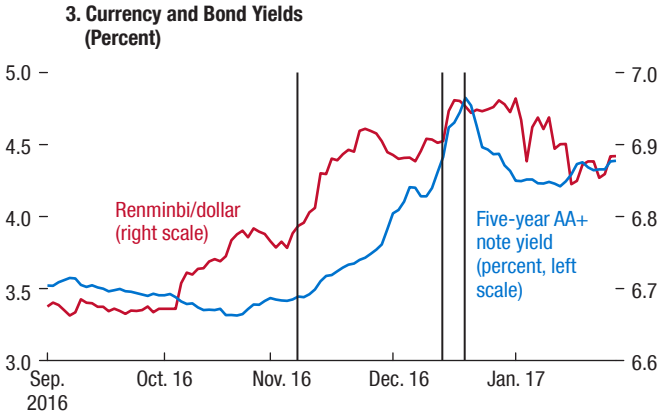
Tighter liquidity conditions pushed up repo rates, which surged in December for riskier institutions.



As repo rates rose, bond market vehicles incurred losses ...



... and corporate bond yields rose sharply with global yields as the U.S. dollar gained.



Sources: CEIC; IMF, Financial Soundness Indicators database, World Economic Outlook database; People's Bank of China; and IMF staff estimates.
Note: Repo = repurchase agreement.

- *Liquidity and credit risks are sizable, amid increased reliance on bond issuance and elevated redemption needs.* Low interest rates, a relaxation of bond issuance requirements, and expectations of a stronger U.S. dollar triggered a surge in issuance beginning early in 2015. China now accounts for more than two-thirds of total emerging market bond issuance and a third of U.S. dollar issuance, and maturities are shortening.
- *Investor composition has grown increasingly complex.* Banks continue to be the largest bond holders, but wealth management products and securities firms also have significant exposure and, in some cases, are highly leveraged to boost returns. Moreover, leverage is often established through informal markets with limited documentation and transparency.

The difficult task of deleveraging the system is thus as crucial and urgent as ever. This is increasingly recognized by the authorities, who have started a host of new regulatory initiatives to close loopholes for regulatory arbitrage, rein in leverage, and increase transparency of nonbank financial institutions and wealth management products. As discussed in previous GFSR reports, proactive recognition of losses, combined with restructuring of overly indebted but viable firms, is needed. Supervisory attention should concentrate on banks' emerging risks, especially fast asset growth among the small unlisted local banks, increasing reliance on wholesale funding, risks packaged into shadow products, and possible contagion through the interbank market.

But staving off further bouts of market instability—and ultimately, macro instability—requires addressing the policy tension between maintaining a high level of growth and the need for deleveraging. To the extent that credit growth remains excessive, the underpricing of credit risks remains an endemic characteristic of the financial system, and the search for yield remains a driving motivation, leverage will continue to build, and financial risks will continue to grow.

European Banking Systems: Addressing Structural Challenges

Considerable progress has been made in the European banking sector over the past few years. Banks have higher levels of capital, regulations have been strengthened, supervision has been enhanced, and efforts continue to adapt business models. More recently, bank equity prices have gained as a result of investor optimism about a cyclical upturn in the economy. However, a cyclical recovery alone is unlikely to fully restore the profitability of persistently weak banks, and more needs to be done to improve resilience. A number of system-wide structural features are compounding profitability challenges for domestic banks and may be affecting some international institutions. One structural challenge is overbanking, the features of which vary from country to country. Although measures are being taken to address concerns, countries with the biggest challenges need to make more progress. Until these structural impediments have been fully addressed, business model restructuring alone may not yield sufficient profitability. Left unresolved, the combination of weak banks, lack of access to private capital, and large bad debt burdens impedes the scope for recovery and could reignite systemic risks.

Sustainable Profitability Remains Elusive for Many Banks

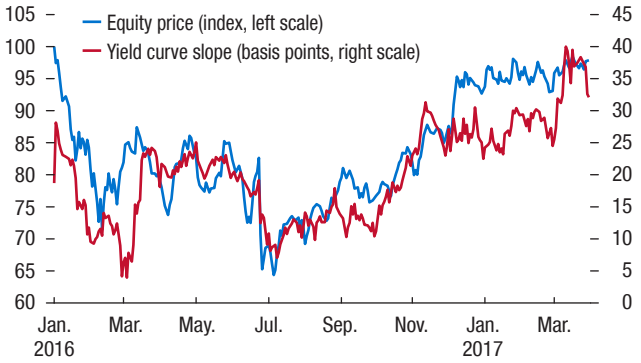
There has been substantial progress in the European banking sector. Bank capital ratios have been raised, and banks have recently recapitalized in Italy and Portugal. Banks now make less use of short-term wholesale funding. Regulations continue to be strengthened and supervision has been enhanced. Steps are being taken to address the burden of nonperforming loans. Efforts continue to be made to adapt business models, and there has been some consolidation within the banking sector in a number of countries.

At the same time, the long-awaited cyclical recovery is gathering momentum. European bank equity prices have increased, rising by about 40 percent on average since mid-2016 (Figure 1.22, panel 1). Bank profits should be helped by the steepening in yield curves, which has relieved some of the building pressures on bank net interest margins in a low rate environment (see Chapter 2). Earnings should also be buoyed by the strengthening economic outlook as provisions fall and lending grows. Despite this improvement, market valuations (price-to-book ratios) continue to reflect concerns about the ability of European banks to generate sustainable profits (Figure 1.22, panel 2). Indeed, in a large sample of European banks, the 2016 return on equity was weak

Figure 1.22. Banking Sector Market Valuations and Return Performance

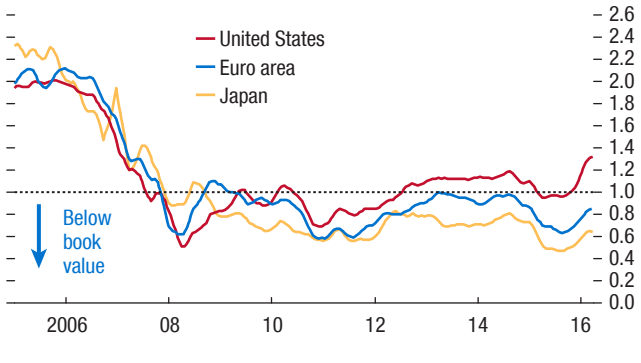
Bank equity prices have increased ...

1. European Bank Equity Prices and the Slope of the Yield Curve



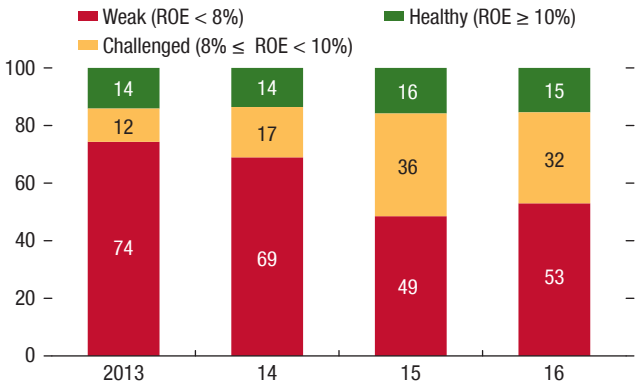
... but European equity valuations remain low.

2. Bank Price-to-Book Ratios (Multiple)



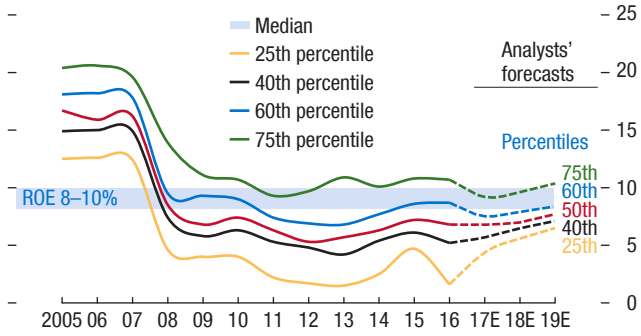
A significant proportion of banks have weak profits ...

3. European Banks, by Return on Equity Thresholds over Time (Percent of sample, by assets)



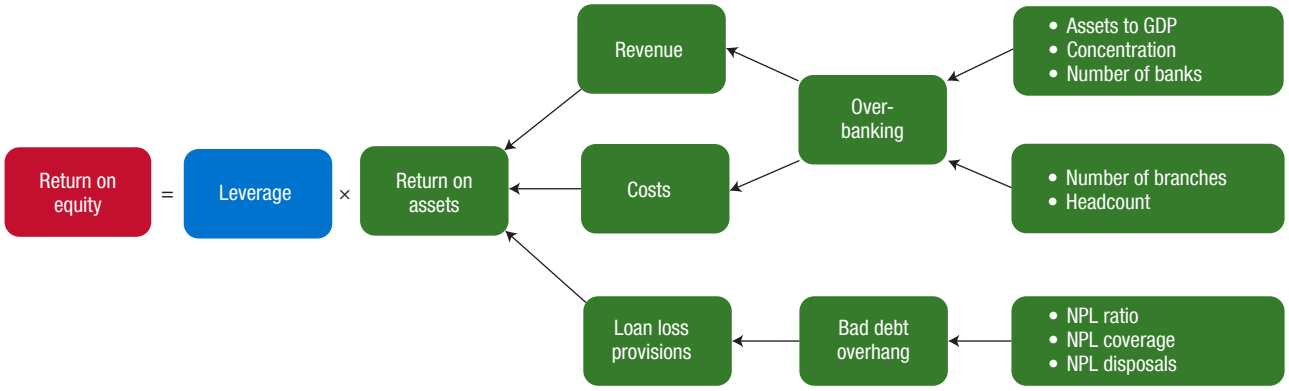
... and analysts do not expect this to change quickly ...

4. Selected European Bank Return on Equity (Percent)



... in the face of significant structural challenges.

5. Structural Causes behind Weak Profitability



Sources: Bloomberg L.P.; SNL Financial; and IMF staff estimates.
Note: In panel 1, the yield curve slope shows the difference between the three-year euro swap rate and the overnight euro rate. Panel 3 is based on a sample of 172 of the largest European banks. Panel 4 is based on about 80 European banks with analysts' forecasts. E = estimate; NPL = nonperforming loan; ROE = return on equity.

(less than 8 percent) for about half of the banks, by assets (Figure 1.22, panel 3).[15]

Although cyclical support for bank profits is welcome, it is likely to be insufficient to resolve the profitability challenge that many banks and banking systems face. The October 2016 GFSR concluded that even after a cyclical recovery in profits, a group of structurally weak banks, representing about $8.5 trillion in assets (or about one-third of bank assets), would be stuck with a return on equity less than 8 percent. This finding is corroborated by market analysts who do not expect the economic upturn to increase bank profits significantly and predict that the asset-weighted average return on equity for about 80 European banks will remain below 8 percent until 2019, and the majority will have a return on equity below that level over the next three years (Figure 1.23, panel 4).

Persistently weak profitability is a systemic stability concern. Low profits can prevent banks from organically building cushions against unexpected losses and thereby make them more vulnerable to adverse shocks. Sustained returns below the cost of equity can also inhibit banks' access to private capital, because investors are generally more willing to recapitalize banks if their profitability will sustain valuations above book value and so avoid future dilution. At the same time, banks facing profitability pressures may look to drive up returns by taking greater risks, for example by seeking higher yields, lending to less creditworthy borrowers at higher spreads, or increasing the maturity mismatch between loans and funding. Weak returns also limit banks' ability to expand balance sheets and lend without depleting their capital base, and therefore place a drag on recovery.

System-wide Operating Environments Are Compounding Challenges to Bank Profitability

Does weak profitability result from poor business models only, or do system-wide operating environments also play an important role? To answer this question—which has important policy implications—we divide banks in our sample of $35 trillion by assets of 172 large European banks into three groups: global, Europe focused, and domestic (Table 1.3 provides further information on the grouping of banks and on the sample used in this analysis). Although the challenge of bank profitability is widespread, domestic banks (banks with more than 70 percent of revenues or assets in their home market) as a group struggled especially with profitability in 2016. Overall, three-quarters of domestic banks in our sample had a weak return on equity, compared with about 65 percent of sample global banks and just 15 percent of Europe-focused banks in our sample (Figure 1.23, panel 1).

In the euro area, significant strides have been made to forge a full-fledged banking union. However, differences in national supervisory practices, legal frameworks, impediments to cross-border mergers and acquisitions, and the role of government policies and institutions in influencing credit distribution mean that the country-level system operating environment and features can influence profitability. Domestic banks, in particular, face more limited scope to improve profitability by shifting their exposures across markets, and hence the profitability of these banks more clearly reflects the structural features of their home systems. Therefore, the discussion of structural features in this section focuses on the performance of domestic banks.

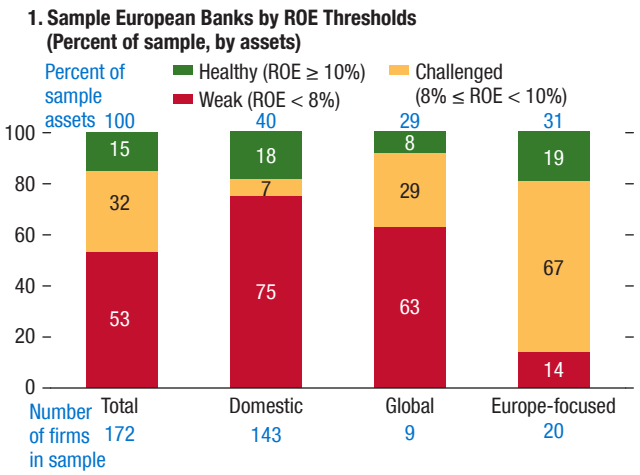
There is great variability in domestic banks' profitability across countries—measured on either a return on equity or return on assets basis (Figure 1.23, panel 2). Although sample domestic banks in Italy and Portugal suffered losses overall in 2016, and the German, Spanish, and U.K. domestic banks in our sample were barely profitable, sample domestic institutions in Ireland, Norway, and Sweden were able to generate much higher returns in the same year.

This variability in profits suggests that it is not necessarily the domestic bank business model as a whole that is the problem, but that conditions and system-wide features in each country can also limit profitability. Cyclical economic conditions—including interest rates, the slope of the yield curve, asset quality, and credit growth—could drive some of this variability. But there are also a number of system-wide structural impediments that could

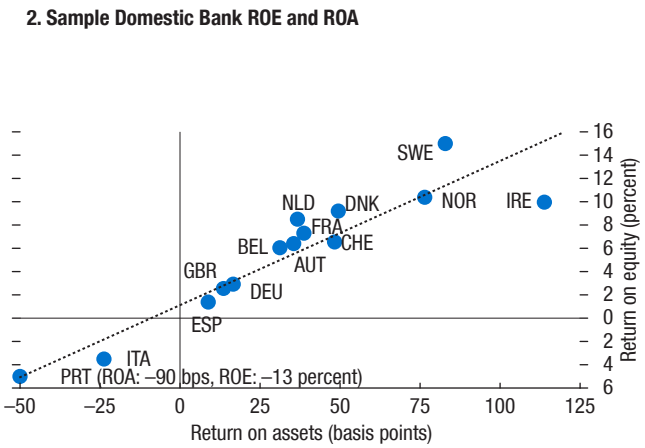
[15]Much of the analysis in this section is based on 2016 profit data. If annual 2016 data have not yet been published, available figures have been annualized. In the few cases where no 2016 numbers have been reported, 2015 profits have been used. An 8 percent return on equity benchmark is used because, as discussed in the October 2016 GFSR, investor surveys suggest that banks' cost of equity is at least 8 percent (though some investors indicated that the cost of equity is above 10 percent).

Figure 1.23. European Bank Profitability, 2016

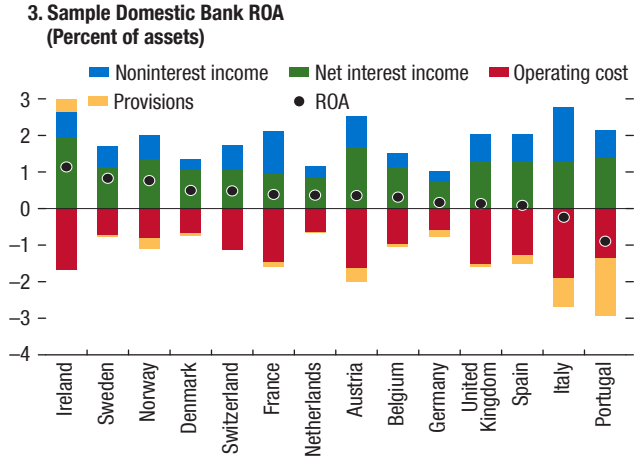
Return on equity varies by type of bank ...



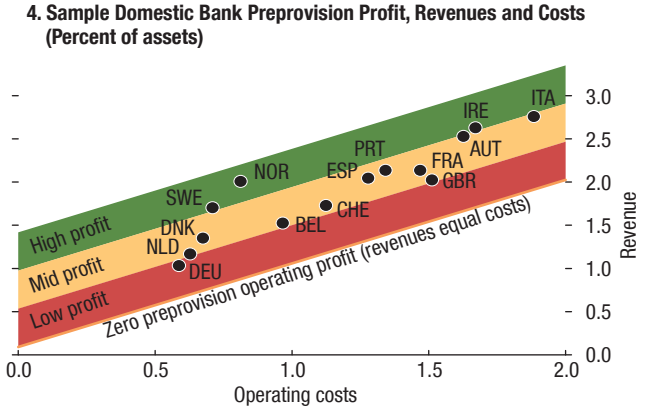
... and profitability varies across countries.



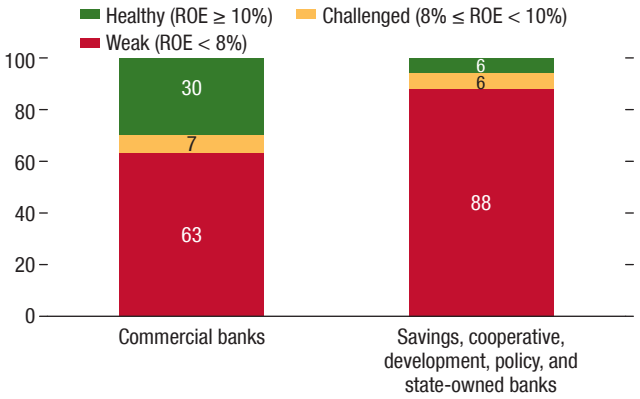
The underlying drivers of profitability differ ...



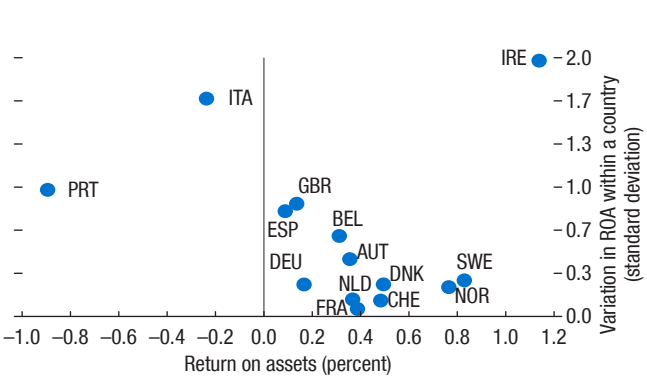
... and may be related to revenues and costs.



Profitability also varies across groups of institutions ...



... and within countries.



Sources: Bloomberg L.P.; SNL Financial; and IMF staff calculations.
Note: Panel 1 is based on a sample of 172 of the largest European banks. Panels 2 to 6 are based on the 143 domestic banks in the sample. The individual countries in the figure are those with the 15 largest bank assets in the sample, excluding Greece. Conduct costs have been removed. Data labels in the figure use International Organization of Standardization (ISO) country codes. ROA = return on assets; ROE = return on equity.

Table 1.3. Details of the Sample Used in the European Bank Analysis

Sample: The sample used in the analysis contains 172 of the largest European banks, where the required data were available. Total 2016 assets in the sample amount to $35 trillion. The sample includes a range of different types of bank so that the analysis could distinguish between profitability across a range of institutions by business model, ownership, and country.

Type of bank: The analysis classifies banks into three main types: domestic, Europe focused, and global. The distinction is based on the geographic location of bank revenues, or assets if revenues are not available. If neither of these is reported, a manual review of qualitative information in bank financial statements is used.

Type of bank:	Definition:
Domestic bank	Home market > 70 percent of total
Europe-focused bank	Europe > 70 percent, but home market < 70 percent of total
Global bank	Europe and home market < 70 percent of total

Bank classification: The classification of institutions into commercial banks and others (*Landesbanken*, cooperative banks, state-owned banks, and policy banks) is based on a review of each bank's financial reports and websites.

	Sample Assets (billions of U.S. dollars)						Proportion of Sample Assets (percent)	Number of Firms in the Sample					
Countries	Total	Domestic	Europe Focused	Global	Commercial Banks	Others		Total	Domestic	Europe Focused	Global	Commercial Banks	Others
France	7,785	2,475	5,309	0	3,648	4,136	22.3	7	4	3	0	2	5
United Kingdom	6,697	2,177	0	4,520	6,648	49	19.2	13	10	0	3	12	1
Germany	4,452	2,180	595	1,677	2,483	1,969	12.7	22	17	4	1	9	13
Spain	3,767	1,583	0	2,184	3,601	166	10.8	15	13	0	2	11	4
Italy	2,651	1,744	906	0	2,063	588	7.6	21	20	1	0	10	11
Switzerland	2,476	612	95	1,769	1,978	498	7.1	20	16	1	3	8	12
Netherlands	1,866	276	1,590	0	940	926	5.3	7	5	2	0	4	3
Sweden	1,545	318	1,227	0	1,506	39	4.4	7	4	3	0	5	2
Denmark	825	331	494	0	803	22	2.4	6	5	1	0	5	1
Austria	733	514	220	0	307	426	2.1	14	13	1	0	5	9
Belgium	543	253	290	0	543	0	1.6	5	4	1	0	5	0
Norway	346	346	0	0	321	26	1.0	6	6	0	0	4	2
Greece	340	340	0	0	340	0	1.0	5	5	0	0	5	0
Portugal	314	273	40	0	214	99	0.9	6	5	1	0	3	3
Ireland	289	289	0	0	188	101	0.8	4	4	0	0	3	1
Others	299	278	21	0	106	193	0.9	14	12	2	0	9	5
Total	**34,929**	**13,990**	**10,788**	**10,150**	**25,690**	**9,239**	**100**	**172**	**143**	**20**	**9**	**100**	**72**
Proportion of total (percent)	100	40	31	29	74	26		100	83	12	5	58	42

Sources: SNL Financial; and IMF staff calculations.

Note: Other countries are those where there are fewer than four banks in the sample (Cyprus, Finland, Iceland, Liechtenstein, Luxembourg, Malta, Slovenia).

lower bank profitability even after cyclical conditions improve.[16]

To understand which structural features may be creating the greatest impediments, it is important to assess the sources of weak profitability. Figure 1.22, panel 5, shows how return on assets can be decomposed into revenues, costs, and loan loss provisions. The range of revenues, costs, and provisions for the domestic banks in our sample in 2016 is shown in Figure 1.23, panels 3 and 4. Interestingly, some domestic banks with weak return on assets have a relatively high preprovision operating profit. This suggests that profitability is largely being affected by the provisioning that they need to undertake to build buffers against the nonperforming loans on their balance sheets. Other domestic banks in the sample with weaker preprovision operating profits may be facing different structural challenges affecting revenues and costs, as discussed below.

Overbanking in Systems Should Be Reduced

One main structural challenge is overbanking. There is no common definition of overbanking. The European Systemic Risk Board has used this term to describe excessive growth in the European banking system, and the European Central Bank has said that overbanking and overcapacity create intense competition and affect bank profitability.[17] Here, the term "overbanking" refers to the variety of structural factors that lead to an overly large banking sector that affects the profitability of the banks in the system. Overbanking can affect revenues—possibly owing to too many banks chasing too few profitable and sound lending opportunities, compressing pricing and margins—and can affect costs and operational efficiency—possibly due to a high number of branches or staff (Figure 1.22, panel 5).

The causes of overbanking can vary from country to country; examples include a banking system with assets that are large for the economy it serves, a long weak tail of banks with low buffers, or too many banks with a regional focus and narrow mandate. These features can result in concentrated lending opportunities and less scalable lending, or a high number of branches relative to the assets in the banking system that add to costs and reduce operational efficiency.

The strength of the structural factors in each country varies across domestic banking systems. In countries where most of the sample domestic banks perform poorly—shown in Figure 1.23, panel 6, where both return on assets and the variation in returns are low—system-wide impediments to profitability are more likely.

Table 1.4 shows a number of system-wide metrics to highlight the aspects of overbanking in different systems.

- The size of banking systems is illustrated by the ratio of local bank claims in a system relative to GDP.
- The degree of concentration in a banking system can be suggested by a number of measures, including bank assets per credit firm, the number of banks operating in a country, and an index of concentration (Herfindahl).
- Cost pressures reflect many factors, and in reality the structural drivers of revenues and costs are intertwined; for example, a high number of branches and staff can be a by-product of having too many banks in the system. These operational efficiencies are illustrated by the level of assets per branch and per employee.

In addition, system structure may have an impact on profitability. Banking systems with a high proportion of savings or cooperative banks, *Landesbanken*, and policy or state-owned banks may face additional pressure on revenues.[18] Figure 1.23, panel 5, shows that the domestic cooperative and savings banks, devel-

[16]The October 2016 GFSR includes an analysis of the impact of a cyclical recovery on European bank profitability and finds that this would not be sufficient to fully restore profitability.

[17]European Systemic Risk Board 2014 highlights the ratio of banking system assets to GDP as an important metric in identifying overbanking. A European Central Bank speech—"Resolving Europe's NPL Burden: Challenges and Benefits," by Vitor Constancio (February 3, 2017)—notes that in addition to the resolution of nonperforming loans, bank profitability is also challenged by high costs and overbanking (https://www.ecb.europa.eu/press/key/date/2017/html/sp170203.en.html). Another European Central Bank speech—"Welcome Address at the First Annual ESRB Conference," by Mario Draghi (September 22, 2016)—notes that overcapacity and the ensuing intensity of competition affect bank profitability (https://www.ecb.europa.eu/press/key/date/2016/html/sp160922.en.html).

[18]Savings banks are institutions whose primary purpose is to channel savings deposits, particularly by providing local or regional banking services to small and medium-sized enterprises. Cooperative banks are similar institutions that are owned by their customers. *Landesbanken* are public banks in Germany that are owned by regional authorities. Policy or state-owned banks are owned by governments.

Table 1.4. Structural Factors Affecting Bank Revenues and Costs

	System Size	System Concentration			Operational Efficiency		System Structure
	Bank Local Claims to GDP (times)	Assets per Credit Firm (billions of euros)	Total Number of Credit Firms	Herfindahl Concentration Index for Credit Institutions (index)	Assets per Branch (millions of euros)	Assets per Headcount (millions of euros)	Share of Savings and Cooperative Banks (percent)
	2016:Q3	2015	2015	2015	2015	2015	2015
Austria	1.5	1.3	678	397	209	12	55
Belgium	1.4	10.8	99	998	306	19	4
Denmark	3.0	9.1	113	1,180	921	25	20
France	2.1	17.5	467	589	217	20	60
Germany	1.6	4.3	1,774	273	225	12	53
Ireland	1.1	2.6	416	679	1,056	50	
Italy	1.9	6.0	656	435	129	13	12
Netherlands	2.2	12.0	209	2,104	1,419	28	30
Portugal	1.9	3.1	147	1,159	80	9	35
Spain	1.7	13.0	218	896	91	14	43
Sweden	1.8	8.4	153	866	721	24	24
United Kingdom	2.3	25.8	362	432	869	23	19

Sources: Bank for International Settlements; European Association of Cooperative Banks; European Central Bank; European Savings Bank Group; Haver Analytics; and IMF staff calculations.

Note: Red (green) shading denotes the four most (least) overbanked systems or those with the highest (lowest) share of savings, cooperative, or state banks. The remaining four systems are shown in yellow. Data are for the dates shown, or latest available figures. The first column shows domestic claims of all banks located in each country, relative to GDP.

opment and policy institutions, *Landesbanken,* and state-owned banks in our sample tended to have lower overall return on equity than other sample domestic banks in 2016.

Overall, no single structural factor clearly explains profitability concerns across a range of countries. A number of features in a system may hurt institutions' pricing and other behavior that then put downward pressure on the profitability of other banks operating in the same country. Each country has a unique mix of structural features that may impact profitability. For example, the French banking sector is large relative to the economy and has a high share of savings and cooperative banks. The banking systems in Austria and Germany have a large number of banks, low concentration, and a large share of savings and cooperative banks. In Italy, Portugal, and Spain there is a large number of branches or staff relative to banking assets (there is also a large number of banks and low concentration in Italy).

More Progress Needs to Be Made in Systems with the Biggest Challenges

Some banking systems have also been reducing costs by cutting excess capacity (Figure 1.24, panels 1 and 2). Banking systems in Denmark, the Netherlands, and Spain, in particular, have seen larger percentage reductions in branches and employees. Rationalizing branches, so that the ratio of deposits to branches of each sample bank at least reaches the European average, could reduce operating expenses by about $23 billion overall, equivalent to 23 percent of after-tax profits for the banks considered here.[19]

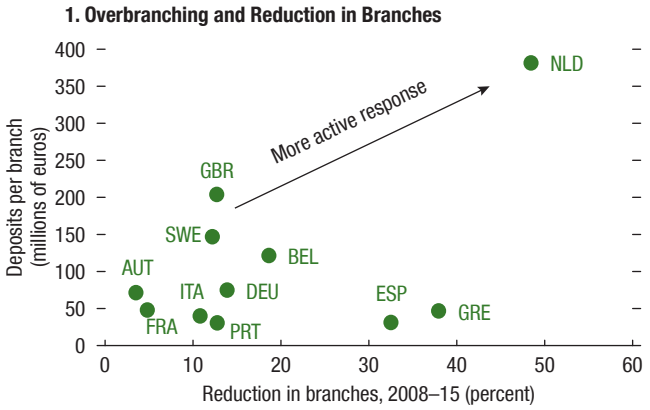
Both business pressures and labor market rigidities can inhibit banks' ability or incentives to restructure more quickly and aggressively. For many banks, high restructuring costs reduce up-front earnings, effectively precluding banks from making the cuts needed to become more efficient. Likewise, many branches may have operating leases that run for a number of years, preventing the realization of short-term savings from closing branches. Demographic factors can also affect a decision to maintain branches because older populations tend to prefer banking in person, rather than over the Internet.

There has also been progress in tackling other structural features. For example, Spain underwent a substantial consolidation in 2009–12, accompanied by

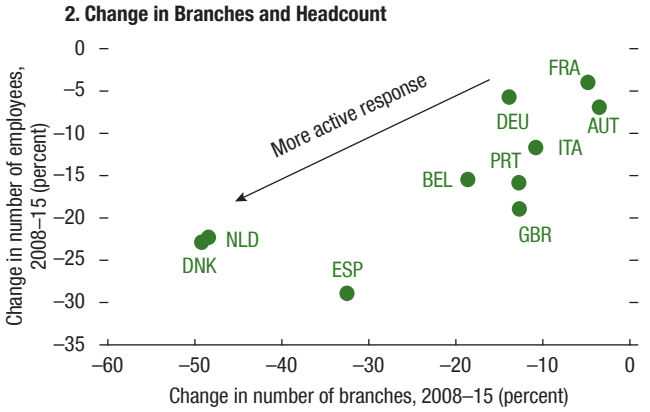
[19]This calculation is based on 159 banks out of the 172-bank sample, representing about 98 percent of sample assets.

Figure 1.24. European Banking System Actions to Reduce Costs

Actions to reduce branches vary significantly ...



... as do cuts in headcount.



Sources: European Central Bank; and IMF staff calculations.
Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

reforms to strengthen governance. There has been some consolidation in the German banking system, and *Landesbanken* continue to deleverage, with institutions downsizing balance sheets, increasing their focus on core business activities, and closing subsidiaries or foreign operations. In Italy, two large *popolare* banks have merged, and reforms to the cooperative bank sector, aiming to strengthen governance, have also been legislated.

More progress needs to be made to tackle profitability challenges in the banking systems with the biggest challenges. The specific actions needed will vary according to the mix of structural factors affecting the profitability in each banking system. Table 1.6 provides recommendations for actions in several European countries.

The Burden of Nonperforming Loans Still Needs to Be Reduced

The euro area as a whole has made progress in alleviating the burden of nonperforming loans on balance sheets. The formation of new problem loans has slowed as the economy has started to recover, write-offs have picked up, and sales of nonperforming loans have increased—cumulative 2010–16 sales now total about 40 percent of the peak level of impaired loans in the euro area.[20]

Resolving problem loans should bring real benefits. Institutions that have dealt adequately with nonperforming loans should also need to provision less in the future. Banks in Ireland and Spain, in particular, have made good progress in reducing nonperforming loans from peak levels. This followed a recognition of the systemic size of the problem, coupled with firm action to address the overhang, including through asset management companies, a strategic approach to restructuring banks, and government recapitalization support. But relatively little reduction, relative to peak levels, has occurred in two of the countries with the highest nonperforming loan ratios, Italy and Portugal (Table 1.5), and further progress needs to be made (shown by the recommendations in Table 1.6). For example, it could take about six years on average for the countries across the euro area to resolve the burden of impaired assets at current write-off rates and new bad debt formation rates[21]—though the pipeline of loan transactions suggests that sales of bad assets could pick up, particularly in Italy.

While actions are being taken to address the debt overhang, a number of structural barriers are still blocking the disposal of nonperforming loans. Inefficient legal frameworks can impede loan recovery and require banks to provision more. Several of the larger distressed asset markets reportedly continue to suffer from poor information quality, which lowers buyers' reservation prices. The characteristics of loan portfolios are structurally unattractive in some countries—it is harder for investors to price portfolios consisting of

[20]Data for sales of nonperforming loans are estimated from data in Deloitte 2017 and Pricewaterhouse Coopers 2016.

[21]IMF 2016 reached a similar conclusion on the length of time to resolve nonperforming loans in the euro area.

Table 1.5. Asset Quality Position and Recent Progress

	Gross NPL Ratio (percent)	Change from the Peak (percentage points)	Net NPL Ratio (percent)	Change in the Net NPL Ratio (percentage points)	Cumulative Write-offs to NPLs (percent)	Coverage Ratio (percent)	Change in Coverage Ratio (percentage points)
	2016:Q3		2016:Q3	2011–16	2013–15	2016:Q3	2011–16
Austria	3.1	–1.0	1.3	0.5	37	58	–14
Belgium	3.5	–0.8	2.0	0.2	23	44	–4
Denmark	3.3	–2.6	1.9	0.1	49	43	–8
France	3.9	–0.6	2.0	0.2	56	50	–9
Germany	2.0	–0.7	1.2	0.2	73	42	4
Ireland	14.6	–11.1	8.5	–0.4	61	42	–3
Italy	12.2	–0.1	6.2	2.5	22	49	9
Netherlands	2.6	–0.7	1.4	–0.2	54	44	4
Portugal	12.6	–0.2	4.3	0.8	53	66	11
Spain	5.7	–3.7	3.3	0.7	63	43	–14
Sweden	1.0	–0.2	0.7	0.5	48	34	–36
United Kingdom	1.0	–3.0	0.6	–1.9	46	42	4

Sources: Central banks; Haver Analytics; IMF, Financial Soundness Indicators database; SNL Financial; and IMF staff calculations.
Note: Red (green) shading denotes the four most (least) risky systems or those that have made the least (most) progress. The remaining four systems are shown in yellow. Data are for the dates shown, or latest available figures. The definition of NPLs is not harmonized across all countries. The peak in the second column is the maximum since 2008. Cumulative write-offs are for a broad sample of banks and are shown as a percentage of 2013 NPLs. NPL = nonperforming loan.

small, heterogeneous loans to small and medium-sized enterprises with collateral of uncertain value than to price portfolios of homogenous unsecured loans. But while these technical issues are important, insufficient buffers at banks to absorb additional losses recognized on sales of bad debts at market prices continues to be an impediment. Therefore, the lack of progress on resolving nonperforming loans also reflects weak earnings and insufficient generation of capital and provisioning buffers.

Systemically Important Banks May Also Be Affected by System-wide Problems

These system-wide challenges are not only a problem within countries: they can affect the profitability of global systemically important banks (G-SIBs) in Europe as well. These institutions are finding it difficult to keep up with their global competitors, and in some cases this is partly due to the profitability problems they are facing in their home countries. The extent of this domestic impact will depend on the exposure of G-SIBs to their home economies. Although this exposure varies significantly across banks, domestic business represents on average about half of European G-SIBs' total assets and about 40 percent of total revenues.[22]

European G-SIBs have strengthened their capitalization and liquidity positions and are in the process of restructuring business models by cutting back balance sheets and reorganizing businesses. They have also made good progress in writing off legacy assets. But profitability remains a challenge for many of these banks and virtually none of the European G-SIBs are currently able to approach the profitability of their U.S. peers (Figure 1.25, panel 1). Of those that have comparable preprovision profitability, several continue to be hampered by continued high provisions, which lowers their return on assets. But many banks have poor preprovision profit margins and thus require further restructuring of their business models to improve core profitability (Figure 1.25, panel 2). While European G-SIBs have been making efforts to cut costs by reorganizing their businesses, these efforts have had varying degrees of success (Figure 1.25, panel 3).

Market pricing of G-SIBs shows differences in investor perceptions of European banks (Figure 1.25, panel 4). Higher price-to-book ratios and lower credit default swap spreads indicate market conviction that business models are already robust. In contrast, lower equity market valuations and higher spreads suggest that investors believe further progress is needed to strengthen business models. Addressing system-wide

[22]Domestic assets and revenues range from about 10 percent of the total to about 95 percent of the total across European G-SIBs, excluding Standard Chartered, based on data from bank financial statements, Bloomberg L.P., SNL Financial, and IMF staff calculations.

Table 1.6. Selected IMF Policy Recommendations

Country	Recommendations	Progress
France	Ensuring profitability necessitates further cost cutting, diversification, and possibly consolidation within the euro area. Regulated savings rates in France should continue to be adapted to reflect market interest rate conditions.	Banks are adapting business models by further diversifying into asset management, private banking, and insurance activities.
Germany	The banking system faces structural headwinds and will need to adapt. Low profitability reflects various combinations of persistent crisis legacy issues, provisions for compliance violations, the need to adjust business models to the postcrisis regulatory environment and technological change, as well as long-standing structural inefficiencies.	Consolidation is ongoing, albeit gradually. The German savings bank sector is deleveraging, with institutions downsizing balance sheets and focusing on core business activities. Restructuring efforts at large banks, however, still need to bear fruit and cost cutting remains slow.
Italy	Further steps would help advance banks' balance sheet repair, including through more intensive use of out-of-court debt restructuring mechanisms; strengthened supervision to facilitate decisive progress in reducing nonperforming loans; and undertaking a systematic assessment of asset quality for those banks not already subject to the European Central Bank comprehensive assessment, with follow-up actions in line with regulatory requirements. Effective use of the framework for the timely and orderly resolution of failing banks would prevent the costs of the weaker banks from being borne by the rest of the system and eventually raising stability concerns.	Monte dei Paschi applied for a precautionary state recapitalization in December 2016. Unicredit successfully raised almost €13 billion in capital and, following their conversion into joint-stock companies, Banco Popolare di Milano and Banco Popolare merged. Mutual bank reform is ongoing. The authorities approved issuance of up to €20 billion in additional government debt to potentially support bank capital and liquidity.
Portugal	To return to profitability and successfully finance economic growth, banks should clean up their balance sheets through a comprehensive approach to debt restructuring supported by an increase in capital, loan loss provisions, and impairment provisions and by appropriately pricing and selling bad loans. Banks should also reduce operating costs and improve their internal governance to let lending decisions be guided solely by commercial criteria.	In March 2017, the final agreement with the European Commission on a €5 billion recapitalization of Caixa Geral de Depositos was announced. Negotiations to sell Novo Banco continue. Banco Comercial Portugues has received a private capital injection and Banco BPI's takeover by CaixaBank has been concluded.
Spain	Continuing to ensure adequate provisioning, further improving efficiency gains—possibly through mergers—boosting non-interest income, and further increasing high-quality capital would enhance the banking system's ability to withstand shocks, and facilitate sufficient credit provision as credit demand picks up.	The system is closer to putting most of the crisis legacies behind it. The framework for savings banks and banking foundations is now fully in place and requires banking foundations either to divest relevant credit institutions or to set up reserve funds.

Source: IMF 2016–17 Article IV Staff Reports and Financial System Stability Assessments; and IMF staff.

problems together with efforts to address business models would work best together in resolving profitability challenges, therefore enhancing systemic resilience.

The Sovereign-Bank Nexus Could Reemerge

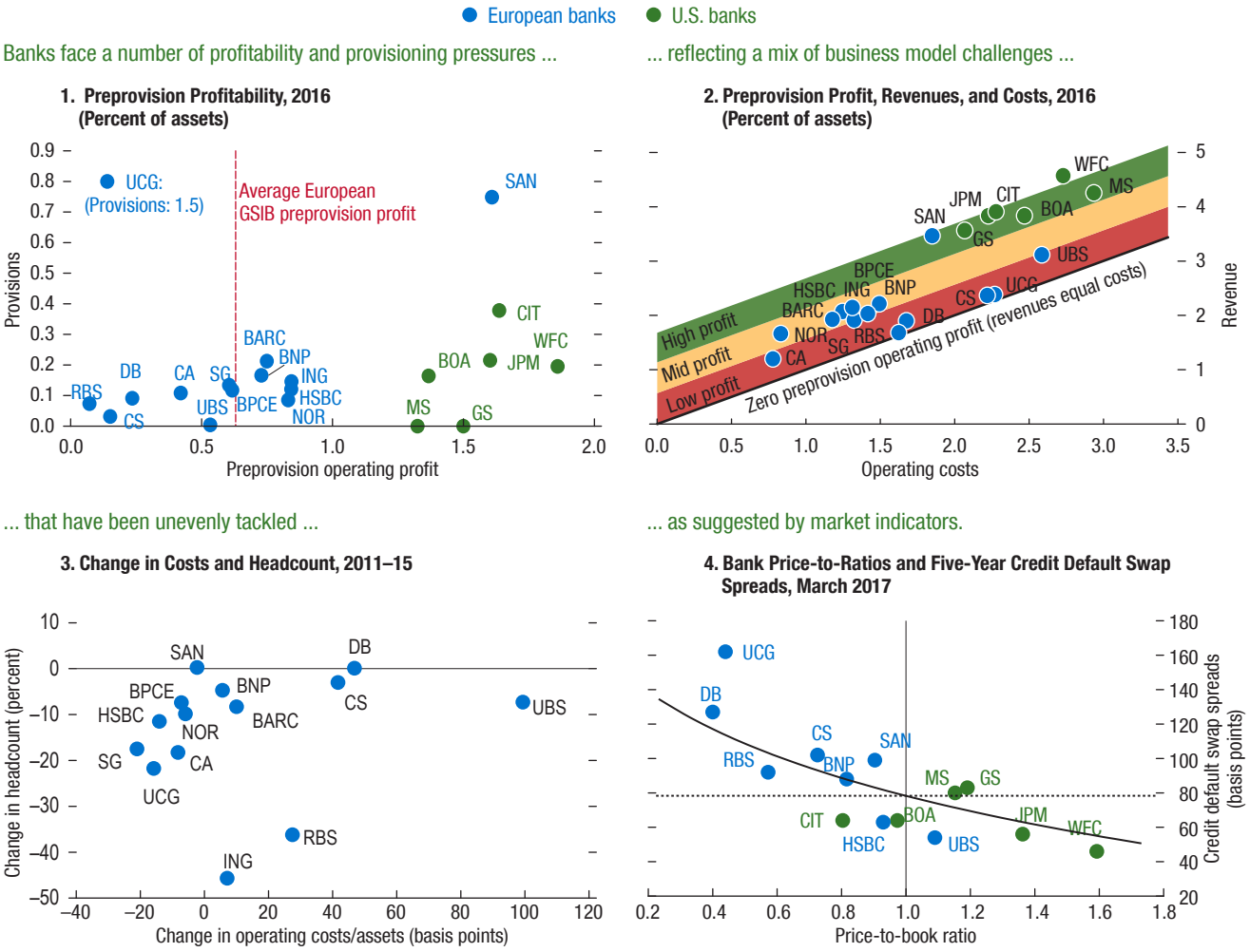
The combination of weak profitability in both domestic banks and G-SIBs, lack of access to private capital, and a large stock of unresolved problem loans has the potential to reignite systemic risks in some economies. Weaknesses in the Italian and Portuguese banking systems led to a widening in bank credit default swap spreads in 2016 (Figure 1.26, panels 1 and 2). These banking risks led, in turn, to a rise in associated sovereign spreads through market concerns about contingent liabilities for the government.[23] Measures such as the EU Bank Recovery and Resolution Directive and Total Loss Absorbing Capacity rules should limit spillovers from banks to sovereigns.[24] But it will take some time to build up sufficient bail-inable liabilities and address bank and system-wide weaknesses, implying that severing the bank-sovereign nexus remains a work in progress.

More recently, government bond spreads have risen in France and Italy, and they remain at high levels in Portugal. This likely reflects a combination of con-

[23]IMF 2015c discusses these issues in more detail.

[24]The Bank Recovery and Resolution Directive establishes rules within the European Union for recovery and resolution of banks, including the resolution of nonviable banks, through the bail-in of some creditors, and rules establishing a minimum amount of bail-inable instruments (8 percent of total liabilities).

Figure 1.25. Global Systemically Important Bank Business Model Challenges



Sources: Financial statements and management presentations from banks listed in the note; Bloomberg L.P.; SNL Financial; and IMF staff calculations.
Note: In panels 1 to 3, conduct costs have been removed. GSIB = global systemically important bank; BARC = Barclays; BNP = BNP Paribas; BOA = Bank of America; BPCE = Groupe BPCE; CA = Crédit Agricole; CIT = Citigroup; CS = Credit Suisse; DB = Deutsche Bank; GS = Goldman Sachs; HSBC = HSBC Holdings; ING = ING Bank; JPM = JPMorgan; MS = Morgan Stanley; NOR = Nordea; RBS = Royal Bank of Scotland; SAN = Santander; SG = Société Générale; UBS = UBS Group; UCG = Unicredit; WFC = Wells Fargo.

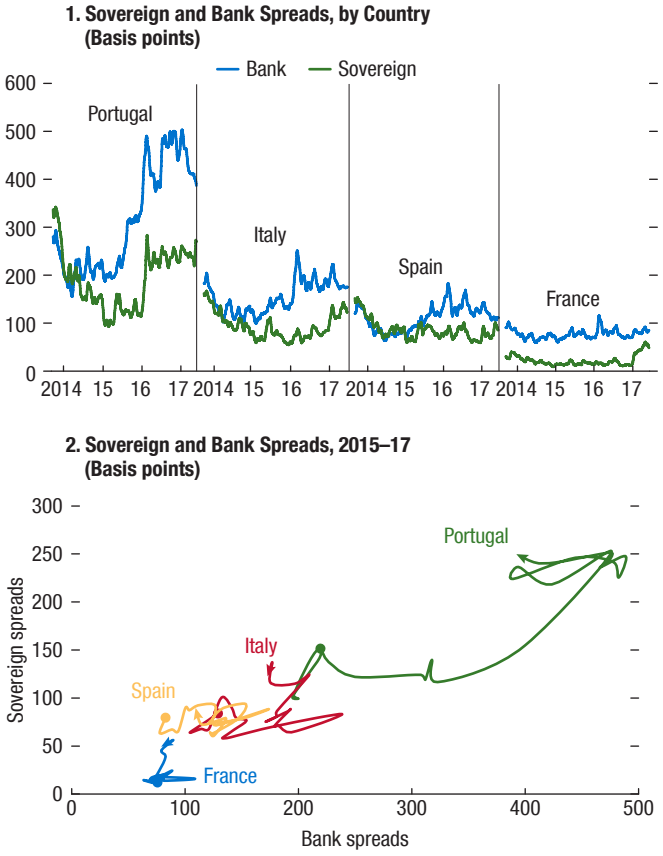
cerns about higher political risks and government debt burdens. There is a risk that higher sovereign spreads could spill back to the banking sector. First, sovereign downgrades could increase bank wholesale funding costs and reduce the amount of assets that banks have available as acceptable collateral. Second, although banks have generally reduced their holdings of local government bonds, some institutions continue to hold a significant amount of these bonds on their balance sheets and could face mark-to-market losses on the bonds held in trading books and available-for-sale portfolios. These wholesale funding and trading risks would be especially problematic if financial conditions were to tighten sharply.

Brexit[25] further Complicates Challenges for System Efficiency and Financial Stability

Box 1.3 assesses the potential financial stability and cost implications of Brexit, albeit with a high degree of

[25]Brexit refers to the June 2016 U.K. referendum result in favor of leaving the European Union.

Figure 1.26. Bank and Sovereign Nexus



Sources: Bloomberg L.P.; and IMF staff calculations.
Note: The figure shows mean five-year senior credit default swaps for banks from each country and five-year sovereign spreads to Bunds. Panel 1 shows a 10-day moving average. Panel 2 shows the evolution of sovereign and bank spreads from 2015 (dot) to 2017 (arrow).

uncertainty about the final outcomes of negotiations. In particular, London is susceptible to losing some of its predominance as a global financial center, with attendant costs related to the loss of economies of scale in conducting financial activities. Regulatory challenges and complexities may also increase, although lower concentration in one center may bring diversification gains to financial stability.

More Comprehensive Efforts Are Needed to Address System and Business Model Challenges

Banks should seek out opportunities to increase weak revenues and reduce high operating costs. Any consolidation should also go hand in hand with governance reforms, where needed, and should avoid creating any too-big-to-fail concerns. To determine weak links in banking systems with significant asset quality challenges, consideration could be given to targeted asset quality reviews for banks that have not undergone such an exercise. Regulators should then take action to resolve unviable institutions to remove excess capacity from banking systems. Authorities should also focus on removing system-wide impediments to profitability. The precise prescription, however, will vary across countries (Table 1.6).

Banks have the primary responsibility for developing sustainable earnings by tackling business model problems. While there is no single business model that will work for all, banks should continue to restructure their business to enhance returns and invest in technology to increase medium-term efficiency. But supervisors also have a role to play. Encouragingly, authorities are increasingly emphasizing the examination of bank business models in their supervisory frameworks. Both the Single Supervisory Mechanism, in its Supervisory Review and Evaluation Process, and the U.K. Prudential Regulation Authority are taking a forward-looking approach to assessing the sustainability of bank business models. If any banks are reacting to profitability challenges by taking greater risks, authorities should consider macroprudential or other regulatory measures to reduce the probability of future problems.

Further action is needed to fully resolve the burden of nonperforming loans.[26] A number of initiatives have been undertaken, which should help speed up bad debt disposal. The European Central Bank has published guidance to banks on how to tackle nonperforming loans.[27] In Italy, two *Atlante* funds have been set up by a group of financial institutions and banking foundations, and the authorities have established a public guarantee on senior tranches of securitized bad loans. Several countries have also put in place reforms to legal frameworks to help alleviate the process of resolving problem loans. Accounting standards (International Financial Reporting Standard 9) should also ensure greater forward-looking provisioning when phased in and may change the dynamics of loss recognition by making banks more proactive. But supervisors should ensure that banks adopt ambitious, time-bound strategies for the disposal of nonperforming loans. Authorities should also

[26]See, for example, European Central Bank 2016; IMF 2015a, 2015b, and 2016; and Jobst and Weber 2016.
[27]European Central Bank 2017.

encourage the development of a market for problem loans. To help erode bank-sovereign links, consideration should be given to reducing the thresholds for the direct recapitalization of viable banks under the European Stability Mechanism and a common deposit insurance scheme should be established in the euro area.

Completing the regulatory reform agenda is vital to ensure that weaknesses are addressed and to reduce uncertainty. In particular, it is important to finalize an agreement on the Basel III package of reforms, including the revision of the "standardized" approach to the calculation of risk-weighted assets and boundaries to the use of internal models to assess risks (Box 1.2).

Box 1.1. Could Fragilities in Offshore Dollar Funding Exacerbate Liquidity Risk?

Global liquidity risks could be amplified by the currency mismatch between non-U.S. banks' assets and liabilities, especially if U.S. interest rates were to increase sharply and the dollar were to appreciate. Risks would be greatest for those banking systems that are highly dependent on short-term dollar funding for long-term assets.

In recent years, monetary policy divergence between the United States and other economies has led some non-U.S. banks to accumulate higher-yielding foreign-currency assets at a pace that has exceeded their funding in those currencies. In many cases, U.S. dollar–denominated assets have outpaced the supply of U.S. dollar funding via deposits, certificates of deposit, commercial paper, and other sources.[1] At the same time, regulatory changes and money fund reform have limited the supply of U.S. dollar funding.[2] The resulting imbalance in the supply and demand of offshore dollars has led to a persistent premium in the price to swap local-currency funding into dollars via foreign exchange swaps, known as the cross-currency swap basis.[3]

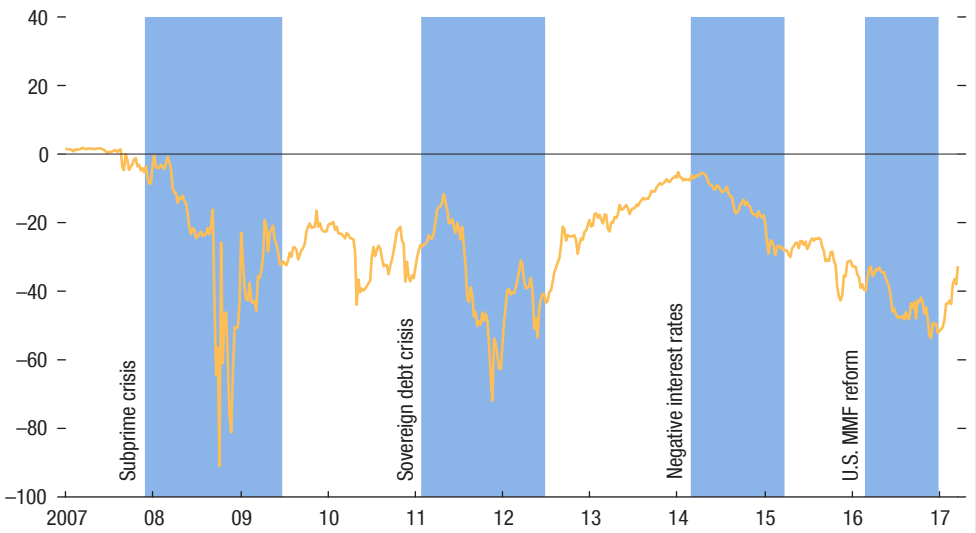
After having steadily widened over 2014–16, cross-currency swap bases have narrowed considerably since late 2016 (Figure 1.1.1). It is unclear what has reduced the cost of dollar funding over this recent period, though several factors point to greater availability of dollar funding—most notably a modest pickup in U.S. prime money fund assets, greater demand from other investors less affected by regulatory balance sheet constraints (for example, corporations, offshore money funds, private liquidity funds), and central bank efforts to provide larger backstops.

[1]McGuire and von Peter 2012.

[2]These include, for instance, bank regulatory reforms, notably adjustments to (1) the capital ratio—the cross-currency swap basis has been more volatile since the crisis, and greater volatility increases a bank's value-at-risk measure, which in turn affects the risk-weighted assets calculation and capital charges; (2) the Volcker Rule—which prohibits firms from engaging in proprietary trading activities in foreign exchange forwards and swaps; and (3) over-the-counter derivatives reform—which increased the capital and minimum margin requirements for cross-currency swap bases.

[3]Under no-arbitrage conditions, the cost of funding in dollars should be equal to the combined cost of funding in a foreign currency and swapping the funds for dollars.

Figure 1.1.1. Weighted Average of Cross-Currency Swap Bases in Selected Advanced Economies
(Basis points)



Sources: Bank for International Settlements; Bloomberg L.P.; and IMF staff estimates.
Note: Weights are based on daily average foreign exchange swap turnover versus the U.S. dollar for the euro, Japanese yen, British pound, and Swiss franc. MMF = money market fund.

Box 1.1 *(continued)*

Even so, many cross-currency swap bases remain negative, suggesting these factors have not been sufficient to fully meet the demand for dollars.

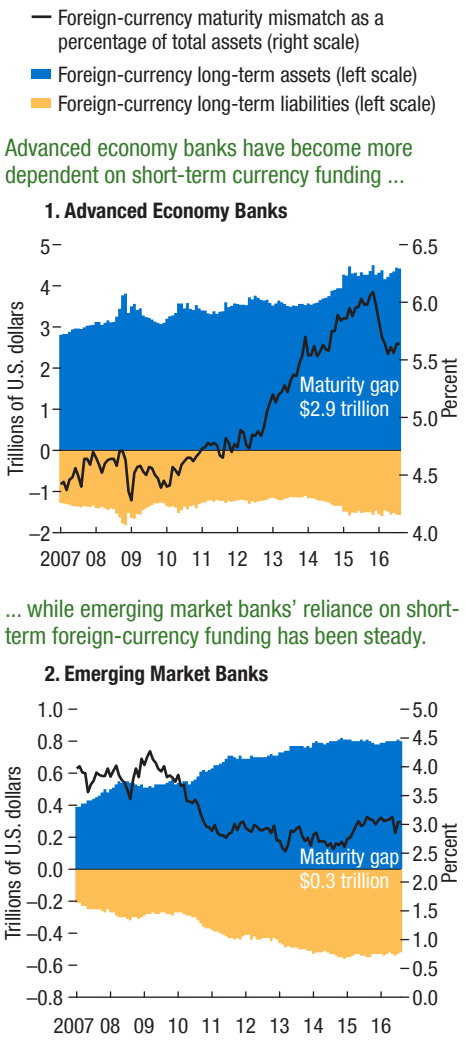
Furthermore, there is reason to believe that the imbalance could persist. Research has found that dollar appreciation—such as may be expected if U.S. growth accelerates and the Federal Reserve continues to raise policy rates—is associated with more negative cross-currency swap bases.[4] In addition, the supply of offshore dollars could deteriorate in the event of potential U.S. tax reform. U.S. corporations hold abroad an estimated $2.2 trillion in cumulative reinvested earnings from overseas operations. Roughly $1.3 trillion of that is in liquid assets, half of which is believed to be held in U.S. banks or U.S. investments. Based on what happened after the previous repatriation tax holiday in 2004 when U.S. companies repatriated $362 billion, tax incentives under a corporate tax reform could lead to repatriation of a significant portion of U.S. dollar assets. Other administrative measures, such as bank ring-fencing, have the potential to increase frictions in the supply of dollar funding, thus increasing the cost, and may lead to a more fragmented offshore dollar market.

Advanced economy banks, in particular, have become reliant on cheap short-term foreign-currency funding for their long-term foreign-currency assets (Figure 1.1.2). Since 2007, their maturity gap—the difference between long-term foreign-currency assets and long-term foreign-currency liabilities—has nearly doubled to $2.9 trillion. As a percentage of total assets, the maturity gap grew from 4.4 percent to a high of 6.1 percent in November 2015.

Banks are vehicles for maturity transformation, and interest rate risk is an intrinsic part of banking. Banks also actively manage foreign exchange and interest rate risk via derivative hedges. However, hedging introduces counterparty risk and does not eliminate rollover risk. When local-currency assets come under funding stress, the local central bank can usually provide almost limitless liquidity to banks via temporary funding transactions. But when funding strains arise for foreign-currency-denominated assets, local central banks can provide liquidity only from their finite foreign-currency reserves or by tapping foreign exchange swap facilities and credit lines with other official institutions. If offshore dollars were to become a scarcer resource, the resulting frictions could lead banks to reduce their global footprint or to increase

[4]Borio and others 2016.

Figure 1.1.2. Foreign-Currency Maturity Mismatches



Sources: Bloomberg L.P.; IMF, International Financial Statistics database, Monetary and Financial Statistics database; and IMF staff calculations.
Note: The foreign-currency maturity mismatch is the difference between long-term foreign-currency assets and long-term foreign-currency liabilities. Assets include 50 percent of other deposits, 50 percent of securities, other loans, 50 percent of equities, insurance, derivatives, trade credit, other accounts receivable residential, and accounts receivable. Liabilities include 50 percent other deposits ex-broad money, 50 percent of securities, other loan liabilities, insurance, derivatives, trade credit liabilities, other accounts payable residential, and accounts payable. In panel 1, advanced economies include Denmark, Finland, France, Germany, Greece, Ireland, Israel, Italy, Japan, Korea, Luxembourg, Netherlands, Norway, Portugal, Spain, and Sweden. In panel 2, emerging markets include Brazil, Bulgaria, Chile, Colombia, Egypt, Hungary, Indonesia, Malaysia, Mexico, Nigeria, Philippines, Poland, South Africa, Thailand, and Turkey.

Box 1.1 *(continued)*

their reliance on central banks acting as dollar providers of last resort.

In contrast to advanced economy banks, emerging market banks have a smaller and more stable maturity gap. Banking systems in emerging European economies are an exception, exhibiting large foreign-currency maturity mismatches, likely as a result of their extensive use of foreign-currency (mostly euro) deposit funding. The deposits are relatively sticky and generally safer than other forms of short-term funding. Foreign exchange regimes, such as currency boards, further mitigate risks. Yet even this kind of mismatch can present risk, and regulators have frequently advised banks to address it. In the event (however unlikely) that European short-term interest rates unexpectedly and rapidly rise, banks in these countries could be exposed to significant funding risk.

Global liquidity risks could be amplified by the currency mismatch between non-U.S. banks' assets and liabilities, the reduced supply of offshore dollars, and structural rigidities, especially if U.S. interest rates were to increase sharply and the dollar were to appreciate. Supervisors should encourage banks to reduce their foreign-currency maturity mismatches by lengthening their foreign-currency debt maturities and securing longer-term foreign-currency credit lines. Authorities should seek to expand bilateral and multilateral currency swap arrangements to backstop foreign currency liquidity, though use of these facilities should be viewed as extraordinary, with access to official liquidity priced accordingly.

Box 1.2. Regulatory Reform at a Crossroads

In response to the global financial crisis, the international community embarked on a major reform program to strengthen financial regulation. Addressing the fault lines at the source of the crisis was the key objective. This sweeping agenda has produced significant successes—banks have substantially increased their capital levels and holdings of liquid assets, increasing their resilience to shocks; derivatives trading is more transparent, and counterparty risks are lower; resolution frameworks have been introduced in some jurisdictions and upgraded in others; macroprudential frameworks have been developed; and the largest and most complex institutions are subject to higher prudential standards and more intense supervision. An unprecedented level of global cooperation has made this success possible—with advanced and emerging market economies participating in a massive effort to define and implement reforms.

Progress to date is impressive. The global financial system is now much stronger. But the reform program is not yet complete. Some key aspects remain unfinished: completion of the strengthened prudential frameworks for banks, insurance companies, and the asset management industry; implementation of the necessary measures to support effective cross-border bank resolution; full application of agreed-on policies to strengthen derivatives markets; development of policies to raise the resilience and facilitate the recovery and resolution of core financial market infrastructure, such as central counterparties; and further steps to raise the robustness of market-based finance. The global system thus remains vulnerable in some dimensions. Moreover, pressures to stall or even roll back the reform process appear to be building, given the difficult macroeconomic environment under which reforms are being implemented.

Finalization of the Basel III package of reforms—the revision of the "standardized" approach to the calculation of risk-weighted assets and limits on the use of internal models to assess risks—appears to have faltered. The Governors and Heads of Supervision group, which oversees the Basel Committee on Banking Supervision, postponed its January meeting, which had been expected to result in agreement on the remaining outstanding issues and complete the package. Discussions are continuing at the working level to bridge remaining areas of disagreement. The objective is to complete the final elements of the capital framework to ensure that banks are resilient and robust to shocks and that confidence in prudential standards is restored. The package under negotiation relies on three interlocking components: a risk-sensitive element (based either on a standardized approach or on banks' internal models), essential for appropriate risk-taking behavior; a leverage ratio backstop that does not adequately reflect risk and that helps guard against the procyclicality of the risk-sensitive framework and model risk; and an appropriately calibrated floor or constraint to prevent internally modeled capital requirements from falling below a certain proportion of the standardized approach amount, to provide a much-needed safety net against model risk. The three elements in combination mitigate the shortcomings of each measure in isolation to provide a coherent overall framework. The outstanding challenge is to reconcile views on the weight to attach to each element, particularly to the balance between reliance on internal models and constraint through the calibration of the floor. Completion of the agreement is important to cement the strong foundations for a safe and resilient global banking system and buttress market confidence in the overall approach. If necessary, implementation of the final measures could be phased in over a longer period to prevent potential procyclical consequences.

Design of regulatory policies requires authorities to form clear views of objectives and the likely effects of reforms, in advance of adoption, to weigh the benefits against the costs. It is good public policy to follow up such analysis with a thorough evaluation of the impact of reforms once they have been implemented and have taken hold. Such evaluations ensure that policies effectively meet their stated goals without major unintended negative side effects and that they continue to deliver on the objectives without imposing unnecessary costs. If policy evaluation reveals major unintended consequences or costs disproportionate to the risks, policy authorities must review and amend the regulations.

As global regulatory reform measures are gradually completed, it will be important to evaluate their impact. The initiative by the Financial Stability Board, in close collaboration with standards-setting bodies, to develop a new conceptual framework for the evaluation of international financial regulation before the Hamburg Group of Twenty Summit is thus very welcome. It is also natural to expect that the authorities will continue to review the impact of regulation (both domestic and international) to ensure that

Box 1.2 *(continued)*

policy measures effectively and efficiently achieve their intended benefits.

Policy reviews nonetheless add to uncertainty. As policymakers resolve such uncertainties, it is important to keep in mind the benefits of a strong, globally consistent framework. A strong framework will sustain financial stability and ensure that the financial system can support the real economy in bad times and good, and a globally consistent framework will support the benefits of international financial intermediation and avoid gaps and wasteful arbitrage that can be exploited to undermine the effectiveness of the regulatory framework and lead to fragmentation of the global system. Failure to complete the global reform agenda could erode the consensus already achieved. And that could encourage a short-sighted rollback and competition to ease regulation as growth continues to elude many advanced economies. Such fragmentation would also hurt countries outside the central standards-setting bodies that rely heavily on a strong global standard to level the playing field and support financial stability, in particular in emerging markets, at a time of higher risk.

A great deal is at stake for all jurisdictions when it comes to successful completion of the global regulatory reform agenda. Completion of the reforms is vital to address previously identified fault lines and thus ensure that the global financial system is safe and resilient and can promote economic activity and growth. It will also support renewed focus on new threats and emerging risks as the financial system continues to rapidly adapt and innovate. Support from all global players is essential to ensure that the full benefits of global financial stability are achieved and sustained.

Box 1.3. Implications of Brexit for Financial Stability and Efficiency

The United Kingdom is a key node in the global financial network, providing important economies of scale and positive network externalities. The benefits from London's role as a financial center stem from a combination of factors, including concentration of capital and risk management, as well as the availability of ancillary financial services and expertise (see Figure 1.3.1).

Although there is significant uncertainty about the outcomes of negotiations—thus rendering any analysis tentative in nature—Brexit threatens to reshape the relationship between the factors mentioned above. The challenges stemming from Brexit could undermine financial stability in ways that are difficult to estimate or predict at this juncture. However, it is also important to note that financial stability benefits could arise from a less concentrated banking system throughout Europe.

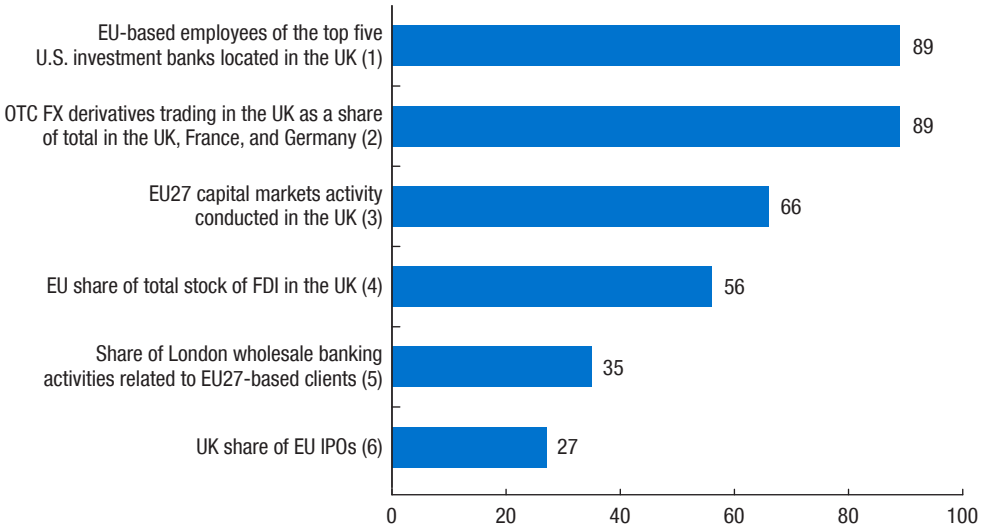
Concentration and Economies of Scale

Although there is a continuum of possible outcomes from Brexit negotiations, it is likely that financial firms' ability to operate across jurisdictions will be curtailed to some degree. Banking activities are likely to be the most affected by the loss of passport rights.[1] Many core areas of banking, including mortgages, cross-border banking, and deposit taking, rely on financial passports. Without them, banks will need to relocate activities outside the United Kingdom. Because the existing EU equivalence regime does not cover the provision of banking services such as lending and deposit taking under Capital Requirements Directive IV, anticipation by banks of their relocation process would smooth the transition.[2] Moreover, under current rules, the United Kingdom and the European Union would retain the right to revoke access if a regulatory regime is no longer deemed to be equivalent.

[1]In this box, passport rights refer to the legal ability of financial companies that are authorized to do a certain business in one EU member country to conduct the same business in other EU member countries without having to be authorized separately in each country.

[2]In this box, equivalence refers to the European Union's recognition of the regulatory or supervisory regime of a non-EU country as equivalent to the corresponding EU regime.

Figure 1.3.1. Measures of Financial Linkages between the United Kingdom and the European Union
(Percent)



Sources: (1) Bruegel; (2) Bank for International Settlements, as of April 2016; (3) Oliver Wyman; (4) Office of National Statistics; (5) Bruegel; and (6) PricewaterhouseCoopers.
Note: EU = European Union; FDI = foreign direct investment; FX = foreign exchange; IPO = initial public offering; OTC = over the counter; UK = United Kingdom.

Box 1.3 *(continued)*

Uncertainty about the negotiation outcome is pushing banks to anticipate Brexit-related costs. Banks have started preparing for a worst-case scenario, in which no agreement is reached, to avoid any possible disruption to their services. Duplication of some activities and business structures in different locations seems inevitable and represents an extra cost. Operating in different regulatory regimes will also increase the burden on banks.

The implications of Brexit for the asset management industry are likely to be lower. Most asset management activities could benefit from existing equivalence frameworks but approval would still be needed. Large U.K.-based asset managers who sell funds in the European Union often use Ireland and Luxembourg as the legal domicile for many funds covered by the Undertakings for the Collective Investment of Transferable Securities (UCITS) Directive, so they should not be affected.[3] Only UCITS funds domiciled in the United Kingdom but sold in the European Union would be affected by the loss of passport rights. Some managers could decide to discontinue these funds, but this is likely to represent a small fraction of the total market.

The impact on the insurance and reinsurance industry is likely to fall somewhere between the impact for banks and asset managers. Like banks, insurance and reinsurance companies may face relocation pressures, but there is already an equivalence regime for the reinsurance industry.

After Brexit, U.K.-based central counterparties will be required to secure European Markets Infrastructure Regulation recognition if they are to continue providing clearing in the European Union. Otherwise, a share of U.K.-based derivatives activity may need to relocate, possibly forfeiting some economies of scale.

The implications for EU-U.K. euro cross-border payments systems could be substantial. The United Kingdom may cease to be part of the Single Euro Payments Area unless membership is retained. The cost of making international payments could increase notably, affecting international activity. U.K. banks' access to the TARGET 2 and EURO-1 payments systems could also be at risk.

[3]The UCITS directive allows compliant investment funds domiciled in one member country to be sold across the European Union. Unless they are redomiciled in the European Union, these funds become "alternative investment funds" and fall under the less advantageous Alternative Investment Fund Managers Directive or must relocate to a domicile in the European Union.

Regulatory and Supervisory Capacity

The complexity of financial entities is likely to increase after the United Kingdom leaves the European Union, posing new challenges and costs for national supervisors. Even if there is a generous agreement on regulatory equivalence, the U.K. and other EU legal systems could start to evolve separately. Financial firms will be forced to develop new strategies for operating and competing in a reconfigured world, and business structures are likely to become more intricate. For example, different firms may split the same business line in very different ways across European supervisory jurisdictions. The greater complexity of financial firms will impose additional burdens on local regulators. New complex structures will require strong and fluid collaboration among regulators in various jurisdictions.

Even if euro clearing and settlement functions remain in London, the burden on U.K. regulators is likely to increase because they will be required to take over the regulation of rating agencies and trade repositories from the European Securities and Markets Authority. Such a task could amount to reviewing and revising thousands of pages of EU regulatory rulebooks.

Restrictions on international data sharing may hinder the assessment of cross-border financial risks. Legal restrictions on sharing financial information with non-EU members under existing European Markets Infrastructure Regulation and Data Protection Directives could limit the ability of authorities to construct a picture of pan-European risk exposures. Similarly, restricted cross-border sharing of clients' data may jeopardize the conduct of business and risk management by private firms. Banks will likely face higher costs from having to duplicate data processing capabilities in various jurisdictions.

Forthcoming Europe-wide cybersecurity protocols will also be affected. The EU Directive on Security of Network and Information Systems is expected to take effect before the United Kingdom leaves the European Union. A new framework for collaboration in this area will need to be negotiated.

Transitional Challenges

The transition to a post-Brexit world needs to be carefully managed to minimize disruption in market services and activities and maintain a sound and effective supervision of financial activities. The United

Box 1.3 *(continued)*

Kingdom and the European Union do not currently qualify as "third countries" vis-à-vis each other and hence cannot begin the formal application process to seek third-country regulatory equivalence.

Banks' uncertainty about the requirements of their new regulators is likely to rise temporarily. Over the years, banks have invested heavily to develop internal risk models that are accepted by their current regulators. Relocation to a new jurisdiction will bring some uncertainty about how quickly these models can be reviewed and accepted by the new regulator.

Market liquidity in government debt markets could be temporarily curtailed. Several U.K.-based banks provide critical primary dealer functions in the sovereign debt market. Because uncertainty and operating costs will likely increase during the transition period, many banks may opt to exit or scale back the primary dealer business, leading to costlier and less efficient markets until new players enter.

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CHAPTER 2

LOW GROWTH, LOW INTEREST RATES, AND FINANCIAL INTERMEDIATION

Summary

Advanced economies have experienced a prolonged episode of low interest rates and low growth since the global financial crisis. From a longer-term perspective, real interest rates have been on a steady decline over the past three decades. Despite recent signs of an increase in long-term yields, particularly in the United States, the experience of Japan suggests that an imminent and permanent exit from a low-interest-rate environment need not be guaranteed. A combination of slow-moving structural factors, notably population aging and slower productivity growth common to many advanced economies, could conceivably generate a steady state of lower growth and lower nominal and real interest rates in these countries.

What would be the consequences for the financial sector of such a scenario? This chapter examines this question, abstracting from the role of monetary policy and from temporary effects. The chapter argues that the persistence of a prolonged low-interest-rate environment would present a considerable challenge to financial institutions. Over the long term, the scenario would entail significant changes to the business models of banks, insurers, and pension funds and the products offered by the financial sector.

In such an environment, yield curves would likely flatten, lowering bank earnings and presenting long-lasting challenges for life insurers and defined-benefit pension funds. If bank deposit rates cannot drop (significantly) below zero, bank profits would be squeezed even further. Smaller, deposit-funded, and less diversified banks would be hurt most, which could increase the pressure to consolidate. As banks reach for yield at home and abroad, new financial stability challenges may arise in their home and host markets. These hypotheses are supported by the experience of Japanese banks.

Low growth and aging populations would likely lower credit demand by households and firms and increase household demand for liquid bank deposits and transaction services. Consequently, in this scenario, domestic banking in advanced economies may generally evolve toward provision of fee-based and utility services.

Pension arrangements and the products and business models of life insurers would also likely change significantly in the long term. In this scenario, defined-benefit pension plans provided by employers would tend to become less attractive relative to defined-contribution plans, which offer more portability. Rising longevity would likely boost the demand for health and long-term care insurance. Demand for guaranteed-return, long-term savings products offered by insurers could be expected to weaken, while that for passive index funds offered by asset management firms would likely grow.

Policies could help ease adjustment to such an environment. Prudential frameworks would need to provide incentives to ensure longer-term stability instead of falling prey to demands for deregulation to ease the short-term pain. For banks, policies should help facilitate smooth consolidation and exit of nonviable institutions, while limiting excessive increases in risk taking and ensuring that the too-big-to-fail problem does not worsen. Implementing economic solvency requirements that encourage life insurers to undertake necessary adjustments to their business models would be vital. Surveillance and regulation of asset management activities would become more important as this industry's share in the financial sector grows.

Introduction

Advanced economies have been experiencing low real and nominal interest rates for several years (Figure 2.1). Interest rates have been less volatile and the yield curve has flattened considerably. Economic growth has also been persistently low over the past decade. Despite recent signs that longer-term yields are increasing, these developments have sparked interest in the question of whether they represent an unusually large and long deviation from a higher equilibrium level of economic growth or a new steady state with lower potential growth. Under the latter interpretation, interest rates at their prevailing low levels are equilibrium natural rates, and monetary policy simply mirrors underlying developments in the real economy.

The secular decrease in real interest rates across advanced economies since the mid-1980s suggests that natural rates may have fallen in response to slow-moving structural factors.[1] This decline may reflect lower steady-state growth and a drop in the investment-to-savings ratio in advanced economies. The combination of demographic changes and lower total factor productivity growth in these countries may represent important driving forces (Chapter 3 of the April 2014 *World Economic Outlook*; Gordon 2014; Bean and others 2015; Bernanke 2015). For example, waning population growth weighs directly on economic growth and may pull down real interest rates if it exerts a negative effect on the marginal productivity of capital. Rising longevity also puts downward pressure on real interest rates because households save more to prepare for longer retirement (Carvalho, Ferrero, and Nechio 2016). Gains in total factor productivity reflect, to an important degree, the pace of innovation, which may have slowed because of several factors (Summers 2014; Rachel and Smith 2015). Steadily rising savings and growing demand for advanced-economy financial assets in emerging market economies have also put pressure on interest rates in advanced economies over the past 15 years (Bernanke 2005).

It is important to understand how prolonged periods of low interest rates affect the provision of financial services. An efficient financial sector that supports growth and innovation is of particular significance in such an environment. The combination of structural factors that keep real interest rates low over a considerable length of time also underpins the impact on the financial sector. For example, population aging and rising longevity are likely to significantly affect asset allocation and the demand for banking and insurance services. Lower total factor productivity will weigh on the demand for credit and financial intermediation. If lower rates are accompanied by flatter yield curves, banks and life insurers are likely to suffer. Changes to the structure of the financial sector in such an economic scenario are also likely to have consequences for financial stability.

Previous studies have mainly examined the impact of *falling* interest rates. They have often focused on the short-term impact of monetary policy decisions, but not on the length of the low rate period and have not distinguished between the impact of falling short-term rates and that of the flattening yield curve itself.[2]

This chapter conducts a scenario analysis of prospects for financial intermediation in an economy in which nominal and real interest rates and growth are low and expected to remain low for the foreseeable future ("low-for-long economy").[3] Importantly, the chapter abstracts from the role of monetary policy and from the temporary effects of falling rates, lower rates, or both. Instead, it considers a hypothetical equilibrium with low growth and low interest rates, where expected returns on most financial assets are low.[4] The scenario should not be interpreted as a baseline or projection of most likely economic outcomes in the medium term, but as an exercise intended to illustrate some of the key associated issues.

This focus allows the chapter to address questions regarding the long-term impact of a steady state of low

Prepared by a staff team led by Jay Surti and composed of Jorge Chan-Lau, Qianying Chen, Gee Hee Hong, Mitsuru Katagiri, Oksana Khadarina, John Kiff, Frederic Lambert, Sheheryar Malik, Win Monroe, Nobuyasu Sugimoto, and Kai Yan, under the general guidance of Gaston Gelos and Dong He. Breanne Rajkumar and Annerose Wambui Waithaka provided editorial assistance.

[1]The concept of natural rates was introduced by Wicksell (1936). Holston, Laubach, and Williams 2016 present evidence of falling natural interest rates in a number of advanced economies.

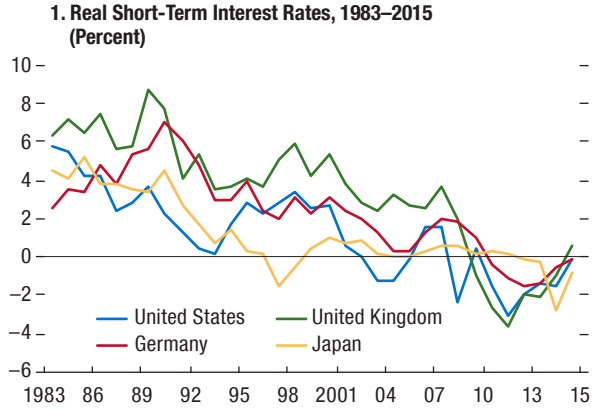
[2]European Systemic Risk Board 2016 also examines some of the issues discussed in this chapter in the European context.

[3]The assumption of low nominal rates does not follow directly from that of low real rates, but recent experience, particularly in Japan, has been marked by both low nominal and low real rates.

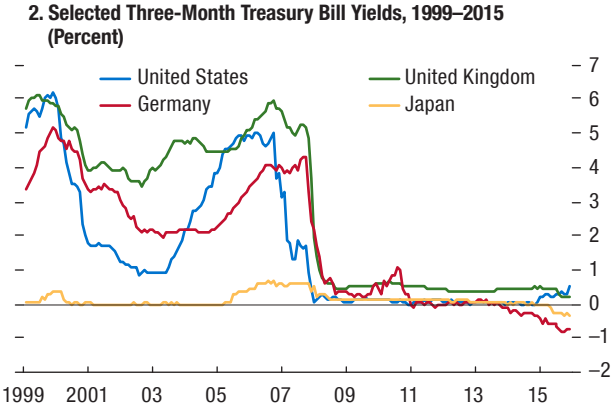
[4]Various other studies have examined the effects of temporary monetary policy measures under low interest rates. For a recent paper analyzing the effects of negative interest rate policies on monetary transmission and bank behaviors, see IMF 2017. The study finds that these policies have not had major side effects on bank profits, payment systems, and market functioning.

Figure 2.1. Interest Rates, Term Spreads, and Volatility in Advanced Economies

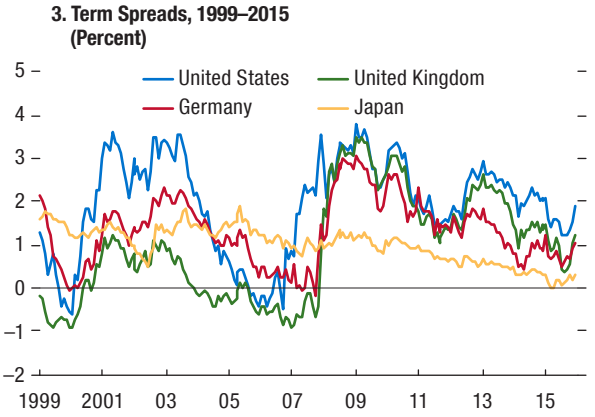
Real interest rates have been decreasing over the past three decades.



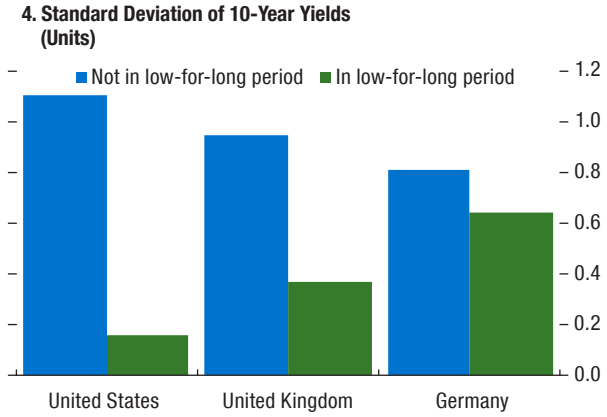
Nominal interest rates have fallen.



Yield curves have flattened.



Interest rate volatility has declined.



Sources: Thomson Reuters Datastream; IMF, World Economic Outlook database; and IMF staff calculations.
Note: Term spreads in panel 3 are defined as the difference in yield between a 10-year government bond and a three-month Treasury bill. Low-for-long periods in panel 4 are defined as those when the 10-year yield was less than 2 percent.

interest rates on financial intermediation and financial stability. What is the long-term impact on profits and solvency of financial institutions? How does it depend on their business models? Will the existing menu of financial products and services survive? How will these circumstances change the relative importance of banks, insurers, pension funds, and asset managers in the financial system? In taking this approach, the chapter seeks to examine the long-term implications of the proposed scenario and its underlying structural drivers for financial intermediation.

While not aiming to offer definitive and exhaustive answers to these questions, the chapter's novel contributions do shed light on them. First, it provides a new analytical framework to help understand the behavior of the term structure of interest rates in an equilibrium with low natural rates of interest. This is important given the relevance of the slope of the yield curve for the profits and solvency of different types of financial institutions. Second, it extends a standard model of bank profitability to such an equilibrium to assess the impact on banks according to their business models, and compares the insights with Japan's experience. Third, it empirically assesses the impact of low interest rates on banks' profits, distinguishing between situations when interest rates are expected to remain low

for a long time and other periods. Fourth, it discusses implications for insurers and pension funds, simulating alternative portfolio choices and discussing the viability of typical pension and insurance products in the low-natural-rate equilibrium. Fifth, it offers a discussion of how such a scenario affects households' asset allocations and the role of asset managers in financial intermediation. Sixth and last, it discusses potential implications for financial stability.

The main findings for this scenario are as follows:

- The yield curve would be flatter compared to an equilibrium with higher rates and growth.
- Although lower interest rates may boost banks' earnings in the short term, they hurt profitability in the steady state once they fall below a particular positive threshold. Smaller, geographically undiversified, deposit-funded banks would be hurt most in such a scenario.
- Tail risk exposure could increase.[5] Banks tend to adopt different strategies in reaching for yield, depending on their business models. Smaller, deposit-funded banks typically take on more interest rate risk by increasing the duration of bond portfolios. Large banks are likely to increase risk exposures in foreign countries that offer higher returns (in particular, emerging market economies) and rely more heavily on wholesale funding markets to do so.
- Life insurers and pension funds would face a long-lasting transitional challenge to profitability and solvency, which is likely to require additional capital. This challenge arises because some of them would find it difficult to meet cash outflows on large stocks of existing liabilities contracted in past periods of higher interest rates by only altering asset portfolios. Moreover, many of their other business lines may struggle to show profit in the tepid growth environment.

All of this would likely result in major changes in the long term to household demand for financial products and asset allocation, the menu of services the financial sector offers, and the relative role of institutions versus markets in financial intermediation.[6]

- To the extent that population aging and rising longevity are key forces behind the scenario, there are likely to be major changes to demand for banking and insurance products. Aging would likely reduce household demand for credit and increase demand for transaction services from banks. In combination with increased longevity, it would likely increase demand for health and long-term care insurance, with ambiguous implications for life annuities. Retail demand for asset management products would continue to grow, in particular for passive modes of index investing targeted at minimizing management fees.
- Pressure on smaller banks would lead them to consolidate among themselves or with larger banks. Credit demand would likely be lower in this scenario given an aging population and lower productivity growth. Domestic bank lending would likely shrink, focusing more on small businesses and less on households and large firms. Business models in advanced economies would tend to evolve toward fee-based and utility banking services.
- Insurers would likely cede some of their savings business to asset managers and banks over the long term. The reason for this shift is that, at low rates, their guaranteed products are relatively less attractive. Although insurers may respond, in part, by switching their focus to unguaranteed savings products, they could face tough competition from asset managers. Health and long-term care businesses would likely grow strongly as people age and live longer.
- The pooled management of household life cycle risks would likely decline more rapidly. Employers could be expected to increasingly move away from defined-benefit and toward defined-contribution pension plans, although the pace and extent of this transition may vary significantly across advanced economies.

The key policy challenge in this scenario would be to successfully balance multiple objectives, including the following:

- For banks, providing a legal and regulatory framework that facilitates smooth consolidation should go hand in hand with efforts to limit excessive risk taking in an environment with lower expected returns and avoid a worsening of the too-big-to-fail problem. This includes containing incentives to increase exposure to tail risk from widening maturity mismatches, higher wholesale funding, and foreign-

[5]Risk taking may arise due to competitive pressures, nominal return targets, or risk shifting in response to lower interest rates, among other factors.

[6]The discussion of the potential long-term impact of the scenario on financial intermediation seeks to take into account the interrelation across different sectors and key drivers. However, it is not based on a formal general equilibrium model, and does not aim to capture all potential accompanying factors, such as changes in labor supply (including changes in retirement ages), regulations, or social safety nets.

currency exposures. A similar challenge would be to reap benefits from banks' higher engagement in emerging market economies while containing potential new financial stability risks in home and host countries.

- Providing incentives to undertake necessary business model adjustments (life insurers) and contain "gambling for resurrection" (certain pension funds) would be key in this scenario. This would strengthen the case for implementing economic solvency requirements that ensure recognition of the costs of guarantees and options embedded in insurance and pension products.
- Surveillance and regulation of asset management activities would become even more important as this industry's share of the financial system grows. In particular, further strong growth of index investing could entail new financial stability challenges. Closing significant data gaps would also be essential to allow for effective macroprudential surveillance of this sector.

The Term Structure of Interest Rates

This section discusses the shape of the yield curve in an economy with very low natural rates. The slope of the yield curve is important for the financial system, since it affects all financial institutions that tend to have maturity mismatches between their assets and liabilities. The section summarizes insights from a new model that applies and extends the techniques of existing consumption-based asset pricing models to incorporate a zero lower bound on nominal interest rates.[7]

The spread between the yield on a longer-maturity bond and the short-term interest rate is the sum of two components. These are the market expectations of how the short rate will evolve between today and the maturity date of the longer-term bond, and the bond's term (risk) premium. Around a steady state in which the short rate is at its long-term equilibrium level, the slope of the yield curve is driven entirely by the sign and magnitude of (nominal) bond term premiums.

A simple way to understand the term premium on a long-term bond is that it reflects the degree to which bond returns provide insurance against shocks to other sources of an investor's income. If bond returns increase when economic shocks reduce other sources of income, investors would be willing to pay a premium to hold the bond (a negative term premium). If bond returns decline in tandem with other sources of income, investors require a premium to be paid to them (a positive term premium).

When the equilibrium rate of economic growth is high and nominal and real rates are not close to zero ("normal economy"), the model implies an upward sloping nominal yield curve (Figure 2.2, panel 1).[8] When inflation goes up, incomes fall and bond returns decline due to the central bank's policy response of raising interest rates. Because bonds worsen the impact of inflation shocks on incomes, bond term premiums are positive.

The key distinguishing feature of the low-for-long economy is a zero lower bound on short-term nominal interest rates. It is assumed that the central bank cannot, or will not, lower policy interest rates below zero, which prevents it from responding by cutting interest rates in response to negative (noninflationary) shocks to real income.[9] This means that bond returns remain resilient in the face of such shocks in a low-for-long economy compared with what happens in a normal economy, which results in lower term premiums and flatter yield curves (Figure 2.2, panel 2).

The decline in term premiums at the zero lower bound can also be interpreted as a consequence of investors perceiving a lower risk of holding long-term securities. Once short-term interest rates are near the zero lower bound and are expected to stay there for the foreseeable future, their sensitivity to macroeconomic news drops because central banks' reaction functions are constrained.[10] In such a situation, investors are more willing to hold long-term bonds, lowering the term premium.

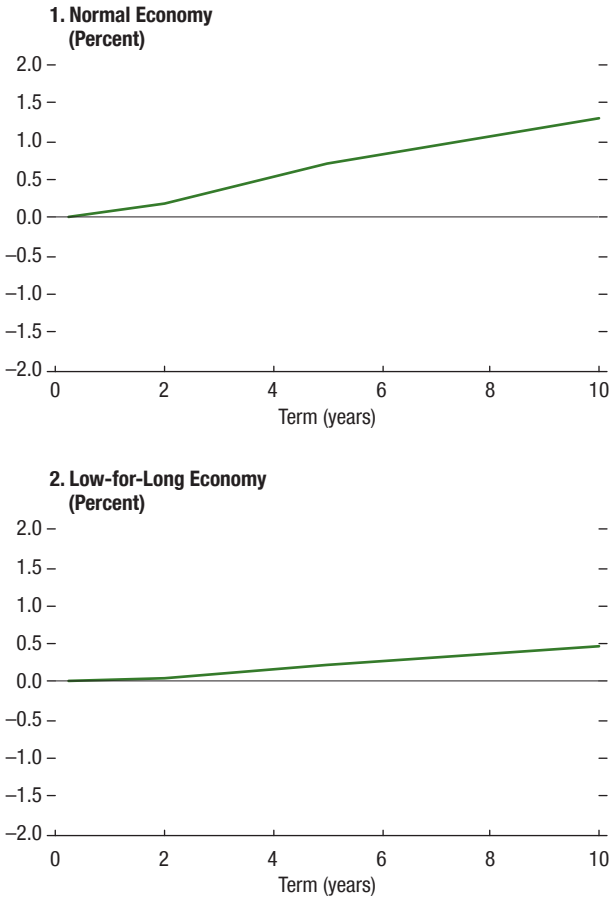
[7]Annex 2.1 contains details of the model and the literature.

[8]The results, as depicted in Figure 2.2, correspond to a parameterization of the model described in Annex 2.1. These results are robust to modeling endowment and inflation shocks as a joint process calibrated through a vector autoregression based on data from Germany, Japan, the United Kingdom, or the United States.

[9]Strictly speaking, it is sufficient for there to be an *effective*, possibly negative, lower bound on nominal short-term interest rates so long as it is close to zero. See Viñals, Gray, and Eckhold 2016 for a discussion of effective lower bounds for monetary policy rates.

[10]The flattening of yield curves due to compression in term premiums is a robust result across term structure models with a zero lower bound. Nakata and Tanaka (2016) and Gourio and Ngo (2016) investigate the term premium at the zero lower bound in a New Keynesian asset pricing model developed by Campbell, Pflueger, and Viceira (2012). In their models, however, the zero lower bound is a temporary phenomenon following a crisis rather than a persistent element of a low-for-long economy.

Figure 2.2. Term Premiums in Economies with Normal versus Low Natural Rates



Source: IMF staff calculations, based on the model described in Annex 2.1.

Banking with Low Natural Rates of Interest

This section augments the literature in two ways. First, it shows that with an unchanged yield curve, even permanently lower interest rates need not affect banks' earnings. Second, it clarifies how a zero lower bound on deposit rates generates pressure on bank interest margins and profits in an equilibrium with a low natural rate. These insights are applied to study the experience of Japanese banks since 2000 and the wider cross-country experience. The analysis also explains how the impact of this low-natural-rate equilibrium depends on bank business models.

Previous studies have clarified that negative interest rate shocks increase bank profits in the immediate future—but this favorable impact dissipates the longer interest rates remain low. Empirical studies covering banks in the United Kingdom (Alessandri and Nelson 2012) and the United States (English, van den Heuvel, and Zakrajsek 2012) show the existence of separate channels for short- and medium-term effects of interest rate changes on banks' interest margins, profits, and equity valuations. Banks tend to lose profitability from longer-lasting drops in interest rates in direct proportion to how much they engage in maturity transformation and make use of deposit funding. However, falling interest rates boost bank profits and equity values in the short term due to gains in the value of collateral, valuation gains on mark-to-market assets, and lower default risk on loans repriced to lower interest rates.[11] Banks appear to respond to falling rates by increasing risk taking through higher leverage.[12]

This literature does not provide guidance on several questions of interest in a low-for-long economy. What is the long-term impact on profits when banks operate in such an environment? Does this impact strengthen as interest rates go ever lower? Are some bank business models especially affected? Are significant changes to the market structure of the banking industry likely? This chapter addresses these issues using a three-pronged approach. First, the section provides a new theoretical model of banking in a low-for-long economy. Next, the insights of this model are applied to interpret the experience of Japanese banks over the past decade. The section concludes with an empirical examination of the impact on bank profitability and equity values and how these depend on banks' business models.

[11]Brunnermeier and Sannikov (2016) demonstrate that the adverse short-term impact of an increase in interest rates can be amplified through *liquidity spirals* (deteriorating net worth increases bank risk aversion, which lowers the market value of assets and lending volumes) and *disinflationary spirals* (the safe-asset value of cash increases).

[12]This is consistent with theoretical findings of Dell'Ariccia, Laeven, and Marquez (2014). Dell'Ariccia, Laeven, and Suarez (forthcoming) find that U.S. banks' risk taking responds similarly to changes in interest rates induced by monetary policy. Focusing on the impact of unconventional monetary easing in the United Kingdom, the United States, and the euro area in recent years, Lambert and Ueda (2014) find that it is associated with deterioration of bank credit risk and delayed balance sheet repair. Chodorow-Reich (2014) does not find evidence of increased risk taking by U.S. banks in response to unconventional monetary policies.

Insights from Theory

A simple model of banking is explored to show how bank profits evolve in a low-rate equilibrium.[13]

Bank profits fall significantly in a low-for-long economy if deposit interest rates are subject to a zero lower bound (Figure 2.3; Box 2.1).[14] Banks' interest margins are (almost) independent of the level of market interest rates if they can flexibly adjust loan and deposit rates in response to changes in steady-state market interest rates. Once deposit rates hit the zero lower bound, banks can no longer maintain spreads between loans and deposits, reducing net interest income under lower equilibrium market interest rates.

Several implications ensue for the business models of different types of banks. Banks able to operate internationally increase their exposure to countries where rates of return remain favorable, notably emerging market economies. They can be expected to increase reliance on wholesale funding in foreign currency (within existing regulatory limits) to finance this expansion. More generally, banks that raise a larger proportion of their funding from capital markets will be less susceptible to the squeeze in interest margins and incomes induced by the zero lower bound. Scale efficiencies in managing deposits would imply incentives for consolidation. At the same time, scale efficiencies in the costs of managing wholesale funding would mean that larger banks will be more inclined to seek this form of financing.

Lessons from Japan

The Japanese economy over the past decade provides the closest real-world approximation to a steady state with low growth and natural rates. The insights from the theoretical model can thus be weighed against the experience of Japanese banks over this period.[15] Japan has faced low interest rates for more than a decade. Short-term interest rates have been close to zero since the Bank of Japan adopted the zero interest rate policy in the early 2000s, with the exception of the extraordinary period of 2007–08. Long-term interest rates have also been low since the early 2000s and recently declined further, particularly after the Bank of Japan adopted policies of quantitative and qualitative monetary easing in 2013 and of negative interest rates in 2016.

Econometric analysis of the drivers of bank net interest margins supports the predictions of the theoretical model (Figure 2.4). An assessment of the behavior of Japanese banks' asset returns, funding costs, and market interest rates demonstrates that banks' interest margins have fallen primarily in response to the narrowing of funding spreads once deposit rates hit the zero lower bound in the mid-2000s.[16] Although market interest rates have remained close to zero since the 1990s, deposit rates first approached the zero lower bound in the mid-2000s. Bank net interest margins then gradually and steadily fell, particularly for regional and small regional cooperative financial institutions known as *shinkin* banks. Japanese banks have not introduced negative deposit rates or charged additional fees, such as account maintenance fees, on deposits even in the face of almost zero deposit spreads (Bank of Japan 2011).[17]

The relative performance of Japanese banks across business models also confirms the theoretical prediction that resilience to the low-for-long steady state improves with diversification (Figure 2.5). Smaller, domestically oriented, deposit-dependent regional and shinkin banks have sought to counter the compression of net interest margins primarily through expansion or adjustment of their domestic balance sheets. When benefits to this strategy declined, they engaged in cost cutting and consolidation. Large internationally active

[13]The model abstracts from the decrease in bank earnings due to yield curve flattening, focusing instead on a new mechanism that has not been explored in the existing literature. Brunnermeier and Koby (2016) explore a model with similar features to examine limits to monetary policy.

[14]The existence of an *effective* lower bound friction on deposit rates is sufficient to generate this result for interest rate levels around and below this lower bound.

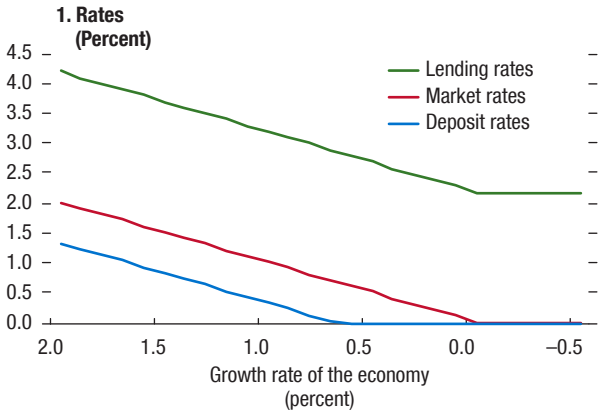
[15]Box 2.2 describes the experience of U.S. banks, which shares some, but not all, characteristics of Japanese banks' adaptation to the prolonged low-interest-rate environment.

[16]The analysis uses an error-correction model in the spirit of Gambacorta (2008). The model assumes that asset returns and funding costs are in a stable relationship with market interest rates in the long term, and that deviations from this relationship shrink gradually in the short term. Moreover, the long-term relationship changes depending on the level of market interest rates. The parameters governing the long-term relationship and the short-term dynamics are simultaneously estimated for a panel of Japanese banks.

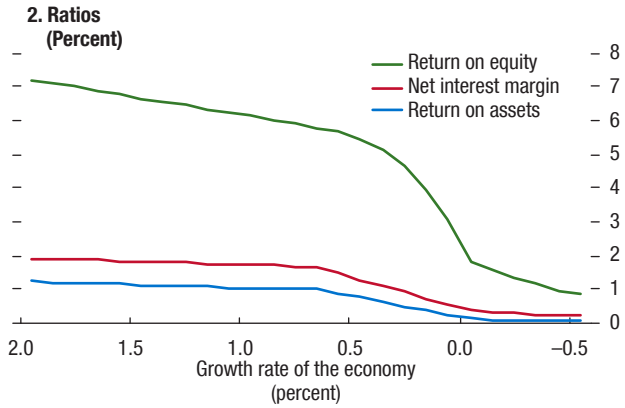
[17]It is important to focus on the past decade when examining the evolution of bank net interest margins and net interest income. First, deposit rates hit the zero lower bound only at the start of this period. Second, earlier hits to Japanese banks' profits in the period of low interest rates were the result of losses during the banking crisis, which had very different origins (Caballero, Hoshi, and Kashyap 2008).

Figure 2.3. Banking under Low Natural Rates: Theoretical Predictions

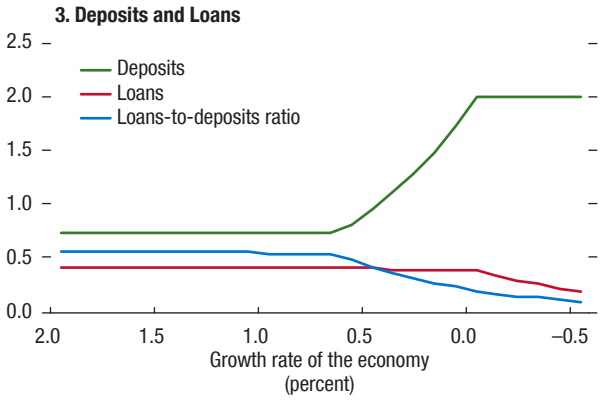
Deposit spreads are squeezed at low rates ...



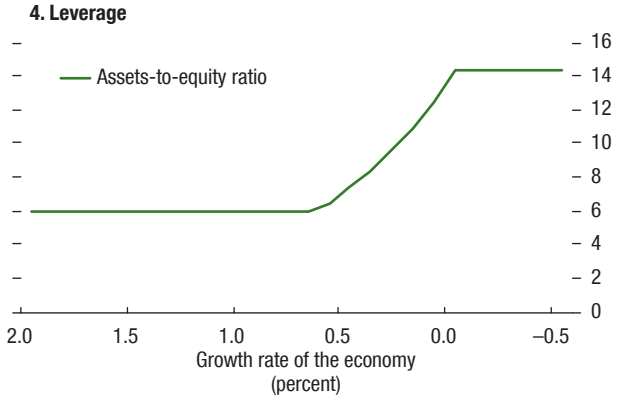
... compressing margins and profits.



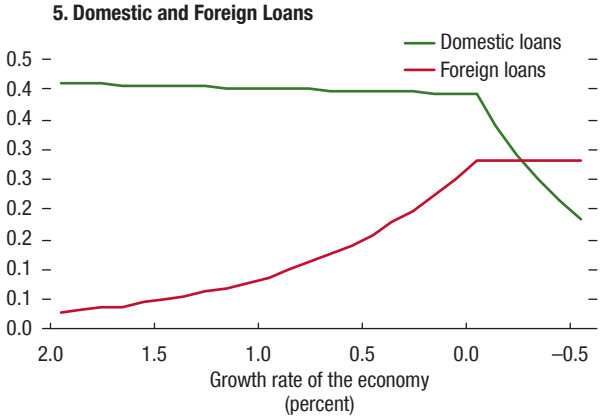
Deposit inflows invested in bonds ...



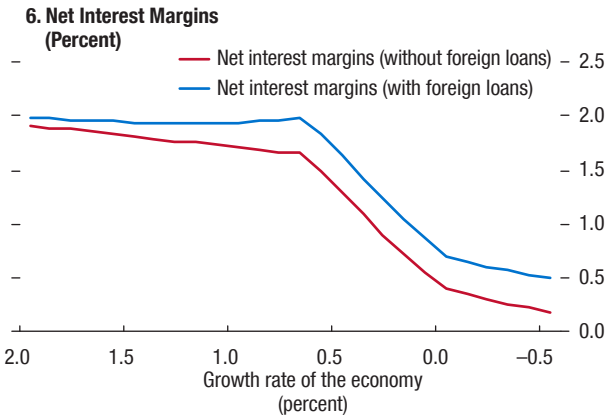
... raise bank leverage.



Banks respond by expanding lending abroad ...



... to maintain margins and profits.



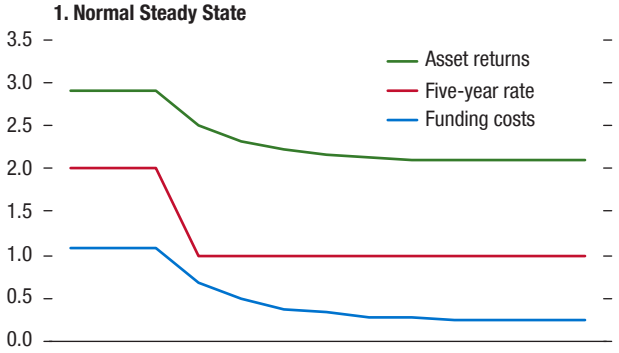
Source: IMF staff calculations (see Box 2.1).

banks, on the other hand, have sought to expand the diversification in their income sourcing. This strategy has been more effective, and these banks have faced little pressure to cut costs or to consolidate.

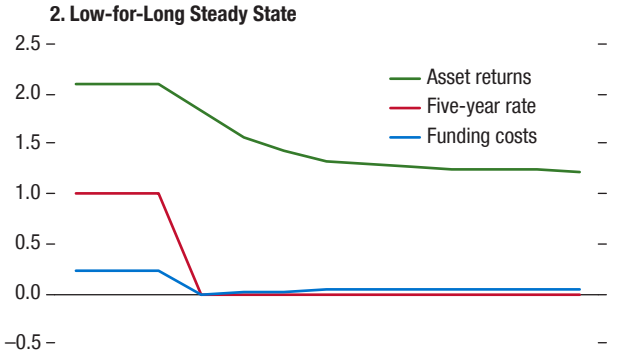
- *Assets and earnings:* Almost all the growth in the major banks' assets can be accounted for by the increase in international loans and securities, through both foreign branches and mergers with and acquisitions of foreign entities. The major banks have expanded their fee businesses outside Japan, including in emerging markets—for example, through the coordination of syndicated loans. Consequently, the share of income from international businesses has risen significantly, consistent with the model's predictions. The major banks have also been able to use their cross-product customer connections to increase noninterest income more effectively through fees and commissions on sales of investment trusts and life insurance products. By contrast, the smaller domestic banks have focused on growing their loan portfolios in urban centers (regional) and on expanding the maturity of their sovereign bond portfolios (regional and shinkin). Success has varied. Pursuing credit spreads has been more profitable, whereas the compression in term premiums has generated a relatively lower increase in returns to regional and shinkin banks from extending bond maturities.
- *Funding:* Major banks source about one-third of funding from capital markets. This has eased the consequences of the compression of domestic funding spreads around the deposit rate zero lower bound relative to regional and shinkin banks, whose deposits constitute over 90 percent of their nonequity financing.
- *Operational costs:* Regional and shinkin banks have cut these costs substantially by rationalizing their branch networks in the face of lower profitability. This is in contrast to the major banks, which have kept operational cost ratios almost flat for the past two decades.
- *Consolidation* has enhanced the effectiveness of strategies to maintain profits in the low-for-long environment. Consolidation can raise profitability by both cutting fixed operational costs and by increasing the banks' monopolistic power in deposit and loan markets. Recently, regional banks have pursued consolidation by forming financial groups to enhance their profitability.

Figure 2.4. Japan: Evolution of Bank Net Interest Margins in Normal and Low-for-Long Settings
(Percent)

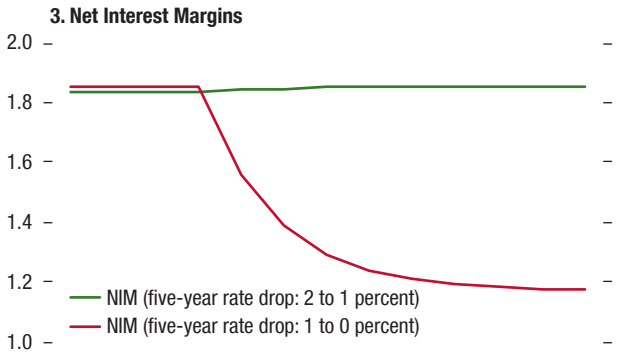
Asset returns and funding costs normally adjust proportionally as interest rates fall ...



... but asset returns fall significantly more once funding costs hit the zero lower bound ...



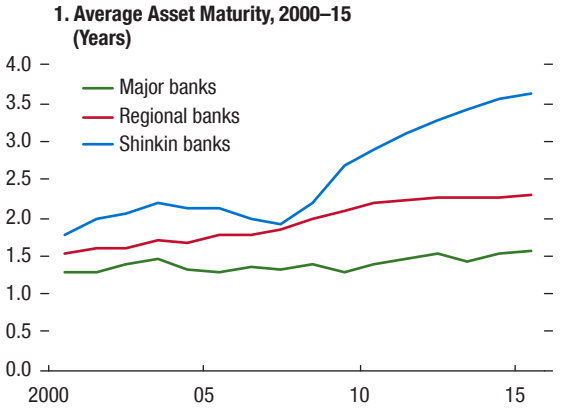
... compressing net interest margins in periods of prolonged low interest rates.



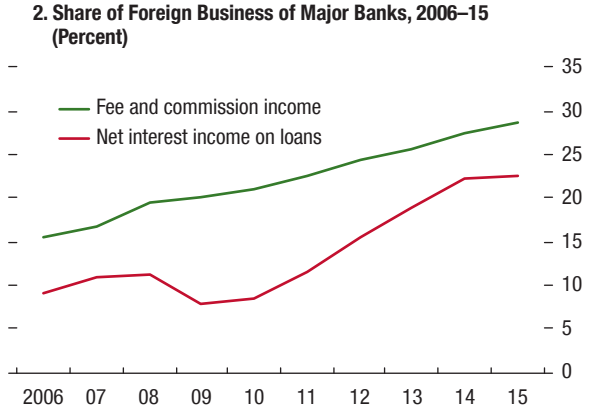
Sources: Fitch Connect; and IMF staff calculations.
Note: NIM = net interest margin.

Figure 2.5. Japan: Banks' Adaptation to the Deposit Rate Lower Bound Period

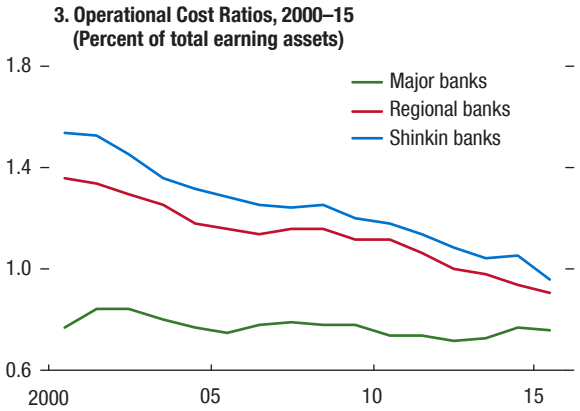
Smaller banks have taken more interest rate risk.



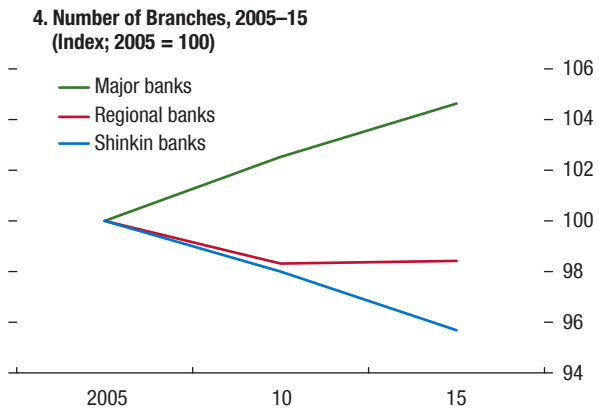
Large banks have expanded abroad.



Smaller banks have also cut costs ...



... in part, by closing branches.



Sources: Bank of Japan; Fitch Connect; Japanese Bankers' Association; and IMF staff calculations.

Alternative strategies have different risk implications. Major banks have maintained net interest margins and profits at the cost of higher cross-border market and counterparty risk. In particular, given the growing share of wholesale foreign currency funding used by major banks, the adverse impact of a tightening in these markets could be large (Chapter 1 of the October 2016 *Global Financial Stability Report* [GFSR]). Already, the costs of funding in this market have risen significantly due to market friction (Avdjiev and others 2016). Shinkin banks have increased interest rate risk by extending the average maturity of domestic bonds, but risk-adjusted returns have nonetheless increased modestly, given unusually low inflation and interest rate volatility during the past decade.

Cross-Country Experience with Prolonged Low Interest Rates[18]

Impact of Low-for-Long Episodes on Bank Profits

A cross-country analysis aims to compare, with other periods, bank profitability at times when interest rates are low *and* are expected to remain low for the foreseeable future. The approach uses a combination of criteria to demarcate these two types of periods. The first is that the short-term yield is below 1 percent. The second is that the "on-the-run," 10-year nominal bond yield is lower than the historical average of short-term policy

[18]Details of the empirical framework are in Annex 2.2.

Table 2.1. Classification of Bank Business Models

	Business Model 1 Wholesale funded, diversified geographically and by business line	Business Model 2 Deposit funded domestic credit intermediary	Business Model 3 Deposit funded, diversified by business line, domestic bank
Average Size (billions of U.S. dollars)	42	3	2
Average Loan-to-Asset Ratio (percent)	47	73	43
Average Deposit Funding Ratio (percent)	25	88	92
Average Share of Foreign Income (percent)[1]	17	2	4

Sources: Bloomberg L.P.; Fitch Connect; and IMF staff calculations.
[1]Data available for a significantly smaller subset of banks.

interest rates.[19] The reason for applying a double-threshold criterion is that it is typically satisfied only when both economic growth and nominal and real interest rates have been low for a considerable time—even if the dip in these measures initially resulted from an economic downturn or macro-financial instability.[20] The analysis also explores how the impact on profits depends on banks' business models (Table 2.1).[21]

Profits Are Lower in Periods of Prolonged Low Interest Rates

Prolonged periods of low interest rates are negatively associated with bank profitability (Figure 2.6, panel 1; Table 2.2). On average, sampled banks earn a 10½ percent return on equity, but in periods with prolonged low rates this falls to 7.8 percent. Consistent with previous literature, a drop in interest rates tends to increase bank profits in normal times. On the other hand, during periods of prolonged low interest rates, a 1 percentage point drop in three-month rates and in term premiums is estimated to reduce bank profits by 31 percent and 8 percent, respectively, below average estimated bank profits.[22]

[19]Some periods that are defined as having prolonged low interest rates under these criteria will not necessarily correspond to underlying economic conditions of low long-term equilibrium growth and interest rates. The results nonetheless provide valuable insights into the likely implications of such a scenario for the reasons cited in the text.

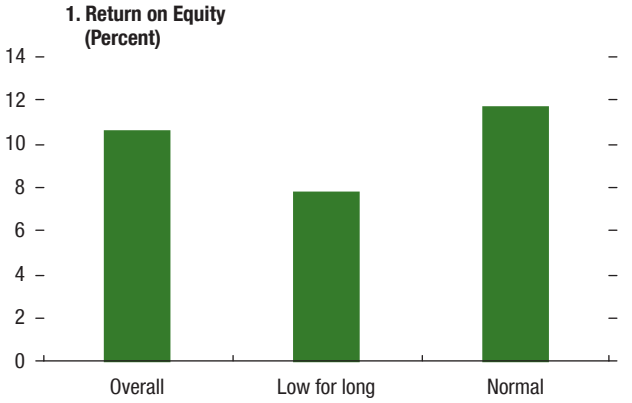
[20]Consequently, a significant proportion of temporary effects—near-term losses and balance sheet adjustments—have, arguably, already been worked out and the remaining effect on earnings is closer to the longer-term impact of prolonged low rates.

[21]The identification of business models relies both on several individual balance sheet indicators and on an approach in which a statistical model combines these multiple indicators to classify a bank's business strategy. The statistical (*clustering*) model is based on Roengpitya, Tarashev, and Tsatsaronis 2014.

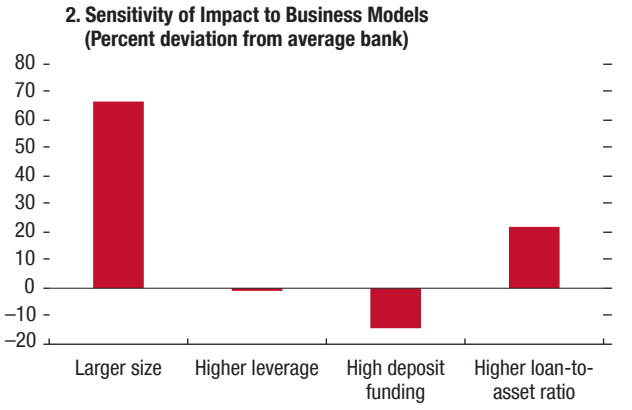
[22]Reported results are robust to controlling for the time-varying intensity of macroprudential policies, notably including enhanced prudential rules for banks in recent years. Stronger macroprudential policies are estimated to soften future profitability of banks but have an insignificant contemporaneous effect.

Figure 2.6. Prolonged Low Interest Rates and Bank Profits

Bank profits are significantly lower under prolonged low interest rates.[1]



The impact is very sensitive to bank characteristics.[2]



Sources: Bloomberg L.P.; Fitch Connect; IMF, *Monetary and Financial Statistics Manual*; Thomson Reuters Datastream; and IMF staff calculations.
[1]Profits in panel 1 are defined as the return on equity (ROE) averaged across all banks across all years in the sample horizon (overall) or for all years in periods with prolonged low and normal interest rates.
[2]Impact measures represent the deviations in ROE from the average bank ROE (in percent of average bank ROE) in periods of prolonged low rates after a one-standard-deviation change from the average value of each bank business model characteristic during such episodes. Only statistically significant results are shown.

Table 2.2. Bank Profitability and Equity Values in Periods of Normal and Prolonged Low Interest Rates

Dependent Variable: Return on Equity	Sign	Dependent Variable: Equity Price Return	Sign
Explanatory Variables		Explanatory Variables	
Prolonged-Low-Rate Period[1]	–		
Term Structure			
Three-Month Interest Rate	–		
Term Premium (normal period)	n.s.	Surprise on Monetary Policy Announcement Dates in Normal Times	–
Three-Month Interest Rate (prolonged low rates)	+		
Term Premium (prolonged low rates)	+	Surprise on Monetary Policy Announcement Dates in Prolonged-Low-Rate Periods	+
Bank Characteristics (prolonged low rates)[2]			
Size	+		
Leverage	–		
Deposit Funding Share	–		
Loan-to-Asset Ratio	+		
Controls		Controls	
Macro Controls		Macro Controls	
		Market Return	
Estimation Method	Bank FE, time FE	Estimation Method	Bank FE

Source: IMF staff calculations.
Note: The table shows the signs of the coefficients of regressors in the cross-country panel regressions of bank profits and daily equity returns that are statistically significant at least at the 10 percent level. Further details about regressions, variable definitions, and data sources are in Annex 2.2. FE = fixed effect; n.s. = not significant at the 10 percent level of significance.
[1]Periods of prolonged low interest rates are defined as described in the chapter.
[2]Denotes the sign and significance of bank business model characteristics in periods of prolonged low interest rates.

Resilience to Episodes of Prolonged Low Rates Depends Significantly on Banks' Business Models

Banks that are smaller, rely more on deposit funding, and have fewer lending opportunities tend to experience a significantly bigger dent in their profits (Figure 2.6, panel 2; Table 2.2). For example, a one-standard-deviation increase in the size of a bank's balance sheet significantly tempers the damage from prolonged low interest rates by raising bank profits an estimated 67 percent relative to the sample average for such periods. By contrast, a one-standard-deviation increase in the share of deposit funding and in the share of loans in the asset portfolio are associated, respectively, with estimated bank returns lower by 14 percent and higher by 22 percent than the sample average for such periods. Clustering the banks by business model confirms these results. Large, internationally more diversified, wholesale-funded banks tend to outperform other types of banks when interest rates are low for a long time. Their estimated average profit is 2.2 percentage points higher than that of deposit-funded domestic banks with small lending portfolios, which have the lowest estimated average profits during such episodes.

How Do Bank Equity Values Respond to Changes in Expectations Regarding a Low-for-Long Scenario?

Changes in stock returns are used to measure how changes in market expectations of future economic conditions affect banks' franchise values. A linear factor model is used to estimate the impact of changes in forward interest rates immediately following monetary policy announcements in periods of normal and prolonged low interest rates.[23] Daily stock returns around the dates of monetary policy decisions are analyzed to ensure that, to the extent possible, the equity price changes do not reflect the release of other relevant information on future economic conditions and bank profitability.

Monetary easing surprises affect bank equity returns differently in normal times compared with periods of prolonged low interest rates (Table 2.2). In normal times, unexpected monetary easing could generate expectations of higher economic activity and asset returns, fewer nonperforming loans, and higher spread income on fixed-rate assets—all of which increase expectations of future bank profits. Monetary easing surprises should, therefore, boost bank equity returns in normal times. During episodes of prolonged low interest rates, however, lower forward rates in response to monetary policy decisions are more likely to imply bad news for economic conditions and bank earnings.

[23]Monetary policy events are used only as exogenous shocks that provide new information about how long interest rates will remain low and hence about the impact on banks' future profits.

They should, therefore, lower equity returns.[24] Estimation results confirm this intuition.

Larger, more diversified, and more-wholesale-funded banks are less sensitive to monetary policy news during periods of prolonged low rates (Figure 2.7). This outcome may reflect the market's recognition of such banks' greater ability to adapt to changing domestic economic prospects—which corresponds both to theoretical prediction and to the experience of Japanese banks. In contrast, for smaller, deposit-funded, domestically oriented banks, the response of equity returns confirms their greater sensitivity to bad news about the domestic economy during prolonged low rates.

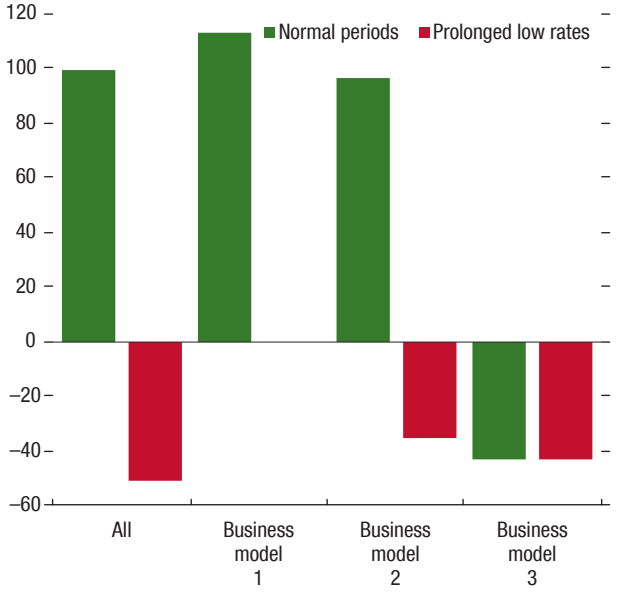
The Evolution of Banking over the Long Term

In a scenario of low natural rates, some consolidation in the banking industry is likely in the long term. Small deposit-funded banks that are less internationally diversified tend to suffer the largest hit to profitability. Eventually, consolidation could result through the merger of smaller banks or of midsize banks with smaller banks, and industry concentration could rise through the exit of nonviable institutions. Merged banks would have lower average operational costs, be more diversified, and have greater market power—all of which may mean less incentive to take excessive risks. The resulting industry structure could be more efficient and stable.[25]

Tail risk exposure is expected to increase. Over the medium term, banks, especially those that are smaller and less diversified, may actively seek longer maturities for their assets. Although less interest rate volatility in the scenario softens the risk implications of such a strategy, a large positive interest rate shock can mean significant losses. Banks would also feel pressure to increase, within regulatory limits, their share of wholesale funding, a more volatile source of financing than retail deposits. This would be particularly true for larger banks, because the low-for-long environment provides strong incentives to use capital market financing, especially for international expansion. Such a development may affect prospects for financial stability in their home and host countries, depending on the modality of expansion.[26]

Demographic factors, low productivity growth, and advances in financial technology will likely cause significant shifts in banks' business lines under this scenario. When the population ages, especially in a context of reduced income growth, demand for household loans falls, and deposits tend to rise (Imam 2013). Aging will also increase demand for transaction

Figure 2.7. Impact of Forward Rate Surprises on Bank Equity Returns
(Percent)



Sources: Bloomberg L.P.; Fitch Connect; IMF, *Monetary and Financial Statistics Manual*; Thomson Reuters Datastream; and IMF staff calculations.
Note: The figure depicts the estimated impact of a 1 percentage point surprise decrease in forward interest rates, occurring on monetary policy announcement dates, on the daily equity returns of banks relative to the estimated sample average impact of such surprises when interest rates are normal. For example, the far-left bar is the relative magnitude of the estimated impact on banks' daily equity return of forward rate surprises during normal periods, and is equal to 100 percent. Only statistically significant impact estimates are depicted as nonzero values. Business models are as defined in Table 2.1. Further details of the methodology are in Annex 2.2.

[24]More precisely, it would reflect the expectation of a lower net present value of future bank profits, even though the short-term impact of monetary easing could still be positive in such a period (though lower when deposit rates are at their zero lower bound).

[25]Some of the efficiency losses from consolidation, including higher funding costs for nonfinancial firms and reduced relationship banking for small and medium-sized enterprises, would be balanced by the gains from more rational branch networks and lower operational costs. Stability benefits may be significant, particularly if forces for consolidation are not strong for the large banks, preventing a worsening of the too-big-to-fail problem. In practice, bank mergers do not always achieve the desired scale economies, and can be fraught with difficulties in integrating participating banks' infrastructures and cultures.

[26]For a comparison of the stability implications of cross-border lending and expansion through subsidiaries, see Chapter 2 of the April 2015 GFSR.

services. However, if current trends in financial technology continue, the long-time preeminence of banks in payment services is not guaranteed. In addition, prospects for lending to domestic companies are also likely to be modest in this environment, because a shrinking population and low productivity imply fewer investment opportunities and lower loan demand. Finally, in a scenario of low rates, banks may lose market share in debt financing of larger companies, if financial technology allows nonbanks to price corporate credit risk, and low rates drive large firms to seek bond market funding. Consequently, business models of banks active in advanced economies may evolve toward fee-based and utility banking services even as fewer domestic lending opportunities motivate larger, internationally active banks to increase their exposure abroad, especially to emerging market economies.

Insurance and Pensions in a Low-Natural-Rate Economy

The life insurance and pension sectors face a formidable transitional challenge in a low-for-long economy. The large existing stock of liabilities offering guaranteed returns creates cash flow obligations over the medium term that are difficult to meet through investment income given lower interest rates and flatter yield curves. Therefore, in many cases, life insurers and defined-benefit pension plans may require additional capital. In the long term, the market for traditional savings products is likely to shrink, and insurers will focus more on protection products, particularly health insurance. Defined-contribution pension plans will probably continue to grow in importance because employees are likely to prefer these to employer-provided defined-benefit plans with benefit levels significantly lower than they are today.

Long-Term Implications for Insurance and Pension Business Models

In the low-for-long scenario, life insurers and sponsors of defined-benefit pension plans may have no choice but to significantly reduce benefits to policyholders and plan participants over the long term. With permanently low growth and interest rates, guaranteed rates of return are possible only if they are reset significantly lower.[27]

Pension Arrangements

A long-term transition from intergenerational collective risk sharing (defined benefits) to individual risk management (defined contributions) appears likely to continue. The combination of lower population growth, aging, and prolonged low interest rates will put pressure on retirement benefit levels. In such a situation, the long vesting periods of employer-provided defined-benefit plans mean that benefit cuts beyond a certain point could make them less competitive than defined-contribution plans, which offer more portability.[28] Portability makes defined-contribution plans attractive to younger employees, who value labor mobility. Over time, as the benefit differentials between the two types of plans dissipate under a low-for-long scenario, the balance will likely tip toward a labor market equilibrium in which defined-contribution plans play a larger role in the pension component of the benefits package. In the United Kingdom and the United States, where this transition is furthest along, the shift to defined-contribution corporate pension plans will likely accelerate due to the recent tightening of reporting and solvency standards. Other countries are attempting a hybrid approach, and their private pension systems embed features that may make for a slower and less extensive transition.[29] For example, multiemployer defined-benefit plans, such as the traditional industry-level arrangements in the Netherlands, will be more resilient in the face of such a scenario, since they offer built-in portability to beneficiaries within industries.

Life Insurers

The market for guaranteed-return life insurance savings products is likely to shrink under this scenario

[27]The remainder of this section does not aim to capture all factors that may be relevant to the long-term evolution of pension arrangements and insurance business models, such as changes to labor supply (including to retirement ages), and social safety nets.

[28]Administrative and actuarial valuation costs limit the portability of defined-benefit plans compared with defined-contribution plans. The traditional advantage of defined-benefit pension plans is superior risk sharing between sponsor and pensioner and across generations of beneficiaries; low asset returns under the scenario and the demographic changes underlying it reduce this advantage.

[29]The Netherlands has opted for a solution that reduces the retirement base salary from a high share of final salary to a lower career average share. Moreover, the system has removed the guarantee, but not the aspiration, to indexed pension payments. This allows for a collective approach to asset management, so that active participants can continue to benefit from equity investments suitable to their age and retirees continue to enjoy indexation and incur less risk of benefit cuts (Ponds and van Riel 2007).

with insurers focusing more on the unit-linked business segment.

- Population aging and rising longevity should raise the demand for life annuities, but countervailing forces may exist (Yaari 1965; Turra and Mitchell 2004; Davidoff, Brown, and Diamond 2005; De Nardi, French, and Jones 2010; Lockwood 2012). Where social safety nets are not sufficiently generous, longer life spans could increase demand for precautionary savings and liquid assets to cover out-of-pocket health expenses in retirement. At very low rates of interest, administrative costs of managing annuity portfolios may tip relative returns in favor of bonds and demand deposits.[30] Finally, a continuing switch from defined-benefit to defined-contribution pensions in such a scenario may also contribute to reducing annuity demand if very low take-up rates of voluntary annuitization (as in the United States) continued to prevail.[31] The combined effect of these forces on annuity demand is ambiguous.
- Life insurers may increasingly seek to expand into so-called unit-linked products on the savings side, where investors bear the risk of asset price volatility. These products make up a significant share of insurer business in such countries as Australia, Belgium, Canada, Ireland, Sweden, the United Kingdom, and the United States.

However, it is unclear what fundamental advantages insurers have in offering these products. Insurers' ability to compete for household savings through these products will increasingly depend on how they stack up against retail investments offered by asset managers. If the tax advantages currently enjoyed by unit-linked products disappear, a portion of household savings could shift over to funds offered by asset managers.

Demand for health and long-term care insurance and for new products may increase significantly. Koijen, Van Nieuwerburgh, and Yogo (2016) clarify that as households age, the value of life insurance progressively falls, the value of health insurance peaks only at a very advanced age, and that of long-term care insurance progressively rises. Population aging and increased longevity could, therefore, give a boost to new products that automatically replicate the life-cycle profile of an optimal package of insurance, eliminating the need for potentially costly active rebalancing by households.

[30]For example, demand for liquid assets has risen in Japan in a context of population aging and prolonged low interest rates (Suzuki 2005).

[31]The experience of Chile suggests that a transition to defined-contribution pensions may also increase voluntary purchases of deferred life annuities (Rocha, Morales, and Thorburn 2008). In Chile, pension reform resulted almost exclusively in defined-contribution plans starting in the early 1980s, and the annuity industry subsequently expanded as workers in the new system reached retirement age—about 60 percent of retired workers opt for an annuity instead of a phased withdrawal option.

A Difficult and Long-Lasting Transition

The challenge for insurers and pension funds is the medium-term impact of prolonged low interest rates on profits and solvency. Their assets are often of significantly shorter duration than their liabilities. Given the lower interest rates and flatter yield curves of the scenario, they will be forced to reinvest assets at significantly lower rates of return much earlier than their higher, fixed-rate obligations terminate. Can they, without assuming significantly greater risk, adjust their asset portfolios to meet cash flow obligations incurred in an environment of higher growth and interest rates? If not, what other options do they have to safeguard solvency?

Insurance Companies

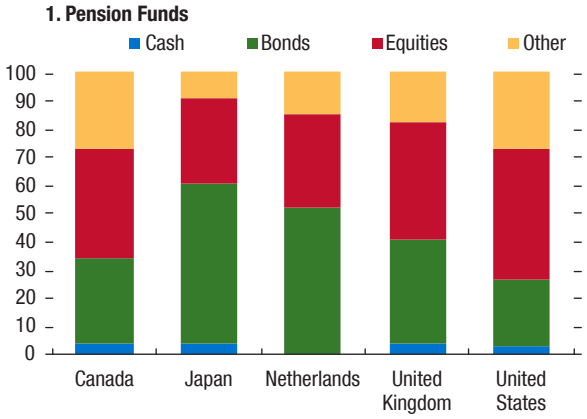
Not all insurers face this transitional challenge. Non–life insurance businesses, whose liability duration is short and whose main income source is profits from underwriting, are relatively unaffected. By contrast, long-term, guaranteed-payout businesses are especially vulnerable because when interest rates fall, a negative duration gap boosts the present value of a company's long-term liabilities much more than it boosts the present value of its assets. Other factors are options offered to policyholders that increase insurer losses when interest rates are low, and the difficulty of raising premiums due to competition and high price elasticity of demand for their savings products (Swiss Re 2012; Koijen and Yogo 2015).

Defined-Benefit Pensions

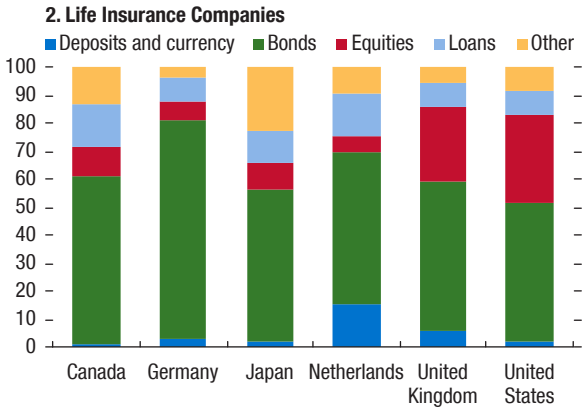
Defined-benefit pension funds with substantial vested obligations suffer most in a low-for-long environment. Because expected life spans after retirement are long, projected pension obligations can be seen as a large portfolio of long-term nominal bonds (real bonds, if the pension contract offers indexation) with coupon payments corresponding to normal interest rates. Pension plan sponsors would

Figure 2.8. Asset Allocation of Pension Funds and Insurers, 2015
(Percent)

Excluding Japan and the Netherlands, pensions place less than a third of funds in bonds.



Life insurers consistently invest a majority of their portfolios in bonds.



Sources: Bank of Japan; Centraal Bureau voor de Statistiek; Deutsche Bundesbank; GDV, Statistical Yearbook of German Insurance; Statistics Canada; U.K. Office of National Statistics; U.S. Federal Reserve; and IMF staff calculations.
Note: In panel 1, pension funds include defined-benefit and defined-contribution plans. In panel 2, for the Netherlands and the United Kingdom, the numbers exclude assets invested through mutual funds in separate accounts.

be hard-pressed to find a duration-matched risk-free bond portfolio to deliver the required cash flow in a low-for-long economy.[32]

[32]In contrast, sponsors of defined-benefit pension plans with a majority of actively employed, younger participants have several other options to actively manage the (future) accumulation of pension obligations. These options may render a smoother adjustment to such an equilibrium, including raising the retirement age and grandfathering current arrangements and subsequently reducing the replacement rate and removing indexation.

Can Existing Product Lines Be Maintained by Changing Asset Allocation?

Adopting a liability-driven investment strategy is recommended as an effective way for life insurers and pension funds to hedge against economic risks. For a life insurer or a mature or closed defined-benefit pension plan, liability-driven investment would entail finding a bond portfolio whose duration is similar to the bond-portfolio-like structure of its liabilities (Figure 2.8).[33]

Life insurers and defined-benefit pension plans tend to enter a period of low interest rates with reduced economic capital buffers (insurance companies) or a higher funding gap (pension funds).[34] This situation significantly complicates financial risk management for these institutions. On the one hand, portfolio decisions will need to continue to be guided by considerations of minimizing the adverse impact of market risk, in particular future interest rate volatility. This will call for an asset portfolio of bonds with cash flow characteristics to match cash outflows. On the other hand, given the wider funding gap, institutions have an incentive to generate returns on assets that exceed returns on liabilities in a sufficient amount to close the gap. This may call for riskier portfolios with a heavier weight on equities and alternative assets.

Can these institutions recover solvency margins and close funding gaps through changes to asset allocation, and, if so, how long would that take? A scenario simulation examines an underfunded defined-benefit pension fund faced with the choice of alternative portfolios of fixed-income and other assets; that is, evaluating the trade-off between the time it will take each portfolio to return it to fully funded status and the solvency risk entailed.[35]

Recovering adequate solvency margins by changing asset allocation appears feasible only by taking potentially unacceptable levels of risk (Box 2.3). The simulation shows that the volatility risk life insurers and defined-benefit pension funds would need to absorb is very high. This would either deter them from ven-

[33]The share of equity investments in the asset portfolios of pension funds may reflect the degree to which beneficiaries can rely on alternative sources of retirement income.

[34]The reason is the presence of significant negative duration gaps, as described earlier. A defined-benefit pension plan is said to have a *funding gap* when the present value of its assets is less than the present value of its projected benefit obligations.

[35]The simulation adapts the analytical approach of Leibowitz, Kogelman, and Bader (1995) and Leibowitz and Bova (2015).

Table 2.3. Capital Charges for Risky Investments by Insurers
(Percent)

	Solvency II (standard approach)	U.S. Risk-Based Capital Requirements	Japanese Solvency Margin Ratio
Listed Equity	22	15	20
Private Equity	49	30	20
Non-Investment-Grade Corporate Bonds	Up to 37.5 (five year)	30 (Class 6)	30
Real Estate	25	15	10

Source: Financial supervisory authorities in euro area, Japan, and the United States.

turing into such portfolios or entail the risk of falling afoul of regulatory constraints. For example, prudential regulation of insurers prevents significant reach for yield across broad asset classes or across risk categories within fixed income (Becker and Ivashina 2015). Many regulators' risk-based capital requirements for insurance companies comprise high capital charges for risky investments, including equity, non-investment-grade bonds, real estate, and alternative investments (Table 2.3). Expected returns on those assets may not compensate for the higher (regulatory) capital charge. This may explain why search for yield in the insurance sector so far has been moderate (Chapter 3 of the April 2016 GFSR). In the case of defined-benefit pensions, regulatory reform for corporate plans in the United States has resulted in tough penalties for underfunding, which also discourages excessively risky investment strategies. Public pension plans organized on a defined-benefit basis in the United States are an important exception: regulatory and accounting rules may encourage so-called gambling for resurrection incentives, especially in an environment of low returns on safe assets.[36]

The preceding analysis makes clear that asset allocation changes alone cannot adequately address the solvency challenge posed by negative cash flows on the current portfolio of liabilities. This means that, in the medium term, insurers and sponsors of defined-benefit pensions must find a way to capitalize their losses. A number of options are potentially available, including those discussed below. However, it seems likely that these institutions will have to make a fresh investment of equity capital to cover part of the loss.

- Insurers can attempt to expand the scale of their nonlife and protection businesses to generate earnings and cover some of the loss from their savings business. Other than health insurance, though, it is unclear whether, in the low-growth environment with an aging population, they can achieve the necessary business growth. The largest firms in the life insurance sector may gain market share if financial difficulties drive some of these insurers out of business.[37]
- Since many firms' defined-benefit pensions are mature or closed, and pension obligations are large relative to their businesses, the variation in the plans' net values due to market volatility increasingly drives companies' financial results. Transferring these pension obligations, or at least their financial risk, to insurers after recapitalizing the plans to close their funding gaps is an attractive option and has boosted growth of the market for pension risk transfers. At the level of the aggregate population, the mortality risk business provides insurers a natural hedge against longevity risk. Pension risk transfers may represent a market-efficient arrangement under which nonfinancial firms close out defined-benefit plans and sell them to insurers at actuarially fair prices. Regulation could play an important role in this area by facilitating such transactions.

The severity of the transitional challenge portends large business model adjustments in the life insurance industry's long-term-savings businesses in the medium term. Lower and less flexible guarantees on returns can be expected. Insurers may be given the option to

[36]This discussion presumes that current regulatory rules remain stable even under the chapter's scenario. The analysis does not formally examine the strength of gambling for resurrection incentives in a low-for-long economy highlighted in the literature (Antolin, Schich, and Yermo 2011) because such incentives reflect a more complex combination of regulatory and accounting factors. See, for example, Addoum, van Binsbergen, and Brandt 2010 for the case of U.S. corporate plans, and Andonov, Bauer, and Cremers 2016 for U.S. public plans.

[37]Japan's long experience with low interest rates has led to supervisory intervention in the case of seven insurers whose losses on existing stocks of guaranteed return liabilities proved impossible to absorb, even though the firms had reduced guarantee levels on new contracts.

adjust guarantees at regular intervals to reflect evolving market conditions. Regulation can play an important role in encouraging a switch to more sustainable business models. This switch will inevitably occur in part as a result of new regulatory and accounting regimes requiring economic valuation of portfolios and full recognition of the economic costs of long-term guarantees. Implementation or introduction of legal and regulatory requirements for reduction and adjustment of costly guarantees and options would support such a switch.

Asset Allocation, Market Finance, and Financial Stability

Households are likely to change their asset allocations in a low-for-long environment. First, demand for bank deposits should rise. Once deposit rates hit the zero lower bound, they become relatively more attractive as returns on other assets become very low—in particular, because bank deposits enjoy a liquidity premium and are usually guaranteed. Second, population aging may, under certain conditions, drive up the share of bonds in asset allocations at the expense of equities for several reasons. Various studies have pointed out that the equity risk premium tends to rise with age because older households have limited ability to earn labor income that can hedge effectively against wealth shocks from losses on equity portfolios (Jagannathan and Kocherlakota 1996).[38] For example, in the United States, older households have demonstrated a tendency to completely switch out of equities at the time of annuitization and withdrawals (Ameriks and Zeldes 2004).[39]

The share of asset managers in financial intermediation is also likely to increase for several reasons.

- Changes to pension arrangements may result in higher household demand for investment of retirement savings through asset managers. Investments of defined-contribution pension plans in the United States tend to be intermediated into both equities and bonds via mutual funds—more than for defined-benefit plans, in which direct investments are more common (Broadbent, Palumbo, and Woodman 2006).
- As discussed in the preceding section, insurers may lose clients to investment funds.
- Finally, as explained earlier, financial technology could drive up the share of market funding of nonfinancial firms, particularly large firms, with direct bank lending focusing more on small businesses.

How quickly such a development takes place could depend on how developed debt capital markets are. Countries with deep corporate bond markets and well-developed retail investment products (such as exchange-traded funds), like the United States, may make a quicker transition than other advanced economies.

Prolonged low rates may promote further growth in the average size of mutual funds and of the relative importance of index funds. Low asset returns under an equilibrium with low natural interest rates will combine with competitive pressure on mutual fund fees to make it increasingly difficult for smaller funds to survive, as has already happened in the money market fund sector in the United States (Chodorow-Reich 2014). The environment also puts active managers at a significant disadvantage relative to passive funds, such as exchange-traded funds, given that excess returns may no longer be high enough to justify fee differentials. Following already remarkable growth over the past two decades, this would place index funds front and center in financial markets in their share of assets both managed and traded (Figure 2.9).

The growth in index funds can present a challenge to financial market efficiency. Indexing promotes access to financial markets at lower cost and should facilitate portfolio diversification. However, as index investing through exchange-traded funds has become more prevalent, it appears to have increased the role of nonfundamental factors in determining both asset returns and their comovement.[40] A number of studies

[38]Such an outcome is very sensitive to the coverage and benefit levels promised by social insurance. Where these are generous, demand for risky assets such as equities can remain robust even in old age (Ang and Maddaloni 2005). However, generous social security benefits may be difficult to sustain fiscally with low long-term growth.

[39]The relationship between investment in equities and demographic structure is significantly richer (Goyal 2004). A higher dependency ratio would, all else equal, reduce investment in equities, but this would be attenuated or even reversed if the middle-age share of the population rose at the same time.

[40]For the price effects of inclusion into and deletion from the Standard & Poor's 500 index, see, for example, Chen, Norohna and Singal 2004; and Kasch and Sarkar 2011. Barberis, Shleifer, and Wurgler (2005) discuss the role of nonfundamental factors in driving market betas of stocks of firms included and deleted from the Standard & Poor's 500 index and quantitatively assess their relative significance.

have shown that widespread index investing could ultimately result in detachment of asset returns from information regarding fundamentals, hence thwarting price discovery (Barberis and Shleifer 2003; Wurgler 2010; and Sullivan and Xiong 2012).[41] Finally, benchmarking may have a detrimental impact on price discovery in additional ways. For example, it appears to motivate even sophisticated investors to overweight high-beta assets (Baker, Bradley, and Wurgler 2011).

Three important financial stability issues stem from the rising share of asset managers and index funds in financial intermediation in a low-for-long economy. First, as emphasized in earlier reports, stronger oversight of, and liquidity risk management by, mutual funds are needed, especially if investors continue to seek exposure to illiquid assets (Chapter 2 of the October 2015 GFSR). Second, the combination of larger fund sizes and increasing passive index investing carries potential new financial stability risks because of less diversity on the buy side and investors' greater proclivity to respond in the same way to shocks (Sullivan and Xiong 2012). Third, herd behavior among fund managers (which can be destabilizing) remains a concern (Chapter 3 of the April 2015 GFSR).

Policy Implications and Conclusions

Policies would help in the adjustment to a low-for-long environment. Prudential frameworks would need to provide incentives to ensure longer-term stability instead of falling prey to demands for deregulation to ease the short-term pain.

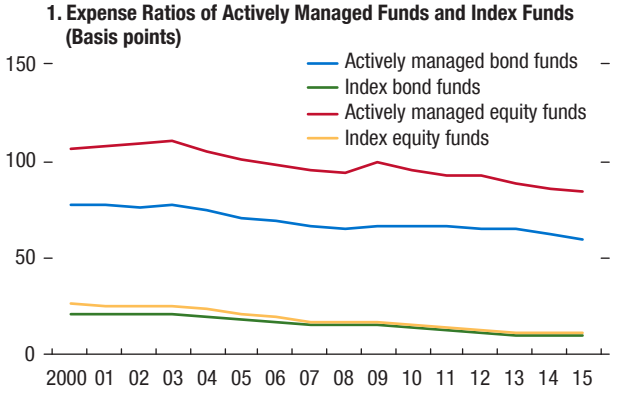
In a scenario of low interest rates and low growth, policymakers must help enable a smooth adjustment of financial institutions' business models. In the case of banks, this includes not hindering and, where feasible, actively facilitating consolidation for smaller institutions and liquidation of nonviable businesses where this is judged to be desirable from efficiency and financial stability perspectives (Chapter 1 of the October 2016 GFSR). For life insurers, a transition to the new contemplated regulatory and accounting regimes requiring more economic valuation is appropriate. These regimes encourage accurate recognition of the economic costs of long-term guarantees in the pricing of these products. Policymakers would do well to support efforts in this direction even in the face of competitive and political pressure.

Policy can play a vital role in guiding better financial planning by households in this scenario. Given the potential pressure on households' financial security in retirement, both through lower returns and less potential for collective risk sharing, encouraging more annuitization at retirement may be beneficial. Options include clearer delineation of its benefits and more

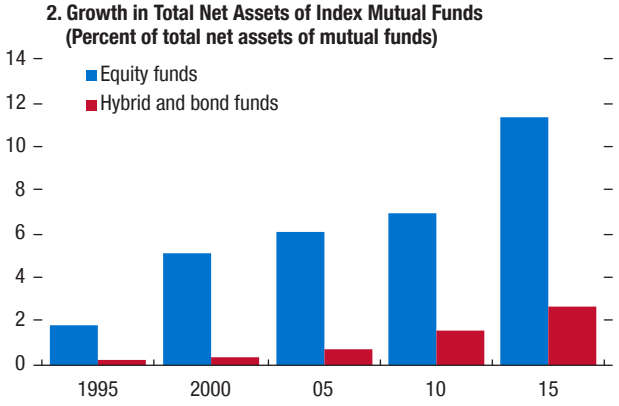
[41]Wurgler (2010) and Sullivan and Xiong (2012) also note that the rising prevalence of benchmarking active managers to indices and of overlap in constituent securities across multiple indices exaggerates the detachment problem.

Figure 2.9. U.S. Mutual Fund Expense Ratios and Growth of U.S. Index Funds

Fees charged by active funds are significantly higher than those charged by index funds.



The share of index funds has increased dramatically over the past two decades.



Sources: Investment Company Institute; and IMF staff calculations.
Note: The expense ratio is the annual fee charged by a mutual fund to its shareholders, defined as the percentage of assets deducted for fees and administrative expenses.

widely available options for automatic enrollment in employee defined-contribution plans.

Prudential authorities would need to contain incentives arising in a low-for-long scenario that may increase exposure to tail risk. Banks may respond to incentives in this environment with wider maturity mismatches, higher leverage, or more wholesale funding (within regulatory limits). Insurance and pension regulators that have not yet introduced economic solvency requirements would need to implement such regulations as soon as practical. Public pension funds in the United States are allowed to discount liabilities at expected rates of return on their asset portfolios. They have taken advantage of this opportunity by aggressively investing in risky assets, with negative financial results (Andonov, Bauer, and Cremers 2016). Aligning liability discounting rules with those for corporate pension plans in the United States would safeguard the solvency positions of these institutions from further erosion.

Surveillance and regulation of asset management activities will become even more important if this industry's share of the financial system continues to grow. Further strong growth of the sector can contribute to financial stability, but also entails new challenges. For example, if passive index investing becomes preeminent, price discovery could be hampered and markets could become more prone to swings in sentiment. More generally, as emphasized in earlier reports (Chapter 3 of the April 2015 GFSR; Chapter 2 of the October 2015 GFSR), closing significant data gaps and implementing adequate macroprudential rules to address risks, such as those related to liquidity mismatches, are essential for effective surveillance and to contain systemic risk.

Box 2.1. A Simple Model of Banking in a Low-for-Long Economy

In a model of a monopolistically competitive banking industry, equilibrium profits are reduced at very low interest rates in a low-for-long scenario if banks are unable to charge negative rates on deposits. In addition to lower profits, the model implies that bank leverage will increase in such a scenario. Banks may be able to attenuate this by expanding their international lending and investment activities.

The analysis builds on the Monti-Klein model, in which banks' profits reflect their market power in lending and deposit markets (Freixas and Rochet 2008, Chapter 3). In the model, lending and deposit rates adjust flexibly and instantaneously in response to the market interest rate.[1] The bank's assets consist of loans (L) and bonds (B); its liabilities consist of deposits (D), wholesale funding (W), and equity (E):

$$L + B = D + W + E.$$

The bank's profit (*before dividends*), π, is then defined as

$$\begin{aligned}\pi &= (R_L L + R_M B) - (R_D D + R_M W) - kL \\ &= (R_L - R_M - k)\mathrm{L} + (R_M - R_D)D + R_M E,\end{aligned}$$

in which R_L, R_D, and R_M are the loan rate, the deposit rate, and the market interest rate, respectively.[2] k is the marginal cost of lending. The bank's profit consists of the lending revenue, $(R_L - R_M - k)L$, and deposit revenue, $(R_M - R_D)D$.[3]

In the model, the bank optimally chooses the loan rate, R_L, and the deposit rate, R_D, so as to maximize its profit, π, subject to (1) the market rate, R_M; (2) the economic growth rate, g; (3) the balance sheet constraint; (4) the loan demand function; (5) the deposit supply function; and (6) market friction, namely, the zero lower bound on deposit rates. Because the economy is at, or close to, its steady state in the model, R_M can be set equal to g. Then, intuitively, loan demand is assumed to be a decreasing function of R_L relative to g. And deposit supply is assumed to be an increasing function, R_D, relative to R_M.[4] The zero lower bound for the deposit rate is introduced to account for the fact that banks find it difficult to charge negative rates to (retail) depositors, even at very low levels of $g = R_M$, when it is optimal to do so.[5]

As long as g is high and R_M is well above zero, the loan spread $R_L - R_M$ and the deposit spread $R_M - R_D$ as well as the loan and deposit volumes are (almost) independent of the market interest rate. As a result, lower market interest rates have a negligible effect on bank profits, and the excess return for bank shareholders, $\pi/E - R_M$, is nearly constant.

However, once g declines to levels at which the optimal deposit rate becomes negative, that is, the zero lower bound on deposit rates binds, lower R_M entails a negative effect on bank profits because of the compression in deposit spreads and, hence, in net interest margin. The narrowing deposit spread makes it more attractive to bank creditors to invest in deposits relative to other, market-based investment products at very low interest rates. This increases deposit inflows and bank leverage as R_M falls.[6] However, the negative effect of lower net interest margins on bank profits is stronger than the positive effect of rising balance sheet size and leverage because new deposits are invested in low-interest-earning bonds and not in higher-interest-earning loans in the low-growth environment.

Finally, when deposit rates are at their zero lower bound, if the economy contracts in equilibrium ($g < 0$), lending will contract and add to pressure on bank profits coming from compressed margins. This is because R_M, itself bounded below by zero, can no longer match the natural rate of interest (equal to g), resulting in lower demand for loans.

The author of this box is Mitsuru Katagiri.

[1]Consequently, the impact of an equilibrium with low natural rates on bank earnings does not ensue from differences in the average maturities of banks' assets and liabilities implied by maturity transformation.

[2]Banks are assumed to borrow and lend freely at the rate R_M. One of interpretations of R_M is the interbank market rate, but in countries where the loan-to-deposit ratio is far below 1, as in Japan, R_M can be interpreted as the rate of return on government bonds.

[3]Since profits are measured before dividend distribution, returns to equity are added back in.

[4]The assumption for loan demand is based on the fact that nonfinancial firms tend to increase their borrowing if the lending rate is low relative to the rate of economic growth. For deposit supply, on the other hand, the assumption implies that depositors decide on the amount of their bank deposits by comparing them with other market-based products, including money market funds. Positive deposit spreads reflect household liquidity needs. See Nagel, forthcoming.

[5]An alternative micro foundation for an effective lower bound on deposit rates is to introduce a preference for cash relative to deposits that is a function of their relative rates of return (Drechsler, Savov, and Schnabl 2016).

[6]In practice, leverage constraints will eventually force banks to raise capital or decline further deposit inflows.

Box 2.1 *(continued)*

Geographic diversification through businesses that operate internationally may mitigate the decline in banks' profitability under the low-for-long scenario. Under the assumption that economic growth in foreign countries is independent of that in the home country, the model implies that the lending spread for foreign loans is independent of R_M. Hence, under the low-for-long scenario, the bank can temper the decline in profitability of domestic businesses by increasing its portfolio of foreign loans.

Richer models are necessary to provide more comprehensive guidance on the implications of the low-natural-rates scenario for banks, for example, regarding risk taking in the steady state. This is an important area for future research.

Box 2.2. How Have U.S. Banks Reacted to the Low-Interest-Rate Environment?

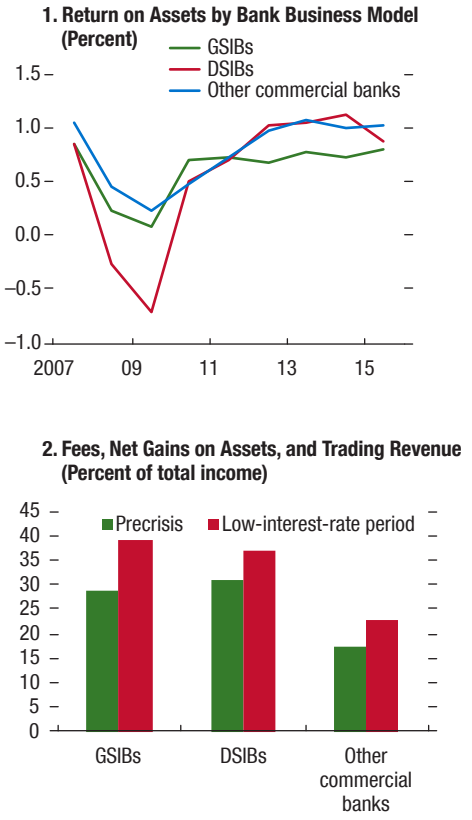
The recent experience of the United States does not lend itself to direct conclusions about the scenario considered here. Nonetheless, reviewing the response of U.S. banks to the prolonged period of very low interest rates may provide valuable additional insights into how banks may adapt to such circumstances.

After a significant dip around the Lehman Brothers bankruptcy, bank profitability in the United States has returned to precrisis levels (Figure 2.2.1, panel 1). A range of adaptation strategies are evident across banks of different sizes.

A common strategy is the increased focus on fee-based businesses and trading. The share of noninterest income in banks' total income has risen compared with the precrisis period (Figure 2.2.1, panel 2). The increase ranges from 5 to 10 percentage points depending on bank size and business model, with the largest increase observed for global systemically important banks. In particular, selected components of noninterest income, such as fees, net capital gains, and trading revenue, have grown significantly during the low-interest-rate period.

Banks have also increased the maturity of their assets, potentially seeking, as far as possible, to conserve interest margins from lending and bond investing.[1] Interestingly, banks that least successfully increased earnings from fees and trading are also the ones that most aggressively pursued this strategy. In

Figure 2.2.1. Bank Earnings and Noninterest Income since 2007



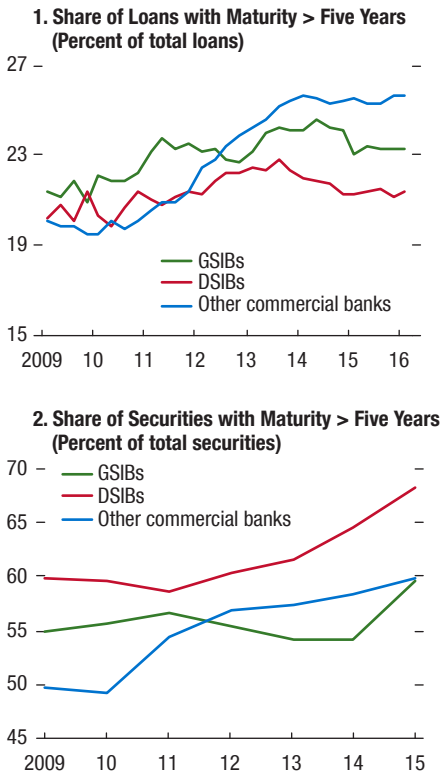
Sources: Call Reports of U.S. banks; and IMF staff calculations.
Note: "Fees, net gains on assets, and trading revenue" include service charges on deposits, net gains on loans and leases, net gains on sales of other assets, trading revenue, venture capital revenue, brokerage commissions, and investment banking advisory fees. DSIBs = domestic systemically important banks; GSIBs = global systemically important banks.

The authors of this box are Gee Hee Hong and Frederic Lambert.

[1]Low interest rates have increased demand for refinancing of residential mortgage loans into fixed-rate longer-maturity contracts, which also contributed to the lengthening of the average maturity of banks' asset portfolios. However, this does not explain why smaller banks have experienced a greater increase in average maturity of loans and securities.

Box 2.2 *(continued)*

Figure 2.2.2. Maturity Distribution of Bank Assets since 2007



Sources: Call Reports of U.S. banks; and IMF staff calculations.
Note: Securities include debt securities issued by the U.S. Treasury, U.S. government agencies and states, and political subdivisions in the United States; other nonmortgage debt securities; and mortgage pass-through securities. DSIBs = domestic systemically important banks; GSIBs = global systemically important banks.

smaller banks, the ratio of loans maturing in more than five years to total loans rose by more than 25 percent between 2011 and 2016 (Figure 2.2.2). In contrast, the average maturity of global systemically important banks' and domestic systemically important banks' loan portfolios has not changed significantly. In securities portfolios, both domestic systemically important banks and smaller banks have lengthened the average maturity of their portfolios by increasing the share of longer-term securities.

Box 2.3. Pension Fund Exit from Underfunding: Risk-Return Trade-off

The simulation analyzes how quickly pension funds can exit underfunded status, depending on asset allocation. Three strategies are considered: a high weight on bonds (*high bonds*), a high weight on equities (*high equity*), and a balanced portfolio strategy (*balanced*). Actual 2016 data are used to calibrate the risk-return profile of fixed-income and other assets (Table 2.3.1).[1] A fixed return of 4 percent is assumed for liabilities, consistent with the current discount rate implied by the Citi Pension Liability Index for U.S. corporate defined-benefit plans.

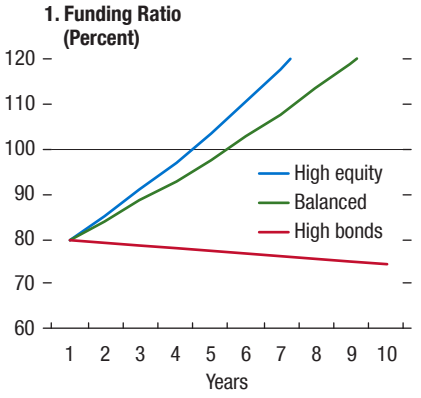
The initial funding ratio in present value terms is set at 80 percent, the current industry average for U.S. corporate defined-benefit plans.[2] Moving from fixed income and into other asset classes brings higher expected returns, but at a cost of greater return volatility, meaning that a fast exit from underfunded status depends on more volatility in the funding ratio.

For example, the low-risk, *high-bond* portfolio cannot help the fund achieve fully funded status. Even the portfolio allocation most tilted toward equity would require about four and a half years to reach full funding, with annual risk equal to 8 percent of the asset portfolio value a year (Figure 2.3.1, panel 1).

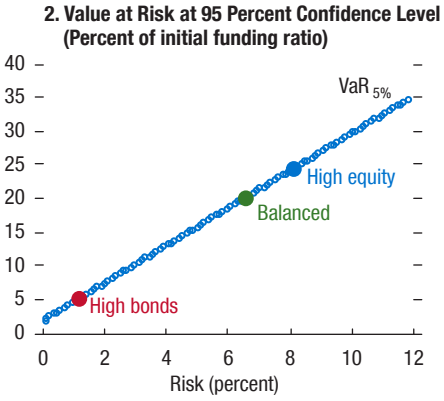
Potential losses from the *high-equity* strategy and from the *balanced* strategy can amount to up to 24 percent and 20 percent of market value of assets, respectively, in a single year at a 95 percent confidence level (Figure 2.3.1, panel 2). The expected time to fully funded status and the corresponding risk are highly sensitive to their initial underfunding. A fund with an initial funding ratio of 90 percent can achieve fully funded status in just two years with an asset portfolio whose return volatility is 7 percent a year, but would take more than four years with the same portfolio and a funding ratio of 80 percent.

Figure 2.3.1. Risk-Return Trade-off and Expected Times to Exit Underfunding

High-equity strategies can return a pension fund to solvency, but a high-bond strategy cannot.



High-equity strategies entail very high levels of risk, which can result in insolvency.



Sources: Bloomberg L.P.; Thomson Reuters Datastream; and IMF staff calculations.

The authors of this box are Sheheryar Malik and Jorge Chan-Lau.

[1]Specifically, the return on fixed-income assets corresponds to the annualized yield on monthly 10-year U.S. Treasury bonds; on other assets, it is the annualized monthly return on the Standard & Poor's 500 index. Both return measures are geometric averages. In general, other assets include alternative assets—real estate, private equity, and hedge funds, among others—other than equities. Since the analysis is illustrative, it is sufficient to focus on equities alone in characterizing the joint distribution of fixed-income and other asset returns and volatility. Long-term annual average equity returns calculated from the data are comparable to those in panel 1 of Table 2.3.1. The duration of liabilities is fixed at 12 years, and the duration of other assets is taken to be zero.

[2]The funding ratio (in present value terms) is the ratio of the present value of a pension fund's assets to the present value of its liabilities.

Box 2.3 *(continued)*

Table 2.3.1. Risk-Return Calibration and Portfolio Allocations

1. Baseline Calibration

	Fixed Income	Other
Assets		
Value (U.S. dollars)	36	44
Return (percent)	1.86	15.43
Risk (percent)	0.07	11.93
Covariance	0.005	–0.27
	–0.27	142.4
Liabilities		
Value (U.S. dollars)	100	
Return (percent)	4	
Duration (years)	12	

2. Selected Portfolio Allocations and Implied Fixed Income Durations under 50 Percent Hedge Ratio

	Fixed Income (percent)	Other (percent)	Implied Asset Duration (years)
High Equity	33	67	22.86
Balanced	45	55	16.66
High Bonds	90	10	8.33

Sources: Bloomberg L.P.; Citi; Thomson Reuters Datastream; and IMF staff calculations.

Annex 2.1. Term Premiums under a Low-for-Long Scenario[42]

This chapter's model derives from consumption-based asset pricing models, extending them to environments in which steady-state growth, inflation, and interest rates are very low and nominal interest rates are subject to a zero lower bound.[43]

An endowment economy model of asset pricing in the spirit of Deaton (1991) is adapted to accommodate an incomplete market with only nominal bonds, no borrowing constraints, an exogenous inflation process, an endowment process partially indexed to inflation, and nominal interest rates determined by a modified Taylor rule. The household receives an endowment Y_t at time t, which it may allocate to consumption C_t or savings through nominal bonds $B_{n,t}$, in which n,t denotes a term of n-periods at date t.[44] Subject to the period t budget constraint,

$$B_{t-1} + \sum_{n>1} Q_{n,t} B_{n,t-1} + Y_t = \frac{B_t}{R_t} + \sum_{n>1} Q_{n,t} B_{n,t} + P_t c_t,$$

households solve the following function:

$$V_t = max_{c_t} \left\{ c_t^{1-\sigma} + \beta E_t \left(V_{t+1}^{1-\alpha} \right)^{\frac{1-\sigma}{1-\alpha}} \right\}^{\frac{1}{1-\sigma}},$$

in which R_t, $Q_{n,t}$, and P_t are the nominal bond return, long-term bond price, and the price level, respectively, in period t; σ denotes the inverse of the intertemporal elasticity of substitution; and α the coefficient of risk aversion. The household optimization problem is situated in the context of exogenous inflation shocks described by

$$log\pi_t = \rho_\pi log\pi_{t-1} + (1-\rho_\pi) log\pi^* + \epsilon_{\pi,t},$$

and income shocks g_t around their steady-state values π^* and g^*. Households receive nominal endowments

$$\frac{Y_t}{Y_{t-1}} = \pi^{*\gamma} \pi_t^{1-\gamma} g_t$$

that are only partially indexed to inflation. Inflation shocks and income shocks are independently Gaussian, $\epsilon_{\pi,t} \sim N(0, \sigma_\pi)$ and $\log(g_t) \sim N(0, \sigma_g)$. The central bank's policy reaction function,

$$R_t = \max \left\{ \varphi_b (b_t - b^*) + \left(\frac{\pi_t}{\pi^*} \right)^{\varphi_\pi} \left(\frac{g_t}{g^*} \right)^{\varphi_g} R^*, \kappa \right\},$$

is subject to an effective lower bound, κ. The sensitivity of the central bank's policy response to growth and inflation shocks is $\varphi_g > 0$; $\varphi_\pi > 1$. A *fiscal risk premium*, φ_b, is assumed to be negative to ensure against explosive paths of capital accumulation by households. In particular, it is assumed that

$$R^* = \frac{\pi^* g^*}{\beta + \eta},$$

in which the value of η is chosen so that the average equilibrium value of real (government) debt outstanding is maintained at b^*. The model is solved following the approach of Caldara and others (2012).

A steady state with a low natural rate of interest close to the zero lower bound has flatter yield curves and compressed term premiums relative to a steady state with higher growth, inflation, and interest rates (Annex Figures 2.1.1 and 2.1.2).

In a normal economy, an inflation shock elicits a corresponding change in real rates because of the strong policy response of the central bank (Annex Figure 2.1.1). Moreover, inflation persistence, central bank policy reaction, and partial indexation of endowments ensure that real savings, real incomes, and expected lifetime utility move in a direction opposite from that of inflation and real interest rates, and hence in the same direction as bond prices. Accordingly, in this economy, households' lifetime utility moves positively with bond returns, which implies positive term premiums and a positively sloped yield curve.

In a low-for-long economy around the zero lower bound, central banks' constrained ability to respond to inflation shocks means that real rates now move in a direction opposite from that of inflation shocks. In turn, through the same transmission channels as above, this generates negative comovement of expected lifetime utility and bond returns, which lowers nominal and real term premiums in this economy relative to an economy with higher equilibrium levels of growth, inflation, and interest rates (Annex Figure 2.1.2).

[42]The author of this annex is Mitsuru Katagiri.

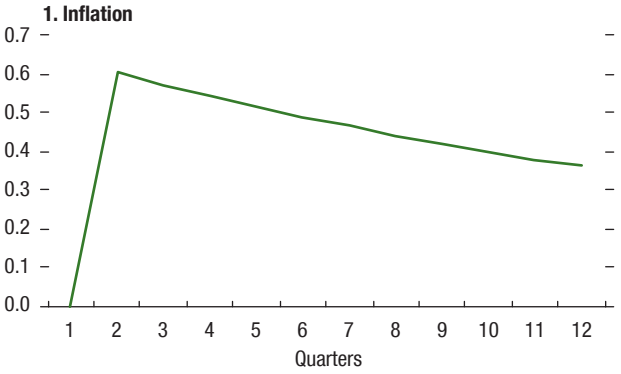
[43]Many factors play a role in determining the slope of the yield curve, including the covariation between household consumption growth and inflation (Piazzesi and Schneider 2007), the hedge provided by bonds against other asset returns (Campbell, Sunderam, and Viceira 2016), and the ability and willingness of arbitrageurs to execute risky, profitable trades in bond markets (Vayanos and Vila 2009; Greenwood and Vayanos 2010). The empirical literature on the measurement of term premiums has also advanced significantly, for example, based on the affine term structure models developed by Adrian, Crump, and Moench (2013) and Abrahams and others (2016) for the United States and applied by Malik and Meldrum (2016) for the United Kingdom.

[44]Uppercase letters denote nominal values, lowercase real values, and starred variables steady-state values.

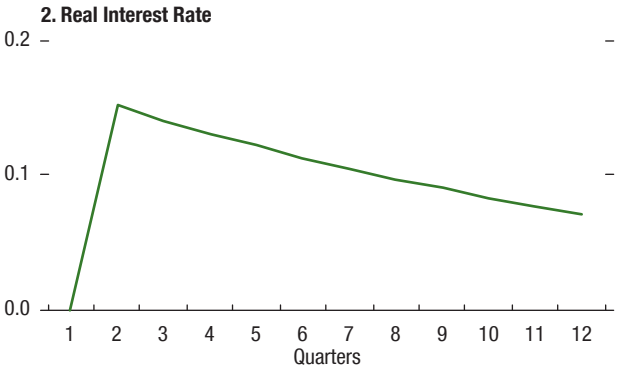
Annex Figure 2.1.1. Impulse Responses outside of a Low-for-Long Scenario

(Percentage points)

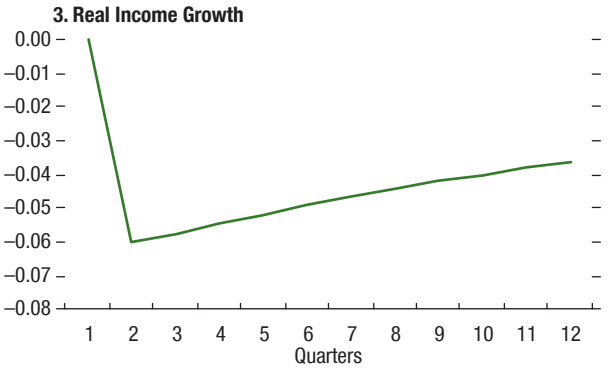
Under persistent inflation shocks ...



... real rates remain elevated ...



... and real incomes remain lower.

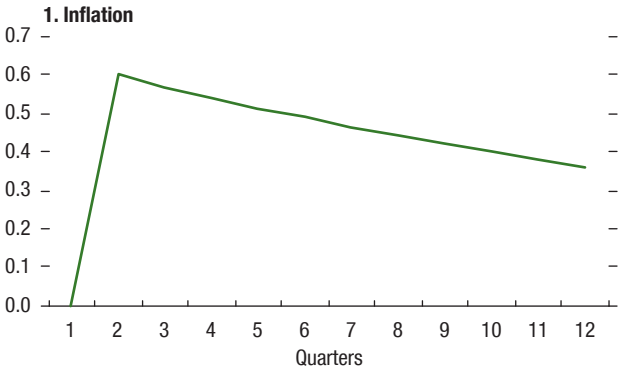


Source: IMF staff calculations.

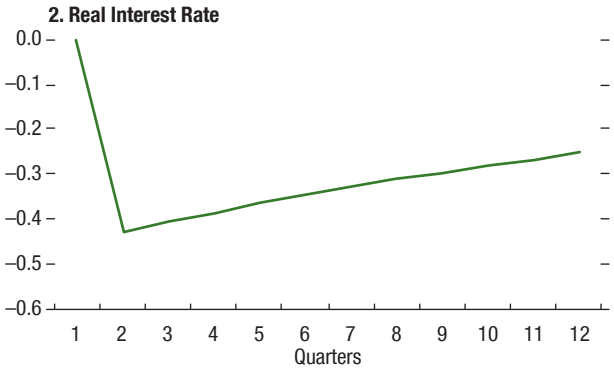
Annex Figure 2.1.2. Impulse Responses in Low-for-Long Economies

(Percentage points)

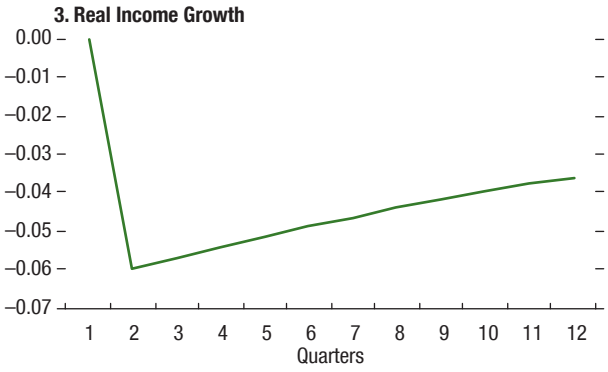
Under persistent inflation shocks ...



... real rates remain lower ...



... as do real incomes.



Source: IMF staff calculations.

Annex 2.2. Cross-Country Evidence of Prolonged Low Interest Rates' Impact on Banks[45]

This annex discusses the data and the empirical methodology used to analyze how periods of low interest rates affect bank profitability as measured by realized profits and expected future profits, as reflected in banks' equity price returns.

The Impact on Bank Profitability

Bank profits, typically measured by return on equity, are analyzed using the following regression (for bank *i* in country *j* in year *t*):

$$\begin{aligned} Profit_{ijt} = {} & \alpha_i + \beta\, Macro_{jt} + \theta\, low_{jt} + \gamma_1\, Shortrate_{jt} \\ & + \gamma_2\, Shortrate_{jt} \times low_{jt} + \gamma_3\, TP_{jt} \\ & + \gamma_4\, TP_{jt} \times low_{jt} + \phi_1\, Businessmodel_{ijt} \\ & + \phi_2\, Businessmodel_{ijt} \times low_{jt} + \varepsilon_{ijt}, \end{aligned}$$

in which *Profit* is measured by return on equity; *Macro* is a vector of macroeconomic control variables, such as consumer price index inflation, credit growth, and GDP growth; and *low* is a dummy for periods with prolonged low rates of interest, defined as years when the 10-year, on-the-run spot rate on government bonds is less than the historic in-sample average of the monetary policy interest rate, *and* the three-month government bond or bill interest rate is less than 1 percent. For Japan, the threshold for the 10-year spot rate is 2 percent;[46] *Shortrate* is the three-month interest rate; *TP* denotes the term premium, based on Wright 2011; and *Businessmodel* represents the indicators of banks' business models.

Two approaches are used to characterize banks' business models. First, several balance sheet indicators are considered individually, including size (total assets), leverage (assets-to-equity ratio), the deposit funding ratio, the loans-to-total-assets ratio, and the share of trading assets in total assets. Second, business models are constructed for each bank using a clustering method. The business models are defined by three features: size, deposit funding ratio, and loan-to-asset ratio.[47] Banks that are similar in these three dimensions are clustered into the same group, following Roengpitya, Tarashev, and Tsatsaronis 2014, and three group-types of business models are estimated and assigned one bank at a time.

The exercise covers an unbalanced panel of almost 17,000 banks in eight advanced economies, using annual data from 1990 through 2015. Only banks with end-of-year statements are included.[48] The estimation incorporates bank-level and time-level fixed effects.[49]

The baseline results are robust to a number of perturbations of this benchmark specification, including alternative definitions of bank profits (return on assets); inclusion of other bank business characteristics; alternative definitions of periods of prolonged low interest rates; lagged values of bank business model characteristics, controlling for the scope and intensity of macroprudential policies and for concentration in the banking industry; and incorporating a lagged dependent variable. A dynamic panel regression was initially implemented resulting in a finding of insignificant year-to-year persistence of bank returns, which argued for dropping the lagged dependent variable and reporting results of a cross-country panel regression.

The Impact on Bank Equity Price Return

The general specification can be written as follows:

$$\begin{aligned} & EquityPriceReturn_{ijt} \\ & = \alpha + \beta\, marketreturn_{jt} + \gamma_0\, surprise_{jt} + \gamma_1\, surprise_{jt} \\ & \quad \times MP\_normaltime_{jt} + \gamma_2\, surprise_{jt} \times MP\_low_{jt} \\ & \quad + \theta\, conditioningvariable_{jt} + \varepsilon_{ijt}, \end{aligned}$$

in which the dependent variable *EquityPriceReturn* is the daily change in equity prices (in logarithm); *marketreturn* denotes the daily change in country-specific stock market indices, capturing the overall market return (in logarithm); *surprise* denotes the unexpected change in market expectations of

[45]The authors of this annex are Qianying Chen and Kai Yan.

[46]Since Japan was in an environment of policy rates of less than 2 percent for most of the time in the sample, the historical average of policy rates is considered inappropriate for defining the ceiling of a period of low interest rates.

[47]Data on the geographic distribution of bank incomes could not be included because it was available only for a small subsample of banks and skews the country and size distributions relative to the overall sample of banks.

[48]Canada, Finland, France, Germany, Japan, the Netherlands, the United Kingdom, and the United States. The country coverage is subject mainly to data availability of the term premium.

[49]Incorporating country and time fixed effects eliminates, as expected, the effect of changes in the term structure of interest rates on bank profits in periods with prolonged low interest rates. However, the estimated sensitivity of the impact depending on bank business model characteristics is robust to inclusion of these fixed effects.

future short-term interest rates, defined as the change in the country-specific nine-year-ahead one-year-forward rate; *MP_low* is the dummy for monetary policy announcement dates in periods with prolonged low rates, while *MP_normaltime* represents the announcement dates in other periods. The period of prolonged low rates is defined as the time when the 10-year government bond yield is less than 2 percent, a level when the real rate adjusted by inflation target is at zero in many countries.[50]

The interaction terms $surprise_{jt} \times MP\_normaltime_{jt}$ and $surprise_{jt} \times MP\_low_{jt}$ measure the market surprises on the expected future short-term rate on the monetary policy announcement days. This is either the surprise triggered by the news about a change in the monetary policy stance or a correction of previous expectations when there is no change in the policy on that day. Assuming that there are no other major announcements on the same day, these interaction terms ensure the exogeneity of the interest rate shock.

The analysis relies on daily data spanning 2000 through 2016, covering banks in 16 advanced economies.[51] Details of variable definitions and data sources are provided in Annex Table 2.2.1. Only banks whose stocks are traded with sufficient frequency are included in the analysis.

Endogeneity may appear when including the surprise in the regression, because other economic news that changes the expectations of forward rates may also directly affect the equity price return. The missing variable of other news in the residual may be correlated with the surprise and result in biased estimation. Therefore, additional robustness checks are conducted. An event study regression was run, covering only the dates of the monetary policy announcements, and also a daily frequency regression with an alternative surprise measure extracting the component in surprise that is orthogonal to the market return, which is taken to represent news that affected interest rate expectations, but not the equity price return directly. Both of these checks confirm that the main results are robust.

[50]In defining periods of prolonged low rates, the second threshold applying to short-term interest rates (in the profit regression) was not applied in this regression to avoid the noise introduced by the volatile movement of daily short-term market interest rates. As part of robustness exercises, two alternative definitions were also examined—periods when the forward rate was less than the in-sample average of the monetary policy rate and when the shadow policy rate deviated from the actual policy rate. However, using the first of these alternative definitions does not work well with the Japanese data because interest rates were also low in the 1990s, and the second definition was problematic: it identified periods of prolonged low rates only with periods of negative interest rates.

[51]Australia, Belgium, Canada, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Netherlands, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

Annex Table 2.2.1. Data Sources

Variable	Description	Source
Low	Dummy for period with low interest rates, which is defined as the time when the 10-year government bond yield and the three-month short rate are below their corresponding thresholds. The threshold for the 10-year government bond yield of all countries except Japan is set to be the historical average of the country-specific policy rates (for Japan, it is set to be 2 percent) when the real rate adjusted by the inflation target is at zero. The threshold for the three-month interest rates is set to be 1 percent.	Thomson Reuters Datastream and IMF staff calculations
Surprise (9-year forward)	Daily change in the forward rate of the one-year government bond yield, based on a no-arbitrage assumption and the spot rate of the 10-year and 9-year government bond yield (from yield curve values for constant maturity).	Thomson Reuters Datastream and IMF staff calculations
Surprise (9-year-forward orthogonal)	Surprise that is orthogonal to market return, measured by the residual of the regression of surprise on market return.	IMF staff calculations
Monetary Policy in Low (2 percent)	Dummy for period in low period and with monetary policy announcements. The low period is defined as a period when the 10-year government bond yield is below 2 percent.	Thomson Reuters Datastream, central bank websites, and IMF staff calculations
Monetary Policy in Normal (2 percent)	Dummy for period in non-low period and with monetary policy announcements. The low period is defined as a period when the 10-year government bond yield is below 2 percent.	Thomson Reuters Datastream, central bank websites, and IMF staff calculations
Bank Characteristics		
Return on Equity	Earnings before interest and taxation divided by equity	Fitch Connect
Size	Logarithm of banks' total assets	Fitch Connect
Loan-to-Asset Ratio	Gross loans divided by total assets	Fitch Connect
Deposit Funding Ratio	Customer deposits divided by total liabilities	Fitch Connect
Trading Asset	Assets held for trading plus assets held at fair value	Fitch Connect
Trading Asset Ratio	Trading assets divided by total assets	Fitch Connect
Leverage Ratio	Total assets divided by equity	Fitch Connect
Macroeconomic		
Consumer Price Index Inflation	Year-over-year growth of consumer price index, percent	IMF, International Financial Statistics database
Credit-to-GDP Ratio	Private sector credit in percent of GDP	Bank for International Settlements
Real GDP Growth	Year-over-year growth of GDP, constant prices	IMF, World Economic Outlook database
Three-Month Interest Rate	Typically central bank bill/Treasury bill yield or interbank offered rate	Haver Analytics
Term Premium	Term premium estimated based on Wright 2011	IMF, *Global Financial Stability Report*, October 2016
Ten-Year Government Bond Yield	On-the-run 10-year government bond yield (from yield curve values for constant maturity)	Thomson Reuters Datastream
Monetary Policy Rates	Short-term interest rates represent the monetary policy stance in a country	Haver Analytics
Financial Market		
Equity Price Return	Log difference of equity prices	
Market Return	Difference of overall country-specific equity price indices	
VIX	Chicago Board Options Exchange Market Volatility Index	Bloomberg L.P.
Oil Price	West Texas Intermediate crude oil spot price	Bloomberg L.P.

Source: IMF staff.

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CHAPTER 3

ARE COUNTRIES LOSING CONTROL OF DOMESTIC FINANCIAL CONDITIONS?

Summary

How much influence do countries retain over their domestic financial conditions in a globally integrated financial system? This question has recently been attracting increased interest in policy and academic circles alike. Financial conditions broadly refer to the ease of obtaining finance, and measuring them can be valuable for appraising the impact of policy and economic prospects.

Greater financial integration can complicate the management of domestic financial conditions in several ways. First, policymakers may need to take external factors into greater consideration when pursuing domestic objectives. Second, global financial integration may make it harder for domestic policymakers to control financial conditions at home—for example, it may hamper the transmission of monetary policy.

This chapter examines the evolving importance of common global components of domestic financial conditions. It develops financial conditions indices (FCIs) that make it possible to compare a large set of advanced and emerging market economies. It finds that a common component (global financial conditions) accounts for about 20 to 40 percent of the variation in countries' domestic FCIs, with notable heterogeneity across countries. Its importance, however, does not seem to have increased markedly over the past two decades.

Global financial conditions loom large, but evidence suggests that, on average, countries still appear to hold sway over their own financial conditions—specifically, through monetary policy. Nevertheless, the rapid speed at which foreign shocks affect domestic financial conditions may also make it difficult to react in a timely and effective manner, if deemed necessary. Given that global financial conditions tend to account for a greater fraction of FCI variability in emerging market economies, these countries, in particular, should prepare for the implications of global financial tightening. Governments can promote domestic financial deepening to enhance resilience to global financial shocks. In particular, developing a local investor base, as well as fostering greater equity- and bond-market depth and liquidity, can help dampen the impact of external financial shocks.

Introduction

To what extent can individual countries steer domestic financial conditions in a globally integrated financial system? This question has recently been attracting increased interest in policy and academic circles alike. The concern is that global factors' greater potential impact on domestic asset prices and credit leave policymakers little room to influence their countries' financial conditions according to domestic objectives (Rey 2013). More narrowly, substantial research has focused on whether monetary policy has lost its ability to independently guide domestic interest rates, even in countries with floating exchange rate regimes.[1]

Financial conditions broadly reflect how easy it is to obtain financing. Going beyond short-term interest rates, they summarize information about the price and nonprice (such as terms and conditions) costs of credit for various agents in the economy. Other definitions of financial conditions look at how financial variables relate to economic decision making and therefore future economic activity.

Financial conditions can be especially valuable for evaluating the impact of policy and the economic outlook:

- Monetary policy, for example, "works its magic through its effect on financial conditions" (Dudley 2010). It largely seeks to influence inflation and output through its effects on financial market variables (including bank credit volumes, collateral valuations, and term premiums), along with direct effects through policy rates. Consequently, measuring financial conditions can be informative for policymakers because doing so can capture the effects through these various transmission channels. At the same time, if the mapping from policy rates to this range of financial variables is not unique or stable, then tracking financial conditions can be helpful in predicting the impact of monetary policy (Dudley 2010).
- Furthermore, measures of financial conditions have been shown to be reliable predictors of economic activity (Hatzius and others 2010; Gilchrist and Zakrajšek 2012; Koop and Korobilis 2014, among others). Indices of financial conditions have also proved useful in predicting downside risks to GDP growth (Adrian, Boyarchenko, and Giannone 2016) and helpful in detecting the buildup of financial vulnerabilities (Adrian and Liang 2016). Empirically, financial conditions indices (FCIs) are typically built from a broad range of financial variables aiming to capture, directly or indirectly, the cost of funding for various agents in the economy.

Because financial conditions can spill across countries, it is important to distinguish between two different effects:

- First, as countries become more integrated into the global economy, their financial conditions are more likely to be affected by external shocks. Accordingly, policymakers must respond to a broader range of developments, complicating their task. But this alone does not constitute a loss in policy "autonomy" for steering domestic financial conditions (Disyatat and Rungcharoenkitkul 2016).
- Second, global financial integration may weaken the transmission channels of monetary policy. For example, if longer-term bond yields are increasingly set in international markets, their responsiveness to short-term interest rates set by central banks may decline. This situation would also expose countries to the types of shocks that are unwarranted by economic fundamentals, such as shifts in investor sentiment.

This chapter examines the importance of common global components of domestic financial conditions, the evolving role of these global factors over time, and their key drivers. It explores country characteristics that influence the extent to which domestic financial conditions move with global factors and the ability of monetary policy to influence domestic financial conditions. For this purpose, it develops new FCIs that are comparable across a large set of advanced and

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[1]Rey (2016) argues that in a world of freely flowing capital, exchange rate flexibility alone cannot guarantee monetary autonomy, because U.S. monetary policy shocks spill over and affect domestic financial conditions—even in inflation-targeting economies with large financial markets. Likewise, Rey (2013) concludes that fluctuating exchange rates cannot insulate economies from the global financial cycle when capital is mobile. Rey contends that the Mundell-Fleming trilemma has morphed into a dilemma: independent monetary policy is possible if and only if the capital account is managed, regardless of the exchange rate regime. In contrast, Kamin (2010), Obstfeld (2015), and Klein and Shambaugh (2015), for example, argue that exchange rate flexibility does allow for monetary autonomy. See also Caceres, Carriere-Swallow, and Gruss (2016). Disyatat and Rungcharoenkitkul (2016) conclude that domestic financial conditions remain in the domain of policymakers.

emerging market economies—in itself a contribution to the literature.

These are the chapter's highlights:

- The new FCI measures appear to signal downside risks to GDP well. In particular, economic contractions are more clearly associated with a preceding change in financial conditions in contrast to expansions.
- A single factor, "global financial conditions," appears to account for a large share of variation in domestic financial conditions around the world. This factor moves in tandem with the U.S. FCI and measures of global risk, such as the Chicago Board Options Exchange Volatility Index (VIX).
- There is no conclusive evidence, however, that this global factor has gained significant influence over the past two decades.
- Financial linkages (such as cross-country investments) are the most reliable indicator of global financial conditions' influence on local FCIs. At the same time, greater financial development can reduce the sensitivity of domestic FCIs to global financial shocks.
- About 20 to 40 percent of the variation in domestic FCIs across countries can be attributed to global financial conditions, with domestic factors accounting for the rest. However, the importance of global financial shocks for domestic financial conditions varies notably across countries. Importantly, monetary policy shocks account for about 15 percent of the variation across countries with flexible exchange rates, suggesting that amid exposure to external factors, changes in the monetary policy stance still can matter for domestic financial conditions.

Even with a sizable impact from global financial shocks, evidence suggests that, on average, countries appear to be able to influence their own financial conditions. In particular, the analysis indicates that they generally have scope to use monetary policy. However, given that local financial conditions react more rapidly to global financial shocks than to changes in domestic policy rates, timely policy responses may often be difficult. Emerging market economies, in particular, clearly need to guard against the risks associated with sharp changes in global financial conditions. Countries can resort to other policies to protect themselves against destabilizing shocks. For example, macroprudential measures can contain potentially lingering vulnerabilities that leave domestic financial conditions sensitive to external shocks. When disruptive outflows threaten financial stability, capital flow management measures could have a temporary role, as noted in IMF 2016. By promoting financial deepening, countries can help protect against global financial shocks. Specifically, developing a local investor base (both banks and nonbanks) can help soften the blow of financial shocks.

An Overview of Financial Conditions

This section examines the concepts surrounding financial conditions, their transmission across countries, and their measurement.

Financial Conditions: Main Concepts

Financial conditions generally refer to the ease of obtaining financing. The literature offers several complementary definitions of financial conditions. For instance, Hatzius and others (2010) define them as the current state of financial variables that influence economic behavior and thereby the future of the economy, while Carlson, Lewis, and Nelson (2012) connect them to price and nonprice costs of credit. This chapter focuses on a notion of domestic financial conditions that seeks to gauge the costs, conditions, and availability of domestic funds to the local economy. In addition to interest rates and asset price valuations, financial conditions are influenced by risk appetite and, for example, agents' willingness to hold illiquid assets.

Financial conditions play a central role in the transmission of monetary policy to the broader economy. In particular, monetary policy influences the rest of the economy mainly by altering financial conditions, and the transmission channels can be classified into two broad categories:

- The first comprises the "traditional," or New Keynesian, channels of monetary policy. The emphasis is on changes in (short-term) policy rates and how expectations about those changes alter longer-term rates and thereby consumption and investment decisions. Effects on trade through exchange rate movements also belong to the list of traditional channels.
- The second category predominantly comprises imperfections in credit supply arising from institutional constraints on financial intermediaries and from informational asymmetries (Boivin, Kiley, and

Mishkin 2010). Examples include the balance sheet channel (Bernanke and Gertler 1989; Kiyotaki and Moore 1997), the bank capital channel (Van den Heuvel 2002), and the risk-taking channels (Adrian and Shin 2011; Adrian and Boyarchenko 2012), as discussed in greater detail in Adrian and Liang 2016 and Chapter 2 of the October 2016 *Global Financial Stability Report* (GFSR).

Many of these "nontraditional" monetary transmission channels feature both incomplete markets and heterogeneous agents, which lead to differences in the pricing of risk over time. As a result, the risk-free rate is not an adequate statistic for funding costs or for assessing the impact of monetary policy on the real economy.[2] FCIs thus aim to distill information from a broad array of financial variables—including measures of risk taking and various kinds of financial frictions—ideally capturing the prevalence of credit constraints and the magnitude of external financing premiums. FCIs can only capture some measure of average funding costs, although different agents may face large variations in funding costs and conditions. Naturally, as financial systems evolve, the most relevant variables for tracking financial conditions may change.

Empirically, measures of financial conditions can be more helpful in predicting economic activity than indicators of current and past real economic activity. Studies, including Hatzius and others 2010 and Koop and Korobilis 2014, argue that FCIs are good predictors of future economic activity. Likewise, Adrian, Boyarchenko, and Giannone (2016) show that FCIs are particularly useful in flagging future economic contractions.

Financial conditions are driven only partly by policy. Changes in uncertainty about the exposures of major financial players, shocks to the net worth of borrowers not triggered by policy actions, runs on financial institutions, changes in risk perception, and shifts in investor sentiment triggered by idiosyncratic events can all influence access to funding in an economy.

[2]As underscored by Dudley (2010), financial conditions are explicitly taken into account in the conduct of monetary policy. In the United States, he notes that this is evident in the transcripts of the Federal Open Market Committee meetings and minutes going back more than a decade. Even before the global financial crisis, Bernanke (2007) highlighted links between financial conditions and growth. More recently, Yellen (2016) drew attention to the relevance of financial conditions for the economic outlook and the stance of monetary policy.

The extent to which global factors affect domestic financial conditions is a question this chapter attempts to decipher. Accordingly, the FCIs consist of domestic financial variables such as corporate, interbank, and term spreads; equity and house price returns; equity return volatility; and credit growth. An attempt is made to purge the FCIs of (contemporaneous) macroeconomic conditions. That way, in principle, it is possible to assess how much "unwarranted" global financial shocks affect domestic financial conditions.

The Transmission of Financial Conditions across Countries

Financial conditions can be transmitted across countries through different channels. A significant strand of the literature has focused on the degree of monetary independence in setting interest rates. A central principle guiding monetary policy in open economies is the so-called Mundell-Fleming "trilemma." It states that policymakers can seek to achieve only two out of the three following objectives: (1) fixed exchange rates, (2) free international capital mobility, and (3) monetary autonomy.[3] However, financial conditions can be transmitted across countries through other mechanisms as well, in ways that usually cannot be fully offset by movements in exchange rates (Obstfeld 2015). In fact, exchange rate movements also typically induce changes in financial conditions in small open economies, and can be sizable (Kearns and Patel 2016). Changes in financial conditions can further spill over from originating countries to other economies through several interrelated channels. For example, changes in credit volumes and other types of capital flows can have powerful cross-border effects. Another transmission channel works through comovements in risk premiums, which can affect collateral valuation and thereby borrowing constraints (Obstfeld 2015).

Global financial integration can complicate the management of domestic financial conditions in at least two distinct ways. First, as countries integrate more into the global economy, policymakers may need to take external factors into greater consideration when pursuing domestic objectives. However, this complica-

[3]Broadly consistent with the predictions of the trilemma, studies have typically found that greater exchange rate flexibility does provide some degree of flexibility in steering short-term interest rates (Klein and Shambaugh 2015; Obstfeld 2015).

tion does not, by itself, imply that countries lose their ability to steer their domestic financial conditions.[4] Second, global financial integration may indeed make it harder for domestic policymakers to control domestic financial conditions—for example, by hampering the transmission of monetary policy or limiting the effectiveness of prudential policies. The speed at which foreign shocks affect local financial conditions also makes it difficult to react in a timely and effective manner.[5] In particular, the efficacy of financial stability policies can be weaker in an open economy (Schoenmaker 2013).[6]

Various studies suggest that financial conditions around the world are heavily influenced by global factors. Building on earlier work by Calvo, Leiderman, and Reinhart (1996), many studies emphasize the important role of global "push factors," such as the VIX, as drivers of financial variables (see, for example, Bruno and Shin 2013; IMF 2014a; Fratzscher 2012; Baskaya and others 2017). Miranda-Agrippino and Rey (2015) argue that prices of risky assets (equities, corporate bonds) across countries can be summarized by a single global factor, the "global financial cycle," which is driven by U.S. monetary policy shocks. Therefore, as argued by Rey (2016), U.S. monetary policy shocks spill over and affect domestic financial conditions even in inflation-targeting economies with large financial markets. Longstaff and others (2011) find that three factors account for more than 50 percent of the variation in credit default swap spreads across countries, and Adrian, Stackman, and Vogt (2016) estimate a highly significant price of risk that forecasts global stock and bond returns as a nonlinear function of the VIX.[7]

Evidence of global factors' greater influence, however, is not by itself proof that policymakers are losing control over domestic financial conditions. Financial conditions that move together across countries may be a natural reflection of comovement in fundamentals because of greater trade and financial integration and could, therefore, be optimal from a domestic standpoint. For example, for a globally integrated economy whose business cycle is highly correlated with the rest of the world, raising domestic interest rates in response to a rise in world interest rates may be the best decision from a domestic perspective. But some changes in financial conditions have nothing to do with macroeconomic factors and may arise from financial frictions (including changes in investor sentiment, the effects of herd behavior, risk management constraints, or regulations). Conceptually, in an extreme case, empirically domestic financial conditions being predominantly influenced by such spillovers not driven by fundamentals (and therefore likely to be undesirable) would suggest a "lack of control" by policymakers. The reason is that policymakers will most likely attempt to counteract such shocks. Accordingly, these spillovers still featuring prominently in domestic financial conditions would be an indication that policymakers do not have the tools to react in an effective or timely manner to offset them. Empirically, the distinction between fundamentals-driven versus other types of spillovers is not easy to derive (see Disyatat and Rungcharoenkitkul 2016 for an effort in this regard). This chapter seeks to address this issue by focusing on measures of financial conditions that are purged of macroeconomic fundamentals, acknowledging the difficulties and limitations inherent to such an endeavor.

Constructing Financial Conditions Indices across Advanced and Emerging Market Economies

Previous studies have constructed FCIs mainly for selected advanced economies, using various methods, each with its strengths and limitations. FCIs are unobservable (latent) variables that are estimated using a wide range of financial variables so as to best reflect the financial conditions faced by domestic end users, such as firms and households. The literature has concentrated primarily on developing FCIs for the United States and, occasionally, for major economies of the Organisation for Economic Co-operation and Development (Box 3.1). However, previous studies have not developed a consistently estimated set of FCIs for both major advanced and emerging market economies.

[4]For example, as trade becomes more important, monetary policy may work more through exchange rates and net exports and less through its effects on domestic demand.

[5]Global financial integration could also worsen the trade-offs authorities face when pursuing financial stability objectives along with more standard macroeconomic stabilization goals (Obstfeld 2015). This is because greater openness to international financial markets would likely diminish the effectiveness of macroprudential tools, which would suffer more from leakage problems (IMF, Financial Stability Board, and Bank for International Settlements 2016).

[6]According to the "financial trilemma" put forward by Shoenmaker (2013), only two of the following three goals can be achieved simultaneously: (1) national autonomy over financial policies, (2) international financial integration, and (3) financial stability.

[7]See also Kennedy and Palerm 2014; and Bekaert and others 2016, among many others.

This chapter goes beyond existing studies and develops FCIs for major advanced and emerging market economies. For the purposes of this chapter, latent FCIs are extracted from an array of financial variables while taking account of growth and inflation. In particular, a time-varying parameter factor-augmented vector autoregression model based on the work of Koop and Korobilis (2014) is used to estimate the FCIs.[8] This method jointly considers the dynamic interactions of the FCI and macroeconomic fundamentals, and has two notable advantages. First, the method aims to purge the FCI of the effects of macroeconomic conditions.[9] Although empirically difficult, conceptually this purging is desirable—ideally, the estimated FCIs would therefore entail primarily exogenous shifts in financial conditions that are distinct from the endogenous reflection of macroeconomic fundamentals. Second, because the parameters are allowed to change, the model can account for the evolving relationships between macroeconomic and financial variables over time.[10]

In principle, the range of possible financial variables to include in an FCI is vast. In practice, however, only a few studies use a large array of financial variables. For example, the Organisation for Economic Co-operation and Development develops FCIs for six major advanced economies using seven variables. Even for the United States, the Kansas City Financial Stress Index is based on 11 variables. Although Hatzius and others (2010) use up to 45 variables, and the Federal Reserve Bank of Chicago uses more than 100 in its U.S. factor models, Boivin and Ng (2006) emphasize that including more data does not always yield better results.

In this chapter, the choice of variables used for the construction of the FCIs is guided by two considerations, one conceptual and the other practical. Conceptually, since the chapter focuses on how global factors affect financial conditions in domestic markets, variables measuring the ease of access to finance on international markets are not included.[11] With regard to practical considerations, the choice of variables should be consistent across countries and reflect as many segments of the financial system as possible. Accordingly, the FCI should include the equity, housing, bond, and interbank markets so as to capture the various channels through which monetary and macroprudential policies can influence the broader economy. Following the literature, the financial variables used include various interest rates and spreads (for example, changes in longer-term interest rate, corporate, interbank, and term spreads), asset price returns (equity and house price returns), equity return volatility, and credit growth. Where available, survey-based information (lending standards) can provide additional information about financial frictions (Annex 3.1). Naturally, as the structure of, and products in, financial systems evolve, the variables most relevant for tracking financial conditions may change. This chapter estimates comparable monthly FCIs for 43 advanced and emerging market economies during 1990–2016, depending on data availability.

Financial Conditions around the World

This section presents key stylized facts about financial conditions in selected countries and around the world.

[8]Roughly speaking, the model decomposes the main patterns across a broad range of variables into a measure of financial conditions, the FCI, and a business cycle component (as captured by macroeconomic conditions such as growth and inflation).

[9]Initially, the FCIs are purged only of the effect of current macroeconomic conditions. However, financial variables can also reflect expectations of future macroeconomic developments. The FCIs are not purged of these expectations about the future in the baseline estimations to the extent that these expectations cannot be captured by the past and current behavior of macroeconomic variables. This is an issue common to all FCIs. As a robustness check, professional forecasts of macroeconomic variables were considered as controls in the case of the United States (based on data availability), which did not result in any material changes to the FCI (consistent with Koop and Korobilis 2014).

[10]Another advantage of the time-varying parameter factor-augmented vector autoregressive model (TVP-FAVAR) is that the time-varying parameters help account for changes in (policy) regimes and, for example, financial-accelerator-related dynamics. Similarly, the TVP-FAVAR recognizes that financial shocks in various periods can be transmitted to the real economy with varying intensity.

[11]For financially open economies, financial conditions encompass the ease of access to funding in both the domestic jurisdiction and across borders. When firms rely more on international markets for funding, global factors are expected to have a larger direct impact on their financing conditions. For the purposes of this chapter, the more indirect channel is considered, whereby global factors are potentially a driver of domestic financial conditions. Similarly, the exchange rate is not included in the FCI. As mentioned earlier, exchange-rate movements may influence domestic financial conditions, for example, by altering the net worth of borrowers and thereby their terms of access to finance. The analysis aims at measuring these indirect effects. Including the exchange rate directly in the FCI would overstate the influence of global conditions on domestic financial conditions, for example, in economies where exchange rate movements have little effect on domestic financial conditions or where they effectively serve as an insulating buffer.

Financial Conditions Indices: Selected Countries

Given its central role in the global financial system, the United States is a natural starting point for appraising the usefulness of the FCIs developed here. In addition, because many FCIs have been developed for the United States, several benchmarks can facilitate comparisons across complementary approaches. It is reassuring that the pattern of the U.S. FCI developed in this chapter closely tracks counterparts developed by the IMF and other institutions, such as the Federal Reserve Banks of Chicago and Kansas City during 1990–2016 (Figure 3.1).[12] At the same time, the fluctuations in the FCI appear to capture key U.S. financial events quite well.[13] After a period of relative tranquility in the early 1990s, financial conditions tightened as stock markets, in particular, were rattled by the collapse of Long-Term Capital Management, a hedge fund, in 1998. The FCI remained elevated because of the dot-com crash in 2000, when stock market declines were led by the technology sector. Then around 2002, the demise of accounting firm Arthur Andersen and the bankruptcy of telecommunications corporation WorldCom (the largest in U.S. history at the time), among other events, resulted in tighter financial conditions. After a period of favorable conditions, the global financial crisis broke out in 2008, resulting in an unprecedented spike in the FCI. More recently, the FCI has been on a gradual uptrend, although still indicating broadly accommodative conditions.

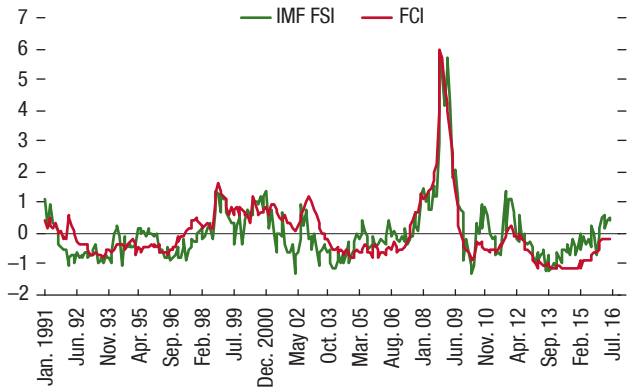
The FCIs in selected small open economies seem to reflect their financial histories well. For instance, in Russia, the FCI tightened dramatically during 1998 as a consequence of the acute financial distress experienced by the country at the time, with the degree of tightening outpacing that encountered 10 years later during the global financial crisis (Figure 3.2). By contrast, financial conditions in Korea were tighter during the global financial crisis than they were during the Asian financial crisis (1997–98). Likewise, for Chile, the global financial crisis represents the sharpest spike in the FCI over the past two decades. Last, for a small open euro area economy, the Netherlands, financial conditions tightened to almost the same extent during the euro area crisis and the global financial crisis.[14]

Figure 3.1. United States: Financial Conditions Indices, 1991–2016

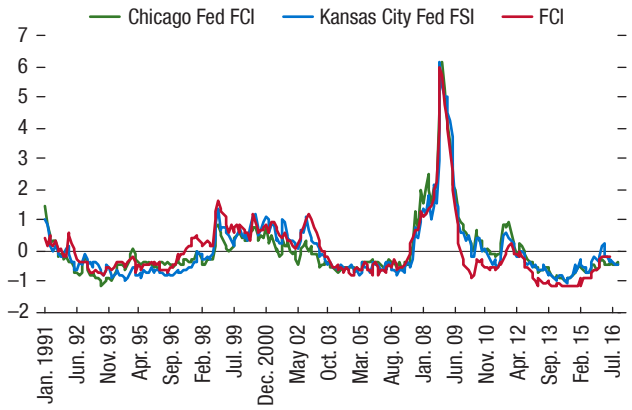
(Standard deviations)

Estimated U.S. financial conditions seem to reflect key financial events well.

1. IMF Financial Stress Index versus Financial Conditions Index



2. Financial Conditions Indices



Sources: Federal Reserve Bank of Chicago; Federal Reserve Bank of Kansas City; IMF, Global Data Source database; and IMF staff estimates.
Note: Higher values indicate tighter-than-average financial conditions. The IMF FSI aims to identify episodes of acute financial stress, when financial intermediation is impaired, similar to the Kansas City Fed FSI. The Chicago Fed FCI summarizes U.S. financial conditions in money markets and debt and equity markets and in the traditional and shadow banking systems (see Box 3.1 for details). FCI = financial conditions index; Fed = Federal Reserve Bank; FSI = financial stress index.

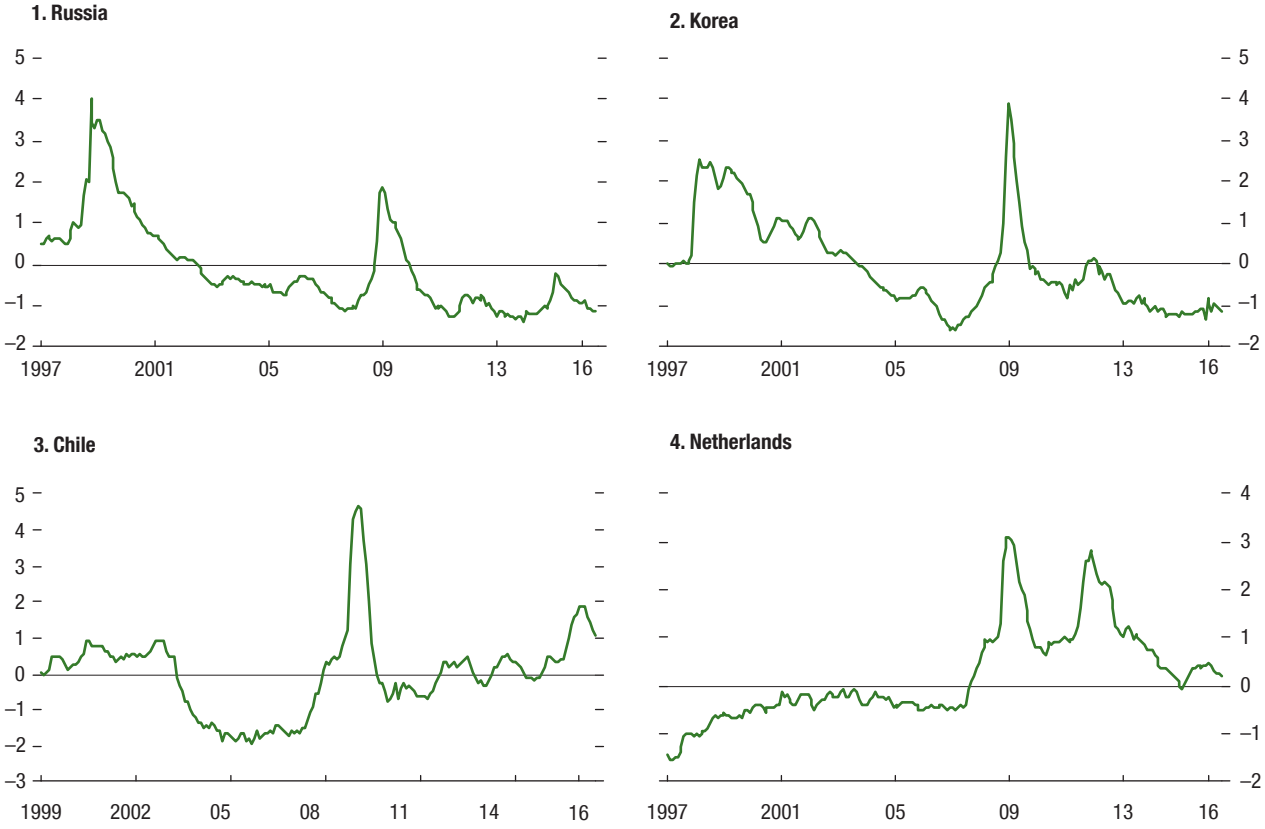
[12]The IMF financial stress indices (FSIs) seek primarily to identify episodes of acute financial stress—that is, when financial intermediation is impaired (extreme events are typically considered outright crises). In practice, FSIs and FCIs can display broadly similar patterns. Here, the IMF FSIs are entirely price based, partly explaining why they tend to be more volatile. For further details on FCIs, see Box 3.1, which includes a discussion of different methods for constructing FCIs.

[13]Positive (negative) values of the FCI indicate that financial conditions are tighter (looser) than on average, which corresponds, for example, to higher-than-average (lower-than-average) corporate spreads and lower-than-average (higher-than-average) credit growth.

[14]The FCIs shown in Figure 3.2 track the patterns in the corresponding IMF FSIs. Interbank and corporate spreads, equity return volatility, and changes in house prices are at the top of the list of the underlying financial variables contributing to countries' FCIs. This result is broadly consistent for advanced and emerging market economies and in line with those in Hatzius and others 2010.

Figure 3.2. Selected Advanced and Emerging Market Economies: Financial Conditions Indices
(Standard deviations)

Major financial developments appear to be captured by the financial conditions indices across selected economies.



Source: IMF staff estimates.
Note: Higher values indicate tighter-than-average financial conditions.

Financial Conditions and GDP Growth

The financial conditions indices developed in this chapter tend to signal downside risks to GDP. Domestic FCIs are significant predictors of future GDP growth across countries; however, this relationship changes depending on the state of the business cycle (Figure 3.3). In particular, the inverse relationship between FCIs and future GDP growth is stronger for economic contractions (the lower percentiles of the growth distribution) than for expansions (the upper percentiles of the growth distribution). For example, at the one-year-ahead horizon, the negative coefficient at the 10th percentile (when growth is well below –½ percent) is about three times as large in absolute terms relative to the coefficient corresponding to the median (when growth is about 3½ percent).[15] These findings confirm and extend the conclusions of Adrian, Boyarchenko, and Giannone (2016). They show that the lower quantiles of GDP growth (recessions) are more closely linked to financial conditions than upper quantiles (economic expansions) for the United States.

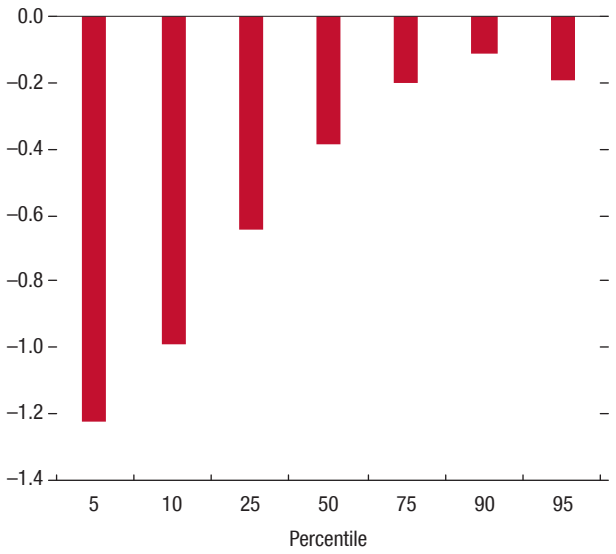
Historical examples highlight the predictive power of FCIs for future economic downturns. Two dates are considered as an illustration: the second quarter of 2006 and the third quarter of 2008, broadly corresponding to the precrisis expansion and the onset of the global financial crisis, respectively. Figure 3.4 shows the conditional distribution of growth

[15]A one standard deviation increase in the FCI (corresponding to tighter financial conditions) is associated with a 0.4 percentage point decrease in median future GDP growth at a one-year horizon.

Figure 3.3. Future GDP Growth and Financial Conditions: Quantile Regressions

(Percentage points)

Financial conditions indices can flag downside risks to growth.

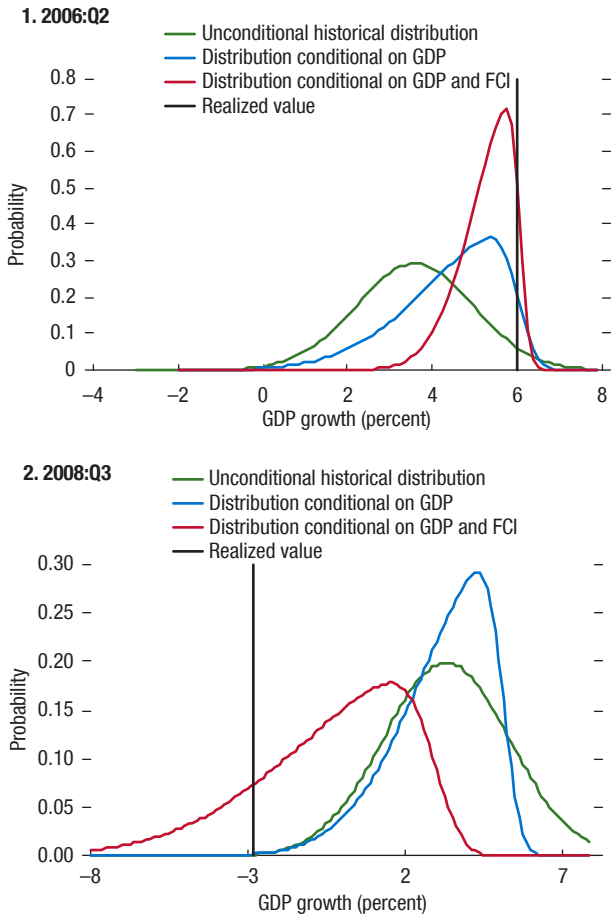


Source: IMF staff estimates.
Note: The figure shows the sensitivity of future growth to financial conditions at various quantiles. For all countries in the sample, growth at the one-year-ahead horizon across selected quantiles is regressed against countries' financial conditions indices.

Figure 3.4. Probability Distributions of One-Year-Ahead GDP Growth

(Probability)

Financial conditions improve the ability to predict future economic downturns.



Source: IMF staff estimates.
Note: The figure displays conditional probability distributions of one-year-ahead real GDP growth for a panel of 43 countries based on quantile regressions. In particular, it includes unconditional historical distributions and two conditional distributions (of growth) based on two forecasting models that use either growth or growth and FCIs to predict future growth (in 2007:Q2 or in 2009:Q3). The figure also includes realized values (average actual GDP growth). FCI = financial conditions index.

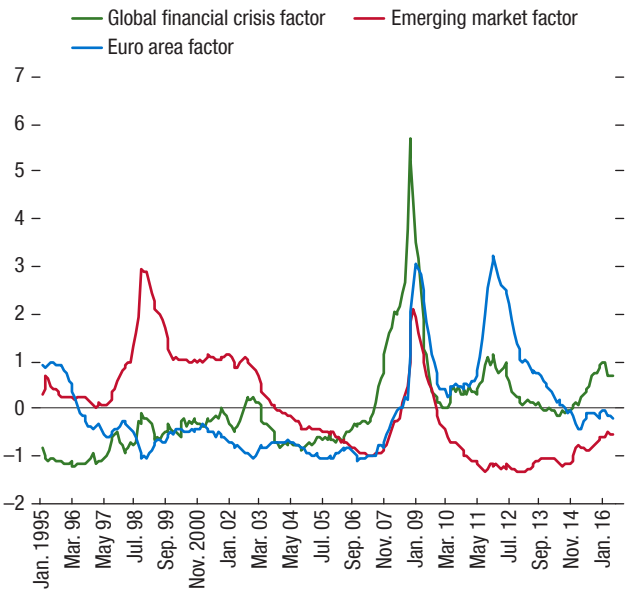
one year ahead based on two empirical forecasting models: one in which current and past growth rates are used as predictors and one that augments the first model by including FCIs. The idea is to gauge the extent to which additional information from the FCIs helps improve forecast accuracy. Based on the information available as of the second quarter of 2006, the model with the FCIs attributes approximately a 45 percent probability to the actual growth outturn in one year (6 percent), which is more than twice the probability generated by the model that uses only growth rates (Figure 3.4). The distributions using information up to the third quarter of 2008 differ to an even greater extent. The long left tail in the distribution associated with the model with the FCIs (as opposed to the simple forecast model) assigns a higher probability to economic downturns, more starkly signaling the actual GDP contraction in the third quarter of 2009. FCIs appear to contain valuable information about the future state of the economy and can be particularly useful in flagging downside risks to economic activity.

The Evolution of Financial Conditions around the World

Three global factors seem to capture the dynamics of financial conditions across countries. A statistical dynamic factor model is used to generate multiple unobservable (latent) factors that summarize the main patterns across countries' financial conditions. Although these factors can be subject to various interpretations, an interesting story emerges. It appears that the financial conditions around the world can be summarized by three

Figure 3.5. Three-Factor Model Based on Financial Conditions Index, 1995–2016
(Standard deviations)

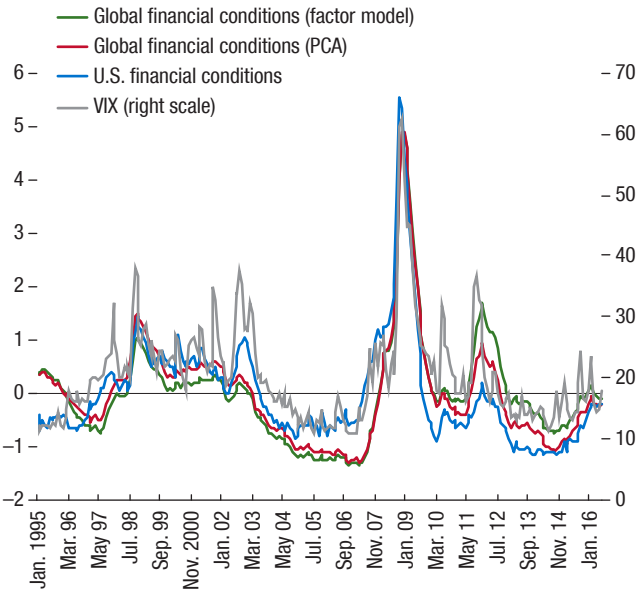
Financial conditions around the world seem to be characterized by three global factors.



Source: IMF staff estimates.
Note: Higher values indicate tighter-than-average financial conditions. Based on a dynamic factor model, the figure displays three latent factors that summarize the main patterns across countries' financial conditions indices.

Figure 3.6. Single Factor versus Principal Component Analysis, 1995–2015
(Standard deviations)

Evidence suggests that global financial conditions move in lockstep with the U.S. financial conditions index and the VIX.



Sources: Haver Analytics; and IMF staff estimates.
Note: The figure displays two measures of global financial conditions derived from a factor model (global financial cycle) or from principal components analysis, the U.S. FCI, and the VIX. Higher values indicate tighter-than-average financial conditions. FCI = financial conditions index; PCA = principal component analysis; VIX = Chicago Board Options Exchange Volatility Index.

factors, which can be characterized by the three main historical crisis episodes over the past two decades. In particular, there seems to be an "emerging market" factor, a "euro area" factor, and a "global financial crisis" factor (Figure 3.5). Although each factor spikes during the global financial crisis, the emerging market and euro area factors also depict markedly tighter financial conditions during the late 1990s and around 2012, respectively.

Nevertheless, a single global factor adequately summarizes financial conditions across countries. Such a factor is consistent with the notion of a global financial cycle discussed in Miranda-Agrippino and Rey 2015. This single factor (the global financial factor or global financial conditions) closely tracks the movements in the U.S. FCI and the VIX (Figure 3.6).[16] This is in line with Rey's (2013) argument that global financial conditions are strongly driven by the United States, the key country in the international monetary system. Part of the reason for this predominance is that the U.S. dollar takes center stage as an international currency with important roles in invoicing, issuance of financial assets, and commodity trading, among others (see also IMF 2014a).

A sizable share of fluctuations in countries' financial conditions is attributable to global financial shocks. On average, global financial conditions account for about 30 percent of the variation in financial conditions across countries, and though not shown, reaches almost 70 percent in several economies (Figure 3.7). As would be expected, the proportion of FCI variability explained by the three-factor model is larger than its single-factor counterpart and is greater than 40 percent.[17] Relative to emerging market economies, it appears that financial conditions in small open advanced economies are more synchronized with global financial conditions.

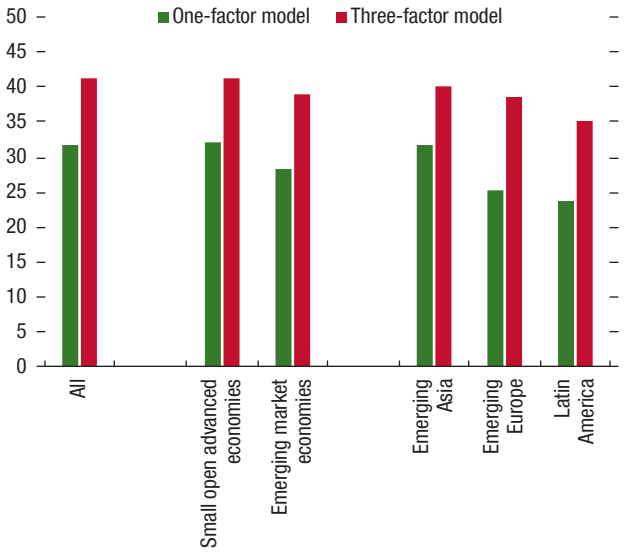
[16]The average correlation between the U.S. FCI and the two measures of global financial conditions and the VIX is 82 percent.

[17]These magnitudes are larger than those in Miranda-Agrippino and Rey (2015), for example, who report that a measure of global financial conditions accounts for about 21 percent of the variation across risky asset prices.

Figure 3.7. Variance Accounted for by One- and Three-Factor Models

(Percent)

An appreciable fraction of fluctuations in countries' financial conditions is attributable to global financial conditions.

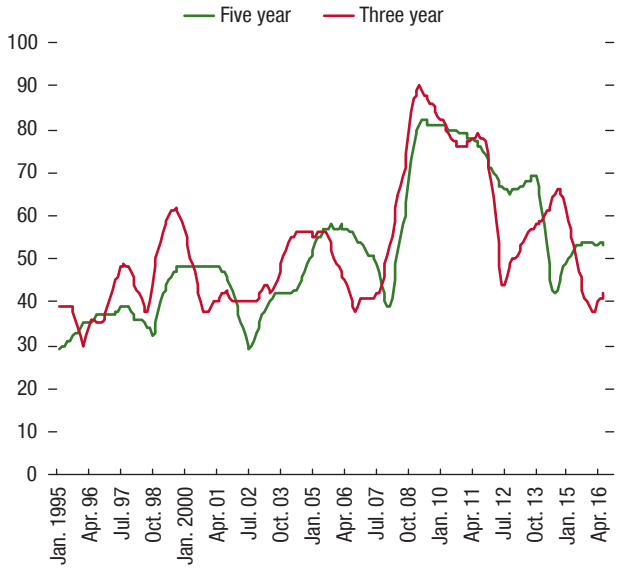


Source: IMF staff estimates.
Note: The figure displays the share of countries' FCI attributable to global factors based on a one- or three-factor model—specifically, the *R*-squared from panel regression models in which countries' FCIs are regressed on measures of global financial conditions based on the one- or three-factor model. Simple averages are used. FCI = financial conditions index.

Figure 3.8. Variance Attributable to Global Financial Conditions, 1995–2016

(Percent)

The share of countries' FCI variability accounted for by global financial conditions does not appear to display a pronounced upward trend.



Source: IMF staff estimates.
Note: The figure displays how the share of countries' FCI variability attributable to global financial conditions changes over time. Specifically, it presents the total variance explained by the first principal component across countries' FCI using either a 36- or 60-month rolling window. FCI = financial conditions index.

However, no clear evidence indicates that the importance of global financial conditions has been markedly increasing over the past two decades. The share of variation across FCIs accounted for by global financial conditions displays some cyclical patterns, especially during the global financial crisis, but portrays a broadly flat trajectory when viewed over the past 20 years (Figure 3.8).[18] These developments may reflect that the effect of greater financial linkages across countries has been partly offset by financial deepening that has been taking place in parallel.[19] Although FCIs encompass various asset classes, these patterns are consistent with Bekaert and others (2016), who document that equity return correlations display an upward trend from the end of the 1990s through the global financial crisis, but then decline notably.[20]

Country Characteristics and Sensitivity to Global Financial Conditions

Country characteristics are likely to influence how sensitive domestic financial conditions are to global financial shocks. Given the prominence of the United States in the international monetary system, the U.S. FCI is taken as a proxy for global financial conditions, based on the findings discussed earlier.[21] Key country characteristics

[18]The patterns related to the FCIs are robust to Forbes and Rigobon 2002–type adjustments, which correct for heteroscedasticity. As an example of an additional robustness exercise, the average R^2 statistics based on 36- and 60-month rolling regressions of countries' FCIs on global factors reveal broadly similar patterns.

[19]Chapter 2 of the April 2017 *World Economic Outlook* finds that the relative importance of external financial conditions for emerging market and developing economies' medium-term growth outcomes has increased over time.

[20]Carrieri, Chaieb, and Errunza (2013) argue that emerging markets are not yet effectively integrated with global markets.

[21]Analysis based on Granger causality and convergent cross-mapping confirm the importance of U.S. FCIs relative to other FCIs across countries. The U.S. FCIs provide more statistically significant information about future FCIs in other countries than do other financial centers (including Germany, Japan, and the United Kingdom), with an average *p*-value of 7 percent. Analysis using convergent cross-mapping (which complements Granger causality using nonlinear methods as described in Sugihara and others 2012) suggests that U.S. FCIs reduce prediction errors to the greatest extent across countries. Although

considered include financial linkages with the United States (foreign direct investment, banking, and portfolio), financial openness and development, institutional quality, and the exchange rate regime (see Forbes and Chinn 2004; Aizenman, Chinn, and Ito 2015; and Sahay and others 2015). For example, the expectation is that FCIs of countries that are more financially open and that feature stronger financial linkages with the United States should be more sensitive to global financial conditions. Conversely, countries with strong institutional and policy frameworks as well as deep financial markets should display less sensitivity (Chinn and Ito 2007; Alfaro, Kalemli-Ozcan, and Volosovych 2008; Brandão-Marques, Gelos, and Melgar 2013; Chapter 2 of the April 2014 GFSR).[22] Given that an attempt has been made to purge the FCIs of macroeconomic drivers, real economic linkages (such as trade ties) should not be among the determinants that help explain the influence of U.S. financial conditions on local FCIs. Exchange rate regimes may not matter very much for the transmission of financial conditions across countries because financial conditions work through various channels that typically cannot be fully counterbalanced by exchange rate movements alone (Obstfeld 2015). In what follows, the chapter investigates the extent to which FCIs across countries are correlated with the U.S. FCI, using a panel of small open advanced and emerging market economies. It explores how the various country characteristics discussed earlier strengthen or weaken this correlation.[23]

Financial linkages are most closely associated with the extent to which FCIs are influenced by global financial conditions. In particular, FCIs in countries with stronger financial linkages (proxied by foreign direct investment) with the United States tend to be more synchronized with global financial conditions (Table 3.1).[24] Greater financial development in general, and deeper financial (equity, bond) market depth in particular, are associated with an attenuated impact of global financial shocks on domestic FCIs.[25] This echoes the conclusions in Chapter 2 of the April 2014 and April 2016 GFSRs, which find that a larger domestic investor base and deeper banking systems and capital markets can increase the resilience of emerging market economies to external financial shocks. Trade linkages to the United States do not seem to matter, although trade relationships with the rest of the world appear to play a role—possibly, this variable captures other factors such as indirect financial linkages. No clear pattern emerges regarding the exchange rate regime and capital account openness—results that are broadly consistent with Aizenman, Chinn, and Ito 2015.[26] These findings are generally in line with evidence that exchange rate flexibility allows for considerable independence at the short end of the term structure, but less so when it comes to broader measures of financial conditions, including, for example, longer-term rates (Obstfeld 2015).[27]

Can Countries Manage Domestic Financial Conditions amid Global Financial Integration?

This section quantifies the relative share of fluctuations in countries' domestic financial conditions explained by global financial conditions and domestic monetary policy. It finds that despite the importance of global financial shocks, evidence suggests that monetary policy still accounts for a notable share of the variation in domestic financial conditions.

the U.S. FCI is taken as a proxy for global financial conditions, U.S. financial conditions may also be affected by financial developments in other advanced and emerging market economies; see, for example, Chapter 2 of the April 2016 GFSR.

[22]It is sometimes argued that more liquid markets are more exposed to sell-offs by foreign investors. However, as discussed in Sahay and others 2014, although some emerging market economies with relatively deeper and more liquid financial markets were strongly affected during the taper tantrum in 2013, their more-developed financial markets subsequently facilitated the needed adjustment.

[23]This is done by including the interaction between the U.S. FCI and the various country characteristics in the regressions (Annex 3.3).

[24]Portfolio linkages matter too (and bank linkages to an even lesser extent), but results of their importance are not as robust across various specifications. It may be that because foreign direct investment tends to be more permanent, it captures financial linkages better than portfolio and bank linkages.

[25]Along with the overall and financial markets indices developed by Sahay and others (2015), the financial markets depth subindex tends to be statistically significant and robust across specifications. This subindex includes measures of equity and bond market size and liquidity.

[26]Recall that in contrast to a general measure of capital account openness, a more specific measure of financial integration as captured by foreign direct investment linkages with the United States is statistically significant.

[27]Regarding the role of exchange rate regimes, recall that financial conditions can be transmitted across countries through various channels that typically cannot be fully offset by exchange rate movements. Furthermore, relative to the sample in this chapter, which considers 43 advanced and emerging market economies, studies that find that exchange rate flexibility does confer monetary autonomy use larger sets of countries (for instance, Obstfeld [2015] considers 70 countries) that are much more heterogeneous in composition (and include low-income countries and other countries with a variety of exchange rate regimes, which helps uncover the potential role exchange rate flexibility can play).

Table 3.1. Determinants of the Sensitivity of Domestic Financial Conditions to Global Financial Shocks

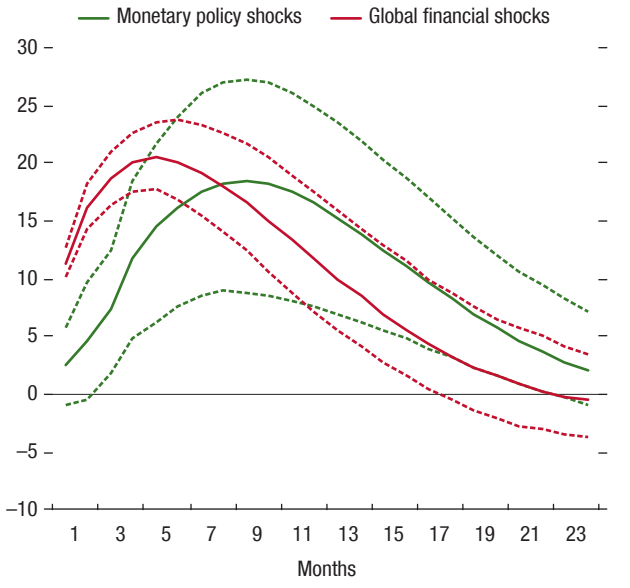
Variable	Expected Sign	Estimated Sign	Significance
Direct Effect of U.S. FCI	+	+	***
Interaction with:			
FDI Linkages with the United States	+	+	**
Portfolio Linkages with the United States	+	–	
Banking Linkages with the United States	+	–	
Trade Linkages with the United States	+	+	
Trade Openness	+	+	**
Financial Openness	+	+	
Exchange Rate Flexibility	–	+	
Financial Development	–	–	**
Rule of Law	–	–	

Source: IMF staff estimates.
Note: This table summarizes panel regressions in which countries' domestic FCIs are regressed against a measure of global financial conditions (U.S. FCI), various country characteristics, and their interactions. Regressions include country fixed-effects terms, and standard errors are clustered at the country level. See Annex 3.3 for details on baseline specifications. FCI = financial conditions index; FDI = foreign direct investment.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Both global financial conditions and policy rates seem to influence domestic financial conditions. Several complementary econometric approaches based on vector autoregression (VAR) models are used. They jointly model output, consumer prices, policy rates, and domestic financial conditions for each country, including a measure of global financial conditions proxied by the U.S. FCI.[28] Using these econometric models, this section investigates the relative magnitude of the influence of global financial and domestic monetary policy shocks in driving domestic financial conditions in small open advanced and emerging market economies with flexible exchange rate regimes. Confirming the previous findings discussed in the chapter, the results based on panel VAR models (Figure 3.9) indicate that global financial shocks have a notable impact on countries'

Figure 3.9. Response of Domestic Financial Conditions to Shocks
(Percent, standard deviations)

Global financial and domestic monetary policy shocks appear to affect local financial conditions.

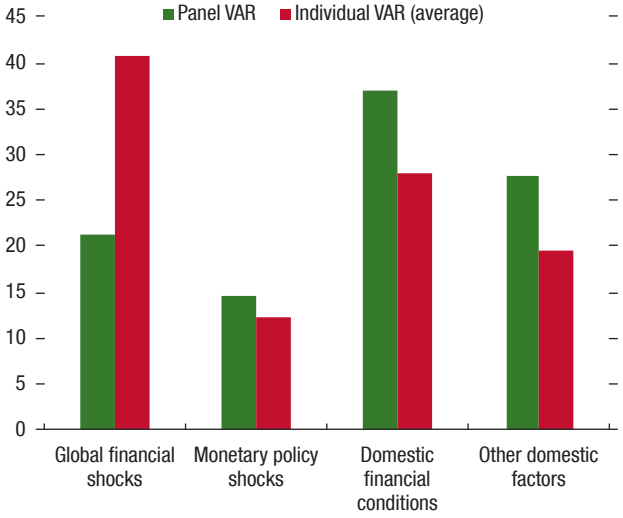


Source: IMF staff estimates.
Note: The figure displays the impulse response functions and 90 percent confidence bands of domestic financial conditions indices to global financial or domestic monetary policy shocks for countries in the sample with flexible exchange rates. It is based on a panel vector autoregression model. See Annex 3.4 for details.

[28]Initially, a parsimonious panel vector autoregression (VAR) model is used, in which the variables are ordered as follows: U.S. FCI, industrial production growth, inflation, domestic FCI, and the change in the domestic monetary policy rate (all shocks identified using a Cholesky decomposition); the results are robust to using the level of the variables (Annex 3.4). The results do not change when exchange rate terms are added into the panel VAR as an additional endogenous variable. The results are also robust to inclusion of global industrial production growth, commodity prices, and a measure of global interest rates (proxied using several U.S. shadow rate measures) as exogenous controls. The average responses from VAR models estimated for individual countries result in broadly similar findings. Complementary methods of identifying the monetary policy shocks are discussed later in this section. See also He and McCauley 2013; Chen, Mancini-Griffoli, and Sahay 2014; Chen and others 2015; and Kose and others 2017.

Figure 3.10. Share of Domestic Financial Conditions Index Fluctuations Attributable to Global Financial and Monetary Policy Shocks
(Percent)

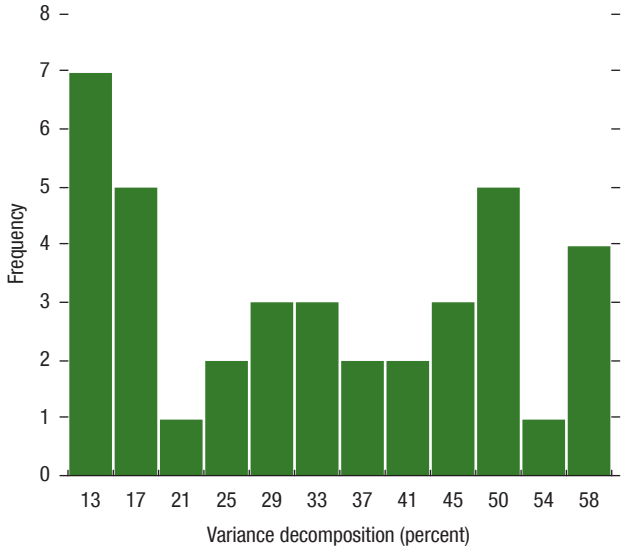
A notable share of domestic FCI fluctuations can be attributed to global financial and domestic monetary policy shocks.



Source: IMF staff estimates.
Note: The figure displays the share of domestic FCI fluctuations accounted for by global financial, domestic monetary policy, or domestic financial condition shocks, and shocks associated with other domestic factors for countries in the sample with flexible exchange rates. It is based on the panel VAR model or on VAR models estimated individually for each country. See Annex 3.4 for details. FCI = financial conditions index; VAR = vector autoregression.

Figure 3.11. Share of Domestic Financial Conditions Index Fluctuations Attributable to Global Financial Conditions
(Frequency)

The importance of global financial conditions varies across countries.



Source: IMF staff estimates.
Note: Histogram intervals on the *x*-axis vary because of rounding.The figure displays the share of fluctuations in domestic financial conditions attributable to global financial shocks based on vector autoregression models estimated individually for all countries in the sample. See Annex 3.4 for details.

domestic financial conditions. However, changes in local policy rates also have an appreciable effect on local FCIs. Notably, it appears that local financial conditions react faster and more strongly to global financial shocks than to changes in domestic policy rates, suggesting timely and effective monetary policy reactions may often be difficult. For example, if monetary policy is intended to offset an unwelcome global shock, it may have to react very quickly and strongly, with potentially undesirable side effects. Examining the subset of emerging market economies shows that their FCIs tend to be somewhat more sensitive to global financial conditions, but less responsive to changes in the domestic monetary policy stance.

A considerable share of domestic FCI fluctuations is attributed to global financial conditions and domestic policy rates. On average, about 21 percent of the variation in domestic FCIs across small open economies with flexible exchange rates is attributed to global financial shocks (Figure 3.10). This implies that the remainder is explained by domestic factors, including shocks originating from the local financial sector. Importantly, domestic monetary policy shocks account for about 15 percent of the fluctuations in FCIs. Moreover, complementary analysis, in which a similar VAR model is estimated for each country individually, yields broadly similar results, albeit with a larger estimated influence from global factors.[29]

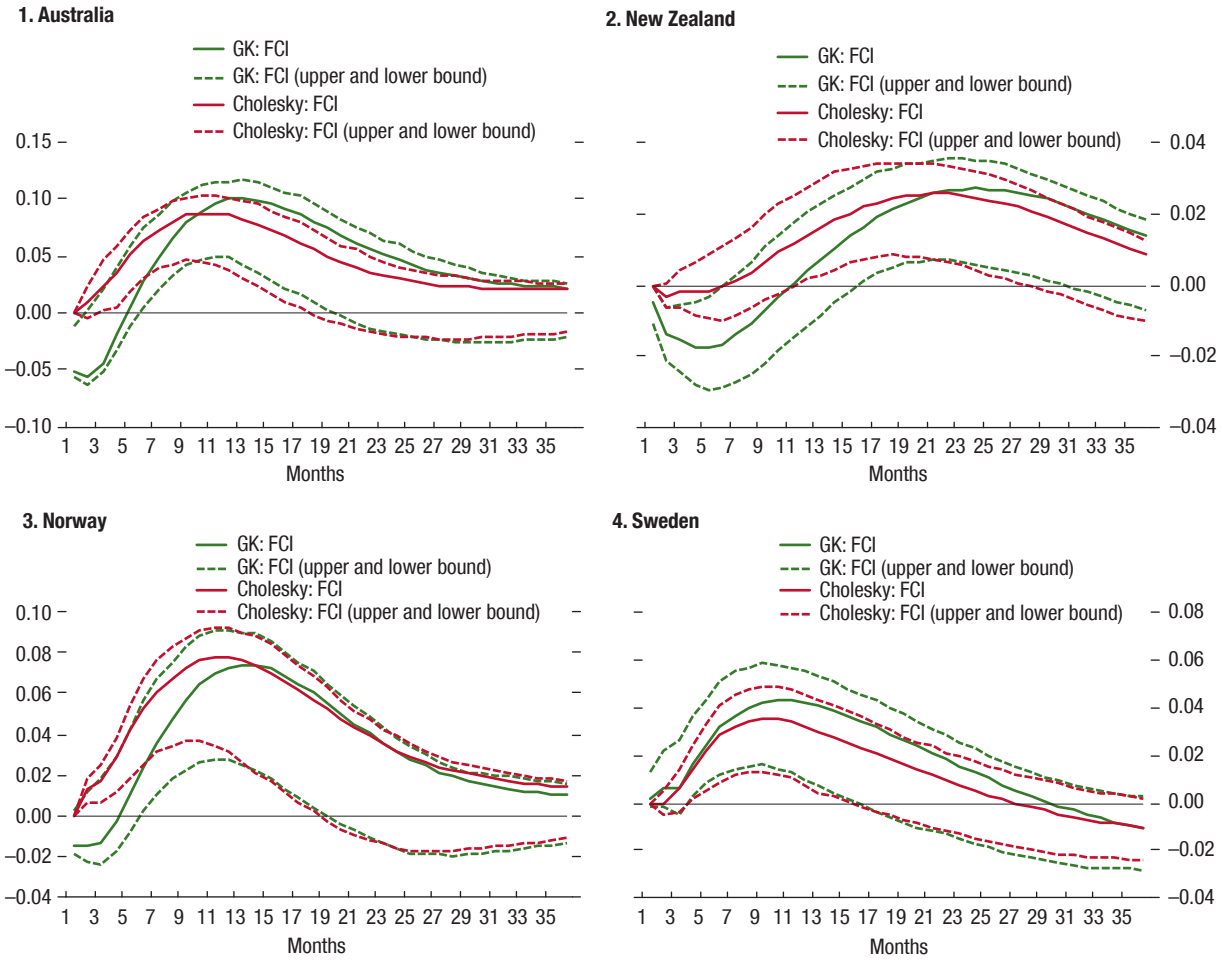
The importance of global financial shocks for domestic financial conditions varies considerably across countries (Figure 3.11). In fact, global financial conditions generally tend to account for a greater proportion of FCI variability in emerging market economies, and in a few cases, this proportion exceeds 60 percent.[30]

[29]In these estimations, shocks to global financial conditions and to monetary policy account for, on average, about 40 percent and 12 percent of countries' domestic FCI variations, respectively. The VAR model contains U.S. FCI, industrial production growth, inflation, domestic FCI, and the change in domestic monetary policy. Robustness exercises that control for global growth and commodity prices and, for instance, various lag lengths, yield broadly similar results. The variance decompositions are statistically significant at the 10 percent level.

[30]These results are based on the country-by-country VAR estimations.

Figure 3.12. Selected Advanced Economies: Response of Financial Conditions Index to Monetary Policy Shocks
(Standard deviations)

Country case studies highlight the influence of domestic monetary policy on domestic financial conditions.



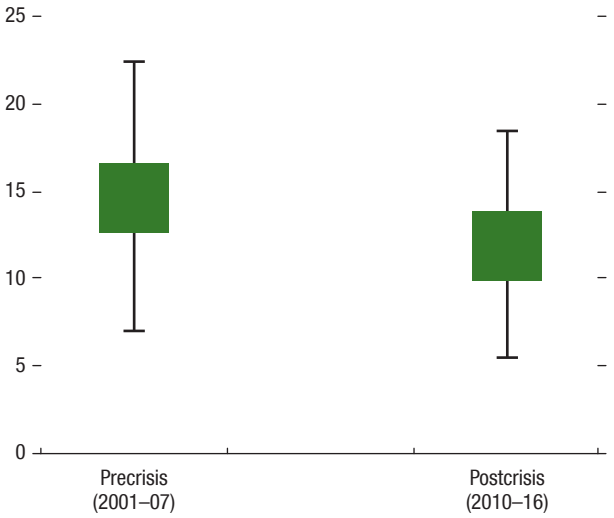
Sources: IMF, Global Data Source database; and IMF staff estimates.
Note: The figure displays the impulse response functions and 90 percent confidence bands of domestic FCIs to domestic monetary policy shocks for countries using two complementary methods to identify the monetary policy shocks. FCI = financial conditions index; GK = Gertler and Karadi.

Moreover, in line with intuition, the results indicate that fluctuations in global financial conditions are associated with a greater share of FCI variability in countries that are relatively more financially integrated with the rest of the world, and these differences are greater for emerging market economies.

A closer look at relevant case studies reinforces these results. The identification of shocks can be especially difficult in the context of the VAR models used in the chapter, particularly for monetary policy. Because precisely identifying monetary policy shocks is challenging, recent studies have developed methods that help better pinpoint exogenous measures of monetary policy shocks. In line with the methodology traced out by Gertler and Karadi (2015), who build on Gürkaynak, Sack, and Swanson 2005, among others, unexpected changes in bond yields on central bank policy announcement dates are used to measure policy surprises. Such shocks are derived for Australia, New Zealand, Norway, and Sweden—four small open advanced economies with floating exchange rate regimes and relatively deep financial markets. In each of the country cases shown in Figure 3.12, VAR models using these better-identified monetary policy shocks yield results similar to those examined earlier, lending further credence to

Figure 3.13. Share of Domestic Financial Conditions Index Fluctuations Attributable to Global Financial Shocks before and after the Global Financial Crisis
(Percent)

There seems to be no conclusive evidence that the role of global financial conditions has been increasing over time.



Source: IMF staff estimates.
Note: The figure displays the share of domestic financial conditions index fluctuations attributable to global financial shocks (squares) for countries in the sample with flexible exchange rates based on the panel vector autoregression model for the precrisis (2001–07) and postcrisis (2010–16) samples, along with the 90 percent confidence bands (lines). See Annex 3.4 for details.

the empirical findings discussed in this section. The share of FCI variation characterized by fluctuations in global financial conditions and domestic monetary policy is, on average 15 percent and 33 percent, respectively, for these four countries.[31]

Notably, there does not appear to be any discernible change in the importance of global financial conditions in influencing local FCIs over time. The cross-country exercises using the panel VAR models are repeated over the period before (2001–07) and after (2010–16) the global financial crisis to gauge how some of the relationships discussed above may have changed. The share of domestic financial conditions attributed to global financial conditions appears to be broadly stable over the two periods (Figure 3.13).[32]

Conclusions and Policy Implications

This chapter extends previous studies by developing a comparable set of financial conditions indices (FCIs) across a large set of advanced and emerging market economies. FCIs seek to summarize information about price and nonprice costs of credit for agents across the economy. Gauging financial conditions is valuable given their role in the transmission of monetary policy and their informational content about the evolution of future economic activity. In particular, FCIs seem well suited to signaling downside risks to GDP growth. The chapter finds that a single factor summarizes the dynamics of a significant share of financial conditions around the world well: global financial conditions, which move in tandem with the FCI of the United States and standard measures of global risk such as the VIX. However, the fraction of fluctuations in countries' domestic financial conditions attributed to global financial conditions does not appear to have increased markedly over the past two decades. Although stronger financial linkages with the United States increase the sensitivity of domestic financial conditions to global financial shocks, greater financial development can attenuate them.

Despite the significant influence of global financial conditions, the analysis indicates that countries, on average, are still able to steer their domestic financial conditions. However, because domestic financial conditions respond faster and more strongly to global financial shocks than to changes in the domestic monetary policy stance, implementing timely and effective policy reactions may often be challenging. Likewise, given that global financial conditions tend to account for a greater fraction of FCI variability in emerging market economies, these countries in particular should prepare for the implications of global financial tightening. Countries also have other policies at their disposal. For example, macroprudential measures can be used to limit risks from a further buildup of vulnerabilities that increase domestic financial conditions' sensitivity to external financial

[31]These findings are based on VARs (similar to the panel VARs discussed earlier) estimated separately for each of the four countries using a Cholesky decomposition to identify the shocks (which, as shown in Figure 3.12, are similar to those based on the methodology developed by Gertler and Karadi [2015]). The impulse response functions of the domestic FCI to global financial and monetary policy shocks—as well as the share of FCI variability attributed to each of these shocks—is statistically significant at the 5 percent level.

[32]The 2001–07 and 2010–16 variance decompositions are not statistically different at the 95 percent level.

shocks (IMF 2014b). Likewise, there may be circumstances that warrant a temporary role for capital flow management measures (IMF 2016).

Governments should prioritize domestic financial deepening to enhance resilience to global financial shocks. In particular, developing a local investor base that encompasses both bank and nonbank financial intermediaries, as well as fostering greater equity and bond market depth and liquidity, can help dampen the impact of external financial shocks.

Box 3.1. Measuring Financial Conditions

This box reviews how financial conditions indices (FCIs) have been developed over time and draws attention to the fact that previous studies have not developed a consistently estimated set of FCIs for major advanced and emerging market economies.

Research on financial conditions can be traced back to the work on measuring monetary conditions. In pioneering work, the Bank of Canada introduced its monetary conditions index (MCI) consisting of the weighted average of its policy rate and the exchange rate (Freedman 1994).[1] The MCI helped figure out the extent of the adjustment in the policy rate that was needed to offset the macroeconomic effects of a swing in the exchange rate to maintain a desired monetary policy stance.

In part motivated by the rapid run-up in equity prices, Dudley and Hatzius (2000) developed one of the earliest FCIs. FCIs augmented MCIs by including other financial variables, such as longer-term interest rates, spreads, and stock market indicators. Although the variables included in various FCIs may differ, they have some elements in common. Most FCIs include selected interest rates and spreads and measures of equity market performance. Some include quantity indicators (such as credit), and a few include survey-based data (lending surveys).[2]

FCIs are constructed in four broad ways. First, a few studies have estimated FCIs based on reduced-form textbook investment-saving curves (Goodhart and Hofmann 2001). Financial variables are linked, for example, to the output gap used in constructing an FCI. One limitation of this approach is that it assumes that the financial variables are exogenous to measures of economic activity, whereas in reality, the financial system responds to the economic cycle. Second, FCIs have been developed using large macroeconomic models (for example, Beaton, Lalonde, and Luu 2009). Although a more structural approach can mitigate econometric issues, including possible identification problems, the financial system in such models tends to be rudimentary (Gauthier, Graham, and Liu 2004). Third, FCIs have been constructed using impulse response functions based on vector autoregression (VAR) models (for instance, Swiston 2008). Fourth, principal components analysis and more sophisticated variants, such as dynamic factor models, have been used to extract a common factor from a large array of financial variables.

Most of the literature has generally focused on developing FCIs for a few advanced economies. Many FCIs for the United States have been developed, including by academics, Federal Reserve Banks, investment banks, and other institutions.[3] Relatively long time series facilitate the tracking of U.S. financial markets, which include more developed segments covering corporate bonds, commercial paper, asset-backed securities, and mortgage markets. FCIs are also available for a few selected advanced economies, typically those in the Group of Seven, and sometimes for the euro area as well.[4] In contrast, FCIs for emerging market economies are rare.[5] Despite the dramatic transformation in their financial markets in recent decades, greater variety across emerging market economies and relatively short times series for monitoring their financial segments have made it difficult to develop FCIs for these economies. Moreover, there is not a set of comprehensive and consistently estimated FCIs that facilitate cross-country analysis for both major advanced and emerging market economies.[6]

The author of this box is Selim Elekdag.

[1]Using structural models, the weights were determined by each variable's relative impact on GDP. For Canada, a relatively open economy, the exchange rate received a weight about one-third that of the policy rate.

[2]Financial stress indices (FSIs)—which should not be confused with financial soundness indicators—can be constructed with similar variables and methods as FCIs. FSIs aim to identify episodes of acute financial stress, when financial intermediation is impaired (extreme events are typically considered outright crises). In practice, FCIs and FSIs can display similar dynamics in part because they can include similar financial variables (such as selected spreads) and because they may be constructed with similar methods. For the United States, the patterns of the Kansas City FSI resemble those of the FCIs developed by the other Federal Reserve Banks (for example, Chicago and St. Louis) where all indices capture the accommodative conditions before and the sharp tightening in conditions during the global financial crisis.

[3]See Hatzius and others 2010; Matheson 2012; Koop and Korobilis 2014; Brave and Butters 2011; Hakkio and Keeton 2009; Carlson, Lewis, and Nelson 2012; Kliesen, Owyang, and Vermann 2012; Oet and others 2011.

[4]See Illing and Liu 2003; Davis, Kirby, and Warren 2016; Moccero, Darracq Paries, and Maurin 2014; Guichard, Haugh, and Turner 2009; Hollo, Kremer, and Lo Duca 2012; Dattels and others 2010; Schüler, Hiebert, and Peltonen 2016.

[5]Exceptions include Brandão-Marques and Perez-Ruiz forthcoming; Gumata, Klein, and Ndou 2012; and Kara, Ozlu, and Unalmis 2012; for Chile, South Africa, and Turkey, respectively.

[6]Chapter 4 of the October 2008 *World Economic Outlook* and Cardarelli, Elekdag, and Lall 2011 develop FSIs for 17 advanced economies, and Chapter 4 of the April 2009 *World Economic Outlook* and Balakrishnan and others 2009 for major emerging market economies. Osorio, Unsal, and Pongsaparn 2011 develop FCIs for 13 selected Asian economies; see also IMF 2015.

Annex Table 3.1.1. Country Coverage

Argentina	Czech Republic	Israel	Philippines	United Kingdom
Australia	Denmark	Italy	Poland	United States
Austria	Finland	Japan	Portugal	Vietnam
Belgium	France	Korea	Russia	
Brazil	Germany	Malaysia	South Africa	
Bulgaria	Greece	Mexico	Spain	
Canada	Hungary	Netherlands	Sweden	
Chile	India	New Zealand	Switzerland	
China	Indonesia	Norway	Thailand	
Colombia	Ireland	Peru	Turkey	

Source: IMF staff.

Annex 3.1. Estimating Financial Conditions Indices[33]

The financial conditions indices (FCIs) are estimated for 1990–2016 at monthly frequency for 43 advanced and emerging market economies (see Annex Table 3.1.1) using a set of 10 financial indicators.[34] The length of the FCIs varies depending on data availability (see Annex Table 3.1.2). The FCIs are estimated based on Koop and Korobilis 2014 and build on the estimation of Primiceri's (2005) time-varying parameter vector autoregression model and dynamic factor models of Doz, Giannone, and Reichlin (2011).[35] This approach has two advantages: first, it can purge financial conditions of (current) macroeconomic conditions; second, it allows for a dynamic interaction between the FCIs and macroeconomic conditions, which can also evolve over time. The model takes the following form:

$$x_t = \lambda_t^y Y_t + \lambda_t^f f_t + u_t,$$

$$\begin{bmatrix} Y_t \\ f_t \end{bmatrix} = B_{1,t}\begin{bmatrix} Y_{t-1} \\ f_{t-1} \end{bmatrix} + B_{2,t}\begin{bmatrix} Y_{t-2} \\ f_{t-2} \end{bmatrix} + \ldots + \varepsilon_t, \qquad \text{(A3.1.1)}$$

in which x is a vector of financial variables, Y_t is a vector of macroeconomic variables of interest (including growth in industrial production and inflation), λ_t^y are regression coefficients, λ_t^f are the factor loadings, and f_t is the latent factor, interpreted as the FCI.

Annex 3.2. Factor Model Analysis[36]

The chapter extracts common latent factors from the financial conditions indices (FCIs) across a panel of 43 countries. The factors represent the unobserved common dynamics across financial conditions from 1995 to 2016. The chapter uses the time series factor analysis (TSFA) methodology described in Gilbert and Meijer 2005, which does not require independent and identically distributed observations. The chapter fits both one- and three-factor TSFA models. On average, the one- and three-factor models explain about 30 percent and 41 percent of the variance of the FCIs in the sample, respectively, and can vary notably across countries. The factor model is as follows:

$$FCI_{c,t} = \lambda_{1,c}x_{1,t} + \lambda_{2,c}x_{2,t} + \lambda_{3,c}x_{3,t}, \qquad \text{(A3.2.1)}$$

in which $x_{1,t}$, and $\lambda_{1,c}$, for example, represent the first common time-varying factor and the country-specific loading associated with it (c and t denote country and time, respectively). The extraction of three factors allows for a more accurate decomposition of the common dynamics across countries and recognizes regional dynamics apart from global financial conditions. These regional dynamics play an important role in explaining countries' financial conditions during

[33]The author of this annex is Dulani Seneviratne.

[34]The vector of financial variables includes corporate spreads, term spreads, interbank spreads, sovereign spreads, the change in long-term interest rates, equity and house price returns, equity return volatility, the change in the market share of the financial sector, and credit growth. Various additional financial variables were also used as robustness checks. For instance, lending standards were included in the case of the United States, based on data availability, resulting in a broadly similar FCI. Sovereign spreads were included to account for the fact that the short-term sovereign yield may not be a good proxy for the risk-free rate during crises. For example, during the euro area crisis, short-term sovereign yields shot up more than corporate yields (which may reflect illiquidity in the corporate bond market) resulting in a counter-intuitive decrease in the corporate spread. Likewise, the sovereign spread is often a good proxy for financing conditions for domestic firms—particularly in emerging market economies, where data on corporate spreads are scarcer (the FCIs are generally robust to their exclusion, however).

[35]The FCIs are estimated using Koop and Korobilis' (2014) code (https://sites.google.com/site/dimitriskorobilis/matlab).

[36]The author of this annex is Romain Lafarguette.

Annex Table 3.1.2. Data Sources

Variables	Description	Source
Domestic-Level Variables		
Term Spreads	Yield on 10-year government bonds minus yield on three-month Treasury bills	Bloomberg L.P.; IMF staff
Interbank Spreads	Interbank interest rate minus yield on three-month Treasury bills	Bloomberg L.P.; IMF staff
Change in Long-Term Real Interest Rate	Percentage point change in the 10-year government bond yield, adjusted for inflation	Bloomberg L.P.; IMF staff
Domestic Policy Rates	Policy-related interest rate of the country	Bloomberg L.P.; Haver Analytics
Corporate Spreads	Corporate yield of the country minus corporate yield of the benchmark country. JPMorgan CEMBI Broad is used for emerging market economies where available.	Bloomberg L.P.; Thomson Reuters Datastream
Equity Returns (local currency)	Log difference of the equity indices	Bloomberg L.P.
House Price Returns	Percent change in house price index	Bank for International Settlements; IMF staff
Equity Return Volatility	Exponential weighted moving average of equity price returns	Bloomberg L.P.; IMF staff
Change in Financial Sector Share	Percentage point change in market capitalization of the financial sector to total market capitalization	Bloomberg L.P.
Credit Growth	Percent change in the depository corporations' claims on private sector	Haver Analytics; IMF, International Financial Statistics database
Sovereign Spreads	Yield on 10-year government bonds minus the benchmark country's yield on 10-year government bonds	Bloomberg L.P.; IMF staff
Real GDP Growth	Percent change in the GDP at constant prices	IMF, World Economic Outlook database
Industrial Production Growth	Percent change in the industrial production index	Haver Analytics; IMF, Global Data Source database
Inflation	Percent change in the consumer price index	Haver Analytics; IMF, International Financial Statistics database
Current Account Balance	Current account balance to GDP	IMF, World Economic Outlook database
Commodity Price Growth	Bloomberg commodity price index	Bloomberg L.P.
FDI Linkages with the U.S.	Stock of bilateral direct investment position with the United States to GDP	IMF, Coordinated Direct Investment Survey
Portfolio Linkages with the U.S.	Stock of bilateral portfolio investment position with the United States to GDP; Source II: previous year's average of total flows (purchases plus sales) of foreign securities between U.S. investors and domestic investors (TIC data) to GDP	IMF, Coordinated Portfolio Investment Survey; Source II: U.S. Department of the Treasury
Banking Linkages with the U.S.	Bilateral BIS locational claims (residency basis) of the United States to GDP	Bank for International Settlements
Trade Linkages with the U.S.	Bilateral imports into the United States to GDP	IMF, Direction of Trade Statistics database
Trade Openness	Exports plus imports to GDP	IMF, Direction of Trade Statistics database; IMF, World Economic Outlook database
Financial Openness	Foreign assets plus foreign liabilities to GDP	Lane and Milesi-Ferreti data set (2007; updated)
Capital Account Openness	Chinn-Ito index measures a country's degree of capital account openness	Chinn and Ito data set (2006; updated)
Exchange Rate Stability	Annual standard deviations of the monthly exchange rate between the home country and the base country	Aizenman, Chinn, and Ito data set (2010; updated)
Exchange Rate Flexibility	Degree of exchange rate flexibility	Ilzetzki, Reinhart, and Rogoff data set (2017)
Financial Development	Based on financial institutions' and markets' access, efficiency, and depth	Sahay and others 2015
Rule of Law	Reflects perceptions on the quality of contract enforcement, property rights, the police, the courts, and the likelihood of crime and violence	World Bank, World Governance Indicators database
Global-Level Variables		
VIX	Chicago Board Options Exchange Market Volatility Index	Bloomberg L.P.
Global Real GDP Growth	PPP-weighted average of real GDP growth	IMF, World Economic Outlook database
Global Industrial Production Growth	PPP-weighted average of industrial production growth	IMF, Global Data Source database

(continued)

Annex Table 3.1.2. Data Sources (continued)

Variables	Description	Source
Variables Used as Benchmarks		
IMF Financial Stress Index	Defined as a period during which the financial system of a country is under strain and its ability to intermediate is impaired. The index relies primarily on price movements relative to past levels or trends to proxy for the presence of strains in financial markets and on intermediation.	Cardarelli, Elekdag, and Lall data set (2009; updated) accessed via IMF, Global Data Source database
Chicago Fed Financial Conditions Index	Adjusted National Financial Conditions Index isolates a component of financial conditions uncorrelated with economic conditions to provide an update on the U.S. financial conditions relative to current economic conditions.	Federal Reserve Bank of Chicago
Kansas City Fed Financial Stress Index	A measure of stress in the U.S. financial system based on 11 financial market variables	Federal Reserve Bank of Kansas City

Source: IMF staff.
Note: BIS = Bank for International Settlements; CEMBI = Corporate Emerging Markets Bond Index; FDI = foreign direct investment; Fed = Federal Reserve Bank; PPP = purchasing power parity; TIC = Treasury International Capital; VIX = Chicago Board Options Exchange Volatility Index.

particular events, as discussed in the chapter. However, over the full sample, the variance gain offered by the two regional factors is limited (about 10 percentage points on average), which suggests that the largest share of common dynamics across countries is actually driven by a single global factor, which moves in lockstep with the U.S. FCI.

Annex 3.3. Panel Regression Analysis[37]

The effect of country characteristics on the sensitivity of countries' domestic financial conditions to U.S. financial conditions is estimated using a panel regression model. The specification is based on other studies in the literature that analyze the relationship between domestic financial variables (for instance, stock returns and sovereign bond yields) and a global driver (typically proxied by the Chicago Board Options Exchange Volatility Index).[38] The sample covers 39 advanced and emerging market economies from 1991 to 2016. Countries that could be main drivers of global financial conditions (Germany, Japan, United Kingdom, United States) are excluded. The model estimated is the following:

$$FCI_{it} = \alpha_i + \beta_1 FCI_t^{US} + \beta_2 CCHAR_{it-1} + \beta_3 FCI_t^{US} \times CCHAR_{it-1} + \beta_4 Z_{it-1} + \varepsilon_{it}, \quad \text{(A3.3.1)}$$

in which *FCI* denotes domestic financial conditions, and country characteristics (*CCHAR*) include measures of integration (trade and financial openness), linkages to the United States (foreign direct investment, banking, portfolio and trade), exchange rate flexibility, financial development, and rule of law. Additional controls (Z) include global variables (commodity price inflation and global growth) and domestic variables (growth, inflation, and current account balance).[39] The model includes country fixed effects, and standard errors are clustered at the country level. Results are generally robust to alternative specifications, such as the inclusion of lags of the global driver and alternative measures of domestic macroeconomic conditions including growth expectations based on Consensus Economics forecasts (see Annex Table 3.3.1 for baseline results).[40]

Annex 3.4. Panel Vector Autoregression Analysis[41]

The study of the transmission of domestic monetary policy and global financial conditions to domestic financial conditions is based on a panel vector autoregression (VAR) model. The system includes the U.S. financial conditions index (FCI), growth, inflation,

[37]The authors of this annex are Nicolas Arregui and Dulani Seneviratne.

[38]See, for instance, Bowman, Londono, and Sapriza 2015; Chapter 2 of the April 2014 GFSR; Passari and Rey 2013; and Rey 2013.

[39]All variables except the global driver are lagged to mitigate endogeneity concerns.

[40]FCIs are by construction standardized at the country level (to aggregate information from the multiple financial variables). This implies that a one-standard-deviation change in the FCI can correspond to different changes in, for example, corporate spreads in different countries, which could bias estimation. At the same time, robustness analysis based on individual financial markets (including corporate spreads and equity returns) confirms the dampening role of financial development (see Chapter 2 of the April 2014 GFSR).

[41]The authors of this annex are Nicolas Arregui, Luis Brandão-Marques, and Romain Lafarguette.

Annex Table 3.3.1. Domestic Financial Conditions Drivers

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
U.S. FCI (lag = 0)	0.3310***	0.2787***	0.3328***	0.3278***	0.4728***	0.4403***	0.4641***	0.4645***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Real Growth (lag = 1)	–0.0922***	–0.0964***	–0.0939***	–0.0931***	–0.0918***	–0.0959***	–0.0936***	–0.0928***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Inflation (lag = 1)	0.0001	–0.0001	–0.0001	–0.0004	0.0001	–0.0001	–0.0001	–0.0004
	(0.779)	(0.797)	(0.855)	(0.304)	(0.794)	(0.777)	(0.845)	(0.295)
Current Account Balance to GDP (lag = 1)	–0.0039	–0.0023	–0.0084	–0.0075	–0.0038	–0.0021	–0.0082	–0.0074
	(0.753)	(0.842)	(0.491)	(0.552)	(0.760)	(0.853)	(0.498)	(0.557)
U.S. FCI (lag = 1)	0.0563	0.0757*	0.0557	0.0540				
	(0.188)	(0.075)	(0.195)	(0.210)				
U.S. FCI (lag = 2)	0.2343***	0.2074***	0.2445***	0.2393***				
	(0.000)	(0.000)	(0.000)	(0.000)				
U.S. FCI (lag = 3)	–0.1480***	–0.1169**	–0.1716***	–0.1572***				
	(0.004)	(0.029)	(0.002)	(0.003)				
Commodity Price Inflation (lag = 1)	–0.5182***	–0.4494***	–0.5072***	–0.5251***	–0.3809	–0.2618	–0.4300*	–0.4094*
	(0.003)	(0.009)	(0.003)	(0.003)	(0.111)	(0.256)	(0.069)	(0.089)
Global Growth (lag = 1)	–0.0321	–0.0317	–0.0282	–0.0328	–0.0391	–0.0439*	–0.0306	–0.0380
	(0.196)	(0.180)	(0.226)	(0.162)	(0.149)	(0.083)	(0.244)	(0.145)
Capital Account Openness	–0.0635	–0.0926	–0.0626	–0.0745	–0.0642	–0.0922	–0.0638	–0.0753
	(0.327)	(0.165)	(0.347)	(0.252)	(0.323)	(0.170)	(0.338)	(0.247)
Capital Account Openness × U.S. FCI	–0.0313	–0.0265	–0.0241	–0.0153	–0.0308	–0.0261	–0.0236	–0.0148
	(0.405)	(0.458)	(0.508)	(0.701)	(0.413)	(0.467)	(0.517)	(0.711)
FDI Linkages with the U.S.	0.0331***	0.0294***	0.0336***	0.0319***	0.0331***	0.0294***	0.0336***	0.0319***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
FDI Linkages with the U.S. × U.S. FCI	0.0047**	0.0041*	0.0052**	0.0052**	0.0047**	0.0041*	0.0052**	0.0052**
	(0.022)	(0.058)	(0.017)	(0.018)	(0.021)	(0.054)	(0.017)	(0.017)
Trade Link with the U.S.	0.0145		0.0199	0.0227	0.0153		0.0205	0.0234
	(0.628)		(0.500)	(0.467)	(0.611)		(0.490)	(0.454)
Trade Link with the U.S. × U.S. FCI	0.0086		0.0070	0.0071	0.0085		0.0070	0.0071
	(0.216)		(0.327)	(0.301)	(0.215)		(0.322)	(0.300)
Trade Openness		0.0077*				0.0077*		
		(0.079)				(0.079)		
Trade Openness × U.S. FCI		0.0022**				0.0022**		
		(0.010)				(0.010)		
Rule of Law Index	–0.6298	–0.5216	–0.6044	–0.4886	–0.6286	–0.5222	–0.6021	–0.4870
	(0.130)	(0.213)	(0.145)	(0.229)	(0.131)	(0.213)	(0.147)	(0.230)
Rule of Law Index × U.S. FCI	0.0873	0.0528	0.0813	0.0772	0.0866	0.0529	0.0805	0.0764
	(0.112)	(0.301)	(0.145)	(0.183)	(0.114)	(0.297)	(0.149)	(0.187)
Financial Development Index	0.0049	–0.4410	–0.0299	–0.0095	–0.0004	–0.4571	–0.0298	–0.0128
	(0.994)	(0.558)	(0.966)	(0.989)	(1.000)	(0.547)	(0.966)	(0.985)
Financial Development Index × U.S. FCI	–0.6577***	–0.5474**	–0.5985**	–0.6444***	–0.6574***	–0.5523***	–0.5946**	–0.6425***
	(0.005)	(0.010)	(0.019)	(0.008)	(0.004)	(0.009)	(0.020)	(0.008)
Exchange Rate Stability Index			–0.3965*				–0.3913*	
			(0.081)				(0.083)	
Exchange Rate Stability Index × U.S. FCI			–0.1203				–0.1207	
			(0.376)				(0.368)	
Exchange Rate Flexibility				0.1986***				0.1983***
				(0.007)				(0.007)
Exchange Rate Flexibility × U.S. FCI				0.0503				0.0506
				(0.224)				(0.221)
Observations	6,920	6,906	6,920	6,920	6,920	6,906	6,920	6,920
R-squared	0.428	0.438	0.432	0.438	0.425	0.434	0.429	0.435
Number of Countries	39	39	39	39	39	39	39	39

Source: IMF staff estimates.
Note: Robust *p*-values in parentheses. FCI = financial conditions index; FDI = foreign direct investment.
*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

domestic FCI, and the change in domestic monetary policy. Growth is measured by industrial production, and inflation is computed using the consumer price index. Monetary policy is measured with a monetary-policy-related interest rate (usually a central bank discount rate or a short-term money market rate). The sample consists of 25 small open economies with flexible exchange rate regimes and uses monthly data from 2001 to 2016. The panel VAR is estimated with four lags using Pesaran, Shin, and Smith's (1999) mean group estimator, which is consistent in the presence of dynamic heterogeneity. Impulse responses are drawn from Cholesky decompositions under the assumption that domestic interest rates move last and U.S. FCI moves first. All standard errors are estimated using a nonparametric bootstrap and 1,000 replications. To compare results according to countries' financial openness, an analogous exercise is conducted splitting the sample into two groups based on their relative capital account openness (as measured by the Chinn-Ito index). Results are generally robust to alternative lag specifications and to the inclusion of global industrial production growth, commodity prices, and a measure of global interest rates (proxied using several U.S. shadow rate measures) as exogenous controls. The results do not change when exchange rate terms are added into the panel VAR as an additional endogenous variable. The VAR models estimated individually for each country use the same set of variables and are robust to the inclusion of global controls including commodity prices and world industrial production growth.

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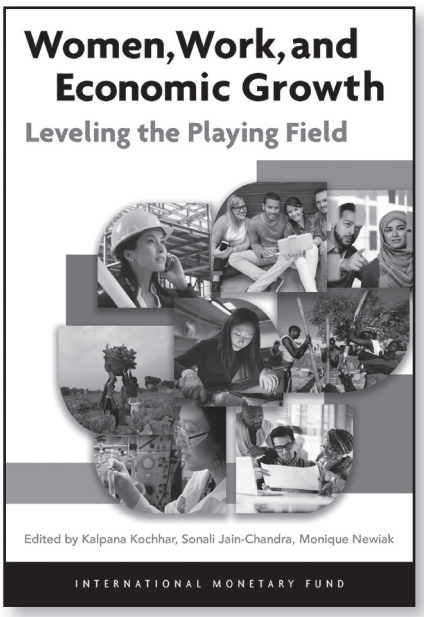

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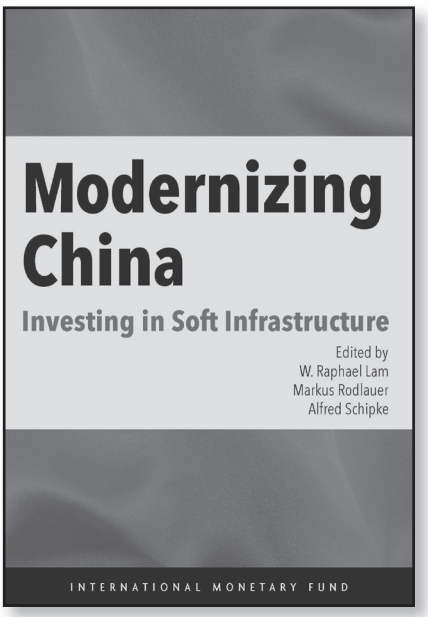

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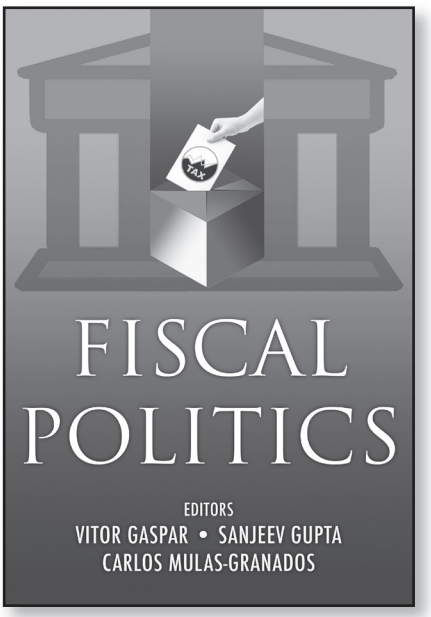

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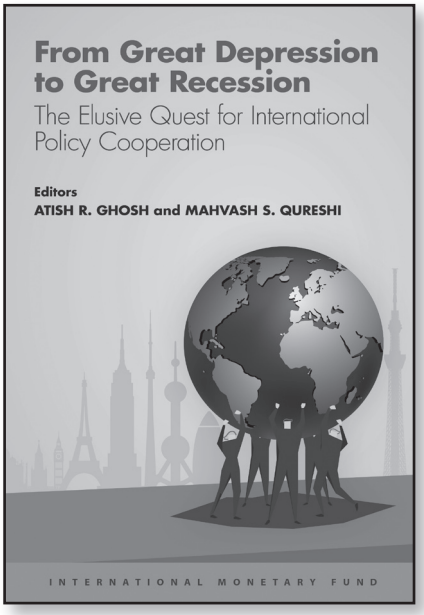

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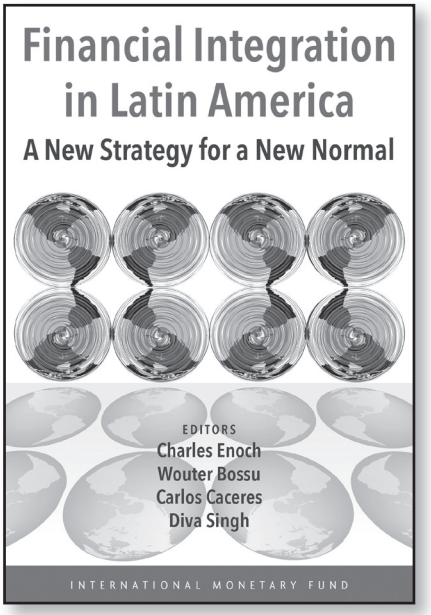

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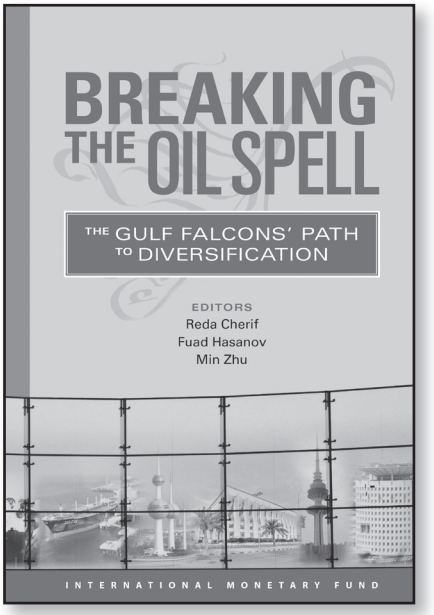

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