

Financial Stability Overview

Near-term financial stability risks have declined with the strengthening global recovery, but medium-term vulnerabilities are building as the search for yield intensifies. Risks are rotating from banks to financial markets as spreads and volatility compress while private sector indebtedness rises.

The Global Recovery Is Improving the Near-Term Outlook for Financial Stability

Near-term risks to financial stability continue to decline. *Macroeconomic risks* are lower (Figures 1.1 and 1.2) amid the global upswing in economic activity, discussed in the October 2017 *World Economic Outlook* (WEO). *Emerging market risks* have also declined, underpinned by the pickup in global activity and benign external conditions. This environment of benign macroeconomic conditions and continued easy *monetary and financial conditions*—but still sluggish inflation—is fueling a marked increase in *risk appetite*, broadening investors' search for yield.

Systemically Important Banks and Insurers Continue to Enhance Resilience

Global systemically important banks (GSIBs) and insurers have strengthened their balance sheets by raising capital and liquidity but are still grappling with remaining legacy issues and business model challenges.

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*), Zohair Alam, Sergei Antoshin, Magally Bernal, Luis Brandão-Marques, Jeroen Brinkhoff, John Caparusso, Sally Chen, Shiyuan Chen, Yingyuan Chen, Charles Cohen, Fabio Cortes, Dimitris Drakopoulos, Kelly Eckhold, Martin Edmonds, Jesse Eiseman, Jennifer Elliott, Caio Ferreira, Tamas Gaidosch, Rohit Goel, Hideo Hashimoto, Sanjay Hazarika, Geoffrey Heenan, Dyna Heng, Henry Hoyle, Nigel Jenkinson, David Jones, Jad Khallouf, Robin Koepke, Tak Yan Daniel Law, Yang Li, Peter Lindner, Rebecca McCaughrin, Aditya Narain, Machiko Narita, Vladimir Pillonca, Thomas Piontek, Mamoon Saeed, Luca Sanfilippo, Jochen Schmittmann, Juan Solé, Ilan Solot, Yasushi Sugayama, Narayan Suryakumar, Francis Vitek, Jeffrey Williams, and Christopher Wilson.

After a painful period of restructuring and absorption of elevated charges for past misconduct in the form of fines and private litigation, the outlook for sustainable profitability is improving, but strategic reorientation remains incomplete. The next section assesses risks from large global banks and life insurance companies.

Medium-Term Vulnerabilities Are Rising and Rotating to Nonbanks

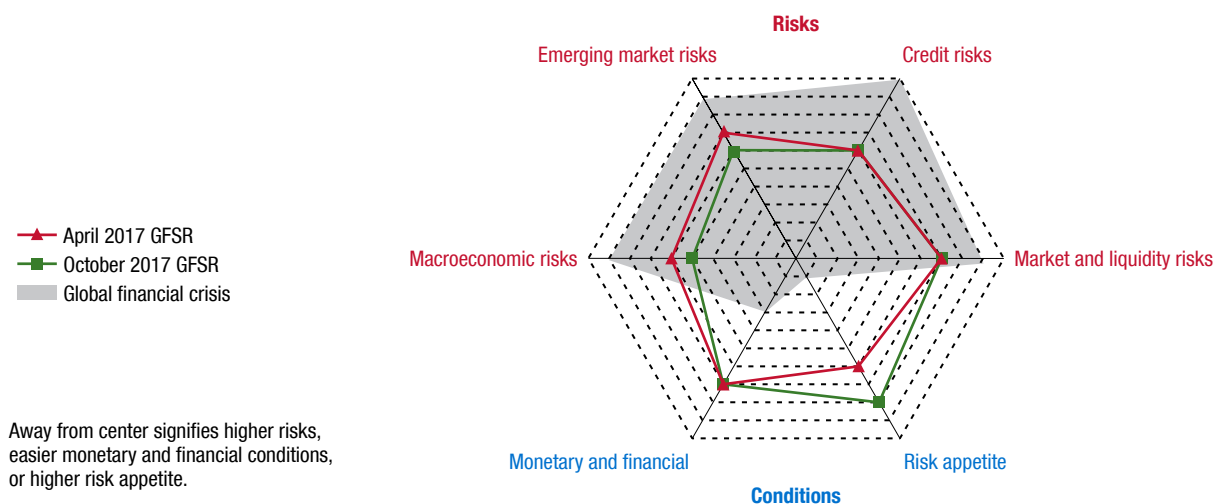
Many asset valuations have continued to rise in response to the improved economic outlook and the search for yield (Figure 1.3, panel 1), driving down a broad range of risk premiums (Figure 1.3, panel 2). While increased risk appetite and the search for yield are a welcome and intended consequence of unconventional monetary policy measures, helping to support the economic recovery, there are risks if these trends extend too far. Compensation for inflation risks (term premiums) and credit risks (for example, spreads on corporate bonds) are close to historic lows, while volatility across asset markets is now highly compressed (Figure 1.3, panel 3). Some measures of equity valuation are elevated, but relative to yields on safe assets (that is, the equity risk premium) they do not appear overly stretched. This prolonged search for yield has raised the sensitivity of the financial system to *market and liquidity risks*, keeping those risks elevated. The widening divergence between economic and financial cycles within and across the major economies is discussed in Box 1.1.

A key stability challenge is the rebalancing of central bank and private sector portfolios against a backdrop of monetary policy cycles that are not synchronized across countries. Too quick an adjustment in monetary policies could cause unwanted turbulence in financial markets and set back progress toward inflation targets. Too long a period of low interest rates could foster a further buildup of market and credit risks and increase medium-term vulnerabilities.

Credit risks are already elevated, given the deterioration in underlying leverage in the nonfinancial sector—households and firms—of many Group of Twenty (G20) economies. Despite low interest rates,

Figure 1.1. Global Financial Stability Map: Risks and Conditions

Risk appetite has grown markedly as near-term stability risks have declined.



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).

private sector debt service ratios in many major economies have increased to high levels because of rising debt. Weaker households and companies in several countries have become more sensitive to financial and economic conditions as a result.

The Global Recovery Could Be Derailed

Prolonged low volatility, further compression of spreads, and rising asset prices could facilitate additional risk taking and raise vulnerabilities further. Investors' concern about debt sustainability could eventually materialize and prompt a reappraisal of risks. In such a downside scenario, a shock to individual credit and financial markets well within historical norms could decompress risk premiums and reverberate worldwide, as explored later in this chapter. This could stall and reverse the normalization of monetary policies and put growth at risk.

Large Systemic Banks and Insurers: Adapting to the New Environment

The large internationally active banks at the core of the financial system—so-called global systemically important banks (GSIBs)—have become more resilient since the crisis, with stronger capital and liquidity. Banks have made substantial progress in addressing legacy issues and restructuring challenges—while adapting their business models to the

new regulatory and market landscape. Strategic reorientation has led to a pullback from market-related business. Banks have, however, retained a presence in international business and cross-border loans. These strategic realignments have come amid changing group structures, as activity is increasingly channeled through subsidiaries. Despite ongoing improvement, progress is uneven and adaptation remains incomplete. About a third of banks by assets may struggle to achieve sustainable profitability, underscoring ongoing challenges and medium-term vulnerabilities.

Life insurers were hit by the global financial crisis, but have since rebuilt their capital buffers. However, they are now facing the challenge of a low-interest-rate environment. In response, insurers have adapted their business models by changing their product mix and asset allocations. But in doing so, they have been increasingly forced out of their natural risk habitat in a search for yield, making them more vulnerable to market and credit risks. Investors still worry about the viability of some insurers' business models and find it difficult to assess risks, resulting in weak equity market valuations. Policymakers should seek to strengthen regulatory frameworks and increase reporting transparency.

Global Systemically Important Banks

Global banks remain critical pillars of international financial intermediation. These GSIBs provide a wide range of financial services for companies, institutions,

Figure 1.2. Global Financial Stability Map: Assessment of Risks and Conditions
 (Notch changes since the April 2017 Global Financial Stability Report)

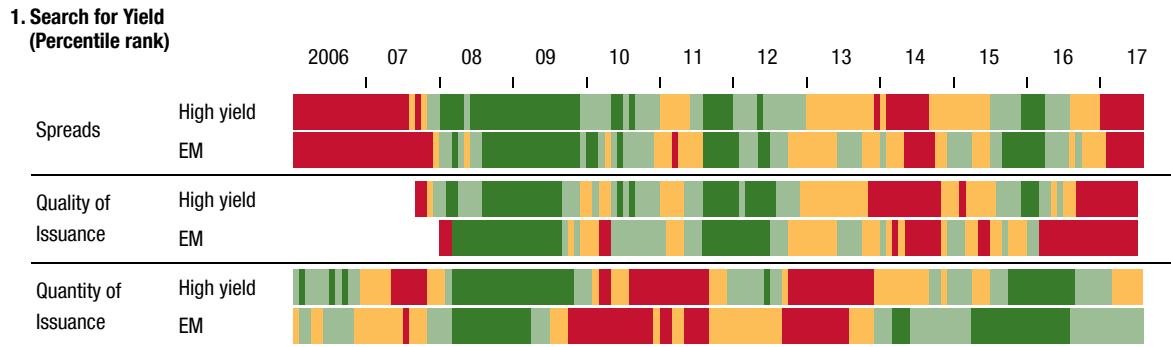


Source: IMF staff estimates.

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.

Figure 1.3. Search for Yield, Asset Valuations, and Volatility

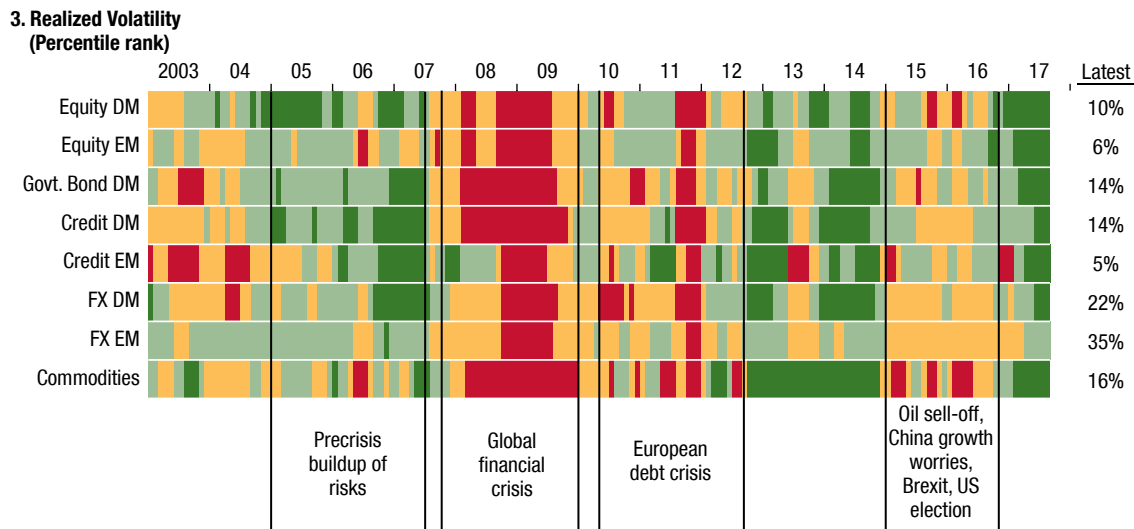
The global search for yield has compressed risk premiums across some assets ...



2. Cross-Asset Valuations (Percentile rank)

	CAPE	Forward P/E	Equity Risk Premiums	Term Premiums (10-year)	Corporate Spreads	House Prices to Income
United States	83	79	85	7	6	74
Germany	62	33	86	9	14	39
Japan	28	17	87	5	65	8
United Kingdom	85	60	96	8	8	92
Emerging Markets	25	58	84	19	5	44

... while volatility remains near precrisis lows.



Sources: Bank of America Merrill Lynch; Bloomberg Finance L.P.; Dealogic; Haver Analytics; Organisation for Economic Co-operation and Development; Thomson Reuters; and IMF staff estimates.
 Note: The color shading is based on valuation quartiles. Red (dark green) denotes low (high) premiums, spreads, volatility, and issuance quality, as well as high (low) issuance and house price to income. In panel 1, quality of issuance shows spreads per turn of leverage. Quantity of issuance is 12-month trailing gross issuance as percent of the outstanding amount. In panel 2, CAPE is the trailing 12-month price-to-earnings ratio adjusted for inflation and the 10-year earnings cycle. Forward P/E is the 12-month forward price-to-earnings ratio. Equity risk premiums are estimated using a three-stage dividend discount model on major stock indices. Term premium estimates follow the methodology in Wright 2011. Corporate spreads are proxied using spreads per turn of leverage. For house-price-to-income ratio, income is proxied using nominal GDP per capita. The percentile is calculated from 1990 for CAPE, forward P/E, equity risk premiums and term premiums, from 1999 for EM term premiums, from 2000 for house-price-to-income ratio, and from 2007 for corporate spreads. In panel 3, the heatmap shows the percentile of three-month realized volatility since 2003 at a monthly frequency. CAPE = cyclically adjusted price-to-earnings ratio; DM = developed market; EM = emerging market; FX = foreign exchange; Govt = government; P/E = price to earnings.

and individuals across many countries.¹ Together, these 30 banks hold more than \$47 trillion in assets and more than one-third of the total assets and loans of thousands of banks globally. They have an even greater role in certain key global financial functions: collectively they comprise 70 percent or more of certain international credit markets (for example, syndicated trade finance), market services, and the international financial infrastructure. GSIBs are central to the international financial system (Figure 1.4, panel 1).

All GSIBs share systemic importance. At the same time, they are a diverse group, with differences in business mix and geographic positions. The 30 GSIBs encompass business models ranging from those that are market focused to those that are consumer focused and from highly specific transaction banking models to all-embracing universal banks (Figure 1.4, panels 3 and 4). About half of GSIBs, by assets, are universal banks, offering a mix of services. Unsurprisingly, most operate on more than one continent. But almost a third of these banks, by assets, are largely domestic businesses (mostly in China and the United States).

GSIBs Are Undergoing Business Model Transitions

In the aftermath of the crisis, GSIBs have been reorienting their business models in three overlapping phases (Figure 1.4, panel 2). First, a process of legacy cleanup has been ongoing for most banks. As these legacy challenges recede, banks have entered a phase of strategic reorientation, which continues to affect both their lines of business and geographic scope. As banks have progressed in these first two phases, the focus is shifting to resolution regimes and the associated need to reconfigure international group structures for some banks. These multiyear adjustments—still ongoing—have been necessary to

¹Global systemically important banks (GSIBs) are identified based on size, interconnectedness, cross-jurisdictional activity, impact on financial institution infrastructure (for example, the payments system), and complexity (Basel Committee on Banking Supervision 2014). GSIBs included in the analysis are based on the list published in November 2016, the latest available at the time of this report, and include the following: *China* (4)—Agricultural Bank of China (ABC), Bank of China (BOC), China Construction Bank (CCB), Industrial and Commercial Bank of China (ICBC); *Japan* (3)—Mitsubishi UFJ Financial Group (MUFG), Mizuho Financial Group (MFG), Sumitomo Mitsui Financial Group (SMFG); *Continental Europe* (11)—Banco Santander (SAN), BNP Paribas (BNP), Crédit Agricole (CA), Credit Suisse (CS), Deutsche Bank (DB), Groupe BPCE (BPCE), ING Groep (ING), Nordea Bank (NDA), Société Générale (SG), UBS Group (UBS), Unicredit Group (UCG); *United Kingdom* (4)—Barclays (BARC), HSBC Holdings (HSBC), Royal Bank of Scotland (RBS), Standard Chartered (STAN); *United States* (8)—Bank of America (BOA), Bank of New York Mellon (BNY), Citigroup (C), Goldman Sachs (GS), JP Morgan Chase (JPM), Morgan Stanley (MS), State Street (STT), Wells Fargo (WFC).

support resilience and achieve more sustainable profitability in the new environment. Progress on these fronts has been positive, but uneven, and challenges remain.

Global Banks Have Fortified Balance Sheets and Continue to Address Crisis Legacies

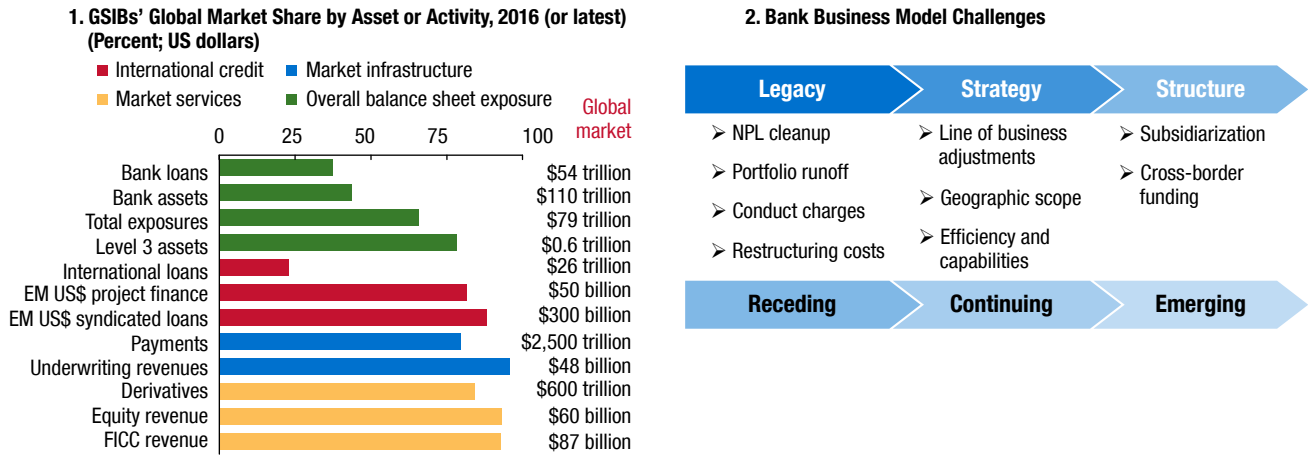
The resilience of GSIBs has improved over the past decade as they have adapted to enhanced prudential standards. They have significantly strengthened their balance sheets with an additional \$1 trillion in capital since 2009 while reducing assets. Adjusted capital ratios (incorporating reserves against expected losses) have in aggregate risen steadily since the undercapitalized precrisis period (Figure 1.5, panel 1). GSIB liquidity has also improved: loan-to-deposit ratios are down from the elevated levels a decade ago, and reliance on short-term wholesale funding has fallen (Figure 1.5, panel 2).

In tandem with higher capital and more liquidity, GSIBs have also made significant progress in dealing with legacy challenges from the 2008–09 financial crisis and its aftermath.

- Banks have made progress in cleaning up legacy assets, facilitated by carving out noncore portfolios (mainly legacy impaired loans and bonds) for aggressive disposal and runoff (Figure 1.5, panel 3). About two-thirds of GSIB noncore assets have been disposed of; US GSIBs are the most advanced in this process. In contrast, several European banks continue to take high charges to provide for and write off legacy bad debts.
- Second, charges for past misconduct in the form of fines and private litigation have eased from a high level. These charges totaled an estimated \$220 billion between 2011 and 2016, equivalent to 27 percent of underlying net income for European banks over the period and 19 percent for US banks. Although some of these charges were the result of misbehavior in personal financial services (insurance products in the United Kingdom, consumer protection in the United States, private banking tax evasion at the global level), most stemmed from market businesses (US residential mortgage-backed securities, fixing of the London interbank offered rate) and international transactions (anti-money laundering measures) in which GSIBs dominate. From a financial stability point of view, the litigation charges should strengthen incentives for more prudent future business practices.

Despite progress in disposing of *legacy assets* and dealing with past misconduct, GSIBs continue to cope

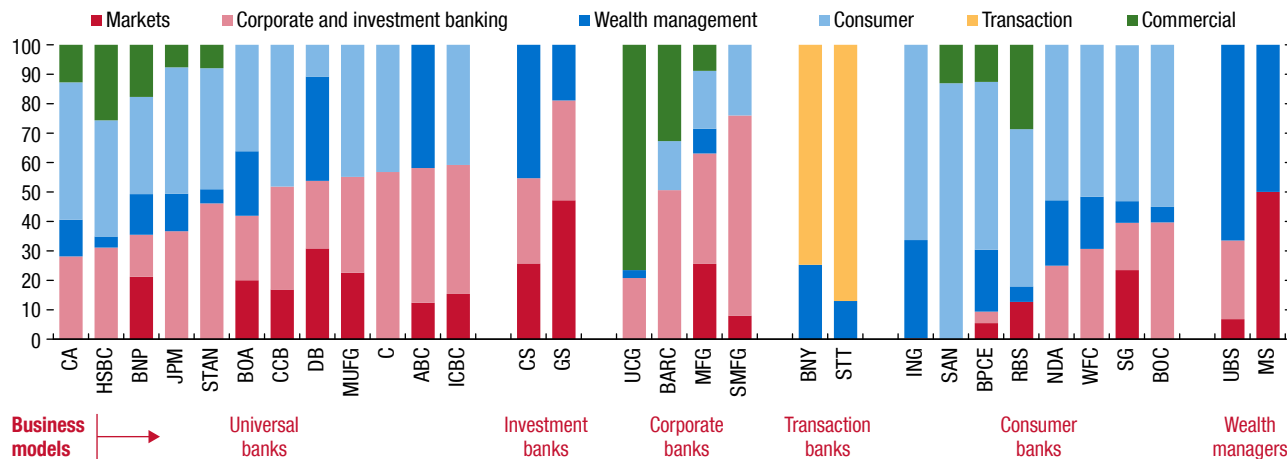
Figure 1.4. Global Systemically Important Banks: Significance and Business Model Snapshot



3. GSIB Business Models and Geographic Strategies

Business Model	Description	Geographic Reach			Percent of GSIB Assets
		Global	Regional	Local	
Universal Bank	Balance of household and business services	C, JPM, HSBC, DB, STAN, BNP, MUFG	CA	BOA, ABC, CCB, ICBC	56
Corporate Bank	Lending to businesses	BARC, SMFG	UCG, MFG		12
Investment Bank	Capital markets services, advisory, mergers, and secondary market sales and trading	GS, CS			3
Transaction Bank	Corporate transaction services (including payments) and institutional services (settlement, clearing, custody)	BNY, STT			1
Consumer Bank	Retail banking including lending (mortgages, credit cards, other unsecured credit), savings products, and retail payment services	ING, SAN, SG	NDA, BOC, RBS	BPCE, WFC	23
Wealth Manager	Asset management, private banking, and insurance	MS, UBS			4
Percent of GSIB Assets		52	18	31	100

4. GSIBs: Revenue Mix by Line of Business, 2016 (Percent of revenue)

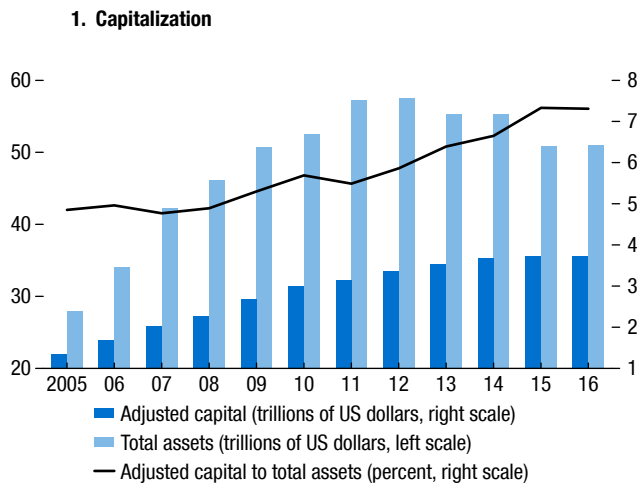


Sources: Bank financial statements; Bank for International Settlements; Basel Committee on Banking Supervision; Bloomberg Finance L.P.; Dealogic; Haver Analytics; Office of Financial Research; S&P Capital IQ; SNL Financial; and IMF staff estimates.

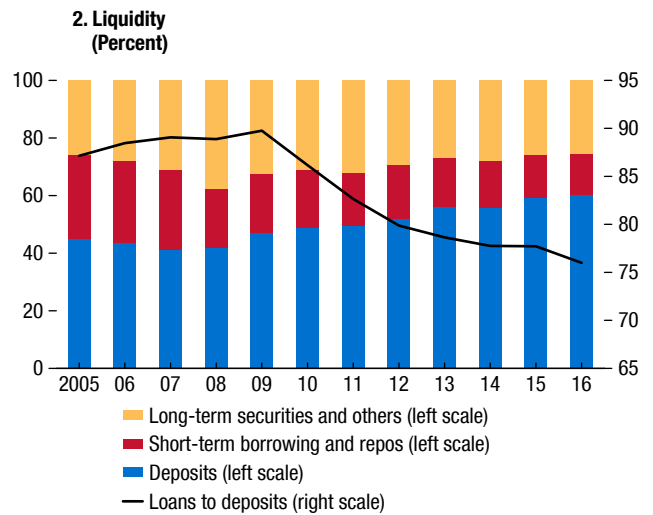
Note: In panel 1, global market size for total exposures, level 3 assets, payments, and over-the-counter derivatives are calculated using the GSIB indicator metrics. "Total exposure" is a proxy for banks' total asset exposures, which includes total consolidated assets, derivatives exposures, and certain off-balance-sheet exposures. This is the same as the denominator used for the Basel III ratio. EM US\$ project finance includes syndicated loans only. GSIBs' apparently low share of international loans reflects the nearly pure domestic focus of the local category banks as shown in panel 3. In panel 1, global banking loans and assets are calculated using a sample of 3,500+ banks. See footnote 1 in the text for an explanation of the abbreviations in panels 3 and 4. EM = emerging market; FICC = fixed income, currencies, and commodities; GSIB = global systemically important bank; NPL = nonperforming loan.

Figure 1.5. Global Systemically Important Banks: Capital, Liquidity, and Legacy Challenges

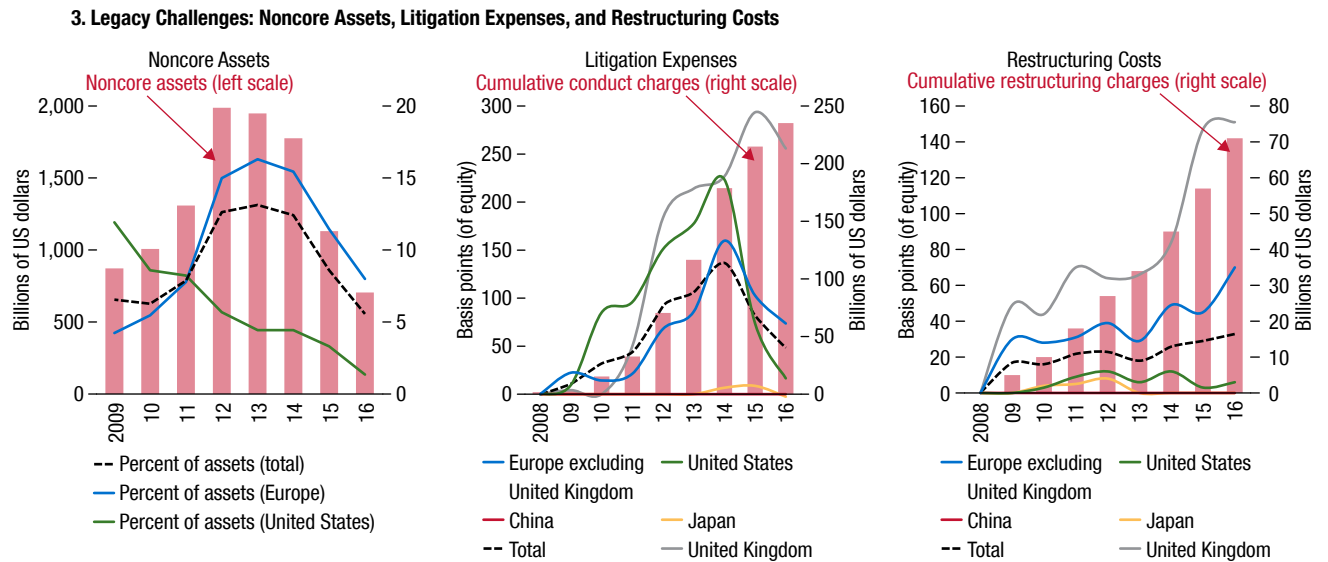
Global banks are better capitalized ...



... and hold higher liquidity ...



... and have made good progress in addressing legacy challenges.



Sources: Bank financial statements; Bloomberg Finance L.P.; Dealogic; S&P Capital IQ; SNL Financial; and IMF staff estimates and analysis.
 Note: Adjusted Tier 1 capital equals shareholders' equity, minus 45 percent (an estimate of average gross loss given default) of reported nonperforming loans, plus loan-loss reserves. In panel 1, total assets are adjusted for the netted derivatives. In panel 3, conduct and restructuring charges (in basis points of equity) are on an estimated posttax basis, assuming charges adjusted by effective tax rates.

with restructuring charges. Most of these are severance and other charges stemming from branch and staff reductions motivated by banks' efforts to reduce their operating cost structures. Continental European and UK banks are most affected; their restructuring charges in 2016 amounted to \$13 billion, equivalent to 25 percent of their underlying net income. Although some GSIBs have made substantial progress in reducing staff, others (particularly some European GSIBs) still report large restructuring charges.

Global Banks Have Reduced Market-Related Business

Strategically, GSIBs have reduced their market-related functions—investment banks have made some of the biggest cutbacks (Figure 1.6, panel 1). This move came as earlier overexpansion and excess capacity collided with regulatory changes that increased risk-asset weighting and capital charges and drove a sharp decline in profitability of banks' other lines of business (Figure 1.6, panel 2). Fixed income, currency, and commodity (FICC) businesses, in particular, have become less attractive to all but a few high-volume or high-margin players, which have taken a greater share of a shrinking revenue pie (Figure 1.6, panels 2 and 3). In this environment, US banks have gained market share, and activity is now concentrated in fewer players.

While GSIBs' declining exposure to financial markets will reduce their risk, there may be associated costs to market liquidity. Evidence that this change affects market liquidity in normal times is mixed, and greater participation by nonbank market intermediaries could help address the fragmentation of market liquidity. What is less clear is whether global banks' reduced capacity to intermediate in financial markets could affect the resilience of liquidity in periods of stress. Similarly, the supply of risk management services that require GSIB balance sheet space and capital could be reduced or provided to fewer clients. The balance between reduced GSIB riskiness and potential costs to liquidity during stress is an issue deserving of careful ongoing consideration.²

²Work is underway at the Financial Stability Board, in collaboration with standard-setting bodies, to evaluate the impact of the regulatory reform agenda. But it will likely take some time to realize the full impact of changes in bank business models on financial activity. Adrian and others (2017) also document the stagnation of broker-dealer balance sheets associated with deleveraging.

Global Banks Overall Continue to Operate Internationally

In contrast to declining market intensity, GSIBs overall have remained central to the provision of international credit and services (including total loans and specific product markets, such as syndicated lending, trade finance, and project finance). International balance sheet commitments and revenue mix have remained quite stable across almost all GSIBs (Figure 1.7, panel 1). Even as non-GSIB banks shrank international loans aggressively during 2009–13 (owing to balance sheet pressures), GSIBs as a group maintained their international lending volume (Figure 1.7, panel 2).

Those GSIBs less impacted by the financial crisis have maintained or expanded their international role. This may in part be motivated by the relative profitability of international operations. Across a sample of 724 banking subsidiaries, foreign banking operations have been more profitable than domestic business for Japanese and continental European and UK GSIBs (Figure 1.7, panel 3). Japanese banks, whose international loans have contributed to raising profitability, have continued to pivot aggressively toward international markets—maintaining their reliance on potentially volatile wholesale foreign currency funding—accompanied by a general expansion of corporate loans and foreign securities investments. Shifts in international exposures of continental European and UK banks reflects three main crosscurrents. A few—mainly UK banks—have emphatically cut exposures in an international arena where they suffered large losses. Some (mainly French) banks were forced by balance sheet constraints to retrench. For many others, international lending remains an attractive business to which they have demonstrated commitment within the constraints of their balance sheet capacity and exposure limits.³ In contrast, US GSIBs, whose domestic operations are highly profitable, have maintained or slightly pulled back the international proportion of their loan portfolios.

Subsidiarization Presents a Structural Challenge for Some Banks

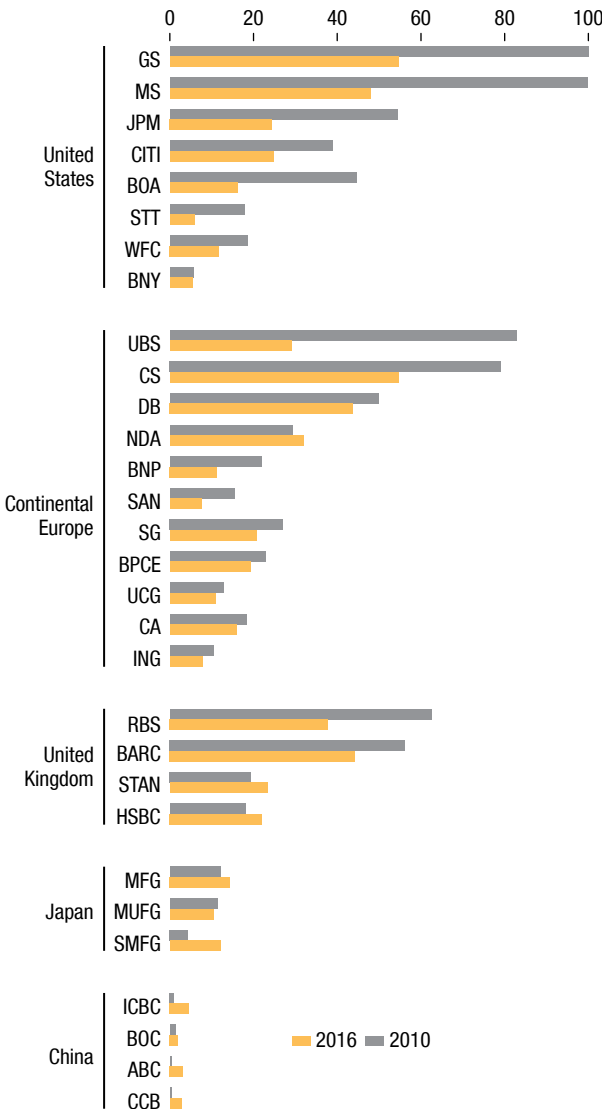
Largely in response to national regulatory pressures, several GSIBs more reliant on branching have begun gradually shifting their international lending from a direct cross-border model to one based on lending via

³This could suggest that reduced international exposure may be more a cyclical than a structural phenomenon for GSIBs, as suggested for the broader banking sector by McCauley and others 2017. See also Caruana 2017.

Figure 1.6. Global Systemically Important Banks: Market Activity

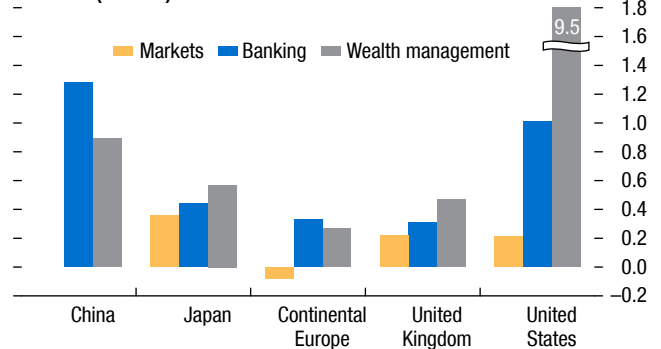
Market intensity has declined sharply ...

1. Market Intensity, 2010 and 2016
(Index, maximum intensity = 100)



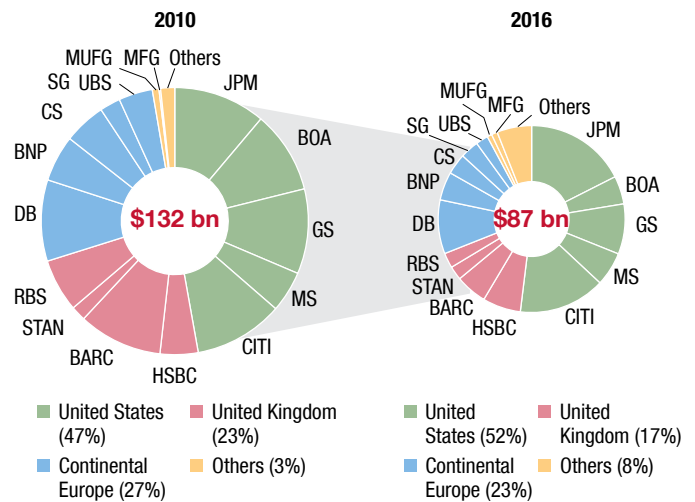
... as banks avoid relatively unprofitable markets businesses.

2. GSIBs by Home Region: Average Return on Assets, by Business Type, 2014–16 Average (Percent)



FICC revenue pool has shrunk with a shift in market share toward US banks.

3. FICC Trading Revenues, 2010 and 2016



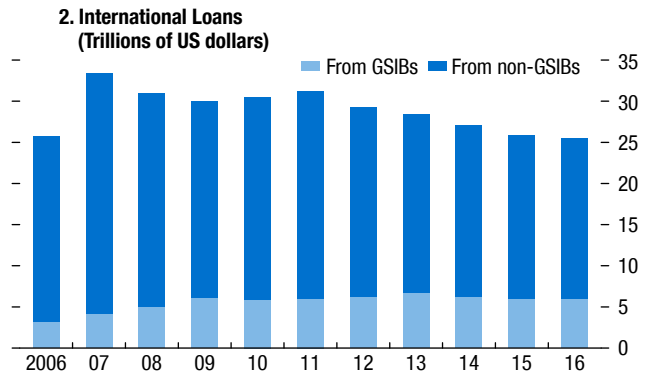
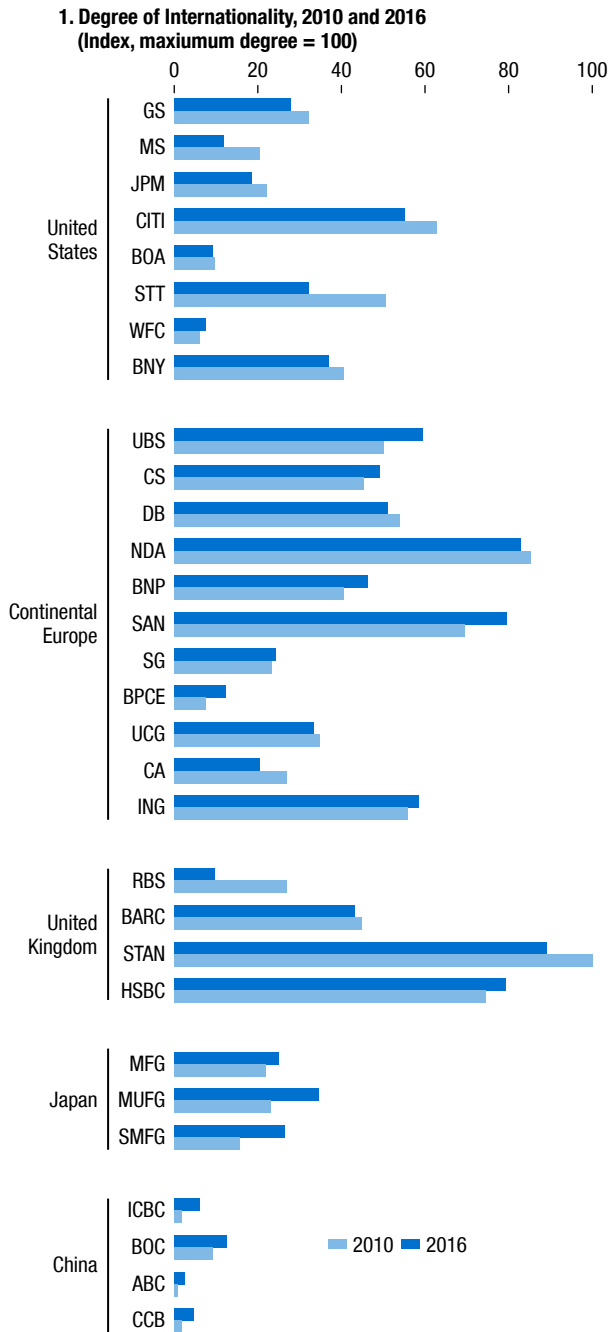
Sources: Bank financial statements; Basel Committee for Banking Supervision; Bloomberg Finance L.P.; equity research reports; European Central Bank; Federal Reserve Board; S&P Capital IQ; SNL Financial; and IMF staff estimates and analysis.

Note: In panel 1, market intensity is an index scaled (1 to 100) of relative exposures across the 30 GSIBs over 2010 to 2016. Each exposure is based on an average of (1) market-risk-weighted assets divided by total risk-weighted assets; (2) Level 3 assets divided by total assets; (3) notional derivatives relative to total assets; and (4) average value at risk relative to risk-weighted assets. In panel 2, business type is identified for each subsidiary entity based on a sample of 934 foreign and domestic subsidiaries of the 30 GSIBs. Banking (724 subsidiaries) includes corporate, commercial, and consumer banking, and the advisory part of investment banking. Markets (156 subsidiaries) include underwriting, secondary market trading in securities, currencies and commodities, and dealings in derivative contracts. Wealth management (46 subsidiaries) includes asset management, private banking, and insurance. See footnote 1 in the text for an explanation of the abbreviations in panels 1 and 3. FICC = fixed income, currencies, and commodities.

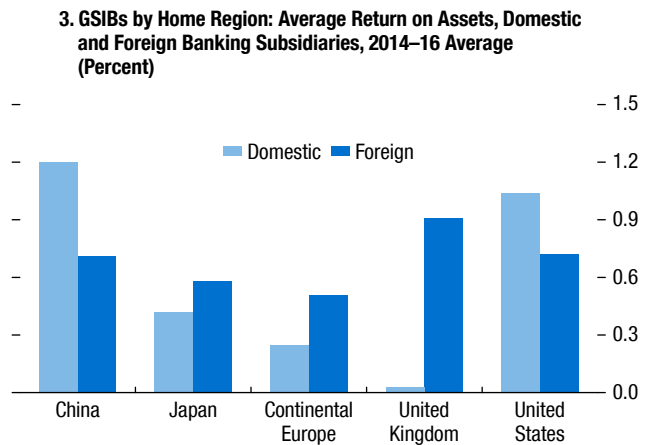
Figure 1.7. Global Systemically Important Banks' International Activity

GSIBs' international activity has remained stable overall.

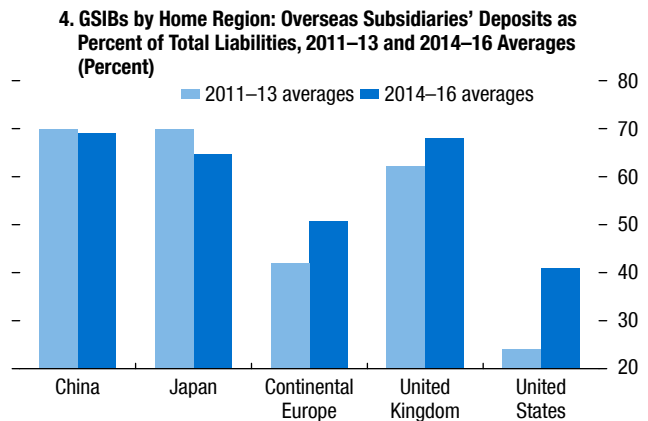
GSIBs are increasing their share in international lending despite an overall reduction.



Foreign banking operations are more profitable than domestic entities for many banks.



Subsidiaries of European and US GSIBs have increased their funding through local deposits.



Sources: Bank financial statements; Basel Committee for Banking Supervision; Bloomberg Finance L.P.; European Central Bank; Federal Reserve Board; S&P Capital IQ; SNL Financial; and IMF staff estimates and analysis.

Note: Degree of internationality is an index scaled (1 to 100) of relative exposures across the 30 GSIBs over 2010 to 2016. Each exposure is based on an average of (1) percent of revenue from nonhome regions; (2) international loans divided by total loans (or international assets divided by total assets); and (3) foreign deposits divided by total deposits. For panel 2, see notes in Figure 1.6 for sample descriptions. In panel 3, subsidiary return on assets are based on reported earnings. The reported earnings of subsidiaries in the United Kingdom and the United States may be understated due to the booking of conduct charges in those jurisdictions. See footnote 1 in the text for an explanation of the abbreviations in panel 1. GSIBs = global systemically important banks.

foreign subsidiaries (“subsidiarization”). The aggregate share of GSIB lending extended through foreign subsidiaries has risen from 40 percent to 60 percent of international lending since 2009 and may continue to increase gradually as banks respond to regulatory pressure to house their activities in each international jurisdiction within local legal entities with adequate local capital and liquidity. This has motivated banks to shift funding from cross-border (interbank and intragroup) funding toward local deposits (Figure 1.7, panel 4).

These structural adjustments have helped improve the resolvability and funding resilience of large, highly interconnected global banks, which strengthens financial stability. Healthy subsidiaries may also be better able to withstand pressure on their parents or other affiliates, which may have a positive effect on the stability of host countries. These considerable benefits come with some possible unintended costs. Keeping individual pools of capital in subsidiaries across a group may lower returns on equity as banks maintain higher levels of capital than before subsidiarization. Lower mobility of capital and liquidity might also compromise GSIBs’ capacity to respond to solvency or liquidity shocks.⁴ This may be more significant for banks that have a globally integrated capital and liquidity model (most investment banks) than for consumer banks. Moreover, regulatory impediments to the flow of liquidity, risk management, and funds deployment within the euro area contribute to higher costs and reduced activity, adding to business model and economic challenges. Again, officials will need to consider the balance of costs and benefits of these structural adjustments.

Progress toward Sustainable Profitability Is Uneven

Uneven progress in tackling legacy charges, business model adaptations, and group structure has led to varied profitability, as well as a mixed outlook across GSIBs (Figure 1.8, panel 1). In part, this owes to the vigor and timeliness in addressing legacy and capital challenges from the global financial crisis. Responding early has paid off. US bank profitability, for example, has reached levels in line with or exceeding 8 percent cost of equity, a conservative estimate of investors’ required returns, and approach management-stated targets for their returns. European banks’ 2016 profitability, in contrast, was more mixed, with several banks generating

low returns, in part because of their slower progress in addressing legacy issues. Overall, about half of GSIBs by asset size remain below an 8 percent return on equity.

The outlook for sustained profitability is becoming more favorable as legacy issues are more fully addressed, business model improvements are implemented, and the global recovery strengthens.⁵

Following a period of strong cyclical and structural profitability headwinds over the past five years, profitability drivers are turning up (Figure 1.8, panel 2). After restructuring, weak and challenged banks’ assets are set to increase again. This is expected to arrest their revenue declines and to improve their reported cost-ratio dynamics. Along with an expected cyclical improvement in net interest margins, these developments should help increase return on assets.

However, even with these improvements and better outlook, analysts expect one-third of the GSIB assets (about \$17 trillion) to generate below-sustainable returns in 2019 (Figure 1.8, panel 3). For these banks, profitability has been restrained by structural forces such as high operating costs, low operating efficiency, and highly competitive home markets, exacerbated in several cases by weak information technology systems. Banks that exhibit both thin capital buffers relative to future regulatory requirements and relatively weak profitability to build those buffers over the next few years warrant heightened attention (see Figure 1.8, panel 4). Some banks continue to grapple with legacy issues, while others, particularly European investment banks, still face the fundamental problem of defining and executing profitable business models. An environment of low domestic interest rates also affects the profitability of Japanese GSIBs. These banks seek continued international expansion to offset compressed domestic profitability, and supervisors must bear in mind that such expansion increases currency and maturity mismatch risks (see IMF 2017d). Problems in even a single GSIB could generate systemic stress, so supervisory action clearly needs to remain focused on business model risks and sustainable profitability.

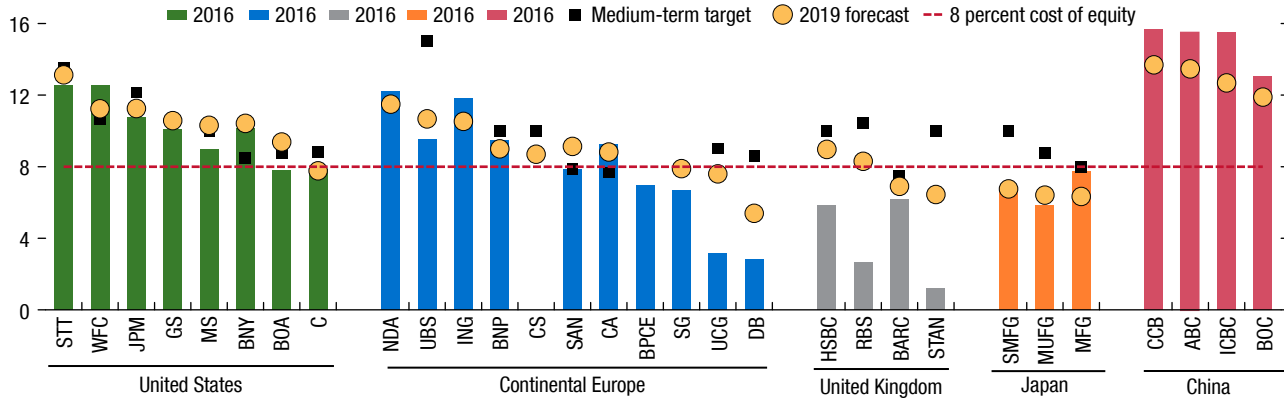
⁵This report defines banks as “weak” if they are expected to generate return on equity below 8 percent in 2019, “challenged” if the expectation is between 8 and 10 percent, and “healthy” if more than 10 percent is expected. Investor surveys, cited in the October 2016 GFSR, suggest that the cost of equity is at least 8 percent. The current cost of equity—inferred from current market prices using a Gordon Growth model—is almost 11 percent for GSIBs as a whole; individual bank estimates for the cost of equity range from 8 to 15 percent. Bank management medium-term profitability targets are consistent with this view: the target for 11 out of 21 GSIBs is a return on equity above 10 percent; for the remaining 10 banks, it is between 8 and 10 percent.

⁴Chapter 2 of the April 2015 *Global Financial Stability Report* (GFSR) discusses these issues further; see also Cetorelli and Goldberg 2012; Reinhardt and Riddiough 2015; and Fiechter and others 2011.

Figure 1.8. Global Systemically Important Banks: Financial Performance Gaps

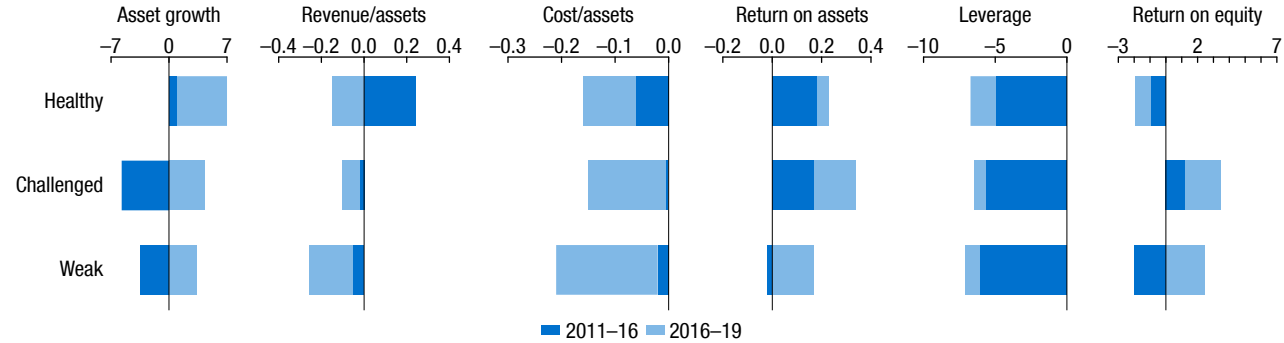
Most US GSIBs should reach profitability targets, but European and Japanese GSIBs face significant gaps.

1. GSIB Return on Equity: 2016 Underlying, 2019 Consensus Forecasts, and Management Medium-Term Target (Percent)



Balance sheet reflation and cost improvement are expected to help profitability ...

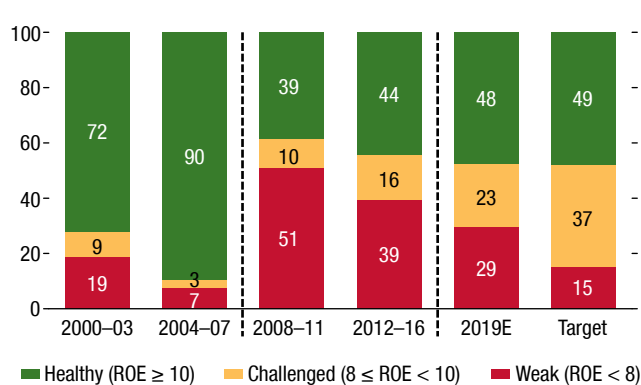
2. GSIBs: Annualized Asset Growth in Percent and Changes in Profitability Drivers and Metrics (Percentage points)



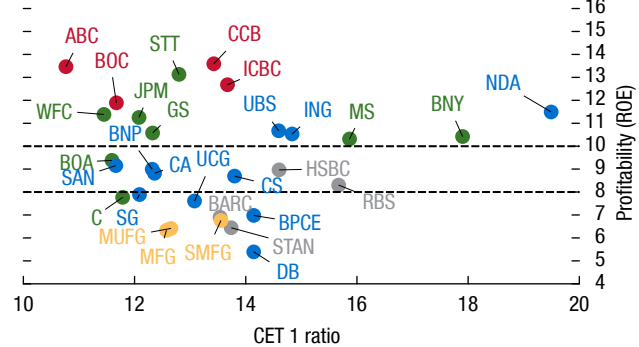
... whereas global banks, representing about one-third of GSIB assets, are still expected to have weak profits.

Some banks have thin capital buffers and weaker profitability prospects.

3. Percent of GSIB Assets by Return-on-Equity Thresholds, 2019 Consensus Forecasts



4. GSIBs: Profitability and Capital Position, 2019 Consensus Forecasts (Percent)



Sources: Bank financial filings; Bloomberg Finance L.P.; SNL Financial; and IMF staff analysis.

Note: Underlying profit is reported net income excluding conduct and litigation charges, restructuring costs, and noncash valuation adjustments. In panel 1, CS has an ROE of -0.3 percent in 2016. Management's ROE targets, where not available directly, are estimated from their stated return on tangible equity targets, assuming a constant ratio of current tangible equity to total equity. In panel 2, asset growth is on an annualized basis. In panels 2 and 3, future asset forecasts are estimated using consensus RWA forecasts and assuming constant RWA density. In panel 3, a balanced sample of the current 30 GSIBs are considered for the entire duration. In all panels, 2016 numbers are used for BPCE due to lack of analyst forecasts. Forward-looking analyst forecasts consensus is gathered from Bloomberg. In panel 4, the colors correspond to those in panel 1. See footnote 1 in the text for an explanation of the abbreviations in panels 1 and 4. CET 1 = common equity Tier 1 capital; GSIB = global systemically important bank; ROE = return on equity; RWA = risk-weighted asset.

Further Policies Are Needed

Regulation and supervision of global systemically important banks have been considerably tightened in recent years, with detailed frameworks governing capital and liquidity and much more vigorous and regular monitoring. There has been less progress in making a resolution framework for international banks operational. Challenges include the need for further strengthening national resolution regimes, the development of cross-border resolution plans with adequate loss-absorbing capacity to make them effective, and close coordination between home and host-country regulators and resolution authorities, providing sufficient comfort for host countries that a centralized resolution strategy would protect their interests. Only with such a framework in place will it be possible to avoid the potential negative consequences that can flow from the imposition of capital and liquidity requirements for GSIBs on a market-by-market basis.

In addition, regulators should have a strong focus on risks from weak business models to ensure that weaker banks are able to achieve sustainable profitability. As discussed in previous GFSR reports, this applies beyond the global banks that are the focus here. In particular, although euro area banks have made further progress in cleaning up their balance sheets, nonperforming loan ratios remain high in some countries, and profitability is still a challenge. Without a more concerted effort to reduce nonperforming assets and improve business models, financial stability concerns could be reignited in the euro area. More generally, continued progress toward completing banking union remains essential to strengthening the financial stability foundations of the euro area banking sector.

Finally, it will be important to finalize Basel III to further strengthen the financial sector and create a more level international playing field. At a minimum, any proposals by national regulators to substantially ease capital, liquidity, or prudential standards should be considered carefully in light of their potential to damage the agenda of global regulatory harmonization.

Insurers

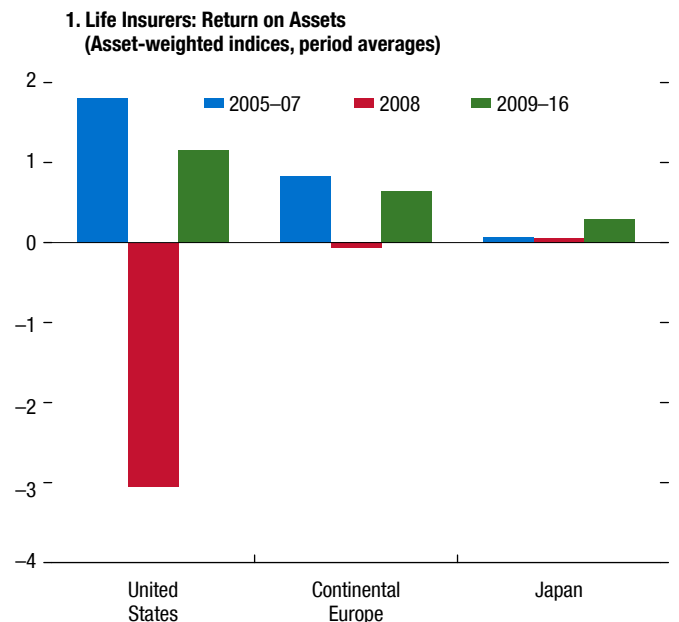
Life Insurers Have Rebuilt Capital Buffers since the Crisis

Life insurers were hit hard by the global financial crisis. Profits tumbled, particularly in the United States (Figure 1.9, panel 1), and capital buffers fell.⁶

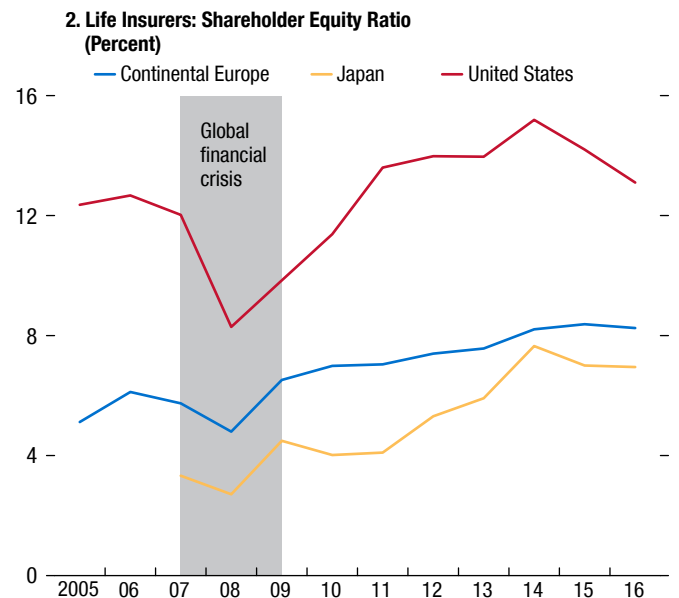
⁶This analysis is based on a sample of more than 80 life insurers from Belgium, France, Germany, Italy, Japan, the Netherlands, Norway, Spain, Sweden, the United Kingdom, and the United States. The sample covers almost two-thirds of total assets of life insurers in Europe, Japan, and the United States.

Figure 1.9. Life Insurance Companies' Profitability and Capital

Amid falling yields and bullish asset markets, life insurers have managed to restore profits ...



... allowing them to retain earnings and lift capital buffers.



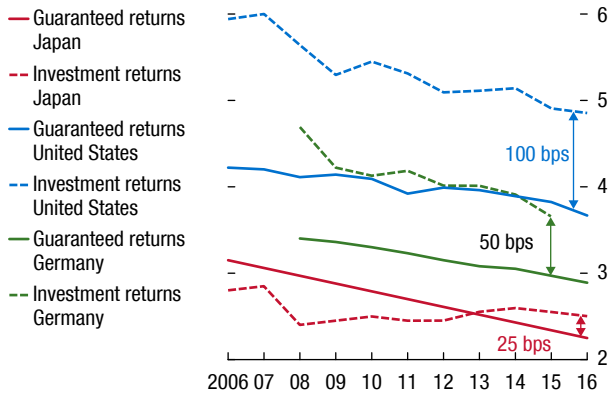
Sources: Bloomberg Finance L.P.; and IMF staff estimates.

Note: In panel 1, return on assets is calculated by dividing net income by total tangible assets minus separate accounts. In panel 2, the shareholder equity ratio is calculated by dividing the sum of common equity plus retained earnings by tangible assets minus separate accounts. In both panels, for Japan, separate accounts were not deducted in the denominator due to lack of data.

Figure 1.10. Changes in Life Insurance Companies' Business Models

Facing investment spread compression, life insurers in Germany, Japan, and the United States have reduced guaranteed returns ...

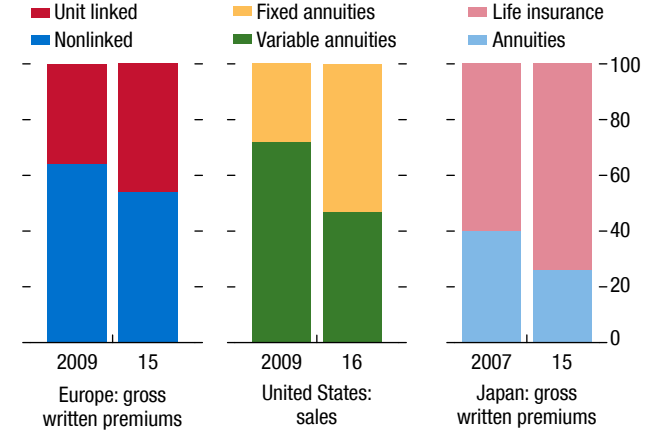
1. Average Investment Returns and Guaranteed Returns (Percent, on existing portfolios)



Sources: Bundesbank; NLI Research Institute; and Office of Financial Research. Note: bps = basis points.

... and have been gradually changing their product mix.

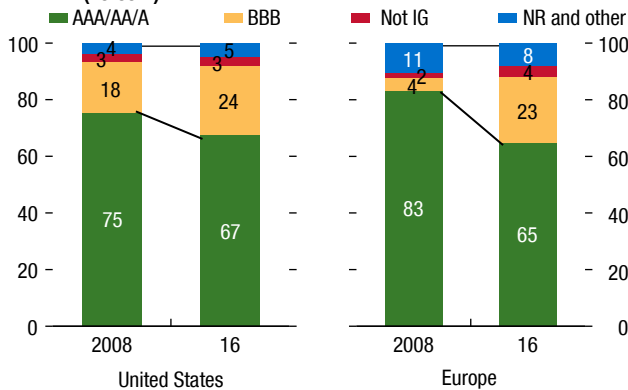
2. Changes in Insurance Product Mix (Percent)



Sources: European Insurance and Occupational Pension Authority; Life Insurance Association of Japan; and Life Insurance and Market Research Association.

Searching for yield, US and European life insurers have invested more in lower-rated bonds ...

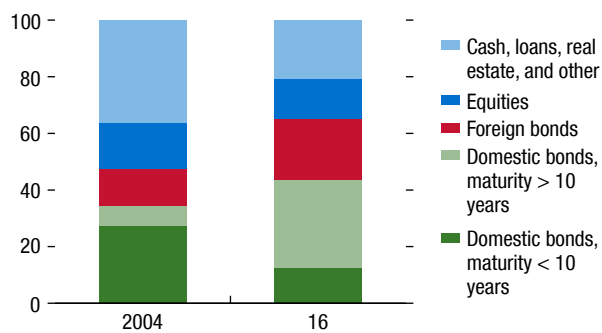
3. European and US Life Insurers: Bond Asset Allocation (Percent)



Sources: SNL Financial; and IMF staff estimates. Note: Not IG = noninvestment grade: bonds with ratings lower than BBB-; NR = not rated. NR and other may include some loans.

... and Japanese life insurers have increased duration and holdings of foreign bonds.

4. Japanese Life Insurers' Investment Portfolio (Percent)



Source: Bank of Japan.

But insurers have been able to build capital since then (Figure 1.9, panel 2). Bullish equity and bond markets have raised the value of the portion of insurers' assets that are marked to market, helping boost earnings, dividend payouts, and capital.

Life Insurers Have Been Adapting Their Business Models to Cope with Historically Low Returns

While building capital levels, life insurance companies have also been adapting their business models in

response to the low-yield environment. Several changes have been made in the face of lower investment spreads. First, insurers have reduced the guaranteed returns on new policies (Figure 1.10, panel 1). Second, they have adjusted their product mix (Figure 1.10, panel 2). European insurers have gradually sold more unit-linked policies. These policies sell units similar to those in a mutual fund and shift market risk to policyholders. US insurers have moved from variable to fixed annuities, which are easier to hedge. Japanese insurers have favored the sale of

insurance products over saving products. However, these changes have been slow to affect balance sheets given the large amount of legacy policies that remain.

In addition, insurers have been adjusting their asset mix to higher-yielding and less liquid assets, moving out of their natural investment habitat in search of yield.

- Insurers have taken on more *credit risk*. Despite risk-sensitive capital requirements, at least one-third of US and European insurers' bond portfolios now have a BBB rating or lower (Figure 1.10, panel 3).⁷ Additional risk taking has also been taking place in the United States—for example, using unregulated subsidiaries, which do not face the same capital requirements as insurers.
- Insurers have taken on more *market risk*. Japanese and US insurers have extended the maturity of domestic bond holdings to better match the duration of their liabilities and enhance yields. Over the past five years, portfolio durations in the United States have increased from about five to eight years overall. Japanese life insurers have also invested in higher-yielding foreign bonds, partly exposing them to currency risk (Figure 1.10, panel 4).
- Insurers have taken on more *liquidity risk*. Examples include commercial property, infrastructure financing, private placements, structured securities, and mortgage loans. In the United Kingdom, about 25 percent of annuities are currently backed by illiquid investments, and insurers have plans to increase that proportion to 40 percent by 2020.⁸

Market Concerns about Insurers Persist

Despite these changes, insurers continue to face profitability pressure (Figure 1.11, panel 1), and investors remain concerned about life insurers' business models, as reflected in market valuations. Half of the US and European insurers in the sample, by assets, now have a price-to-book ratio both below precrisis levels and below one (Figure 1.11, panel 2), reflecting concerns over future profitability in a low-rate environment, as well as difficulties in assessing risks.

- *Profitability*: Despite efforts to change business models, insurers in a significant group of countries continue to face both high guaranteed returns and

high duration mismatches (Figure 1.11, panel 3).⁹

If low interest rates persist, investment returns could continue to decrease for the next decade, a situation that would leave life insurers in the Netherlands, Germany, Sweden, and Norway facing negative spreads within a few years. Even if interest rates were to increase by 100 basis points, many insurers would still face this risk (Figure 1.11, panel 4).

- *Risk assessment*: Investors continue to have difficulties adequately assessing risk in the sector because regulatory regimes are evolving and disclosure is inadequate. For example, discount rates used to value future liabilities differ between insurers and are often higher than market risk-free rates, resulting in an underestimation of liabilities. Regulatory gaps (discussed later in this chapter) make it hard to compare risks in insurers across countries. Options embedded in some insurance contracts are also hard to value, making it difficult to assess balance sheet risks.

Life Insurers Are More Vulnerable to Market and Credit Risks

Business model adjustments on the asset side have made insurers more vulnerable to a decompression of risk premiums and falls in asset prices. A sharp decline in equity and real estate markets, combined with an increase in credit spreads and a flight to high-quality sovereign bonds, would amount to a double hit on insurers' balance sheets in this scenario. Asset values would fall, while liabilities would increase as risk-free rates used to discount future liabilities decline. Figure 1.12 shows a simulation of such a scenario, in which assets and liabilities are fully marked to market. However, current accounting and regulatory rules exempt insurers from marking all their liabilities to market and allow them to dampen market shocks through adjustments to liabilities. In the simulation, life insurers in Italy, Spain, and the United States would be affected by their lower-rated sovereign and corporate bond holdings. Insurers in Germany, the Netherlands, Norway, and Sweden would be affected by the relatively long duration of their liabilities.

If such a shock were to occur, it could mean that life insurers would be unable to fulfill their role as financial intermediaries, precisely when other parts of the finan-

⁷Part of this change can be attributed to downgrades of bonds that were already in the bond portfolios of insurers.

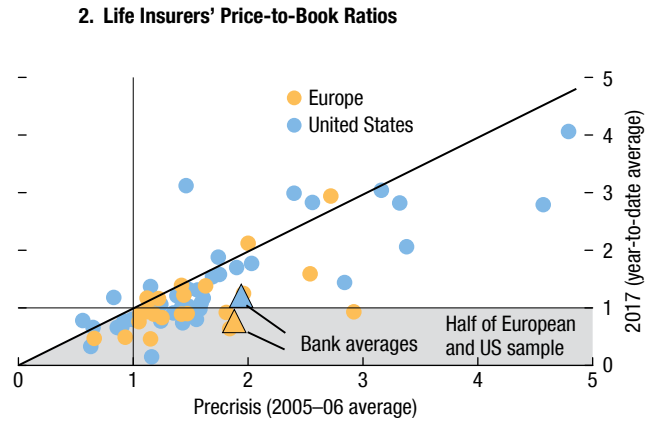
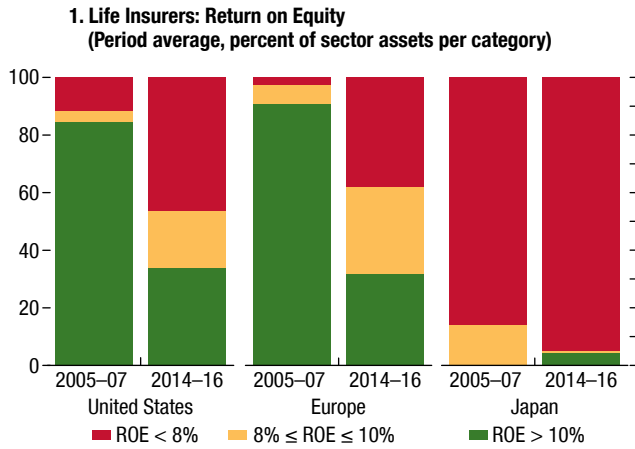
⁸See Bank of England 2017.

⁹See Chapter 2 of the April 2017 GFSR.

Figure 1.11. Life Insurers' Market Valuations and Risk Outlook

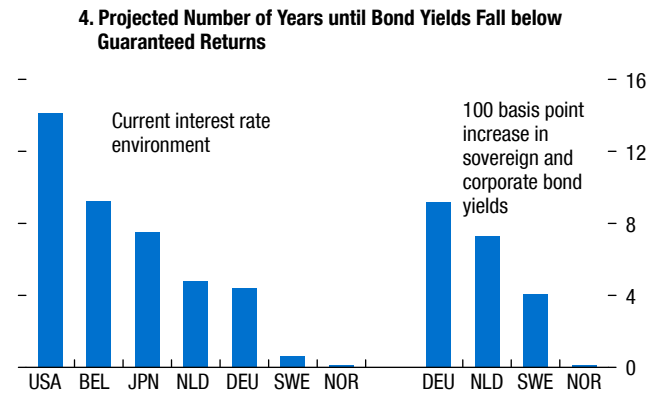
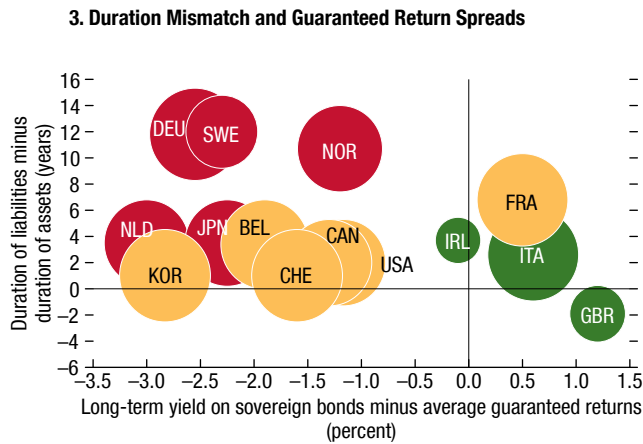
Legacy liabilities are a drag on their profitability ...

... such that half of European and US insurers are valued below their book values and below precrisis levels.



Guarantees and duration mismatches remain high for a large part of the sector.

Some insurers may soon face negative investment spreads.



Sources: Annual reports; Autorité de Contrôle Prudential et de Résolution; Bloomberg Finance L.P.; Bundesbank; De Nederlandsche Bank; European Insurance and Occupational Pensions Authority; Moody's Investors Service; National Association of Insurance Commissioners; Nationale Bank van België; NLI Research Institute; Office of Financial Research; Organisation for Economic Co-operation and Development; SNL Financial; and IMF staff estimates.

Note: In panel 1, the implied cost of capital was about 10 percent before and after the global financial crisis. In panel 3, the size of the bubble relates to the share of liabilities with guaranteed returns to total life insurance liabilities. Green = countries with insurance sectors that have low guaranteed returns and low or negative duration mismatch. Yellow = countries with insurance sectors that have either high guaranteed returns or a high duration mismatch. Red = countries with insurance sectors that have both high guaranteed returns and high duration mismatch. In both cases in panel 4, guaranteed returns continue to decline. In the case of a 100 basis point increase in bond yields, Belgian, Japanese, and US investment yields are not expected to fall below guaranteed returns. Data labels in the figure use International Organization for Standardization (ISO) country codes. ROE = return on equity.

cial system are also failing to do so.¹⁰ This highlights the importance of guarding against complacency and the need for additional policy focus on nonbank financial institutions and financing markets and the extension of macroprudential tools.

Policies Are Needed to Ensure Greater Insurer Resilience

Life insurers face growing vulnerabilities in the continued low-interest-rate environment. Policymakers should ensure that as insurers adapt to this environment they do not take excessive risks. Risk assessment in the insurance sector suffers from opaque and heterogeneous financial disclosure and deficiencies in the accounting and regulatory regimes. Policymakers must continue to strengthen regulatory frameworks and increase reporting transparency.

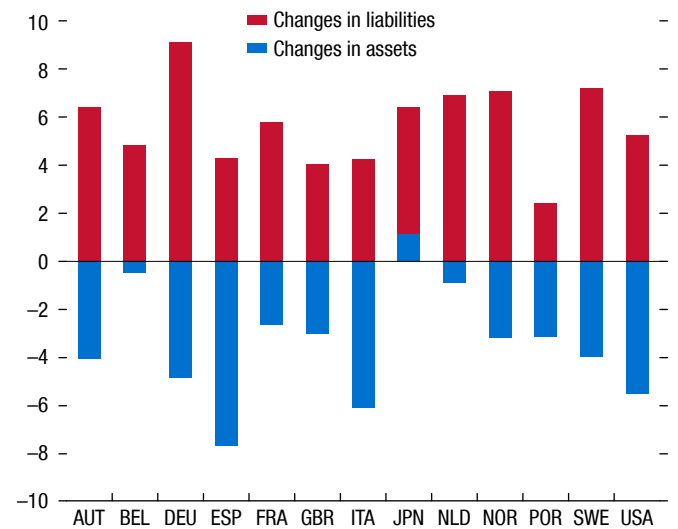
Greater public disclosure of timely information on key metrics to assess interest rate risk (namely, guaranteed returns and duration mismatches) would motivate insurers to further adapt their business models and build additional capital buffers. Liabilities are often not valued using current market prices (Japan, United States) or are understated by country- and firm-specific adjustments (Europe), hampering comparability. In the United States, there is no consolidated capital requirement, and sector-wide stress tests are not regularly undertaken, which leaves the potential for firms to mask risks. In Europe, the lack of loss-absorbing capacity in some instruments eligible as regulatory capital harms the credibility of reported solvency positions. Regulators are encouraged to close these regulatory gaps. In particular, the International Association of Insurance Supervisors should accelerate its efforts to establish a global insurance capital standard that adequately addresses these underlying vulnerabilities.

Monetary Policy Normalization: A Two-Sided Risk

Central bank balance sheets have grown considerably due to large-scale asset purchase programs. This has forced substantial portfolio adjustments in the private sector and across borders, reducing government bond yields, term premiums, and credit spreads while boosting equity valuations. As the global recovery progresses, a key stability challenge is to gradually rebalance central bank and private sector portfolios against the backdrop of monetary policy cycles that are not synchronized across countries.

¹⁰See also Chapter 3 of the April 2016 GFSR.

Figure 1.12. Simulated Mark-to-Market Shocks to Assets and Liabilities (Percent)



Sources: Bank of Japan; European Insurance and Occupational Pensions Authority; Life Insurance Association of Japan; Moody's Investors Service; National Association of Insurance Commissioners; and IMF staff estimates.

Note: Cash flows are fixed. Derivative positions and loss absorption by policyholders and by taxes and regulatory adjustments are not taken into account. This implies that results should be considered an upper-bound impact. Shocks are applied to aggregate sector balance sheets of solo life insurers as of 2016:Q3 (Europe), 2016:Q1 (Japan), and 2015:Q4 (United States). The following shocks are applied: equity (-10 percent); real estate (-6 percent); sovereign debt yield AAA-A (-50 bps), BBB (+100 bps), < BBB (+100 bps); corporate bond yields AAA-A (+50 bps), BBB (+150 bps), < BBB (+200 bps); risk-free rates (-50 bps). Data labels in the figure use International Organization for Standardization (ISO) country codes. bps = basis points.

Too quick an adjustment could cause unwanted turbulence in financial markets and international spillovers. However, the expected process of normalization is likely to be gradual, with continued easy monetary conditions and low volatility that could foster a further buildup of financial excesses and medium-term vulnerabilities.

Managing the gradual normalization of monetary policies presents a delicate balancing act. The pace of normalization cannot be too fast or it will remove needed support for sustained recovery and desired increases in core inflation across major economies. The substantial rebalancing of private portfolios that has occurred also makes the adjustment of financial market prices much less predictable than in previous cycles. On the other hand, the likely prolonged period of low interest rates could further deepen financial stability risks as investors take on more risk in their search for yield.

Uncertainty around Central Bank Balance Sheet Adjustments

Large-scale asset purchase programs by the major central banks have led to a considerable shift in portfolios by domestic and foreign investors (Figure 1.13, panels 1 and 2). Central banks in Japan, the United Kingdom, the United States, and the euro area have increased their holdings of outstanding government securities to 37 percent of GDP, up from 10 percent before the global financial crisis. These purchases have produced marked shifts in asset allocations across major advanced economies during their respective periods of quantitative easing (QE).

- The Bank of Japan's QE program, the most aggressive of those of major advanced economy central banks, led domestic banks and pension funds to reduce their Japanese government bond holdings. The European Central Bank's QE program also had a large impact in altering the composition of portfolios: foreigners significantly reduced their holdings of government debt, followed by domestic banks and pension funds. In the United States, the Federal Reserve's QE programs led to a more muted shift: foreigners reduced their holdings of Treasuries as the accumulation of foreign exchange reserves slowed, as did insurance companies and pension funds, but other investors increased their holdings, including banks (to satisfy liquidity requirements), households, and mutual funds. The extent of the QE programs across central banks largely reflected the severity of the deflationary pressures experienced since the crisis began.
- Some 100 percent or more of the supply of government bonds has been absorbed by central bank purchases in the euro area and Japan. Official demand for Japanese government bonds exceeded net issuance in early 2013, while official purchases of euro area government debt eclipsed net issuance in 2016 as the growth in government deficits slowed (Figure 1.13, panel 3). But even though the Federal Reserve's QE programs were large in absolute terms, they were more modest relative to net issuance, which explains their more muted impact on investor portfolio rebalancing.¹¹

¹¹Federal Reserve asset purchases accounted for a lower share of net issuance of US Treasuries, but a much greater share of quasi-agency mortgage-backed securities (net issuance in excess of 100 percent).

- By reducing the stock of fixed income instruments available to the private sector, central banks crowded out traditional investors, such as banks, insurance companies, and asset managers, to differing degrees (Figure 1.13, panel 4). This prompted some private investors to reach for duration, credit, and liquidity risk to increase returns—an intended and beneficial consequence of asset purchase programs.

Going forward, portfolio rebalancing will have an impact on term premiums and broader risk premiums through two main channels. First, by releasing particular assets, central bank balance sheet normalization will increase their net supply to the public and may increase their term and risk premiums (the portfolio balance channel) (Figure 1.13, panel 4). Second, normalization will be associated and consistent with higher future short rates (the signaling channel).

There is significant uncertainty as to the magnitude of the adjustment in term premiums, given the unique set of conditions—large central bank balance sheets, a prolonged period of accommodation, diverging monetary policy cycles, and uncertain effects of postcrisis reforms and portfolio substitution. The magnitude holds great import: sovereign bond yields are the benchmark rate for a wide range of other assets, and term premiums are an input for broader risk premiums.

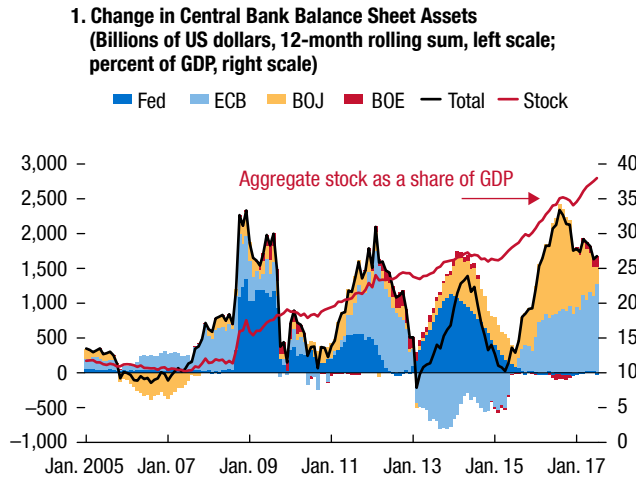
Historically, policy rates and term premiums have not always moved in unison; indeed, they diverge quite often (Figure 1.14, panel 1). Once the central bank starts increasing policy rates, it also provides forward guidance, reducing uncertainty (over interest rates and inflation). Consequently, bond risk and term premiums decline. Indeed, term premiums actually declined during the two most recent US tightening cycles; even previous monetary tightening cycles draw at best a mixed picture.¹²

But historical precedent may not be a helpful guide, given the large size of central bank balance sheets and compressed term premiums (Figure 1.14, panel 2). In the case of the United States, the Federal Reserve estimates that market expectations of a gradual unwinding and fall in the maturity of its securities holdings would increase the term premium by about 15 basis points by the end of 2017, at which point QE would still be holding down term premiums by a total of about

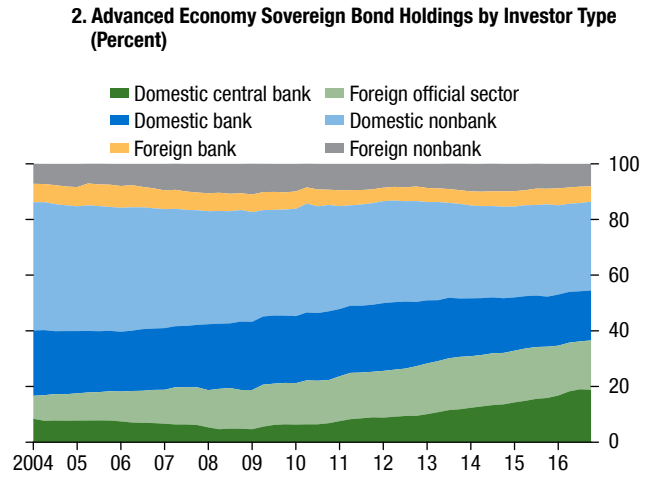
¹²Adrian, Crump, and Moench 2013.

Figure 1.13. Central Bank Balance Sheets and the Sovereign Sector

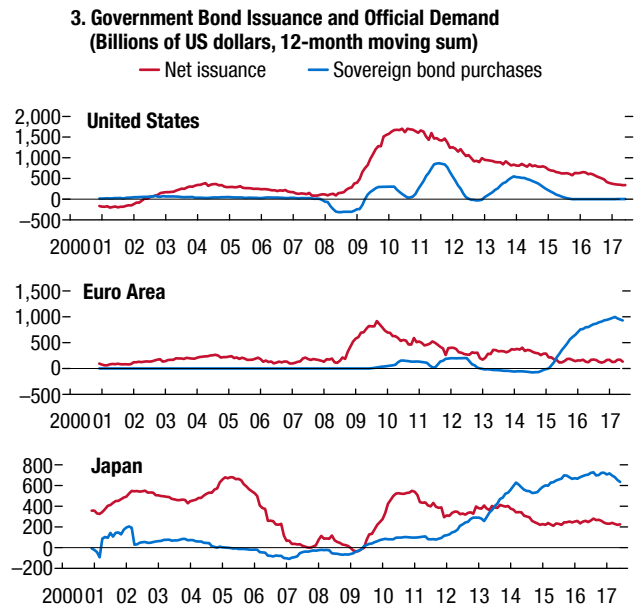
Central bank balance sheets have expanded because of large-scale asset purchases ...



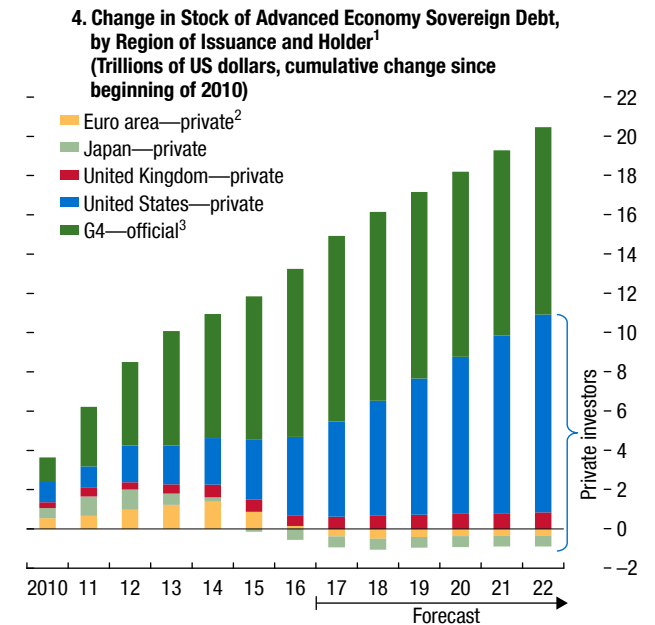
... leading domestic and foreign central banks to capture a sizable share of sovereign debt.



Large official purchases have outstripped net issuance in the euro area and Japan ...



... but going forward, the private sector will need to absorb additional supply.



Sources: Bank of England; Bank of Japan; European Central Bank; Federal Reserve; government sources; Morgan Stanley; World Bank; Arslanalp and Tsuda 2012, updated; and IMF staff estimates.

Note: Panels 2–4 exclude agency debt securities. In panel 4, debt stocks are converted to US dollars using end of quarter exchange rates; ECB net purchases are assumed to decline to a reduced pace and the asset purchase program extended to June 2018; Fed net purchases are assumed to follow the path outlined by the Fed starting in 2017:Q4; BOJ net purchases are assumed to equal forecast net supply; BOE net purchases are assumed to equal zero from 2017:Q1 onward. BOE = Bank of England; BOJ = Bank of Japan; ECB = European Central Bank; Fed = US Federal Reserve; G4 = euro area, Japan, United Kingdom, United States; QE = quantitative easing.

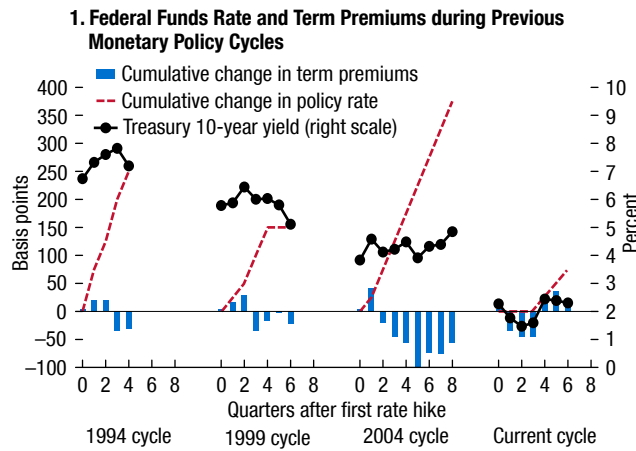
¹Forecasts use forecasted central government net lending/borrowing.

²The following member countries of the euro area are included: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Netherlands, Portugal, and Spain.

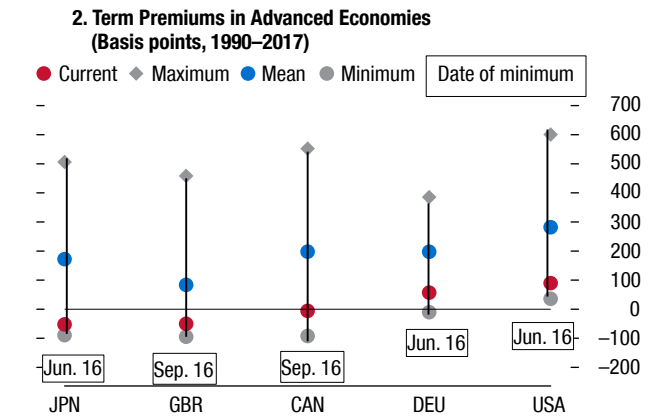
³Until end-2016, debt absorbed by central banks and foreign and supranational institutions; from 2017 onward, aggregated central bank purchases.

Figure 1.14. Policy Rates, 10-Year Government Bond Yields, and Term Premiums

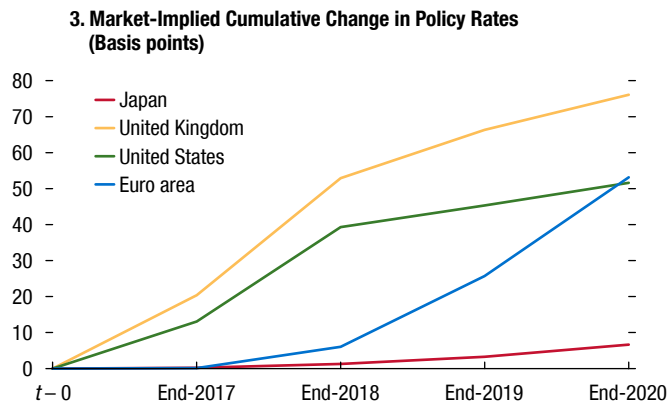
Policy rates and term premiums have diverged during recent monetary policy tightening cycles ...



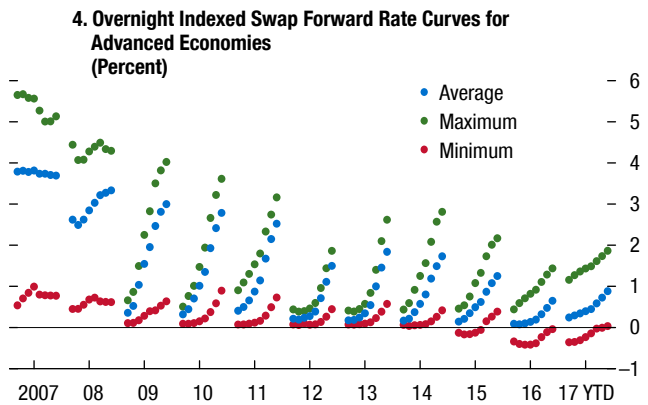
... but term premiums are near historical lows in several major economies.



Monetary policy cycles are diverging ...



... and markets expect a slow pace of tightening.



Sources: Bloomberg Finance L.P.; and IMF staff estimates based on Wright 2011.

Notes: Panel 4 shows annual average three-month overnight indexed swap (OIS) rates on forward contracts for tenors from six months to five years. The OIS forward curves are constructed from the US dollar, euro, Japanese yen, and British pound, and the average, maximum, and minimum are computed for each tenor across the four jurisdictions. Data labels in the figure use International Organization for Standardization (ISO) country codes. YTD = year to date.

85 basis points, with the portfolio balance channels accounting for two-thirds of the impact.¹³ An inflation surprise on the upside could also lead to a sharp jump in term premiums.

Potential International Spillovers Pose Additional Challenges and Risks

Because of the different starting points and time paths for both economic recovery and the state of financial repair, the international aspects of balance

¹³Bonis, Ihrig, and Wei 2017.

sheet normalization and spillovers are significant for two reasons:

- The domestic effects of balance sheet normalization may be transmitted to other economies because global financial markets are highly integrated. Balance sheet normalization in major advanced economies could tighten financial conditions in other countries, raising long-term rates and inducing capital outflows from those countries. This is because term premiums exhibit a high degree of comovement, particularly if they originate from shocks from the largest global bond markets,

such as the United States, Germany, and Japan (see the October 2016 GFSR). These heightened cross-border dynamics could potentially trigger a large simultaneous increase in global rates. This poses challenges because of diverging monetary policies (Figure 1.14, panel 3) and paths for normalization (Figure 1.14, panel 4).

- Differences in balance sheet repair across countries could create additional sources of financial stress as monetary policy normalizes. For example, euro area sovereign term spreads could increase further as the prospect of reduced monetary accommodation moves closer. Although this could partly reflect rising inflation expectations, it could also signal increased credit risks in countries with high debt burdens given the prospect of further reductions in European Central Bank (ECB) net asset purchases.

How Will Emerging Market Economies Fare amid Reduced Central Bank Support?

Large-scale monetary accommodation has underpinned a significant portion of portfolio flows to emerging market economies. Model estimates indicate that about \$260 billion in portfolio inflows since 2010 can be attributed to the *push* of unconventional policies by the Federal Reserve (Figure 1.15, panel 1).¹⁴

These estimates suggest that the expected steady pace of Federal Reserve policy normalization over the next two years (as described in the baseline of the October 2017 WEO) could reduce portfolio flows by about \$35 billion a year (Figure 1.15, panel 2). Countries that benefited the most during the boom period could see the largest moderation in inflows. If so, Chile, Mexico, and South Africa would be expected to experience the greatest decline in inflows

¹⁴Estimates for portfolio flows are obtained using a model adapted from Koepke 2014. The model estimates the impact of external “push” and domestic “pull” variables on portfolio flows to emerging markets, consistent with the capital flows literature. The dependent variable is monthly data from the Institute of International Finance on nonresident portfolio flows to emerging market economies (that is, foreign purchases of emerging market stocks and bonds). Independent variables include push factors, pull factors, and a constant term. Push variables include a proxy for global risk aversion (the US corporate BBB spread over Treasuries), three-year-ahead expectations for the federal funds effective rate, and the change in assets on the Federal Reserve’s balance sheet. Pull variables include an emerging market economic surprise index compiled by Citigroup and the Morgan Stanley Capital International Emerging Markets Index. The (positive) constant term captures the sizable passive component of portfolio flows, which is due to portfolio growth and passive reallocation (and thus unrelated to push or pull factors).

relative to the size of their economies, estimated at a cumulative 1.0 to 1.5 percent of annual GDP over the next two years (Figure 1.15, panel 3). It is worth noting, however, that emerging market economies with previously large inflows are generally those with deeper and more liquid markets that are able to withstand outflows better. Countries that have benefited the most from inflows owe some of this benefit to strong domestic factors, such as improving growth and external positions and declining corporate vulnerability. To the extent that such favorable conditions are maintained, the impact of a less favorable external environment would be mitigated, including via other types of foreign capital inflows, such as foreign domestic investment.

Emerging market economies should be able to handle this reduction in inflows in a relatively smooth manner, given their enhanced resilience and stronger growth outlook. However, a rapid increase in investor risk aversion would have a more severe impact on portfolio inflows and prove more challenging, particularly for countries with greater dependence on external financing. For example, Malaysia, Poland, South Africa, and Turkey are projected to have sizable external financing needs through 2020 (Figure 1.15, panel 4). However, pressures from external shocks can be mitigated by large external asset holdings of domestic investors and banks.

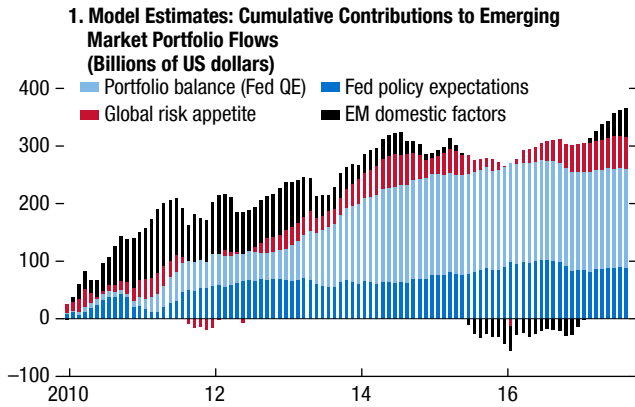
Monetary Policy Changes Should Be Well Communicated to Prevent Excessive Market Volatility

The baseline path for the global economy foresees continued support from accommodative monetary policies, as inflation rates are expected to recover only slowly. Too quick an adjustment could cause unwanted turbulence in financial markets while removing needed support for the recovery. To ensure a smooth normalization of monetary policy, monetary authorities should provide and follow well-communicated plans on unwinding their holdings of securities and, if needed, provide guidance on prospective changes to the framework. At the same time, authorities need to be mindful of potential global spillovers as normalization proceeds. These efforts will help anchor market expectations and avoid undue market dislocations or excessive volatility.

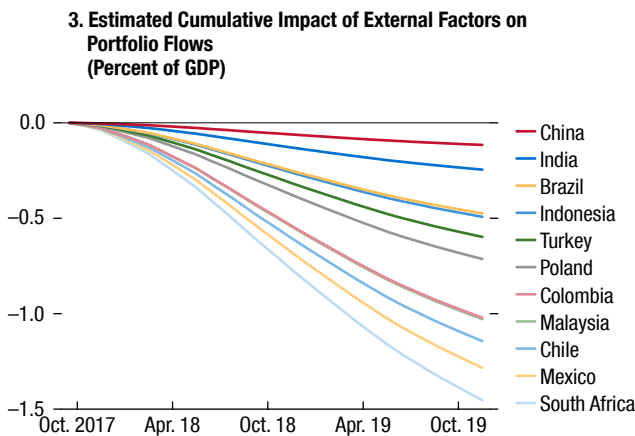
Central banks with still-expanding balance sheets will need to take appropriate measures to alleviate col-

Figure 1.15. Emerging Market Economy Capital Flows

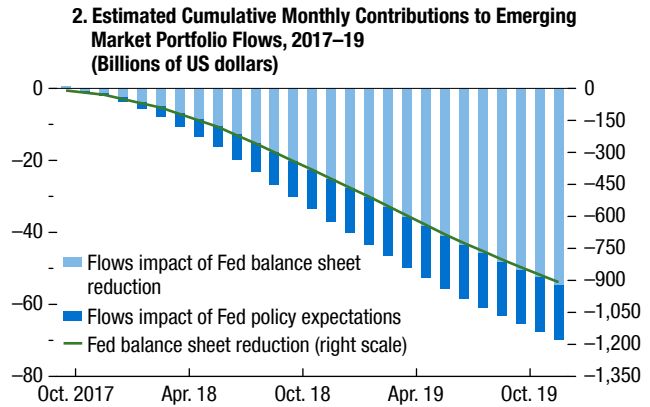
A large portion of portfolio flows has been driven by US monetary policy accommodation.



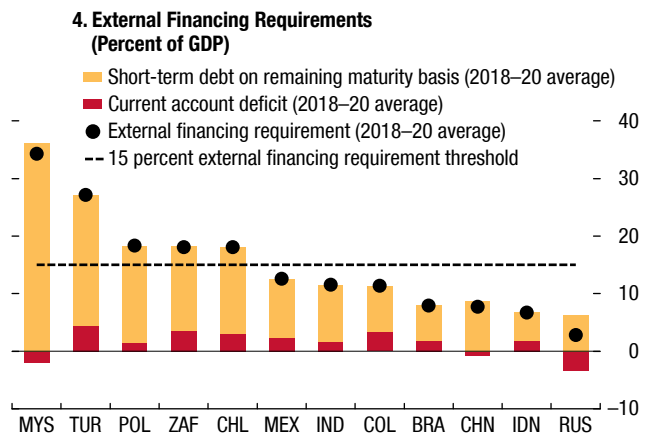
... with some countries likely to experience reduced inflows of 1–1.5 percent of annual GDP over the next two years.



Estimates point to a substantial reduction in portfolio flows due to US monetary policy normalization ...



This could prove challenging for those with large external financing needs.



Sources: Federal Reserve; and IMF staff estimates.

Note: Data labels in the figure use International Organization for Standardization (ISO) country codes. EM = emerging market; Fed = Federal Reserve; QE = quantitative easing.

lateral scarcity pressures in order to support liquidity resilience and efficient market functioning.

- For the European Central Bank, subdued inflation points to the need for monetary policy to remain accommodative for an extended period.¹⁵ To this end, the ECB has committed to keeping policy rates at their current levels until well past the horizon of net asset purchases. It will be important to adhere to this commitment, thus ensuring the credibility of forward guidance and maintaining accommodation even if supply constraints neces-

¹⁵See IMF 2017c.

sitate scaling back net asset purchases next year. Moreover, reinvesting the proceeds from maturing assets would keep the central bank balance sheet from shrinking.

- For the Bank of Japan, stubbornly low inflation underscores the importance of maintaining sustained accommodation through its “quantitative and qualitative easing with yield curve control” framework.¹⁶ The Bank of Japan should carefully calibrate its yield curve policy in the event of downside risks, including by considering lowering

¹⁶See IMF 2017d and IMF 2017e.

the yield curve—in coordination with appropriate fiscal support and with consideration to the profitability of financial institutions and the functioning of the Japanese government bond market—should deflation pressure persist. Moreover, it is important for the Bank of Japan to continue to monitor the market liquidity and functioning of the Japanese government bond market and to consider appropriate measures to alleviate shortages in the event of liquidity stress.

Has the Search for Yield Gone Too Far?

The low-interest-rate environment has stimulated a search for yield in markets, pushing investors beyond their traditional risk mandates. This has compressed spreads, reduced the compensation for credit and market risk in bond markets, contributed to low volatility, and facilitated the use of financial leverage. While these supportive financial conditions have helped boost growth, as intended, they have also raised the sensitivity of the financial system to market risks. Prolonged normalization of monetary policy could extend these trends. Unless well managed, these rising medium-term vulnerabilities could lead to significant market disruptions if risk premiums and volatility decompress rapidly.

Too Much Money Chasing Too Few Yielding Assets Has Created a Search for Yield

After nearly 10 years of extraordinary monetary accommodation, as well as changing structural factors such as demographics and slower growth, the universe of global fixed income looks very different than before the global financial crisis. While the size of the fixed income market has exploded—one of the major investment-grade benchmark indices has increased from about \$19.5 trillion in 2007 to \$45.7 trillion in 2017—the portion of bonds with yields that meet investor targets has shrunk dramatically. In 2007, about 80 percent of the fixed income index (\$15.8 trillion) yielded over 4 percent—the approximate required return for many absolute return investors such as pension funds and insurance companies (Figure 1.16, panel 1).¹⁷ But

¹⁷For example, the required return on investment for insurance companies = the guaranteed returns promised to policyholders + the cost of their equity * leverage. These numbers differ between markets. For the United States, this is 3.6 percent + 10 percent * 0.10 = 4.6 percent. For Europe, this is 2.3 percent + 10 percent * 0.07 = 3.0 percent. This assumes no additional sources of profit, such as underwriting margins, so the required return should be seen

this proportion has now shrunk to less than 5 percent (\$1.8 trillion) (Figure 1.16, panel 2).¹⁸

In the United States, this dearth of higher-yielding securities combined with the portfolio rebalancing effects of QE has resulted in a search for yield. There has been a marked shift of foreign investors out of their traditional positions in US Treasury bonds and agency securities and into higher-yielding US corporate bonds (Figure 1.16, panels 3 and 4). Non-US investors now rank among the largest holders of US corporate bonds, at nearly 30 percent of outstanding debt, up from 12 percent in 1990 and one quarter before the start of quantitative easing policies. Marginal demand has been especially pronounced among Asian investors, with flows from insurance and pension funds from Japan and Taiwan Province of China accounting for almost two-thirds of all foreign institutional flows into US investment-grade credit over the past three years.

The Search for Yield Has Also Led to Greater Capital Flows and More Borrowing by Low-Income Countries

In emerging market economies, the search for yield—combined with stronger growth and lower corporate vulnerabilities—has supported a notable rebound in portfolio inflows. Nonresident inflows of portfolio capital reached an estimated \$205 billion in the year through August and are on track to reach \$300 billion for 2017, more than twice the total observed during 2015–16 and on par with the strong pace of inflows from 2010–14 (Figure 1.17, panel 1). The primary beneficiaries of portfolio inflows have been large emerging market economies, including Colombia, Mexico, South Africa, and Turkey. Some have used this period to enhance policy buffers in the form of higher international reserves (Figure 1.17, panel 2). This has helped compress yields and spreads for sovereigns and firms, lifting asset valuations and external bond issuance (Figure 1.17, panels 3 and 4).

Low-income countries have also benefited from the search for yield by expanding their access to international bond markets. Bond issuance has risen sharply since the start of 2017, with the total volume \$7.4 billion close to the record level in 2014 (Figure 1.18, panel 1). Despite strong global demand for yield,

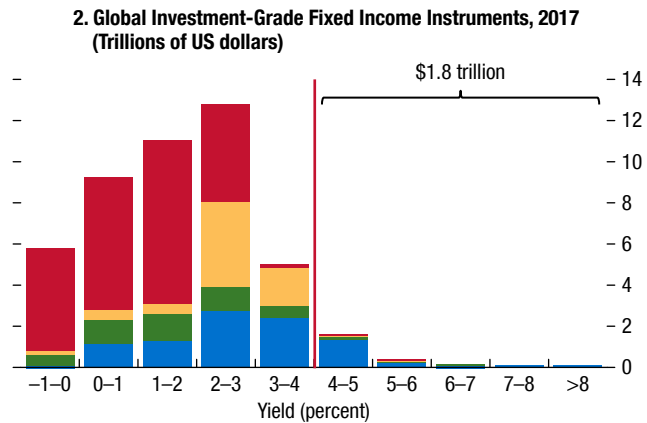
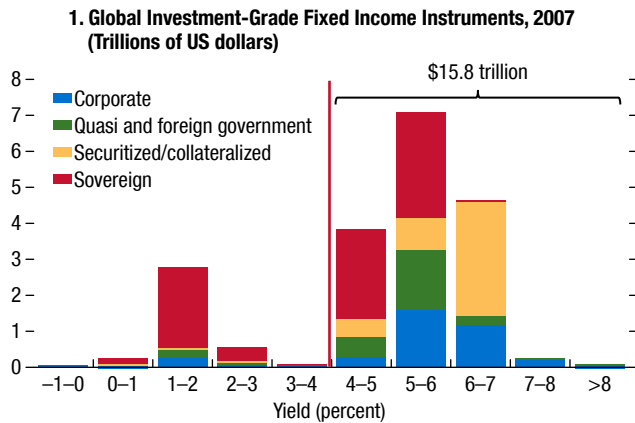
as an upper bound. Nevertheless, absolute return investors require historically high real rates. For pension funds, the required return is the discount rate applied to liabilities.

¹⁸Bank of America Global Broad Market Index.

Figure 1.16. Global Fixed Income Markets and US Corporate Credit Investor Base

In 2007, a variety of asset classes generated returns in excess of 4 percent.

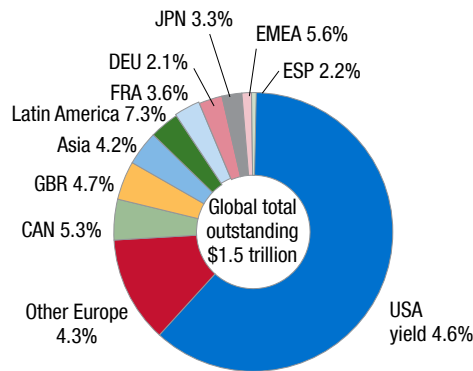
In 2017, corporate debt is the only significant asset class that provides a comparable return.



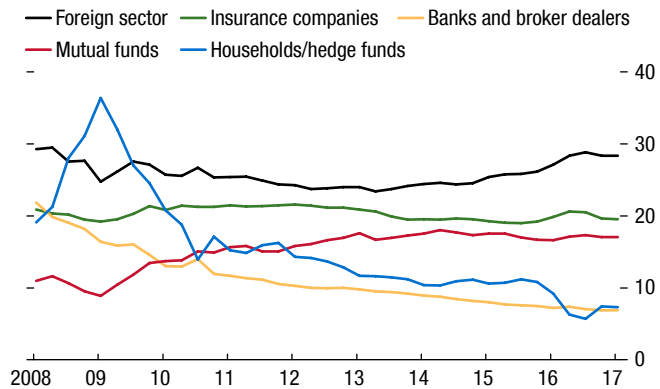
US corporate bonds make up the majority of the US dollar corporate bond universe ...

... drawing foreign investors beyond their traditional risk habitats.

3. Yields of US Dollar Corporate Bonds Outstanding



4. Holdings of US Corporate Bonds and Loans, by Investor Type (Percent)



Sources: Bank of America Merrill Lynch; Bloomberg Finance L.P.; Federal Reserve; Haver Analytics; and IMF staff estimates. Note: Panels 1 and 2 are based on the Bank of America Global Bond Market Index. Data labels in the figure use International Organization for Standardization (ISO) country codes. EMEA = Europe, Middle East, and Africa.

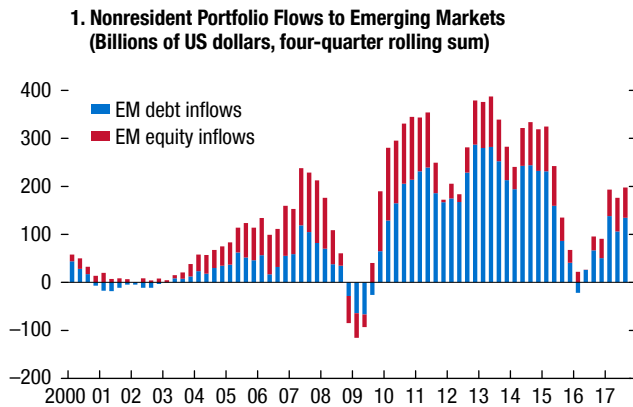
low-income countries face less favorable borrowing conditions, reflecting less liquid markets, weaker credit profiles, and the lack of an issuance track record (Figure 1.18, panel 2). Borrowing has generally been used to fund infrastructure projects, refinance debt, repay arrears, and increase budgetary flexibility.¹⁹ However, this borrowing has been accompanied by an underlying deterioration in debt burdens (Figure 1.18, panel 3).

In low-income countries, greater reliance on foreign borrowing leaves them vulnerable to a decompression of global risk premiums. This vulnerability reflects several factors, including higher total debt stocks and greater debt servicing needs and high exposure to flight-prone foreign asset managers and hedge funds. Low-income countries would be most at risk if adverse external conditions coincided with spikes in their external refinancing needs. Although near-term debt rollover needs are small, many low-income-country

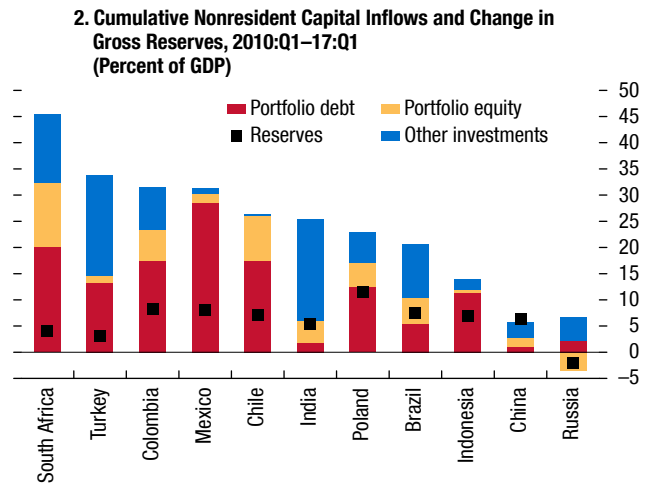
¹⁹See IMF 2017a.

Figure 1.17. Emerging Market Economies: Debt Issuance, Portfolio Flows, and Asset Prices

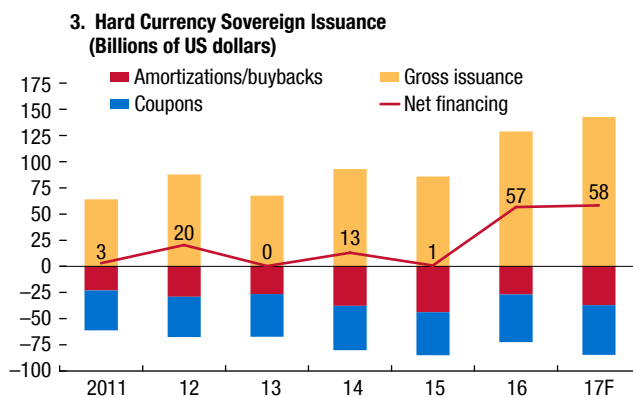
Portfolio flows to emerging markets have rebounded in recent quarters.



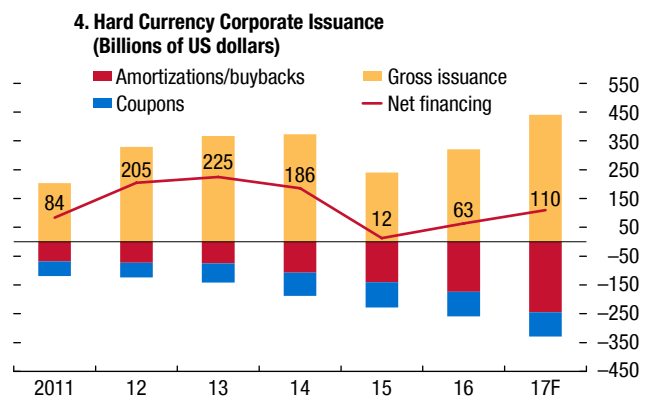
Some emerging markets have used foreign inflows to build reserve buffers.



Emerging market sovereign gross and net issuance is at record levels.



Corporate gross issuance is back to 2013–14 levels, but net issuance remains subdued.



Sources: Haver Analytics; Institute of International Finance; JPMorgan Chase & Co.; and IMF staff estimates. Note: Panel 2 uses four-quarter sum of GDP to 2017:Q1. Panels 3 and 4 are JP Morgan estimates. Panel 4 omits direct investment and financial derivative liabilities. EM = emerging market; F = forecast.

issuers face a significant repayment hump after 2021 (Figure 1.18, panel 4). Indeed, annual principal and interest repayments (as a percent of GDP or international reserves) have risen above levels observed in regular emerging market economy borrowers.

Credit and Market Risks Are Increasingly Being Mispiced

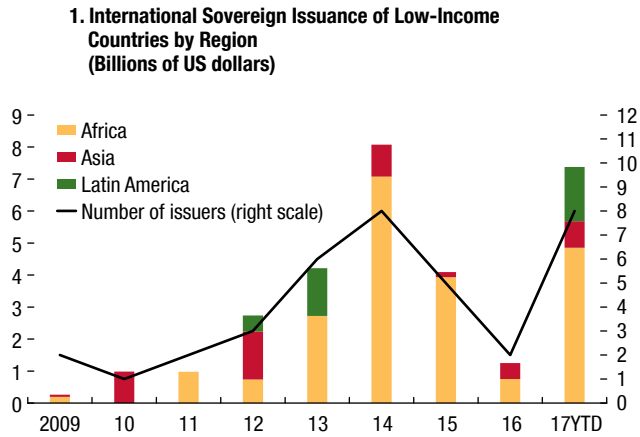
Low yields, compressed spreads, abundant financing, and the relatively high cost of equity capital

have encouraged a buildup of financial balance sheet leverage as corporations have bought back their equity and raised debt levels (as discussed in the April 2017 GFSR). This means that the share of lower-rated companies in major US, European, and global bond indices has increased (Figure 1.19, panel 1). This trend of worsening credit quality also means that the estimated default risk for high-yield and emerging market bonds has remained elevated (Figure 1.19, panels 4 and 5).

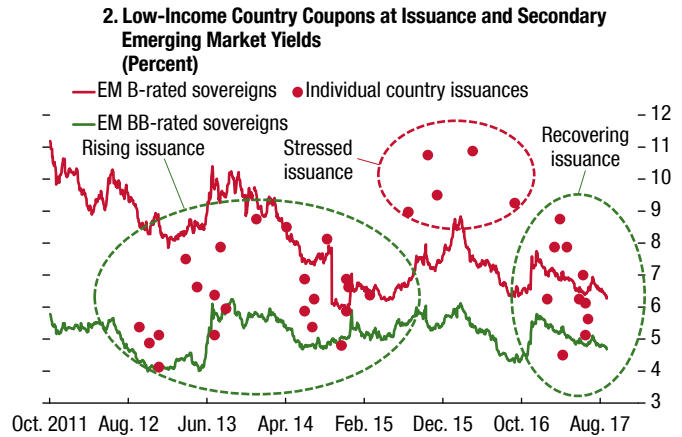
Despite declining credit quality, the compensation for credit risk in key corporate bond markets has

Figure 1.18. Low-Income Country External Borrowing and Vulnerabilities

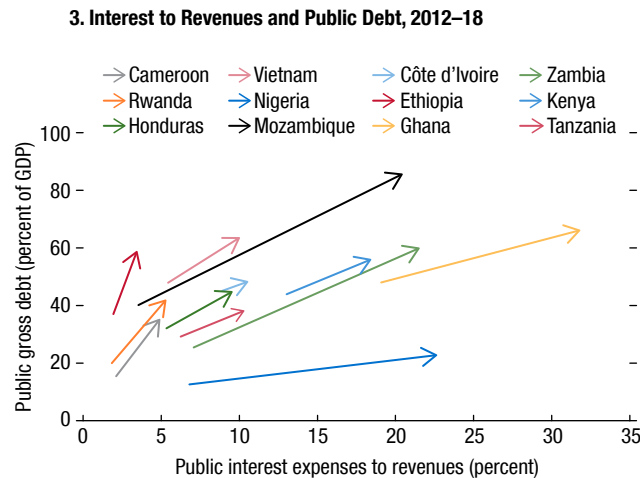
Low-income sovereign bond issuance has risen sharply in 2017, nearing previous peaks.



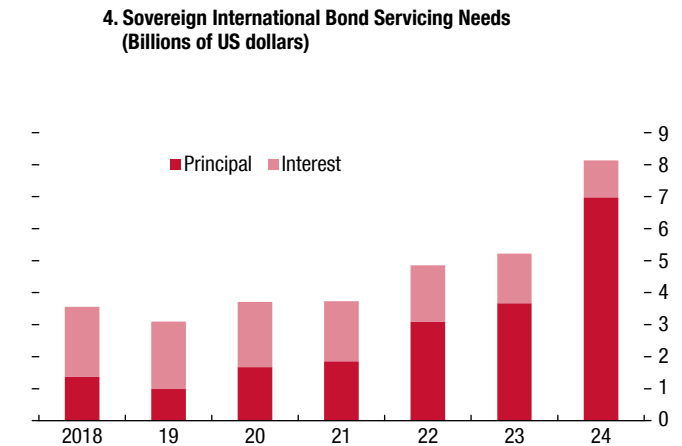
Market access conditions improved recently, but remain less favorable compared with other issuers.



Debt burden indicators have deteriorated.



Tighter external financial conditions would affect those with large rollover needs.



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

Note: Sample includes 74 low-income countries that were both International Development Association and IMF Poverty Reduction and Growth Trust (PRGT) eligible as of end-2014. Four countries (Bolivia, Mongolia, Nigeria, Vietnam) have graduated from the list of PRGT-eligible countries. Data labels use International Organization for Standardization (ISO) country codes. EM = emerging market; YTD = year to date.

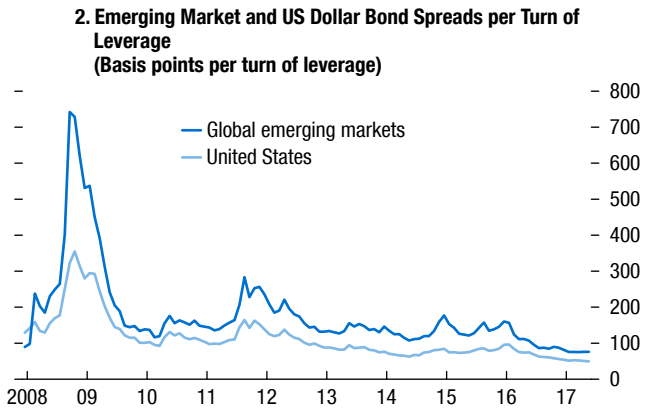
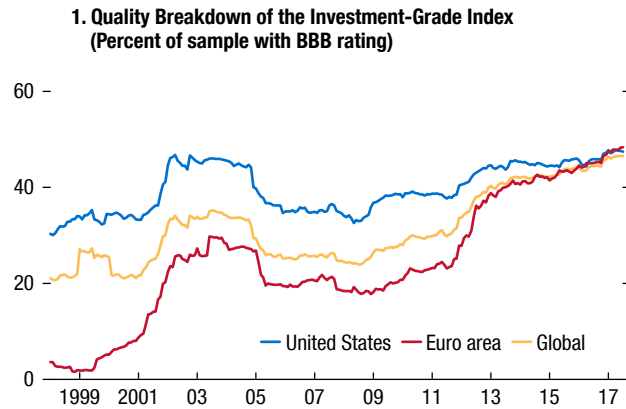
actually fallen. One way to gauge this is to measure the amount of spread per unit of corporate leverage paid to investors. For every increase in the leverage multiple (measured by debt to earnings before interest, taxes, depreciation, and amortization), the spread received has declined sharply for both US dollar-denominated and emerging market bonds (Figure 1.19, panel 2). A decomposition of bond yields suggests that the amount of spread left for market risk has fallen, particularly for high-yield bonds

(Figure 1.19, panels 3–5). Similarly, other estimates of market risk premiums in bond markets suggest that compensation has declined steadily over time (Figure 1.19, panel 6). To reach the average levels from 2000 to 2004, market risk and term premiums would need to rise about 200 basis points for investment-grade bonds and about 450 basis points for high-yield bonds. Market risk and term premiums would need to rise about 375 basis points for emerging market bonds.

Figure 1.19. US and Emerging Market Corporate Bond Spread Decomposition and Leverage

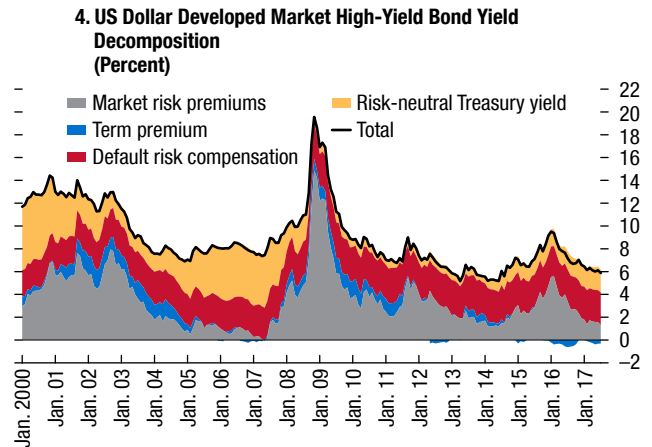
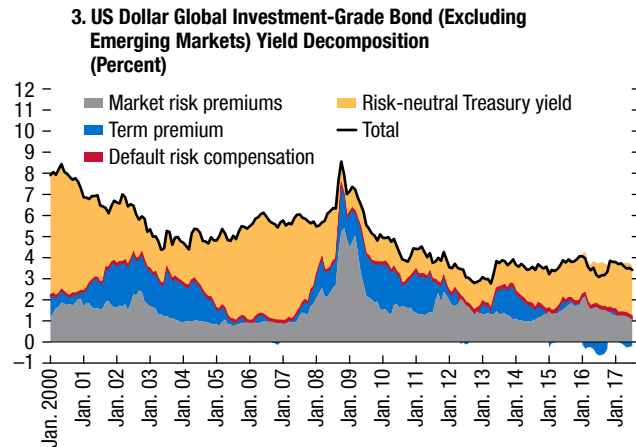
A high proportion of ratings are clustered at the bottom end of the investment-grade rating range.

Risk-adjusted spreads have compressed to postcrisis lows.



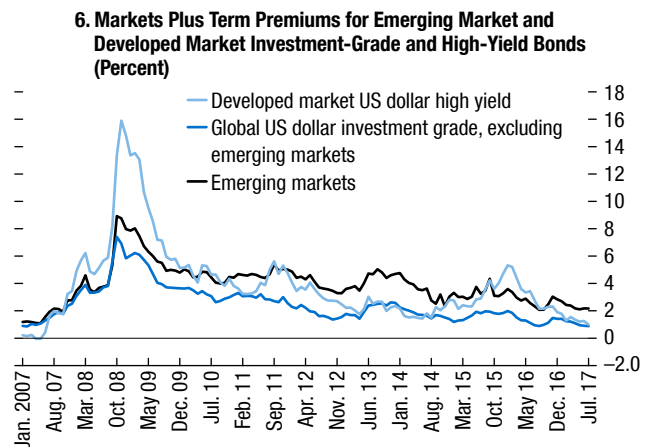
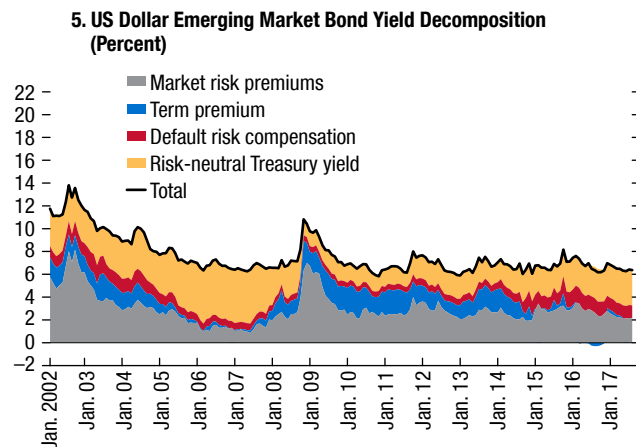
Risk premiums grind tighter for investment ...

... and high-yield risk premiums fall to near new tightts after an energy-related pop in 2016.



Emerging market bond risk premiums are also grinding lower ...

... driven by declines in term and market risk premiums.



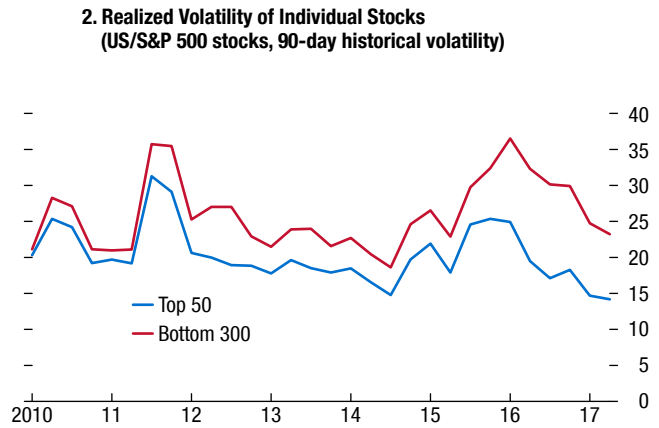
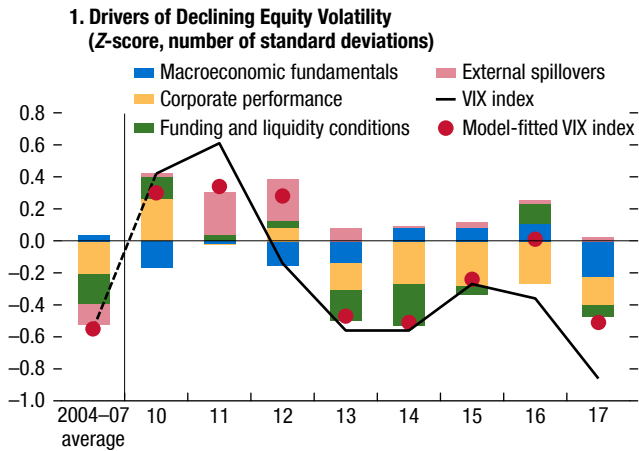
Sources: Bank of America Merrill Lynch; JPMorgan Chase & Co; Standard & Poor's; and IMF staff calculations.

Note: Market risk premium is the difference between the observed monthly bond spread and the estimated default risk compensation. Default risk compensation is estimated monthly by breaking down each index's holdings into Standard & Poor's (S&P) ratings buckets. Then, based on each bucket's rating and average duration, an average cumulative default probability is derived by referencing S&P's ratings transition tables. These results are weighted by the duration and ratings distribution of the corresponding index. Investment-grade spread, duration, and weightings are derived from the JPMorgan JULI ALL ex-EM index. High-yield data are derived from the JPMorgan Developed Market High Yield index. Emerging market data are derived from the JPMorgan EMBI Global index. Loss given default is always assumed to remain constant at 60 percent. Panel 5 includes both investment-grade and high-yield bonds.

Figure 1.20. Long-Term Drivers of the Low-Volatility Regime

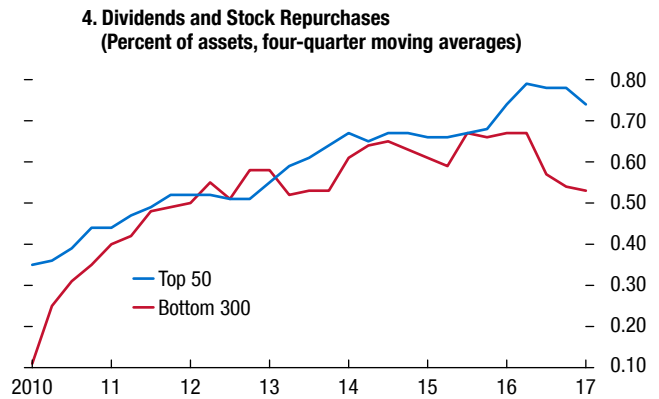
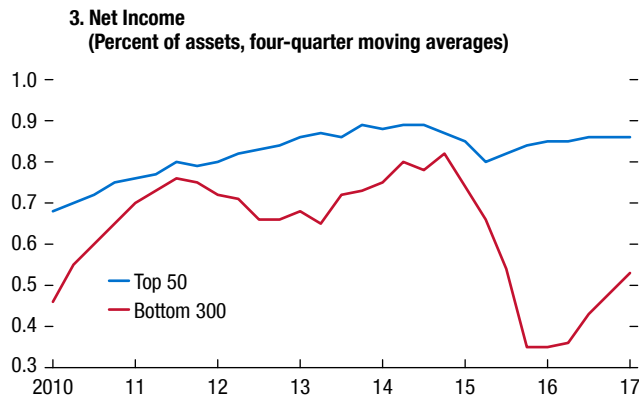
Equity volatility touched record lows in 2017.

S&P 500 index volatility is suppressed by large firms ...



... whose earnings are stronger and more stable ...

... and whose payouts are more generous.



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

Note: The Chicago Board Options Exchange Volatility Index (VIX) model is an ordinary least squares regression using quarterly data since 2004:Q1. Macroeconomic fundamentals include US GDP growth and the rolling 12-month standard deviation of the Citi US Economic Surprise Index. Corporate performance includes net income to assets and payouts to assets for Standard & Poor's (S&P) 500 firms. Funding and liquidity conditions include the TED spread (the difference between the interest rates on interbank loans and on short-term US government debt, "T-bills"); average euro, Japanese yen, and British pound one-year cross-currency basis swap rate; and supply of US Treasuries net of Federal Reserve purchases. External spillovers include the average of 10-year Greek, Italian, Portuguese, and Spanish yield spreads to the German 10-year yield. The VIX is used as the dependent variable in the volatility model.

Volatility Is Compressed

The bountiful liquidity provided by major central banks through their QE programs, as well as the expectation that central banks will react swiftly to market stress, has further strengthened the link between low risk premiums and low volatility. The impact of economic and financial conditions on US equity volatility is examined through an explanatory

model, which offers three main findings (Figure 1.20, panel 1).²⁰

- First, *stable macroeconomic fundamentals* have reduced volatility, as captured by the volatility of

²⁰The analysis is centered on the United States as the most representative measure of global market volatility, given that the United States accounts for over one-third of the global equity market and dominates trading of implied volatility futures.

economic surprises and the strength of underlying growth. Accommodative monetary policy has helped support this economic environment.

- Second, the *accommodative funding and liquidity conditions* provided by monetary policy have left volatility lower than in previous cycles.
- Third, *corporate performance has remained stable* and contributed to steady investor earnings expectations and reduced volatility.

This steady corporate performance—and associated low realized volatility measures—has been driven in part by large-cap companies (Figure 1.20, panel 2). The market performance of large-cap companies has been underpinned by stronger and more resilient earnings (Figure 1.20, panel 3). At the same time, however, cash-rich US corporations have used payouts via dividends and stock repurchases to smooth equity valuations and compress volatility (Figure 1.20, panel 4). With payouts rising to a high percentage of assets, this tool may be less available to smooth earnings. Finally, increased dispersion of returns across sectors, which may reflect potential policy shifts in the United States and abroad, has also contributed to reduced volatility of the overall index.

Low Volatility, Financial Leverage, and Liquidity Mismatches Could Amplify a Market Shock

Low volatility can increase the sensitivity of the financial system to market risk. First, in standard portfolio risk models, low volatility enables investors to increase their exposure to financial assets and so their sensitivity to market risk. Second, low volatility can create incentives for investors to increase financial leverage, which collectively can amplify market shocks. An example of this effect is the increased popularity of so-called volatility-targeting investment strategies (Figure 1.21, panel 1). These strategies seek to keep expected portfolio volatility to a specific targeted level. Lower market volatility (in both global equity and bond markets) then means that greater financial leverage is needed to meet volatility targets (Figure 1.21, panel 2).²¹

However, during volatility spikes, these strategies can lead to significant asset sales to pare back leverage.

²¹Derivatives such as equity index futures are commonly used to achieve greater financial leverage by volatility-targeting investment strategies.

Such an episode took place in August 2015,²² when a representative volatility-targeting investment strategy cut its global equity exposure drastically (Figure 1.21, panel 3).²³ The size of US equity holdings held by volatility-targeting investment strategies may be larger than \$0.5 trillion today.²⁴ Although this is less than 2.5 percent of the market capitalization of all US publicly traded equities, the trading volume related to deleveraging from these trading strategies could be much larger, particularly at times of equity market stress.²⁵

The low-interest-rate environment has also raised bond market risk. Low interest rates have reduced coupons of newly issued bonds. While this has been a boon for issuers, helping to reduce debt servicing costs, it has come at the price of higher market risk for investors. The prices of those bonds are more sensitive to changes in interest rates (increasing their duration). This market risk is illustrated in Figure 1.22, panel 1, which simulates the impact of an immediate 100 basis point shock on long-term interest rates. The analysis shows that this impact has increased over time as duration has increased. Losses in bond funds might lead to outflows from asset managers. Indeed, the sensitivity of outflows appears to have increased in relation to periods of large negative returns in US high-yield bond funds (Figure 1.22, panel 2). A significant outflow might trigger sales of riskier and less liquid assets held by open-end mutual funds, which could lead to substantial changes in the price of these instruments and

²²The Chicago Board Options Exchange Volatility Index (VIX) increased sharply to 40.7 percent on August 24, 2015, its highest level since September 2011, from 13.0 a week earlier. While rising concerns about a hard landing in China amid a significant decline in oil prices were major drivers of the increase in market volatility, market participants' concern about a perceived end to the Federal Open Market Committee quantitative easing policy may have also played a major role in the equity market sell-off.

²³The Standard & Poor's (S&P's) 500 index exposure for a representative volatility-targeting investment strategy uses the AQR Risk Parity Fund mutual fund as its proxy portfolio.

²⁴This estimate assumes that the universe of volatility-targeting investment strategies holds on average a portfolio in which global US equities account for 60 percent of the exposure and bonds account for 40 percent. The result is also adjusted by an estimated leverage number based on the volatility targets of different volatility-targeting investors. US equity exposure is assumed to be about half of the exposure to global equities. This is similar to the average geographic breakdown of equity investments in the AQR Risk Parity Fund over the past two years.

²⁵Chandumont 2016 estimates that selling from volatility-targeting funds accounted for between 9 and 16 percent of all trading volume in S&P 500 futures during August 24–26, 2015.

Figure 1.21. Leveraged and Volatility-Targeting Strategies

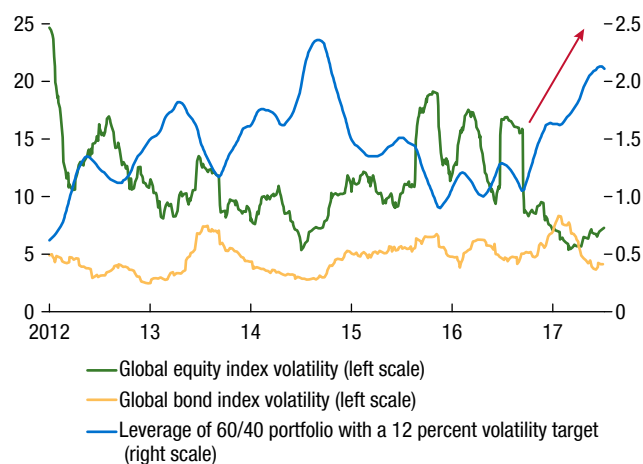
1. The Growth of Volatility-Targeting Investors

Investment Strategy	Volatility Target (percent)	Flexibility to Deviate from Volatility Target	AUM Mid-2017	Growth in AUM Past Three Years (percent)
Variable Annuities	8–12	Low	\$440 billion	69
CTA/Systematic Trading	15	Medium	\$220 billion	19
Risk Parity Funds	10–15	Medium–high	\$150–\$175 billion	...

Sources: Annuity Insights; Barclays Capital; BarclayHedge; and IMF staff calculations.

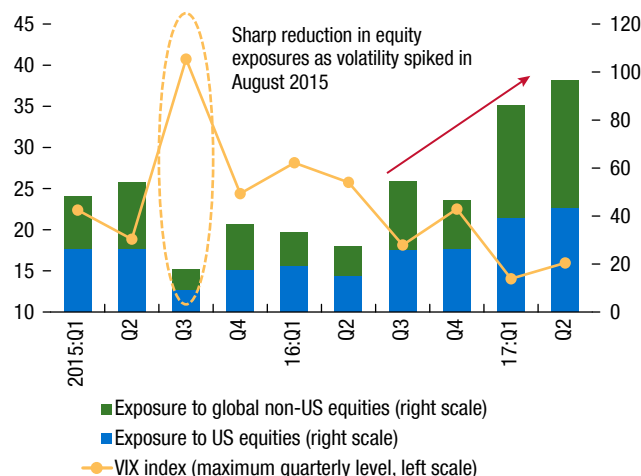
Lower volatility drives investors to increase financial leverage to meet their return and volatility targets ...

2. Leverage for a Theoretical Volatility-Targeting Investment Portfolio¹
(Sixty-day moving average)



... leading to rising equity exposures that are prone to sell-offs during volatility spikes.

3. Global Equity Exposure for a Representative Volatility-Targeting Investment Portfolio²
(Percent/net asset value)



Sources: Bloomberg Finance L.P.; Federal Reserve; Investment Company Institute; and IMF staff calculations.

Note: AUM = assets under management; CTA = Commodity Trading Advisor; VIX = Chicago Board Options Exchange Volatility Index.

¹The leverage calculation for a theoretical volatility-targeting investment strategy assumes a theoretical investment portfolio consisting of 60 percent global equities/40 percent bonds and an annual return volatility target of 12 percent. Leverage is defined as total investment exposure divided by the net asset value of the portfolio. The calculation uses a 60-day realized volatility moving window on the returns of equity and bond investments. The MSCI World Index is used as the proxy for equity investments; the Bloomberg Barclays Global Aggregate Total Return Value Unhedged index is used as the proxy for bond investments.

²The S&P 500 index exposure for a representative volatility-targeting investment strategy uses the AQR Risk Parity mutual fund as its proxy portfolio. The exposure data are obtained using Bloomberg's port function and reflect the percentage exposure of the fund's portfolio to equity index futures as a percentage of market value.

affect the value of these assets held by other investors. Figure 1.22, panel 3 shows that mutual funds hold a greater share of the high-yield bond market than in the past.

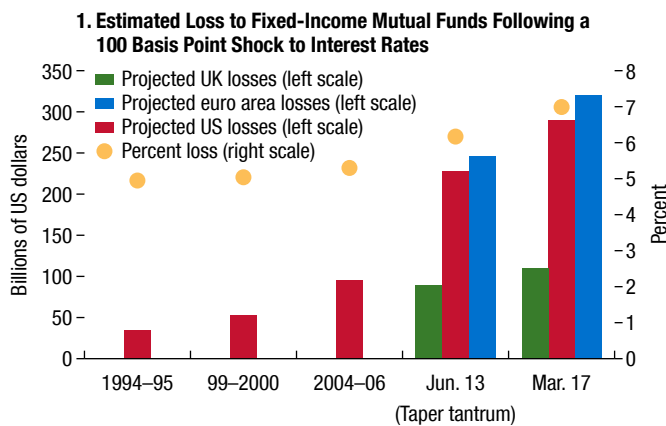
Prolonged normalization of monetary policy could mean continued low volatility and a further buildup of exposures, duration, and financial leverage. This would make the financial system even more sensitive to market risk, storing up medium-term vulnerability.

Efforts Are Needed to Help Lessen Stability Risks

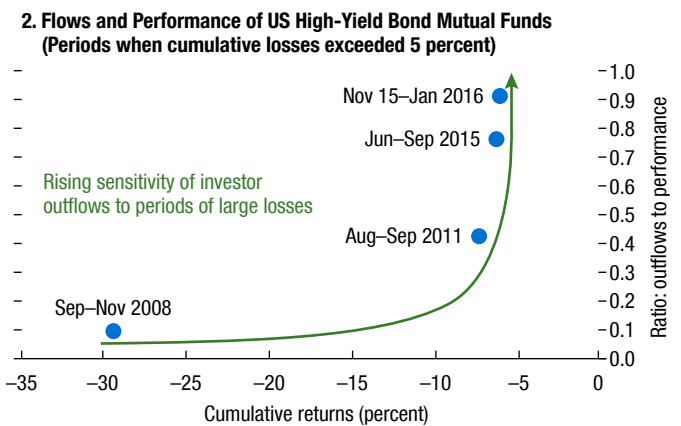
Regulators should be attentive to the potential for a substantial increase in asset market volatility to contribute to destabilizing feedback effects such as asset fire sales and adverse liquidity and leverage spirals. To lessen these risks, financial regulators should continue working to ensure that financial institutions maintain robust risk management standards at all points in the credit, business, and interest rate cycles. In addition,

Figure 1.22. Vulnerability of the US Corporate Credit Investor Base to Shocks

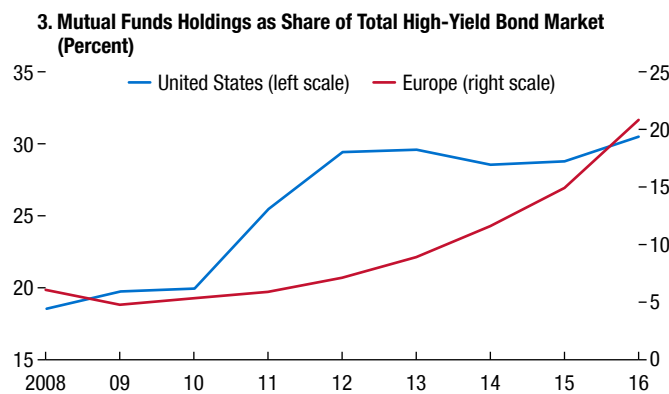
Higher duration leaves investors more vulnerable to interest rate risk ...



... at a time when there is greater sensitivity of investor outflows.



Liquidity mismatch risk is also a concern amid the rise in illiquid assets held by mutual funds globally.



Sources: Bloomberg Finance L.P.; EPFR Global; Federal Reserve; Investment Company Institute; and IMF staff estimates.

Note: In panel 1, data are based on prior periods of US monetary policy tightening starting in February 1994, July 1999, July 2004, and December 2015 and periods of large interest rate moves since the global financial crisis. The Barclays Capital Global Aggregate index is used as a proxy for duration of an average fixed-income portfolio. Total fixed-income mutual fund assets are used to calculate the dollar losses from a parallel 100 basis point increase in interest rates. Panel 2 shows periods when cumulative losses have exceeded 5 percent. There have been only four periods over the past decade when cumulative monthly losses on US high-yield bond benchmarks have exceeded 5 percent—a typical threshold used by investors when implementing stop-loss strategies. These risk management strategies are commonly used by investors to reduce their holdings in risky assets if prices breach certain prespecified loss limits. By closing out the position, the investor is hoping to avoid further losses.

supervisors, regulators, and firm management should closely monitor and assess financial institutions' exposure to asset classes where there are indications that the search for yield has contributed to valuation pressure.

There is also a need for regulators to endorse a clear and common definition of financial leverage in investment funds and to improve data transparency, particularly with respect to derivatives. Lack of progress on regulation on the use of derivatives is a concern given that the use of financial leverage through derivatives

appears to be on the rise as fund managers seek to enhance low yields, particularly in strategies that target a specified level of price volatility.

Policymakers should continue to strengthen supervisory frameworks relating to liquidity risk management. This could be done by building on recent initiatives and recommendations to include greater flexibility in redemption and dealing frequency,²⁶ marking illiquid

²⁶See US SEC (October 2016), FSB (January 2017), IOSCO (July 2017), and UK FCA (February 2017).

assets to market, and the treatment of institutional investors, as well as through better guidance on the use of particular risk management tools and enhanced disclosure requirements.

For borrowers in frontier markets and low-income countries, authorities should develop institutional capacity to deal with the risk that accompanies increased issuance of marketable debt securities. Authorities should formulate a comprehensive debt management strategy that incorporates exchange rate, interest rate, and liquidity risks associated with the issuance of external debt and explore liability management operations to mitigate refinancing risk.²⁷ Authorities should ensure efficient use of the borrowed funds by strengthening public investment management. They should also enhance investor relations programs to better understand and inform the international investment community regarding their debt issuance strategy.

The Rise in Leverage

Leverage in the nonfinancial sector has increased since 2006 in many G20 economies amid easy financing conditions. While this has helped facilitate the recovery in aggregate demand, it has also made the nonfinancial sector more sensitive to changes in interest rates. Private sector debt service burdens have increased in several major economies as leverage has risen, despite declining borrowing costs. Debt servicing pressure could mount further if leverage continues to grow and could lead to greater credit risk in the financial system. China has seen a rapid buildup in leverage, so the recent derisking measures are a welcome step. Yet continued rapid credit growth and accumulated vulnerabilities at smaller banks make it challenging to fully address systemic risks.

Group of Twenty Nonfinancial Sector Leverage

Aggregate G20 Debt-to-GDP Ratios Are Higher than before the Global Financial Crisis

Among G20 economies, total nonfinancial sector debt—borrowing by governments, nonfinancial companies, and households from both banks and bond markets—has risen to more than \$135 trillion, or about 235 percent of aggregate GDP (Figure 1.23, panel 1).²⁸ This partly reflects economic develop-

ments since the global financial crisis. The rise in sovereign debt is largely due to the downturn in GDP, but is also due in part to the necessary actions taken by governments to stabilize economies and financial sectors. Private sector credit growth has helped facilitate the subsequent recovery in aggregate demand, and so has cushioned economic growth against further downside risks. But higher debt has made the nonfinancial sector more sensitive to changes in interest rates.

In G20 advanced economies, the debt-to-GDP ratio has grown steadily over the past decade and now amounts to more than 260 percent of GDP. In G20 emerging market economies, leverage growth has accelerated in recent years. This was driven largely by a huge increase in Chinese debt since 2007, though debt-to-GDP levels also increased modestly in other G20 emerging market economies (Figure 1.23, panel 2).

Overall, about 80 percent of the \$60 trillion increase in G20 nonfinancial sector debt since 2006 has been in the sovereign and nonfinancial corporate sectors (Figure 1.23, panel 3). Much of this increase has been in China (largely in nonfinancial companies) and the United States (mostly from the rise in general government debt). Each country accounts for about one-third of the G20's increase. Average debt-to-GDP ratios across G20 economies have increased in all three parts of the nonfinancial sector (Figure 1.23, panel 4).

There has also been a broad increase in nonfinancial debt-to-GDP ratios across individual G20 economies since 2006; only Argentina and Germany have experienced a decline in total nonfinancial sector debt to GDP (Table 1.1). In some economies, individual sectors have deleveraged. For example, household debt to GDP fell in Germany and the United States, in particular. Nonfinancial corporate leverage declined the most in Argentina, Japan, and the United Kingdom. But in the majority of cases in the G20, nonfinancial debt-to-GDP ratios have risen.

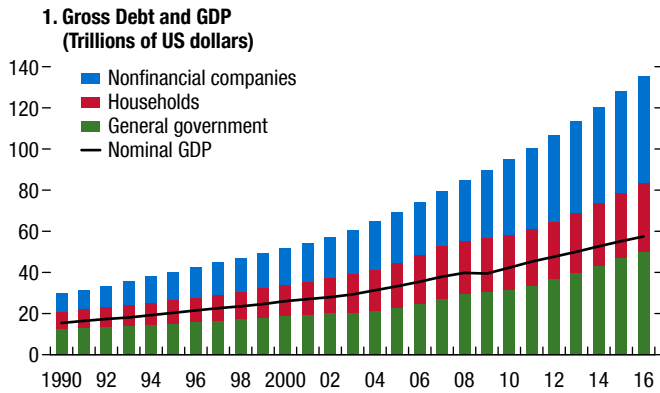
While gross liabilities have risen, the development of net debt—gross debt minus financial assets—has varied across the nonfinancial sector in G20 advanced economies (Figure 1.23, panel 5). General government net debt rose along with gross debt over the decade since 2006. Nonfinancial private sector net debt, however, fell as savings and higher asset prices helped build up financial assets more quickly than liabilities. This, in turn, has helped support the recovery in spending

²⁷See IMF 2017b.

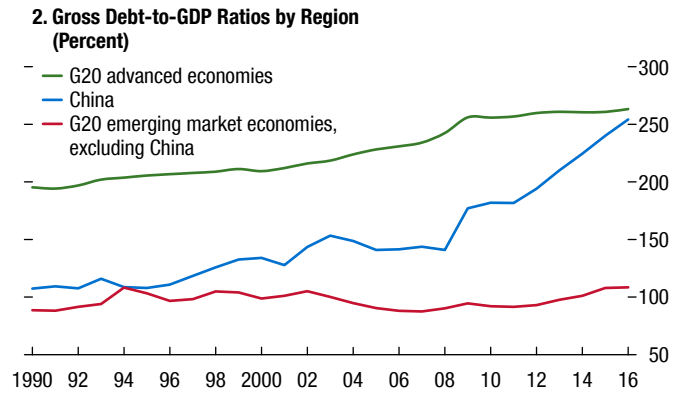
²⁸G20 aggregates are based on the 19 individual economies in the group (the 20th member is the European Union).

Figure 1.23. Group of Twenty Nonfinancial Sector Credit Trends

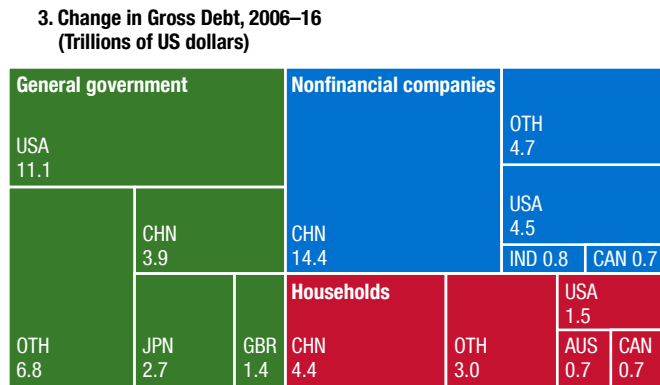
Debt has been rising more quickly than GDP ...



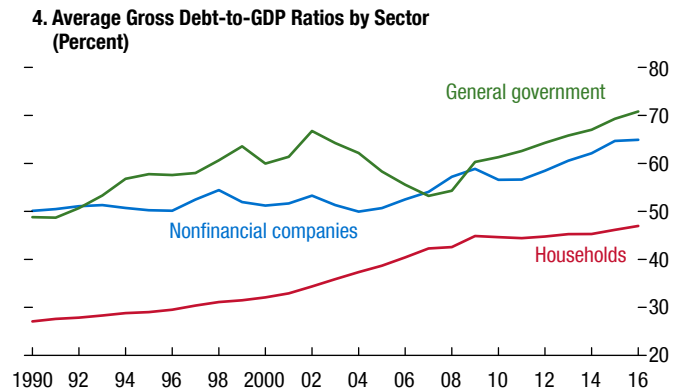
... largely in advanced economies and China ...



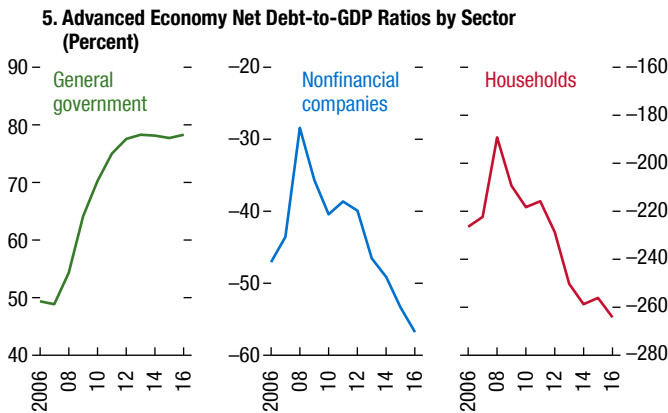
... and in sovereigns and firms ...



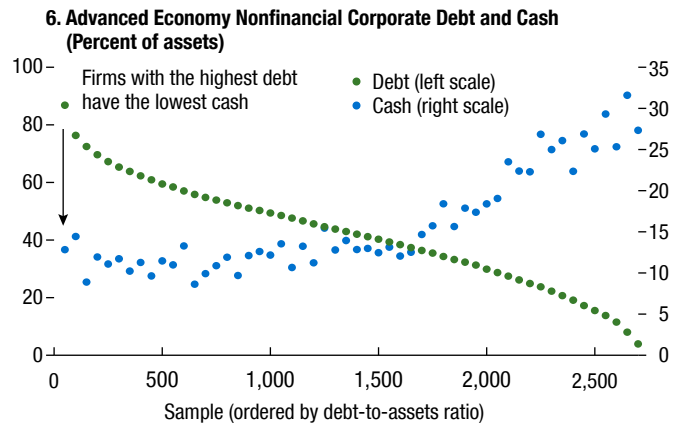
... with debt-to-GDP ratios above precrisis levels.



Private sector financial assets have risen ...



... but cash is unevenly distributed among firms.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; IMF, World Economic Outlook database; and IMF staff calculations. Note: Data are adjusted for foreign exchange movements by converting to US dollars at the end-2016 exchange rate. Advanced economy nonfinancial corporate debt is shown net of estimated intercompany loans. In panel 3, OTH = other Group of Twenty (G20) economies. Panel 4 shows the average debt-to-GDP ratio across the G20 economies, by sector. Panel 5 shows debt minus financial assets as a percent of GDP. Panel 6 is based on a sample of more than 2,600 nonfinancial companies in continental Europe, Japan, the United Kingdom, and the United States. Each dot shows average debt and cash to assets for the same 50 firms. Data labels in the figure use International Organization for Standardization (ISO) country codes.

Table 1.1. Sovereign and Nonfinancial Private Sector Debt-to-GDP Ratios
(Percent)

		Advanced Economies									Emerging Market Economies									
		JPN	CAN	USA	GBR	ITA	AUS	KOR	FRA	DEU	CHN	BRA	IND	ZAF	TUR	MEX	RUS	SAU	ARG	IDN
General	2006	184	70	64	41	103	10	29	64	66	25	66	77	31	45	38	10	26	70	36
Government	2016	239	92	107	89	133	41	38	96	68	44	78	70	52	28	58	16	13	54	28
Households	2006	59	74	96	90	36	105	70	44	65	11	14	10	39	9	12	8	12	4	11
	2016	57	101	79	88	42	123	93	57	53	44	23	10	35	18	16	16	15	6	17
Nonfinancial Corporations	2006	100	76	65	79	67	73	83	56	49	105	39	38	33	27	14	32	28	20	14
	2016	92	102	72	73	71	79	100	72	46	165	44	45	37	67	28	52	50	12	23
Total	2006	343	221	225	210	205	187	183	164	180	142	118	125	104	81	64	49	66	93	61
	2016	388	295	259	250	246	243	232	226	168	254	145	125	124	113	103	84	78	73	68

Sources: Bank for International Settlements; Haver Analytics; IMF, World Economic Outlook database; and IMF staff calculations.

Note: Dark shading denotes a higher debt-to-GDP ratio in 2016 than in 2006. The table shows debt at market values. Advanced economy nonfinancial corporate debt is shown net of estimated intercompany loans where data are available. Data labels in the table use International Standardization Organization (ISO) codes.

and GDP. But it is important not to draw too much comfort from this development. While debt accumulation is not necessarily a problem, one lesson from the global financial crisis is that excessive debt that creates debt servicing problems can lead to financial strains. Another lesson is that gross liabilities matter. First, in a period of stress, it is unlikely that the whole stock of financial assets can be sold at current market values—and some assets may be unsellable in illiquid conditions. Second, the aggregate data used here do not account for differences in the distribution of assets and liabilities. For example, the younger population might have a greater proportion of debt in the household sector, while the older population might have a greater proportion of financial assets.

A similar argument can be made about cash holdings in nonfinancial companies. Although cash holdings may be netted from gross debt at an individual company—because that firm has the option to pay back debt from its stock of cash—it could be misleading to do so in the aggregate data generally used in this section. This is because the distribution of debt and cash holdings differs between companies. Figure 1.23, panel 6, which is based on debt and cash stocks held by a sample of more than 2,600 European, Japanese, and US companies, shows that those with higher debt also tend to have lower cash holdings and vice versa.

Although G20 gross private nonfinancial debt has increased in the aggregate, the reasons for higher leverage differ across sectors. For example, changes in household leverage appear to be broadly associated with lower borrowing costs and house price move-

ments (Figure 1.24, panel 1). Higher house prices, driven up by buoyant market conditions and risk appetite, mean that not only is more borrowing needed to purchase properties but also that more collateral is available to support the increased borrowing. Lower interest rates make new borrowing more attractive for households. Chapter 2 examines household indebtedness in more detail. It finds that household debt has continued to grow over the past decade across a broad set of countries. It also concludes that high growth in household debt in the medium term is associated with a greater probability of a banking crisis.

The increase in corporate debt has taken place during loose financing conditions, just as during the period before the global financial crisis (Figure 1.24, panel 2). Low interest rates probably stimulated greater demand for credit from companies as larger debt became more affordable, leading to changes in capital structures. Easy financing conditions—a combination of low interest rates, buoyant market valuations, and low volatility—have reduced the probability of default as measured by credit models, which is likely to have increased the willingness of lenders to supply credit to companies.²⁹

However, this contemporaneous default probability is based on current market conditions, which might not last. If there are adverse shocks, a feedback

²⁹Growth in private sector debt in some emerging market economies may also be linked to improvements in credit infrastructure (such as increased use of credit registries and improvements in credit risk evaluation) as well as policies to foster lending to small and medium enterprises and financial inclusion.

loop could develop, which would tighten financial conditions and increase the probability of default, as happened during the global financial crisis. Thus the low contemporaneous default probability could mask risks associated with the buildup of corporate leverage, a phenomenon that has been called the “volatility paradox.”³⁰

Higher Private Sector Debt Has Raised Servicing Costs and Could Increase Vulnerabilities

While debt has generally increased relative to GDP, it happened in a period of falling and low interest rates. So what happened to debt affordability over this period? This question is important because measures of debt affordability tend to be good vulnerability signals, particularly when debt levels are high.³¹ Although lower interest rates have helped lower sovereign borrowing costs, in most of the G20 economies where companies and households increased leverage, nonfinancial private sector debt service ratios—defined as annualized interest payments plus income amortization—also increased (Figure 1.25, panel 1).

Moreover, there are now several economies where debt service ratios for the private nonfinancial sectors are higher than average and where debt levels are also high. Figure 1.25, panel 2, shows that this is particularly the case for the nonfinancial private sector in Australia, Canada, and China, and for the household sector in Korea (debt service ratios for households and nonfinancial companies are available only for G20 advanced economies).

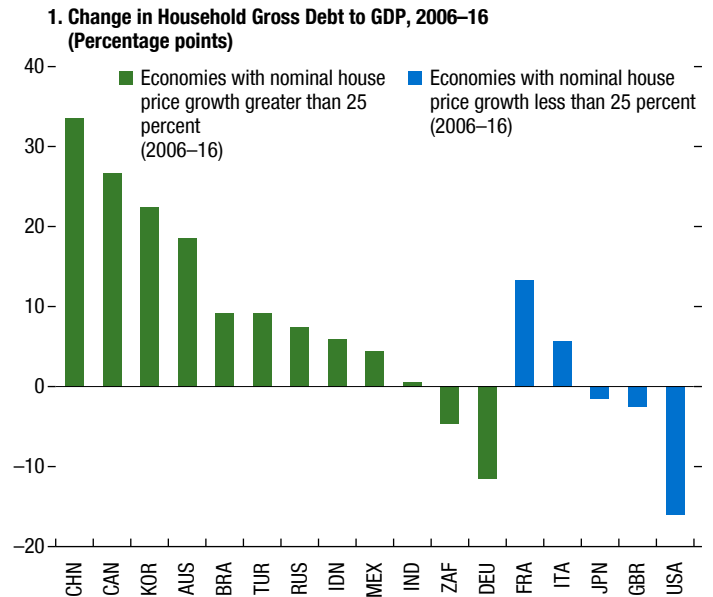
The distribution of debt within an economy’s corporate and household sectors is also important in assessing payment pressures. While the aggregate data on debt service ratios used here do not allow an examination of the distribution, other work might shed some light on this question. The April 2017 GFSR found (for companies in the United States) a deterioration in interest coverage ratios for those most indebted, particularly in the energy sector. In emerging market economies, however, commodity companies and industrials made up a significant proportion of firms with weak interest

³⁰See Adrian and Shin 2013 and Geanakoplos 2010 for a discussion of the leverage cycle, and Brunnermeier and Sannikov 2014 and Adrian and Brunnermeier 2016 for a discussion of the volatility paradox.

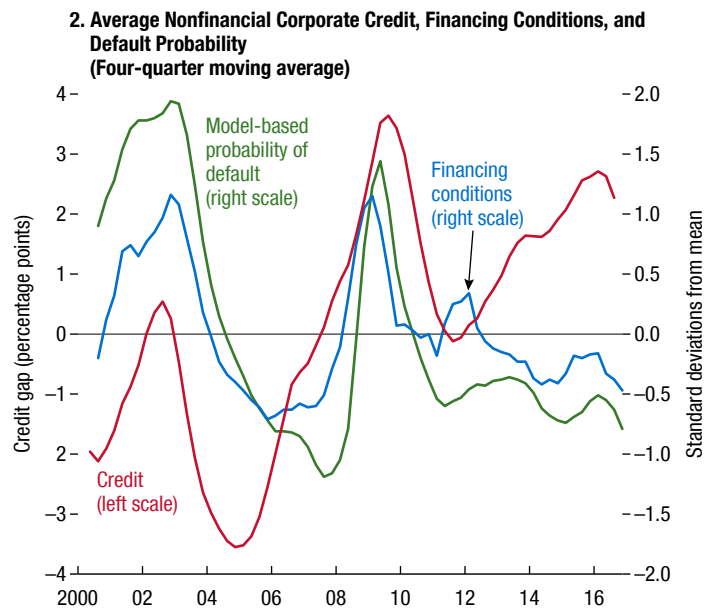
³¹Chapter 2 discusses household debt service capacity as a vulnerability indicator. See also work at the Bank for International Settlements on this issue, including Drehman, Juselius, and Korinek 2017; BIS 2017; and BIS 2012.

Figure 1.24. Group of Twenty Nonfinancial Private Sector Borrowing

Household debt has risen broadly with house prices.



Corporate debt has built up with easy financing conditions.

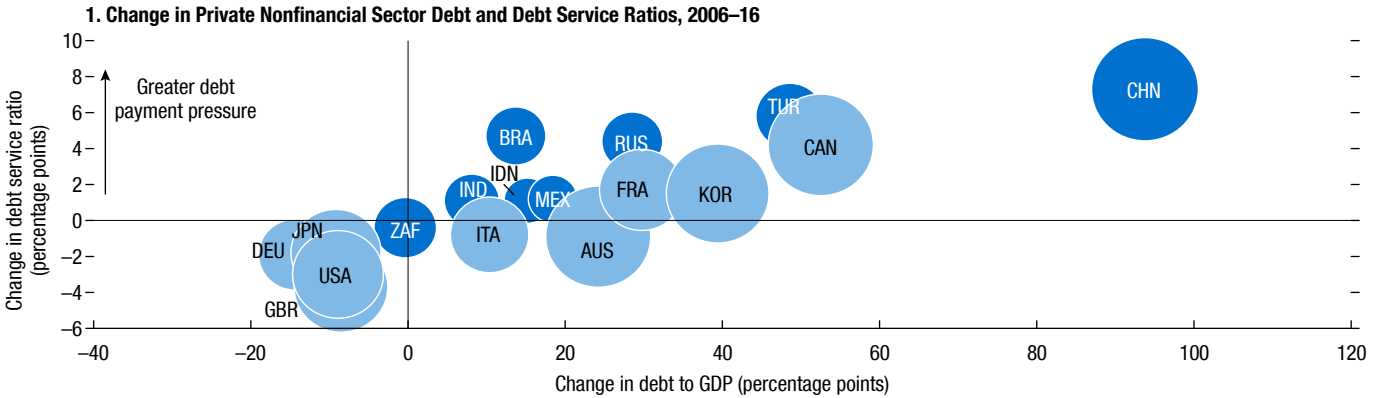


Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; Moody’s CreditEdge; Organisation for Economic Co-operation and Development; and IMF staff calculations.

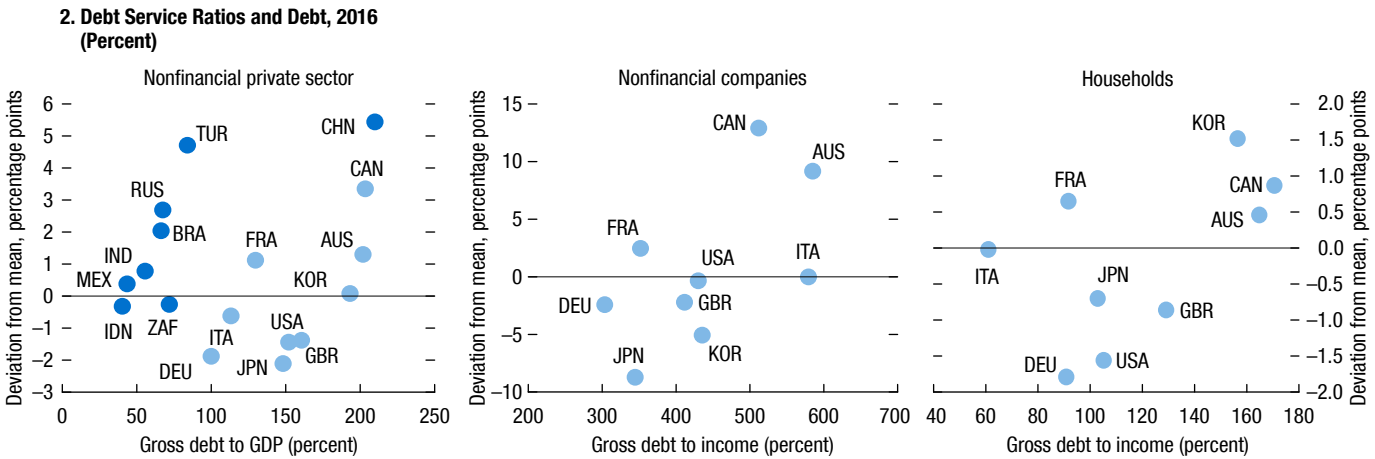
Note: In panel 1, house price growth is from 2008 in Brazil; from 2010 in China, India, and Turkey; and is not available for Argentina and Saudi Arabia. Panel 2 shows the average Group of Twenty: corporate debt-to-GDP gap, financing conditions (average of corporate borrowing rates, book-to-market ratios, and implied volatility), and probability of default from the Moody’s KMV model (based on a sample of more than 41,000 companies). Data labels in the figure use International Organization for Standardization (ISO) country codes.

Figure 1.25. Group of Twenty Nonfinancial Private Sector Credit and Debt Service Ratios

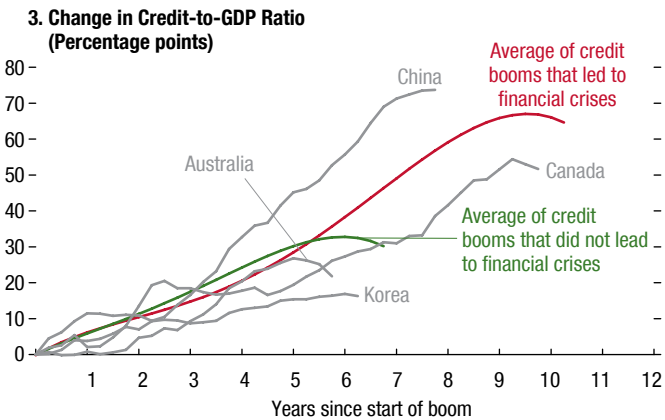
Debt service ratios have increased with higher leverage, despite low interest rates.



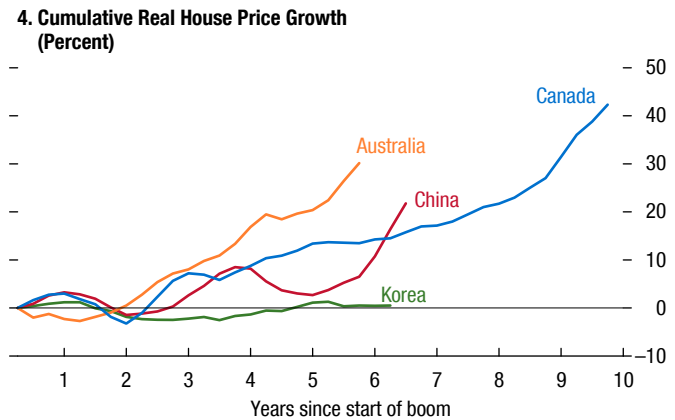
Debt service ratios in some countries are now at high levels ...



... in economies with credit booms ...



... and house price growth.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; national statistical offices; Organisation for Economic Co-operation and Development; and IMF staff calculations.

Note: Debt service ratios are defined as annualized interest payments plus amortizations as a percentage of income, as calculated by the Bank for International Settlements. In panel 1, the size of the circles is proportional to debt to GDP in 2016. In panel 2, income is gross disposable income plus interest payments (plus dividends paid for firms). Panel 3 shows Group of Twenty economies with higher demeaned nonfinancial private sector debt service ratios and debt levels against past booms. Past booms are for a sample of 43 advanced and emerging market economies where the credit-to-GDP gap rose above 10 percent. The start and end dates of the booms are defined as periods when the credit gap was above 6 percent. Financial crisis dates were taken from Laeven and Valencia 2012. Data labels in the figure use International Organization for Standardization (ISO) country codes.

coverage ratios. Similarly, ECB 2017 shows that the distribution of household debt service ratios reveals greater vulnerability among those that had more recently taken out a mortgage to finance a house purchase than was evident from the aggregate figure.

Although not all credit booms lead to recessions, it is interesting to compare the credit booms in economies most likely to face payment pressures with past experience. While the boom in Australia is similar to the average of past credit booms that did not lead to a financial crisis, the boom in Canada has been longer than the average of these benign booms, and the boom in China has been steeper than the average of past credit booms that did coincide with a financial crisis (Figure 1.25, panel 3). In addition, in three of the economies with the highest debt service ratios, there has been a steep increase in real house price valuations (Figure 1.25, panel 4).

Experience has shown that a buildup in leverage associated with a run-up in house price valuations can develop to a point that they create strains in the nonfinancial sector that, in the event of a sharp fall in asset prices, can spill over to the economy. For example, Chapter 2 finds that the relationship between future GDP growth and household debt is driven mostly by mortgage debt. This could be because of the procyclicality of home equity lines of credit, or more generally because of wealth effects that lead households to cut consumption when the value of their housing assets declines.³²

Overall, there are now several major economies where debt servicing pressure in the private nonfinancial sector is already high. Weaker households and companies in these countries could have trouble repaying their debt if interest rates rise or if incomes fall.

Policies Are Needed to Reduce Vulnerabilities in the Private Nonfinancial Sector

Policymakers should address the risks from continued increases in debt and leverage across sectors by drawing on, and enhancing where needed, an appropriate mix of macroprudential and microprudential policies, preemptive regulatory measures, and close monitoring of balance sheets.

Higher household debt burdens should be reduced where debt servicing pressures are already high and should not grow further where debt servicing is

currently manageable but debt levels are elevated.

This can be achieved through a combination of measures, including limits on debt-service-to-income and loan-to-value ratios, and measures to restrict loan contracts. Some countries have undertaken measures to address high house price valuations and deter further buildup of household debt. Policy measures, however, must carefully balance minimizing the medium-term risks to financial stability while not harming the potential long-term benefits of financial inclusion and development.

Policymakers should vigilantly monitor nonfinancial corporate leverage. Macroprudential measures extended through banks (such as sectoral capital requirements or risk weights on foreign currency credit) could also be considered to reduce or prevent a further buildup in corporate debt. In addition, tax reforms that reduce incentives for debt financing could help attenuate the risk of a further buildup in leverage and may even encourage firms to lower existing tax-advantaged leverage. More broadly, measures to foster smooth corporate deleveraging should be deployed where needed, including by strengthening corporate restructuring mechanisms.

China: From Derisking to Deleveraging—Challenges Ahead

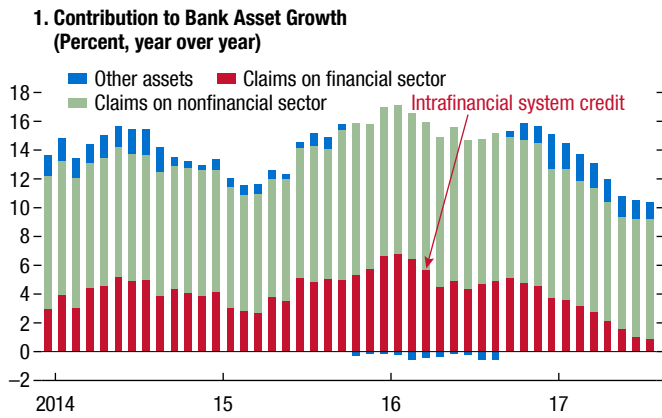
The rapid rise in nonfinancial sector leverage in China in recent years, along with the size, complexity, and pace of growth of its financial system, point to continued financial stability risks. Banking sector assets are now 310 percent of GDP, nearly three times the emerging market average and up from 240 percent at the end of 2012. Rapid increases in intrafinancial-system credit have been an important factor in this growth (see Figure 1.26, panel 1). This reflects both the growing use of short-term wholesale funding to boost leverage and profits (Figure 1.26, panel 2) and shadow credit to firms and other nonfinancial borrowers (Figure 1.26, panels 3 and 4), particularly by small and medium-sized banks.³³ This

³³Shadow credit refers to banks' nonloan, nonbond credit to nonfinancial borrowers. This includes assets that are on balance sheet (trust beneficiary rights, specialized asset management plans, and other structured assets) and off balance sheet (bank-sponsored wealth management plans). Estimates of off-balance-sheet bank credit are calculated as 65 percent of outstanding wealth management plans, which deduct the portion of underlying plan assets that are claims on financial or public sector counterparties, as reported in *China Bank Wealth Management Market Annual Report 2016*.

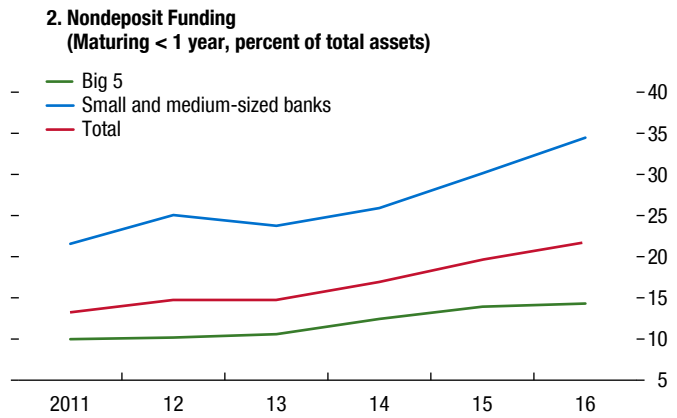
³²See also Mian and Sufi 2011 and Schularick and Taylor 2012.

Figure 1.26. Chinese Banking System Developments

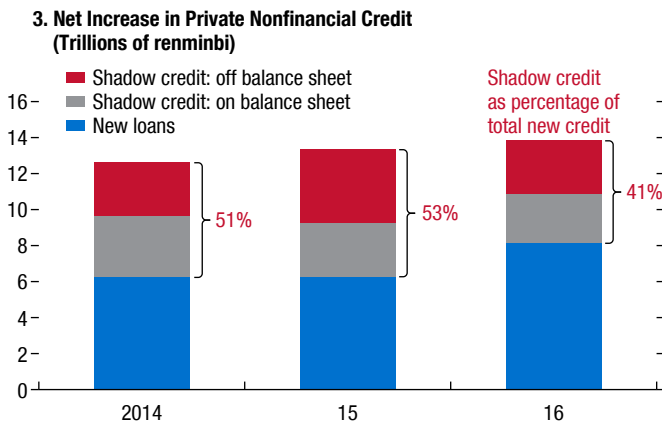
Intrafinancial system credit has driven bank growth ...



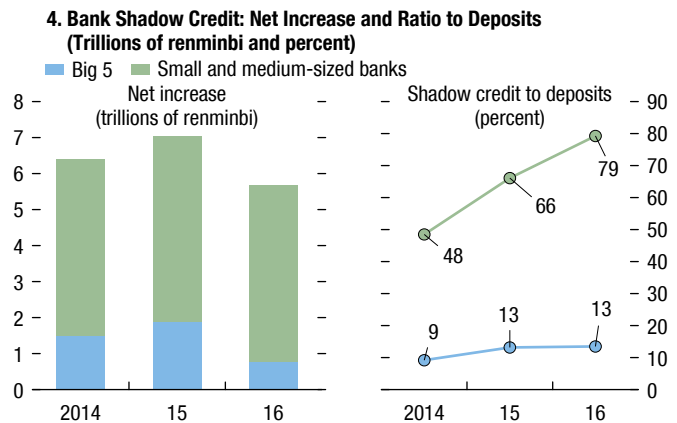
... increasing reliance on risky funding ...



... but also reflecting significant shadow credit ...



... particularly from small and medium-sized banks.



Sources: Haver Analytics; People’s Bank of China; SNL Financial; and IMF staff calculations.

Note: Shadow credit refers to banks’ nonloan, nonbond credit to nonfinancial private borrowers, both on and off balance sheet. For a complete definition, please see footnote 33. Panels 2, 3, and 4 are based on publicly available financial statement data for 32 of China’s largest banking groups.

has increased the opacity of intermediation, increased the use of unstable short-term funding, and raised sensitivity to liquidity stress.

China recently introduced a range of prudential and administrative measures to contain these vulnerabilities. Efforts to derisk the financial system using better-designed regulatory tools (such as the Macroprudential Assessment, or MPA) aim to slow growth in banks’ supply of shadow credit, reduce dependence on interbank funding, and contain regulatory arbitrage.³⁴

³⁴Among examples of such measures are the People’s Bank of China’s inclusion of wealth management products in its MPA framework, counting negotiable certificates of deposit toward the prudential limit on interbank liabilities, and tightening corporate bond collateral requirements for exchange-traded repurchase agreements.

On-balance-sheet shadow credit products at small and medium-sized banks declined sharply in late 2016 and early 2017. Growth in off-balance-sheet shadow credit, in the form of wealth management products, has also recently reversed by the largest amount in the post-crisis period (Figure 1.27). This coincided with rising interbank and bond market interest rates and stalling corporate bond issuance.

Authorities Face a Delicate Balance between Tightening Financial Sector Policies and Slowing Credit Growth

Curbing shadow credit could have an outside impact on banks’ capacity to increase credit. Bank-level data show that roughly half of lenders’

estimated credit in recent years was extended via such products.³⁵ As shadow credit typically requires less capital and provisioning than regular loans, reducing its growth would free up only enough capital to support a smaller increase in lending, leading to a net slowdown in the flow of total credit. For instance, if banks expanded shadow credit by 27 percent—the pace in 2016—their projected retained earnings would support total credit growth (loans and shadow credit) of 17 percent year over year, just above the actual growth rate in 2016. If banks instead kept shadow credit constant, increasing only loans, the same amount of retained earnings would support credit growth of 11 percent, in line with nominal GDP growth in the second quarter of 2017 (Figure 1.28, panel 1).

Banks face a trade-off between using retained earnings to address vulnerabilities or support credit growth.³⁶ If some retained earnings are used to increase the pace of loss recognition, or increase capital and provisions against a modest portion of existing shadow products, credit capacity would decline further (Figure 1.28, panel 2). Balance sheet vulnerabilities from shadow credit would also recede only gradually at smaller banks, remaining elevated relative to the biggest banks (Figure 1.28, panel 3).

Derisking Will Weigh on Some Banks' Profitability and Business Models

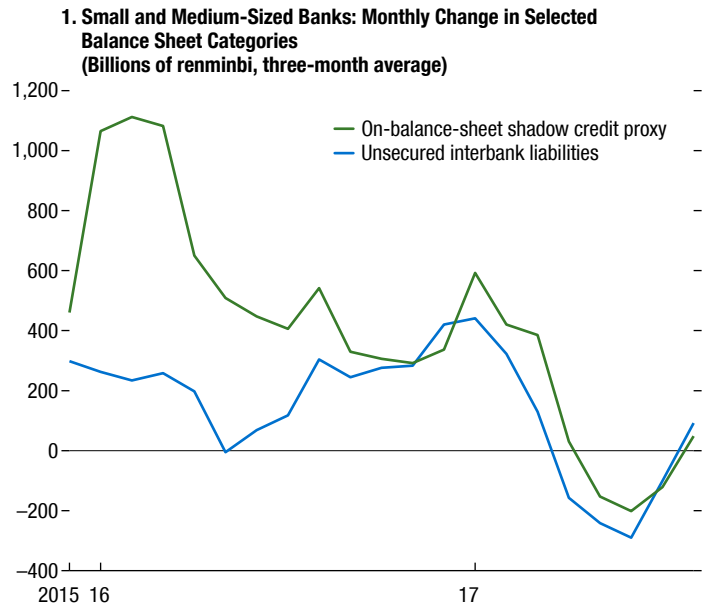
Shifting away from shadow credit products and interbank funding will improve bank balance sheets over time, but in the short term could also decrease bank profitability, weakening buffers at already vulnerable banks and reducing capacity to expand credit. Bank earnings in China have fallen in recent years, driven by an uptick in provision expenses and lower net interest margins (Figure 1.29, panel 1). Small and medium-sized banks have sustained profitability in

³⁵Based on publicly reported data for a sample of 32 of China's largest banking groups. This calculation excludes corporate bonds held in banks' securities portfolios. The total credit provision from these banks depicted is equivalent to roughly 90 percent of the total increase in nonfinancial credit in 2015 and 2016 (as measured by Total Social Financing flows).

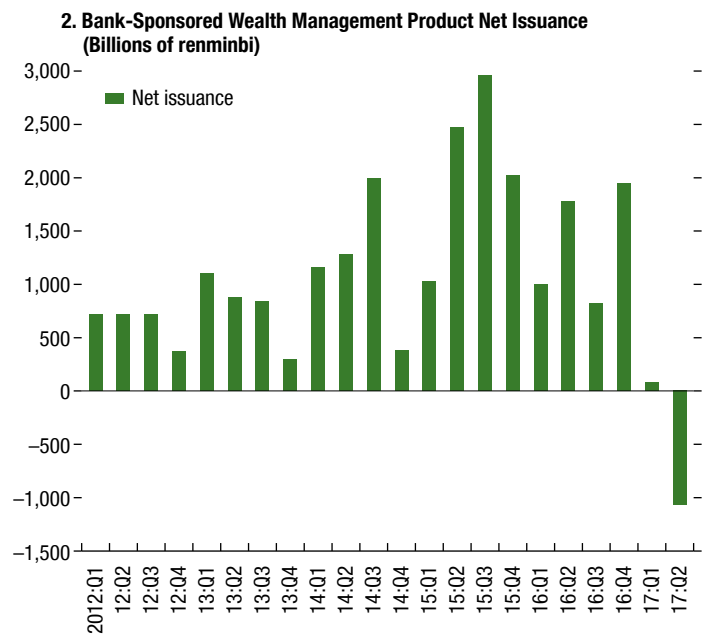
³⁶Banks can avoid this trade-off through recapitalization. Chinese banks have announced planned increases of RMB 66 billion in new common equity for 2017, or about 2 percent of end-2016 common equity at small and medium-sized banks. Raising capital in public markets is complicated, however, by rules against raising capital when price-to-book ratios are below 1.

Figure 1.27. China: Regulatory Tightening Has Helped Contain Financial Sector Risks

Interbank lending and shadow credit dipped sharply in 2017 ...

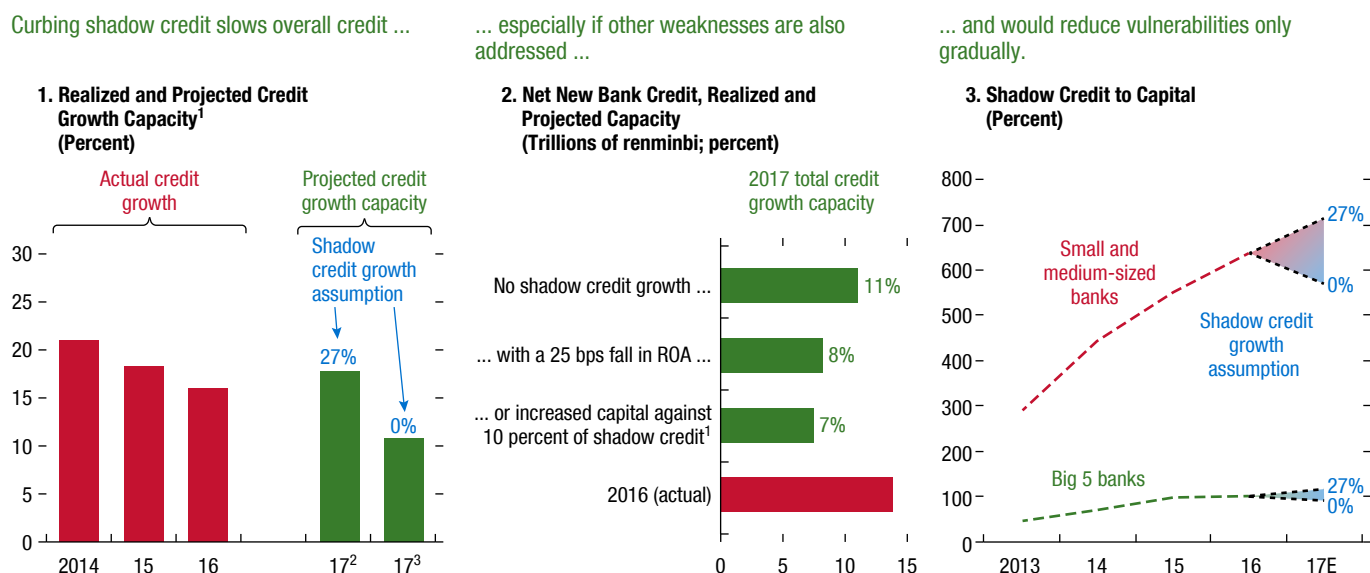


... and so did off-balance-sheet shadow credit.



Sources: CEIC Data Co. Ltd.; China Banking Regulatory Commission; Haver Analytics; media reports; People's Bank of China; Wind data; and IMF staff calculations.

Figure 1.28. Chinese Banks: Financial Policy Tightening and Credit Growth Capacity



Sources: Company annual reports; SNL Financial; and IMF staff calculations.

Note: Shadow credit refers to nonbond, nonloan credit to nonfinancial private borrowers, both on and off balance sheet. For a complete definition, please see footnote 33. bps = basis points; E = estimated; ROA = return on assets.

¹Credit growth capacity is calculated at the bank level for 32 firms as the maximum net new credit possible given assumptions for growth in shadow credit (on and off balance sheet) and common equity Tier 1 (CET1) capital. Changes in shadow credit affects the CET1 available to support credit growth. New shadow credit is assumed to carry regulatory capital risk weightings of 25 percent, whereas off-balance-sheet shadow credit carries a risk weighting of zero. Assumes firm-level profitability, dividend payout ratio, CET1 ratio, and loan mix from 2016 stay constant.

²Projected credit growth capacity assuming shadow credit growth of 27 percent year over year.

³Projected credit growth capacity assuming shadow credit growth of 0 percent year over year.

part by shifting their business model toward shadow credit activities, which account for a growing share of revenue (Figure 1.29, panel 2) and balance sheets, with shadow products surpassing loan growth over the past three years by a wide margin.

A return to traditional lending would strain profits at smaller banks via several channels. Net interest income from loans and deposits fell from 1.7 percent of assets in 2011 to just 1.0 percent in 2016, reflecting the changing asset mix but also the higher (and relatively liberalized) interest rates in the shadow credit market (Figure 1.29, panel 2).³⁷ Profitability could suffer if more credit flows through the formal loan market, which is subject to more conservative provisioning rules and macroprudential controls on sector allocation. Any tightening in shadow credit

³⁷The deterioration in net interest margins is mostly attributable to the traditional lending and deposit-taking business, whereas shadow investment and funding activities have had a neutral or positive contribution on a net basis, particularly at smaller lenders.

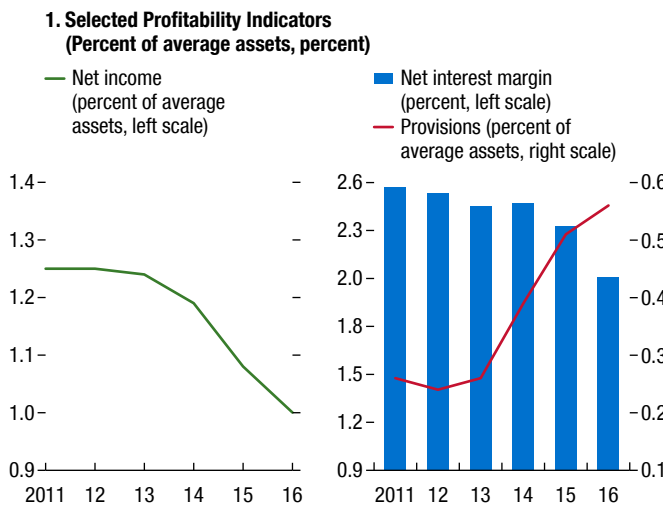
activities would likely crimp net fees and commissions, which have doubled since 2011 at smaller banks on the back of higher off-balance-sheet income related to shadow products.

Reducing wholesale funding will also weigh on credit growth, particularly at small and medium lenders. These banks have funded much of their growth via nondeposit-funding sources with shorter maturities. Nondeposit funding maturing in less than one year has risen to about 34 percent of assets, from 22 percent in 2011, with over half maturing in less than three months (Figure 1.29, panel 3). The result has been a sharp increase in short-term borrowing to finance long-maturity assets, with short-term nondeposit funding exceeding similar-maturity nonloan assets by about 6 percent of assets, or RMB 2.8 trillion (see Figure 1.29, panel 4). Any meaningful reduction in short-term market funding would require liquidating longer-term assets.

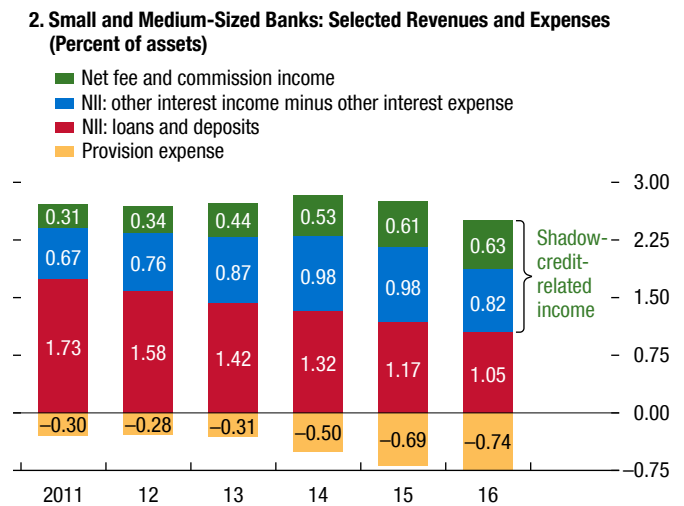
To be successful, regulatory tightening on lenders must be accompanied by reforms that reduce

Figure 1.29. Bank Profitability and Liquidity Indicators

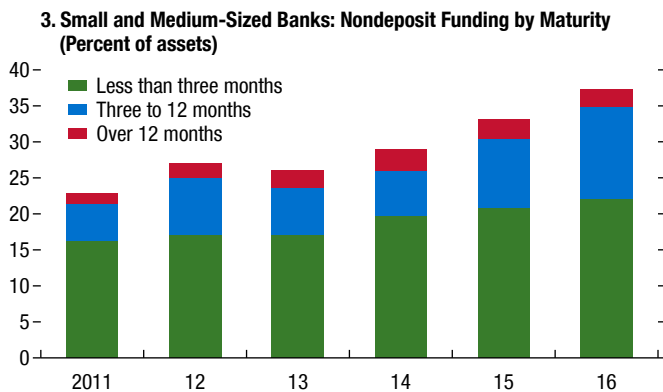
Bank earnings are lower due to narrower margins and rising provisions ...



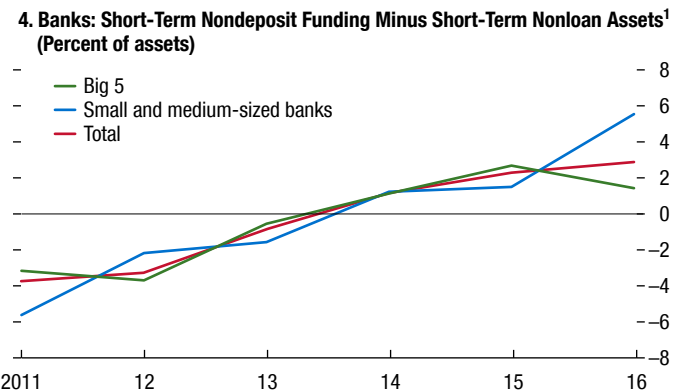
... but would be worse without shadow-related income.



Growing use of risky short-term funding ...



... has led to worsening maturity mismatches.



Sources: SNL Financial; and IMF staff calculations.

Note: Shadow credit refers to banks' nonloan, nonbond credit to nonfinancial private borrowers, both on and off balance sheet. For a complete definition, see footnote 33. NII = net interest income.

¹Assets and liabilities available on demand or maturing in three months or less.

the economy's vulnerability to slower credit growth. Authorities' recent efforts to improve banks' risk management and reduce maturity and liquidity transformation risks in shadow credit activities are necessary and must be deepened. Stability risks will nonetheless remain elevated, however, if banks support continued rapid credit growth: they will have fewer buffers to recognize losses, profitability could compress further at weaker lenders, and incentives for regulatory arbitrage will remain strong. Raising new equity would allow banks to raise provisions and capital without slowing credit growth, but must be accompanied

by reforms to strengthen bank risk management and governance.

A broader reform package could help mitigate the economic impact of slower credit growth and tighter regulations while addressing vulnerabilities. On the borrower side, authorities must build on their commitment to reduce corporate leverage, resolve nonviable firms, and improve credit efficiency.³⁸ With lenders, regulation to reduce shadow credit risks and

³⁸IMF 2016b, 2016c, and 2017f discuss progress and recommendations on these topics in more detail.

regulatory arbitrage should be further strengthened. Policies should target reducing balance sheet vulnerabilities at weak banks, including through restricting dividend payouts. Restructuring or resolving nonviable financial institutions would also support corporate debt restructuring and strengthen risk management and governance incentives. The forthcoming IMF–World Bank Financial Sector Assessment Program report on China will discuss financial sector stability issues in China in more detail and provide specific recommendations.

Could Rising Medium-Term Vulnerabilities Derail the Global Recovery?

Concerns about a continuing buildup in debt loads and overstretched asset valuations could have global economic repercussions. This section uses a scenario analysis to illustrate how a repricing of risks could lead to a rise in credit spreads and a fall in capital market and housing prices, derailing the economic recovery and undermining financial stability.

This section illustrates how shocks to individual credit and financial markets well within historical norms can propagate and lead to larger global impacts because of knock-on effects, a dearth of policy buffers, and extreme starting points in debt levels and asset valuations. A sudden uncoiling of compressed risk premiums, declines in asset prices, and rises in volatility would lead to a global financial downturn. With monetary policy in several advanced economies at or close to the effective lower bound, the economic consequences would be magnified by the limited scope for monetary stimulus. Indeed, monetary policy normalization would be stalled in its tracks and reversed in some cases.

The Global Macrofinancial Model documented in Vitek 2017 is used to assess the consequences of a continued buildup in debt and an extended rise in risky asset prices, from already elevated levels in some cases. This dynamic stochastic general equilibrium model covers 40 economies and features extensive macro-financial linkages—with both bank- and capital-market-based financial intermediation—as well as diverse spillover channels.

This scenario has two phases. The first phase features a continuation of low volatility and compressed spreads. Equity and housing prices continue

to climb in overheated markets. As collateral values rise, bank lending conditions adjust to maintain steady loan-to-value ratios, facilitating favorable bank lending rates and more credit growth. As discussed, leverage in the nonfinancial private sector has already increased over the past decade across major advanced and emerging market economies. In the scenario, a further loosening in lending conditions, combined with low default rates and low volatility, leads investors to drift beyond their traditional risk limits as the search for yield intensifies despite increases in policy rates.

As presented earlier, market and credit risk premiums are close to decade-low levels—leaving markets exposed to a decompression of risk premiums. Thus, the second phase begins with a rapid decompression of credit spreads and declines of up to 15 and 9 percent in equity and house prices, respectively, starting at the beginning of 2020. This shift reflects debt levels breaching critical thresholds, prompting markets to grow concerned about debt sustainability, while risk premiums jump, aggravating deleveraging pressures. As risk premiums rise, debt servicing pressures are revealed as high debt-to-income ratios make borrowers more vulnerable to shocks. The asset repricing is moderate in magnitude, but is broad-based across jurisdictions and leads to a tightening of financial conditions. Flight to quality flows reduce long-term bond yields in safe havens and raise them in the rest of the world. Segments with higher leverage and extended valuations are hit particularly hard, leading to higher funding costs and debt servicing strains.

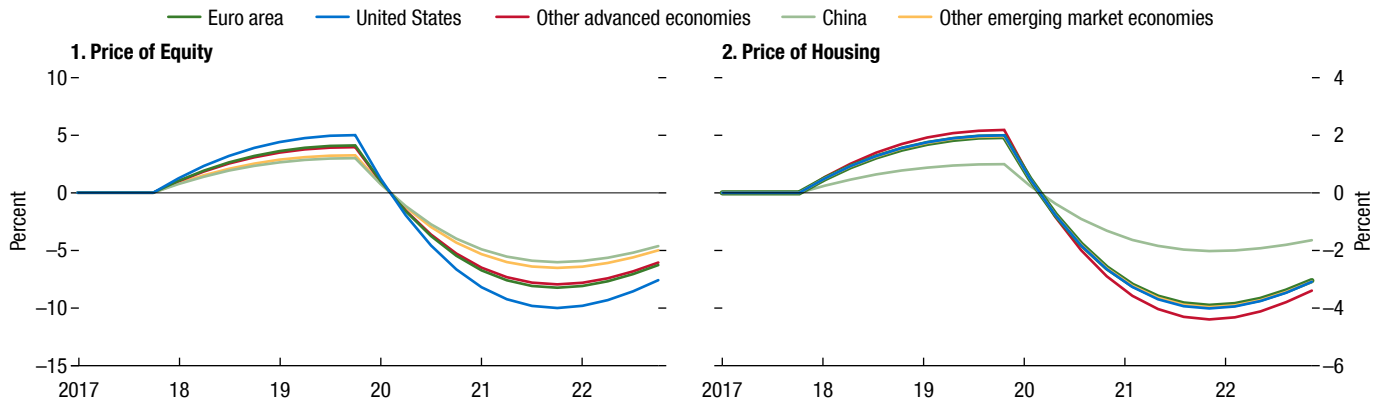
Underlying vulnerabilities are exposed, and the global recovery is interrupted. Figure 1.30 summarizes the main impacts and spillovers:

- The global economic impact of this scenario is broad-based and significant, about one-third as severe as the global financial crisis.³⁹ The level of global output falls by 1.7 percent by 2022 relative to the WEO baseline, with varying cross-country impacts.
- The severity of the economic impact on the United States is cushioned by stronger bank buffers, milder house price declines, and more monetary policy

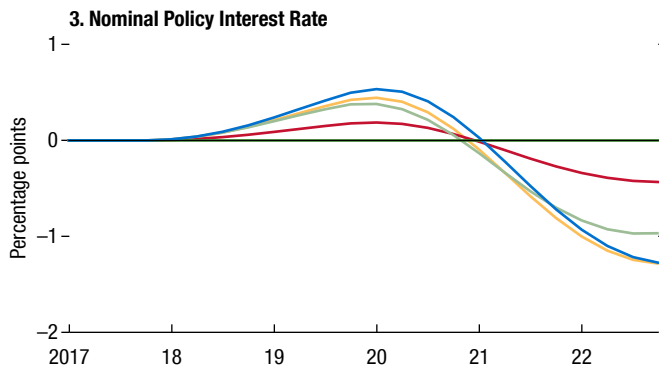
³⁹The results are broadly consistent with Chapter 2, which finds that increases in household debt from already elevated levels signal high economic risks, and with Chapter 3, which concludes that rising private sector leverage signals higher downside risks to growth over the medium term.

Figure 1.30. Global Financial Dislocation Scenario

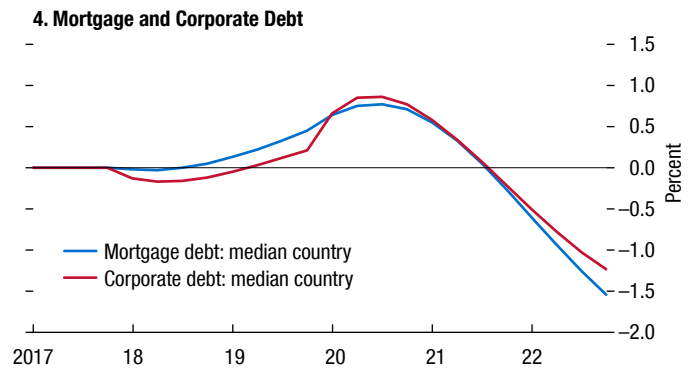
Financial stability risks build up for two more years, as equity and house prices continue to rise amid low volatility and narrow spreads, followed by an eventual sharp repricing.



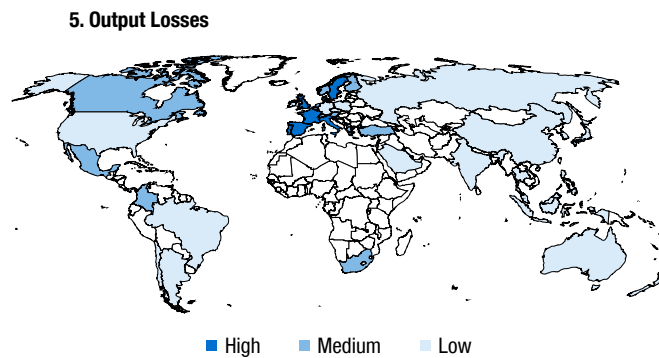
Monetary policy responses are limited by policy space in some countries.



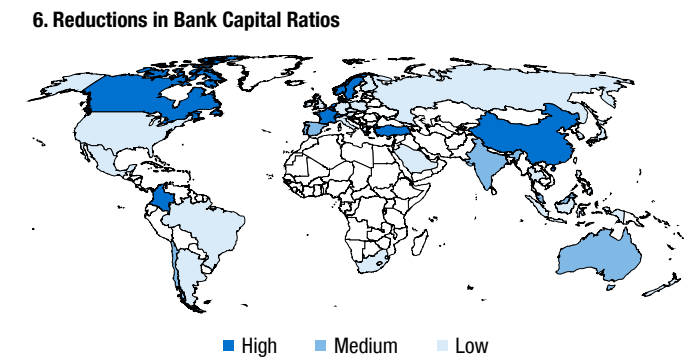
A decompression of risk premiums leads to an abrupt deleveraging.



Output losses are broad-based.



Rising defaults reduce capital at banks.



Source: IMF staff estimates.

Note: The variables in all panels are expressed as deviations from baseline. In panel 5, countries are shaded according to the following magnitudes of output losses: (1) smaller than 1.8 percent of GDP (“low impact”), (2) between 1.8 percent and 2.3 percent of GDP (“medium impact”), and (3) greater than 2.3 percent of GDP (“high impact”). In panel 6, the thresholds for reductions in bank capital ratios are (1) smaller than 0.625 percentage points (“low impact”), (2) between 0.625 and 0.675 percentage points (“medium impact”), and (3) greater than 0.675 percentage points (“high impact”).

space compared with other advanced economies, despite relatively high equity valuations. The Federal Reserve reverses interest rate hikes during the second phase of the scenario, cutting the policy rate by 150 basis points to 1.75 percent by 2022.

- The euro area suffers a larger output loss because the policy rate is at the effective lower bound and—as a result of renewed financial fragmentation—term premiums rise in high-spread euro area economies. Government debt ratios climb because nominal output is lower and debt service costs are higher for these economies.
- Emerging market economies are disproportionately affected by the correction in global risk assets. The flight to quality prompts outflows from their equity and bond markets, putting pressure on currencies and challenging countries with large external financing needs.
- Corporate and household defaults rise on the back of higher interest costs, lower earnings, and weaker growth. Default rates do not breach global financial crisis levels but return to levels consistent with prior cyclical peaks. Firms in some euro area countries and China with excessive debt overhangs are more sensitive to the increase in credit costs. Household leverage and high house prices in Australia and Canada make these economies more susceptible to risk premium shocks.
- Higher credit and trading losses, in turn, reduce bank capital ratios to varying degrees worldwide. Banking systems in advanced economies are healthier compared with the precrisis period, while leverage is less of a potential amplifier. Chinese banks suffer outside declines in capital, but strong policy buffers could be used to mitigate the financial and economic impacts.

Emerging Markets Would Suffer a Retrenchment in Foreign Capital Inflows

Drawing on the above scenario, the potential for emerging market stress due to pressures on portfolio inflows is examined in more detail, including by taking into account the likely reduction in these flows from Federal Reserve balance sheet normalization (as discussed earlier).

- During the first phase of the scenario, portfolio flows to emerging market economies are supported by rising investor risk appetite. This partially offsets the drag on portfolio inflows from US monetary

policy normalization observed during 2017–19. As a result, there is a (net) reduction in portfolio inflows to emerging market economies of about \$25 billion a year, compared with \$35 billion under the baseline (Figure 1.31, panel 1).

- During the second phase of the scenario, the asset market correction triggers a more rapid retrenchment in capital inflows to emerging market economies of about \$65 billion over the first four quarters, in addition to the projected reduction of \$35 billion in inflows associated with continued Federal Reserve balance sheet normalization. The combined effect results in a reduction of portfolio inflows of some \$100 billion during the first four quarters of the correction (and about \$65 billion during the subsequent four quarters).
- At the country level, the associated portfolio inflow reduction during the first two years of the shock to global risk premiums ranges from 1.6 to 2.3 percent of GDP for the most affected countries (Figure 1.31, panel 2). Such a reduction is likely to lead to an outright reversal of portfolio flows, at least during some quarters, considering that the decompression of risk premiums is likely to be more rapid in some periods than in others (rather than unfolding at a steady pace as depicted in this exercise).

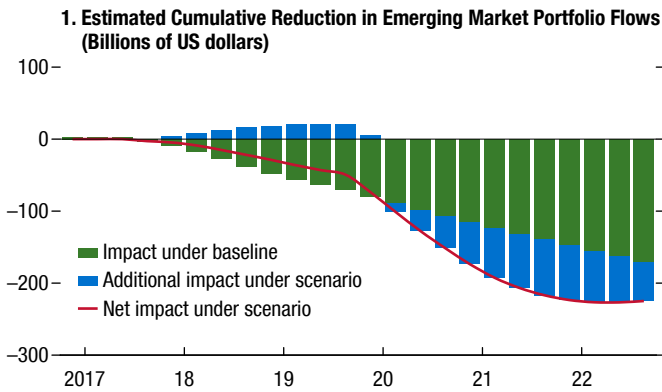
The buildup in external financing pressures could be particularly challenging for countries with large and rising projected current account deficits. For example, Colombia, South Africa, and Turkey have projected current account deficits in the range of 3 to 4½ percent of GDP in 2019 (Figure 1.31, panel 3). Moreover, emerging market currencies would come under pressure, limiting space for monetary policy to ease. In turn, higher domestic interest rates would affect firms' debt servicing capacity, hitting those with still high levels of corporate leverage and increasing risks to weaker banking systems (as explored in the April 2017 GFSR) (Figure 1.31, panel 4).

Emerging Market Policies

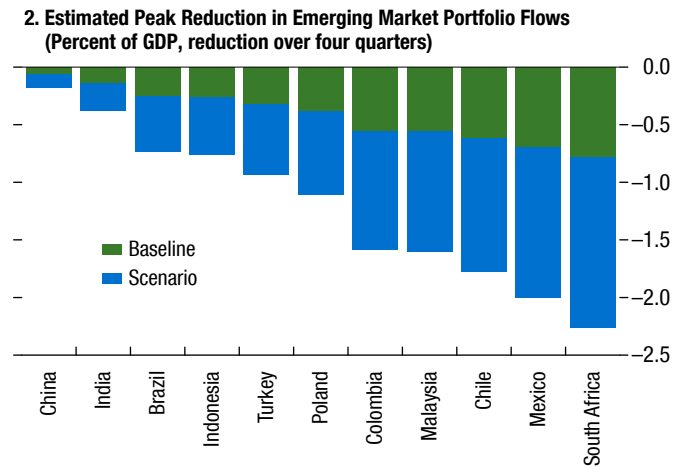
In emerging market economies, policymakers should take advantage of current favorable external conditions to further enhance their resilience, including by continuing to strengthen external positions where needed and reduce corporate leverage where it is high. Deploying policy buffers and exchange rate flexibility would help buffer external shocks, while

Figure 1.31. Emerging Market Economy External Vulnerabilities and Corporate Leverage

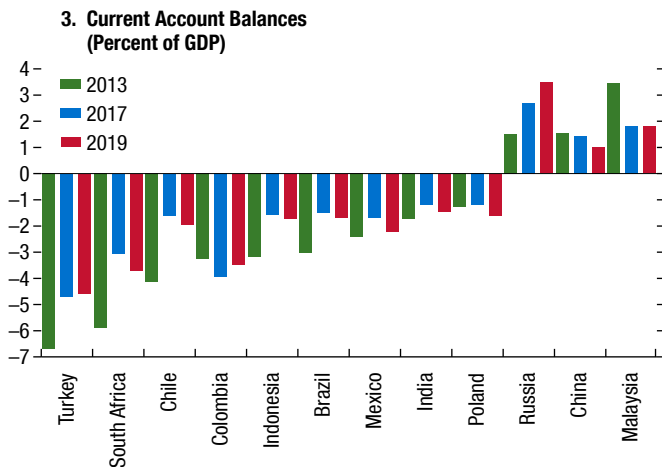
US monetary normalization and a global asset market correction would increase capital outflow pressures.



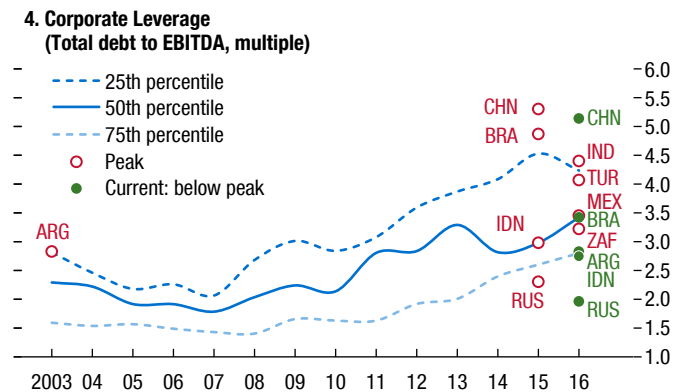
Countries that previously received large inflows may see sizable outflows.



Outflows could be challenging for countries with large current account deficits ...



... and put pressure on those with high levels of corporate leverage.



Sources: Bank of America Merrill Lynch; Bloomberg Finance L.P.; Capital IQ; Haver Analytics; and IMF staff calculations.

Note: Data labels in the figure use International Organization for Standardization (ISO) country codes. EBITDA = earnings before interest, taxes, depreciation, and amortization.

improving corporate debt-restructuring mechanisms and monitoring firms' foreign exchange exposures would lower corporate vulnerabilities. Advances in these areas would leave these economies better placed to cushion any reduction in capital inflows that may occur from monetary policy normalization in advanced economies.

However, capital outflow pressures could become more significant if there is a severe retrenchment in global risk appetite, as in the scenario described earlier.

Such pressures should usually be handled primarily with macroeconomic, structural, and financial policies, although the appropriate response will differ across countries depending on available policy space (see IMF 2012, 2015, 2016a). Where appropriate, exchange rate flexibility should be a key shock absorber, but in countries with sufficient international reserves, foreign exchange intervention can be useful to prevent disorderly market conditions. In periods of stress, liquidity provision may also be needed to support the orderly

functioning of financial markets. Capital flow management measures should be implemented only in crisis situations, or when a crisis is considered imminent, and should not substitute for any needed macroeco-

nomie adjustment. When circumstances warrant the use of such measures on outflows, they should be transparent, temporary, and nondiscriminatory and should be lifted once crisis conditions abate.

Box 1.1. A Widening Divergence between Financial and Economic Cycles

Prolonged monetary accommodation—and a continuing need to sustain economic momentum—has contributed to a widening divergence between financial and economic cycles. Rapid inflation of asset prices has ensued as large output gaps necessitate an unusually protracted period of low interest rates. This asset price growth has been accompanied by gathering strength in credit growth and rising leverage, the combination of which has facilitated strong financial expansion across several economies. Such financial expansions have generally been accompanied by less remarkable economic recoveries, leading to only slowly dissipating negative output gaps. This divergence creates a challenge for monetary and financial policies to support economic recovery while ensuring that medium-term risks do not build.

- In the United States, a maturing financial cycle expansion has combined with a slowly closing output gap. The combined growth of asset prices (equity, bond, property) since the recent recession has seen one of the longest and largest cyclical expansions since 1970, albeit from a relatively weak starting point (Figure 1.1.1, panel 1). This growth across asset markets has only moderated a little from its peaks, while credit growth has been gathering momentum.

This box was prepared by Paul Hiebert, Yingyuan Chen, and Yves Schüler (Deutsche Bundesbank).

At the same time, an unusually large negative output gap has been slow to close, suggesting a need for complementary macroeconomic and financial sector policies to support the economic recovery while attenuating the financial cycle upswing as needed.

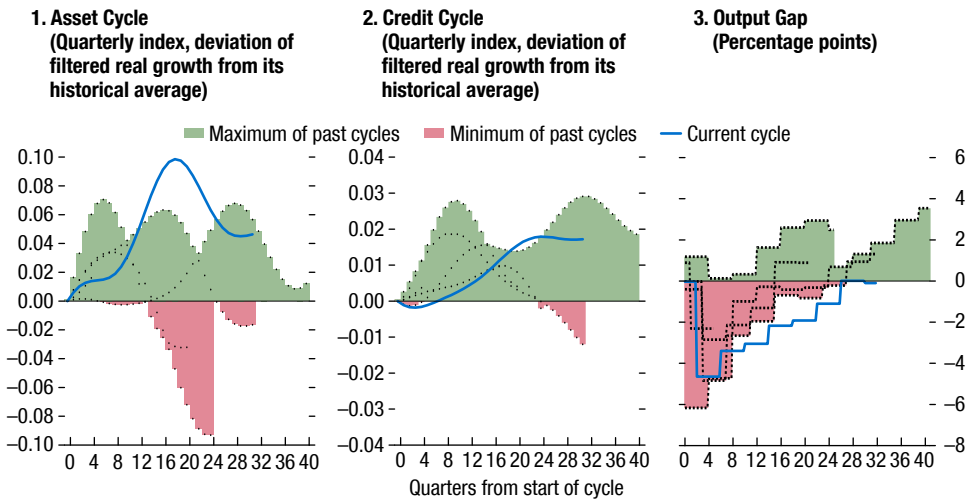
- In the euro area, the divergence between financial and economic cycles is also growing. A strong asset price boom is only slightly off recent peaks, while credit growth is slowly recovering (Figure 1.1.1, panel 2). This contrasts with a persistently large negative output gap—also suggesting a need for continued accommodative macroeconomic policies and tighter financial sector policies, as warranted in particular euro area member countries.
- The financial cycle in Japan, in contrast, has been more muted in tandem with a weak economic recovery, while asset price inflation has been volatile and oscillating around long-term trends in recent years. Recently, however, stronger credit growth has emerged along with a narrowing of the negative output gap.
- In other economies where debt service ratios for the private nonfinancial sectors have risen to high levels—such as Australia, Brazil, Canada, China, and Korea—there is a particularly strong need for financial sector policy vigilance to guard against any further buildup of imbalances.

Box 1.1 (continued)

Figure 1.1.1. Financial and Economic Cycles

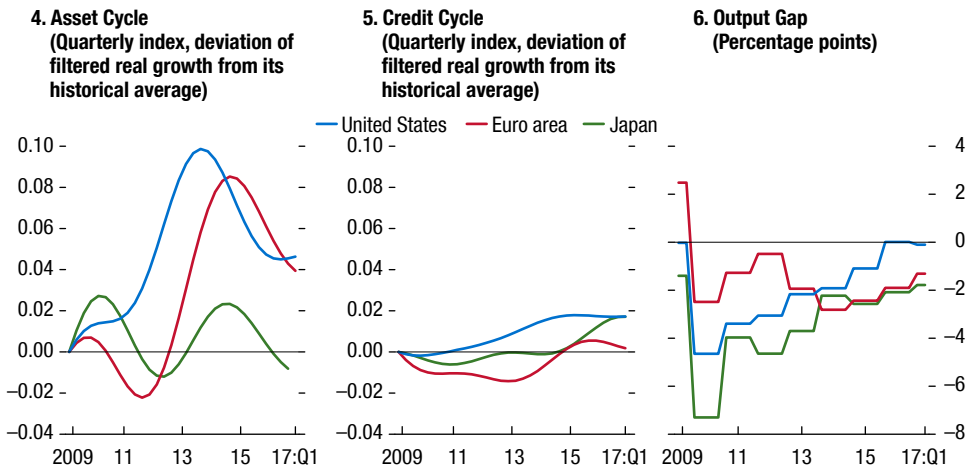
The US financial expansion and output gap are noteworthy by historical standards ...

US Cycles: Current versus Historical since 1970



... as a cumulative gap grows between financial and economic cycles across major advanced economies.

Asset and Credit Cycles and Output Gap



Sources: Bank for International Settlements; IMF, World Economic Outlook database; national sources; and IMF staff estimates.

Note: Cycles are dated using National Bureau of Economic Research recession dates. Cycles capture low-frequency movements around long-term rates. Real asset price cycles combine momentum common to equity, corporate bond, and house price indices—deflated using national consumer price indices. The credit cycle is real total nonfinancial sector credit. For more information on the underlying methodology, see Schüler, Hiebert, and Peltonen 2017.

Box 1.2. Cyberthreats as a Financial Stability Risk

Cyberthreats to financial institutions are growing, and events in 2016 and 2017 have altered the threat landscape substantially. There has been a sizable increase in the impact and sophistication of financially motivated cyberattacks on financial institutions.¹ Cyberthreats can be related to financial gain—including malware attacks—or can aim to destroy information technology systems. Some estimates place the economic losses of a hypothetical major global cyberattack as high as \$53 billion (Lloyds 2017). While the magnitude and frequency of attacks have grown, their nature has evolved as perpetrators have adopted operational models that replicate legitimate businesses, such as the use of vertically integrated software packages and cloud-based operations. This evolution renders the technology both more potent and easier to access. Moreover, because cyberthreats are international and can become systemic, private sector institutions are not well positioned to respond effectively on their own. A coordinated regulatory approach is needed, which would result in a consistent risk mitigation framework to support financial stability.

The systemic risk ramifications of a cyberattack could be substantial. There are several channels through which cybersecurity events could threaten financial stability: (1) data breach, (2) disruption of business, (3) integrity attack (modifications to internal data), and (4) malicious activities (financial gain). Greater reliance on technology, combined with the interconnection of the global financial system, means that many, if not all, participants in the system are at risk. Banks and financial market infrastructures, in particular, harbor the potential for contagious cyber risk, given their interconnection—so that attacks on individual financial institutions can quickly fan out across national financial systems and beyond. A recent example concerns the June 2017 “NotPetya” attack, disguised as ransomware, which among others severely hit bank operations in Ukraine. Information technology systems in the country, including automatic teller machines, were rendered unusable. Problems spilled across borders² at a total global cost of some \$850 million. Other interconnected financial institutions, such as financial infrastructures (for example, payment,

clearing, and settlement systems), are also at risk. Insurance companies are less exposed through connectedness; however, their indirect exposure through their cyberinsurance risk underwriting can be significant and is not fully understood.³

A global and coordinated policy response is needed to ensure *resilience* to cyberattacks and combat cybercrime. Regulators have begun introducing cybersecurity regulations. Among recent initiatives, the European Parliament—following up on the EU-wide Cybersecurity Strategy—adopted the directive on security of network and information systems; the European Banking Authority issued guidelines on information and communications technology risk assessment; the Bank of England launched a vulnerability testing framework and set out a supervisory statement on cyberinsurance underwriting risk; the Board of Governors of the Federal Reserve System, the Office of the Comptroller of the Currency, and the Federal Deposit Insurance Corporation jointly published a notice of proposed rulemaking regarding enhanced cyber risk management standards; the Committee on Payments and Market Infrastructures and the Board of the International Organization of Securities Commissions issued cyberguidance for financial market infrastructures; and the New York State Department of Financial Services issued Cybersecurity Requirements for Financial Services Companies. The EU-wide General Data Protection Regulation, effective May 2018, although not specific to the financial sector, will nevertheless have a significant global impact on the system, given its extraterritorial applicability and potentially drastic fines for data breaches.⁴ While regulations converge on common themes, their sectoral applicability and level of detail vary, which presents compliance difficulties for international operations. Tackling cybercrime effectively means attacking its business model. The risks of being engaged in cybercrime must be raised significantly, underpinned by stronger international coordination.

Beyond ensuring resilience, regulation has increasingly focused on *prevention*. Frameworks are being designed for the identification and prevention of cyberincidents, as well as for timely recovery and information sharing. Ongoing initiatives by financial

This box was prepared by Tamas Gaidosch and Chris Wilson.

¹For example, the number of stolen identities rose 95 percent year over year in 2016, according to Symantec.

²For example, two multinational companies estimated losses from NotPetya exceeding \$130 million each.

³As evidenced by the recent supervisory statement of the Bank of England on cyberinsurance underwriting risk.

⁴Fines can be up to 4 percent of yearly turnover or €20 million, whichever is greater.

Box 1.2 (continued)

regulators typically include practical countermeasures such as requirements on penetration and resilience tests (for example, testing how far into an organization's system hackers can go and how well the system defends itself and recovers). As these regulations take hold, harmonization of minimum standards is needed to help smooth implementation, especially for institu-

tions operating across borders and sectors. More international coordination would be helpful to share good practice, identify emerging risks, and raise standards across the entire global system—including, as needed, broader cross-border cooperation and information sharing with intelligence and other agencies outside the financial sector, among others.

References

- Adrian, Tobias, and Markus Brunnermeier. 2016. “CoVaR.” *American Economic Review* 106 (7): 1705–41.
- Adrian, Tobias, Richard Crump, and Emanuel Moench. 2013. “Pricing the Term Structure with Linear Regressions.” Staff Report 340 (revised), Federal Reserve Bank of New York.
- Adrian, Tobias, Michael Fleming, Shachar Or, and Erik Vogt. 2017. “Market Liquidity after the Financial Crisis.” Staff Report 796 (revised), Federal Reserve Bank of New York, June.
- Adrian, Tobias, and Hyun Song Shin. 2013. “Procyclical Leverage and Value-at-Risk.” Staff Report 338 (revised), Federal Reserve Bank of New York.
- Arslanalp, Serkan and Takahiro Tsuda. 2012. “Tracking Global Demand for Advanced Economy Sovereign Debt”, IMF Working Paper 12/284, Updated, International Monetary Fund, Washington, DC.
- Bank for International Settlements (BIS). 2012. “Do Debt Service Costs Affect Macroeconomic and Financial Stability?” *BIS Quarterly Review* (September): 21–35.
- . 2017. *Annual Report: The Global Economy: Maturing Recoveries, Turning Financial Cycles?* Basel.
- Bank of England. 2017. “Changing Risks and the Search for Yield on Solvency II Capital.” Speech by David Rule, July 6.
- Bank Wealth Management Registration and Trusteeship Center. 2017. *China Bank Wealth Management Market Annual Report 2016* (in Chinese). <http://www.chinawealth.com.cn/resource/830/846/863/51198/52005/961636/1495184467803885769503.pdf>.
- Basel Committee on Banking Supervision. 2014. “The G-SIB Assessment Methodology—Score Calculation.” Bank for International Settlements, Basel.
- Bonis, Brian, Jane Ihrig, and Min Wei. 2017. “The Effect of the Federal Reserve’s Securities Holdings on Longer-Term Interest Rates.” FEDS Notes, Board of Governors of the Federal Reserve System. <https://www.federalreserve.gov/econres/notes/feds-notes/effect-of-the-federal-reserves-securities-holdings-on-longer-term-interest-rates-20170420.htm>.
- Brunnermeier, Markus, and Yuliy Sannikov. 2014. “A Macroeconomic Model with a Financial Sector.” *American Economic Review* 104 (2): 379–421.
- Caruana, Jaime. 2017. “Have We Passed ‘Peak Finance?’” International Center for Monetary and Banking Studies, Bank for International Settlements, Basel.
- Cetorelli, Nicola, and Linda Goldberg. 2012. “Banking Globalization and Monetary Transmission.” *Journal of Finance* 67 (5): 1811–43.
- Chandumont, M. L. 2016. “The Volatility Regime.” *Actuary* 13 (1): 36–43.
- Dattels, Peter, Rebecca McCaughrin, Ken Miyajima, and Jaume Puig. 2010. “Can You Map Global Financial Stability?” IMF Working Paper 10/145, International Monetary Fund, Washington, DC.
- Drehman, M., M. Juselius, and A. Korinek. 2017. “Accounting for Debt Service: The Painful Legacy of Credit Booms.” BIS Working Paper 645, Bank for International Settlements, Basel.
- European Central Bank (ECB). 2017. “Box 2: Financial Vulnerabilities of Euro Area Households.” *Financial Stability Review* (May).
- Fiechter, Jonathan, Inci Otker-Robe, Anna Ilyina, Michael Hsu, Andre Santos, and Jay Surti. 2011. “Subsidiaries or Branches: Does One Size Fit All?” IMF Staff Discussion Note 11/04, International Monetary Fund, Washington, DC.
- Financial Stability Board (FSB). 2017. “Policy Recommendations to Address Structural Vulnerabilities from Asset Management Activities.” January 12.
- Geanakoplos, John. 2010. “The Leverage Cycle.” *NBER Macroeconomics Annual* (24).
- Guscina, A., G. Pedras, and G. Presciuttini. 2014. “First-Time International Bond Issuance—New Opportunities and Emerging Risks.” IMF Working Paper 14/127, International Monetary Fund, Washington, DC.
- International Monetary Fund (IMF). 2012. “The Liberalization and Management of Capital Flows: An Institutional View.” Washington, DC.
- . 2015. “Managing Capital Outflows: Further Operational Considerations.” IMF Policy Paper, Washington, DC.
- . 2016a. “Capital Flows—Review of Experience with the Institutional View.” IMF Policy Paper, Washington, DC.
- . 2016b. “China—2016 Article IV Consultation.” IMF Country Report 16/270, Washington, DC.
- . 2016c. “China—Selected Issues.” IMF Country Report 17/271, Washington, DC.
- . 2017a. “Macroeconomic Developments and Prospects in Low-Income Developing Countries.” Policy Paper, Washington, DC.
- . 2017b. “The Medium-Term Debt Management Strategy: An Assessment of Recent Capacity Building.” Policy Paper 072817, Washington, DC.
- . 2017c. “Euro Area Policies—2017 Article IV Consultation.” IMF Country Report 17/235, Washington, DC.
- . 2017d. “Japan—2017 Article IV Consultation.” IMF Country Report 17/242, Washington, DC.
- . 2017e. “Japan—Financial System Stability Assessment.” IMF Country Report 17/244, Washington, DC.
- . 2017f. “China—2017 Article IV Consultation.” IMF Country Report 17/247, Washington, DC.
- International Organization of Securities Commissions (IOSCO). 2017. “Consultation on CIS Liquidity Risk Management Recommendations.” July.
- Koepke, Robin. 2014. “Fed Policy Expectations and Portfolio Flows to Emerging Markets.” Working Paper, Institute of International Finance, Washington, DC.
- Laeven, Luc, and Fabian Valencia. 2012. “Systemic Banking Crises Database: An Update.” IMF Working Paper 12/163, International Monetary Fund, Washington, DC.

- Lloyds. 2017. “Counting the Cost: Cyber Exposure Decoded.” Emerging Risks Report 2017. <https://www.lloyds.com/-/media/files/news-and-insight/risk-insight/2017/cyence/emerging-risk-report-2017---counting-the-cost.pdf>.
- McCauley, Robert Neil, Agustín Bénétrix, Patrick McGuire, and Goetz von Peter. 2017. “Financial Deglobalisation in Banking?” Working Paper 650, Bank for International Settlements, Basel.
- Mian, Atif, and Amir Sufi. 2011. “House Prices, Home Equity-Based Borrowing and the US Household Leverage Crisis.” *American Economic Review* 101: 2132–56.
- Reinhardt, Dennis, and Steven Riddiough. 2015. “The Two Faces of Cross-Border Banking Flows.” *IMF Economic Review* 63 (4): 751–91.
- Schularick, Moritz, and Alan Taylor. 2012. “Credit Booms Gone Bust: Monetary Policy, Leverage Cycles, and Financial Crises, 1870–2008.” *American Economic Review* 102 (2): 1029–61.
- Schüler, Yves S., Paul P. Hiebert, and Tuomas Peltonen. 2017. “Coherent Financial Cycles for G7 Countries: Why Extending Credit Can Be an Asset.” Working Paper 43, European Systemic Risk Board, Frankfurt am Main.
- UK Financial Conduct Authority (FCA). 2017. “Illiquid Assets and Open-Ended Investment Funds.” Discussion P DP 17/1. February.
- US Securities and Exchange Commission (SEC). 2016. “Investment Company Risk Management Program Rules.” October 13.
- Vitek, Francis. 2017. “Policy, Risk and Spillover Analysis in the World Economy: A Panel Dynamic Stochastic General Equilibrium Approach.” IMF Working Paper 17/89, International Monetary Fund, Washington, DC.
- Wright, Jonathan. 2011. “Term Premia and Inflation Uncertainty: Empirical Evidence from an International Panel Dataset.” *American Economic Review* 101 (4): 1514–34.