

THREE SCENARIOS FOR FINANCIAL STABILITY

Financial Stability Overview

During the past six months financial stability has improved in advanced economies, but risks continue to rotate toward emerging markets amid a lower risk appetite and higher market and liquidity risks. In advanced economies, growth is gaining traction, and monetary policy normalization is approaching in the United States. Despite these improvements in advanced economies, emerging market vulnerabilities remain elevated. Several key emerging market economies face substantial domestic imbalances, and growth projections have been downgraded, leaving financial stability risks tilted to the downside. The possibility of a global asset market disruption, whereby market risk premiums would decompress in a disorderly way and spread financial contagion, remains heightened. Such a scenario could derail the recovery and delay or stall monetary policy exits. In contrast, “successful normalization”—featuring gradually rising risk premiums, orderly balance sheet adjustments, and renewed financial and corporate health—will require concerted policy action.

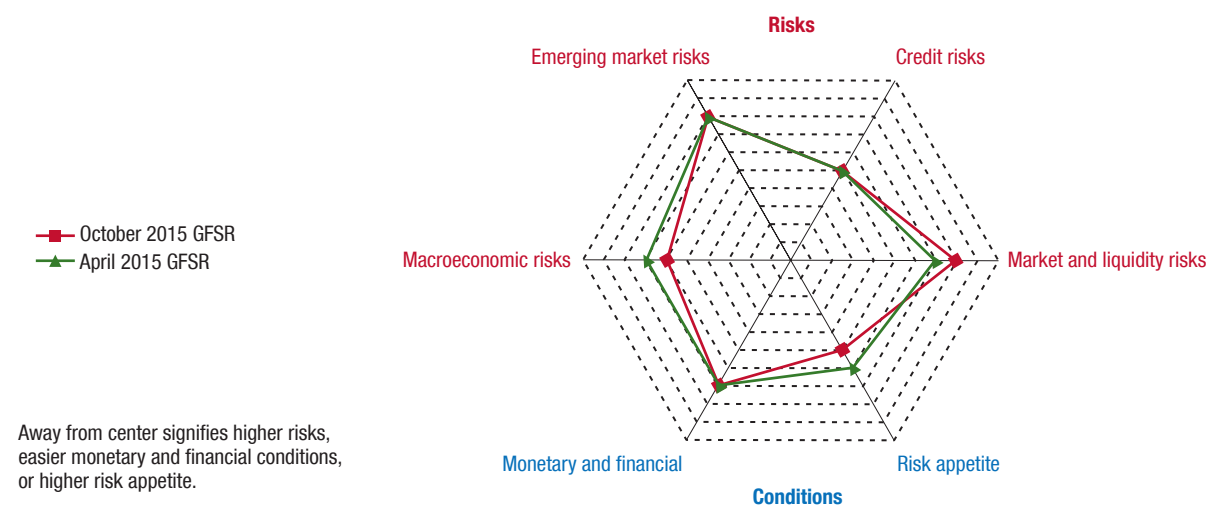
Financial stability has improved modestly in advanced economies since the April 2015 *Global Financial Stability Report* (GFSR), as shown in the Global Financial Stability Map (Figure 1.1) and its components (Figure 1.2). Risks continue to rotate from advanced economies to emerging markets and from banking to nonbanking sectors, keeping *emerging market risks* elevated, while *market and liquidity risks* continue to increase, in an environment of lower *risk appetite*.

Prepared by Matthew Jones (Division Chief), Martin Čihák (Advisor), Ali Al-Eyd (Deputy Division Chief), Jennifer Elliott (Deputy Division Chief), Serkan Arslanalp, Magally Bernal, Antoine Bouveret, Peter Breuer, John Caparusso, Yingyuan Chen, Fabio Cortes, Reinout De Bock, Martin Edmonds, Michaela Erbenova, Tryggvi Gudmundsson, Sanjay Hazarika, Geoffrey Heenan, Eija Holttinen, Mustafa Jamal, Bradley Jones, David Jones, William Kerry, Sheheryar Malik, Evan Papageorgiou, Vladimir Pillionca, Jean Portier, Juan Rigat, Shaun Roache, Luigi Ruggerone, Luca Sanfilippo, Kate Seal, Nobuyasu Sugimoto, Narayan Suryakumar, Shamir Tanna, Constant Verkoren, Francis Vitek, and Jeffrey Williams.

Financial stability has improved in advanced economies

Macroeconomic risks have declined as the economic recovery in advanced economies has broadened. Deflation fears peaked in early 2015 and confidence in monetary policies has since increased (Figure 1.3, panels 1 and 2), as reflected in improved cyclical economic data in advanced economies. The following developments allow for cautious optimism about near-term stability and growth:

- *The U.S. recovery has resumed, and wage and price inflation pressures remain subdued.* Improving labor market performance is boosting hopes of sustainable consumer and household support for the recovery, as noted in the October 2015 *World Economic Outlook* (WEO). With the output gap closing, the Federal Reserve is nearer to raising its monetary policy rate above the zero bound. This action will mark the beginning of a move away from the long period of extraordinary monetary accommodation and the first step toward normalizing monetary and financial conditions. It will also help reduce the pockets of both excess financial risk taking and corporate leverage—as flagged in previous issues of the GFSR—that have arisen as a result of the highly accommodative monetary policies of recent years.
- *The policies of the European Central Bank (ECB) are taking hold and euro area credit conditions are easing.* Signs are growing that the ECB’s unconventional monetary policy is starting to work. For example, the portfolio rebalancing channel sent asset prices higher, narrowed spreads, and boosted the nonbank supply of credit. Policies aimed at strengthening the banking system have bolstered confidence as well as safety, and credit supply and demand have risen. The market’s expected time remaining before the commencement of ECB policy normalization has halved to 2½ years, but has recently edged up amid increased turmoil in global markets (Figure 1.3, panel 2). Market reactions to developments in Greece have been muted so far, reflecting the strength of European firewalls, the ECB’s commitment and actions, and the declining importance of systemic linkages associated with Greece.

Figure 1.1. Global Financial Stability Map: Risks and Conditions


Source: IMF staff estimates.

Note: GFSR = *Global Financial Stability Report*.

- *The Japanese economy is expected to continue to recover, despite a setback in the second quarter.* Tentative signs are emerging that corporate investment plans are firming, helping improve the outlook for wage and price inflation. The Bank of Japan's quantitative and qualitative monetary easing has improved financial conditions, increasing equity prices and leading to a modest increase in bank lending. However, market-based inflation expectations remain below the Bank of Japan's inflation target.

Easy monetary and financial conditions and improvements in private balance sheets in advanced economies have spurred the cyclical recovery, but the transition to self-sustaining growth is incomplete. The financial stability outlook is characterized by continuing cyclical recovery, but prospects for medium-term growth are weak, as noted in the October 2015 WEO. In the United States, earlier measures to repair bank balance sheets have helped boost credit growth, and economic risk taking is rising, but from low levels (Figure 1.4). In Japan, investment is slowly recovering from very low levels as the availability of credit has increased with the improvement in banking system health. The level of euro area real investment still remains below that of 2008, and the outlook for medium-term growth is decidedly weak.

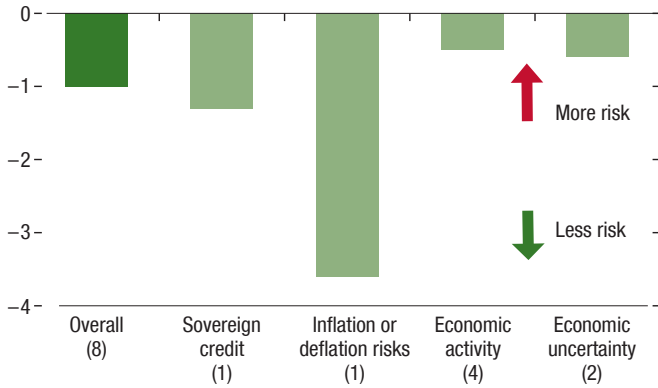
Risks continue to rotate from advanced economies to emerging markets

Emerging market risks remain elevated. Several key emerging market economies face substantial domestic imbalances, and growth projections have been downgraded. Although the quality of bank assets appears robust, many emerging market economies are at late stages in their credit cycles, leaving them more vulnerable to an economic downturn and a likely tightening of external financial conditions as the Federal Reserve prepares to raise policy rates for the first time since 2006 (see also Chapter 3).

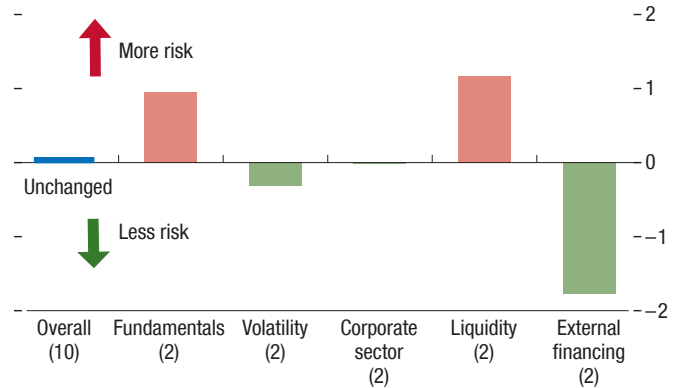
China faces a delicate balance of transitioning to more consumption-driven growth without activity slowing too much, addressing rising financial and corporate sector vulnerabilities, and making the transition toward a more market-based financial system that discourages the buildup of imbalances. Recent market developments underscore the complexity of these challenges, as well as potentially stronger spillovers from China. A gradual growth slowdown is inevitable in the process of reining in vulnerabilities, but the recent weaker-than-expected economic indicators and exchange rate depreciation raised concerns about corporate indebtedness (particularly in foreign currency), while banks are reporting higher credit costs and rising nonperforming loans, albeit from low levels. Although China has substantial buffers to deal with shocks—including official foreign reserves well exceeding private sector external debt—

Figure 1.2. Global Financial Stability Map: Components of Risks and Conditions
(Notch changes since the April 2015 Global Financial Stability Report)

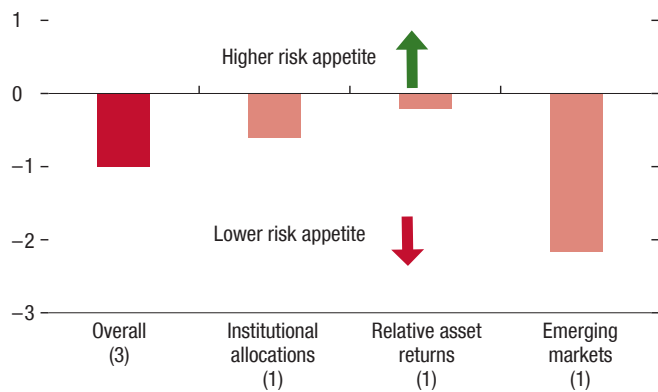
1. Macroeconomic risks are lower, mainly from improved signs of recovery in advanced economies.



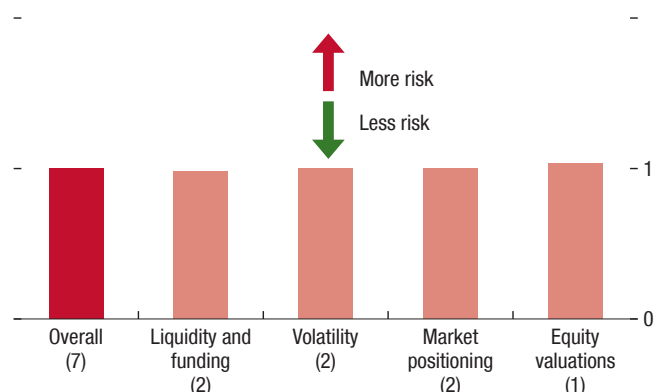
2. Emerging market risks are unchanged but elevated. External conditions, including current account balances, have improved, but liquidity has weakened and credit ratings have deteriorated.



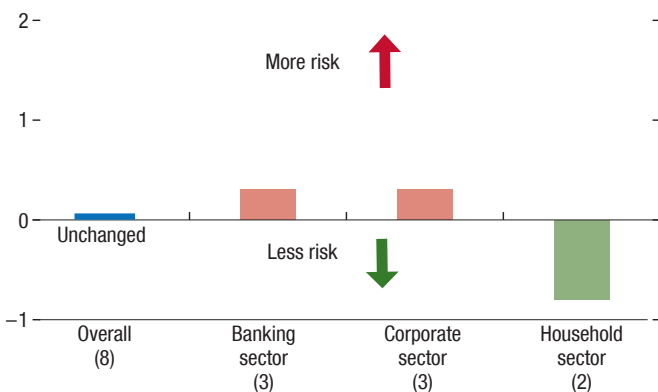
3. Risk appetite has decreased, primarily as a result of substantial outflows from emerging markets, although the allocation to, and performance of, riskier assets have declined somewhat.



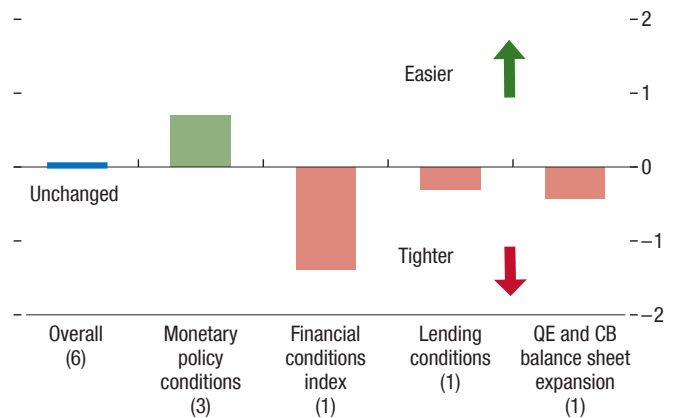
4. Market and liquidity risks have increased following a broad worsening of market conditions. Liquidity is weaker and volatility higher following the deterioration in markets and downturn in sentiment.



5. Credit risks are unchanged although their composition has shifted. Banking valuations have deteriorated and corporate defaults have increased. Household credit risks have decreased.



6. Monetary and financial conditions are unchanged, as real interest rates remain very low and central bank balance sheets are at highly expansionary levels.

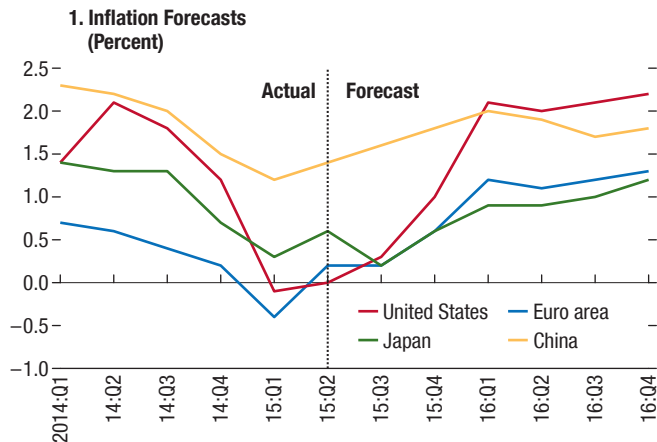


Source: IMF staff estimates.

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 below each label indicates the number of individual indicators within each subcategory of risks and conditions. For lending conditions, positive values represent slower pace of tightening or faster easing. CB = central bank; QE = quantitative easing.

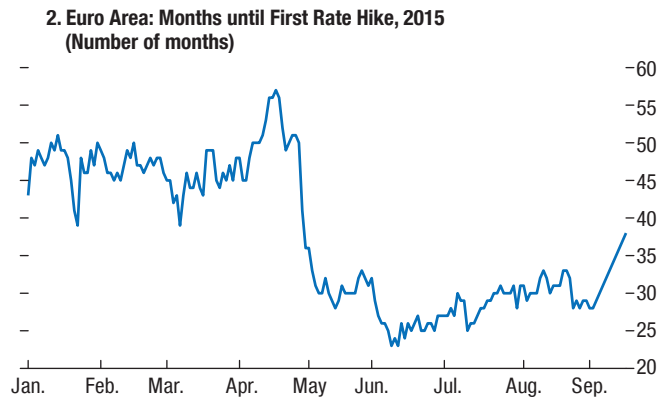
Figure 1.3. Inflation, Monetary Policy, and Policy Rate Normalization

Headline inflation is projected to gradually rise in advanced economies...



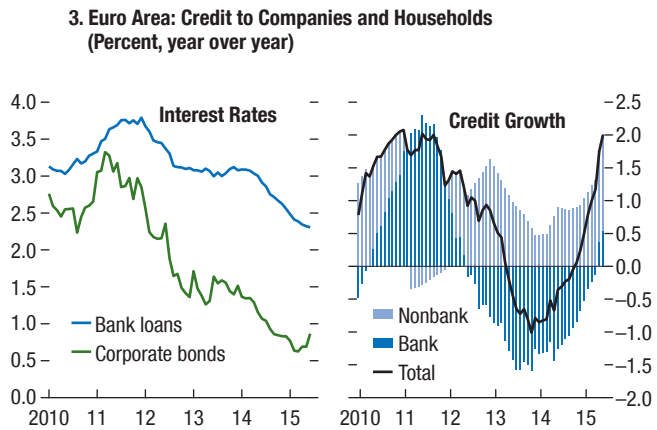
Sources: Bloomberg, L.P.; and IMF staff calculations.
Note: Headline inflation (Japan adjusted for value-added tax).

...and markets have shifted from pessimism to cautious optimism.



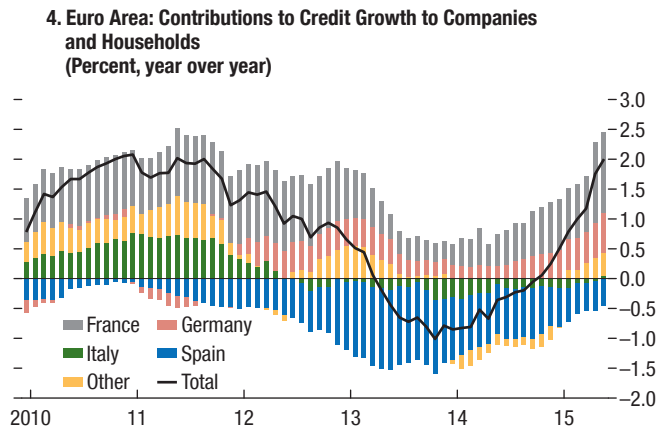
Source: Citigroup.

Euro area credit conditions are easing...



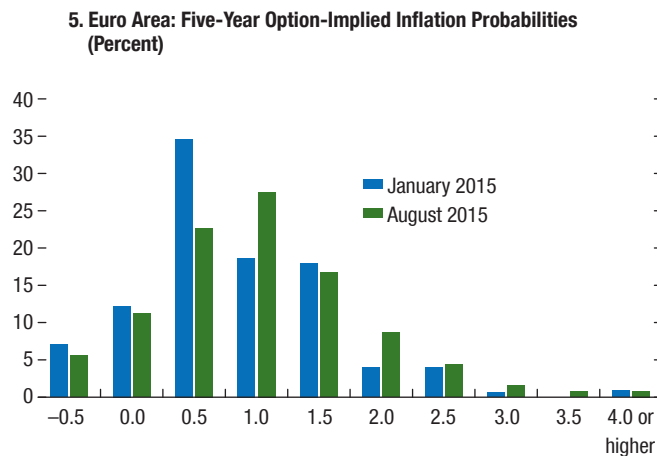
Sources: European Central Bank; Haver Analytics; and IMF staff calculations.

...as quantitative easing and bank reform begin to revive credit.



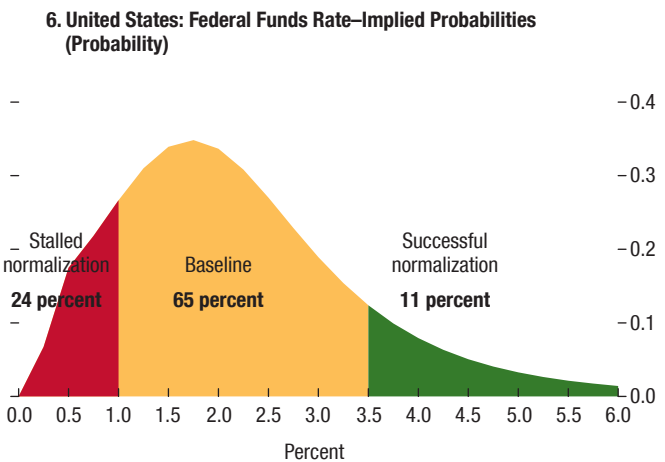
Sources: European Central Bank; Haver Analytics; and IMF staff calculations.

But deflation risks remain in the euro area...



Source: IMF staff calculations.
Note: The probabilities are constructed by creating a "butterfly" portfolio that pays out if inflation takes a specific value or range. The options involved are inflation caps and floors that protect the buyer against high and low inflation, respectively. Each x-axis label refers to midpoint probability.

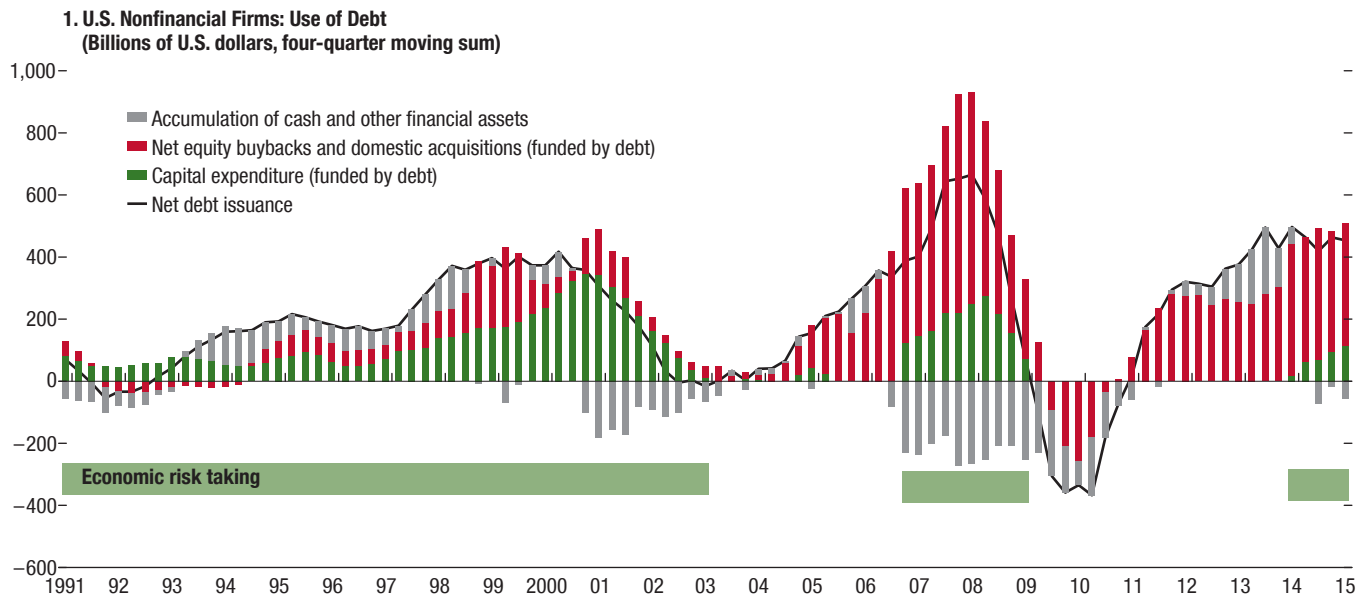
...and full monetary policy normalization is not guaranteed, even in the United States.



Source: IMF staff calculations.
Note: For this calculation, the market pricing of options expiring in August 2017 on three-month swaps was used to determine the probability that market participants are placing on a stalled normalization. The calculation assumes that the difference between the three-month swap rate and the effective federal funds rate would remain relatively stable, at 15 basis points.

Figure 1.4. Economic Risk Taking Remains Weak in Advanced Economies

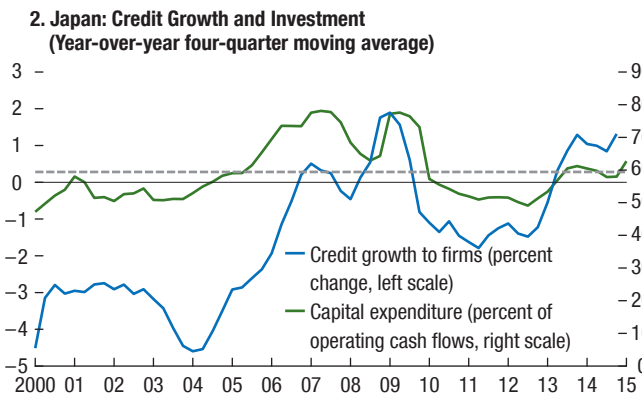
In the United States, easier policies have spurred only tentative signs of economic risk taking.



Sources: Federal Reserve; and IMF staff estimates.

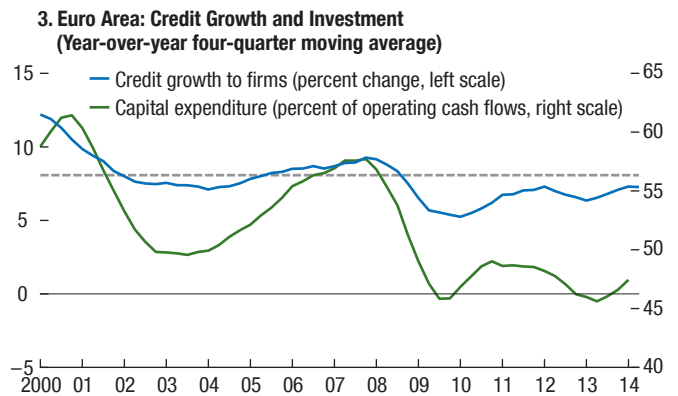
Note: Capital expenditure (funded by debt) is equal to capital expenditures minus internal funds. Net equity buybacks consist of the sum of buybacks, after deducting any new issues that companies make to finance their own businesses, and when employees exercise their options. Episodes when debt issuance finances capital expenditures are identified as common risk taking.

Investment in Japan is rising from low levels...



Sources: Bank for International Settlements; Japan, Ministry of Finance (Quarterly Report of Incorporated Enterprises Statistics); and IMF staff estimates.
Note: The dashed line represents the historical average since 2000.

...but remains subdued in the euro area.



Sources: Bank for International Settlements; European Central Bank; and IMF staff estimates.
Note: The dashed line represents the historical average since 2000.

what has been perceived as unconventional official policy interventions to stem volatility in Chinese equities and the exchange rate have weakened market confidence in a smooth resolution of these challenges. The consequences for emerging market economies of weaker economic performance and increased policy uncertainty in China

could be significant. Further softening of Chinese demand for commodities and investment goods would undermine growth in emerging market economies, while a weaker Chinese exchange rate would affect external competitiveness. These concerns have started to manifest in market prices, crystallizing the rotation of financial

market risks toward emerging market economies, as discussed in this and previous GFSRs (Figure 1.5).

The risks of tipping into the downside are driven by disruptions in global asset markets

Potential near-term adverse shocks in the presence of system vulnerabilities could prematurely halt the rise in U.S. interest rates, degrade financial stability, and stall the economic recovery. Shocks could originate in advanced economies—possibly owing to greater spillovers from Greece to the euro area and international markets—or emerging markets, for example, from greater-than-expected spillovers from China. These shocks could further exacerbate the negative influence of the medium-term forces at play, including ongoing low productivity growth, crisis legacies in advanced economies (high public and private debt and low investment), and ongoing adjustment in emerging market economies after the postcrisis boom in credit and growth and the turn of the commodity cycle (see the October 2015 WEO).

Disruptions in global asset markets would erode public confidence in policy, eliminate market optimism, and generate an abrupt rise in market risk premiums. A rise in equity risk premiums would push global equities down, while credit spreads would widen as default risk increases. The tightening of overall financial conditions and decline in confidence would worsen the outlook along with prospects for investment and consumption.

Financial contagion could surface should asset price movements be amplified by low market liquidity and fragile market structures. Balance sheet commitments by dealers have shrunk dramatically, and smaller trade sizes and reduced market making have had a negative impact on liquidity across markets. These developments raise the risk of volatility and mark-to-market losses during stress periods, while higher asset market correlations and embedded leverage in derivatives positions create the potential for cross-market contagion. An analysis of corporate debt trading indicates how liquidity stress could put pressure on corporate earnings of highly leveraged companies, as discussed in the section “Global Policy Challenges” and in Chapter 2.

Many emerging markets are in the late stage of the credit cycle, and are highly vulnerable to this downside scenario because their balance sheets have become more stretched and more susceptible to market stress and

shocks. Oversupply and concerns about slowing growth in China have been the primary drivers for the recent slump in commodity prices, with relatively tepid growth in advanced economies also weighing on prices. Investor concerns have focused on commodity-exporting emerging markets (Brazil, Chile, Malaysia, Russia, and South Africa), whose currencies so far this year have declined between 5 and 25 percent against the dollar, while their equity indices have generally tracked declines of global commodity prices. The capital positions of a number of emerging market banks—until recently, stronger than those of their advanced economy peers—have been weakening. Borrowers’ rising leverage and increasingly strained balance sheets suggest that their credit costs will probably rise (Chapter 3).

Policies are needed to ensure successful normalization

Successful normalization of financial and monetary conditions would bring macrofinancial benefits and considerably reduce downside risks. This report analyzes the prospects for normalization according to three scenarios: the baseline, an upside scenario of successful normalization, and a downside scenario characterized by disruptions in global asset markets (Table 1.1). This analysis points to structural problems and incomplete postcrisis policy initiatives that open the way for shocks to halt normalization. It also models the downside and upside scenarios to indicate the scale of costs and benefits at stake.

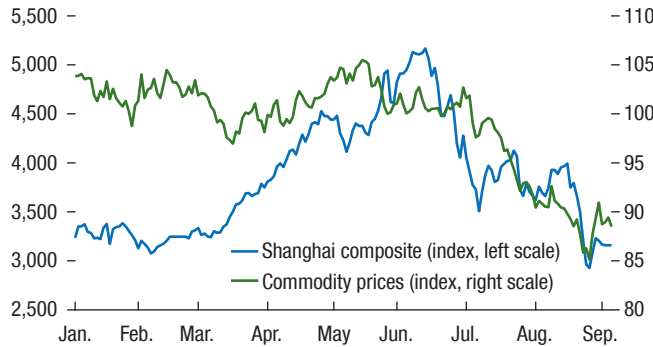
The decline during the past six months in market-implied probabilities of below-target inflation in the euro area (Figure 1.3, panel 5) has not been large enough to vanquish elevated risks of euro area recession and deflation. In the United States, market data suggest a notable risk that an initial tightening by the Federal Reserve could stall, bringing about a loss of momentum in economic activity. More precisely, the market-implied expectation is of a nearly 25 percent chance that the central bank will tighten fewer than four times by the end of 2017. Similarly, the market-implied probability of achieving a more rapid tightening to a higher terminal policy rate consistent with a stronger economy is also relatively low. The inference is that attaining monetary normalization in the United States could prove challenging, possibly owing to global factors.

A concerted, collective effort and strong policy action (Table 1.1) can help ensure continued improvement in prospects for financial stability by reducing the

Figure 1.5. Locus of Risks Shifting toward Emerging Markets

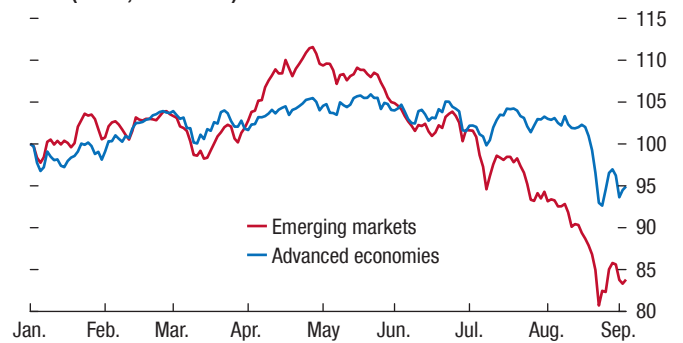
Negative sentiment on China has hurt commodities and Chinese equities...

1. Commodities and Chinese Stock Prices, 2015



...adding to pressures, particularly on emerging market equities...

2. Global Equities, 2015 (Jan. 1, 2015 = 100)



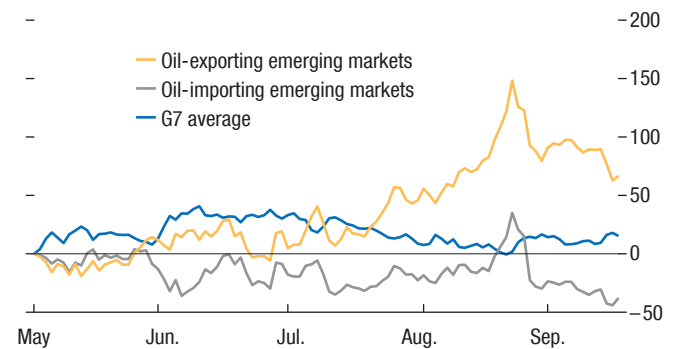
...and weakening emerging market currencies.

3. Trade-Weighted Foreign Exchange, 2015 (Jan. 1, 2015 = 100)



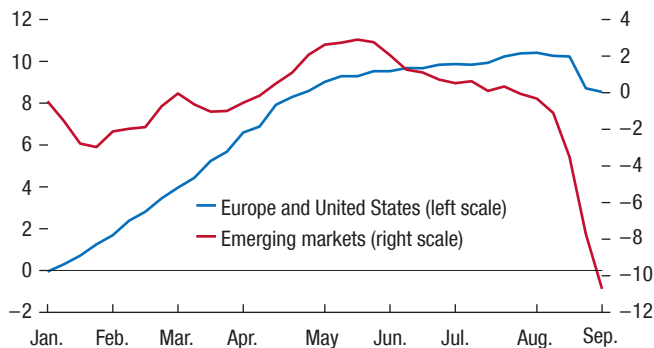
Sovereign yields for commodity exporters have been hurt the most...

4. Sovereign Bond Yield Changes since April 30, 2015 (Cumulative change in basis points)



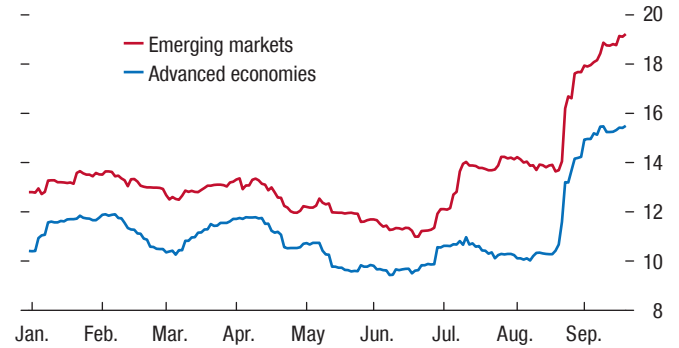
...contributing to persistent outflows from emerging markets...

5. Cumulative Bond Fund Flows, 2015 (Exchange-Traded Funds and Mutual Funds) (Billions of U.S. dollars)



...and rising volatility.

6. Historical Equity Volatilities, 2015 (Percent, 90-day window)



Sources: Bloomberg, L.P.; EPFR Global; Morgan Stanley; Morgan Stanley Capital International; and IMF staff calculations. Note: G7 = Group of Seven.

Table 1.1. Three Scenarios for Financial Stability

Global Asset Market Disruption	Baseline	Successful Normalization
<ul style="list-style-type: none"> • Loss of confidence in policies • Growth declines • Delayed or stalled monetary normalization • Abrupt decompression of risk premiums amplified by low market liquidity • Credit cycle downturns in most emerging markets, along with disorderly deleveraging 	<ul style="list-style-type: none"> • Current policies • Mediocre growth • Only partial handover from financial risk taking to economic risk taking • Asynchronous monetary normalization in systemic advanced economies 	<ul style="list-style-type: none"> • Policy implementation complete • Higher medium-term growth driven by improved fundamentals • Handover from financial risk taking to economic risk taking • Smooth and converging monetary normalization in systemic advanced economies • Smooth decompression of risk premiums • Emerging market resilience, orderly deleveraging

Source: IMF staff.

Note: For calibration of the scenarios and the underlying methodology, see Annex 1.2.

downside risks and achieving successful normalization of financial conditions. Policies must provide for more resilient market liquidity, address legacy problems, contribute to economic risk taking, and anchor optimism for medium-term financial stability and growth. This would be aided by a smooth market response to the rise in the U.S. policy rate. In the euro area, the necessary measures include cleaning up impaired bank and nonbank balance sheets. Complementary policies include strengthening prudential supervision, reforming insolvency procedures, and developing distressed-debt markets. In China, and in emerging markets more broadly, policies for orderly deleveraging must be implemented. The scenario and policy recommendations are discussed in the final section, “Policies for Successful Normalization.”

Global Policy Challenges

Policymakers face a triad of challenges relating to crisis legacies in advanced economies, vulnerabilities in emerging market economies, and systemic market liquidity concerns. If these challenges are mishandled, they could materialize as significant risks to financial stability.

The world is facing a triad of challenges

The global outlook remains clouded by three broad policy challenges in evidence during the past several months (Figure 1.6):

- *Emerging markets’ vulnerabilities*—Many emerging markets have increased their resilience to external shocks with increased exchange rate flexibility, higher foreign exchange reserves, increased reliance on FDI flows and domestic-currency external

Figure 1.6. Triad of Global Policy Challenges



Source: IMF staff.

- financing, and generally stronger policy frameworks. But company and bank balance sheets are now stretched thinner in many emerging markets, making some of these economies more susceptible to financial stress, economic downturn, and capital outflows. China in particular faces a delicate balance of transitioning to more consumption-driven growth without activity slowing too much, addressing rising financial and corporate sector vulnerabilities, and making the transition to a more market-based system that discourages the buildup of imbalances—a challenging set of objectives. Recent market developments, including slumping commodity prices, China’s bursting equity and margin-lending bubble, falling emerging market equities, and pressure on exchange rates, underscore these challenges.
- *Legacy issues from the crisis in advanced economies*—In particular, high public and private debt in advanced economies and remaining gaps in the euro area architecture need to be addressed to consolidate

financial stability and avoid political tensions and headwinds to confidence and growth. In the euro area, addressing remaining sovereign and banking vulnerabilities is still a challenge.

- *Weak systemic market liquidity*—This poses a challenge in adjusting to new equilibria in markets and the wider economy. Extraordinarily accommodative policies contributed to a compression of risk premiums across a range of markets, including sovereign bonds and corporate credit, as well as a compression of liquidity and equity risk premiums. Risk premiums remain below historical levels in the U.S. Treasury market, as the Federal Reserve looks set to begin the gradual process of tightening monetary policy (Figure 1.2.1). As such, the global financial system faces an unprecedented adjustment as risk premiums “normalize” from low levels alongside rising policy rates, amid a modest global cyclical recovery. The challenge will be for abnormal market conditions to adjust smoothly to the new environment. However, there are risks from a rapid decompression, particularly given what appear to be more brittle market structures and market fragilities concentrated in credit intermediation channels, which could come to the fore as financial conditions normalize (see Chapter 2). Indeed, recent episodes of high market volatility and liquidity dislocations across advanced economy and emerging market asset classes highlight this challenge.

Other potential global risks and repercussions can be subsumed under this triad, including from the recent marked fall in global commodity prices or a flare-up of geopolitical tensions. Policy challenges in China and Greece are used here to illustrate the potential risks posed by vulnerabilities in emerging markets and legacy issues in advanced economies, respectively, and to illustrate how such shocks could combine with a “bumpy” exit in the United States and be amplified through existing market fragilities.

Emerging markets are in the late stages of the credit cycle

Emerging market and advanced economies’ credit cycles have diverged since the global financial crisis (Figure 1.7). Advanced economies have spent the past few years traversing a sharp downturn and painful balance sheet deleveraging and repair. But some

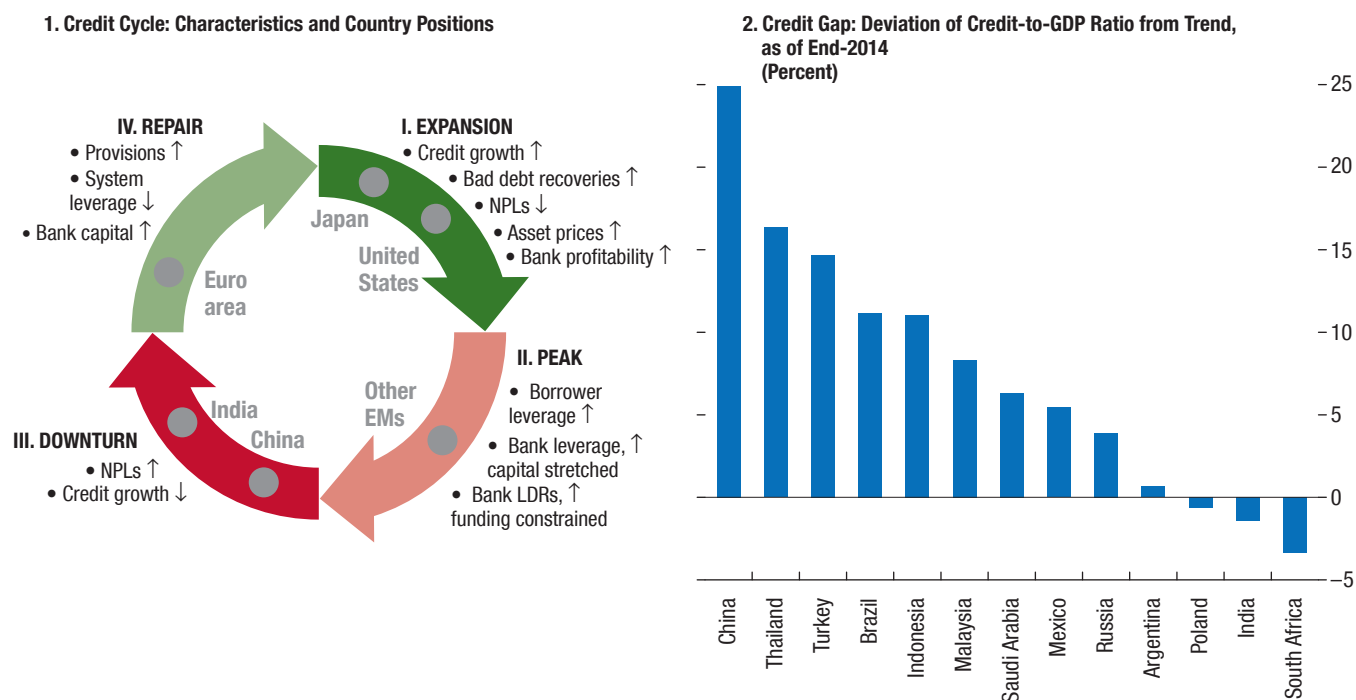
countries, including Japan and the United States, are now in the early phases of a new cycle. In contrast, key emerging market economies relied on rapid credit creation to sidestep the worst impacts of the global crisis. This strategy has resulted in sharply higher leverage of the private sector in many emerging market economies.

A measure of the credit cycle is the “credit gap,” or deviation of current credit growth from the long-term trend. China’s credit gap is elevated compared with that in recent history (Figure 1.7, panel 2). Although the recent deceleration of credit growth is ultimately beneficial, the process of reducing excess credit creation may impose significant stress on borrowers. Brazil, Thailand, and Turkey also have large credit gaps, while eastern European economies continue to deleverage. India’s credit expansion, although relatively more moderate, has not prevented high formation of new stressed loans. Recent decelerations in credit growth signal that many emerging market economies are now close to their cycle peaks and approaching the downturn phase.

Rapidly rising leverage (Figure 1.8, panel 1) and falling corporate profitability across emerging markets, particularly since 2010, have left corporate sectors in a number of economies with stretched debt-servicing capacity (Figure 1.8, panel 2). Reflecting the late stage of the credit cycle, emerging market firms, especially in the “weak tail” of the corporate sector, are vulnerable to downside risks (Figure 1.8, panel 3). The share of nonperforming loans in emerging market banks continues to rise and now exceeds the improving levels in advanced economy banks (Figure 1.8, panel 4). Household leverage is also high in some emerging markets, but household borrowing is a small portion of total borrowing across virtually all emerging markets. Public sector leverage is generally low both in absolute terms and relative to advanced economy peers.

Recent currency and commodity price weaknesses could exacerbate stresses

The deterioration of emerging market companies’ financial health suggested by historically high debt-to-EBITDA ratios ignores two additional risk factors that have become much more severe in recent months: external and foreign currency borrowing, and borrower cash flows linked to weakening commodity prices. Emerging

Figure 1.7. The Credit Cycle


Sources: Bank for International Settlements; Bankscope; IMF, World Economic Outlook database; national authorities; and IMF staff calculations.

Note: Credit cycles describe the consequences of credit growth on economic growth, asset quality, and leverage. In expansion, borrower profits and asset quality are robust, but high credit growth also increases banks' and borrowers' leverage. Leverage in banks and borrowers then peaks, followed by a contraction or slowdown in credit growth, downturn in asset quality, and rising nonperforming loans (NPLs). The process culminates in balance sheet repair and recapitalization, which sets the stage for a new credit cycle. The credit gap is calculated using a one-sided Hodrick-Prescott filter with a smoothing parameter of 400,000. EM = emerging market; LDR = loan-to-deposit ratio.

market companies face two related but distinct risks associated with foreign currency borrowing—liquidity risk and exposure to foreign exchange losses. Companies that borrow externally face the risk that lenders could decline to roll over funding as conditions deteriorate. Liquidity risk affects countries with high external debt *irrespective of the currency composition*. In addition, the bulk of external borrowing is denominated in foreign currencies (Figure 1.9 panel 1), usually U.S. dollars, which gives rise to the risk that a borrower's operating cash flow could decline relative to its repayment obligations if there were to be a depreciation.

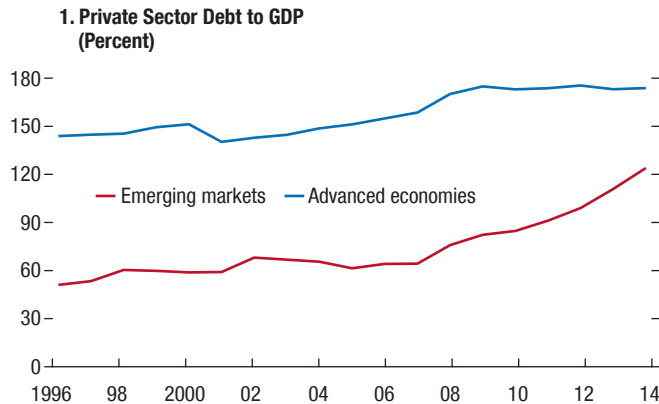
In addition, commodity firms whose cash flows are under pressure from sharply declining product prices make up a disproportionately large segment of emerging market corporate borrowers (particularly large listed firms). As shown in Figure 1.9, panel 2, deteriorating cash flows during the past few years have driven a sharp increase in the debt-to-EBITDA ratio and erosion of interest coverage ratios. Figure 1.9, panel 3 shows the borrowings of commodity producers relative to all listed

firms, distinguishing between energy producers and metals and mining firms. Economies whose firms display both high external and foreign currency borrowings and high exposure to commodity prices are particularly at risk of rising defaults and banking system losses.

Emerging market banks' balance sheets have yet to reflect late-cycle asset quality deterioration

Banking system capital dynamics differ between advanced and emerging market economies (Figures 1.10 and 1.11). Capital ratios in most advanced economy banking systems have improved during the past five years, mainly through a combination of very low credit growth and modest profitability. Despite their more robust profitability, emerging market systems' much faster new asset growth has absorbed essentially all of the retained earnings and new capital raised during the past five years. In systems with already apparent asset quality and earnings issues, emerging market banks' capital adequacy may be at risk.

Figure 1.8. Credit Growth, Corporate Leverage, and New Nonperforming Bank Loans



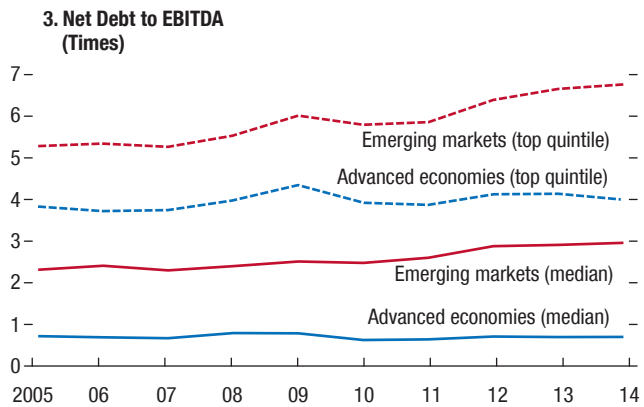
Sources: Bank for International Settlements (BIS); Haver Analytics; and IMF Staff calculations

Note: Private sector debt refers to the sum of credit to households (BIS: adjusted credit by all sectors to households and nonprofit institutions serving households) and credit to nonfinancial firms (BIS: adjusted credit by all sectors to nonfinancial corporations). In the case of Argentina, Brazil, China, India, Malaysia, Russia, Saudi Arabia, and South Africa, it refers to the BIS series of adjusted credit by all sectors to the nonfinancial private sector.



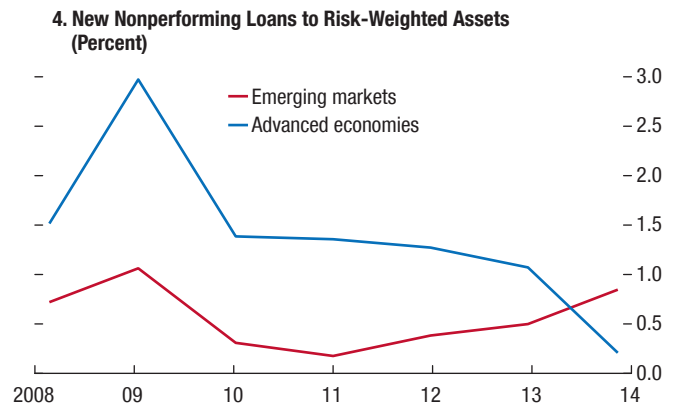
Sources: Standard & Poor's Capital IQ; and IMF staff calculations.

Note: EBITDA = earnings before interest, taxes, depreciation, and amortization.



Sources: Standard & Poor's Capital IQ; and IMF staff calculations.

Note: Based on a sample of 45,992 emerging market and 14,251 advanced economy nonfinancial companies. EBITDA = earnings before interest, taxes, depreciation, and amortization.



Sources: Bankscope; and IMF staff calculations.

Note: Loans are net of recoveries.

As emerging market economies approach the late stage of the credit cycle, banks have thinner capital cushions relative to advanced economy banks, and nonperforming loans are set to rise as corporate earnings and asset quality deteriorate. In China, banks have only recently begun to address the growing asset quality challenges associated with rising weaknesses in key areas of the corporate sector. Banks are doing this in part by accelerating charge-offs, which rose quickly to about 26 percent of gross nonperforming loans in 2014. Chinese banks will need to enhance loss-absorbing buffers if they are to meet the likely challenges from the exit of nonvi-

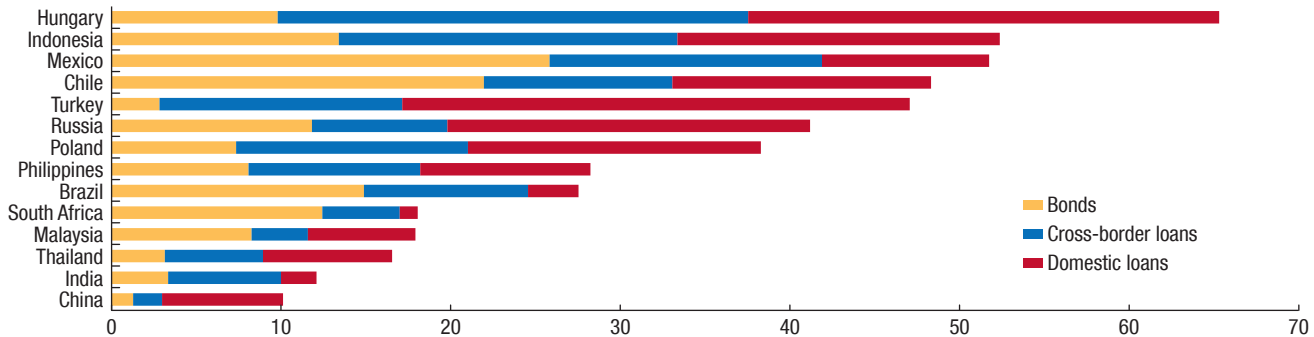
able firms in industries with overcapacity and excessive indebtedness (Figure 1.12). Increasing these buffers will require raising additional capital, because higher provisioning and lower profitability will hinder the ability of banks to generate internal capital.

Erosion in bank funding can amplify the effects of a credit cycle downturn

Rapid credit growth also underlies a significant increase in emerging market banks' loan-to-deposit ratios during the past eight years. Their loan-to-

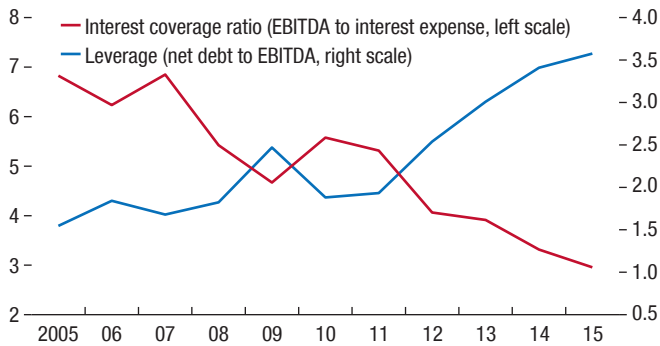
Figure 1.9. Emerging Market Companies: Exposure to Dollar Strength and Commodity Prices

**1. Foreign Currency Nonfinancial Corporate Debt
(Percent of total corporate debt, 2014:Q4)**



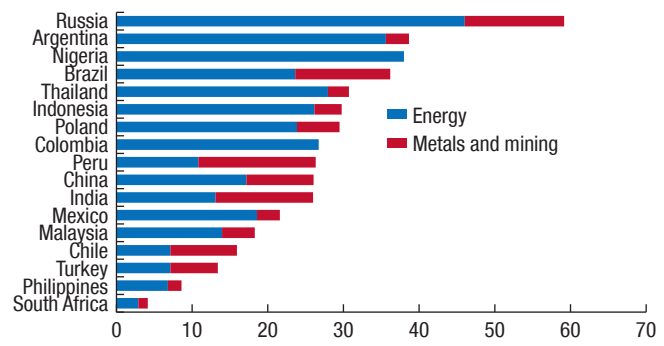
Sources: Bank for International Settlements (BIS); Bloomberg, L.P.; CEIC; IMF, Monetary and Banking database; and IMF staff calculations
 Note: Bonds include securities issued abroad and are as of September 2015 (Bloomberg). Cross-border loans are for the nonbank sector. We approximate cross-border loans denominated in foreign currency using the level of cross-border loans for each country denominated in specific currencies as reported in the bank for International Settlements international banking statistics. Indian domestic loans are as of 2013:Q3.

2. Energy and Metals and Mining: Debt to EBITDA and Interest Coverage Ratios (Median)



Sources: Standard & Poor's Capital IQ; and IMF staff calculations.
 Note: The sample includes 442 energy firms and 660 metals and mining firms from 18 emerging markets. Other sources include loans, money market instruments, trade credits, and bonds. EBITDA = earnings before interest, taxes, depreciation, and amortization; FX = foreign currency. In panel 3, the numerator is the outstanding debt of energy and metals and mining companies in the sample; and the denominator is the aggregate debt of the sample of firms.

3. Borrowings of Commodity Producers (Percent of total corporate debt)



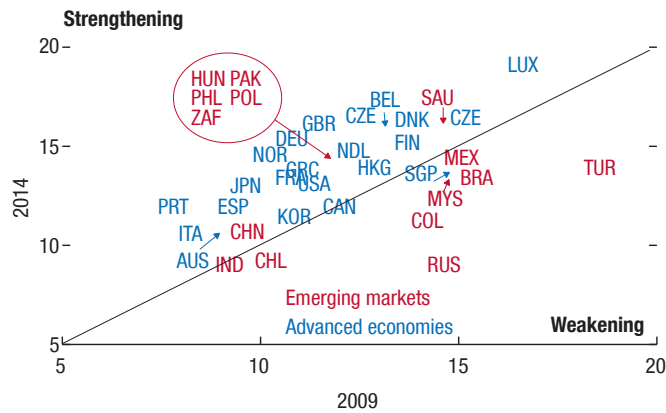
deposit ratios are now converging with those of advanced economy banks, whose funding positions have improved in the same period (Figure 1.13, panel 1). Emerging market banks have historically relied heavily on deposits, which are a stable, low-cost source of funding that has been a cornerstone of their performance and stability (Figure 1.13, panel 2). But funding positions in some countries are now approaching statutory ceilings (domestic liquidity regulations or the Basel III liquidity requirements) or an “economic” ceiling that is effectively set by banks’ access to funding at a reasonable cost. This deterior-

ation in funding positions is a further constraint on banks’ ability to underwrite the credit needed to drive growth.

Can China avoid destabilizing markets while achieving its objectives?

China is aiming to make the transition to a new growth model and a more market-based financial system to reduce vulnerabilities inherited from the old system, while safeguarding financial stability. Reflecting the inherent difficulty in smoothly engineering this transi-

Figure 1.10. Banking System Average Regulatory Tier 1 Ratio
(Percent of risk-weighted assets)



Source: IMF, Financial Soundness Indicators.
Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

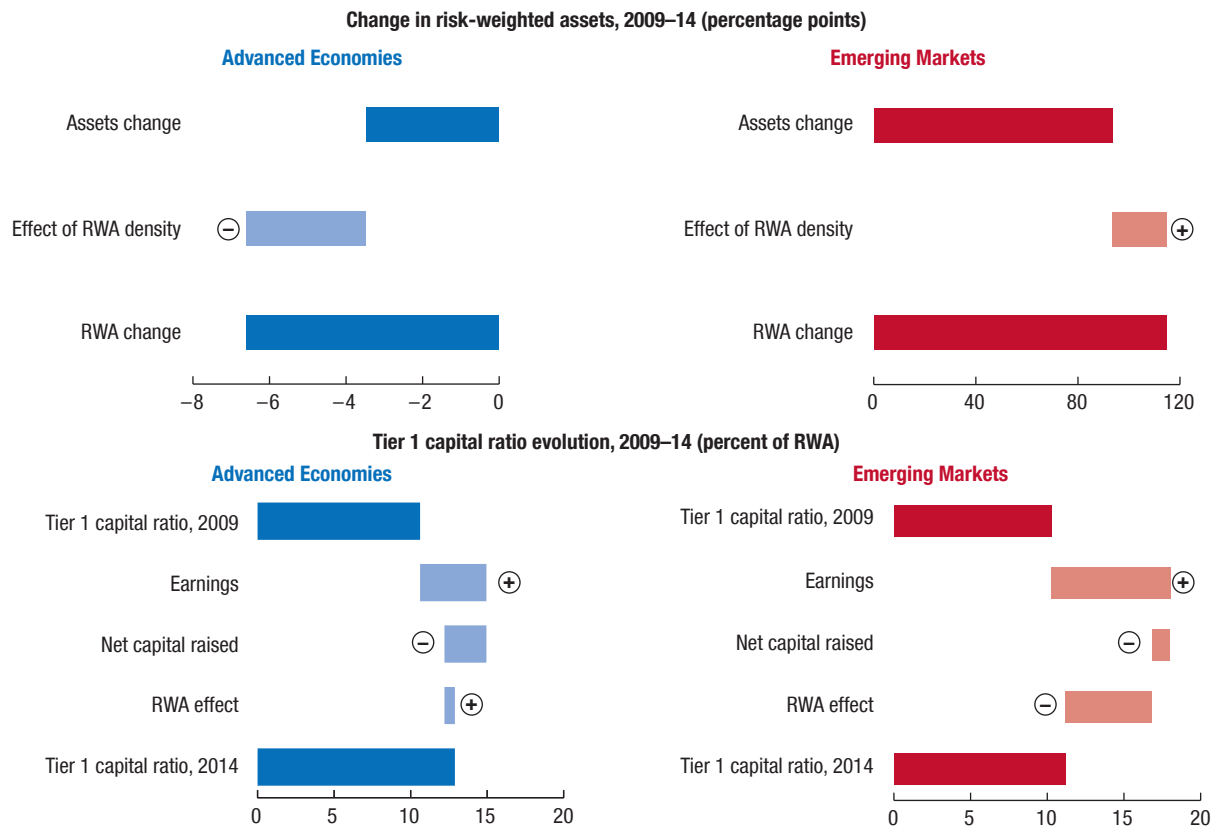
tion, global financial markets have become more sensitive to changes in China's economic and financial conditions and policies. Spillovers from higher equity market volatility and recent exchange rate policy shifts, against the background of more uncertain Chinese growth prospects, have affected commodity prices, currencies, and other asset prices, especially in emerging markets.

A deeper Chinese equity market would help facilitate needed deleveraging by providing an avenue for firms to raise equity capital and reduce reliance on banks. However, progressive relaxation of rules on margin borrowing to buy equities, a perception of official support for rising equity prices, and shortcomings in supervision created the conditions for a debt-fueled rally that pushed valuations to bubble territory by June 2015 (Box 1.1 and Figure 1.1.1, panels 1 and 2). The subsequent correction in

Figure 1.11. Bank Capital and Asset Changes

Advanced economy banks have on balance deleveraged and raised new capital...

...while emerging market banks have used their strong profitability to increase lending.

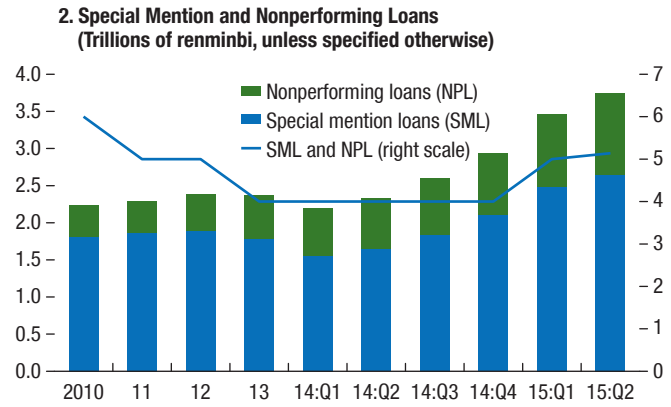
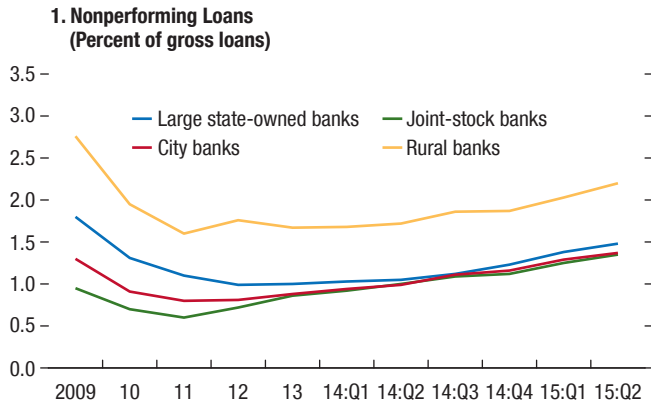


Sources: Bankscope; and IMF staff calculations.
Note: The earnings and net capital in the two lower panels are expressed in 2014 risk-weighted assets (RWA). RWA density = RWA/total assets. The top panels include 512 advanced economy banks and 222 emerging market economy banks. The lower panels include 1,356 advanced economy banks and 576 emerging market economy banks. The plus/minus symbols indicate that the impact increase/decrease the relevant measure by the size of the bar.

Figure 1.12. Chinese Banks: Asset Quality Challenges

China's slowing economic and credit growth reveals a gradual deterioration in asset quality, albeit from low levels...

...reflected in rising nonperforming and special mention loans.

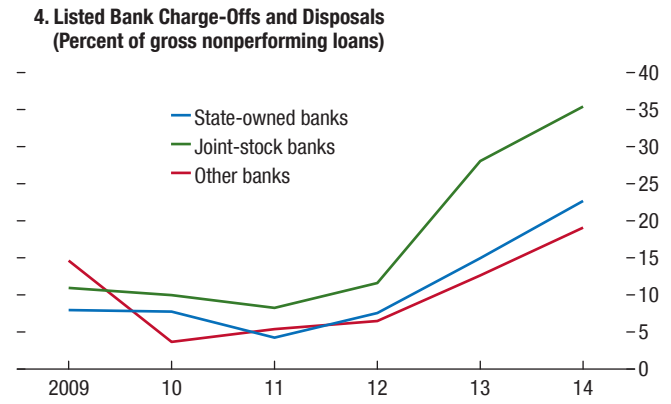
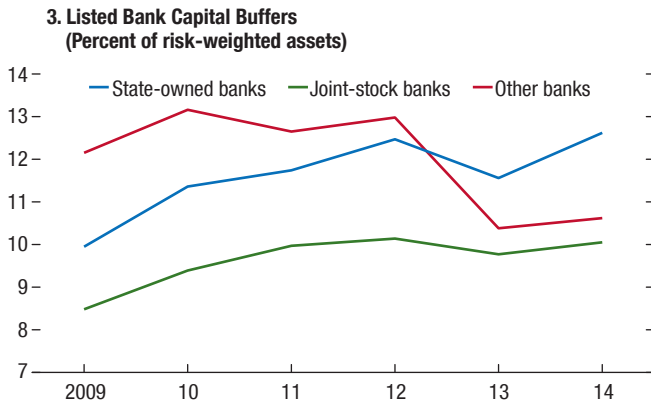


Sources: CEIC; and China Banking Regulatory Commission.

Sources: CEIC; and China Banking Regulatory Commission.

Deteriorating asset quality will contribute to an erosion of loss-absorbing buffers.

Banks are selling an increasing proportion of nonperforming loans.



Sources: Wind Info Co.; and IMF staff calculations.

Sources: Wind Info Co.; and IMF staff calculations.

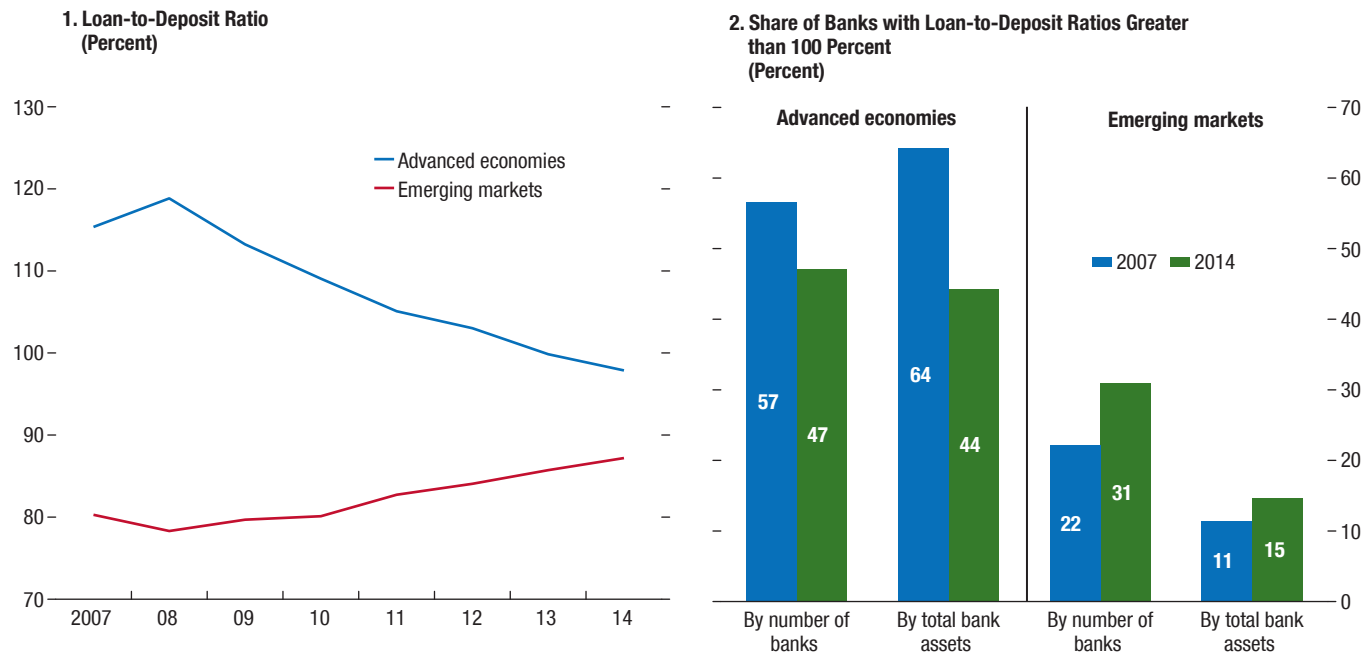
Note: Capital buffers are defined as Tier 1 capital plus provisions less nonperforming loans. The sample of listed banks refers to 22 listed banks with combined assets of 55.8 trillion renminbi at the end of 2015:Q1, which accounts for 79 percent of the commercial banking system's gross loans.

Note: Gross nonperforming loans are calculated as the sum of previous nonperforming loans and gross flows (net increase and charge-offs). The sample covers 18 listed Chinese banks.

equity prices was fueled by a self-reinforcing dynamic of margin calls and forced selling, prompting heavy-handed official efforts to arrest precipitous price declines. Although equities have had limited systemic implications in China (partly because of limited wealth effects), actions to stem price declines have created uncertainty about the direction and consistency of policy.

Increased flexibility of the renminbi exchange rate would facilitate more market-based decision making, including by encouraging better risk management by Chinese companies and households. The announcement

on August 11 by the People's Bank of China of a new mechanism to determine the daily reference rate (or central parity of the ± 2 percent trading band) of the onshore renminbi (CNY) exchange rate versus the U.S. dollar was a significant move in this direction. However, the timing of the decision came as a surprise to markets and introduced greater exchange rate uncertainty, with the CNY depreciating by 3 percent versus the U.S. dollar in the first three days, similar to moves in offshore renminbi trading. The exchange rate subsequently stabilized, including with the help of periodic

Figure 1.13. Evolution of Bank Funding

Sources: Bankscope; and IMF staff calculations.

official intervention and enhanced communication, but exchange rate expectations remain fragile, and weakness has spread through commodity and emerging economy currency markets (Figure 1.14, panels 1 and 2).

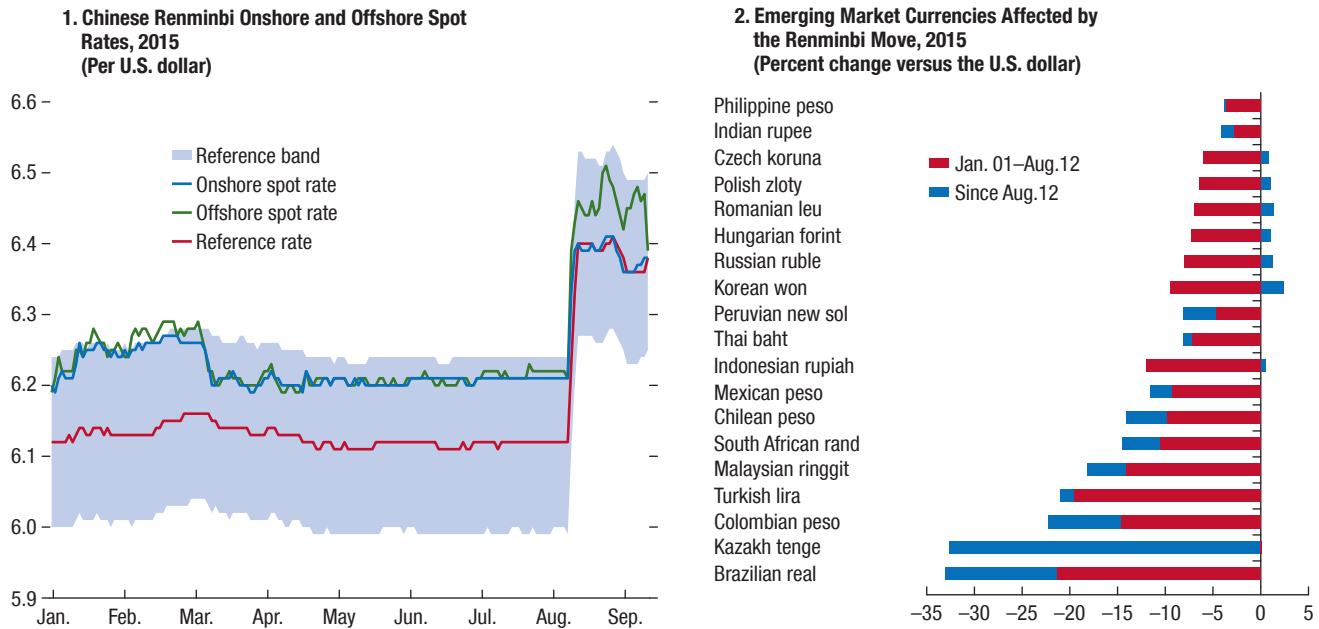
China's major financial sector challenge is to gradually give a greater role to market forces and reduce debt-related vulnerabilities. Both processes will help facilitate economic rebalancing and will involve an appropriately paced withdrawal of explicit and implicit public support across broad areas of the financial system, with increased tolerance for defaults and volatility. China still has policy buffers to absorb financial shocks, including a relatively strong public sector balance sheet, but overreliance on these buffers could exacerbate existing vulnerabilities. For example, measures designed to boost credit growth could further weaken highly leveraged corporate balance sheets in some vulnerable sectors.

Even with these buffers, the potential remains for bouts of financial volatility during China's transition that reach beyond the equity market to undermine market confidence and trigger a tightening of domestic financial conditions. Notwithstanding the central role of large state-owned banks, fragility in the corporate and financial sectors, notably in the opaque and still-large nonbank financial system, suggests that the sensitivity to a change

in financial conditions could be high. Higher exchange rate uncertainty could further increase risk aversion. Such a tightening of financial conditions would weaken the debt-servicing capacity of vulnerable firms, elevating counterparty risks, further undermining fixed asset investment, and weakening the growth outlook.

The main spillover channels from China to the rest of the world remain economic growth and trade, but confidence channels and direct financial linkages have also become stronger since 2010. Concerns about weaker Chinese import demand have already contributed to lower global commodity prices. In turn, currencies have weakened in emerging market economies with strong trade ties to China and high commodity dependence. Intensified capital flight to perceived safer assets would further weaken exchange rates and increase financial market volatility in emerging markets, with adverse effects for sovereigns and companies with large foreign indebtedness. Direct financial spillovers include a possibly adverse impact on the asset quality of at least \$800 billion of cross-border bank exposures; repricing in Asia's external dollar bond markets, which are increasingly dominated by Chinese issuers; and capital flows from China, including through the Shanghai–Hong Kong SAR stock connect program.

Figure 1.14. Chinese Exchange Rate Movements and Effect on Emerging Market Currencies



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

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

Gaps in the euro area architecture need to be addressed to consolidate stability gains

Significant policy measures in recent years at the European and national levels have strengthened the collective commitment to monetary union. This has removed the extreme tail risks evident in mid-2012, helping to put the Economic and Monetary Union (EMU) on a sounder footing and limit recent market volatility associated with Greece. In addition, direct financial exposures of foreign banks and nonbanks to Greece have been sharply reduced since 2010 (Figure 1.15). The exposure has shifted to the European official sector, which now holds nearly €260 billion of Greek assets, of which the European Stability Mechanism (ESM) holds about half. Importantly, the recent agreement on a new program with the ESM underscores the strong collective efforts at the European level.

Nevertheless, in the absence of greater integration, lingering questions remain about the medium-term viability of the EMU, particularly as the specter of “euro exit” was raised anew before the new ESM program with Greece was put in place. Although financial market contagion from recent difficulties in Greece has been quite limited, there could be indirect spillovers through broad, negative confidence effects if the situation deteriorates or risks flare up once again. Further policy actions

to address the remaining gaps in euro area architecture are thus needed to reduce the euro area’s vulnerability to shocks and to the risk of prolonged stagnation.

The most immediate impact of higher redenomination risk would be a widening of sovereign spreads of other euro area countries, although quantitative easing combined with the Outright Monetary Transactions framework would be likely to contain excessive pressures.¹ An additional channel through which redenomination risk could act would be reduced confidence in the medium-term viability of the EMU, which could undermine investment plans and capital flows both within and to the region, raise sovereign spreads and fragmentation, and possibly restart the destabilizing sovereign-bank nexus (Figure 1.15, panel 4). Finally, political contagion could emerge in some countries, in the form of increased opposition to further integration of the monetary union.

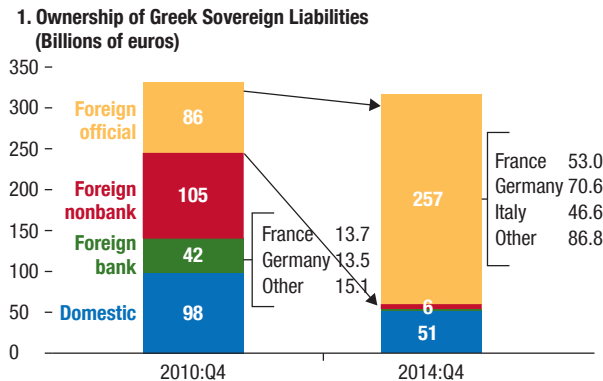
Advanced economy banks face profitability challenges

Reduced profitability in advanced economy banks limits their ability to generate capital and better support the

¹“Core euro area” consists of Austria, Belgium, Finland, France, Germany, and the Netherlands. “Other euro area” consists of Greece, Ireland, Italy, Portugal, and Spain. (This division does not include all euro area countries.)

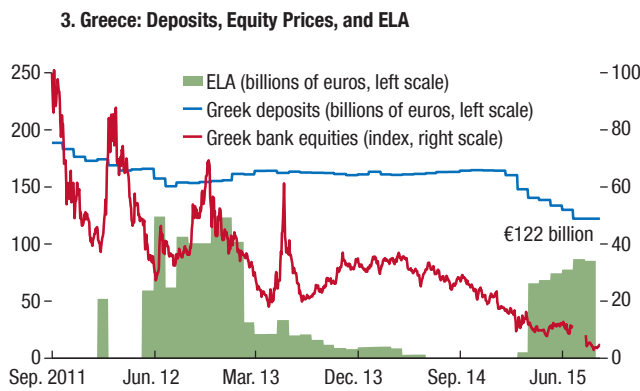
Figure 1.15. Greece: Developments

Private exposures to Greece have been absorbed by the official sector, mitigating recent market volatility.



Sources: Arslanalp and Tsuda (2014a); and Bank for International Settlements. Note: Individual country holdings represent those on an ultimate risk basis, including indirect holdings through the European Stability Mechanism and the European Financial Stability Facility.

...reinforcing deposit flight from Greek banks and their reliance on European Central Bank emergency funding.



Sources: Bank of Greece; Bloomberg, L.P.; European Central Bank; Haver Analytics; and IMF staff calculations. Note: ELA = Emergency Liquidity Assistance.

recovery. Their 2014 aggregate return on equity was about 8 percent, down from an average of about 13 percent during the 2000–06 period (Figure 1.16, panel 1). More than 3 percentage points of the decline is attributable to the structurally higher capital in bank balance sheets. This reflects tighter regulation of capital levels and quality, intended to make banking systems safer. The remaining 2 percentage points of the difference is due to a decline in underlying profitability, particularly through the loss of profits stemming from the cutback on trading profit.

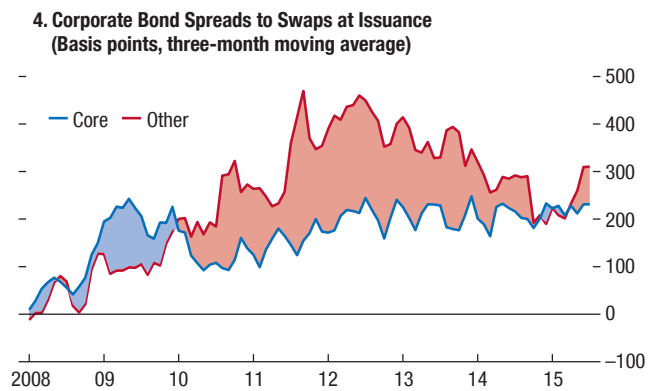
Regarding regional variations (Figure 1.16, panel 2), euro area banks are struggling the most to generate

Political difficulties surrounding negotiations have been reflected in higher uncertainty...



Sources: Bank of Greece; Bloomberg, L.P. Haver Analytics; and IMF staff calculations.

There have been signs of financial fragmentation, with borrowing costs of firms in non-core countries rising modestly over those in the core.



Sources: Dealogic; and IMF staff calculations. Note: “Core” countries comprise Austria, Belgium, Finland, France, Germany, Luxembourg, and the Netherlands. “Other” countries comprise Cyprus, Estonia, Greece, Ireland, Italy, Latvia, Portugal, Slovak Republic, Slovenia, and Spain.

sustainable profits, partly because of their high rates of nonperforming loans (see the April 2015 GFSR). Expectations of continued weak profitability in a number of banks are reflected in current market pricing, with price-to-book ratios lower for institutions whose profitability is forecast to be weaker (Figure 1.16, panel 3).²

Advanced economy banks will be cautious about lending until their medium-term regulatory environment is clearer, as the Basel III framework is being implemented

²For a formal explanation of this relationship, see the price-to-book model in Wilcox and Philips (2004).

Box 1.1. China's Equity Market

The rise and fall of China's equity market has been dramatic. Although the systemic implications for the broader financial system appear limited, broad-ranging interventions by the authorities to stem the decline appear to have increased investor uncertainty about financial sector policies.

The dramatic upswing in Chinese equity prices that began in mid-2014 was driven by a combination of factors. Perceptions of official support for equities, a reallocation of household saving from a weaker property market, and optimism about reforms in state-owned enterprises all contributed. The defining feature, however, was the surge in individual investor leverage in the form of margin financing.¹¹ By early 2015, equity valuations reached very high premiums of about 50 percent over international peers, and even higher in some segments of the market. Daily market turnover rose to 1.7 trillion renminbi (RMB) in June 2015 from less than RMB 0.2 trillion the previous year, compared with a free-float market capitalization of RMB 24 trillion at end-June.

The risk of defaults on margin loans rose as investors rapidly increased borrowing and prudential margin rules were eased. The self-reinforcing dynamic of steep equity price falls, margin calls, and forced selling was clearly evident over the summer in the initial disorderly unwinding of margin balances, which fell by more than a third to RMB 1.4 trillion (\$225 billion) in just three weeks (Figure 1.1.1, panel 3). Official measures intended to limit selling pressure also meant that investors could have been unable to liquidate their positions sufficiently quickly or could post a wider range of possibly less liquid collateral to meet margin calls. These measures may have increased risks for the margin financing exposures of some securities firms.

The authors of this box are Shaun Roache and Daniel Law.

¹¹First permitted in late 2011, access to margin financing was initially available to only the wealthiest investors, but a progressive easing in rules expanded this access. Important easing measures included broadening the range of eligible securities (early 2012), lower capital charges for securities firms' margin financing (early 2012), and relaxed margin borrowing qualifications for individual investors (mid-2013).

The systemic importance of equities remains limited but the market's interconnectedness with the rest of the Chinese financial system has grown. Increased short-term borrowing by securities firms has strengthened linkages between equity markets, banks, and short-term funding markets. As a result, securities firms could quickly transmit a liquidity shock to funding markets if they were unable to their meet their rising debt service as a result of customer defaults on margin loans. One prominent securities firm's inability to meet its obligations could trigger uncertainty about the liquidity or solvency of all securities firms and threaten a cut-off in financing, widespread account liquidations by clients, and, potentially, a vicious circle. However, in aggregate, securities firms appear to have adequate liquidity and capital (Figure 1.1.1, panels 4 and 5).

Banks' indirect exposures, other than lending to securities firms, are also likely to have increased since 2013.²² The most important of these is the issuance of wealth-management products to customers who then provided loans to high net worth investors in "umbrella trusts."³³ These products were typically structured with a senior fixed-income tranche funded by the wealth-management product and a junior equity tranche that provided up to five times leverage to the high net worth investors. The main risk of this product is that in a disorderly market decline, the junior tranche is unable to liquidate equity positions fast enough to protect the senior tranche from a loss on the principal. The de facto (if not de jure) obligation for the bank that sponsored the wealth management product is to make the investor whole by absorbing the loss.

²²Market estimates of firms using listed equity as collateral vary widely but at the peak hovered around RMB 1 trillion (\$160 billion) or about 1.1 percent of total bank loans. For the other risks, including firms and individuals using bank loans to invest in equities, there are almost no reliable data on which to provide an assessment, though most bank analysts suggest that such exposures are not large.

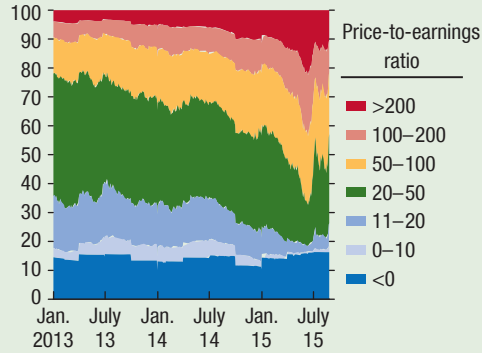
³³Assessing how large umbrella trusts became is difficult because of lack of data, though analysts' estimates suggest that this form of leverage peaked between RMB 0.8 trillion and RMB 2 trillion (\$130 billion and \$322 billion) with exposures concentrated in medium-sized joint-stock banks.

Box 1.1. (continued)

Figure 1.1.1. Chinese Equity Market

At the June 2015 peak, valuations touched very high levels for a wide range of stocks...

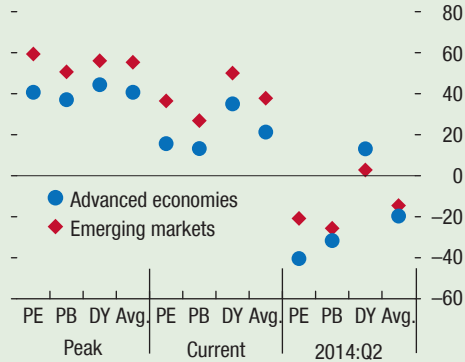
1. A-Share Price-to-Earnings Ratios (Distribution, percent)



Sources: Wind Info Co.; and IMF staff calculations.
Note: Price over reported earnings for the previous four quarters.

...pushing China's market valuation to rich premiums over international peers.

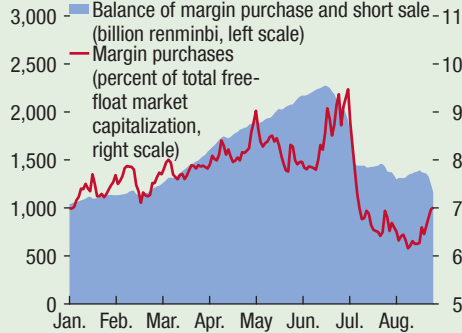
2. Equity Market Valuations Relative to Peers (Percent premium over peers)



Sources: Bloomberg, L.P.; Morgan Stanley Capital International; and IMF staff calculations.
Note: "Advanced economies" is the market-capitalization-weighted average of Group of Seven economies. "Emerging markets" is the market-capitalization-weighted average of Group of 20 emerging market economies. Avg. = average; DY = dividend yield; PB = price to book; PE = price to earnings.

A surge in margin borrowing by individual investors fueled the rally...

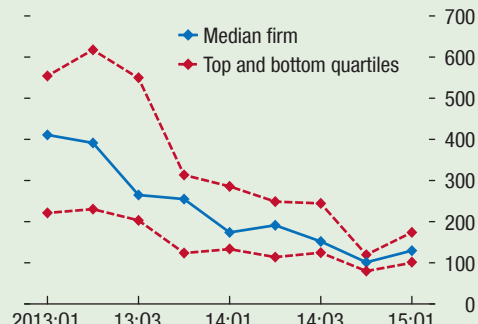
3. Outstanding Amount of Margin Lending for Equities, 2015



Source: CEIC.

...but for now, the securities firms that provided margin finance have adequate liquidity...

4. Liquidity of Securities Firms (Cash as a percentage of short-term debt)



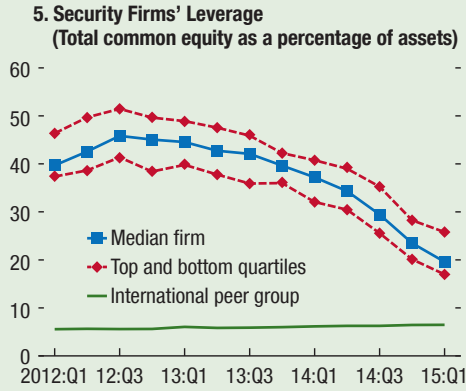
Sources: Bloomberg, L.P.; Wind Info Co.; and IMF staff calculations.
Note: Unbalanced panel of 22 securities firms.

(Figure 1.1.1 continues)

Box 1.1. (continued)

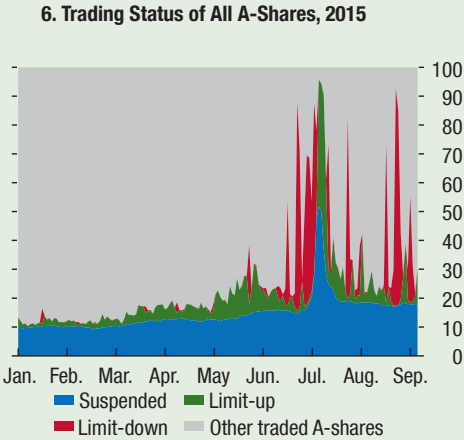
Figure 1.1.1. (continued)

...and capital buffers to absorb shocks.



Sources: Bloomberg, L.P.; Wind Info Co.; and IMF staff calculations.
Note: Unbalanced panel of 22 securities firms. The international peer group is a sample of 10 firms from Europe, Japan, and United States.

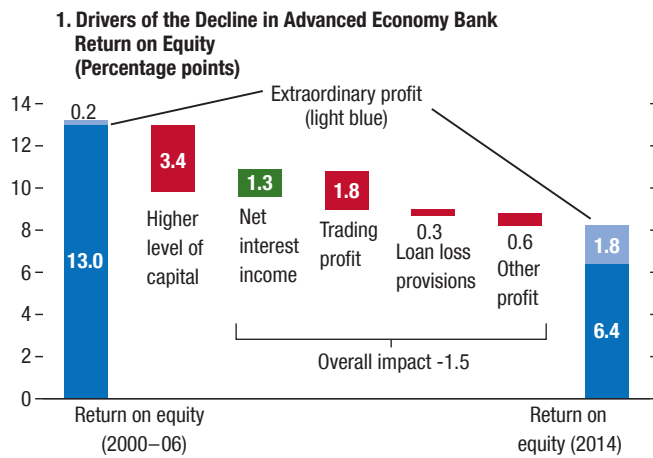
Shortcomings in the regulatory regime, including widespread trading halts, damaged confidence.



Sources: Bloomberg, L.P.; Wind Info Co.; and IMF staff calculations.

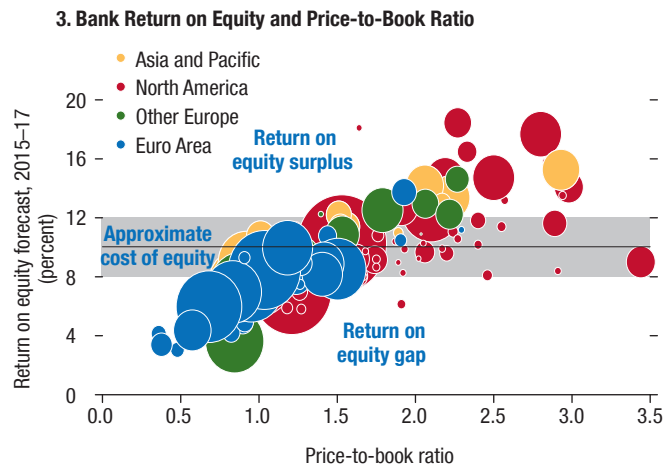
Figure 1.16. Bank Profitability and Balance Sheet Strength

Bank profitability has fallen...



Sources: Bloomberg, L.P.; and IMF staff calculations.
Note: Based on a sample of more than 300 banks.

...and is reflected in market prices.

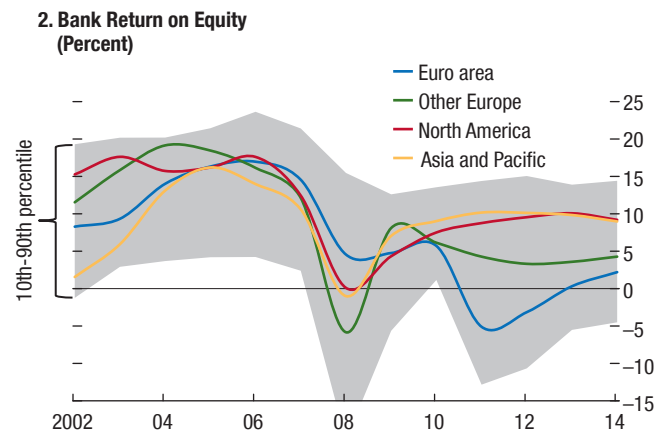


Sources: Bloomberg, L.P.; and IMF staff calculations.
Note: The size of the circles is proportional to bank assets in 2014.

on a national basis.³ In the euro area, in particular, this process is taking place alongside initiatives to harmonize options and national discretion set out in the European capital regulation, and as supervision of the largest banks is being centralized within the Single Supervisory Mechanism. A key challenge is to make rapid progress toward a fully harmonized definition of regulatory capital ratios in

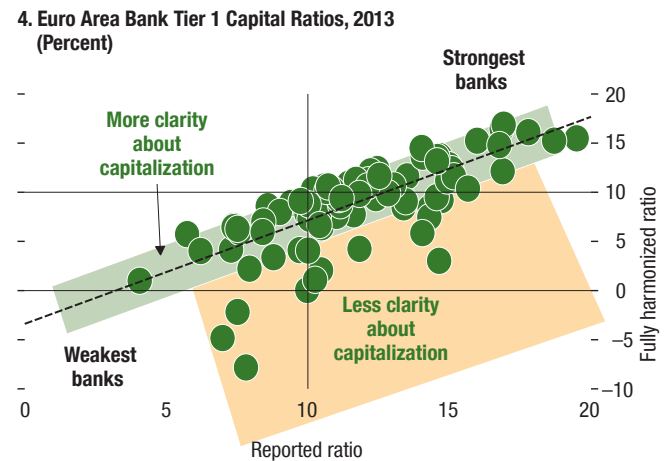
³See Annex 1.1 for a discussion on the progress toward completion of the global regulatory reform agenda.

...across all advanced economies...



Sources: Bloomberg, L.P.; and IMF staff estimates.
Note: Based on a sample of more than 300 banks.

Questions about bank capital quality remain.



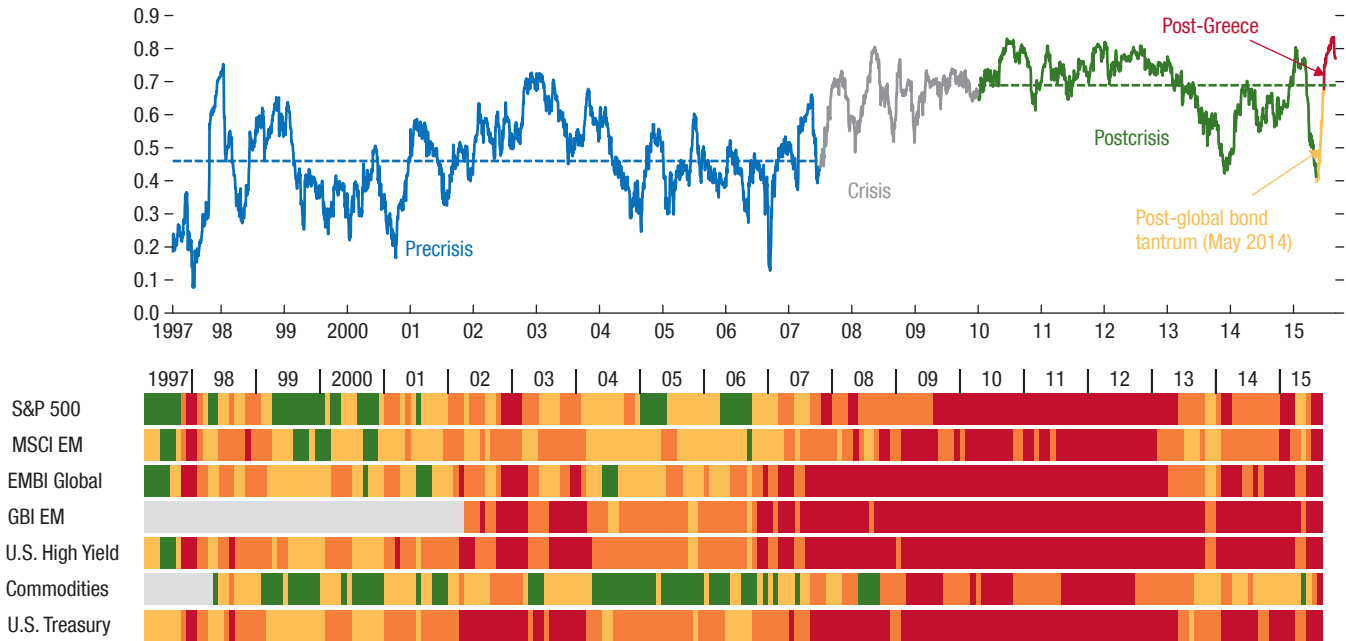
Sources: European Banking Authority; European Central Bank; and IMF staff calculations.
Note: The fully harmonized ratio uses the “fully loaded” definition of capital under the Capital Requirements Directive (CRD-IV) and the harmonization of asset quality definitions from the European Central Bank’s Comprehensive Assessment.

the euro area. The recent Single Supervisory Mechanism Comprehensive Assessment showed that full implementation of Basel III and a more harmonized approach to asset quality resulted in 2013 capital ratios that were significantly lower than reported ratios (those shown in yellow in Figure 1.16, panel 4) in banks accounting for about 20 percent of the risk-weighted assets of participating institutions. Box 1.3 examines the effect of Europe’s banking challenges on the availability of credit to finance economic growth.

Figure 1.17. Potential Amplifiers of Market Stress

Asset correlations have increased in the postcrisis era, reflecting a rise across most major asset classes.

1. Cross-Asset Correlations (median daily) and Correlation Heat Map



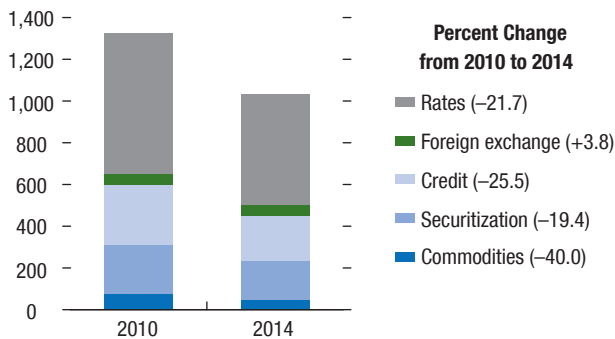
Sources: Bank of America Merrill Lynch; Bloomberg, L.P.; and IMF staff estimates.

Note: The correlation index summarizes the median daily cross-asset correlations of Sharpe ratios across all of the following asset classes: U.S. Standard & Poor's 500, MSCI Emerging Markets, U.S. Treasuries, EMBI Global Bond Index, GBI Emerging Markets Bond Index (local currency), U.S. High Yield, and Commodities. The heat map displays the underlying median correlation for each of the seven asset classes against the remaining six asset classes. The correlation of U.S. Treasuries, being a "risk-free" asset, is expressed in absolute terms, as it is typically negative vis-à-vis risk. Correlation key: green 0.00–0.30; yellow 0.31–0.50; orange 0.51–0.65; and red 0.66–1.00.

Liquidity has declined as broker-dealers have retreated from market-making activities...

...while volatility appears to rise as market depth declines.

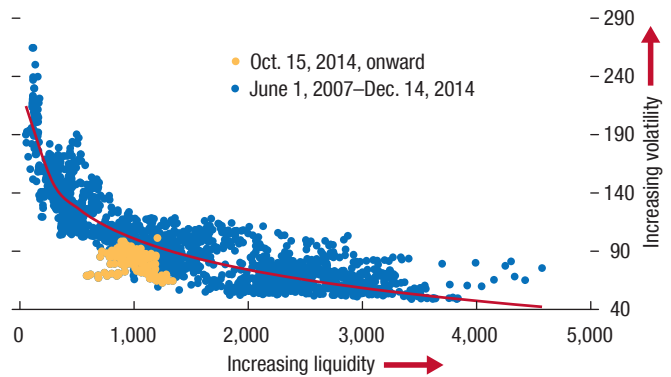
2. Fixed-Income Trading Assets for Top U.S. Banks (Billions of U.S. dollars)



Source: Goldman Sachs.

Note: Data for 2014 are average of first three quarters.

3. U.S. Treasury Market Depth and Volatility



Sources: Bloomberg, L.P.; BrokerTec; JPMorgan Chase & Co; and IMF staff calculations.

Note: Volatility is proxied by the Merrill Lynch Option Volatility Estimate (MOVE) index, which is a yield-curve-weighted index of normalized implied volatility on three-month Treasury options. Market depth, defined as the sum of the three bids and offers in on-the-run two-year Treasuries (average between 8:30 a.m. and 10:30 a.m. each day), is measured in millions of U.S. dollars.

Vulnerable market structures could amplify the impact of shocks and the scope for financial contagion

At the global level, several financial market fragilities could amplify the impact of a decompression in market risk premiums and thus heighten the challenge to financial stability (Box 1.2):

- Prices across asset classes are moving increasingly in unison. The tendency of global asset prices to move together across markets is now at its highest level since the beginning of the Great Recession. As examined in the April 2015 GFSR, not only have asset correlations been much higher on average since 2010 across advanced and emerging economies (Figure 1.17 panel 1), but they have remained elevated even during periods of low volatility. More recently, they rose in the wake of European sovereign bond market volatility in May and the subsequent difficulties in Greece. Data on cross-asset correlations suggest that the assets most vulnerable to price contagion include emerging market bonds and U.S. high-yield bonds.
- Mutual funds are vulnerable to potential large-scale redemptions. Mutual funds have become increasingly important in supplying credit to the U.S. corporate bond market. The search for yield has contributed to the increase in the retail share of corporate bond ownership, which is held largely in mutual funds, to one-third, the highest level on record. As noted in previous GFSRs and in Chapter 2, those mutual funds that invest in relatively illiquid assets are subject to liquidity mismatches. Their promise of liquidity may be challenged under elevated outflows, and could generate a vicious circle of further price declines and redemptions.
- Excess leverage⁴ in the derivatives positions of a number of regulated investment funds could further amplify the impact of redemptions. The

⁴While U.S. regulated investment funds are subject to explicit leverage limits, derivatives exposures may mask implicit leverage since there is less explicit regulation on leverage through derivatives as there is in Europe. For certain specifically approved derivatives that require cash settlement, mutual funds in the United States are required to hold only enough cash to cover the current mark-to-market value of their positions, which in practice allows them to have large notional exposures. In the EU, the Undertaking for Collective Investment in Transferable Securities Directive expressly limits derivatives leverage to 100 percent of the fund's net asset value. However, the directive's implementing measures allow mutual funds to use an advanced value-at-risk methodology to measure their market exposure, thus permitting mutual funds to exceed the 100 percent limit as long as the value at risk is within certain bounds.

search for yield may also be the impetus for the growth of large bond mutual funds that actively use derivatives; their assets under management now amount to more than \$900 billion, or about 13 percent of the world's bond fund sector (Figure 1.18, panel 1).⁵ Derivatives can be used to hedge risks, but they can also be used to boost returns through excessive leveraging.⁶ In the low-volatility conditions of recent years, leveraged bond funds exhibited a risk profile similar to that of U.S. fixed-income benchmarks (Figure 1.18, panel 3). However, this relative performance may mask the risks of leverage,⁷ given that the market value of a number of speculative derivatives positions could possibly have been unaffected by the limited price action. A significant portion of leveraged bond funds exhibit both relatively high leverage and sensitivity to fixed-income assets (measured by the Barclays U.S. aggregate index in Figure 1.18, panel 4). This combination suggests a risk that losses from highly leveraged derivatives positions could accelerate with an abrupt increase in volatility and risk premiums and reinforce a vicious circle of fire sales, redemptions, and volatility.

What happens when liquidity suppliers retreat?

Markets for some assets, including U.S. Treasury securities, are exhibiting episodes of volatility, marked by a disappearance of liquidity and depth. As discussed in Chapter 2, the loss of market depth reflects a combination of factors—including smaller trade sizes, less frequent trading, and greater volatility—that have

⁵Funds with reported leverage in derivatives positions in the sample account for some \$600 billion of these assets, including the assets of the U.S.-domiciled version of the same EU-domiciled funds that report leverage. Although these funds are separate investment vehicles, they share the same mandate and portfolio manager and therefore have closely matched portfolios, exhibiting a high correlation of returns. The remaining \$300 billion of assets correspond to a group of selected funds that do not report leverage in derivatives positions but are known to be active in derivatives (the funds' latest annual reports list at least 15 derivatives positions).

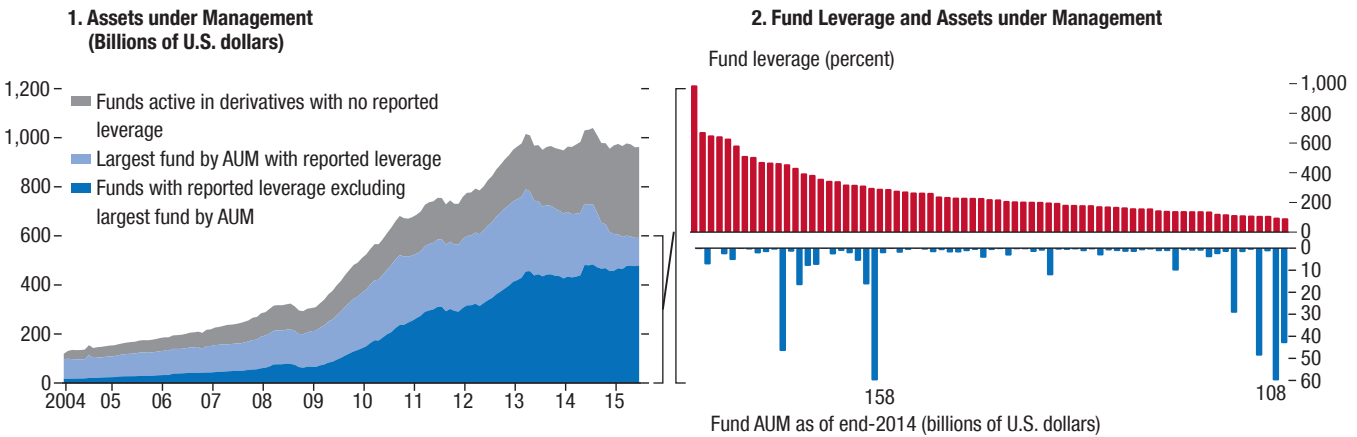
⁶The notional exposure of derivatives of the funds in the sample range from 100 percent to 1,000 percent of net asset value according to their latest annual reports. This range may be conservative (see AIMA 2015) because the exposures are adjusted for hedging and netting at the asset manager's discretion. See CESR (2010) for a discussion on the guidelines and the methodology.

⁷In addition to the risk of amplifying losses, some derivatives, particularly complex over-the-counter instruments, may be illiquid and some previously liquid derivatives (as well as cash securities) may become illiquid during periods of market stress (SEC 2011; IDC 2008).

Figure 1.18. Large United States and European Regulated Bond Investment Funds with Derivatives-Embedded Leverage

Growth is strong in the assets under management of selected large regulated bond funds that use derivatives...

...with embedded leverage exceeding 100 percent of net asset value...

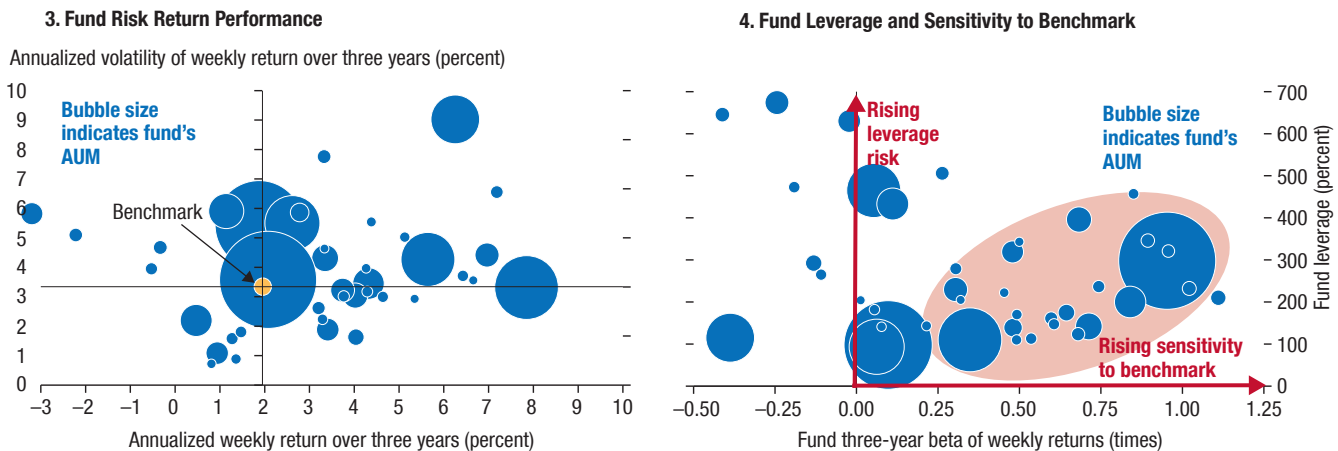


Sources: Bloomberg, L.P.; funds annual reports; and IMF staff calculations.

Note: Includes funds with assets under management (AUM) > \$0.5 billion for funds with reported leverage, and AUM > \$1 billion for other funds active in derivatives without reported leverage. Reported leverage during the previous year is obtained from the funds' latest annual reports under the Committee of European Securities Regulators' commitment approach. Leverage is defined as notional exposure of derivatives positions adjusted by hedging and netting. The AUM calculation of funds with reported leverage includes the assets of the U.S.-domiciled version of the same European Union-domiciled funds that report leverage. Funds active in derivatives without reported leverage have a minimum 15 separate derivatives lines in their latest annual reports. The sample includes two multistrategy funds that have significant exposure to fixed income.

...and similar risk return performance to U.S. fixed income amid low volatility conditions...

...but those sensitive to U.S. fixed income could be at risk from higher volatility and risk premiums.



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

Note: Includes funds with reported leverage and assets under management (AUM) > \$1 billion, amounting to total AUM of \$550 billion. The beta is a measure of a fund's sensitivity to the benchmark, calculated as the covariance between the fund's return and the benchmark return divided by the variance of the benchmark return. The benchmark is the Barclays U.S. aggregate total return bond index.

increased the cost to dealers of trading and holding inventory (April 2015 GFSR).⁸ Analysis suggests that

the likelihood of rapid and significant spikes in volatility rises considerably as two-year U.S. Treasury market depth falls below a critical level of approximately \$1

⁸As banks retreat from risk warehousing, market depth can be reduced. In an environment of low market depth, large intermittent ("chunky") trades have a higher price impact than they would under normal trading conditions, taking market prices deep into the order

book where new market makers (that is, high-frequency traders and asset managers) tend not to operate.

Box 1.2. Compression of Global Risk Premiums and Market Abnormalities

Exceptionally¹ easy monetary policies, required by the severity of the global financial crisis, have encouraged financial risk taking, resulting in asset price inflation, but have also eroded normal relations between key asset prices and fundamentals. By removing low-risk, long-duration assets from the market through quantitative easing, and by lowering short-term rates to near zero (or even negative levels), officials have herded market participants into riskier and longer-duration assets. As a result, global sovereign bond valuations appear overvalued even though, in a number of countries, deflation risks have been mitigated, confidence in policy has risen, and economic prospects have improved (Figure 1.2.1, panel 3).

By suppressing the real cost of capital, easy monetary policies may have also impaired the market's ability to efficiently distribute capital. As credit and term premiums narrowed, asset prices increased, but with less differentiation in pricing, leading to increased correlation in the prices of major asset classes. Instead of being driven largely by fundamentals, price action in global assets has become more binary—investors are either “risk on” or “risk off.” In the United States, monetary policy has helped contain corporate credit risk despite a steady rebound in leverage (Figure 1.2.1, panel 4).

The search for yield has forced capital to flow into illiquid assets or to entities that might otherwise not be viable if rates returned to more normal levels. Markets have already priced in some expectation of future

The authors of this box are David Jones and Francis Vitek.

liquidity problems, with many bond funds running high allocations to cash (despite near-zero rates) and increasing premiums observed on the most liquid bond issues. Pockets of excessive leverage have emerged because the low-yield environment has compelled investors to employ leverage (often through derivatives) to meet their return targets.

Until the market correction in late August, global equity markets had traded at new highs. However, in the United States, much of the gain has been driven by defensive stocks—such as utilities, which typically offer a high dividend component—rather than cyclical stocks, which normally lead the business cycle and recoveries (Figure 1.2.1, panels 5 and 6). Taken together, the overvaluation of sovereign bonds and outperformance of defensive stocks may reflect an ongoing search for yield and concern for the medium-term outlook.

Shocks like these could be expected to cause a significant, though likely manageable, increase in global risk premiums. However, given the current tight levels of risk premiums in some markets (such as sovereign bonds), the imminent reduction of monetary accommodation in the United States, and the reduced capacity of markets to efficiently transfer risk, a major shock could cause risk premiums to rise dramatically and abruptly. A sharp decompression in risk premiums would lead to a marked tightening of financial conditions, raise financial stability challenges, and act as a drag on economic growth. As a result, monetary policy exit could be delayed or stalled if already under way.

billion (Figure 1.17, panel 3). Underlying market liquidity is also being affected by changes in regulation and bank business models and by the rise of algorithmic and high-frequency traders. These newer market participants have dramatically reshaped the structure of many markets and reduced the attractiveness of the traditional risk-warehousing role played by dealers.⁹ As

⁹Kite (2010) reports that high-frequency traders accounted for 45 percent of overall trading in U.S. Treasuries in 2010, while Jiang and others (2014) find that high-frequency traders accounted for 40 percent of trades in 2011, and Light (2014) estimates that high-frequency traders account for more than 50 percent of the volume in the Treasury market.

highlighted in Chapter 2, market liquidity is correlated across markets.

The loss of market liquidity carries systemic implications

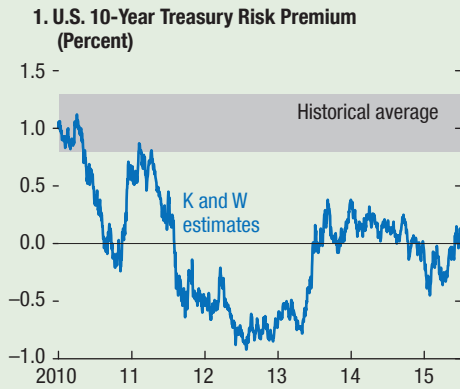
A loss in market liquidity carries wider systemic implications that can be illustrated in the corporate bond market. For example, a permanent 200 basis point rise in the spread for high-yield U.S. corporate debt¹⁰ from a liquidity shock could result in a

¹⁰Consisting of a 100 basis point rise in both term premiums and credit risk premiums for the outstanding stock of high-yield debt.

Box 1.2. (continued)

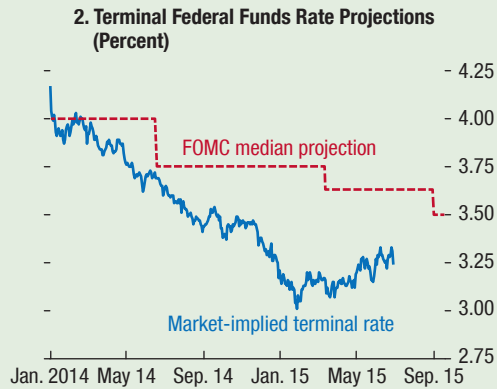
Figure 1.2.1. Policies Have Led to Compressed Term Premiums and Market Abnormalities

Quantitative easing programs in the United States have compressed term premiums (10-year Treasury) well below historical averages...



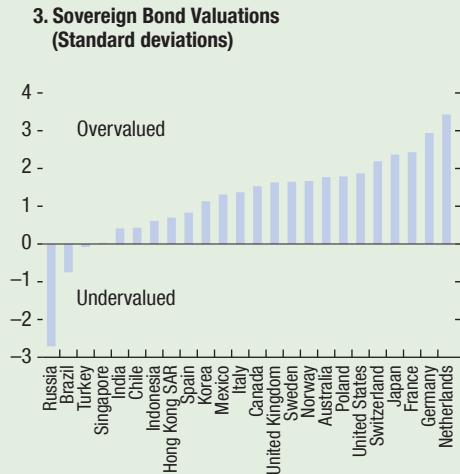
Sources: Kim and Wright (K and W) (2005, updated); and IMF staff estimates.
 Note: K and W estimates as of end-June 2015. The upper bound of the blue bar indicates the average K and W term premium from 1990 to 2007, while the lower bound indicates the average term premium from 2000 to 2007.

...dampening market expectations of the terminal federal funds target.



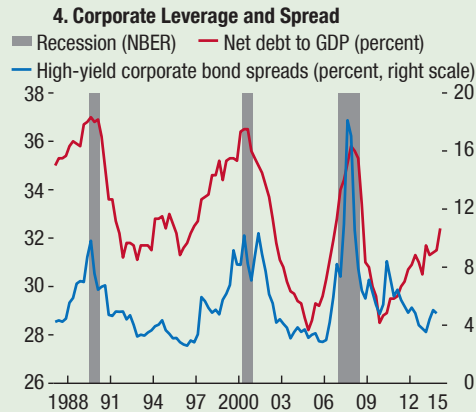
Sources: Bloomberg, L.P.; Kim and Wright (K and W) (2005, updated); and IMF staff estimates.
 Note: The market-implied terminal rate is derived from the 10-year Treasury rate, the 10-year term premium (Kim and Wright 2005), and the expected months to liftoff in the federal funds rate. The pace of rate hikes is assumed to be 100 basis points per year until the terminal rate is reached. Market-implied terminal rate as of June 2015; FOMC projection as of September 2015. FOMC = Federal Open Market Committee.

Accommodative policies have led to signs of overvalued sovereign bonds.



Sources: Bloomberg, L.P.; and IMF staff calculations.
 Note: Five-year-five-year sovereign bond yield in local currency terms minus five-year-five-year survey-based expectation of real GDP growth and inflation. Z-score computed as mean-adjusted return, scaled by the standard deviation: $(y - \bar{y})/\sigma$. Inverted, up = overvalued.

Corporate leverage in the United States has risen but credit spreads have diverged in recent years.



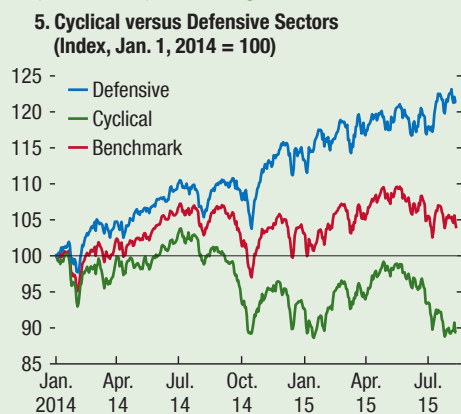
Sources: Bank of America Merrill Lynch; Federal Reserve, Flow of Funds; National Bureau of Economic Research (NBER); and IMF staff calculations.

(Figure 1.2.1 continues)

Box 1.2. (continued)

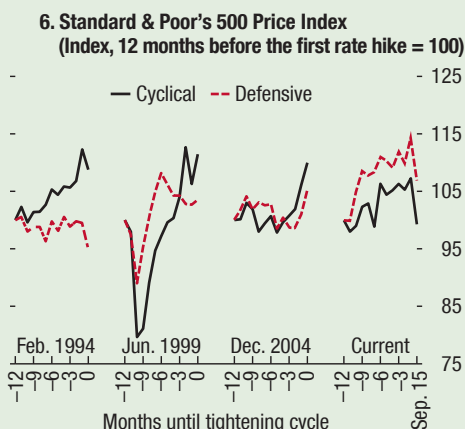
Figure 1.2.1. (continued)

Dividend yield and defensive stocks have outperformed cyclical and growth stocks...



Sources: Bloomberg, L.P.; Financial Times Stock Exchange; and IMF staff calculations.

...unlike in previous recovery cycles.



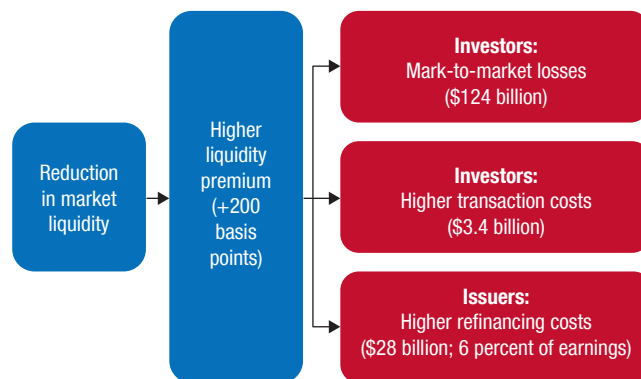
Sources: Bloomberg, L.P.; and IMF staff calculations. Note: Cyclical sectors include basic materials, consumer discretionary, and financial services. Defensive sectors include consumer staples, health care, and utilities.

number of costs for investors (Figure 1.19). First, retail and institutional investors would be hit by significant mark-to-market losses on their holdings. Second, corporate issuers would suffer from higher borrowing costs, particularly hurting those with large rollover needs. Third, investors and dealers would face higher transaction costs, further limiting turnover in this market.¹¹ High-yield companies would face additional issuance costs of \$3.4 billion, or roughly 6 percent of current one-year earnings. A shock of this nature could reinforce a cycle of redemption risks in retail mutual bond funds and pressures on other illiquid assets. Moreover, risks of further shocks (or decompression in risk premiums) would only reinforce this negative cycle.

¹¹The impact on investors is measured by computing the mark-to-market losses resulting from increased yields (and the corresponding decline in prices) and by increasing a measure of actual transaction costs (costs of a roundtrip buy-and-sell transaction for the same quantity). The costs for issuers are computed by estimating the additional issuance costs required to roll over the entire stock of debt.

Figure 1.19. Systemic Implications of a Liquidity Shock

A risk premium shock results in costs to high-yield issuers and investors.



Sources: Federal Reserve; Oliver Wyman; Securities Industry and Financial Markets Association; Trade Reporting and Compliance Engine (TRACE); and IMF staff estimates. Note: Issuance costs account for 6 percent of high-yield companies' one-year earnings as of 2015:Q1.

Policy mistakes can turn risk decompression into a global asset market disruption

If policymakers mishandle the triad of challenges that they face, the expected further decompression in risk premiums could turn into an abrupt one, pushing the global financial system from the baseline to a

downside scenario: a global asset market disruption. The likely implications of this downside are quantified with the help of the IMF's Global Macrofinancial Model (Annex 1.2), which allows us to elaborate on the discussion of disruptive asset price shifts and financial market turmoil in the October 2015 WEO. The shock sizes are informed by the historical behavior of key variables, making the scenario plausible and adverse, but not extreme. The exercise is useful in bringing together knowledge about business cycle dynamics in the world economy, macrofinancial linkages under bank and market-based intermediation, and diverse channels for the transmission of spillovers. A particularly relevant feature of the model is that it captures financial contagion and balance sheet effects. As with any model, the interpretation of results must take into account the underlying assumptions and model limitations.

On the downside, monetary normalization in systemic advanced economies would be delayed or stalled by realization of financial stability risks. The scenario consists of three main layers:

- *First, an abrupt further decompression of asset risk premiums.* The decompression is amplified by low secondary market liquidity in systemic advanced economies. The risk premium decompression elevates long-term government bond yields relative to the baseline, but yields in Japan, the United Kingdom, Germany, and the United States are relatively lower as the result of “safe haven” capital flows. Higher long-term government yields interact with a reemergence of financial strains in some euro area economies. Lower risk appetite also leads to a stock market selloff and declining equity prices. Elevated global capital market volatility widens the spread of the money market interest rate over the policy interest rate.
- *Second, credit cycle downturns in emerging markets.* These downturns result in higher default rates on bank loans to nonfinancial firms in emerging markets, given the rising share of corporate debt at risk, in addition to defaults induced by spillovers from advanced economies. In China, the emergence of counterparty credit risk widens the spread of the money market interest rate over the policy interest rate.
- *Third, a worldwide decline in economic risk taking,* and an additional decline in private investment and consumption. The contraction of private domestic demand is driven by a loss of business

and household confidence, which increases saving rates and delays investment. Monetary authorities in the systemic advanced economies continue quantitative easing to keep policy rates at or near the zero lower bound. In emerging market economies, monetary policy loosens in response to the adverse shock.

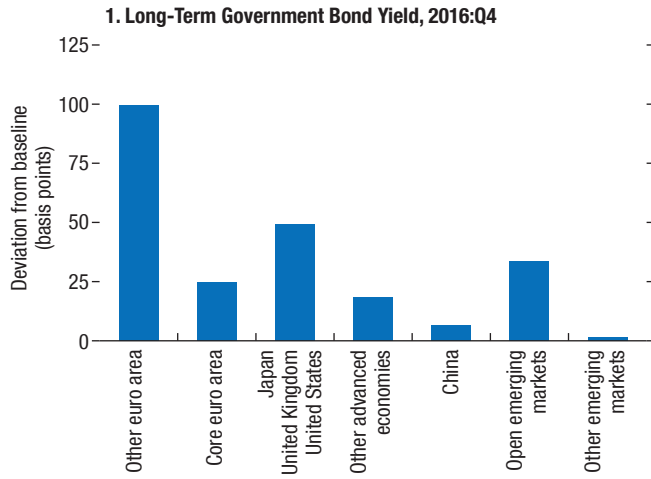
The scenario reduces bank capitalization and worsens government debt sustainability (Figure 1.20, panels 5 and 6). Output is lower relative to the baseline, inflation falls, and unemployment rises. These developments induce cuts in policy interest rates where possible. Automatic fiscal stabilizers operate fully in all economies, but discretionary fiscal stimulus measures are not considered. The deployment of policy buffers is not considered, which would mitigate the negative growth impact, particularly in China where substantial buffers exist. The banking sector responds and contributes to reductions in private investment by decreasing bank credit and nonfinancial corporate debt. Bank capital ratios fall, especially in emerging market economies, where loan default and credit loss rates increase relatively more. Reflecting lower nominal output, government debt ratios rise, especially in advanced economies, where initial government debt ratios and debt-service cost increases are higher.

In aggregate, world output is lower by 2.4 percent by 2017 relative to the baseline, which implies still positive but low global growth. Energy and non-energy commodity prices fall by 22.7 percent and 11.8 percent, respectively.

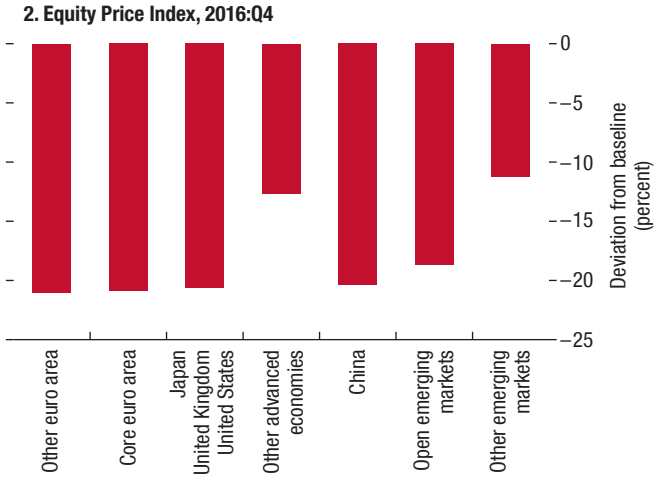
For comparison, the October 2015 WEO includes a scenario illustrating the impact of a longer-term structural slowdown in potential output growth of emerging market economies. The WEO scenario includes lower capital inflows and tighter financial conditions. Country risk premiums on interest rates rise as investors worry about default risks on loans made before expected growth fell. The scenario suggests that worldwide economic growth in 2016 would be about 0.4 percentage points below the WEO baseline. Economic growth in the major emerging markets (Brazil, Russia, India, China, and South Africa) worsens by about 1¾ percentage points relative to the baseline after five years. A second version of the scenario adds in the impact of depreciation in emerging market currencies, and a larger increase in country risk premiums, which would amplify the extent of the slowdown.

Figure 1.20. Effect of a Global Asset Market Disruption

The global asset market disruption scenario entails rapid decompression of risk premiums in bonds...

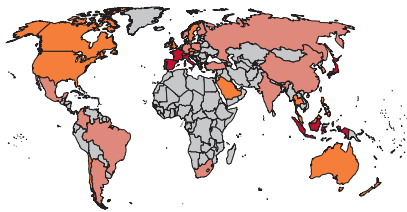


...and equities.



The scenario generates moderate to large output losses worldwide...

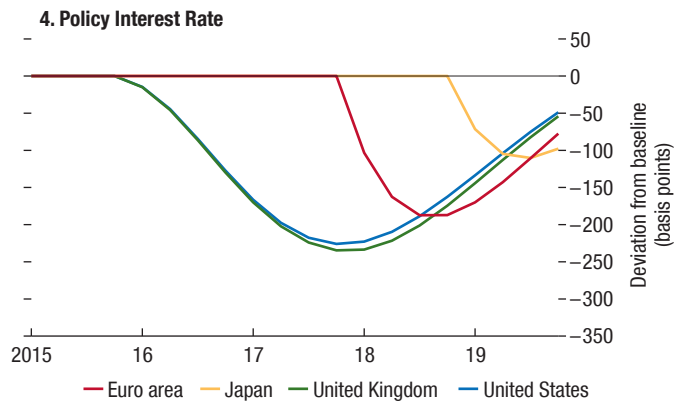
3. Output, 2017



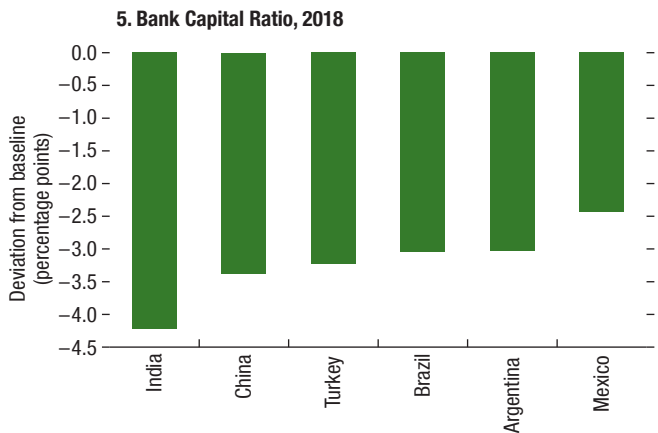
Percent

- less than -3.0
- from -3.0 to -2.0
- from -2.0 to -1.0
- more than -1.0

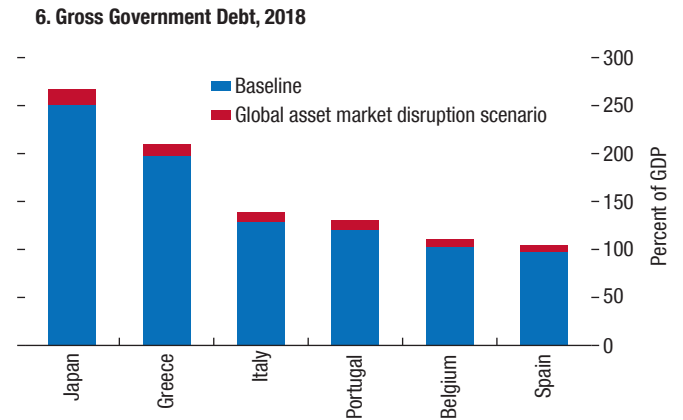
...and delays or stalls monetary policy normalization in advanced economies.



Banking sector capitalization suffers...



...as does government debt sustainability.



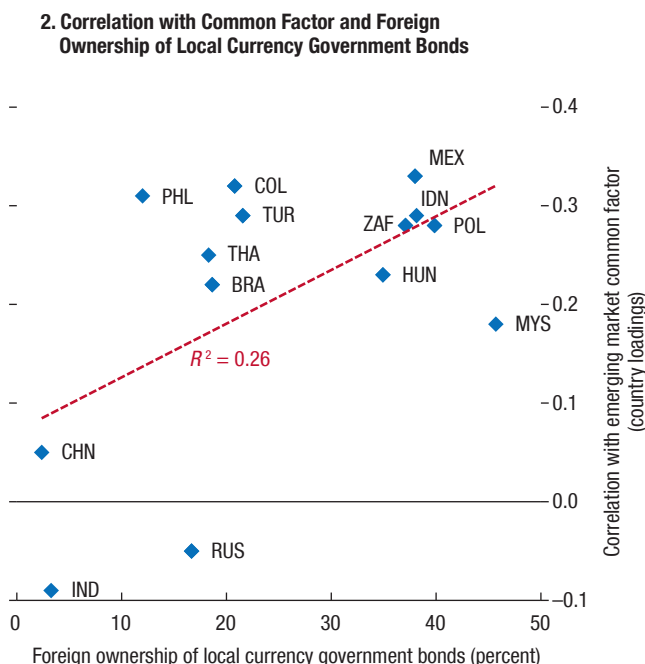
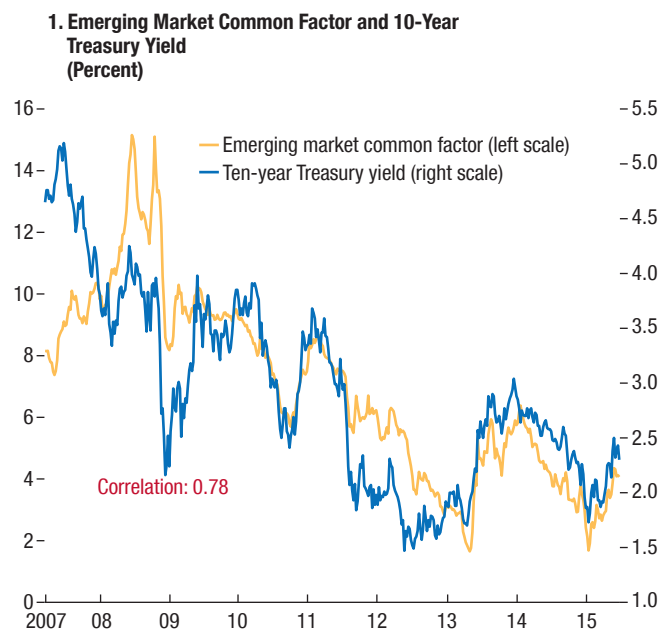
Source: IMF staff calculations.

Note: For the methodology, see Annex 1.2. Open emerging markets = Argentina, Brazil, Colombia, India, Indonesia, Mexico, Philippines, Poland, Russia, South Africa, Thailand, and Turkey.

Figure 1.21. Emerging Market Local Currency Bond Yields

Comovements in emerging market local currency bond yields are largely explained by a common factor, which is highly correlated with the U.S. Treasury rate.

Countries with higher foreign ownership of local currency government bonds tend to have higher sensitivity to the common factor.



Source: IMF staff calculations.

Note: The emerging market common factor is the first component of 10-year government bond yields from 14 emerging market economies using principal component analysis. The common factor was transformed to have the same mean and variance as the U.S. 10-year Treasury yield.

Sources: Arslanalp and Tsuda (2014b); national authorities; and IMF staff calculations.

Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

Emerging markets would be hit with multiple shocks

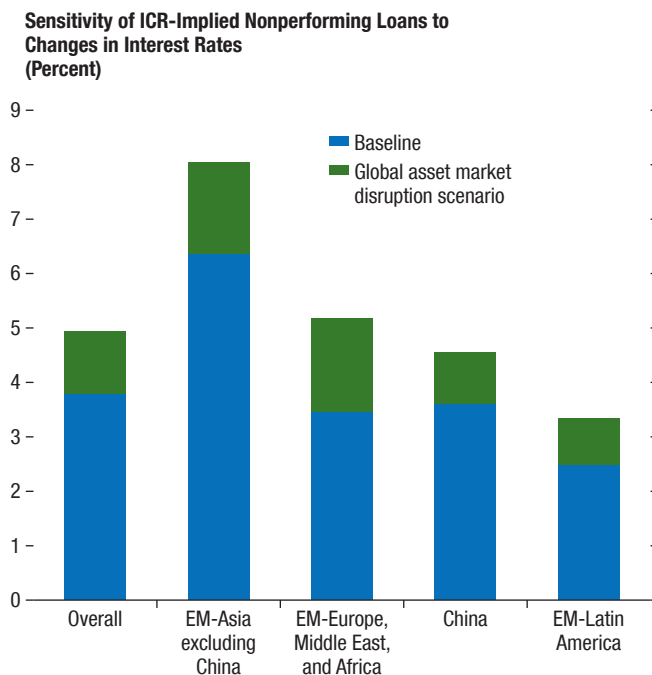
The likely adverse effects of the global asset market disruption scenario vary considerably across countries, but most are hit by one or more of three transmission channels: financial contagion shocks (via equity, bond, and money markets), corporate debt shocks (affecting bank soundness), and commodity shocks (affecting net commodity exporters). Financial contagion—via portfolio outflows from emerging markets—is a particularly important transmission channel in the global asset market disruption scenario. Emerging market sovereign bonds face a particularly rocky adjustment in the scenario. Emerging market bond yields tend to comove, especially during stress episodes. About half of this variation can be explained by a single common factor. The common factor is highly correlated to the 10-year U.S. Treasury rate and this relationship has become stronger since the 2013 taper tantrum (Figure 1.21,

panel 1), implying that the U.S. rate plays a key role in the transmission channel.¹² The adjustment would be particularly painful for emerging markets with high foreign participation in bond markets. The sensitivity of each country’s bond yield to the common factor can be partly explained by the share of foreign ownership in local government bond markets (Figure 1.21, panel 2), even though other factors, such as the quality of domestic fundamentals, also have an influence.

The scenario’s combination of risk premium reversal (higher rates) and deteriorating economic outlook (lower corporate cash flows) would particularly compromise emerging market firms’ debt-service capacity. Asset quality would deteriorate in all regions under the simulation, significantly so in emerging Asia

¹²Statistical analysis shows that the causation runs from the U.S. rate to the common factor rather than the reverse.

Figure 1.22. Corporate Debt Burden in Market Disruption Scenario



Sources: Standard & Poor's Capital IQ; and IMF staff calculations.

Note: The global asset market disruption scenario consists of a 25 percent increase in borrowing costs and growth shocks. Vulnerable debt is defined as the debt of firms whose EBITDA does not cover interest expenses for six consecutive quarters. EBITDA = earnings before interest, taxes, depreciation, and amortization; EM = emerging markets; ICR = interest coverage ratio.

(Figure 1.22). These calculations assume relatively small changes in exchange rates; if larger depreciation risks were to materialize, solvency risks for unhedged dollar borrowers, especially property developers, would increase, translating into even larger nonperforming loans (this is also discussed in Chapter 3).

Corporate weaknesses highlight the corporate-sovereign risk nexus in emerging markets

Several emerging market sovereigns—Brazil, South Africa, and Turkey, for example—are at the lower end of the investment-grade ratings scale (Figure 1.23). The global asset market disruption scenario, with weaker growth and higher risk premiums, would put pressure on the ratings of several economies in the medium term. A loss of investment-grade ratings would cement higher borrowing costs for sovereigns and firms. This underscores the need to take the necessary fiscal policy adjustments

and reform efforts to maintain investment grade ratings.

The sovereign–state-owned enterprise nexus can also amplify headwinds to the sovereign when contingent liabilities of the state-owned enterprises are assumed by the sovereign. Since 2010, an increasing portion of externally issued emerging market corporate debt has been issued by state-owned entities (Figure 1.23). Firms in the oil, gas, and utility sectors can feed commodity price and credit turmoil back to the sovereign as, for example, Petrobras in Brazil, PDVSA in Venezuela, Rosneft in Russia, KazMunayGas in Kazakhstan, and Eskom in South Africa (Figure 1.24).

Policies for Successful Normalization

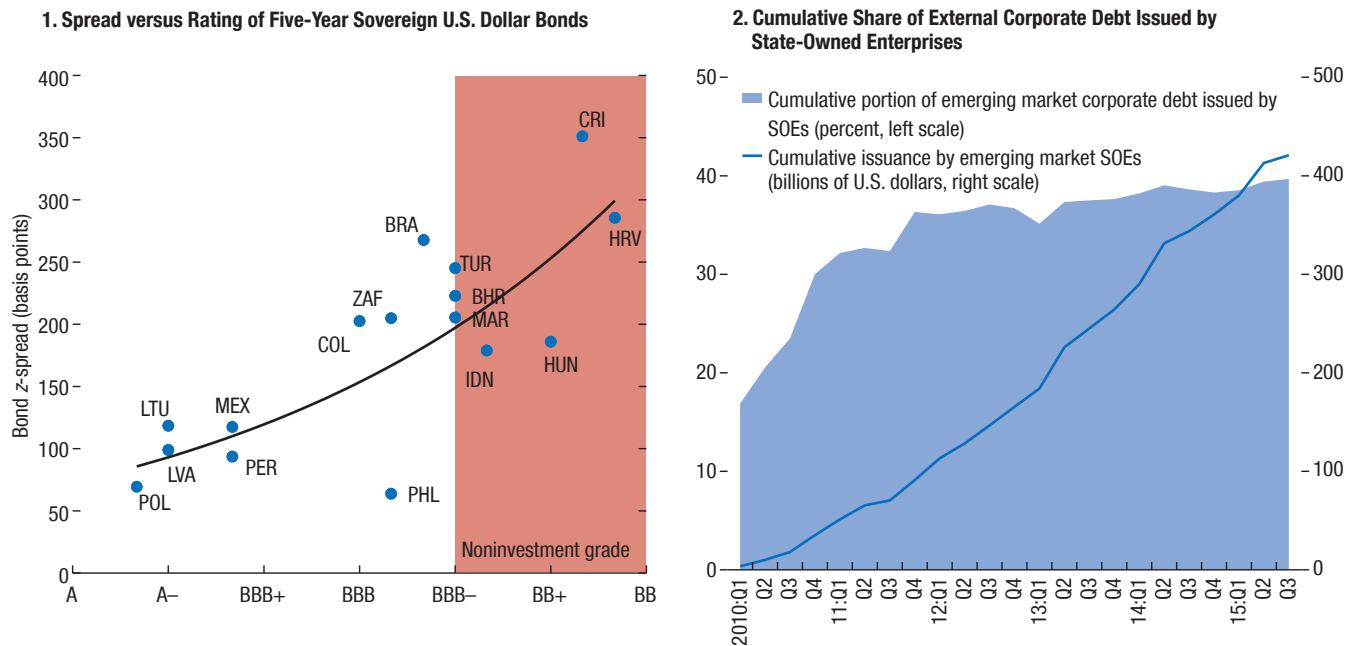
Successful normalization of financial and monetary conditions would yield significant financial stability benefits. Accomplishing this objective will require concerted policy efforts across several fronts in advanced and emerging market economies.

Confidence in policymaking remains essential in a challenging environment

The smooth absorption of a rise in the U.S. policy rate will be important to global financial health. The commencement of policy normalization—even if accompanied by a strong underlying economy—may lead to financial market volatility, a repricing of the U.S. yield curve, or a selloff of riskier assets. The Federal Open Market Committee should remain data dependent, with the first increase in the federal funds rate waiting until there are firmer signs of inflation rising steadily toward the Federal Reserve's 2 percent medium-term inflation objective, with continued strength in the labor market. The pace of subsequent policy rate increases should be gradual and clearly communicated. Such an approach would reduce the possibility that episodes of financial market volatility could disrupt the current economic expansion. Stronger growth in the United States would help cushion the impact of rising rates in emerging markets.

In Japan, the central bank should be prepared to ease further to achieve its inflation target, and should provide stronger guidance to markets, as outlined in the IMF's 2015 Article IV report for Japan. Since supply and demand dynamics suggest the Bank of Japan may need to taper its government bond purchases in 2017 or 2018 (Arslanalp and Botman 2015), contin-

Figure 1.23. Lower Ratings Would Lock in Higher Borrowing Costs



Sources: Bloomberg, L.P.; Fitch; Moody's; Standard & Poor's; and IMF staff calculations.
 Note: Data labels in the figure use International Organization for Standardization (ISO) country codes.

Sources: Dealogic; and IMF staff calculations.
 Note: SOE = state-owned enterprise.

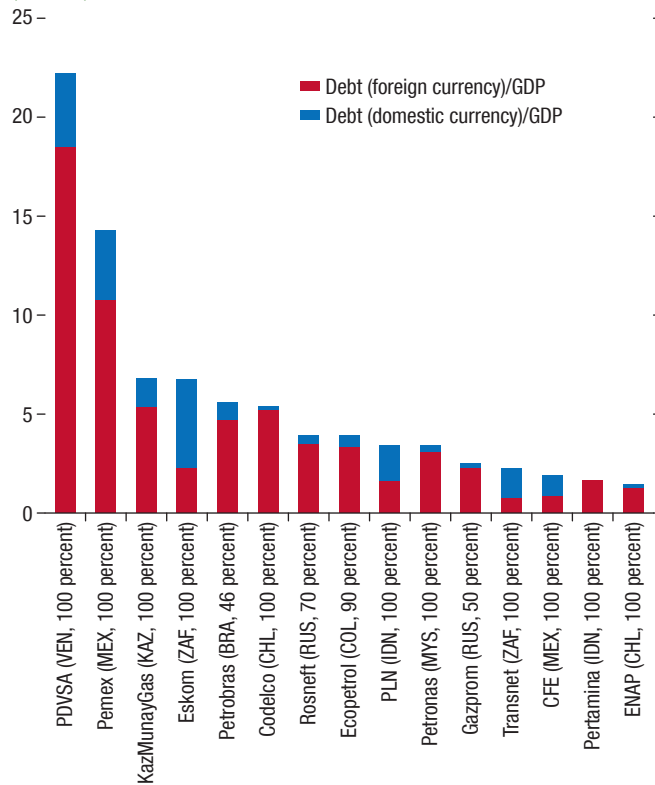
ued monetary stimulus will likely require extending the maturity of its government bond purchases or scaling up private asset purchases. Even with further easing, reaching the inflation target in a stable manner is likely to take longer than envisaged in the absence of deeper structural reforms and adequate fiscal policy. To further stimulate bank lending to the private sector, the authorities should jumpstart the securitization market for loans to small and medium-sized enterprises and mortgages, and enhance the provision of risk capital, in part by encouraging more asset-based lending and removing barriers to entry and exit for small and medium-sized enterprises.

In the euro area, more progress is needed to bolster market confidence. So far, at the most difficult times during the negotiations with Greece, ECB policy has staved off potential contagion emanating from concerns about a Greek default or exit from the euro. But euro area policymaking cannot rely on the ECB alone to move financial stability onto firmer ground. The agenda to strengthen the currency union must include finishing the essential pillars of a banking union, including establishing a pan-European deposit insurance scheme;

lowering the obstacles to direct recapitalization of banks by the ESM, thereby severing the bank-sovereign link; laying the groundwork for a capital markets union; and advancing fiscal and economic integration (EC Presidents' report June 22, 2015).

Further strengthening euro area banks by comprehensively tackling nonperforming loans will improve the outlook and further bolster market confidence, as discussed in the IMF's 2015 Article IV Staff Report for the euro area and in previous GFSRs. At the European Union (EU) level, the Single Supervisory Mechanism could accelerate loan resolution in a number of ways: (1) by strengthening incentives for write-offs or debt restructuring, (2) by ensuring that banks provision prudently and value collateral conservatively, (3) by imposing higher capital surcharges or time limits on long-held nonperforming loans, and (4) by developing standardized criteria for identifying nonviable firms for quick liquidation. Improvements in national insolvency and foreclosure rules would also help, including by reducing foreclosure times to help close the gap between the market value and book value of distressed debt, and passing reforms to accelerate out-of-court

Figure 1.24. Selected Quasi-Sovereign Company Ownership and Debt (Percent)



Sources: Bloomberg, L.P.; company annual reports; Standard & Poor's Capital IQ; and IMF staff calculations.
 Note: Country and sovereign ownership (percent) are identified within parentheses. Country abbreviations in the figure use International Organization for Standardization (ISO) country codes.

procedures and facilitate out-of-court workouts to reduce costs and encourage more market-led corporate restructuring. National asset management companies, acting in compliance with EU rules, could help achieve economies of scale in handling distressed debt by purchasing nonperforming loans and quickly disposing of them (Box 1.3).

Rebalancing and deleveraging in China will require great care

The Chinese authorities face an unprecedented policy challenge in carrying out their objectives to make the transition to a new growth model and a more market-based financial system, and to reduce vulnerabilities inherited from the old system. Achieving this outcome will require careful pacing of reforms and policy consistency.

Appropriately deleveraging the corporate sector would avoid directing credit and labor resources toward inefficient activities, which diminishes growth prospects and leads to a further deterioration in balance sheets. A more proactive restructuring—which could include increased write-offs of nonperforming loans, bankruptcies, and exits (including of unviable state-owned enterprises)—would more quickly break this trend. It would help unclog credit intermediation, allowing the dynamic firms that will drive future growth to get better access to credit, and free up labor that could flow to more productive activities. Although it would initially hurt bank balance sheets and increase unemployment, these problems could be addressed by a comprehensive plan that would include a strong social safety net for laid-off workers, and a financial sector restructuring program to deal with bad assets and recapitalize banks as needed. Moving faster may ultimately prove less costly than trying to “grow out of the problem” through a protracted period of fairly tight credit conditions.

The removal of unconventional measures, including those to stem recent equity price declines, combined with steps to strengthen the resilience of the financial system would ensure continued progress toward a well-regulated, more market-based financial system in China. Shortcomings in the supervisory framework should be addressed, including by filling data gaps regarding equity-related leverage and linkages between financial institutions. The market role of the China Securities Finance Corporation, including the extent of its interventions and equity holdings, should be clarified, and an eventual exit strategy from its current balance sheet should be established. Incentives for leverage in equity markets should be removed, and leverage, including margin borrowing by equity investors, should be regulated more tightly. Authorities should also review trading-halt criteria and other stock exchange regulations.

Looking forward, the commitment to reform will be key to policy credibility and effectiveness. Policy priorities include completing interest rate liberalization and containing the risk of excessive competition through supervision, regulation, and better liquidity management by the central bank. Authorities should rely less on moral suasion to guide banks' lending activities and allow loan policies and interest rates to be determined by commercial considerations. Loss-absorbing buffers for banks should also be enhanced. The web of implicit guarantees to the corporate, bank, and nonbank sectors should be broken to better price risk and allocate

Box 1.3. Banking in Europe: The Impact of Nonperforming Loans

A pickup in credit growth will be needed to secure broader economic growth in Europe. Although banks' capital bases have improved—making banks safer—lending capacity remains constrained and profitability expectations are subdued.¹ At the end of 2014, nonperforming loans (NPLs) locked up some €52 billion, or 3 percent of regulatory capital, at euro area banks. Reducing NPLs would free up bank capital and encourage credit growth.

A heat map (Figure 1.3.1) illustrates the capital relief that euro area banks might achieve as a function of foreclosure time and investors' return expectations at the end of 2014, assuming a 5 percent additional loss. It shows that despite the loss, banks could free up regulatory capital at the current foreclosure time of about three years.

Progress has been made in resolving NPLs, provisioning ratios have improved, and distressed asset markets have been successfully developed in certain countries.² However, one impediment to a reduction in NPLs is the pricing gap—the difference between book values on bank balance sheets and the prices investors are willing to pay. Reducing the time required to foreclose allows the present value of the collateral to be maximized, which works to the benefit of both debtor and creditor. Quick foreclosures facilitate the workout for any asset holder, whether the bank itself or an investor, and they are one mark of an efficient judicial system that helps develop investor confidence and reduce return expectations. If NPLs were sold to investors expecting a 10 percent return, €602 billion in new lending capacity

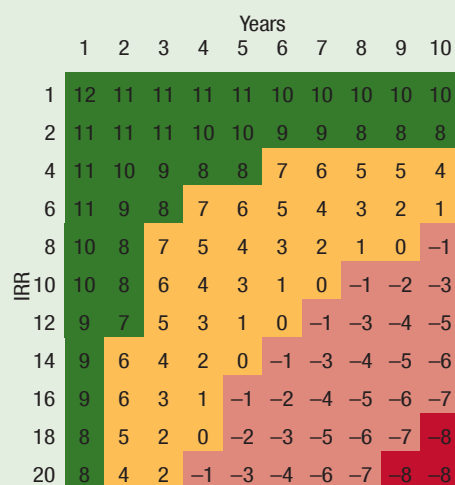
The authors of this box are Jean Portier and Luca Sanfilippo.

¹October 2014 GFSR. More than 70 percent of the largest euro area banks by assets would be unable to increase credit by more than 5 percent to finance growth.

²For example, Spain has set up asset management companies and kick-started active management of nonperforming assets.

Figure 1.3.1. Euro Area Capital Relief from Nonperforming Loans

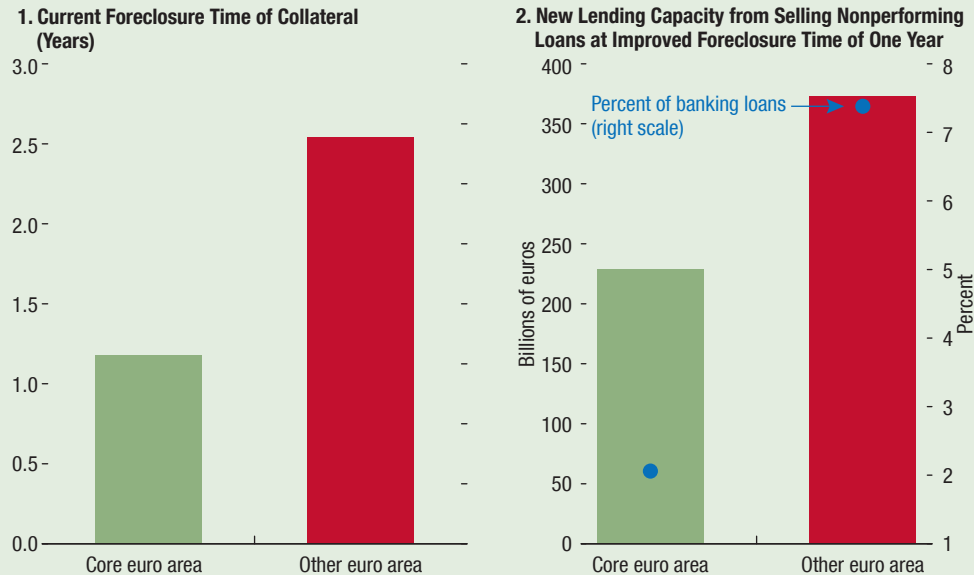
(Percentage of total regulatory capital as a function of foreclosure time and investors' return expectations)



Sources: European Banking Authority, European Central Bank; Haver Analytics; IMF, Financial Soundness Indicators; national central banks; SNL Financial; and IMF staff calculations.

Note: Investor price derived from foreclosure time and internal rate of return; assumes 80 percent collateralization, usual servicing fees, 5 percent additional loss, actual risk-weighted assets and coverage ratios at end-2014, and 16 percent capital asset ratio. IRR = internal rate of return. Green shading indicates that the percentage of regulatory capital (when rounded to whole numbers) is 8% or larger, orange is between 0% and 7%, pink is between -7% and 0%, and red indicates below -8%.

(3.7 percent of bank loans to EA residents) could be obtained in the overall euro area, of which €373 billion would be made available in other (non-core) euro area countries (7.4 percent of bank loans to other (non-core) euro area residents), if foreclosure times were reduced to the euro area best-practice level of one year (Figure 1.3.2).

Box 1.3. (continued)**Figure 1.3.2. Euro Area Foreclosure Time and Lending Capacity from Foreclosure Time Reduction**

Source: European Banking Authority; European Central Bank; Haver Analytics; IMF, Financial Soundness Indicators; national central banks; SNL Financial; World Bank, Doing Business Report; and IMF staff calculations.
 Note: Assumes a best practice foreclosure time of one year. Dots in second panel refer to new lending capacity as a percentage of banking loans in the respective region. Core euro area comprises Austria, Belgium, France, Germany, and Netherlands. Other euro area comprises Cyprus, Greece, Ireland, Italy, Portugal, Slovenia, and Spain.

capital more efficiently. The transition will require an upgraded monetary policy framework that uses market interest rates as the main policy tool.

Building and maintaining policy confidence in emerging markets will be crucial

Many emerging markets have increased their resilience to external shocks with increased exchange rate flexibility, higher foreign exchange reserves, increased reliance on FDI flows and domestic-currency external financing, and generally stronger policy frameworks. However, the turning of the credit cycle to its late stage and recent market turbulence put the spotlight on prevention of deterioration in financial sector conditions. Authorities in emerging markets should develop a more in-depth understanding of continued credit growth in their banks and assess its financial risk against economic benefits, bringing to bear micro- and macroprudential tools to discourage the buildup of excessive leverage and foreign indebtedness. This includes considering

higher risk weights (capital requirements) for corporate foreign currency exposures as well as caps on the share of such exposures on banks' balance sheets. At the microprudential level, regulators need to conduct bank stress tests related to foreign currency risks and regularly monitor corporate foreign currency exposures, including derivatives positions. Furthermore, policymakers should encourage banks to strengthen provisioning to deal with rising nonperforming loans, improve regulations on credit quality classification, and address important data gaps in the corporate and nonbank sectors.

As set out in Chapter 3, corporate leverage in emerging markets is a potential source of vulnerability if financial conditions tighten. Special attention should be paid to foreign currency exposures and risks, reducing or cushioning exposures as needed and reforming corporate insolvency regimes. Maintaining sovereign investment-grade status is a priority. Accelerating measures to foster money market and corporate bond issuance may also help corporate borrowers reduce their dependence on balance sheet-constrained banks. Sovereign borrowers should buttress

their investment-grade ratings. They should also manage and contain contingent liabilities from state-related entities by ensuring effective management and oversight.

Safeguarding against market illiquidity and strengthening market structures are priorities

The weakening of liquidity in fixed-income markets has potential effects on both market efficiency and financial stability (Table 1.2), and it requires a multi-faceted solution. Diminished liquidity carries a high risk of contagion—it impairs the ability of markets to adjust and absorb events and may prompt episodes of excessive volatility, cause fire sales that disrupt asset values, and spread shocks across markets as the result of increased asset correlations.

Although the full effect of changed market conditions may not be known until a stress event occurs, as set out in Chapter 2 some markets show clear signs that liquidity conditions have worsened and that accommodative monetary policy is masking underlying risks. To assess these risks properly, authorities must develop greater monitoring capacity, particularly across markets, and put in place preemptive strategies. The cumulative impact of new banking regulations should also be evaluated. The changes in the investor base should be recognized by removing first-mover advantage from investment fund products (see Chapter 2). Moreover, addressing the lack of harmonization in over-the-counter derivatives markets would reduce costs and improve liquidity conditions.

Market structure solutions to liquidity shortages should be explored, for example, by working with market participants to introduce market making or raise minimum requirements for market makers. For markets without primary dealers, possibilities include minimum limits on bid-ask spreads, minimum amounts of quoted volumes, and a minimum presence during the usual trading periods. Trading venues could encourage liquidity provision by imposing small fees on liquidity consumers and using the revenue to pay liquidity providers (so-called maker/taker fees).

More study of the effect on liquidity of technological innovations such as high-frequency trading is also warranted (U.S. Department of the Treasury and others 2015; Bouveret and others, forthcoming). Banks should upgrade their technology infrastructure to allow for a unified trading book that can distribute capital dynamically across trading desks. Most banks currently run separate books for each desk; as a result, one desk may hit its risk limits faster than others and thus be unable to take on additional risk. Consequently, individual trading desks may lack the capacity to take significant positions during stress periods even though the bank as a whole may be adequately capitalized.

Conditions constraining market liquidity are likely to continue for some time and supervisors should ensure that institutional investors are adequately prepared. The supervision of liquidity risk at nonbanks

Table 1.2. Why Is Resilient Liquidity Important?

Effect of Diminished Liquidity	Implication
Less market making	More difficult to execute trades without affecting asset prices Greater asset price volatility Further breaches of value-at-risk limits leading to forced sales of assets
Reduced activity in repo (repurchase agreement) markets	Less funding available for hedge funds to arbitrage away discrepancies in asset prices More difficult to trade short positions, affecting market efficiency More difficult to hedge market risk Likely sporadic “snapbacks” in some asset prices as dislocations are corrected
Lower trading in single-name CDS	No single instrument to trade credit risk in an individual company Hedges move to CDS indices, with fragmentation between indices and single-name CDS Less efficient hedging of credit exposure
Cutback in interest rate swaps	More difficult to hedge floating or fixed interest rate exposure
Liquidity herding	Greater fragmentation of liquidity and breakdown of relationships between assets More difficult to hedge risks in financial markets Greater use of foreign exchange markets as proxy hedges More difficult for banks to manage good-quality liquid asset portfolios

Source: IMF staff.

Note: CDS = credit default swap.

should be enhanced, especially for investment funds, as discussed in the October 2014 and April 2015 GFSRs.

Leverage in investment funds has the potential to amplify market shocks

The use of embedded leverage through derivatives appears to be on the rise as fund managers seek to enhance low yields, and the lack of sufficient data collection and oversight by regulators compounds the risks.¹³ Implementing comprehensive and globally consistent reporting standards across the asset management industry would give regulators the data necessary to locate leverage risks. Reporting standards should include enough leverage information (level of cash, assets, and derivatives) to show funds' sensitivity to large market moves (for example, bond funds should report their sensitivity to rate and credit market moves) and to facilitate meaningful analysis of risks across the financial sector.¹⁴

Adopting a clear and common definition of leverage would be useful. Definitions vary across jurisdictions and are often insufficiently precise. Reporting based on a single well-understood definition would permit authorities to stress test for potential losses from market spillovers, unexpected moves in the yield curve, and changes in market volatility. Authorities should also make sure they have the right infrastructure in place to collect and interpret this information, both at the firm level and from a financial stability perspective.

These policies can support successful normalization

The baseline outlook is for sluggish growth and ongoing financial stability risks. There is also a nonnegligible risk that the baseline becomes a more pernicious scenario in which financial stability is compromised. Successful normalization of financial and monetary conditions in the context of sustainable medium-term growth and inflation requires policymakers to act on the various fronts outlined in this

¹³No disclosure requirements for detailed leverage information for regulated investment funds are in place in the United States, and requirements are in place only on a selected basis in some European countries.

¹⁴A welcome reporting initiative is the proposal by the U.S. Securities and Exchange Commission for U.S. mutual funds to disclose metrics such as sensitivity to rate and credit market moves (SEC 2015).

chapter. The upside scenario of successful normalization shows what would happen if the authorities took such action:

- First, successful normalization would entail a smooth transition from financial risk taking to economic risk taking in systemic advanced economies, boosting economic activity relative to the baseline. Monetary normalization would be accompanied by gradual upward shifts of yield curves as investors move away from long-term bonds.¹⁵ Higher risk appetite would drive a gradual and moderate rise in stock prices.
- Second, the scenario also assumes smooth financial liberalization and orderly deleveraging in China, accompanied by an orderly rebalancing of private domestic demand from investment to consumption.

Successful normalization would reinvigorate financial and corporate risk taking, helping to anchor optimism for medium-term financial stability and economic growth. On the banking side, stronger balance sheets would mean new lending capacity, which is especially important in the euro area. Moreover, the firms in the long-term savings-investment complex—insurance companies, pension funds, and other nonbank financial institutions—would be able to generate stronger earnings and returns, improving their balance sheet health.

Under this favorable upside scenario, world output would expand by an additional 0.4 percent by 2018 relative to the baseline, while energy and non-energy commodity prices would rise by 3.1 percent and 1.5 percent, respectively.¹⁶ Because the primary focus of these scenarios is on financial policies, this upside scenario does not include any growth-enhancing structural reforms (to increase growth potential) or possible further expansionary demand policies (such as infrastructure spending) to close output gaps. In other words, the main benefit of these financial sector policies in the successful normalization scenario is that they insure against the loss of financial stability, which would entail high losses of output. Specifically,

¹⁵The shift away from long-term bonds is induced by decompression of term premiums, which in turn is driven by internationally correlated shocks to duration risk premiums.

¹⁶Wide variation in output across economies reflects differences in the extent to which positive trade spillovers from the systemic advanced economies outweigh net negative financial spillovers from those economies (via higher interest rates) and negative trade spillovers from China.

successful normalization avoids the financial risks that could return the global financial system back to crisis. For medium- and long-term growth, macroeconomic policies and structural reforms are needed—a topic addressed more fully in the October 2015 WEO.

Annex 1.1. Progress on the Financial Regulatory Reform Agenda

Many of the key elements of the financial regulatory reform agenda, particularly in the banking sector, have been agreed upon. Additional effort is now focused on three areas: consistent implementation, finalization of outstanding reforms, and addressing emerging risks.

Implementation monitoring is well established through the Basel Committee on Banking Supervision's (BCBS's) regular update reports and its Supervisory Capital Assessment Program. The Financial Stability Board will support and broaden this initiative, incorporating the outcomes from its own peer reviews and those of the standards-setting bodies—the International Association of Insurance Supervisors and the International Organization of Securities Commissions—with the first annual consolidated report on implementation of the regulatory reforms and their effects, which will be delivered at the next summit of the Group of 20.

In the area of banking regulatory policy development, priorities include assessing the interaction, coherence, and overall calibration of the reform policies. The BCBS's work to reduce excessive variability in measuring risk-weighted assets has led to a review of the nonmodeled approaches to risks in the regulatory capital framework, including most recently through the consultation on the standardized approach to credit risk. The BCBS has also launched a consultation on the treatment of interest rates in the banking book, which is not at present subject to mandatory internationally agreed-upon minimum capital requirements. The supervisory community has been concerned with ensuring that banks are well placed to manage their balance sheet risks given that the low interest rate environment is likely to change. The review of the regulatory treatment of sovereign risk has begun, while the criteria for identifying simple, transparent, and comparable securitizations have been agreed upon.

Ending too-big-to-fail remains a cornerstone of the postcrisis reform agenda. Two key outstanding design

elements include international agreement on the quantity and composition of total loss-absorbing capital instruments that global systemically important banks should hold to support orderly resolution. Nonetheless, further action is needed in many jurisdictions to ease resolution of large, complex firms. Steps to achieve this include fully aligning resolution regimes with international best practice; reducing impediments to effective cross-border resolution, which includes finalizing policy measures to support cross-border recognition of resolution; and developing policies for recovery and resolution of systemically important nonbank intermediaries, such as central counterparties.

The reform agenda has moved forward in the nonbank financial sector. The International Association of Insurance Supervisors has issued consultation papers on risk-based global insurance capital standards and higher loss-absorbency requirements for globally systemically important institutions. The Financial Stability Board launched work on identifying financial stability risks associated with market liquidity in fixed-income markets and asset management activities and a peer review of the implementation of its policy framework for financial stability risks posed by nonbank financial entities other than money market funds.

Although jurisdictions have continued to make some headway in building the necessary legal and regulatory frameworks, efforts to achieve reform of over-the-counter derivatives have been restrained by implementation challenges. Five jurisdictions have central clearing requirements in effect for at least one product type. Most jurisdictions are in the early stages of implementing the new framework on margin requirements for non-centrally cleared derivatives. The availability and use of trade repositories and central counterparties continue to expand. However, limited progress has been made on the cross-border application of the new rules. While the European Commission and the U.S. Commodity Futures Trading Commission continue their negotiations on the cross-border application of their respective requirements, regulatory uncertainty for market participants persists.

Emerging risks are attracting increasing regulatory focus. These include financial stability risks stemming from market-based finance, including those associated with asset management activities (see Chapter 3 of the April 2015 GFSR). Addressing misconduct risks and the impact on emerging market and developing economies of banks' derisking their activities is also gaining prominence.

Annex prepared by Kate Seal with contributions from Nobuyasu Sugimoto, Constant Verkoren, and Eija Holttinen.

Annex 1.2. Simulating the Global Macrofinancial Scenarios

This annex provides additional details on the report's analysis of the global macrofinancial effects of global asset market disruption and successful normalization scenarios. These scenarios are simulated using the Global Macrofinancial Model documented in Vitek (2015), which is a structural macroeconomic model of the world economy. As with any scenario analysis, the simulation results need to be interpreted carefully, taking into account the underlying assumptions and limitations of the model. Nonetheless, this estimated panel dynamic stochastic general equilibrium model consolidates much existing theoretical and empirical knowledge concerning business cycle dynamics in the world economy. It features a range of nominal and real rigidities, extensive macro-financial linkages with both bank- and capital-market-based financial intermediation, and diverse spillover transmission channels.

The global macrofinancial model

Estimated dynamic stochastic general equilibrium models are widely used by monetary and fiscal authorities for policy analysis and forecasting purposes. This class of structural macroeconomic models has many variants, incorporating a range of nominal and real rigidities, and increasingly often macrofinancial linkages. Its unifying feature is the derivation of approximate linear equilibrium conditions from constrained optimization problems facing households and firms, which interact with governments in an uncertain environment to determine equilibrium prices and quantities under rational expectations.

The Global Macrofinancial Model is a structural macroeconomic model of the world economy, disaggregated into 40 national economies. This panel dynamic stochastic general equilibrium model features a range of nominal and real rigidities and diverse spillover transmission channels. Following Smets and Wouters (2003), the model features short-term nominal price and wage rigidities generated by monopolistic competition, staggered reoptimization, and partial indexation in the output and labor markets. Following Christiano, Eichenbaum, and Evans (2005), the resultant inertia in inflation and persistence in output is enhanced with other features such as habit persistence in consumption, adjustment costs in investment, and variable capital utilization. Following Galí (2011), the model incorporates involuntary unemployment through a reinterpretation of the labor market. Households are differentiated

according to whether they are bank intermediated, capital market intermediated, or credit constrained. Bank-intermediated households have access to domestic banks where they accumulate deposits, whereas capital-market-intermediated households have access to domestic and foreign capital markets where they trade financial assets. Following Vitek (2013), these capital-market-intermediated households solve a portfolio balance problem, allocating their financial wealth across domestic and foreign money, and bond and stock market securities, which are imperfect substitutes. To address dimensionality issues, targeted parameter restrictions are imposed on the optimality conditions determining the solution to this portfolio balance problem, avoiding the need to track the evolution of bilateral asset allocations. Firms are grouped into differentiated industries. Following Vitek (2013), the commodity industries produce internationally homogeneous goods under decreasing returns to scale, while all other industries produce internationally heterogeneous goods under constant returns to scale. Banks perform international financial intermediation subject to financial frictions and a regulatory constraint. Building on Hülsewig, Mayer, and Wollmershäuser (2009), they issue risky domestic-currency-denominated loans to domestic and foreign firms at infrequently adjusted predetermined lending rates. Also building on Gerali and others (2010), they obtain funding from domestic-bank-intermediated households via deposits and from the domestic money market via loans, and accumulate bank capital out of retained earnings given credit losses to satisfy a regulatory capital requirement. Motivated by Kiyotaki and Moore (1997), the model incorporates a financial accelerator mechanism linked to collateralized borrowing. Finally, following Monacelli (2005) the model accounts for short-term incomplete exchange rate pass through with short-term nominal price rigidities generated by monopolistic competition, staggered reoptimization, and partial indexation in the import markets.

An approximate linear state space representation of the model is estimated by Bayesian maximum likelihood, conditional on prior information concerning the generally common values of structural parameters across economies. In addition to mitigating potential model misspecification and identification problems, exploiting this additional information may be expected to yield efficiency gains in estimation. These cross-economy equality restrictions, which are necessary for this estimation procedure to be computationally feasible, are justified by assuming that these structural parameters do not vary too much across economies.

Annex prepared by Francis Vitek and Martin Čihák.

This estimated panel dynamic stochastic general equilibrium model of the world economy has been used to quantify the monetary, fiscal, and macroprudential transmission mechanisms; account for business cycle fluctuations; and generate forecasts of inflation and output growth. The monetary, fiscal, and macroprudential transmission mechanisms, as quantified with estimated impulse response functions, are broadly in line with the empirical literature, as are the drivers of business cycle fluctuations, as accounted for with estimated historical decompositions. Sequential unconditional forecasts of inflation and output growth dominate a random walk in terms of predictive accuracy by wide margins, on average across economies and horizons.

Scenario assumptions

The global asset market disruption scenario assumes that the realization of financial stability risks delays or stalls monetary normalization in the systemic advanced economies. In particular, it assumes an abrupt decompression of asset risk premiums relative to the baseline amplified by low secondary market liquidity in all of the systemic advanced economies as financial risk taking unwinds, interacted with the reemergence of financial stress in some euro area countries. The collapse of financial risk taking is represented by a 50 basis point increase in the long-term government bond yield in Japan, the United Kingdom, and the United States during 2016, induced by term premium decompression driven by internationally correlated duration risk premium shocks. The reemergence of financial stress in some euro area countries is driven by contagion from Greece, reigniting redenomination risk. This is represented by the divergence of long-term government bond yields between other (non core) euro

area countries, where they rise by 100 basis points during 2016, and core euro area countries, where they rise by only 25 basis points. There is also a selloff in stock markets due to lower risk appetite, with the real price of equity falling by 20 percent in the euro area, Japan, the United Kingdom, and the United States during 2016, driven by internationally correlated equity risk premium shocks. The elevated global capital market volatility generated by these bond and stock market adjustments widens the spread of the money market interest rate over the policy interest rate by 25 basis points in the euro area, Japan, the United Kingdom, and the United States during 2016, driven by internationally correlated credit risk premium shocks. The calibration of these global capital market adjustments, summarized in Annex Table 1.2.1, is informed by relevant historical episodes. This makes the global asset market disruption scenario plausible and adverse, but not extreme. In particular, it is broadly consistent with the approximately 20 percent likelihood of failed normalization shown for the United States in Figure 1.3.

The global asset market disruption scenario also assumes credit cycle downturns in all emerging market economies to varying degrees, reflecting their respective stages in the credit cycle (with China undergoing sizable deleveraging). These credit cycle downturns are represented by an increase in the default rate on bank loans to nonfinancial firms in all emerging economies, above and beyond those induced by spillovers from the systemic advanced economies. These exogenous default rate increases average 2 percentage points across emerging market economies, are proportional to their estimated share of corporate debt at risk, and are phased in gradually during 2016 and 2017. In China, the emergence of counterparty credit risk widens the spread of the money market

Annex Table 1.2.1. Global Asset Market Disruption Scenario: Assumptions

Scenario component	Deviation from baseline
<i>Layer 1: Tightening of financial conditions in systemic economies (2016)</i>	
Long-term government bond yield, term premium shocks	
euro area (other)	+100 basis points
euro area (core)	+25 basis points
Japan, United Kingdom, United States	+50 basis points
Real equity price, equity risk premium shocks	
China, euro area, Japan, United Kingdom, United States	-20 percent
Money market interest rate spread, credit risk premium shocks	
China	+100 basis points
euro area, Japan, United Kingdom, United States	+25 basis points
<i>Layer 2: Credit cycle downturns in emerging economies (2016–2017)</i>	
Loan default rate, loan default shocks	+0.1 to 4.5 percentage points
<i>Layer 3: Suppressed economic risk taking worldwide (2016–2017)</i>	
Private investment, investment demand shocks	-0.500 percent
Private consumption, consumption demand shocks	-0.125 percent

Source: IMF staff.

Annex Table 1.2.2. Successful Normalization Scenario: Assumptions

Scenario Component	Deviation from Baseline
<i>Layer 1: Handover from financial to economic risk taking in United Kingdom and United States (2016–17) and euro area and Japan (2017–18)</i>	
Private investment, investment demand shocks	+4.0 percent
Private consumption, consumption demand shocks	+1.0 percent
Long-term government bond yield, duration risk premium shocks	+50 basis points
Real equity price, equity risk premium shocks	+10 percent
<i>Layer 2: Credit cycle upturns in non-core euro area countries (2017–18)</i>	
Loan default rate, loan default shocks	-2.0 percentage points
<i>Layer 3: Smooth financial liberalization and orderly deleveraging in China (2016–17)</i>	
Money market interest rate spread, credit risk premium shocks	+50 basis points
Real equity price, equity risk premium shocks	-20 percent

Source: IMF staff.

interest rate over the policy interest rate by 100 basis points during 2016, driven by internationally correlated credit risk premium shocks. There is also a selloff in the stock market due to lower risk appetite, with the real price of equity falling by 20 percent in China during 2016. Finally, the scenario assumes suppressed economic risk taking worldwide, with private investment falling by an additional 0.5 percent and private consumption declining by an additional 0.125 percent in all economies during 2016 and 2017. These private domestic demand contractions are driven by negative investment and consumption demand shocks representing confidence losses by non-financial firms and households, which raise their saving rates and delay their expenditures. Under this scenario, monetary policy remains at or near the zero lower bound in the systemic advanced economies, where quantitative easing programs remain at their baseline scales. Automatic fiscal stabilizers operate fully in all economies, but discretionary fiscal stimulus measures are not considered. The deployment of policy buffers is not considered, which would mitigate the negative growth impact, particularly in China where substantial buffers exist.

In contrast, the successful normalization scenario assumes that macroeconomic expansions accelerate asynchronous monetary normalization in the systemic advanced economies. In particular, it assumes macroeconomic expansions relative to the baseline in all of the systemic advanced economies as economic risk taking takes hold, with private investment increasing by 4 percent and private consumption rising by 1 percent in the United Kingdom and the United States during 2016 and 2017, and in the euro area and Japan during 2017 and 2018. These private domestic demand expansions are driven by positive investment and consumption demand shocks representing confidence gains by nonfinancial firms and households, which reduce their saving rates and bring forward their expenditures. The reflation they generate accelerates smooth exits of monetary policy from the zero

lower bound, with gradual policy interest rate increases in the wake of successful quantitative easing programs in the United Kingdom and the United States beginning in the first quarter of 2016, and in the euro area and Japan beginning in the first quarter of 2017.

This asynchronous monetary normalization is accompanied by gradual upward shifts of yield curves, with the long-term government bond yield rising by 50 basis points in the United Kingdom and the United States during 2016 and 2017, and in the euro area and Japan during 2017 and 2018. These long-term government bond yield increases are residually induced by term premium decomposition driven by internationally correlated duration risk premium shocks, which shift investor preferences away from long-term bonds. There are also gradual and moderate stock price increases, with the real price of equity rising by 10 percent in the United Kingdom and the United States during 2016 and 2017, and in the euro area and Japan during 2017 and 2018. These stock price increases are residually driven by higher risk appetite represented by internationally correlated equity risk premium shocks, which shift investor preferences toward equities. Finally, the successful normalization scenario assumes credit cycle upturns in some (non-core) euro area countries following successful nonfinancial corporate debt restructuring initiatives, above and beyond those induced by their macroeconomic expansions. This is represented by a decrease in the default rate on bank loans to nonfinancial firms by an additional 2 percentage points during 2017 and 2018. This calibration of the successful normalization scenario, summarized in Annex Table 1.2.2, is designed to clearly differentiate it from the baseline while making it achievable with suitable policies. It is broadly consistent with the approximately 15 percent likelihood of successful normalization shown for the United States in Figure 1.3.

The successful normalization scenario also assumes smooth financial liberalization and orderly deleveraging in China. In particular, it assumes that financial liber-

alization gradually widens the spreads of the deposit and money market interest rates over the policy interest rate by 50 basis points during 2016 and 2017, driven by credit risk premium shocks. It also assumes that a moderation in risk appetite gradually lowers the real price of equity by 20 percent during 2016 and 2017, driven by equity risk premium shocks. This smooth financial liberalization and equity risk premium decompression induces a gradual increase in the default rate on bank loans to non-financial firms, as well as an orderly reduction in the ratio of bank credit to nominal output, reducing the likelihood and severity of a financial crisis. This gradual deleveraging is accompanied by an orderly rebalancing of private domestic demand from investment to consumption.

Shock transmission mechanisms

The Global Macrofinancial Model features a wide range of shock transmission mechanisms. Under both the global asset market disruption and successful normalization scenarios, spillovers are transmitted across economies via trade, financial, and commodity price linkages. These financial linkages encompass cross-bor-

der bank lending, portfolio debt and portfolio equity exposures, as well as contagion effects.

Under the global asset market disruption scenario, output losses are generated by the contractionary effects on private domestic demand of the tightening of financial conditions in systemic economies, credit cycle downturns in emerging market economies, and suppressed economic risk taking worldwide. The operation of these shock transmission mechanisms is explained in Annex Table 1.2.3.

Under the successful normalization scenario, output gains are generated by the expansionary effects on private domestic demand of the handover from financial to economic risk taking in the systemic advanced economies, together with credit cycle upturns in other (non-core) euro area countries. These output gains are offset by losses associated with the smooth financial liberalization and orderly deleveraging in China. The operation of these shock transmission mechanisms is explained in Annex Table 1.2.4.

Simulation results

The global asset market disruption scenario is mildly to severely negative for banking sector capitalization and

Annex Table 1.2.3. Global Asset Market Disruption Scenario: Shock Transmission Mechanisms

Tightening of Financial Conditions in Systemic Economies:

Increases in long-term government bond yields driven by higher term premiums induce:

- Households to raise saving rates in response to higher expected portfolio returns and correspondingly to reduce consumption.
- Firms to reduce investment financed by retained earnings as shareholders discount dividend payments generated from future production at higher rates.
- Governments to gradually face higher debt service costs as outstanding long-term bonds mature and are rolled over in primary markets.

Decreases in real equity prices driven by higher equity risk premiums induce:

- Households to raise saving rates in response to higher expected portfolio returns and correspondingly to reduce consumption.
- Firms to reduce investment financed by retained earnings as shareholders discount dividend payments generated from future production at higher rates.

Increases in money market interest rate spreads driven by higher credit risk premiums induce:

- Households to raise saving rates in response to higher deposit interest rates and expected portfolio returns and correspondingly to reduce consumption.
- Banks to gradually and partially pass through higher funding costs to firms through higher lending interest rates while eroding their profitability and capital buffers.
- Firms to reduce investment financed by retained earnings as shareholders discount dividend payments generated from future production at higher rates, and to reduce investment financed with bank loans in response to higher corporate loan interest rates.
- Governments to immediately face higher debt service costs as outstanding short-term bonds mature and are rolled over in primary markets.

Credit Cycle Downturns in Emerging Economies:

Loan default rate increases reflect endogenous and exogenous components.

- Endogenous loan default rate increases reflect materialization of systemic risk given financial spillovers from systemic advanced economies.
- Exogenous loan default rate increases are proportional to estimated share of corporate debt at risk and capture position in credit cycle.

Loan default rate increases raise credit loss rates of exposed banking sectors, which in turn raise lending interest rates to compensate for higher risk and gradually rebuild capital buffers.

- Higher bank lending interest rates translate into higher corporate loan interest rates, reducing investment by firms.

Suppressed Economic Risk Taking Worldwide:

Confidence losses by households and firms raise their saving rates and delay their expenditures.

- Households intertemporally substitute future for current consumption.
- Firms intertemporally substitute future for current investment.
- Firms to reduce investment financed by retained earnings as shareholders discount dividend payments generated from future production at higher rates.

government debt sustainability. Reflecting lower financial and economic risk taking, output contracts by 1.2 to 4.0 percent relative to the baseline across economies by 2017, while consumption price inflation falls by 0.9 to 2.2 percentage points, and the unemployment rate rises by 0.4 to 1.3 percentage points. These disinflationary macroeconomic contractions induce policy interest rate cuts of 1.6 to 2.7 percentage points across economies not constrained by the zero lower bound by 2017. The banking sector accommodates and contributes to reductions in private investment with 2.8 to 7.9 percent decreases in bank credit by 2019, implying similar decreases in non-financial corporate debt. Bank capital ratios fall by 0.5 to 4.2 percentage points across emerging market economies by 2018, where loan default and credit loss rates increase more, versus 0.1 to 0.9 percentage points across advanced economies. Reflecting lower nominal output, government debt ratios rise by 1.1 to 17.4 percentage points across advanced economies by 2018, where initial government debt ratios and debt-service cost increases are higher, versus 1.2 to 5.4 percentage points across emerging market economies. Energy and non-energy commodity prices fall by 22.7 and 11.8 percent, respectively, by 2017. In

aggregate, world output is lower by 2.4 percent by 2017 (Annex Figures 1.2.1 and 1.2.2).

The successful normalization scenario has mixed effects on banking sector capitalization and government debt sustainability. Reflecting a successful handover from financial to economic risk taking, output expands by 0.8 to 1.0 percent relative to the baseline across the systemic advanced economies by 2018, while consumption price inflation rises by 0.2 percentage points, and the unemployment rate falls by 0.2 to 0.3 percentage points. These inflationary macroeconomic expansions induce policy interest rate hikes of 0.5 to 0.6 percentage points across the systemic advanced economies by 2018. The banking sector accommodates and contributes to increases in private investment with 1.7 to 2.1 percent increases in bank credit by 2020, implying similar increases in nonfinancial corporate debt. In other (non-core) euro area countries, materially lower loan-default and credit-loss rates translate into 1.2 to 1.5 percentage point increases in bank capital ratios by 2019. As a result of higher nominal output, government debt ratios fall by 0.9 to 2.7 percentage points across the

Annex Table 1.2.4. Successful Normalization Scenario: Shock Transmission Mechanisms

Handover from Financial to Economic Risk Taking in Systemic Advanced Economies:

Confidence gains by households and firms reduce their saving rates and bring forward their expenditures.

- Households intertemporally substitute current for future consumption.
- Firms intertemporally substitute current for future investment.

Increases in long-term government bond yields driven by higher term premiums induce:

- Households to raise saving rates in response to higher expected portfolio returns and correspondingly to reduce consumption.
- Firms to reduce investment financed by retained earnings as shareholders discount dividend payments generated from future production at higher rates.
- Governments to gradually face higher debt service costs as outstanding long-term bonds mature and are rolled over in primary markets.

Increases in real equity prices driven by lower equity risk premiums induce:

- Households to reduce saving rates in response to lower expected portfolio returns and correspondingly to raise consumption.
- Firms to raise investment financed by retained earnings as shareholders discount dividend payments generated from future production at lower rates.

Credit Cycle Upturns in Other (Non-Core) Euro Area Countries:

- Successful nonfinancial corporate debt restructuring initiatives reduce loan default rates.
- Loan default rate decreases reduce credit loss rates of exposed banking sectors, which in turn reduce lending interest rates given lower risk and higher capital buffers.
- Lower bank lending interest rates translate into lower corporate loan interest rates, raising investment by firms.

Smooth Financial Liberalization and Orderly Deleveraging in China:

Increases in deposit and money market interest rate spreads driven by rises in credit risk premiums induce:

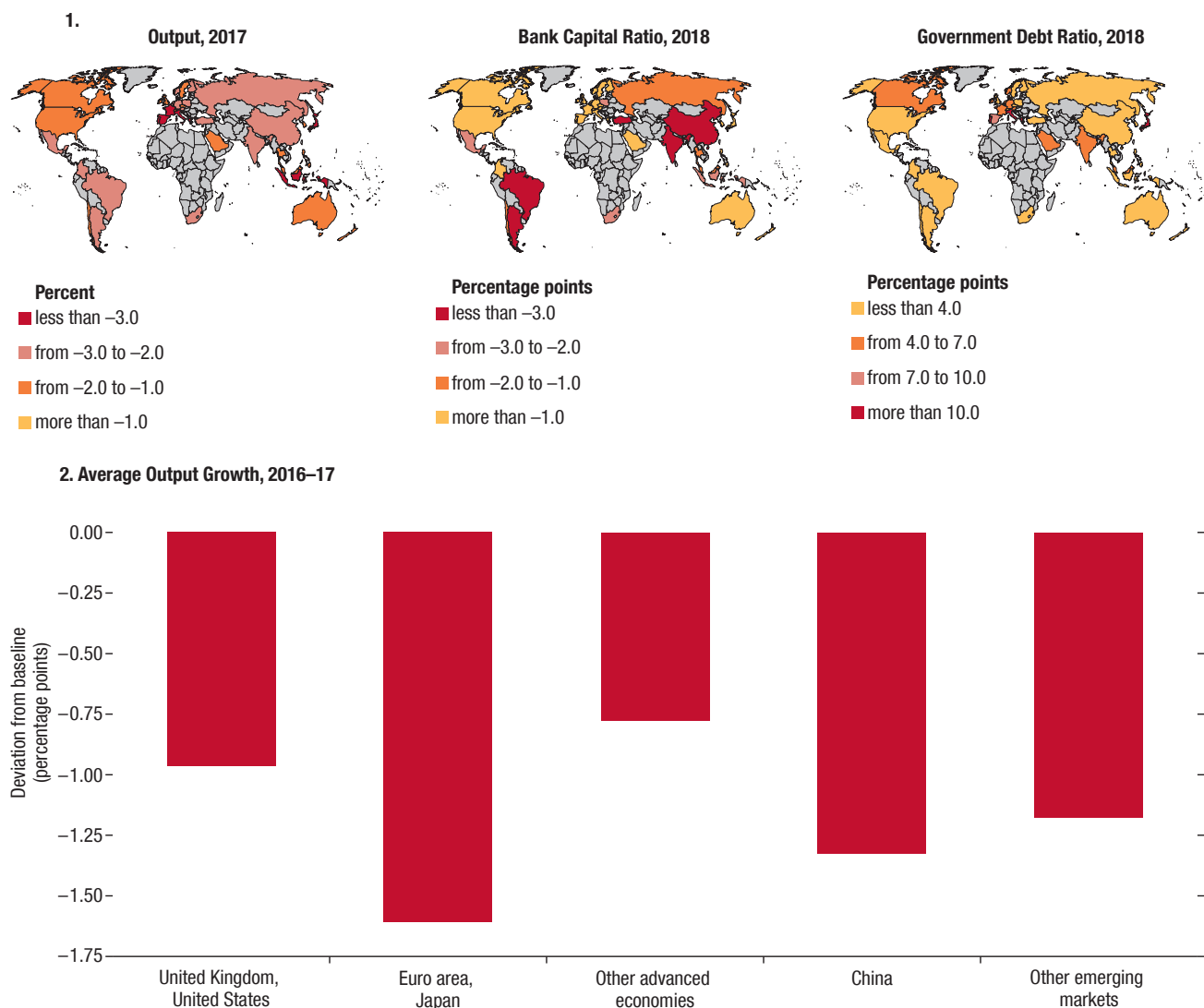
- Households to raise saving rates in response to higher deposit interest rates and expected portfolio returns and correspondingly to reduce consumption.
- Banks to gradually and partially pass through higher funding costs to firms through higher lending interest rates while eroding their profitability and capital buffers.
- Firms to reduce investment financed by retained earnings as shareholders discount dividend payments generated from future production at higher rates, and to reduce investment financed with bank loans in response to higher corporate loan interest rates.
- The government to immediately face higher debt service costs as outstanding short-term bonds mature and are rolled over in the primary market.

Decreases in real equity prices driven by rises in equity risk premiums induce:

- Households to raise saving rates in response to higher expected portfolio returns and correspondingly to reduce consumption.
- Firms to reduce investment financed by retained earnings as shareholders discount dividend payments generated from future production at higher rates.

Source: IMF staff.

Annex Figure 1.2.1. Global Asset Market Disruption Scenario: Simulated Peak Effects



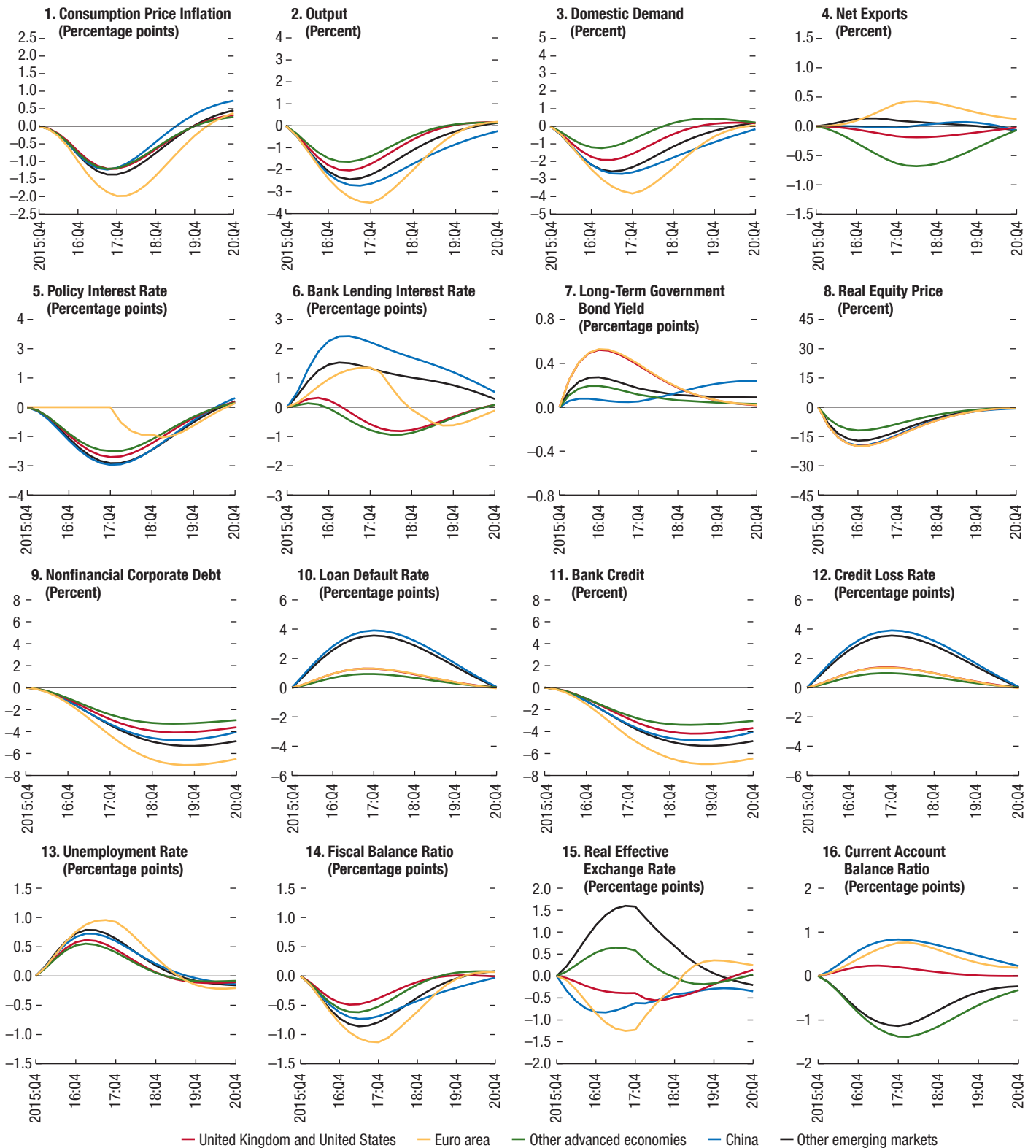
Source: IMF staff calculations, based on Vitek (2015).

Note: Other advanced economies: Australia, Canada, Czech Republic, Denmark, Israel, Korea, New Zealand, Norway, Sweden, and Switzerland. Other emerging markets: Argentina, Brazil, Chile, Colombia, India, Indonesia, Malaysia, Mexico, Philippines, Poland, Russia, Saudi Arabia, South Africa, Thailand, and Turkey.

systemic advanced economies by 2019, in spite of higher debt-service costs. In China, output is lower by 1.4 percent by 2018, reflecting a 7.2 percent fall in private investment, versus a 2.1 percent decline in private consumption. The banking sector accommodates and contributes to this reduction in private investment with a 2.1 percent decrease in bank credit by 2020, implying a similar decrease in nonfinancial corporate debt. In the rest of the world, output expands by up to 0.5 percent or contracts by up to 0.3 percent by 2018. This wide variation across economies reflects differences in the extent to which

positive trade spillovers from the systemic advanced economies outweigh the sum of net negative financial spillovers from the systemic advanced economies and negative trade spillovers from China. These trade and financial spillovers are interacted with opposing commodity price spillovers from the systemic advanced economies versus China, which differ in sign across net commodity exporters versus importers. Energy and non-energy commodity prices rise by 3.1 and 1.5 percent, respectively, by 2018. In aggregate, world output expands by 0.4 percent by 2018 (Annex Figures 1.2.3 and 1.2.4).

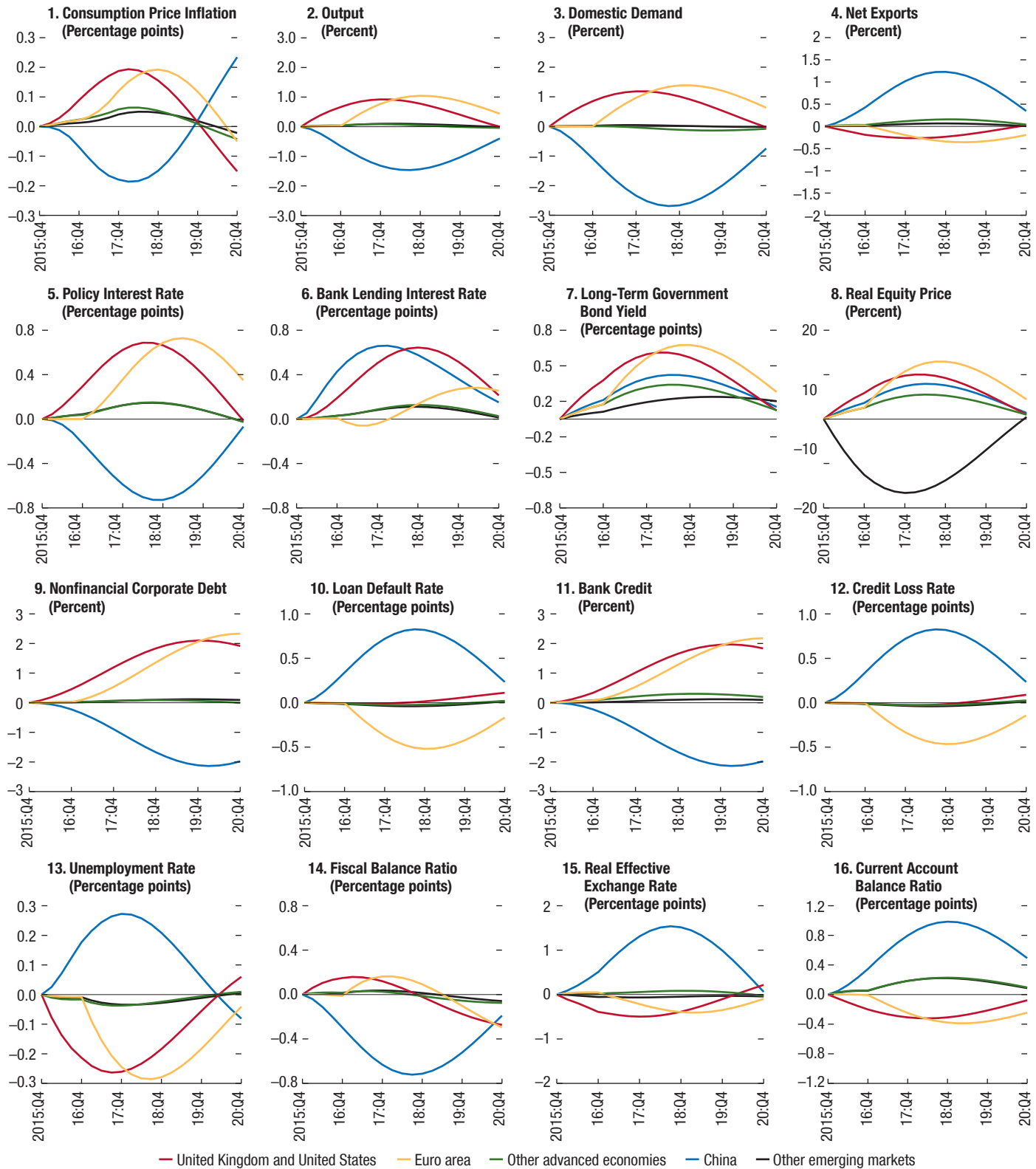
Annex Figure 1.2.2. Global Asset Market Disruption Scenario: Aggregated Simulated Paths



Source: IMF staff estimates.

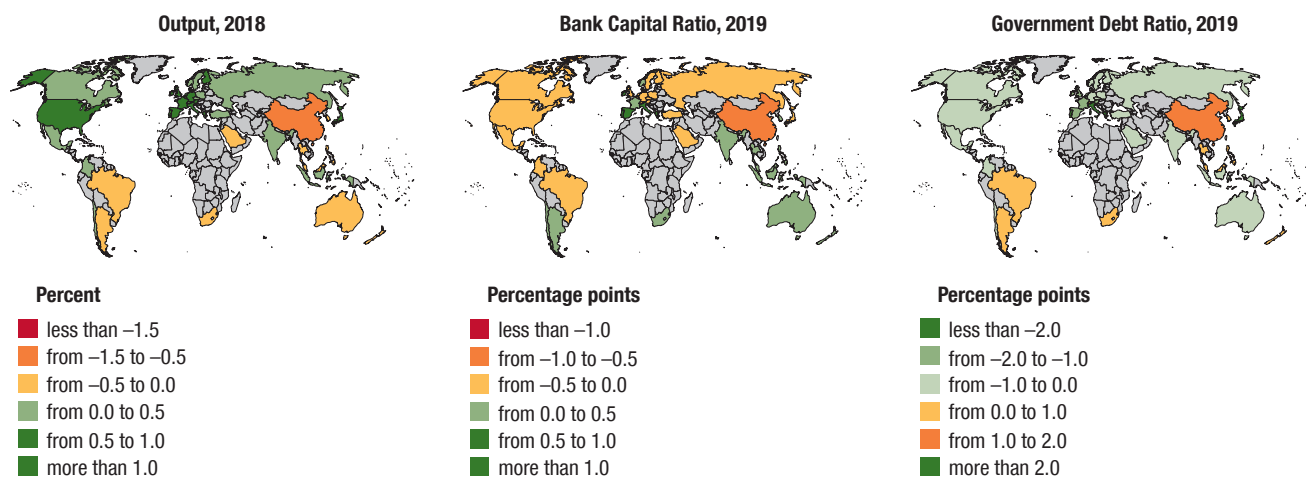
Note: Other advanced economies: Australia, Canada, Czech Republic, Denmark, Israel, Japan, Korea, New Zealand, Norway, Sweden, and Switzerland. Other emerging markets: Argentina, Brazil, Chile, Colombia, India, Indonesia, Malaysia, Mexico, Philippines, Poland, Russia, Saudi Arabia, South Africa, Thailand, and Turkey.

Annex Figure 1.2.3. Successful Normalization Scenario: Aggregated Simulated Paths



Source: IMF staff estimates.

Note: Other advanced economies: Australia, Canada, Czech Republic, Denmark, Israel, Japan, Korea, New Zealand, Norway, Sweden, and Switzerland. Other emerging markets: Argentina, Brazil, Chile, Colombia, India, Indonesia, Malaysia, Mexico, Philippines, Poland, Russia, Saudi Arabia, South Africa, Thailand, and Turkey.

Figure 1.2.4. Successful Normalization Scenario: Simulated Peak Effects

Source: IMF staff calculations, based on Vitek (2015).

REFERENCES

- Alternative Investment Management Association (AIMA). 2015. "Alternative Investment Fund Managers: Additional Measure of Leverage." Letter to European Commissioner Lord Jonathan Hill.
- Arslanalp S., and T. Tsuda. 2014a. "Tracking Global Demand for Advanced Economy Sovereign Debt." *IMF Economic Review* 62 (3).
- . 2014b. "Tracking Global Demand for Emerging Market Sovereign Debt." IMF Working Paper No. 14/39, International Monetary Fund, Washington.
- Arslanalp S., and D. Botman. 2015. "Portfolio Rebalancing in Japan: Constraints and Implications for Quantitative Easing." IMF Working Paper No. 15/186, International Monetary Fund, Washington.
- Bouveret, Antoine, Peter Breuer, Yingyuan Chen, David Jones, and Tsuyoshi Sasaki. Forthcoming. "Fragilities in U.S. Treasury Markets and Lessons from the Flash Rally of October 15, 2014." IMF Working Paper, International Monetary Fund, Washington.
- Christiano, L., M. Eichenbaum, and C. Evans. 2005. "Nominal Rigidities and the Dynamic Effects of a Shock to Monetary Policy." *Journal of Political Economy* 113 (1): 1–45.
- Committee of European Securities Regulators (CESR). 2010. "Guidelines on Risk Measurement and the Calculation of Global Exposure and Counterparty Risk for UCITS." July 28.
- Dattels, Peter, Rebecca McCaughrin, Ken Miyajima, and Jaume Puig Forne. 2010. "Can You Map Financial Stability?" IMF Working Paper No. 10/145, International Monetary Fund, Washington.
- European Commission. 2015. "Completing Europe's Economic and Monetary Union." Five Presidents' Report. Brussels.
- Galí, J. 2011. "The Return of the Wage Phillips Curve." *Journal of the European Economic Association* 9 (3): 436–461.
- Gerali, A., S. Neri, L. Sessa, and F. Signoretti. 2010. "Credit and Banking in a DSGE Model of the Euro Area." *Journal of Money, Credit and Banking* 42 (1): 107–41.
- Hülsewig, O., E. Mayer, and T. Wollmershäuser. 2009. "Bank Behavior, Incomplete Interest Rate Pass-Through, and the Cost Channel of Monetary Policy Transmission." *Economic Modelling* 26 (6): 1310–27.
- Independent Directors Council (IDC). 2008. "Board Oversight of Derivatives." Task Force Report, Independent Directors Council, Washington.
- Jiang, George J., Ingrid Lo, and Giorgio Valente. 2014. "High-Frequency Trading around Macroeconomic News Announcements: Evidence from the U.S. Treasury Market." Bank of Canada Working Paper/Document de travail 2014-56, Bank of Canada, Ottawa.
- Kim, D. H., and J. H. Wright. 2005. "An Arbitrage-Free Three-Factor Term Structure Model and the Recent Behavior of Long-Term Yields and Distant-Horizon Forward Rates." Finance and Economics Discussion Series (FEDS): 2005-33, Federal Reserve Board, Washington.
- Kite, S. 2010. "Algos Take Hold in Fixed-Income Markets." *Securities Technology Monitor* (February).
- Kiyotaki, N., and J. Moore. 1997. "Credit Cycles." *Journal of Political Economy* 105 (2): 211–48.
- Light, D. 2014. "Liquidity Is Not What It Used to Be." Cross-Rate Technologies LLC blog.
- Monacelli, T. 2005. "Monetary Policy in a Low Pass-Through Environment." *Journal of Money, Credit and Banking* 37 (6): 1047–66.

- Securities and Exchange Commission (SEC). 2011. "Use of Derivatives by Investment Companies Under the Investment Company Act of 1940." Concept Release. Securities and Exchange Commission, Washington.
- _____. 2015. "Investment Company Reporting Modernization." Proposed Rule.
- Smets, F., and R. Wouters. 2003. "An Estimated Dynamic Stochastic General Equilibrium Model of the Euro Area." *Journal of the European Economic Association* 1 (5): 1123–75.
- U.S. Department of the Treasury, Board of Governors of the Federal Reserve System, Federal Reserve Bank of New York, U.S. Securities and Exchange Commission, U.S. Commodity Futures Trading Commission. 2015. *The U.S. Treasury Market on October 15, 2014*. Joint Staff Report. Washington.
- Vitek, Francis. 2013. "Policy Analysis and Forecasting in the World Economy: A Panel Dynamic Stochastic General Equilibrium Approach." IMF Working Paper 13/253, International Monetary Fund, Washington.
- _____. Forthcoming. "Macrofinancial Analysis in the World Economy: A Panel Dynamic Stochastic General Equilibrium Approach." IMF Working Paper, International Monetary Fund, Washington.
- Wilcox, J., and T. Philips. 2004. "The P/B-ROE Valuation Model Revisited." *Journal of Portfolio Management* 31 (4): 56.