

## Financial Stability Overview

Since the last *Global Financial Stability Report* (GFSR) in October 2015, overall stability risks have increased (Figures 1.1 and 1.2). The outlook for financial stability has been clouded by disruptions to global asset markets reflecting setbacks to growth, greater uncertainty, and weaker confidence. This environment has led to tighter financial conditions (Box 1.1). Although some decompression of risk premiums and volatility is to be expected as the U.S. Federal Reserve begins the gradual process of normalizing monetary policy, the speed and intensity of market movements and reduced *risk appetite* suggest that other factors are at play.

The proximate causes of global market disruptions in January and February were as follows:

- *Higher macroeconomic risks*, as a combination of weaker data, deteriorating sentiment, and policy surprises roiled markets. More uncertain global growth prospects and declines in inflation expectations (Figure 1.3) have increased downside risks to the baseline growth forecast, as discussed in the April 2016 *World Economic Outlook* (WEO).
- *Oil and commodity prices continued to decline*. Concerns about slower growth, weaker commodity prices, and tighter credit conditions are reducing many emerging market economies' buffers, keeping *emerging market risks* elevated.
- *Uncertainty about economic rebalancing in China* as it tackles domestic and external imbalances. Spillovers

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to global financial markets from exchange rate pressure, drops in commodity prices, capital outflows, and notable declines in international reserves added to market strains.

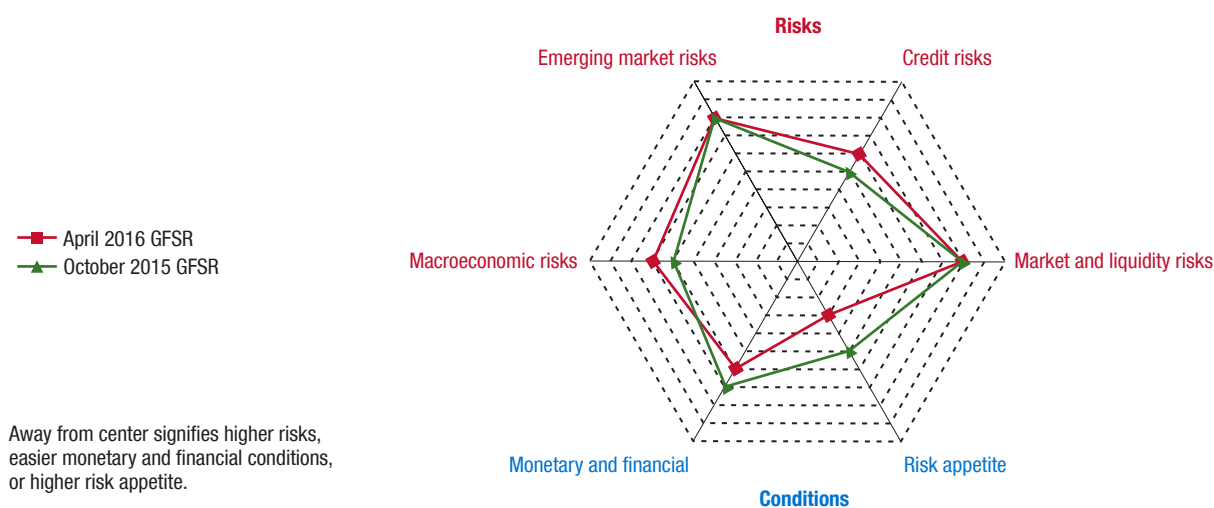
- *Reduced confidence in policy traction*, along with less confidence in the ability of policymakers to offset the impact of rising economic, financial, and geopolitical risks on the outlook.

These shocks and developments in global markets are testing the resilience of emerging market and advanced economies alike:

- In advanced economies, *credit risks* have increased for the first time since 2011. Banks in many advanced economies came under renewed pressure from equity price declines and rising credit spreads. This pressure pushed bank valuations sharply lower in February, particularly for banks with the weakest business models and capital buffers (see the section on Advanced Economies: Banks' Legacy Problems and New Challenges).
- In emerging markets, excess capacity, especially in commodity-related sectors, is being unwound through sharp reductions in capital expenditures, while high private debt burdens reinforce risks to sovereign balance sheets, credit markets, and banks. This mix is further weighing on growth, deterring capital inflows, and weakening exchange rates (see the section on Emerging Market Economies and China's Complex Transition).

Despite significant policy efforts to support aggregate demand and strengthen the financial system, the risks from slowing growth, remaining balance sheet vulnerabilities, and tighter and more volatile financial conditions have become more apparent. *Monetary and financial conditions* have become less accommodative as risk premiums spiked alongside tighter financial conditions, keeping *market and liquidity risks* elevated. Financial markets appear to be questioning the ability of policymakers to fully offset recurring bouts of market disruption and deliver a stronger path for growth and financial stability. These misgivings stem from the

**Figure 1.1. Global Financial Stability Map: Risks and Conditions**



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

overreliance on monetary policy and insufficient confidence-enhancing reforms and cyclical demand support.

Increased political uncertainty related to geopolitical conflicts, political discord, terrorism, refugee flows, or global epidemics loom over some countries and regions, and if left unchecked, could have significant spillovers on financial markets. The uncertainties associated with the possibility of British exit from the European Union could also weigh heavily on the outlook. Perceptions of limited policy space to respond to adverse shocks are exacerbating concerns about these risks.

In the absence of additional measures that deliver a more balanced and potent policy mix, episodes of market turmoil may occur, tightening financial conditions and eroding confidence. Further shocks and a broader deterioration of confidence could seriously damage the baseline outlook and increase the risks of tipping into a downside scenario of persistent low inflation and economic and financial stagnation, as discussed in the next section and noted in the April 2016 WEO.

Policymakers must deliver a stronger path for growth and financial stability. This vital and urgent need calls for a more balanced and ambitious set of policies to repair balance sheets and enhance growth prospects (see the section on Scenarios and Policies). Such measures will address growing downside risks and clear the way for a strong and balanced recovery and a supportive financial system.

## Global Market Disruptions and Risks to the Baseline

*The market turbulence earlier this year is a reminder that economic and financial shocks can rapidly reverberate throughout the world economy, threatening to overwhelm policy frameworks that are not sufficiently strong, and push countries into a phase of economic and financial stagnation.*

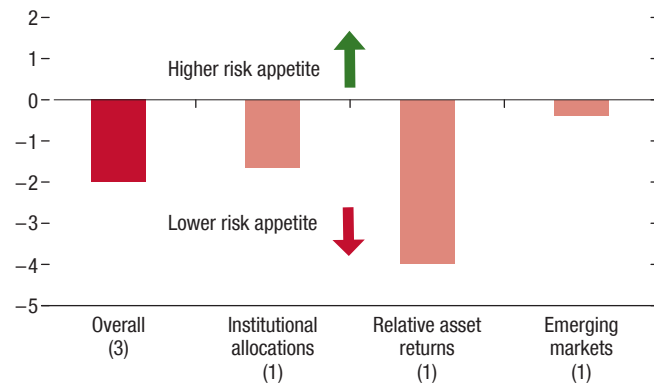
### What Does Market Turbulence Tell Us about the Risks to the Outlook?

Many market prices dropped dramatically during the turmoil in January and February, pushing asset valuations lower than levels consistent with the weakened baseline, given that macroeconomic fundamentals suggest a steady but slowly improving growth path (see the April 2016 WEO). Equity markets bottomed out in mid-February and have since recovered much of their losses.

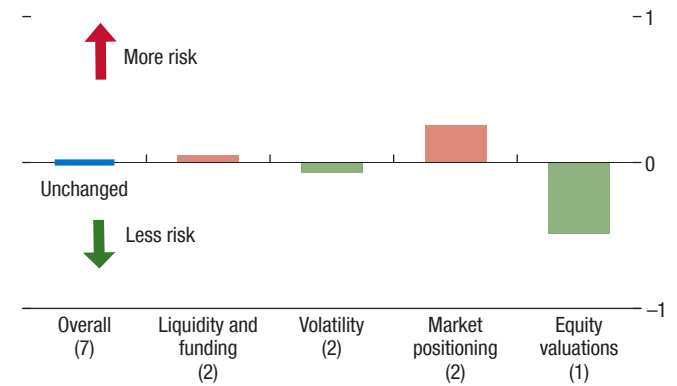
Despite the recovery in asset values from their February lows, current valuations still reflect higher economic, financial, and geopolitical risks amid weakened confidence in policy frameworks. Further shocks and a broader loss of confidence could impart more damage to the economic baseline and increase the risks of sliding into an adverse downside scenario of persistent disinflationary pressures and rising debt burdens. Such a situation would be marked by persistent low

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

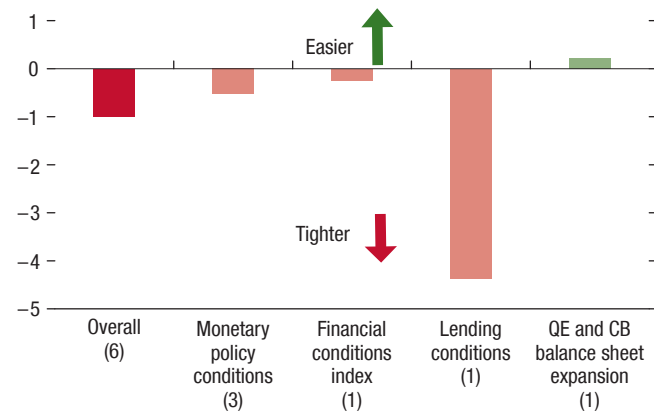
**1. Risk appetite** has decreased with continued outflows from emerging markets.



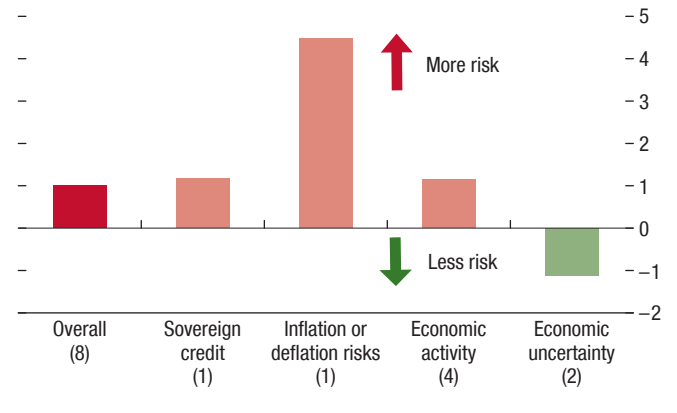
**2. Market and liquidity risks** remain high as volatility persists.



**3. Monetary and financial conditions** have tightened due to stricter lending standards.



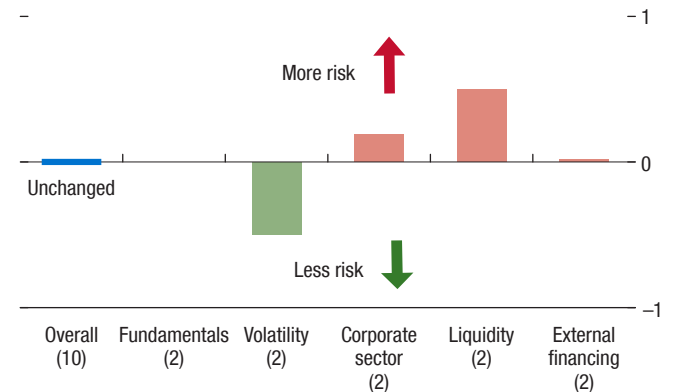
**4. Mixed incoming data and much-worse inflation** have led to higher macroeconomic risks.



**5. Credit risks** have increased as both firms and banks experience deterioration.



**6. Emerging market risks** remain elevated, with continued macro uncertainty and few signs of improving credit cycles.



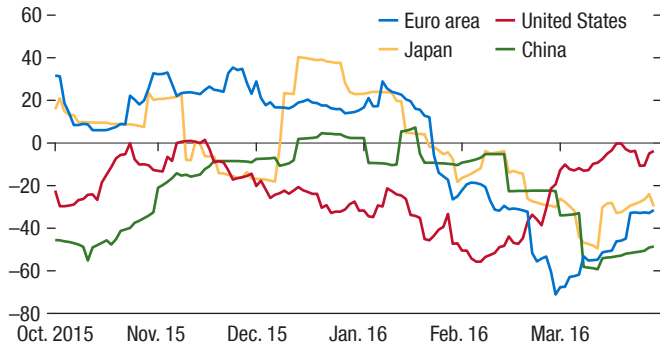
Source: IMF staff estimates.

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. Recent Market Developments**

Worries of a global economic slowdown ...

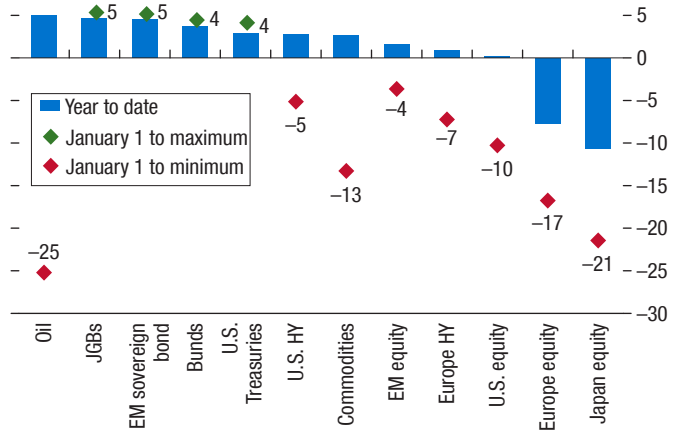
**1. Economic Surprise Indices**



Sources: Bloomberg, L.P.; and Citigroup.

... led to market turmoil and volatile equity and commodity prices ...

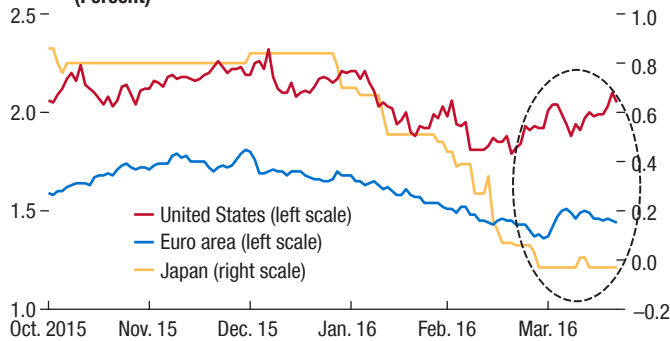
**2. Asset Class Returns, 2016 (Percent change)**



Sources: Bloomberg, L.P.; and IMF staff calculations.  
Note: EM = emerging market economy; HY = high yield; JGB = Japan government bond.

... while disinflation worries have mounted ...

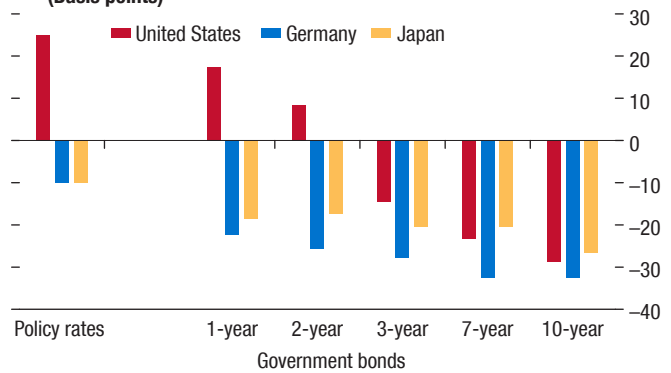
**3. Five-Year, Five-Year Swap Forward Rates (Percent)**



Source: Bloomberg, L.P.

... as have fears of a "low-for-long" downside.

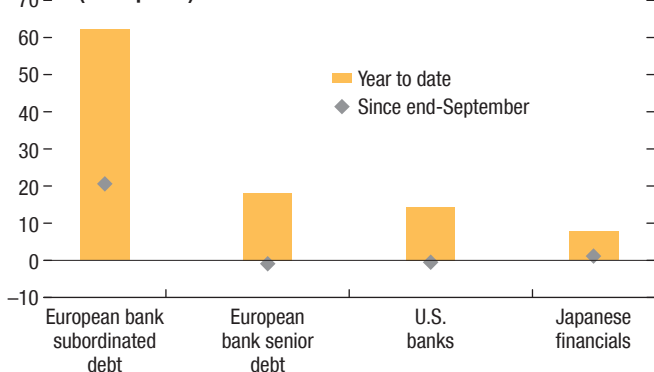
**4. Rate Changes, since End-September 2015 (Basis points)**



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

Credit concerns have intensified ...

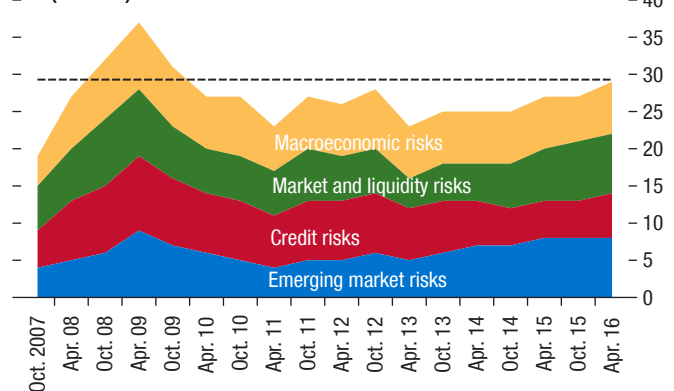
**5. Change in Bank Credit Default Swap Spreads (Basis points)**



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

... raising aggregate stability risks.

**6. Global Financial Stability Map Risk Indicators (Notches)**



Source: IMF staff estimates.

nominal growth and sustained, ultra-low, or negative rates that could push banks, insurers, and other savers toward *financial stagnation*. Key groups of financial institutions responsible for the allocation of capital, mobilization of savings, dissemination of information, and pricing of assets would struggle with low profitability and impaired balance sheets for a sustained period. Financial stagnation would erode soundness to such an extent that both economic growth and financial stability would be negatively affected in the medium term.

Equity markets provide some insights into these concerns. The synchronized global sell-off of equities in late 2015 and early 2016 lowered stock market valuations in a wide range of economies. By early March, equity indices had dropped by 10 percent or more in some exchanges: Japan's Nikkei had lost 11 percent as of March 3, China's Shanghai Composite was down 20 percent, and Frankfurt's DAX had lost almost 10 percent. Despite the recovery since the lows in February, these losses suggest that the underpinnings of equity valuations have weakened, especially following a period of deteriorating earnings expectations since the end of 2014. In fact, looking over the entire period, weaker earnings growth explains a large share of the fall in equity prices (Figure 1.4, panel 1).

The downward revision to earnings expectations has been motivated in large part by the possible impact of weak foreign demand on U.S. economic activity, a subdued medium-term outlook for the euro area, and rising uncertainty surrounding China's growth. The deterioration in external conditions and the stronger U.S. dollar have weighed heavily on U.S. firms that rely on exports, regardless of whether they are energy or non-energy companies (Figure 1.4, panel 2), especially those that have higher leverage (Figure 1.4, panel 3). Beyond these factors, however, markets may have overreacted to the deterioration of the outlook, thus overshooting the correction in equity valuations.

Nonetheless, worsening earnings are clearly an important factor behind the recent decline in equities in the United States and emerging market economies, even as low risk-free rates continue to sustain valuations, but not sufficiently to offset the negative pressure from a weaker outlook. This also suggests that the ability of monetary policy to sustain high valuations through a compression of equity risk premiums has waned amid the spike in volatility and global

uncertainty earlier this year.<sup>1</sup> *Equity risk premiums*—a measure of investors' required compensation for holding risky equities instead of "safe" assets, such as U.S. Treasury bonds—are no longer compressed, and in several cases have overshot their long-term means (Figure 1.4, panel 4).<sup>2</sup>

### Severe Declines in Oil Prices Added to Market and Credit Distress

Adding to adverse macroeconomic pressures, sector-specific shocks—notably in the energy sector and, more recently, in the financial sectors—accentuated the downward comovement across major equity markets.

Oil prices have fallen sharply since June 2014, hitting a 13-year low in February 2016 (Figure 1.5, panel 1). Although the shock has been acute for energy producers, a number of factors have muted the positive impact of a supply-driven oil decline, especially for net oil importers (see the section on Emerging Market Economies and China's Complex Transition). Two explanations are discussed that bear heavily on financial stability (see the April 2016 WEO for further discussion on the economic impact of low oil prices).

First, balance sheet effects may be exacerbating adverse spillovers. Lasting downward pressure on the currencies of oil producers raises the value of their foreign-denominated debt, further undercutting investment and growth prospects. Other non-oil commodity producers in many countries are also retrenching capital expenditures and output at the same time, in response to falling non-oil commodity prices, after expanding capital expenditures rapidly from 2010 to 2013 (see Figure 1.15).

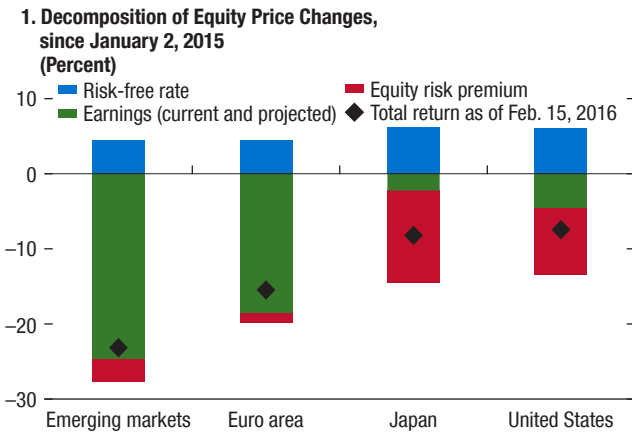
Second, the large size and rapid pace of the decline in oil prices could be causing some nonlinear effects. The retrenchment in energy-related firms has been so severe that it has spilled over into the

<sup>1</sup>The decomposition of equity prices was performed with a standard three-stage dividend discount model, where dividend growth initially follows the median forecasts, then reverts toward its long-term average, which is reached in the third and final phase. For details, see Annex 2 to the October 2014 GFSR and Panigirtzoglou and Scammell (2002).

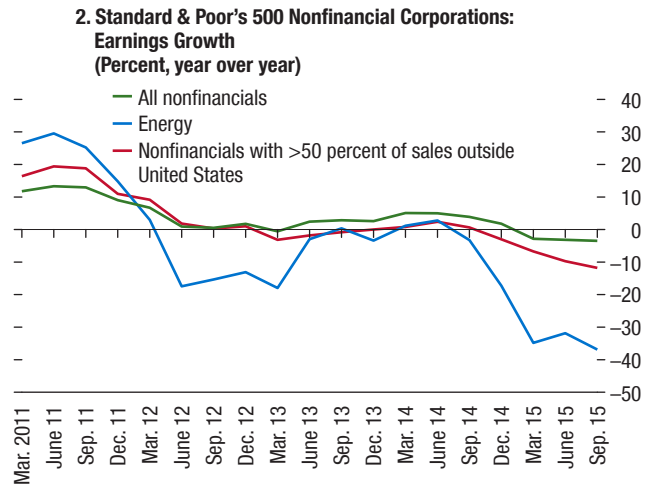
<sup>2</sup>The equity risk premium is a key indicator of investors' risk perceptions in that it measures how much compensation investors expect in excess of the risk-free interest rate on "safe" assets such as U.S. Treasury bonds; as such, it is an informative measure of perceived risks to financial stability. It is also a determinant of the cost of capital for corporations, influencing firms' investment decisions, and thus has macroeconomic implications.

**Figure 1.4. Equity Risk Premiums and Earnings Decompositions**

The corporate earnings outlook deteriorated into 2016 ...



... especially for exporters and energy companies ...



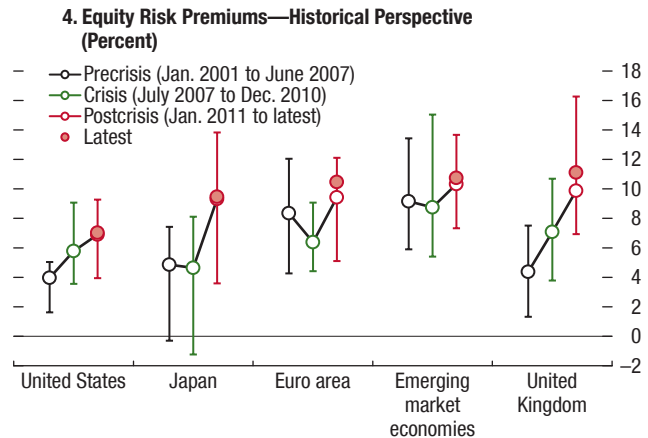
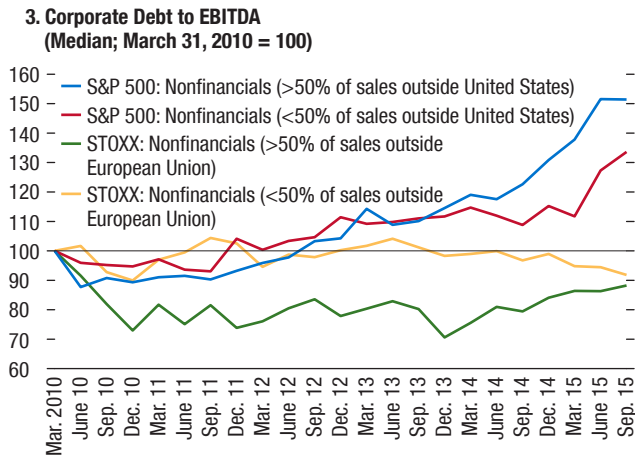
Sources: European Central Bank; Haver Analytics; Thomson Reuters I/B/E/S; and IMF staff estimates.

Sources: Factset; and IMF staff estimates.

Note: Based on the five-year-ahead market consensus earnings per share.

... amid a bigger increase in leverage.

As equities come under pressure, risk premiums are reverting toward their historical means.



Sources: Factset; and IMF staff estimates.  
Note: EBITDA = earnings before interest, taxes, depreciation, and amortization; S&P = Standard & Poor's.

Sources: European Central Bank; Haver Analytics; Thomson Reuters I/B/E/S; and IMF staff estimates.  
Note: Based on five-year-ahead market consensus earnings per share.

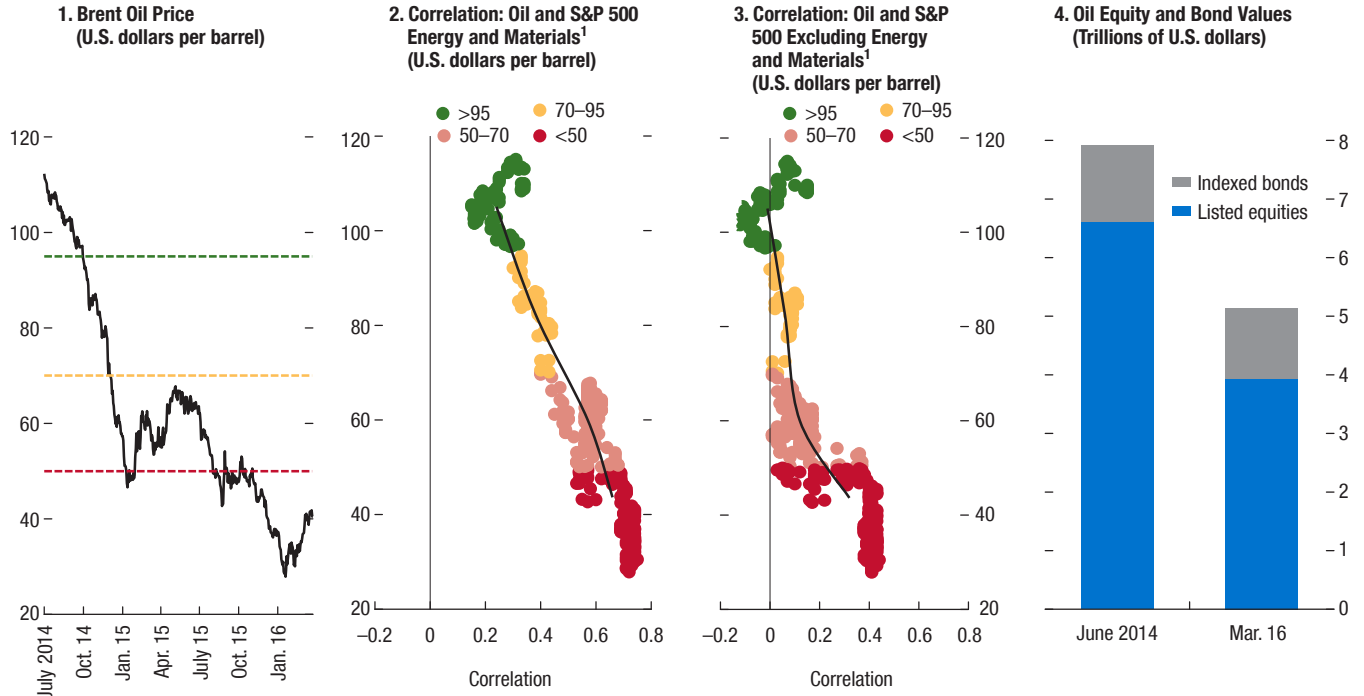
non-energy sectors of the global economy. Falling capital expenditures, increasing job layoffs, and the downstream impacts on ancillary businesses have broadened the effects of the oil shock beyond the energy sector, partially offsetting the positive benefits of lower energy costs.

In the United States, for example, the shale oil boom sparked an expansion of credit to the high-yield energy sector. The swiftness of the debt buildup during the shale oil bonanza was mirrored by the rapidly

deteriorating financial conditions of high-yield energy companies as oil prices plummeted.<sup>3</sup> Most companies

<sup>3</sup>Approximately 20 percent of U.S. high-yield energy and materials bonds are rated CCC or lower. The distress ratio of U.S. high-yield energy bonds (the percentage of bonds trading with a spread of more than 1,000 basis points) has reached 70 percent, the highest level since the global financial crisis and well above the 28 percent distress level of U.S. high-yield excluding energy bonds. Interest coverage ratios for U.S. high-yield bonds overall have fallen to their lowest levels since the 2000–01 recession. Non-energy firms,

Figure 1.5. Global Oil Prices, Equity, and Bond Markets



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

Note: Based on five-year-ahead market consensus earnings per share. S&P = Standard & Poor's.

<sup>1</sup> Six-month rolling correlation of the daily price of oil (Brent front contract) with the relevant Standard & Poor's 500 index from June 2014 to January 2016. Index is based on weights as of February 1, 2016.

have had to scale back investment more aggressively than in past cycles, and are unable to generate enough revenue to finance capital spending internally.<sup>4</sup> Access to capital markets has also become more restrictive and expensive. Debt issuance from high-yield energy firms has dwindled, with only \$1.7 billion issued during the past six months—a 94 percent decline compared with a year earlier.

An analysis of recent trends in oil prices and the different sectors of the Standard and Poor's 500 equity index provides some insight into these explanations. As expected, oil prices and energy sector valuations display a fairly linear relationship and positive correlation (Figure 1.5, panel 2): falling oil prices push down equity prices of energy firms. However, the relationship between oil and the non-energy sector is decidedly different. When the oil price decline is moderate

however, are in much better financial shape. Excluding energy, high-yield interest coverage ratios remain near cycle highs.

<sup>4</sup>Moody's expects earnings of oilfield services companies, which are largely a function of capital expenditures by energy exploration and production firms, to decline 25 to 30 percent as a result.

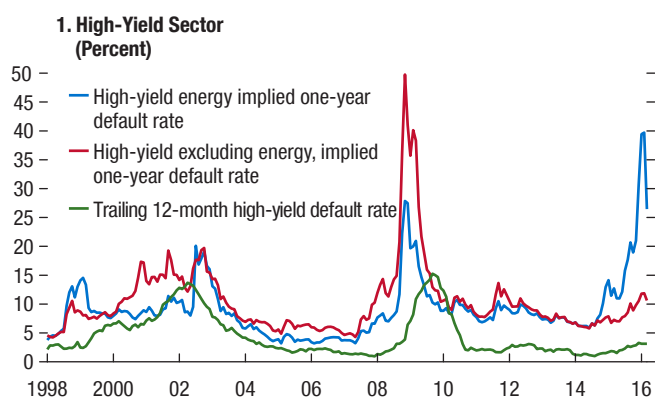
(Figure 1.5, panel 3, green dots), oil prices and prices of non-energy sector stocks follow no clear pattern, alternating between negative and positive correlation. But as oil prices fall to less than \$70 a barrel (orange dots), the correlation between non-energy stocks and oil prices gradually turns positive, especially as the oil price falls to less than \$50 a barrel (red dots). This relationship suggests that the negative impact of lower oil prices on both energy and non-energy firms became larger as the decline in the price of oil became more extreme. This relationship also holds for other advanced economy indices.

The magnitude of the oil shock can also be gauged by the mark-to-market impact on oil reserves. With proven global oil reserves estimated to be 1.6 trillion barrels, a price decline of \$70 a barrel would be equivalent to a mark-to-market loss of \$112 trillion. A further consequence for oil-related stocks has been a loss of more than \$2.6 trillion in value in the 18 months since June 30, 2014 (Figure 1.5, panel 4).

Although fundamentals remain fairly solid in the non-energy sector, the weakness in the U.S. high-

**Figure 1.6. U.S. High-Yield Markets and Lending Conditions**

The number of energy firms trading at distressed levels has risen sharply.



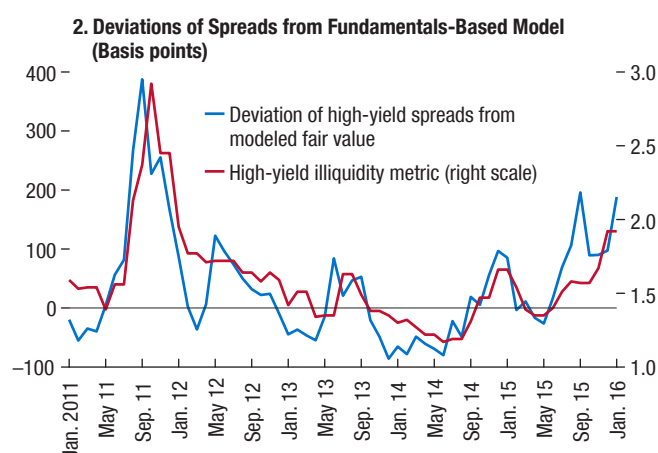
Source: Bank of America Merrill Lynch.

yield energy market threatens to spread to other high-yield sectors.<sup>5</sup> Symptomatic of a growing perception of credit risks, the share of bonds trading at distressed levels (that is, with spreads greater than 1,000 basis points) rose sharply in January and February, pressuring investors with exposure to lower-rated debt. Spreads on non-energy-related firms are much tighter than those in the energy sector, yet they too reached historically elevated levels. Spreads on non-energy firms also implied a default rate on those firms at recessionary levels. Only in 2002, in the wake of the bust in the telecommunications sector, and in 2009, on the heels of the global financial crisis, did default rates exceed the implied levels experienced in February (12 percent per year for the next few years) (Figure 1.6, panel 1).

Deteriorating liquidity conditions may have contributed to the widening of spreads beyond fundamentals. High-yield spreads have deviated significantly from what a fair-value model would indicate, and this widening is closely correlated to tighter market liquidity (Figure 1.6, panel 2). As of the end of January, the deviation from fair value reached its

<sup>5</sup>The pair-wise correlation between spreads of different high-yield sectors is currently significantly higher than in previous stress episodes. Additionally, consistent with greater intersector comovement, the standard deviation of yields remains significantly lower than in previous high-yield sell-offs.

Spreads deviated from fundamentals as liquidity conditions have deteriorated.



Sources: Barclays; and IMF staff calculations.

Note: High-yield illiquidity metric = Barclays Liquidity Cost Score (Dastidar and Phelps 2009).

highest level since 2011. Previous GFSRs have documented how poor liquidity increases the probability of transition to a high-volatility regime and how illiquidity and mutual fund redemption pressures may be exacerbated by the increasing amount of corporate debt held by mutual funds. The non-negligible share of high-yield debt in mutual funds has provided a channel through which spillovers may flow to other sectors.

### Economic and Financial Stagnation Risks Are Rising

Although under the baseline scenario the United States and other advanced economies are expected to continue to grow steadily, markets are exhibiting increased pessimism, suggesting that a softer global environment may not allow the data-dependent Federal Reserve to continue the normalization process as previously envisaged. Market expectations of inflation have eased significantly since the October 2015 GFSR (Figure 1.7). Market pricing of both the level and distribution of future inflation rates, as well as survey-based measures, shows a broadly similar pattern of falling inflation expectations across the euro area, Japan, and the United States. These measures may be distorted by recent liquidity conditions and the exaggerated impact of sharply lower oil prices, but the consistency of these different measures across countries is notable.



In line with the weaker inflation outlook, interest rate expectations have shifted downward as well. Thus, policy interest rates are expected to be cut further across advanced economies—and even deeper into negative territory in some cases—while in the United States, markets are pricing in a much higher risk of stalled normalization of monetary policy, notwithstanding continued improvements in the labor market (Figure 1.8, panels 1 and 2).

The unfavorable market assessment of inflation and policy interest rate expectations reflects growing concern about a mutually reinforcing dynamic of weak growth and low inflation that could produce sustained economic and financial weakness in various countries. Such a downside stagnation scenario is examined in the April 2016 WEO.

Worrisome signs are also seen in the evolution of global sovereign bond yields. Although term premiums are already compressed, they could become further compressed if expectations of lackluster growth become entrenched, as has been the case in episodes of stagnation elsewhere (Figure 1.8, panel 3). Notably, the term premiums of Japanese government bonds underwent a steep decline beginning in the late 1990s and throughout the 2000s, as deflation and negative growth expectations became widespread and drove term premiums and bond yields down to new historical lows.<sup>6</sup> Reminiscent of that trend, the share of government bonds in the euro area with a zero or negative yield increased from 33 percent in December 2015 to 43 percent in February 2016 (Figure 1.8, panel 4).

### Further Bouts of Market Turmoil or Disorderly Balance Sheet Deleveraging Could Erode Financial Stability without Stronger Policy Frameworks

If the growth and inflation outlooks degrade further, the risk of a loss of confidence would rise. In such circumstances, recurrent bouts of financial volatility could interact with balance sheet vulnerabilities. Risk premiums could rise and financial conditions could tighten, thereby creating a pernicious feedback loop of weak growth, low inflation, and rising debt burdens. These negative disruptions to global asset markets, operating through financial channels, could

lead to a worse outcome than the one envisaged in the WEO's economic stagnation scenario. The implications of this “global market disruption” scenario are analyzed below.

The global market disruption scenario (detailed in Annex 1.2) builds on the WEO economic stagnation scenario, and features further disruptions in global capital markets with increases in risk premiums in systemic economies, balance sheet deleveraging in the euro area and emerging economies, and losses in business and consumer confidence that reduce investment and raise saving worldwide:<sup>7</sup>

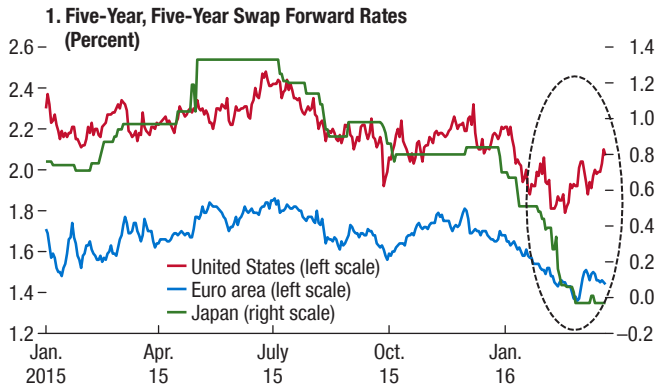
- *Loss in policy confidence could lead to rising global risk premiums.* A further sell-off in stock markets sparked by reduced risk appetite could lower real equity prices by 20 percent in the systemic economies (China, euro area, Japan, United Kingdom, and United States) over two years.
- *Advanced economy legacies could amplify downturns.* Higher risk aversion may interact with existing balance sheet vulnerabilities in the euro area. Banking sector and sovereign strains could reappear in high-spread euro area countries (see the section on Advanced Economies: Banks' Legacy Problems and New Challenges); banking sector stress might also appear (though to a lesser extent) in low-spread euro area countries. The resultant tightening of financial conditions in the euro area could be compounded by the need to build bank capital buffers to comply with regulations (see Table 1.3).
- *China could experience a disorderly deleveraging and the credit cycle could worsen in emerging markets.* In China, rising corporate sector strains caused by a further deterioration in balance sheet fundamentals (see the section on Emerging Market Economies and China's Complex Transition) might lead to a rise in credit market stress and more rapid deleveraging. This process could cause negative spillovers to other emerging market economies and the global economy, along the lines of the confidence shock observed in August 2015. In turn, these spillovers would further tighten financial conditions and could cause emerging market currencies to depreciate, reinforcing emerging market credit cycle downturns, with adverse consequences for companies with high foreign indebtedness (as discussed in Chapter 2).

<sup>6</sup>According to IMF estimates based on the Wright model (2011), the Japanese term premium declined from more than 4 percent during 1990–98 to less than 0.4 percent during 1997–2007.

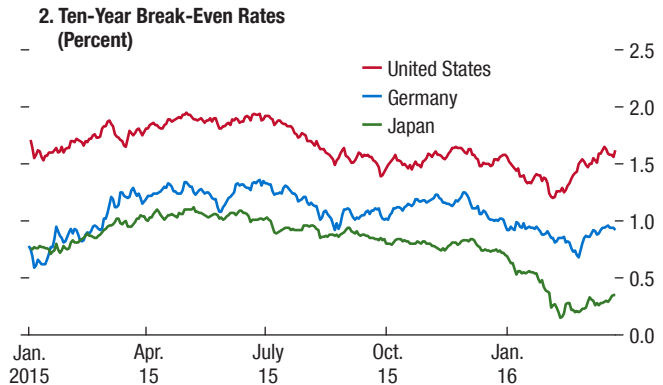
<sup>7</sup>The scenario is simulated using the global macrofinancial model documented in Vitek (2015).

**Figure 1.7. Deterioration of Inflation Expectations**

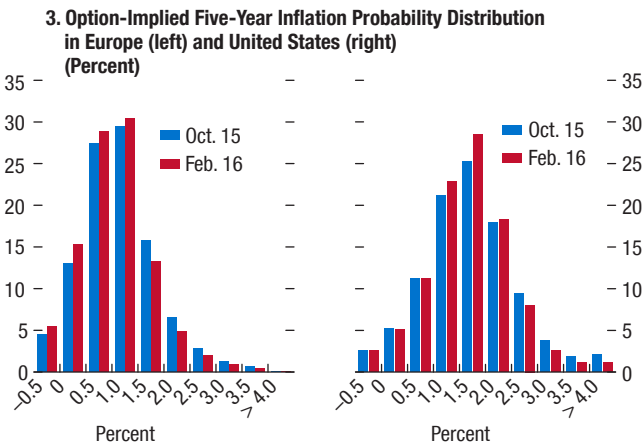
Market-based inflation expectations have declined across the board ...



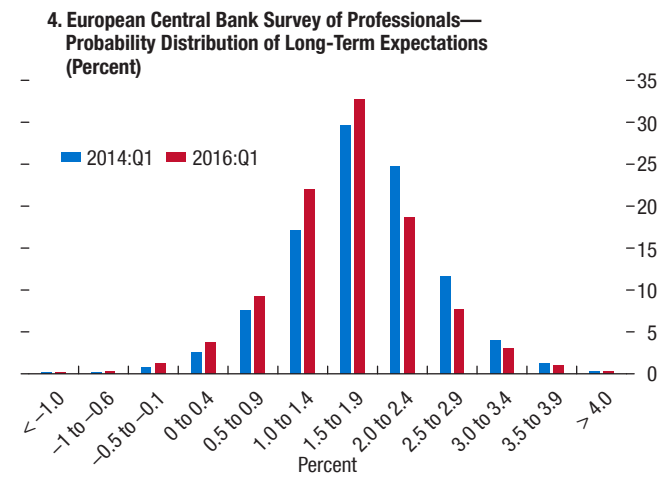
... with long-term indicators also declining.



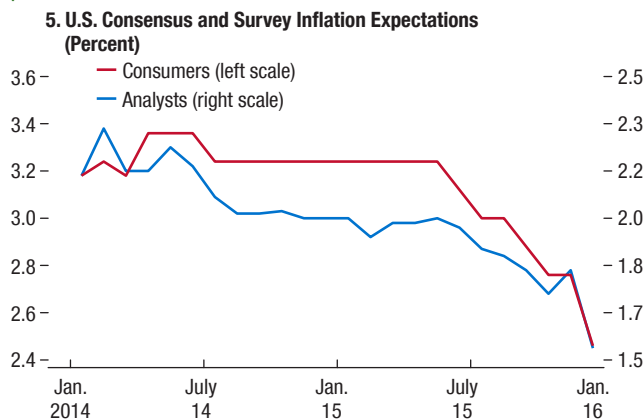
The distribution of market-implied expectations has shifted further to the left tail in Europe ...



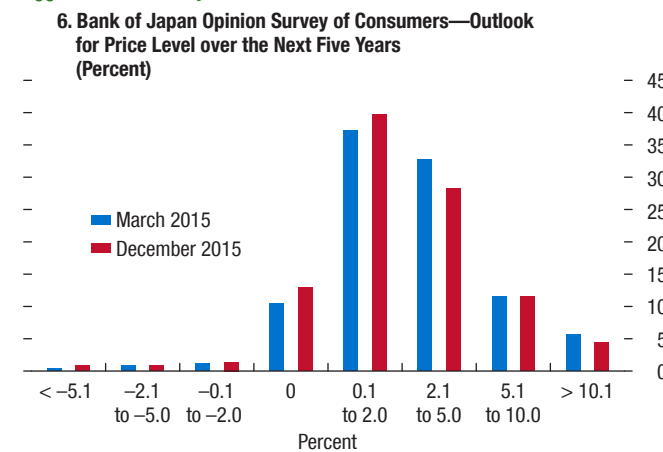
... while European surveys are more unfavorable than before the launch of quantitative easing.



U.S. surveys have also deteriorated, among both consumers and professionals.



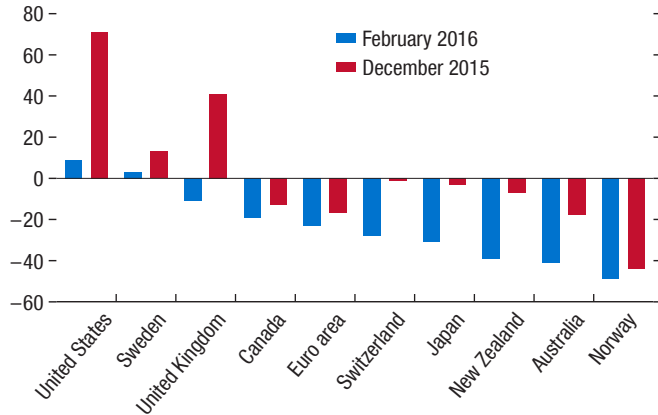
Japan surveys have hinted at similar downward trends despite aggressive monetary action.



**Figure 1.8. Interest Rate Expectations and Bond Term Premiums**

Central banks are moving into negative territory ...

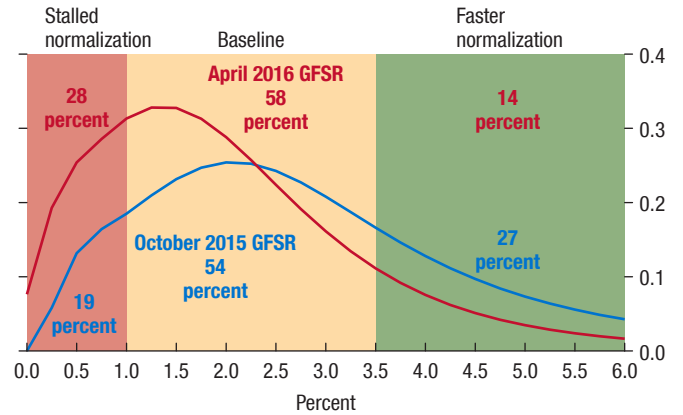
**1. Market-Implied Policy Rate Changes, over Year Ahead (Basis points)**



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

... and in the United States markets are pricing a high probability of stalled normalization.

**2. United States: December 2018 Federal Funds Rate Implied Probabilities (Probability)**

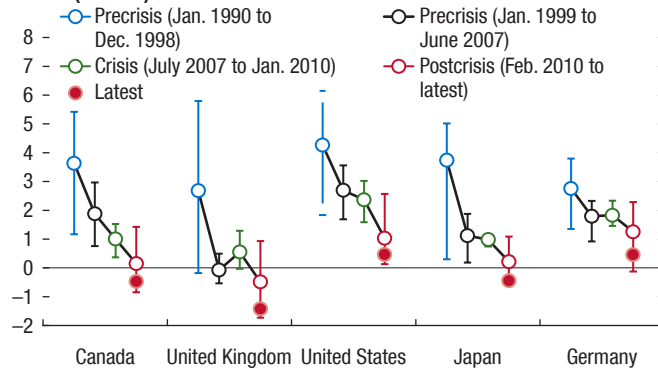


Sources: Bloomberg, L.P.; and IMF staff calculations.

Note: For this calculation, the market pricing of options expiring in December 2018 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. GFSR = *Global Financial Stability Report*.

Global term premiums are hitting record lows, suggesting higher risks of nominal stagnation ...

**3. Bond Term Premiums—Historical Evolution (Percent)**

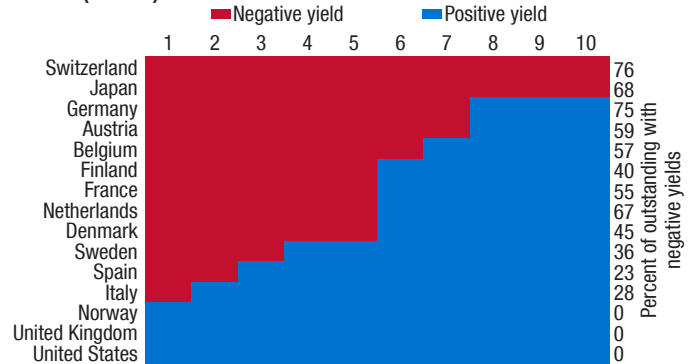


Sources: Bloomberg, L.P.; Bundesbank; Consensus Economics; Haver Analytics; Organisation for Economic Co-Operation and Development; and IMF staff estimates.

Note: Based on Wright (2011).

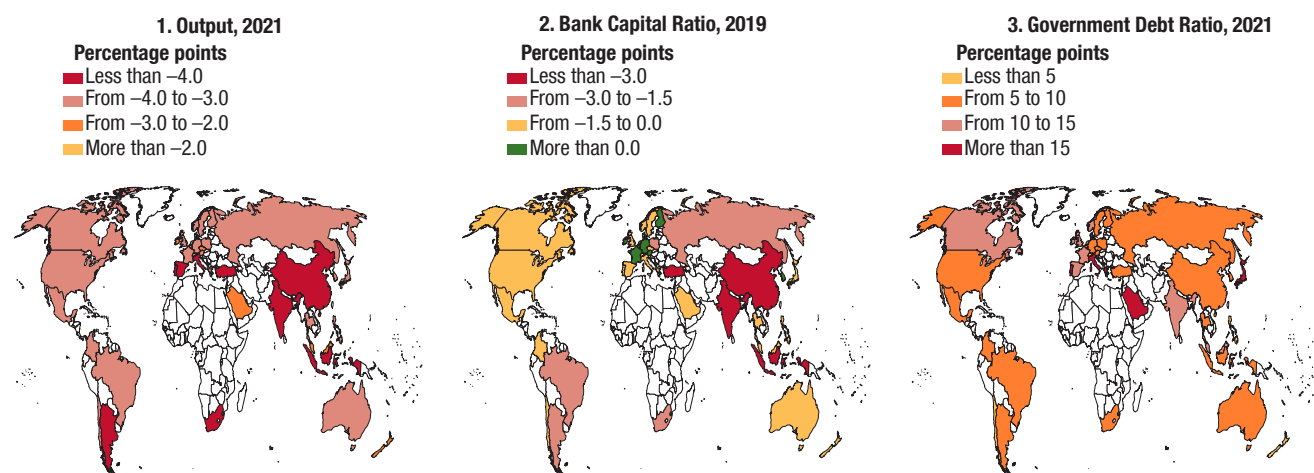
... and pushing a greater share of global bonds into negative rates.

**4. Share of Sovereign Bond Markets with Negative Rates (Percent)**



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

**Figure 1.9. Simulated Peak Effects under Global Market Disruption Scenario**



Source: IMF staff calculations.

This global market disruption scenario would materially worsen economic and financial stability. World output could fall by 3.9 percent relative to the baseline by 2021, with output losses of 2.4 to 6.8 percent across economies reflecting differences in shocks, vulnerabilities, and the policy stance in each country. Banking sector capitalization could fall by 0.4 to 4.5 percentage points relative to the baseline across emerging markets by 2019, largely reflecting high credit loss rates, versus at most 0.4 percentage points across advanced economies.<sup>8</sup> Low nominal growth and weakening fiscal positions would increase government debt burdens, with the ratio of debt to GDP rising 4 to 22.9 percentage points above the baseline across advanced economies by 2021, and 3.9 to 15 percentage points across emerging market economies (Figure 1.9).

The disinflationary effects of the economic contractions could, in turn, induce major central banks to extend support, either by cutting policy interest rates further or postponing monetary policy normalization.<sup>9</sup> In response to consumer price inflation declines of 1.2 to 2.8 percentage points relative to the baseline across economies by 2019, central banks could cut policy interest rates by 1.1 to 1.9 per-

centage points relative to the baseline. This global disinflationary environment would be associated with energy and non-energy commodity price reductions of 40 and 22.4 percent relative to the baseline by 2021, respectively.

## Emerging Market Economies and China's Complex Transition

### China's Economic Rebalancing Is Proceeding

*China continues to navigate a complex transition to a slower and safer pace of growth and a more market-based financial system. China has advanced reforms and made notable progress in rebalancing the economy. Yet slowing growth has eroded corporate sector health, with falling profitability undermining the debt-servicing capacity of firms, adding to balance sheet pressures across the system. Corporate stress is reflected in rising problem assets held by banks. Bank loans to the corporate sector potentially at risk are substantial, but remain manageable given available buffers. Implementation of a more ambitious and comprehensive policy agenda is urgently needed to stay ahead of rising financial sector vulnerabilities and to ensure continued confidence in policymakers' ability to achieve a smooth transition.*

China has made notable progress in rebalancing its economy toward new sources of growth and addressing financial sector risks. The contribution of private consumption to growth is rising in line

<sup>8</sup>Bank capital ratios would deteriorate less in advanced economies than in emerging markets (Figure 1.9), primarily because of weaker credit cycle downturns in advanced economies.

<sup>9</sup>In the simulation, policy interest rates cannot be reduced to less than the zero lower bound.

with a more resilient labor market, strong wage and income growth, and pro-consumption measures. Investment has moderated further, with its contribution to growth falling from a peak of 8 percentage points in 2009 to 3 percentage points in 2015. The share of service sector activities has increased in both employment and output, supporting wage growth and consumption, while manufacturing activity has slowed. At the same time, a number of reform efforts underscore the authorities' commitment to economic transition:<sup>10</sup>

- Deposit rates were liberalized in the fourth quarter of 2015, ending all formal interest rate controls and complementing the deposit insurance scheme.
- The new exchange rate mechanism introduced in August 2015, and the emphasis on an exchange rate basket in December, are signs of the People's Bank of China's resolve to advance to a more flexible exchange rate regime.
- The IMF Executive Board determined the renminbi to be a freely usable currency and decided to include it in the basket of currencies that make up the special drawing right, effective October 1, 2016.
- Fiscal reforms have also advanced, with the new budget law aiming to regularize local government finances, steps toward improving public sector accounting, and progress in reforming the pension and tax systems.
- The negative list of sectors for domestic investment was reduced, as were items subject to price controls (from 100 to about 20), and natural monopolies are to be opened to private firms.
- Approvals required for outbound foreign direct investment were largely abolished.

In addition, stricter regulations on shadow banking activities have helped steer the composition of financing toward bank loans and bond issuance. This direction has benefited private companies, which have seen an increasing share of new corporate loans relative to loans to state-owned enterprises (SOEs), helping reallocate credit to more efficient sectors and firms.

As China's economy transforms, its pattern of consumption will continue to change, naturally spilling over to the rest of the world through trade, growth, and financial channels (see the April 2016 *Regional Economic Outlook Update: Asia and Pacific*). In partic-

ular, concerns over China's slowdown have weighed on global commodity prices, affecting currencies and capital inflows of economies with high commodity dependence or close trade ties with China (see the section on Emerging Market Economies Are Being Tested). Thus, a smooth transition to a new growth model is critical not just for China, but also for global economic and financial stability.

### Corporate Balance Sheet Health Has Deteriorated

Despite progress on economic rebalancing, corporate health is declining. Chinese corporate profitability has eroded during the past five years. This decline reflects structural features stemming from years of easy credit and overinvestment as well as cyclical factors—falling margins, declining investment income, and lower asset turnover—related to the weaker economic environment. China's domestic credit boom, which has resulted in a large credit overhang (in the range of 25 percent of GDP; Figure 1.10, panel 1), drove excess capacity in “old economy” sectors (such as mining, energy, steel, and other industrials). Along with a slowing Chinese economy and dampened global demand, this overhang has contributed to sustained low prices, downward pressures on production volumes, and lower profits (Figure 1.10, panel 2). The correction of oversupply in the Chinese property market has added to these strains through falling prices and lower demand for basic materials. These forces appear to be entrenched, underscoring the likelihood of continued balance sheet weakness and thus broader financial stability concerns.

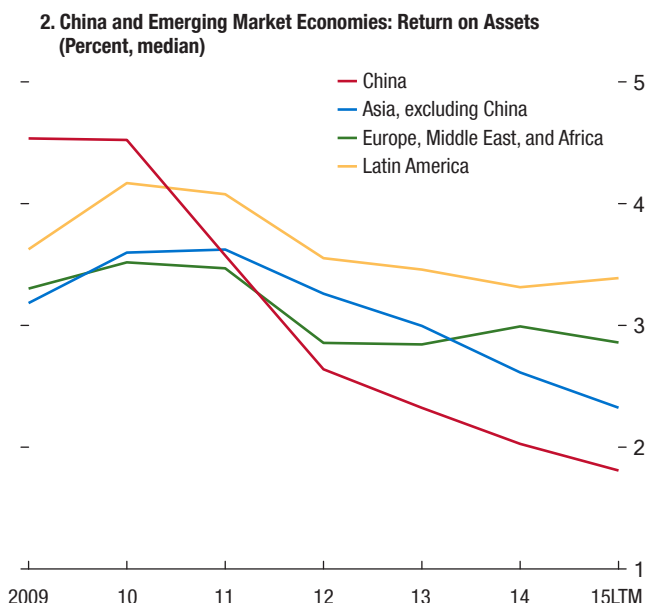
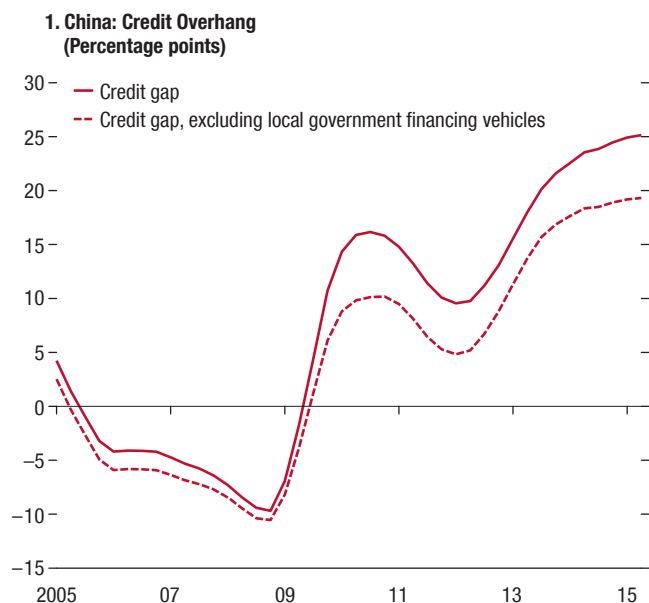
The ability of many Chinese listed firms to service their debt obligations is eroding, with higher debt and declining earnings capacity. Lower profitability and cash generation have pushed debt relative to earnings (debt/earnings before interest, taxes, depreciation, and amortization [EBITDA]) to a multiple of just under four for the median Chinese firm, more than doubling since 2010 (Figure 1.11, panel 1). Risks are concentrated in five sectors, including real estate, manufacturing, retail and wholesale (mainly industrial trading companies), mining, and steel (Figure 1.11, panel 2), that exhibit both high leverage and a high share of loss-making firms. More generally, earnings relative to interest expenses have fallen despite declining nominal interest rates (Figure 1.11, panel 3). Debt at risk (borrowing by companies unable to generate sufficient

<sup>10</sup>See IMF (2015c) for a more detailed discussion.

**Figure 1.10. China and Emerging Market Economies: Credit and Profitability**

China's credit boom has resulted in a credit overhang of 25 percent ...

... driving excess capacity and thus putting pressure on corporate earnings.



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

Note: Credit overhang is measured by the credit gap, defined as the deviation of the credit-to-GDP ratio from trend, using a one-sided Hodrick-Prescott filter with a smoothing parameter of 400,000.

Sources: S&P Capital IQ; and IMF staff estimates.

Note: The China sample contains 3,280 firms. 15LTM = last 12 months.

earnings to cover debt interest payments) has increased to 14 percent of total sample debt from 4 percent over the period 2010–15 (Figure 1.11, panel 4).

Structural weakness and cyclical stresses are becoming more evident. For example, the payment capacity of weaker Chinese companies is increasingly stretched, impeding cash flows to their suppliers and thus transmitting stress across the system. Payables days have increased steadily from a median of 53 days in 2011 to 72 days in 2015 (Figure 1.12, panel 1). The buildup has been substantial for firms in the energy, construction materials, information technology, real estate, and manufacturing sectors (Figure 1.12, panel 2). Excess payables (more than 45 days' sales) are equivalent to some 40 percent of overall listed corporate credit (Figure 1.12, panel 3).<sup>11</sup> Continued access to financing,

including for SOEs carrying perceived implicit government guarantees, and lack of credit discipline have permitted weakening firms to accumulate large payables to suppliers. The broad and marked run-up in payables debt throughout supply chains strongly suggests widespread and rising corporate stress. More-leveraged firms (with leverage ratios greater than two times) now account for almost 60 percent of total debt, doubling from 2007 (Figure 1.12, panel 4).<sup>12</sup>

### Corporate Weakness Is Mirrored in Rising Bank Vulnerabilities

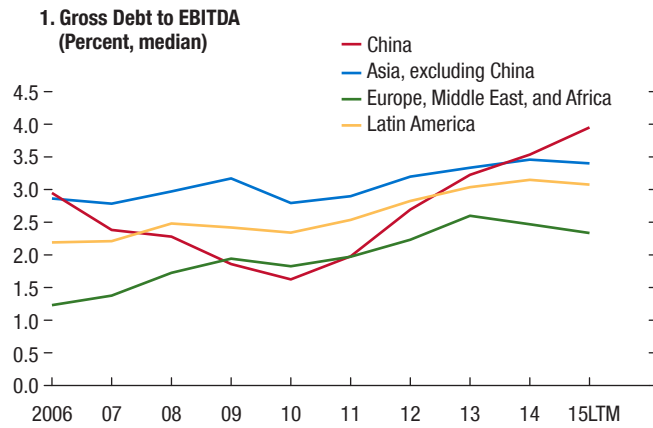
Increasing corporate stress is mirrored in rising problem assets held by banks. Reported problem loans amount to 5.5 percent of bank loans (\$641 billion, or 6 percent of GDP) after including “special mention loans,” for both corporate and household loan expo-

<sup>11</sup>Figure 1.12, panel 2, captures primarily listed firms. The excess of receivables compared with payables in each sector implies that the included firms are financing unlisted firms. Thus, cash flow and solvency metrics for unlisted firms could be worse than for listed firms, pointing to even greater debt-at-risk concerns than illustrated here.

<sup>12</sup>Average leverage among SOEs is about 200 percent.

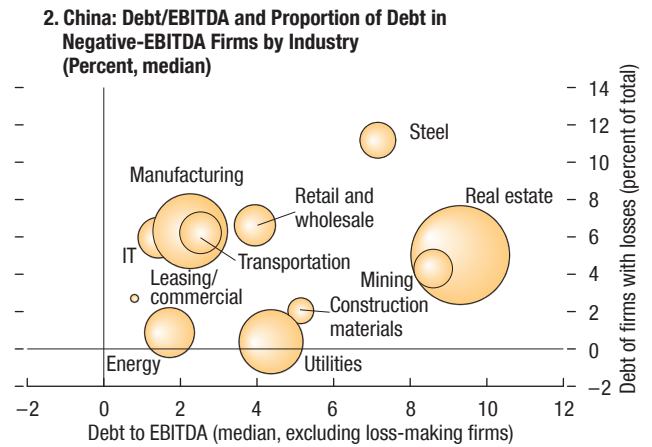
**Figure 1.11. Chinese Listed Companies: Leverage, Interest Coverage, and Debt-at-Risk**

Chinese firms' debt/EBITDA has more than doubled since 2010.



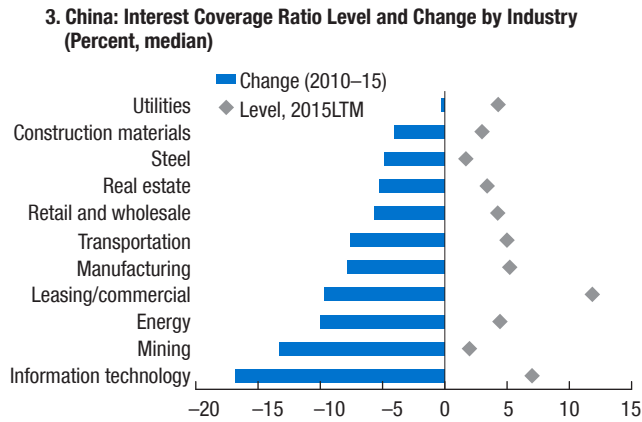
Sources: S&P Capital IQ; and IMF staff estimates.  
 Note: Ratios of companies with negative EBITDA are set to 10. The China sample contains 3,241 firms (2015LTM). EBITDA = earnings before interest, taxes, depreciation, and amortization; LTM = last 12 months.

Real estate, mining, and steel firms are among the most highly indebted and least profitable.



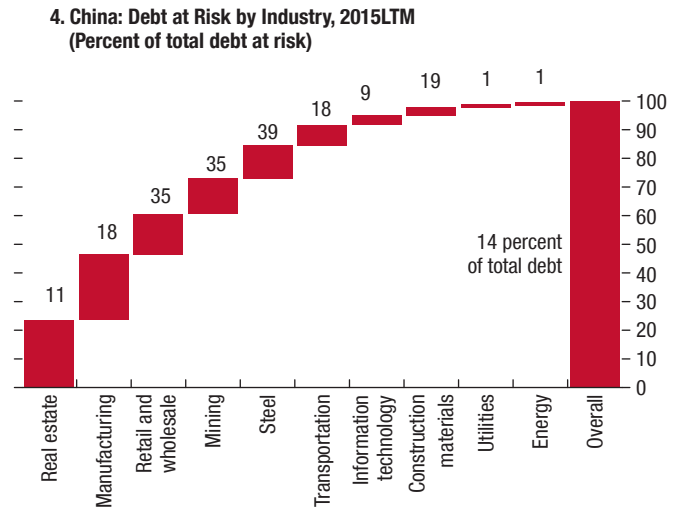
Sources: S&P Capital IQ; and IMF staff estimates.  
 Note: The size of the bubble represents the size of the sector based on its proportion of debt within the sample of listed corporations. The China sample contains 3,241 firms (2015LTM). EBITDA = earnings before interest, taxes, depreciation, and amortization; IT = information technology.

Declining profits have sharply lowered interest payment capacity in old economy industries ...



Sources: S&P Capital IQ; and IMF staff estimates.  
 Note: The China sample contains 2,878 firms (2015LTM). LTM = last 12 months.

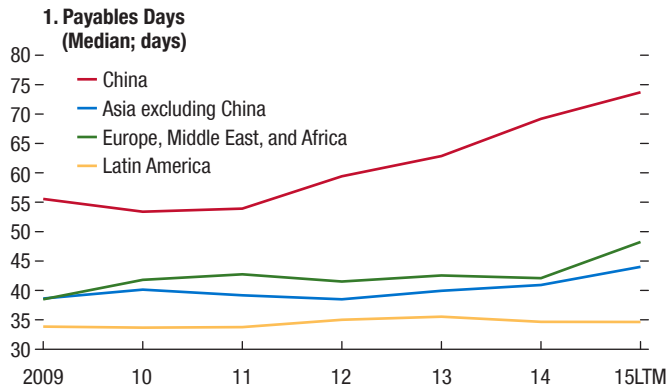
... which also account for the bulk of listed company debt-at-risk.



Sources: S&P Capital IQ; and IMF staff estimates.  
 Note: The numbers above the bars represent the total debt at risk as a proportion of total debt within the industry. The sample contains 2,871 firms (2015LTM), including 2,607 listed firms and 264 unlisted firms. Debt-at-risk is defined as the debt of corporates with interest coverage ratio of below 1. Interest coverage ratio is EBITDA/interest expense of the corporate. 2015LTM = last 12 months; EBITDA = earnings before interest, taxes, depreciation, and amortization.

**Figure 1.12. Chinese Listed Companies' Performance**

Listed firms' payables days have risen from 55 to 75 days during 2011–15 ...



Sources: S&P Capital IQ; and IMF staff estimates.  
 Note: Payables or receivable days = payables or receivables/annual sales × 365.  
 LTM = last 12 months.

Excess working capital balances are large and rising relative to reported corporate debt ...

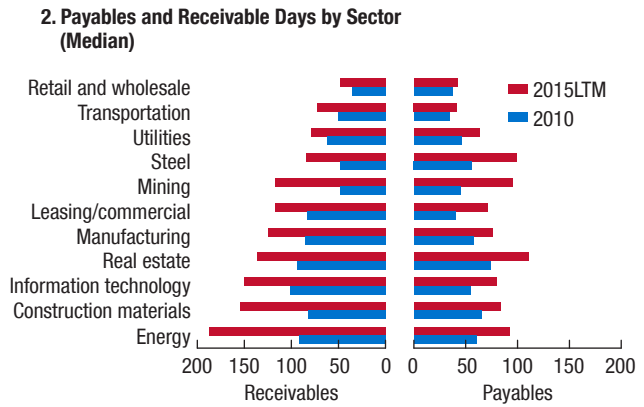
**3. Long-Term Payables (Days > 45; percent of corporate debt)**



Sources: S&P Capital IQ; and IMF staff estimates.  
 Note: LTM = last 12 months.

... with “old economy” industries showing the greatest deterioration.

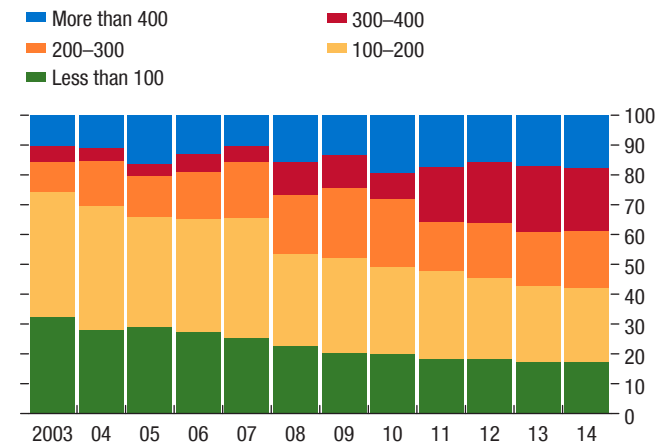
... while listed firms with leverage ratios greater than 2 account for nearly 60 percent of corporate liabilities.



Sources: S&P Capital IQ; and IMF staff estimates.  
 Note: Payables or receivable days = payables or receivables/annual sales × 365.  
 LTM = last 12 months.

... while listed firms with leverage ratios greater than 2 account for nearly 60 percent of corporate liabilities.

**4. China: Debt-to-Equity of Listed Firms (Percent)**



Sources: WIND database; and IMF staff estimates.

... with “old economy” industries showing the greatest deterioration.

defined as a bank loan to a borrower that has an interest coverage ratio (EBITDA divided by interest expenses) below one. Put another way, it is a loan to a borrower that doesn't have sufficient income to cover its interest payments. A loan potentially at risk as discussed in this report is thus not the same as a nonperforming loan (NPL) as reported by banks and supervisors, which meets a regulatory standard (usually nonpayment of interest or principal for a predetermined time), and recognition of an NPL



triggers accounting consequences. Not all of these loans potentially at risk will translate into actual NPLs that lead to bank losses. First, companies can meet their interest obligations by selling assets, drawing on cash buffers, or restructuring their operations. Second, in cases of nonpayment, banks can take steps to recover collateral, seize assets, or restructure the underlying loan.

Considering estimates of bank loans potentially at risk and assuming a 60 percent loss ratio suggests that potential bank losses on these loans could amount to \$756 billion (7 percent of GDP). Assuming a lower loss ratio of 45 percent—a Basel II norm for defaulted loans—yields potential bank losses of \$567 billion, or 5 percent of GDP (refer to Annex 1.1).

A key message of this report is that although these estimates of losses on loans potentially at risk are substantial, at about 7 percent of GDP, they are manageable given existing bank and policy buffers and the continued strong underlying growth in the economy. Estimated losses are equivalent to around 1.9 years of projected banking system pretax profits for 2015. Bank Tier 1 capital totals about \$1.7 trillion, or 11.3 percent of system risk-weighted assets, and bank reserves are \$356 billion.<sup>13</sup> Beyond bank buffers, China's public debt level—at 43 percent of GDP in 2015—provides space to address current estimates of potential bank losses. The Chinese authorities are also working to reduce excess capacity in inefficient industries and to improve the health of the corporate sector. Nevertheless, prompt action to address rising corporate sector vulnerabilities is essential to ensure that the costs of addressing potential losses on bank lending remain manageable. Continued strong growth in lending to an increasingly weak corporate sector will undermine actual and potential growth because an increasing share of new credit will be used just to roll over existing debts, instead of being used to finance new projects and investment and contribute to the dynamism of the corporate sector. Avoiding this outcome will require reform of both the corporate and banking sectors to ensure credit is channeled more efficiently to healthier companies and priced appropriately.

<sup>13</sup>Even though this level of capital meets the regulatory minimum, it is somewhat lower than those of a number of its peers, which average 12 percent.

### Weak Corporate Health Increases Risks in Bond and Equity Markets

Chinese firms are increasingly turning to the corporate bond market as their borrowing needs rise. Measures to liberalize the bond market—such as expanding access to foreign investors and domestic firms, and removing quota limits and delegating issuance approval to banks—are a positive reflection of China's rebalancing efforts. However, corporate bond issuance has surged and yields have dropped despite the slowing economy and deteriorating corporate health (Figure 1.13, panels 1 and 2). Debt issuance has been substantial in sectors suffering from price pressures, overcapacity, and rising balance sheet weakness, namely the real estate, mining, and manufacturing sectors (Figure 1.13, panel 3), while retail exposure to the bond market is increasing through wealth management products.<sup>14</sup>

A larger bond market that is well regulated and efficiently priced would be an additional source of funding for viable firms and help facilitate a smooth deleveraging of corporate balance sheets. But the surge in issuance comes amid high and rising corporate leverage, while the pricing of credit risk is significantly distorted in overcapacity sectors (largely due to perceived implicit state guarantees) despite some tentative evidence of widening spreads (Figure 1.13, panel 4).

The combination of corporate balance sheet weakness and inefficiencies in bond and equity markets poses a potentially serious challenge for financial stability. For example, an abrupt repricing of credit risk could drive a sudden rise in corporate stress, crystallizing concerns about banks' NPLs and bringing to the fore underlying problem assets and associated capital needs. Investor confidence would be damaged in such an environment, including directly through any losses on wealth management products and equity holdings, possibly leading to a marked reduction in the provision of credit (a "credit crunch"). In this instance, the risk of a disorderly deleveraging scenario with severe negative implications for financial stability and economic growth would increase.

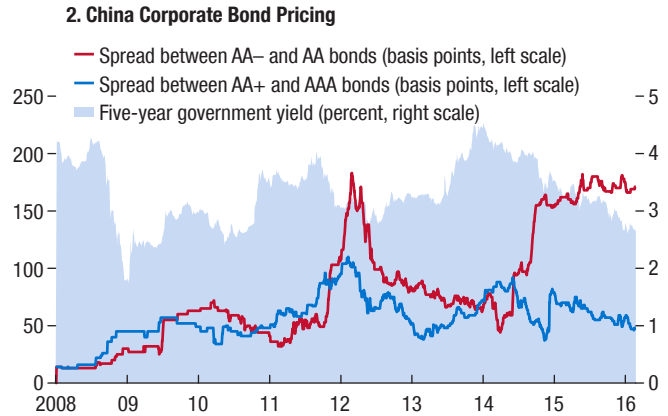
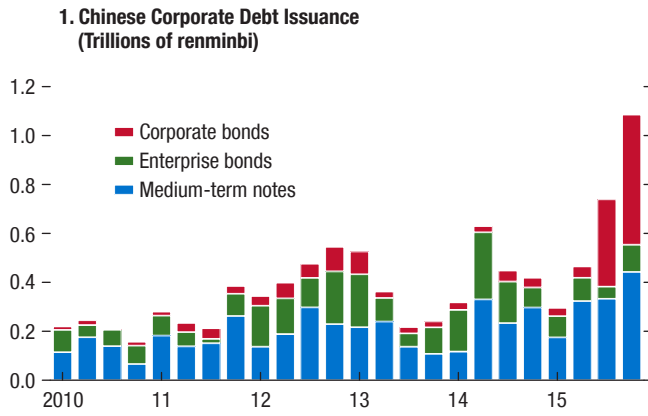
Deteriorating corporate health has also manifested itself in equity markets, broadening financial stability risks despite limited direct real economy linkages. Financial connections and stability concerns have

<sup>14</sup>About 50 percent of wealth management products sold by banks to retail investors have bonds and money market paper as underlying assets, as compared with 40 percent in 2014.

**Figure 1.13. China: Corporate Bond Issuance and Pricing**

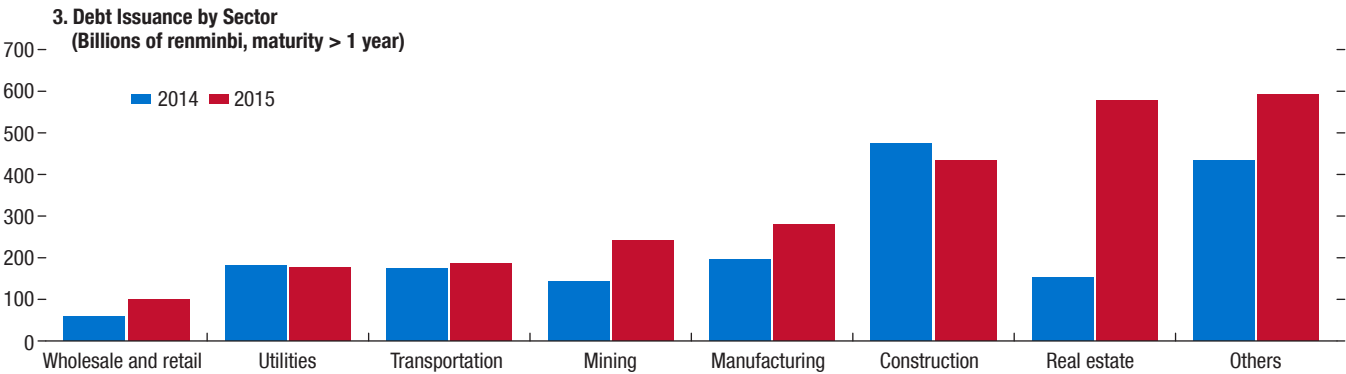
Domestic corporate bond issuance has recently surged ...

... but borrowing costs remain quite low despite declining corporate balance sheet health.

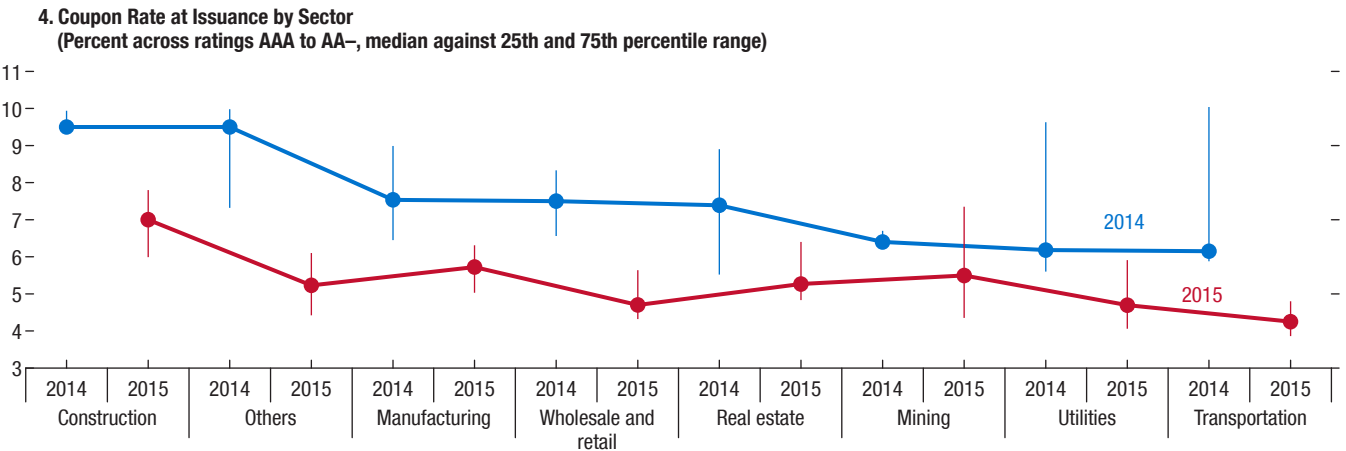


Sources: ChinaBond; and WIND.  
 Note: Enterprise bonds are issued by state-owned enterprises often for the financing of large infrastructure projects. Corporate bonds includes listed medium-term notes and nonlisted debt.

Sources: ChinaBond; and WIND.  
 Note: AA- in Chinese rating terminology is the lowest-rated corporate bond index published by ChinaBond, and is broadly comparable to international high-yield bonds.



Sources: ChinaBond; and WIND.  
 Note: Others includes services (information technology, media, social, among others), insurance firms, and agriculture.



Sources: ChinaBond; and WIND.  
 Note: Others includes services (information technology, media, social, among others), insurance firms, and agriculture.

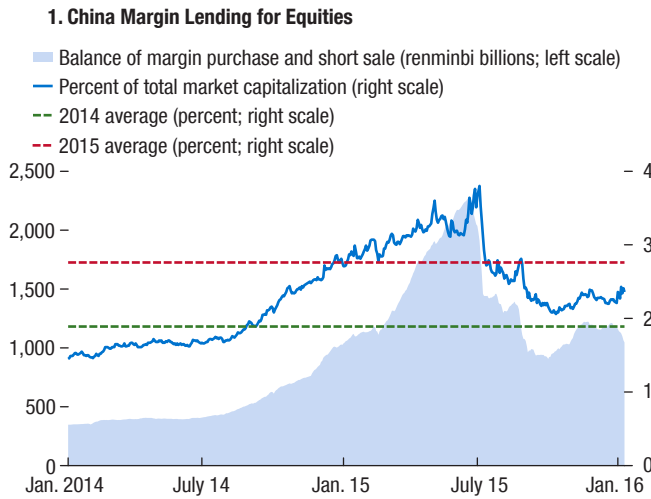
increased with rising equity market volatility, even as equity market leverage (Figure 1.14, panel 1) and overvaluation have been reduced. Correlations between the Shanghai composite index and equity indices from other major economies have risen since last August,

increasing the transmission of volatility to and from other markets (Figure 1.14, panel 2).

Another trend that could amplify equity market risks is the growth in share-collateralized lending by company owners borrowing against the value of their

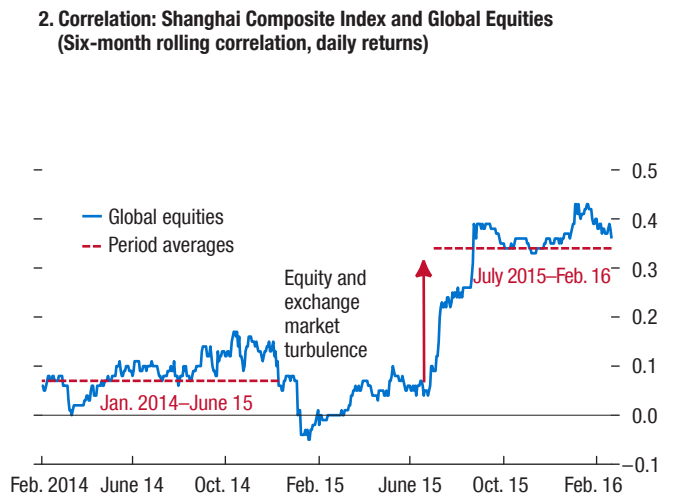
**Figure 1.14. China: Equity Markets and Exchange Rates**

Margin balances have declined ...



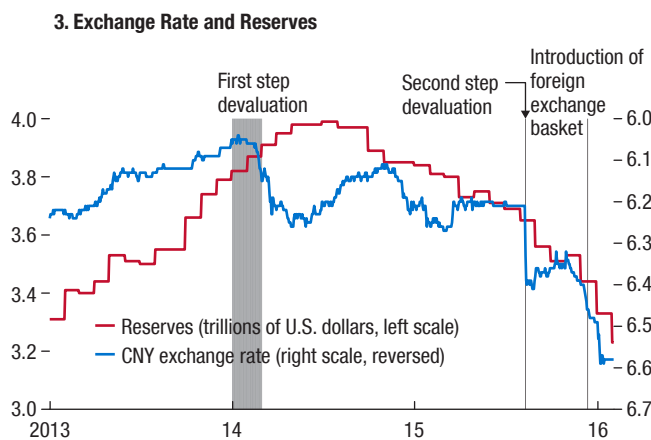
Source: CEIC.

... but spillovers to and from global markets have increased.



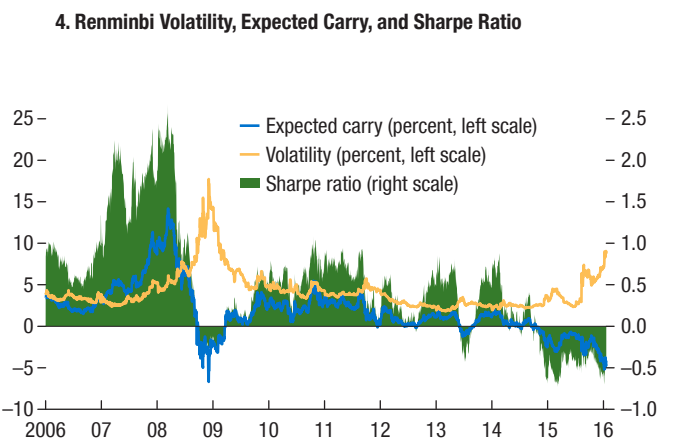
Sources: Bloomberg, L.P.; Morgan Stanley Capital International; and IMF staff calculations.  
Note: Global equities is the Morgan Stanley Capital International All Country World Index.

International reserves have declined against periodic devaluations of the renminbi ...



Source: Bloomberg, L.P.  
Note: CNY = onshore renminbi spot rate.

... reinforcing pressures from the unwinding of carry trade positions.



Sources: People's Bank of China; and IMF staff calculations.  
Note: Expected carry is defined as the difference between Chinese one-year government bond yields and the renminbi 12-month nondeliverable forward implied yield; the Sharpe ratio is defined as the expected carry divided by the US\$-CNY one-year implied volatility, derived from at-the-money options.

equity. Share-collateralized lending schemes increase risks for borrowers, banks, and brokers and act as an accelerant for downward price spirals. The total value of stock pledged as collateral for loans topped RMB 3 trillion at the end of 2015, up 29 percent from July of that year.<sup>15</sup> This amount translates into an estimated RMB 1.2 trillion of loans (assuming an average loan-to-value ratio of 40 percent), which is greater than the volume of margin financing (RMB 1 trillion) outstanding at the end of 2015. When the value of share collateral declines, additional sales of shares by company owners are needed to meet shortfalls, reinforcing pressures on equity prices. Falling equity prices encourage liquidation of these positions by banks and brokers, further exacerbating equity price declines. Given the adverse feedback loop between share price and collateral value, these schemes are often last-ditch efforts to raise funds; their rise underscores borrowers' balance sheet pressures. For banks and brokers, rising borrower vulnerability could crystallize potential losses and affect their ability to intermediate and provide funding. Brokers could be particularly hard hit because they tend to carry thinner liquidity buffers than banks.

### Capital Outflow Pressures from China Have Increased

Turbulence in China's domestic financial markets could add to capital outflows and exchange rate pressures. Capital outflows began in early 2014, triggered in part by an intervention by the People's Bank of China to address expectations of continued currency appreciation, but picked up pace in the second half of 2015. Meanwhile, the pressure on foreign exchange reserves continued, falling by roughly \$100 billion in January, compared with an average of \$115 billion in 2015:Q4, though it moderated in February to \$29 billion.

Capital outflows have been driven in part by an unwinding of the carry trade that followed the rapid appreciation in effective terms during the first half of 2014, as evidenced by the sharp outflows in loans and deposits. Meanwhile, direct investment abroad and bank loans to nonresidents have accelerated. Some outflows are expected given China's economic transition as well as changing expectations for returns on renminbi-denominated assets. On net, China's

growing current account surplus, low external debt, large reserves, and remaining capital controls should allow flows to stabilize. Notably, the scope for external debt to continue to drive balance of payments pressure appears limited. The outstanding stock of foreign debt at the end of 2015 is about \$1.4 trillion (13.5 percent of GDP, about half in local currency), of which \$650 billion is loans and deposits. By the estimates in this analysis, if all carry-trade-related liabilities were unwound, the stock of loans and deposits would settle around \$600 billion, roughly the level seen in 2011–12. Moreover, China's recent measures easing a number of capital account restrictions for inflows and opening up its bond market to foreigners could encourage capital inflows in the medium term.

Still, vulnerabilities remain. Domestic savings are large (M2 is 200 percent of GDP); the outlook for resident firms' and households' foreign asset accumulation is uncertain. Should the pace of asset accumulation accelerate, these outflows could weigh on the external outlook. A number of vulnerabilities reinforce these pressures. Successive episodes of monetary policy easing and periodic depreciations of the renminbi have increased uncertainty about the future exchange rate regime and deepened expectations of further depreciation (as captured by the gap between the spot and forward exchange rates). Moreover, the attractiveness to international investors of holding renminbi-denominated assets has waned with a drop in returns on the associated carry. Against such a backdrop, domestic residents' confidence in the stability of the onshore capital market is crucial; an increase in domestic capital market volatility could well spur capital outflow.

### A More Ambitious and Comprehensive Policy Approach Would Help Address Vulnerabilities, Anchor Expectations, and Foster a Smooth Deleveraging

China's unprecedented rebalancing to a new growth model and greater market determination of asset prices is inherently complex. This process has been bumpy at times, as expected, given the magnitude of adjustment required to address China's domestic and external imbalances. Nevertheless, the transition has become more complicated amid uneven reform efforts, rising vulnerabilities in the corporate and financial sectors, and sustained capital outflows and exchange rate pressures. Recent announcements around the March National People's Congress suggest that reform efforts

<sup>15</sup>A situation in which owners of more than 5 percent of a company pledge their own shares as collateral.

to address corporate vulnerabilities in the overcapacity sectors, especially coal and steel, may be accelerated, which is a welcome development.

Smooth rebalancing and orderly deleveraging of past excesses now require urgent implementation of a more ambitious and comprehensive policy and reform agenda. Measures to address vulnerabilities will inevitably slow growth in the near term. Achieving a safer and more sustainable pace of growth should be carefully managed, and the rebalancing process should be supported through an appropriate macroeconomic policy mix (IMF 2015c). Clear communication and consistent implementation of policies are central to upholding public confidence and retaining healthy policy buffers. Policies to alleviate strains coming from a structural decline in corporate balance sheets, associated risks for banks and financial markets, and pressures on capital outflows will improve prospects for a smooth rebalancing.

- *A comprehensive plan to address the corporate debt overhang would assist a steady deleveraging process.* This plan would include faster write-offs of bad debt (as called for in IMF 2015c), thereby promoting corporate restructuring and hardening budget constraints for inefficient SOEs by eliminating implicit government guarantees. Corporate governance frameworks, particularly for SOEs and state-owned banks, should be strengthened in tandem with these measures to guard against the future buildup of excessive debt. Slowing the overall pace of credit growth would help address the credit overhang and system leverage. Increasing the number of defaults of nonviable firms should be carefully phased in and clearly communicated to help facilitate better pricing of credit risks in domestic financial markets.
- *Stock markets should be allowed to find equilibrium levels without official support for prices, except to prevent disruptive price movements, and leveraged buying should be regulated more tightly.*
- *Corporate deleveraging should be accompanied by a strengthening of bank balance sheets and social safety nets, especially for displaced workers in overcapacity sectors.* A comprehensive restructuring program to deal with bad assets and recapitalize banks should be developed, along with a sound legal and institutional framework for facilitating bankruptcy and debt-workout processes. The recent announcement of a RMB 100 billion fund to ameliorate the effects of the layoffs in the steel and coal sectors is encour-

aging in this regard. A further strengthening of the pension and health insurance systems would facilitate a smoother economic transition by enhancing the capacity of institutional investors to act as a stabilizing force in domestic bond and equity markets.

- *The supervisory framework should be continually upgraded to meet the needs of an increasingly complex financial system.* Although significant progress has been made in building supervisory capacity and strengthening the macroprudential framework, more effective coordination and information sharing among the regulatory bodies is essential. Better coordination would enhance the agility and effectiveness of supervisory actions and contribute to smooth and coherent policy formulation, communication, and implementation. Increased transparency would improve confidence in supervisors. The authorities intend to conduct a comprehensive review of the regulatory and supervisory framework in comparison with international standards and codes during the upcoming Financial Sector Assessment Program.

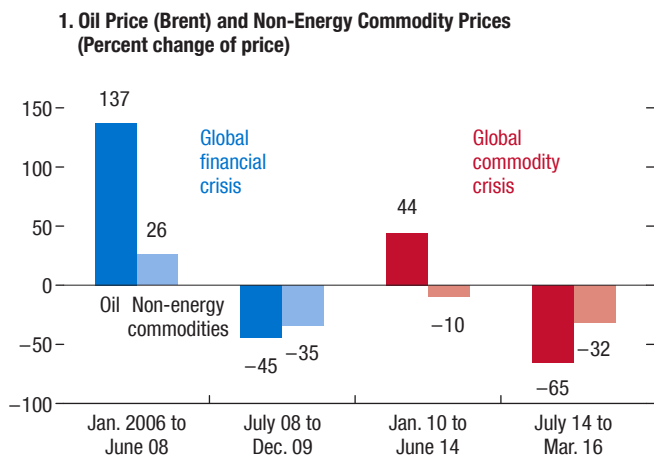
### Emerging Market Economies Are Being Tested

*The resilience of emerging market economies is being tested by slower growth, weaker commodity prices, and tighter credit conditions. Commodity-related firms are cutting capital expenditures sharply as high private debt burdens reinforce risks to credit and banks. Commodity-exporting countries and those in the Middle East and the Caucasus are particularly exposed to strains across the real economy and the financial sector. Though emerging market economies have faced multiple shocks, most have shown resilience with few crisis-like situations. Many countries accumulated buffers during the boom years, and some of these buffers have begun to be drawn down as economies make the necessary adjustments to shifting external conditions. The nexus between SOEs and sovereigns has intensified, and could increase fiscal and financial stability risks in countries with repayment pressures. Bank capital buffers are generally adequate, but will likely be tested by weaker earnings and the downturn in the credit cycle.*

Most emerging market economies have undergone several severe shocks in recent quarters (Figure 1.15). Growth continues to slow across most economies, commodity prices have collapsed, assets have repriced markedly (at times violently), and domestic vulnerabilities

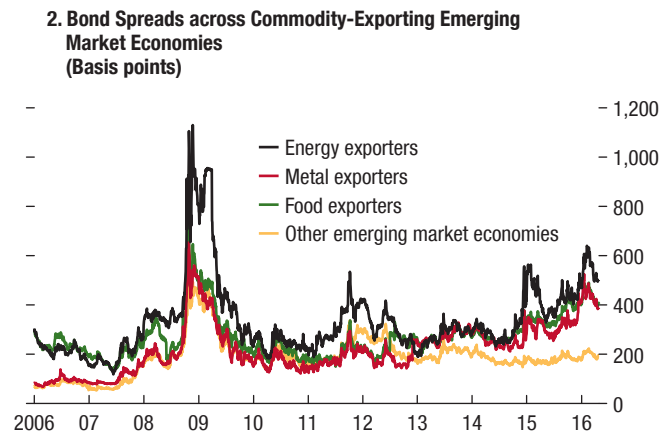
**Figure 1.15. The Global Commodity Crisis**

The big ramp-up and eventual collapse of oil prices ...



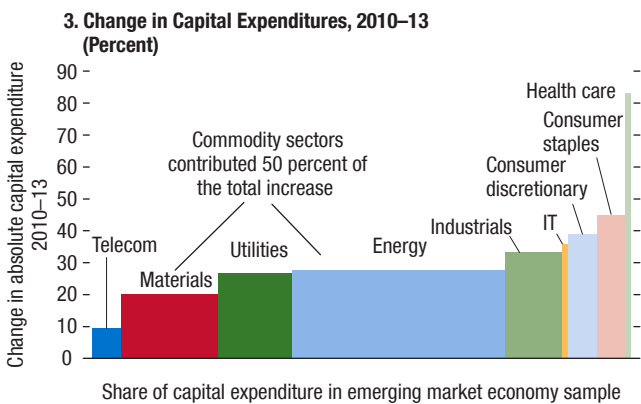
Source: Bloomberg, L.P.

... is reflected in the borrowing costs of emerging market economies.

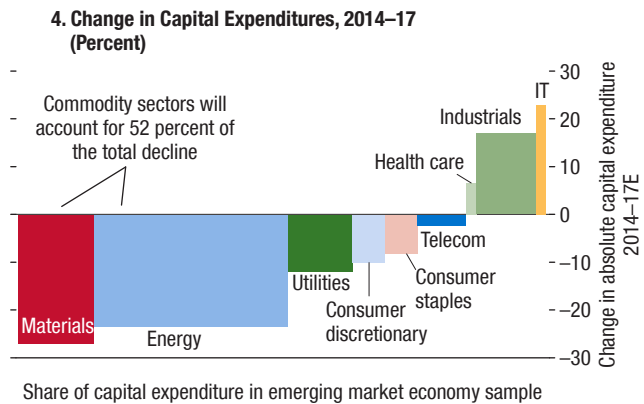


Sources: JPMorgan Chase & Co.; and IMF staff calculations.

Commodity sectors account for the bulk of corporate capital expenditures and affect overall economic investment.



Sources: S&P Capital IQ; and IMF staff calculations.  
Note: IT = information technology; Telecom = telecommunications.



Sources: S&P Capital IQ; and IMF staff calculations.  
Note: E = estimated; IT = information technology; Telecom = telecommunications.

have intensified. The *global commodity crisis*—the sharp decline in oil and other commodity prices since 2014—has added to corporate and sovereign vulnerabilities.

Many countries have used their buffers to absorb these shocks and provide support to growth, but after nearly two years of commodity price declines and downward growth revisions, some economies may be running out of room to maneuver. Financial and economic risks in emerging market economies remain elevated along the following four dimensions: (1) the big decline in corporate capital investment; (2) increased credit risk arising from the deterioration of corporate (and sover-

eign) fundamentals and oncoming refinancing pressures, jointly dubbed the *corporate-sovereign nexus*; (3) banking sector spillovers; and (4) depletion of buffers and policy space in some economies. This section examines these shocks and risks, and delineates the countries and regions with the highest financial stability concerns.

**Capital Expenditures of Commodity Economies Matter for All Economies**

Although commodity exporters’ hard-currency (J.P. Morgan Emerging Markets Bond Index Global)

sovereign bond spreads have widened to levels last seen in early 2009, spreads for countries with a low commodity intensity of exports have barely budged and remain close to post-2009 lows (Figure 1.15 and Table 1.1).<sup>16</sup> This condition suggests that the repricing of external sovereign debt has reflected balance sheet concerns in commodity-exporting countries specifically.

Corporate capital investment continues to decline in many emerging market economies in reaction to falling profitability and slowing growth, with materials and energy firms expected to account for half of the decline through 2017 (Figure 1.15, panels 3 and 4). Capital expenditures of commodity-related firms are expected to decline by about 25 percent in the period 2014–17. Because of their large share in economic investment, oil-related capital expenditures in some economies tend to have a broad dampening effect on the entire economy's investment, even in net importers of oil, such as Brazil (Table 1.1).

### Corporate and Sovereign Credit Risks Have Risen and Feed into Each Other

Previous GFSRs have highlighted the increase in corporate sector leverage in many emerging market economies, along with an overall decline in their debt-repayment capacity. Firm-level data suggest that the deterioration in company fundamentals is more pronounced in Asia (led by China), and remains elevated in Latin America and in Eastern Europe, the Middle East, and Africa (Figure 1.16, panel 1). Debt belonging to nonfinancial corporations with reduced ability to repay (interest coverage ratio less than one) has risen to \$650 billion, or 12 percent of total corporate debt of firms in the sample of firms from the major emerging market economies. The role of SOEs in debt is important. Indicators of corporate health and debt at risk for the major emerging market economy SOEs show similar levels of deterioration since 2010, even excluding China, because many big SOEs are commodity firms (Figure 1.16, panel 2).

Companies in the energy sector have indeed issued the most debt since 2012 among nonfinancial firms, particularly in Colombia, Kazakhstan, Nigeria, and Russia, and have seen their corporate debt reprice

<sup>16</sup>Non-commodity-exporting countries in the J.P. Morgan Emerging Markets Bond Index Global Diversified account for roughly one-third of the index.

accordingly (Table 1.1).<sup>17</sup> Markets have differentiated between firms in commodity-related sectors, such as metals, mining, oil and gas, and firms in other sectors, and between firms in countries with a large share of oil-related debt and firms in other countries (Figure 1.16, panel 3; and Table 1.1).<sup>18</sup> Firms are now seeking to deleverage by paying down debt, cutting back on capital investment and shedding assets. Russian firms also dealt with the large depreciation of the ruble without significant spillovers to foreign currency debt, while also managing to delever. Nevertheless, the ongoing recession in Russia continues to pose risks to financial stability.

With weakening corporate balance sheet fundamentals and rising costs and risk perceptions, continued market access for refinancing may become more difficult for some corporations. Firms with short maturity profiles and high borrowing costs could run into problems. Indonesian, Kazakh, and Nigerian firms have both relatively short-term debt (with median maturity of four years or less) compared with other emerging market economies (Figure 1.16, panel 4), and high borrowing spreads (Table 1.1).

Countries with large state-owned corporate sectors and limited fiscal space may see greater stress spill over from sovereign vulnerabilities to the corporate sector or vice versa. This feedback loop could adopt different forms. In one direction, sovereign stress may reduce the value of default protection accorded to SOEs by implicit or explicit government guarantees. For example, in Brazil the sovereign's adverse debt profile, fiscal pressure, and ongoing recession have contributed to the widening of Petrobras's credit spread.

In the other direction, SOE contingent liabilities, if recognized, could worsen sovereign debt dynamics. The fiscal impact of weaker SOEs could be substantial if the sovereign has to assume their short-term liabilities. Contingent liabilities are largest in Kazakhstan, Mexico, Russia, South Africa, and Venezuela, and are also sizable for other emerging market economies, such

<sup>17</sup>The large share of oil-related debt in Argentina (raised by the state oil producer YPF) is the result of the small issuance of non-oil-related debt because of the country's high borrowing costs. Issuance is bound to increase when Argentina regains access to global financial markets.

<sup>18</sup>Corporate bond spreads for Latin America appear higher than other regions owing to the region's higher dependence on oil and commodities than Asia, where only the higher-quality corporations are able to issue debt and be included in corporate bond indices.

**Table 1.1. The Effects of Energy Commodities on Emerging Market Economies and Other Economies and Their Buffers and Policy Indicators**  
(Percent, unless otherwise noted)

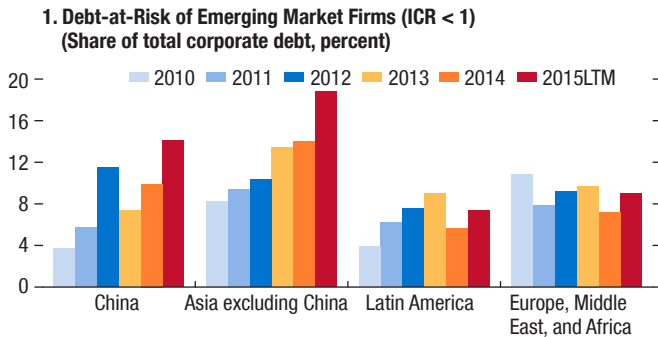
	Effect of Energy Commodities Price Decline										Market Pricing				Buffers			Policy Indicators				
	Oil Price Change in Local Currency (year over year; 2015)	Debt Issued by Energy Firms Since 2012					Share of Energy Firms					Sovereign		Corporate		Bank Tier 1 Capital (in risk-weighted assets)	Reserves to Short-Term External Financing Requirements (multiples; 2016E)	Current Account plus Foreign Direct Investment (Percent of GDP; 2016E)	Fiscal		Monetary	
		U.S. dollars (billions)	Nonfinancial Corporate Debt	In Total Nonfinancial Corporate	Capex in Total Nonfinancial Corporate	Assets in Total Nonfinancial Corporate	Average 2016 Level	Δ June 30, 2014, to Dec. 31, 2015	Average 2016 Level	Δ June 30, 2014, to Dec. 31, 2015	Δ June 30, 2014, to Dec. 31, 2015	Tier 1 Capital (in risk-weighted assets)	Primary Balance (2016E; GDP)	General Government Debt (2016E; GDP)	Real 10-year Bond Yields				Inflation Gap	Credit Gap (2015:Q2, percentage points)		
																					Assets (LTM)	Assets (LTM)
<b>Asia</b>																						
China	-32	250	15	28	19	203	57	372	-6	11.3	6.3	3.1	-2.4	47	1.9	-1.3	26					
Hong Kong SAR	-35	...	...	18	5	...	...	...	...	...	...	1.1	0.8	...	...	...	45					
India	-32	13	19	26	19	175	-8	375	97	...	1.9	0.1	-2.4	66	2.6	0.0	-3					
Indonesia	-28	8	31	25	24	363	101	760	172	18.6	1.2	-1.3	-1.2	28	3.7	0.0	11					
Malaysia	-20	4	7	52	29	265	175	215	44	13.9	...	2.8	-1.5	56	0.5	...	9					
Philippines	-32	2	10	5	3	144	11	523	105	13.8	5.2	2.7	1.4	36	1.4	-0.5	...					
Singapore	-30	4	10	14	9	...	...	232	24	...	...	31.5	0.6	98	-0.3	...	20					
Thailand	-29	11	19	36	29	...	...	262	65	13.8	4.2	8.5	0.2	44	0.8	-1.9	17					
<b>Central and Eastern Europe</b>																						
Hungary	-28	0	...	65	67	229	-6	273	21	...	2.3	5.8	1.1	75	1.0	-1.1	-25					
Kazakhstan	21	6	59	67	66	455	131	1,010	346	...	...	-0.2	-4.3	22	-3.8	...	...					
Poland	-28	1	26	20	20	135	14	302	53	14.0	1.0	0.3	-1.1	52	1.2	-2.2	1					
Romania	-27	...	...	88	50	216	27	...	...	...	0.8	0.1	-1.5	40	2.4	-2.4	...					
Russia	-22	68	52	52	51	326	69	565	158	8.5	3.3	4.1	-3.7	18	3.4	8.9	6					
Turkey	-19	1	10	5	6	340	88	398	71	12.3	0.5	-2.2	0.2	31	-0.2	1.8	16					
<b>Middle East</b>																						
Bahrain	-35	...	...	...	...	...	...	507	231	...	2.0	-2.7	-14.7	82	4.8	...	...					
Kuwait	-33	...	...	29	18	...	...	466	189	...	1.0	-0.8	-27.6	19	...	...	...					
Saudi Arabia	-35	1	5	13	5	...	...	138	27	16.2	5.0	-9.8	-16.6	17	...	...	3					
United Arab Emirates	-35	5	25	11	4	...	...	335	87	16.6	...	-0.7	-10.5	21	...	...	...					
<b>Africa</b>																						
Nigeria	-29	1	51	28	21	659	361	1,245	578	16.3	2.1	-2.1	-3.9	13	3.3	...	...					
South Africa	-13	3	22	15	7	452	209	505	207	13.8	0.9	-4.8	-0.2	51	2.0	0.0	-2					
<b>Latin America</b>																						
Argentina	-1	7	71	67	42	486	-262	735	48	...	0.2	1.2	-4.8	61	...	...	...					
Brazil	-3	54	34	32	22	538	357	956	551	12.1	2.0	1.3	-1.7	76	7.2	4.2	12					
Chile	-24	9	25	6	6	279	151	394	73	9.5	1.0	-0.3	-2.8	20	1.4	0.4	...					
Colombia	-13	12	63	51	30	384	200	745	505	11.4	1.2	-1.7	0.2	49	3.0	2.8	...					
Ecuador	-35	...	...	...	...	1,443	921	...	...	...	...	-1.5	-1.1	38	9.3	...	...					
Mexico	-24	61	46	32	19	373	181	427	164	13.3	2.0	-0.3	-0.5	55	2.6	-0.9	6					
Peru	-25	2	17	6	5	283	116	481	146	...	3.4	-1.1	-1.1	25	3.0	1.4	...					
Venezuela	-35	13	...	...	...	3,379	1,879	...	...	...	...	-6.1	-23.4	36	...	...	...					

Sources: Bank for International Settlements; Bloomberg, L.P.; Consensus Economics; Fitch; IMF Financial Soundness Indicators, International Financial Statistics, and World Economic Outlook databases; Moody's; S&P Capital IQ; and IMF staff calculations. Note: Bond spread levels and changes are colored by their quartiles across countries: green for first, yellow for second, orange for third, and red for fourth. The inflation gap is defined as the distance of the latest headline inflation (year over year) from the lower or upper inflation band or inflation target if no band is available and no value data (...), if no inflation target exists. Credit gap is defined as the distance of the latest credit to GDP metric from its long-term trend fitted from a Hodrick-Prescott line. Reserves refers to official reserve assets as of 2015:Q4 or latest in 2015 as reported in IMF, International Financial Statistics database. Official reserve assets may not include sovereign wealth fund assets. Short-term external financing requirements refer to short-term external debt and current account; capex = capital expenditure; E = estimated; LTM = last 12 months.



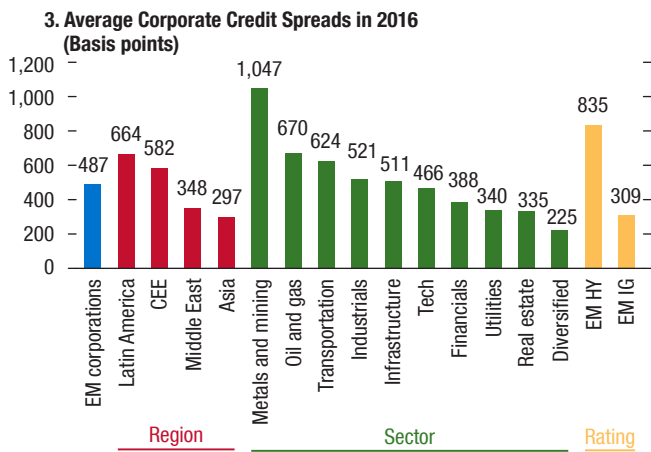
**Figure 1.16. Corporations, Sovereigns, and Their Nexus**

Emerging market economy firm fundamentals have deteriorated in Asia, and remain weak in most emerging market economies ...



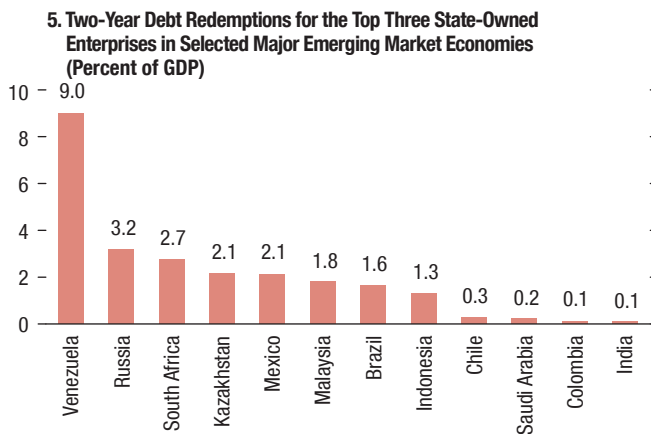
Sources: S&P Capital IQ; and IMF staff calculations.  
Note: Debt-at-risk is defined as the debt of corporates with interest coverage ratio of below 1. Interest coverage ratio is EBITDA/interest expense of the corporate. 2015LTM = last 12 months; EBITDA = earnings before interest, taxes, depreciation, and amortization; ICR = interest coverage ratio.

The deterioration in fundamentals and commodity prices is reflected in market prices.



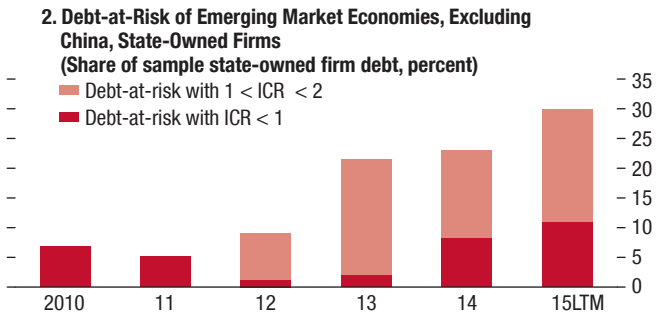
Sources: JPMorgan Chase & Co.; and IMF staff calculations.  
Note: CEE = central and eastern Europe; EM = emerging market economy; HY = high yield; IG = investment grade.

State-owned enterprise debt redemption is large in some countries.



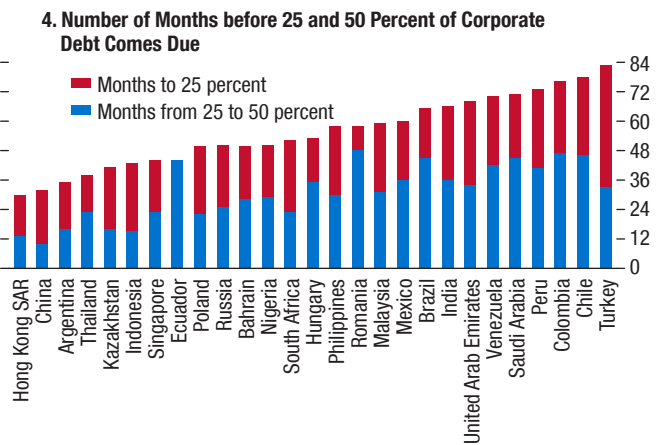
Sources: S&P Capital IQ; and IMF staff calculations.

... with state-owned enterprises leading the deterioration.



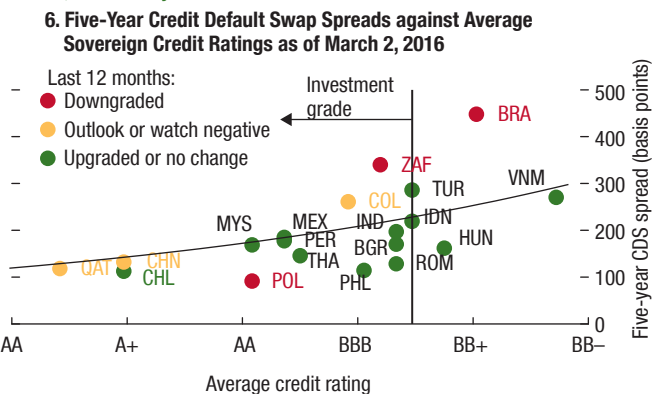
Sources: S&P Capital IQ; and IMF staff calculations.  
Note: 15LTM = last 12 months; ICR = interest coverage ratio.

Corporate refinancing pressures are acute in some economies.



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

Sovereign risk perceptions appear acute in Brazil, Colombia, South Africa, and Turkey.



Sources: Bloomberg, L.P.; rating agencies; and IMF staff calculations.  
Note: Data labels in the figure use International Organization for Standardization country codes. CDS = credit default swap.

as Brazil, Indonesia, and Malaysia (Figure 1.16, panel 5). As such, increased perceptions of repayment stress on the debt of Petrobras (Brazil) and Eskom (South Africa) may have fed into the sovereign credit spread. This is one of the factors that may have pushed sovereign credit default swap spreads higher than implied by their credit ratings, predisposing credit rating downgrades and adding to existing concerns about sovereign risks (Figure 1.16, panel 6).

Frontier markets, especially commodity exporters, were also hit hard during recent bouts of financial market turbulence. Some frontier market economies have postponed their plans for international bond issuance or had to borrow at higher costs than before (e.g., Mongolia). The volume of corporate issuance in 2015 declined to a quarter of the pace of issuance in 2014, to levels seen at the time of the global financial crisis. Focusing on the behavior of spreads and credit ratings using two complementary approaches (signaling and risk zone),<sup>19</sup> a significant deterioration in market access indicators for many frontier economies is found (Table 1.2). The most pronounced worsening of spreads during the 18 months prior to December 2015 is observed in Angola, Egypt, El Salvador, Ghana, Iraq, Kenya, Mongolia, Tanzania, Tunisia, and Zambia. Although credit ratings are lagging indicators and do not move as fast or as frequently as spreads, credit downgrades in Angola, El Salvador, Mongolia, and Zambia occurred during the same period as the worsening spreads.

### Bank Buffers May be Tested, Especially in the Middle East and Other Oil-Heavy Economies

Although many emerging market economy banking systems remain profitable and adequately capitalized, rapid credit growth and a worsening credit cycle will pressure bank buffers. Many emerging market economy banks have aggregate return-on-equity ratios

<sup>19</sup>The signaling approach identifies vulnerability thresholds for spreads and ratings by minimizing the noise-to-signal ratio over historically observed loss of market access episodes. Unlike the signaling approach, which relies on aggregating information across countries, the risk zone approach accounts for cross-country heterogeneity by delineating various thresholds (percentiles) from country-specific empirical distributions for spreads and ratings. This can flag whether an indicator is, for example, in a zone of high, elevated, or low risk, relative to its historical norms. A country is categorized as “high risk” if the relevant indicator breaches both the vulnerability threshold and its 75th percentile established under the risk zone approach.

of more than 10 percent, which is well above most advanced economy banks. These higher ratios are due to higher net interest margins and higher underlying growth rates, but also to higher balance sheet leverage.<sup>20</sup> However, multiple shocks to the real economy from lower domestic growth, lower commodity prices, and prolonged currency depreciation will likely reduce earnings and capital buffers for banks in emerging market economies as NPLs and provisions rise (Figure 1.17, panel 1). Given higher expected default rates on corporate and household loans from the turn in the commodity cycle and the advanced stage of the credit cycle, capital buffers in emerging market banks may be tested (Figure 1.17, panel 2).<sup>21</sup> An IMF study also finds that financial sector deepening at too fast a pace carries risks (Sahay and others 2015). Box 1.2 provides an assessment of Brazilian corporations and their spillovers to bank stability.

Emerging market economies in the Caucasus and Central Asia (CCA), and the Middle East and North Africa (MENA) regions are particularly sensitive to oil price developments because of their extreme dependence on the oil sector through the macroeconomy and government ownership of banks.<sup>22</sup> Of the 32 countries that make up the two subregions, half depend on hydrocarbons for GDP and fiscal and export revenues, and another 7 are indirectly linked to oil prices through trade, remittances, and other financial ties with oil-dependent economies (Figure 1.18).<sup>23</sup> The domestic macroeconomic environment, in turn, drives financial sector performance, since banks largely depend on domestic and regional economies for funding, asset expansion, and income. Oil-dependent governments (such as in Algeria, Azerbaijan, Iraq, Islamic Republic of Iran, Kazakhstan, Turkmenistan, Uzbekistan, and the Gulf Cooperation Council [GCC])

<sup>20</sup>Averaging a multiple of 13.5 for banks in the major emerging market economies—as measured by total assets to total common equity—against a multiple of 9.3 in the United States.

<sup>21</sup>Chilean banks meet regulatory minimum capital requirements and are considered adequately capitalized for local regulations.

<sup>22</sup>For a more in-depth analysis of the risks to the CCA and MENA regions, please see Lukonga and others (forthcoming).

<sup>23</sup>Oil-exporting countries include Azerbaijan, Bahrain, Iraq, Islamic Republic of Iran, Kazakhstan, Kuwait, Oman, Qatar, Saudi Arabia, Turkmenistan, the United Arab Emirates, Uzbekistan, and Yemen, as well as Libya and Sudan, but the latter two are not covered in this section. Among the net oil importers, Egypt, Jordan, and Lebanon are linked to oil through trade and remittances with the GCC, and Armenia, Georgia, the Kyrgyz Republic, and Tajikistan are linked through trade and remittances with Russia and Kazakhstan.

**Table 1.2. Loss-of-Market-Access Indicators**

	Sovereign Dollar Bond Spreads (basis points)			Sovereign Credit Ratings	
	Average 2015 Level	Average 2016 Level	Δ June 2014 to Dec. 2015	S&P 2014	S&P 2015
<b>Asia</b>					
Mongolia	610	989	279	B+	B
Sri Lanka	421	615	223	B+	B+
Vietnam	259	325	87	BB-	BB-
<b>Central and Eastern Europe</b>					
Belarus	921	588	59	B-	B-
Bulgaria	233	249	-10	BBB-	BB+
Croatia	283	316	69	BB	BB
Georgia	421	515	165	BB-	BB-
Serbia	280	301	12	BB-	BB-
Ukraine	2,375	860	41	CCC	B-
<b>Middle East</b>					
Egypt	409	604	232	B-	B-
Iraq	746	1,189	514	...	B-
Jordan	249	402	186	BB-	BB-
Lebanon	402	482	100	B-	B-
Pakistan	500	587	65	B-	B-
Tunisia	378	638	318	...	...
<b>Africa</b>					
Angola	638	1,042	545	BB-	B
Côte d'Ivoire	459	584	132	...	...
Ghana	755	1,224	388	B-	B-
Kenya	489	703	303	B+	B+
Senegal	485	633	205	B+	B+
Tanzania	572	875	446	...	...
Zambia	686	1,243	553	B+	B
<b>Latin America</b>					
Belize	781	1,079	60	B-	B-
Costa Rica	449	568	208	BB	BB
Dominican Rep.	385	496	111	B+	BB-
El Salvador	497	741	246	BB-	B+

Sources: Bloomberg, L.P.; Dealogic; Fitch; Moody's; Standard & Poor's; and IMF staff calculations.

Note: Based on EMBI Global sovereign spreads. In ascertaining vulnerability to loss of market, we followed the methodology described in IMF 2015b. Red = high risk; orange = elevated risk; yellow = medium risk; green = low risk (see footnote 19).

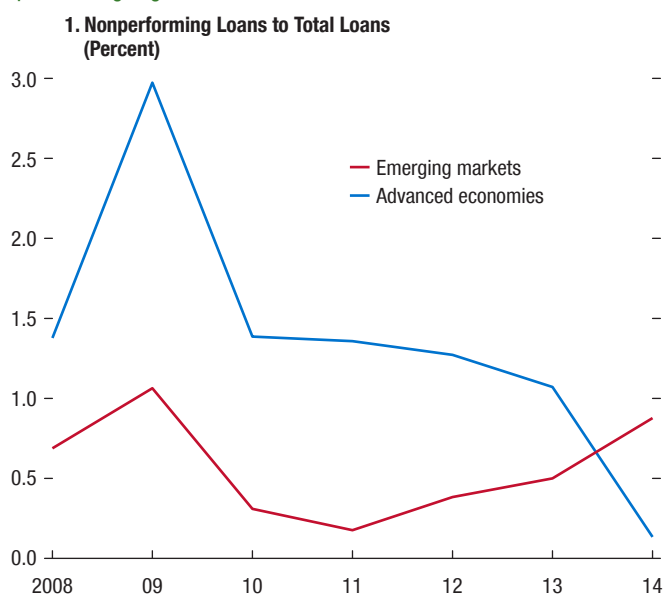
member countries) also have substantial stakes in the banking systems through which oil-related deposits in many cases are channeled.

Financial strains have emerged more rapidly in response to falling oil prices in the CCA and non-GCC oil exporters, but the GCC is also facing increasing pressures. Many CCA countries—both oil exporters and importers—have registered an immediate

increase in NPLs, declines in capital adequacy ratios, slower growth in the money supply, and declines in private sector credit (Figure 1.19). The number of restructured bank loans and of undercapitalized banks and banks seeking recourse to central bank financing have also risen. In MENA, pressures have been felt in capital and financial markets whereas the impact on bank asset quality has so far been moderate. Algeria,

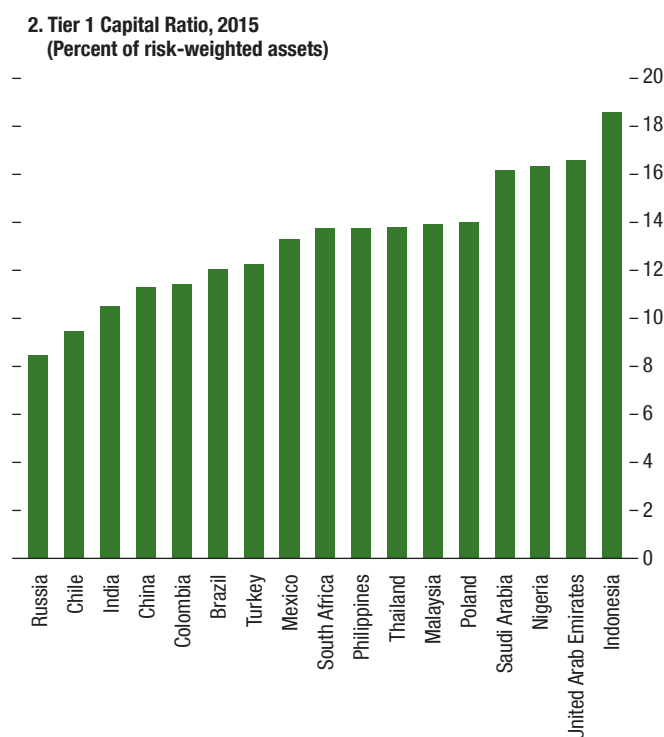
**Figure 1.17. Banking System Health**

Rising bad loans and slowing growth will likely raise required provisions going forward ...



Sources: Bankscope; and IMF staff calculations.

... and loss-absorbing buffers may be tested.



Sources: Bank of Thailand; CEIC; and IMF, Financial Soundness Indicators database.

Note: Data are as the latest available date in 2015. Data for Thailand are from the Bank of Thailand. Data for China are from the China Bank Regulatory Commission via CEIC.

Bahrain’s wholesale Islamic banking sector, Iraq, and Islamic Republic of Iran registered some deterioration in financial soundness indicators, but in some cases not directly related to the oil price decline. Banking system liquidity, though still high, has shrunk, and private sector credit growth has begun to slow in many countries (Figure 1.19, panels 3 and 4).

**Countries with External Imbalances are Particularly Vulnerable to Shocks**

A worsening outlook may call more attention to international reserves as a stabilizing mechanism, given that exchange rates have already depreciated substantially in many countries, and further declines could trigger policy concerns about inflation or have a dislocating impact on balance sheets and the real economy. Argentina, Malaysia, Romania, South Africa, and

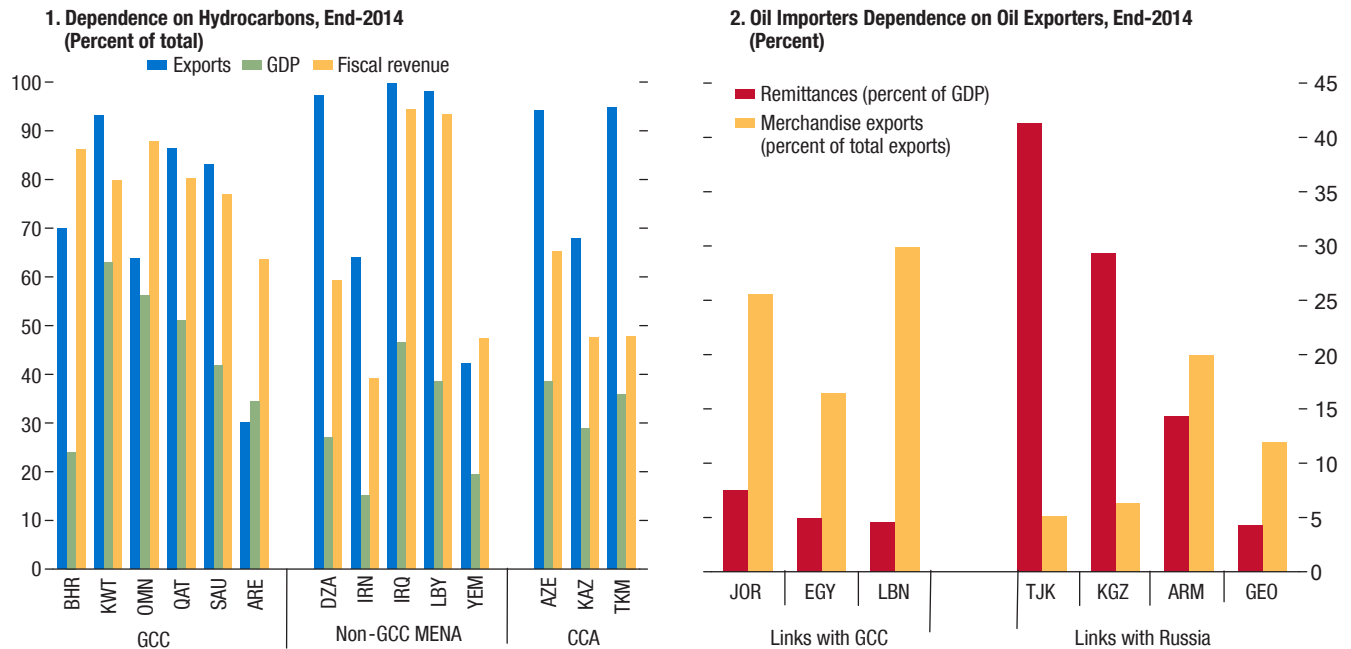
Turkey may need more reserves because their reserve levels are not high relative to their short-term external financing requirements (see Table 1.1).<sup>24</sup> External imbalances remain elevated for the oil-exporting countries of Bahrain, Ecuador, Saudi Arabia, and Venezuela, where direct investment does not cover the current account deficit and new portfolio investment may be constrained. South Africa and Turkey continue to have significant external imbalances, despite being net oil importers. South Africa continues to deal with infrastructure bottlenecks, primarily in electricity production, that hold back exports, while export commodity prices also fell. Turkey’s domestic-demand-driven growth leads to persistent import growth,

<sup>24</sup>Argentina’s access to international capital markets after the settlement with holdout investors should significantly reduce the need to increase reserves to fund foreign currency financing requirements.

**Figure 1.18. Oil Prices and Economic Links in the Caucasus and Central Asia, and Middle East and North Africa Regions**

Extreme economic dependence on hydrocarbons in oil exporters ...

... and oil importers through trade and remittances.



Sources: IMF, Direction of Trade Statistics database; national authorities; and IMF staff estimates.  
 Note: Data labels in the figure use International Organization for Standardization country codes. CCA = Caucasus and Central Asia; GCC = Gulf Cooperation Council; MENA = Middle East and North Africa.

and the need to finance the current account deficit with portfolio flows exposes the economy to external shocks. In contrast, Hungary, India, and Thailand have used the opportunity provided by lower import prices to substantially improve their external positions.

**Countries Need to Use Their Buffers and Deploy Policy Space Faster**

The tighter link between firms (SOEs in particular) and sovereigns in some cases may require greater use of resources to help facilitate the adjustment to lower commodity prices. Many emerging market economies have used their reserves to smooth external shocks and should continue to do so as warranted and where they are sufficient. Countries with insufficient buffers and limited policy space should act early to address their vulnerabilities and to seek help in the form of bilateral loans, swap lines, or precautionary funding with the IMF or other multilateral organizations.

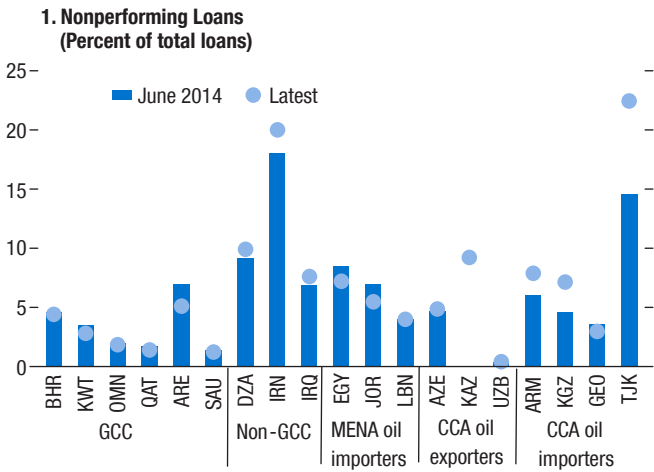
In many emerging market economies the space for further fiscal expansion is generally more constrained

now than during the global financial crisis because economies issued more debt to finance growth policies and sidestep the worst of the global fallout. Emerging market economies and firms with high yields and spreads may have greater difficulty financing spending and debt rollovers, even if their absolute debt levels are low because foreign demand for emerging market assets has fallen. In Brazil, restoring fiscal sustainability requires a fiscal consolidation strategy that addresses structural sources of expenditure pressure; although fiscal consolidation efforts may generate some short-term headwinds, they are necessary for a turnaround in sentiment and a return to economic growth. For more on the fiscal risks of other emerging market economies, see Box 1.3 of the April 2016 *Fiscal Monitor*.

Hungary and Poland may have more monetary policy space since inflationary pressures are under control (or absent) and the credit overhang does not pose a stability issue. Brazil and Turkey are in the late stage of the credit cycle and are faced with persistent inflationary pressures, leaving little room for monetary

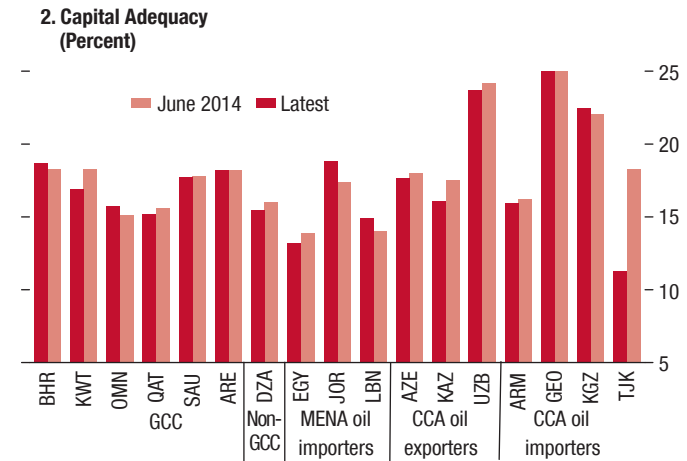
**Figure 1.19. Performance of the Banking System in the Caucasus and Central Asia, and Middle East and North Africa Regions since June 2014**

Nonperforming loans have increased in some countries ...



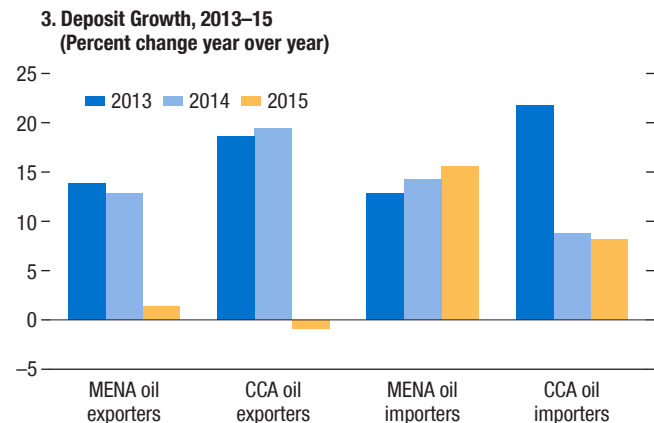
Sources: IMF, Direction of Trade Statistics database; national authorities; and IMF staff estimates.

... and capital adequacy ratios have slipped.



Source: Audited bank financial statements.

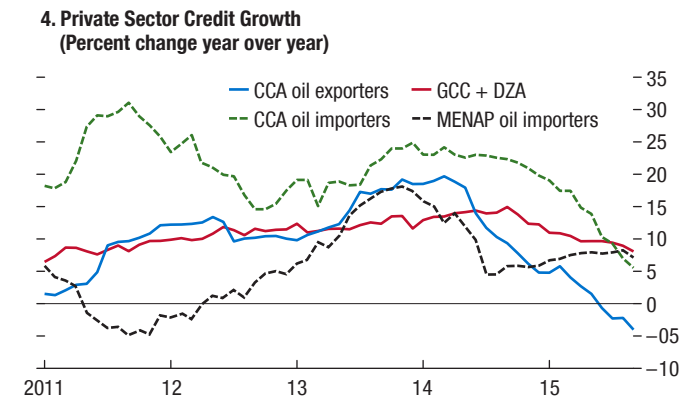
System-wide liquidity has declined ...



Source: Country authorities.

Note: For Algeria, Iraq, and Qatar, nonperforming loan figures are for end-December 2014 and not June. Data labels in the figure use International Organization for Standardization country codes. CCA = Caucasus and Central Asia; GCC = Gulf Cooperation Council; MENAP = Middle East and North Africa and Pakistan.

... and private sector credit growth has generally slowed.



Source: Country authorities.

policy easing because of the risk that it may reinforce currency weakness.

Portfolio outflows exerted pressure on several emerging market economies in 2015. The recent stabilization and resumption of bond inflows presents an opportune moment for policymakers to evaluate vulnerabilities and rebuild policy space. Further dollar appreciation or monetary policy tightening by the Federal Reserve has the potential to introduce more portfolio flow volatility, which can test external buffers and policy space again.

### Emerging Market Economies Have Tools to Boost Their Resilience

- Policymakers will need to deploy a range of tools to counter the effects of the end of the commodities boom and slowdown in capital flows. Countries may use available fiscal space to boost demand, although many are constrained by ratings and cost concerns given that commodity-related revenues will likely have fallen just when aggregate demand support may be desirable. Those without inflation concerns may use monetary easing in a countercyclical man-

ner. Currency depreciation has provided a cushion in some countries, but greater reliance on the use of foreign reserves may be needed in some cases to prevent inflation from rising or to stave off the balance sheet effects of depreciation.

- *The implementation of reforms to macroprudential and supervisory frameworks should be accelerated, and supervisory resources will be required to ensure credible and timely responses.* Coordination across agencies and central banks, as well as enhanced supervision of banks, will be needed.
- *Policymakers should closely and proactively monitor corporate vulnerabilities, particularly those arising from exposures to commodity producers and foreign currency risk.* Concentration of exposures should be evaluated and reduced if necessary. Foreign currency lending to unhedged borrowers in the banking system should be assessed, and limits on further foreign currency lending to unhedged borrowers, tightening of net-open-position limits for banks, and foreign currency liquidity requirements should be deployed where there are significant foreign currency liabilities.
- *The slowing of the credit cycle will begin to dent bank asset quality, but there is time to mitigate the impact.* This deterioration should be managed in a credible and transparent manner. Banks that have built capital buffers can now use them to cushion bad-debt losses, but where buffers were not built in the boom years, more capital may be needed and policymakers will have to balance necessary prudential tightening against the risk of being excessively procyclical. Supervisors will need to become more intrusive and examine underwriting standards to ensure sound new lending and avoid a further buildup of risk. Supervisors will need to work with banks and their boards to plan responses, which could include limiting dividend distributions or expansion of business lines. Given the role of state-owned banks and state-owned or quasi-sovereign companies in many emerging markets, special attention should be paid to these exposures.
- *Skillful management of corporate distress will be key.* Policymakers should put in place contingency plans to manage corporate insolvencies, including a framework that ensures timely market-based restructuring (through formal and informal mechanisms), one that minimizes moral hazard but may provide limited scope for state support (depending

on the country circumstance and policy space). The European debt crisis showed that countries with efficient legal frameworks for dealing with debt restructuring and insolvency had lower macroeconomic costs associated with any given level of deleveraging (see the April 2015 GFSR, Chapter 1, pp. 9–12).

- *Swift recognition of nonperforming assets and transparency in how they are managed will be central to future banking system health.* Evergreening and poor credit classification can compound concerns about asset quality and degrade policymakers' credibility.

### Advanced Economies: Banks' Legacy Problems and New Challenges

*Banks in advanced economies face substantial challenges in adapting to the new regulatory and market environment. Regulation has improved capital and liquidity buffers at most banks and instituted better protections for taxpayers in systemic events. However, legacy problems of excess capacity, high levels of NPLs, and poorly adapted business models continue to depress bank profitability, which could erode bank resilience over time. These legacy problems became more apparent in late 2015 and early 2016 as sharp downward pressures on bank equity and debt prices drove valuations down to levels that could impair their ability to tap capital markets. Actions taken by the European Central Bank in March have supported a rebound in valuations. But policies are urgently needed to address long-standing structural issues to prevent the return of systemic stress and enhance monetary transmission.*

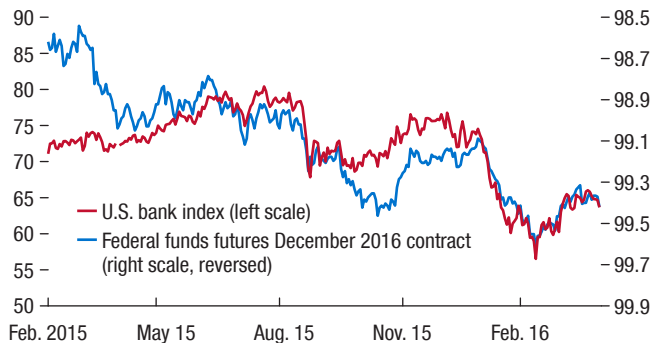
#### Banks Are Safer, so Why Did Their Valuations Come Under Stress?

Banks in advanced economies are more resilient to credit and liquidity shocks thanks to regulatory efforts to increase the amount and quality of capital, raise liquidity buffers, and reduce funding mismatches. Despite these improvements, bank equity prices plunged and funding stresses emerged in late 2015 and early 2016. Notwithstanding some recovery following additional policy action by the European Central Bank in March, this episode reflects continued cyclical economic weakness, as well as long-standing structural problems. Structural challenges include poorly adapted business models that continue to depress bank profitability and, par-

**Figure 1.20. Falling Bank Valuations Reflect Weakening Outlook**

Fears of stalled normalization led to declines in bank equity prices in the United States.

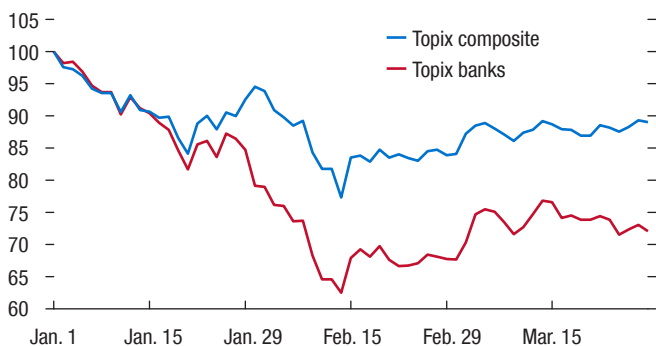
**1. U.S. Bank Equity Prices and Federal Funds December 2016 Contract**



Source: Bloomberg, L.P.

... and Japanese banks came under pressure as the Bank of Japan went to negative rates.

**3. Japanese Equities (January 1, 2016 = 100)**



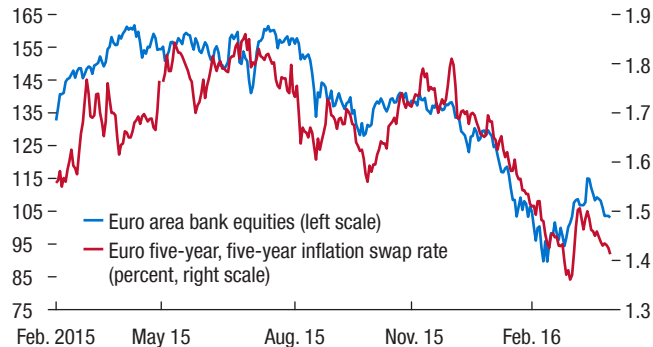
Source: Bloomberg, L.P.

ticularly in the euro area, excess bank capacity and nonperforming loans. Over time, this could work to erode bank soundness and increase systemic risk if left unaddressed.

Cyclical pressures have hurt the outlook for bank earnings generation. Low inflation and low growth act to reduce loan demand and therefore the outlook for future bank earnings (Figure 1.20, panels 1 and 2). In the United States, expectations of a steepening yield curve weakened along with delayed prospects of monetary policy normalization. In the euro area, rising risks of low inflation and low growth pushed bank valuations down, and weak sentiment was reinforced

European bank equities fell in line with the worsening inflation outlook ...

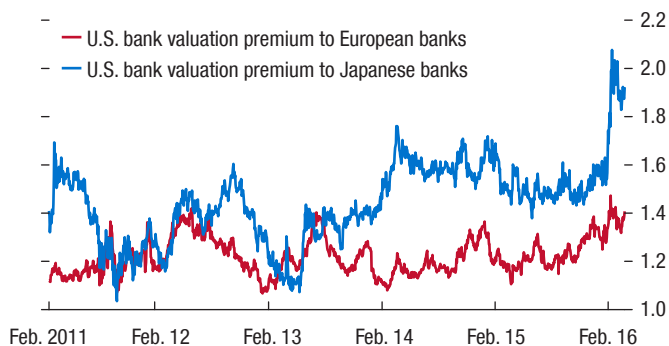
**2. European Bank Equity Prices and Five-Year, Five-Year Inflation Forwards**



Source: Bloomberg, L.P.

Valuations on European and Japanese banks fell to a deep discount to U.S. banks.

**4. Relative Bank Valuations (Times)**



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

Note: The valuation premium is defined as the price-to-book ratio of the KBW index (U.S. banks) divided by that of the Stoxx 600 banks index (for European banks) or Topix banks index (for Japanese banks).

by poor earnings results from some banks. A further cyclical challenge to bank profitability comes as more central banks push rates into negative territory, notwithstanding the macroeconomic benefits of increased monetary easing, discussed below (Figure 1.20, panel 3, and Box 1.3).

**Long-Standing Legacy Issues and New Policy Challenges**

*Japanese banks*

In response to the decline in bond yields since the introduction of quantitative and qualitative easing, major banks have reduced their holdings of



yen-denominated bonds by about 25 percent, and sought to bolster profitability by increasing their foreign income through a mix of acquisitions, direct lending, and securities purchases. This trend is likely to accelerate under negative rates, but could raise concerns about increased credit risks, especially given the weak global outlook.

The Bank of Japan's introduction of a negative interest rate on marginal bank reserve balances is important for sustaining price stability and growth.<sup>25</sup> A side effect, however, could be additional downward pressure on the profitability of Japanese banks, which is already low relative to global peers (Table 1.3). Since the adoption of negative rates, Japanese banks' equity prices have fallen substantially, reflecting market fears about their impact on bank profitability (Figure 1.20, panel 3). In addition, yields on Japanese government bonds have fallen sharply, with yields now negative for tenors out to 10 years. This broader compression of interest income could have significant impact on regional and *shinkin* (regional cooperative) banks, which have less business model flexibility and hence remain more reliant on domestic interest income.

### U.S. banks

U.S. banks face rising risks from the weakening baseline outlook. The postcrisis repair and regulatory cycle was quicker in the United States than in Europe, and banks are more profitable and have low levels of nonperforming assets. The slowdown in emerging market economies is likely to have a limited impact on banks—data from the Federal Financial Institutions Examination Council show that loans to emerging market economies constitute only 5.4 percent of the loan exposure of the largest U.S. banks (Federal Financial Institutions Examination Council 2015). Assuming an average recovery rate of 60 percent, emerging market economy loans would need to suffer a 33 percent default rate to wipe out U.S. banks' loan loss provisions.

U.S. banks have limited direct exposure to energy-related credits, with little evidence so far of a strong uptick in delinquencies even as the cycle slows. According to dis-

closures in fourth quarter financial statements, the “Big 6” banks<sup>26</sup> have about \$200 billion in lending commitments to energy firms, of which only up to one-half is currently funded. The majority of the lending has been to investment-grade borrowers, many of the loans are secured by collateral, and banks have increased provisioning. Smaller regional banks with operations in oil-producing states have larger exposures and lower loan-loss provisions, and their indirect exposures could rise if energy prices remain low. However, even these higher exposures are seen as manageable. Although Federal Reserve data do not break down the performance of commercial and industrial loan by industry group, there has been little evidence to date of increased distress in commercial and industrial loans as a whole. Delinquency and nonaccrual rates remain near cycle lows for bank holding companies with assets in excess of \$10 billion. While defaults are expected to rise in high-yield energy bonds, market prices reflect this rise and bank exposures are limited.

### European banks

European bank equity prices declined along with global bank equities, pushing valuations to a record discount to U.S. banks (Figure 1.20, panel 4). The hardest hit banking systems within the euro area in February have been those of Greece, Italy, and to a lesser extent, Portugal, along with some large German banks, reflecting some or all of the following factors: structural problems of excess bank capacity, high levels of NPLs, and poorly adapted business models:

- *Legacy issues.* Weak euro area bank profitability increases the difficulty of dealing with NPLs by reducing banks' capacity to build capital buffers through retained earnings. For many banking systems, elevated NPLs comprise a major structural weakness. Euro area banks still have €900 billion in NPLs (as of end-June 2015). Figure 1.21, panel 1, and Table 1.3 show that banking systems with higher NPLs have generally seen a greater decline in equity prices, especially in Greece and Italy.
- *Business model challenges.* Difficulties in business model transitions and legal costs have led to extraordinarily weak earnings results at several large European banks, while market turbulence has also affected other revenue streams, especially trading revenues and even wealth management. The return on assets for Euro-

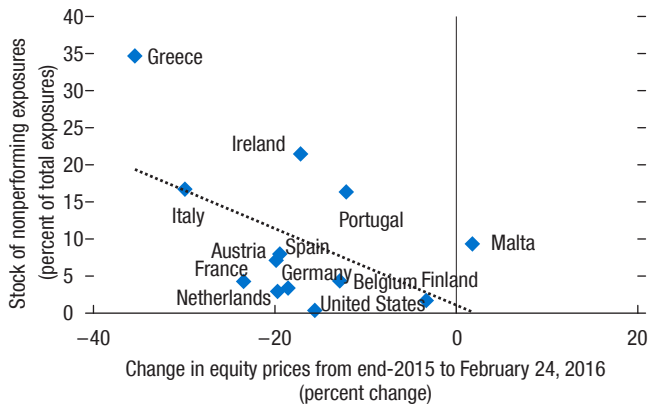
<sup>25</sup>The Bank of Japan has also adopted a three-tier system in which a positive interest rate or a zero interest rate will be applied to current account balances up to certain thresholds in order to make sure that financial institutions' functions as financial intermediaries would not be impaired due to undue decreases in financial institutions' earnings.

<sup>26</sup>JPMorgan, Citigroup, Wells Fargo, Bank of America Merrill Lynch, Goldman Sachs, and Morgan Stanley.

**Figure 1.21. Valuations Reflect Legacy and Business Model Challenges**

Euro area banks with high stocks of nonperforming loans ...

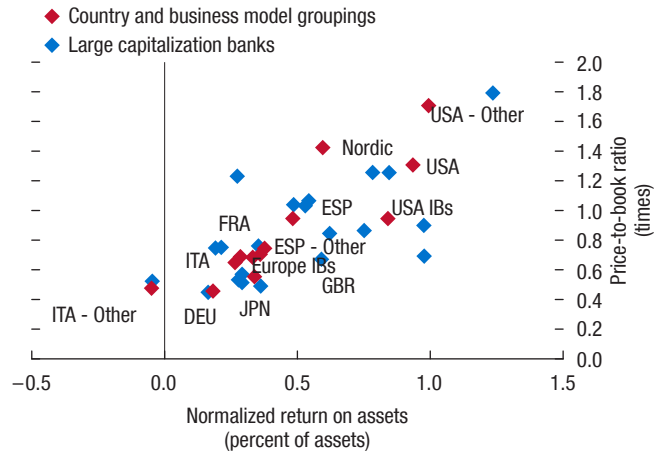
**1. Change in Bank Equity Prices and Stock of Impaired Assets, Year to Date**



Sources: Bloomberg, L.P.; European Banking Authority Transparency Exercise 2015; and IMF staff calculations.  
 Note: Nonperforming exposures as of end-June 2015 for European banks; U.S. data are latest available ratio of nonperforming assets to total assets.

... and low profitability were hit the hardest.

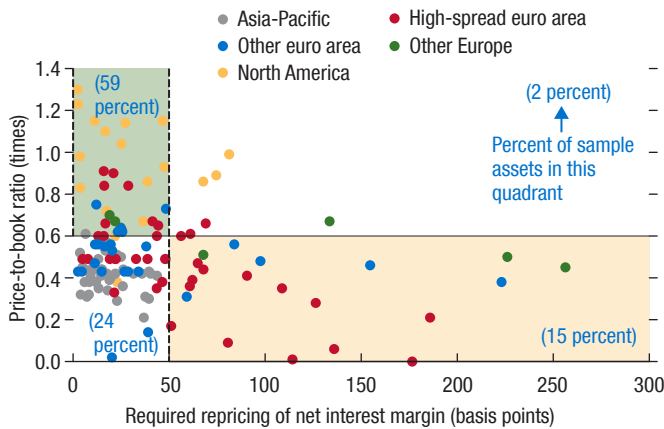
**2. Advanced Economy Bank Profitability and Valuations**



Sources: Bloomberg, L.P.; and IMF staff calculations.  
 Note: Data labels in the figure use International Organization for Standardization country codes. IB = investment bank; Other = listed banks with under \$500 billion in assets.

Business models are under strain in a low-for-long environment ...

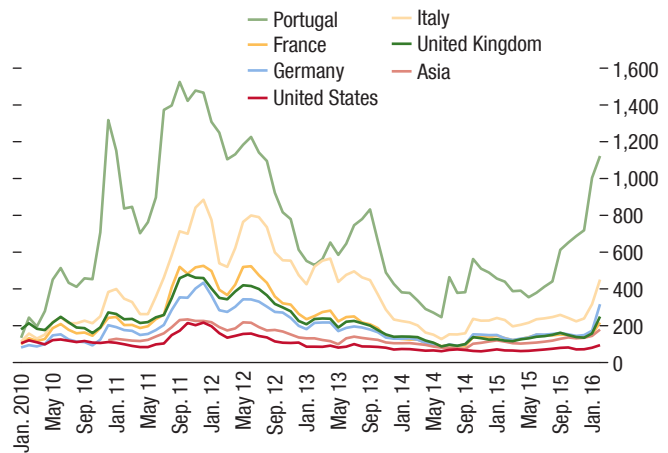
**3. Bank Valuations and Margin Increase Required to Reach 10 Percent Return on Equity**



Sources: Bloomberg, L.P.; SNL Financial; and IMF staff calculations.  
 Note: Banks with required net interest margin repricing of zero are omitted from the chart for clarity. Repricing needs are based on 2015:Q3 or latest available data on a sample of more than 300 advanced economy banks. High-spread euro area countries = Cyprus, Greece, Ireland, Italy, Portugal, Slovenia, and Spain. Other euro area = Austria, Belgium, Finland, France, Germany, Luxembourg, Malta, Netherlands, and Slovak Republic. Other Europe = Denmark, Sweden, Switzerland, and United Kingdom. Asia Pacific = Australia, Japan, and Singapore. North America = Canada and United States.

... and funding costs rose sharply in reaction to earnings and bail-out concerns.

**4. Credit Default Swap Spreads for Subordinated Bank Debt (Basis points)**



Sources: Bloomberg, L.P.; and IMF staff calculations.  
 Note: Data depict asset-weighted averages.

Table 1.3. Selected Indicators of Advanced Economy Banks

	Profitability					Capital					Market Pricing <sup>1</sup>			
	Pre-Provision Profit/Tangible Assets <sup>2</sup> (%)	ROE <sup>3</sup> (%)	ROA <sup>3</sup> (%)	NIM (%)	Cost/Revenue (x)	Equity/Assets <sup>4</sup> (%)	CET1/RWA (%)	Texas Ratio <sup>5</sup> (%)	NPL Ratio <sup>6</sup> (%)	RWA/Assets <sup>2</sup> (x)	P/TB Ratio <sup>7</sup> (x)	Equity Chg. YTD (%)	Senior CDS Spread (bps)	Sub CDS Spread (bps)
<b>United States</b>	1.30	9.5	0.93	2.41	0.58	6.6	11.7	5.1	0.7	0.59	1.21	-20		
U.S. Investment Banks	0.95	8.6	0.84	2.01	0.58	5.9	12.3	4.2	0.7	0.49	0.88	-23		
Other U.S. Banks <sup>8</sup>	1.63	9.5	0.99	2.98	0.59	8.2	10.6	5.7	0.7	0.81	1.51	-16		
<i>Goldman Sachs</i>	0.52	11.2	0.98	0.43	0.57	4.6	11.7	n/a	n/a	0.37	0.86	-20	135	...
<i>Morgan Stanley</i>	0.64	7.4	0.62	0.40	0.65	4.8	15.5	n/a	n/a	0.35	0.78	-26	133	...
<i>JPMorgan Chase</i>	0.99	9.6	0.85	2.08	0.58	5.4	11.8	3.8	0.8	0.46	1.19	-16	84	...
<i>Bank of America</i>	0.90	7.0	0.75	2.39	0.61	6.0	10.2	5.7	1.0	0.60	0.79	-29	121	...
<i>Citigroup</i>	1.30	8.6	0.98	2.99	0.50	7.9	14.6	2.8	0.8	0.54	0.63	-27	121	...
<i>Wells Fargo</i>	2.04	12.8	1.24	2.97	0.56	7.7	11.4	8.4	1.2	0.70	1.72	-13	67	...
<b>United Kingdom</b>	0.40	5.6	0.35	1.93	0.66	5.7	12.6	18.3	2.8	0.37	0.72	-23		
<i>HSBC</i>	0.80	7.9	0.59	1.55	0.51	6.9	11.9	13.7	2.5	0.46	0.73	-19	128	251
<i>RBS</i>	-0.39	5.0	0.29	1.61	0.97	5.8	15.5	22.5	3.9	0.30	0.58	-23	136	280
<i>Lloyds</i>	0.25	3.2	0.16	1.59	0.52	4.7	12.8	23.7	2.1	0.28	1.19	-15	106	233
<i>Barclays PLC</i>	0.39	6.9	0.31	2.90	0.82	4.2	11.4	15.3	1.9	0.32	0.57	-29	137	276
<i>Standard Chartered</i>	0.61	-0.7	-0.05	1.90	0.53	6.8	12.6	25.4	4.8	0.48	0.41	-31	219	446
<b>Select Euro Area</b>	0.44	6.5	0.28	1.51	0.55	3.8	12.0	34.0	4.3	0.29	0.61	-25		
Other Europe	0.43	7.4	0.42	1.66	0.60	5.4	14.4	15.8	2.2	0.33	0.87	-21		
Nordic Banks	0.77	12.2	0.60	1.13	0.34	4.7	18.3	16.9	1.6	0.23	1.38	-8		
European Investment Banks	0.07	6.8	0.32	1.91	0.80	4.1	13.9	11.2	1.5	0.29	0.62	-32		
<i>Deutsche Bank</i>	-0.32	4.4	0.17	1.69	0.89	3.2	13.2	14.1	1.9	0.25	0.39	-34	242	493
<i>Credit Agricole</i>	0.32	7.4	0.23	...	0.57	2.3	10.7	35.1	4.7	0.20	0.68	-18	115	234
<i>BNP Paribas</i>	0.67	8.4	0.35	1.47	0.43	3.8	11.0	40.8	5.6	0.32	0.66	-24	113	229
<i>Societe Generale</i>	0.66	6.7	0.29	...	0.66	4.0	10.9	34.8	5.6	0.27	0.45	-30	114	259
<i>UBS Group</i>	0.55	13.2	0.70	0.98	0.65	5.2	19.0	3.3	0.5	0.23	1.12	-25	88	188
<i>Credit Suisse Group</i>	-0.27	4.1	0.21	1.46	0.72	4.8	14.3	5.6	0.7	0.37	0.63	-41	154	244
<b>Italy</b>	1.09	5.8	0.39	1.57	0.57	6.0	11.8	58.7	11.2	0.48	0.55	-35		
<i>Unicredit</i>	1.04	6.3	0.36	1.50	0.62	5.2	10.7	58.3	10.8	0.46	0.46	-36	227	441
<i>Intesa</i>	1.06	6.9	0.49	1.18	0.55	5.9	13.0	52.2	10.7	0.44	0.79	-27	163	339
Other Italian Banks <sup>8</sup>	1.17	4.1	0.35	2.11	0.54	7.1	12.0	65.6	12.2	0.54	0.43	-43		
<b>Spain</b>	1.70	7.5	0.50	2.51	0.51	5.1	12.5	60.4	6.7	0.47	0.81	-25		
<i>Santander</i>	2.38	8.2	0.53	3.03	0.51	4.5	12.6	43.6	4.5	0.45	0.85	-25	174	363
<i>BBVA</i>	1.52	7.9	0.55	2.84	0.55	5.0	12.1	48.4	6.1	0.54	0.92	-22	172	360
Other Spanish Banks <sup>8</sup>	0.93	6.3	0.41	1.57	0.49	6.0	12.7	91.3	10.1	0.43	0.67	-26		
<b>Japan</b>	0.59	6.9	0.34	1.02	0.54	4.8	...	16.2	...	0.39	0.51	-32		
Mega Banks	0.62	7.3	0.34	0.96	0.54	4.5	...	11.8	...	0.37	0.51	-34		
Next Biggest 10 Banks	0.54	6.5	0.32	1.02	0.48	4.9	...	21.2	...	0.36	0.61	-27		
Other Japanese Banks	0.53	5.9	0.34	1.20	0.58	5.9	...	25.8	...	0.47	0.45	-29		

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

Note: Table is based on sample of 214 listed advanced economy banks. Yellow highlighting indicates a bank is at or below the 30th percentile in the table for a given indicator. Orange highlighting indicates a bank grouping is among the two weakest in the table. bps = basis points; CDS = credit default swap; CET1 = common equity tier 1; IFRS = International Financial Reporting Standards; NIM = net interest margin; NPL = nonperforming loan; ROA = return on assets; ROE = return on equity; P/TB = price-to-book ratio; RWA = risk-weighted assets; YTD = year to date. Select Euro Area includes banks from Austria, Belgium, France, Germany, and the Netherlands. Other Europe includes banks from Denmark, Sweden, Switzerland, and the United Kingdom. Nordic Banks includes banks from Denmark and Sweden.

<sup>1</sup>Market pricing based on data from February 24, 2016.

<sup>2</sup>Denominator is tangible assets including gross derivatives. Data is for 2015 except for several European banks where 2015 data was unavailable and 2014 data was used instead.

<sup>3</sup>Return on equity and assets are calculated using net income adjusted for extraordinary items.

<sup>4</sup>Tangible common equity/total tangible assets including gross derivatives.

<sup>5</sup>The Texas ratio is NPL/(Tangible Common Equity + Loan Loss Provisions).

<sup>6</sup>NPLs for Italian banks are loans classified "sofferenze," or nonaccrual loans according to IFRS.

<sup>7</sup>Price to tangible book value per share. Select banks from Denmark, Italy, Sweden, and the United Kingdom show price to book value per share.

<sup>8</sup>Other banks here include listed banks with assets below \$500 billion.

pean banks is structurally low at 0.25 to 0.50 percent, compared with about 1 percent at U.S. banks (Table 1.3); those banks with the lowest returns on assets also have a large discount to book value pointing to business model challenges (Figure 1.21, panel 2).

- *Regulatory challenges.* Banks face structural demands for more capital as a result of ongoing regulatory actions, but some may have difficulties meeting these requirements. Under the Basel III timetable, banks will be subject to simple leverage ratio requirements starting 2018. Many European banks will also need to raise bail-inable liabilities for higher regulatory requirements to meet total loss-absorbing capacity (TLAC) and minimum requirements for own funds and eligible liabilities (MREL). In general, European investment banks have higher leverage and more compressed risk weightings on assets than their U.S. counterparts, suggesting they must travel a more challenging adjustment path (Table 1.3).

Taken together, a large share of European banks (by assets) face a combination of the above challenges. Figure 1.21, panel 3, measures the increase in net interest margins each bank requires to reach a return on equity of 10 percent.<sup>27</sup> Roughly one-third of listed European banks (by assets) are in the bottom right quadrant, which suggests significant challenges to attaining sustainable profitability without reform (that is, require margin repricing of greater than 50 basis points). Deteriorating profitability and unresolved legacy challenges raise the risk that external capital and funding could become more expensive, particularly for weaker banks with very low equity valuations (price-to-tangible-book valuations of less than 60 percent), pointing to weak future prospects. Italian banks face a particular challenge in this regard, as market pricing has reflected investor concerns that some banks may face difficulties in growing out of their substantial NPL overhang, despite constructive steps taken by Italian authorities to facilitate balance sheet repair.

One manifestation of this challenge is the sharp repricing in January and February in the market for

subordinated and convertible debt-equity hybrid securities—on which some European banks have relied heavily. Banks and their investors now face a tighter bank resolution regime with bail-ins, and the surge in the cost of protection for junior debt holders (via subordinated credit default swaps) early this year suggests that there was indeed a higher perception of risk (see Figure 1.21, panel 4). The bail-in of the subordinated debt of four small Italian banks late last year raised concerns among investors, and the treatment of select senior debt holders of Novo Banco (Portugal) has led to a perception of uneven handedness and increased uncertainty that has dented confidence.

### Systemic Risk Is Contained but Could Reemerge

In February, market indicators in some high-spread countries in Europe indicated a greater likelihood of the reemergence of systemic risk from the confluence of high unresolved NPLs and funding strains, as the possibility of bail-in was fully internalized by liability holders. A widening in the spreads of the liabilities of high-spread banks in particular could unwind some of the progress in reducing fragmentation. There were also tentative signs of spillovers to some sovereigns. However, the feedback effect to market-implied sovereign risk was much weaker than during the sovereign debt crisis in 2012.

The expansion of European Central Bank quantitative easing and other powerful credit and funding easing measures announced in March will help address and contain systemic concerns, but it is not a full solution. The measures announced will help stimulate growth through credit easing and will support achieving inflation targets. At the same time, it provides banking system funding through refinancing. It also mitigates the impact of net interest margin compression. This has supported a strong recovery in bank equities and funding markets from their mid-February lows. However, while these actions bolster growth momentum and reduce the likelihood of near-term systemic stress, they do not (and were not intended to) address the legacy issues that are weighing on euro area banks.

### Raising the Urgency of Strengthening the Banking Sector in Japan and the Euro Area

Policies are urgently needed to address long-standing structural issues, otherwise systemic issues can reemerge and monetary transmission will remain impaired.

<sup>27</sup>See Chapter 1 of the October 2014 GFSR for methodology; each bank is assumed to increase (or shrink) lending until hitting target capital and leverage ratio constraints; the required repricing from that point shows the extent to which net interest margins would need to increase to bring net income to 10 percent of capital. While this exercise results in a measure of profitability adjusted for capital strength, it does not attempt to differentiate between cyclical or structural factors, nor does it explicitly account for potential changes in non-interest income and expenses.

In Japan, the large global banks are well-capitalized and meet Basel III capital and liquidity requirements, but implementing TLAC could be challenging amid low profitability. Supervisors should review profitability stresses on these banks as well as risks arising from overseas commitments. Profitability strains for regional banks may be more acute and should be carefully monitored. Consideration should also be given to formalizing and improving the effectiveness of the macroprudential framework.

Renewed market turmoil indicates the need for a more complete solution to euro area bank legacy problems:

- *Elevated NPLs* urgently need to be tackled, using a comprehensive strategy combining assertive supervision, reforms to insolvency regimes, and developing distressed debt markets, including through asset management companies.
- *Excess capacity* in the European banking system will have to be steadily addressed over time. In many countries, a consolidation and downsizing of the system might be required so that the remaining banks can enjoy pricing power and sufficient demand to increase the system's capital generation capacity of the system.
- The Bank Recovery and Resolution Directive (BRRD) is an important step forward in strengthening the *resolution regime* and better aligning incentives for banks and investors with the risks they are taking, but challenges may arise in utilizing the new framework in a transition period (Box 1.4). With large legacy stocks of NPLs and weak profitability across a number of banks, issuing adequate loss-absorbing capacity (TLAC- and MREL-eligible instruments) will take time and may prove difficult for some banks. The European Union State Aid rules (which place constraints on the use of public funds in bank restructurings) and the BRRD are important checks on market distortions and moral hazard, but they should be implemented carefully, as public support may still be needed in a crisis. In such a situation existing options under the BRRD could be considered, such as excluding some creditors from bail-in if there are financial stability risks; but this may be difficult while still achieving the required bail-in and ensuring other creditors are not worse off than in liquidation. An assessment of the degree of flexibility afforded under the BRRD should be undertaken as part of the next review of imple-

mentation of the Directive, expected by June 2018. Consideration should also be given to reducing the thresholds for “direct recapitalization” of European banks by the European Stability Mechanism (which go beyond the 8 percent bail-in requirement).

Addressing legacy issues and strengthening the banking system will enhance the transmission of monetary policy through the banking system, increase confidence, and mitigate any adverse side effects of, and the need for, more negative rates.

### U.S. Reforms

In the United States, reform of the government-sponsored enterprises (GSEs) remains the largest piece of unfinished business in the U.S. mortgage market reform initiated after the financial crisis. U.S. mortgage markets were at the center of the crisis, and the mortgage market, at \$10 trillion, remains globally systemic. The government maintains a strong role in mortgage guarantees (80 percent of originated single family loans; IMF 2015a), and the Federal Housing Administration insures a significant portion, creating distortions and moral hazard concerns. Continued reform of the GSEs is needed, and the path to their exit from conservatorship is uncertain.

The IMF Financial Sector Assessment Program for the United States in 2010 and in 2015 called for reforms of the U.S. mortgage system, including a rebalancing of the public and private roles in the market (IMF 2010, 2015a). Without reforms, including winding down GSE portfolios, standardizing and modernizing data reporting, reducing the public backstop, and introducing appropriate supervision, the U.S. mortgage system remains unnecessarily risky and complex.

### Scenarios and Policies

*A broad-based policy response is needed to strengthen financial stability and growth, and lead the world to a successful normalization of economic and financial conditions. The stakes are high: First, rising risks of weakening growth and more instability must be avoided. Then, growth must be strengthened and financial stability improved beyond the baseline. An ambitious policy agenda is required, comprising a more balanced and*

*potent policy mix, including stronger financial reforms, with continuing monetary accommodation and measures to support growth. Increased confidence in the policy framework would help reduce vulnerabilities, remove policy uncertainties, and touch off a virtuous feedback loop between financial markets and the real economy. Under such a scenario, world output could be 1.7 percent above the baseline by 2018, while reflation would accelerate smooth normalization of monetary policy and financial market conditions.*

### **Ambitious Policy Action Is Needed to Reduce Downside Risks and Boost Global Financial Stability and Growth**

The policy framework for global financial stability outlined in this report calls for the following key elements:

- *Addressing legacy issues in advanced economies.* Global banks came under renewed stress at the start of the year, bringing to the fore structural challenges in adapting business models and long-standing legacy issues in the euro area. This new stress is a sign that a more complete solution to European banks' problems cannot be further postponed. Elevated NPLs urgently need to be tackled using a comprehensive strategy, and excess capacity in the European banking system will have to be addressed over time. Mortgage markets in the United States—which were at the epicenter of the 2008–09 crisis—continue to benefit from significant government support. Authorities should reinvigorate efforts to reduce the dominance of Fannie Mae and Freddie Mac in the U.S. mortgage market and continue with reforms of these institutions (IMF 2010, 2015a).
- *Strengthening the resilience of emerging market economies.* Emerging market economies are adjusting to the reversal of a number of booms experienced during the past decade. Rapid credit growth and surging commodity prices helped boost capital expenditure, capital inflows, and currencies. Countries should use their buffers and policy space and strengthen policy frameworks to smooth adjustments and ensure the strength of sovereign and banking balance sheets while making the transition to a post-commodity boom world, including by rebalancing financing flows that have been heavily skewed toward commodity sectors.
- *Achieving successful financial and economic rebalancing in China.* Commitment to a more ambitious

and broader policy agenda is urgently needed, including (1) a comprehensive plan to address the corporate debt overhang, including through the development of a sound legal and institutional framework for debt-workout processes; (2) the strengthening of bank balance sheets and a restructuring program to deal with bad assets and recapitalize banks; and (3) an upgraded supervisory framework to meet the needs of an increasingly complex financial system.

- *Enhancing the resilience of market liquidity.* As discussed in previous GFSRs, a comprehensive approach to reducing risks of liquidity runs on mutual funds, and strengthening the provision of market liquidity services is needed to prevent market shocks from being amplified.

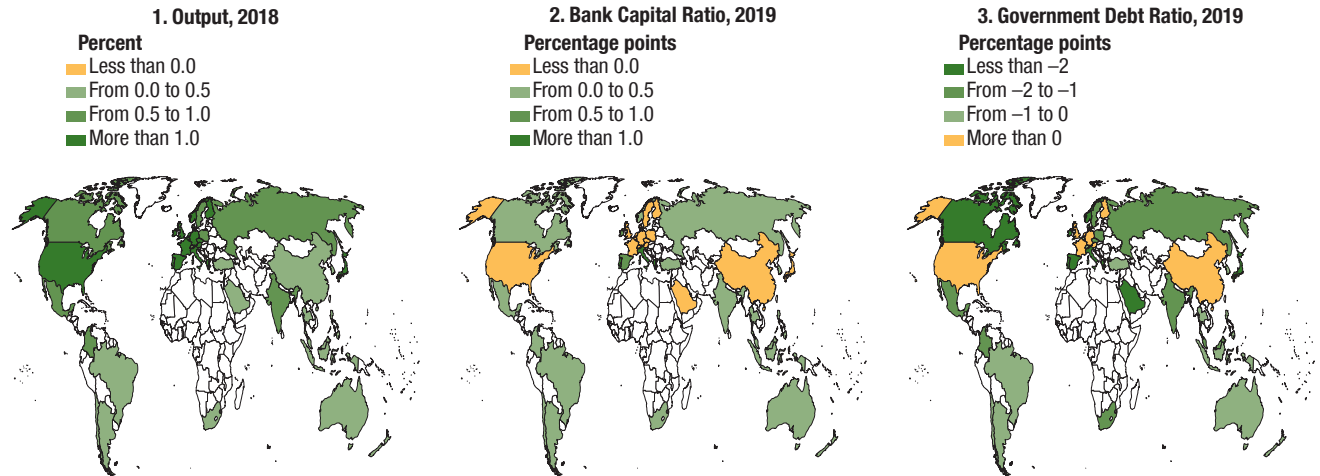
These policy actions will strengthen the resilience of the global financial system and enhance confidence in financial policy frameworks. Some of these reforms will be contractionary in the short term, at a time when monetary policy is at or near the effective zero bound. Therefore, as called for in the WEO, supportive fiscal policies, including structural fiscal reforms, effective debt-management strategies, and active fiscal-risk-management strategies (see also the April 2016 *Fiscal Monitor*, Chapter 1), will be needed alongside continuing monetary accommodation where required to avoid the downside and to boost growth beyond the baseline in the medium term.

### **The Successful Normalization**

The successful normalization would be powered by balance sheet repair, increased confidence in economic risk taking, much reduced risks emanating from global financial markets, and demand support from monetary and fiscal policies. What does the successful normalization scenario look like in the global macrofinancial model used to evaluate its impact?

- *Economic risk taking in the systemic advanced economies rebounds,* supported by balance sheet repair and fiscal stimulus. Private investment increases by 4 percent while private consumption rises by 1 percent in all of the systemic advanced economies over two years.
- *The vitality of the corporate and banking systems rises in the euro area.* Credit cycle upturns follow nonfinancial corporate debt-restructuring initiatives, with the

Figure 1.22. Simulated Peak Effects under Successful Normalization Scenario



Source: IMF staff calculations.

default rate on bank loans to nonfinancial corporations falling by 2 percentage points over two years.

- *Smooth rebalancing in China is supported by fiscal stimulus.* The default rate on bank loans rises gradually, with an orderly deleveraging and a rebalancing of private demand from investment to consumption.
- *Bank capitalization and government debt sustainability changes.* Bank capital ratios rise by 1 to 1.3 percentage points across high-spread euro area countries by 2019, largely reflecting lower credit loss rates. There is a moderate deterioration in bank capital ratios in China given the realization of defaults on nonfinancial corporate loans, and minor changes in the rest of the world. For government debt sustainability, there are mild deteriorations in the systemic economies given the assumed fiscal stimulus measures,

versus mild to moderate improvements in the rest of the world due in part to positive spillovers from the systemic advanced economies.

- *World output increases* by 1.7 percent above the baseline by 2018, while energy and non-energy commodity prices rise by 13.6 and 6.8 percent, respectively (see Figure 1.22).
- *Reflation accelerates smooth normalization of monetary policy.* Reflation toward price stability objectives is accompanied by gradual upward shifts of yield curves, with the long-term government bond yield rising by 50 basis points in all of the systemic advanced economies over two years. Stock prices also increase gradually and moderately, with the real equity price rising by 10 percent in all of the systemic advanced economies over two years.

### Box 1.1. Developments in Financial Conditions

The *Global Financial Stability Report* relies on a range of indicators to assess financial conditions and the availability and cost of credit across economies. The overall assessment is that financial conditions have become less accommodative since last October, following adverse developments in January and February that pushed credit spreads and volatility up, and equity prices and issuance down. The recent recovery in asset prices has unwound much of this tightening in financial markets, but so far the net impact has not been sufficient to offset earlier tightening.

The report relies on a variety of indicators for overall financial conditions. The monetary and financial conditions indicator of the Global Financial Stability Map is designed to capture movements in monetary conditions across mature markets. It includes different sub-indicators such as the cost of central bank liquidity—measured as the average level of real short rates—or the amount of excess liquidity—defined as the difference between broad money growth and estimates for money demand. Realizing that the transmission of monetary policy to the overall economy is tightly intertwined with conditions in financial markets, this indicator also incorporates movements in exchange rates, interest rates, credit spreads, and asset market returns to arrive at a summary indicator of global conditions.

For the United States, the chapter relies on additional indicators based on the methodology developed in Swiston (2008). This indicator includes a broad range of variables covering major financial markets in the United States—such as money markets, and investment grade and high-yield bond markets—as well as a measure of credit availability from the Federal Reserve’s Senior Loan Officer’s Opinion Survey on Lending Standards (Figure 1.1.1, panel 1). The index also allows for a disaggregated assessment of the relative contribution of each variable to the overall index (Figure 1.1.1, panel 2).

Financial Conditions Indices from Bloomberg track the overall level of financial stress in money, bond, and equity markets (Figure 1.1.1, panel 3). The indicators measure the number of standard deviations by which current financial conditions deviate from normal (precrisis) levels. A positive value of the index indicates accommodative financial conditions, while a negative value indicates tighter financial conditions relative to precrisis norms.

While there is no single preferred indicator summarizing the overall situation in financial markets, taken together these measures provide a broad-based assess-

The authors of this box are Juan Sole and Martin Edmonds.

ment of whether monetary and financial conditions are becoming tighter or looser.

So what are these different indicators telling us about financial conditions?

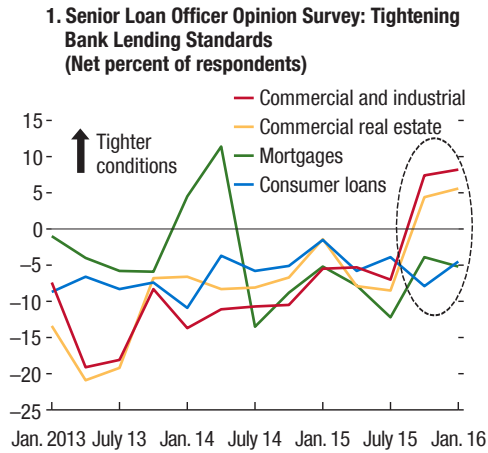
- The global indicators in the Global Financial Stability Map suggest an overall tightening of monetary and financial conditions since the last report. This is largely the result of tighter lending standards in the United States, and a lesser degree of easing in lending standards in Japan. In the United States, banks have progressively tightened lending standards across a range of loan types, but especially in “commercial and industrial” and “commercial real estate” loans (Figure 1.1.1, panel 1). This tightening in lending conditions may reflect some rising corporate credit risks and deterioration in energy-related exposures. A contraction in these two categories is telling: they account for more than 40 percent of total U.S. bank loans, and developments in the commercial real estate sector are seen as a leading indicator of economic activity.
- Developments in lending standards have resulted in a modest tightening of the (Swiston 2008) financial conditions index for the United States since mid-2014, but still leaving overall conditions accommodative as measured by this indicator (Figure 1.1.1, panel 2).
- An alternative gauge of financial conditions is provided by Bloomberg’s high-frequency index of market indicators. Although more volatile, this index also shows tightening conditions since June 2014. In the past month, however, the index has largely reversed the tightening seen in December to February (Figure 1.1.1, panel 3).
- Given the importance of U.S. dollar funding conditions for global markets, tighter conditions in the United States can have wide-ranging implications for global markets. Moreover, since the impact of changes in financial variables lasts for a few quarters in the Swiston (2008) financial conditions index, the historically high spreads for high-yield bonds seen in January and February may weigh on this measure of financial conditions going forward, even though spreads have fallen sharply since reaching historically high levels in mid-February. Equity market performance, which was the largest individual contributor to easy financial conditions in this index over the past several quarters, will also bear down on financial conditions given the recent equity market correction that has only recently been unwound.



Box 1.1. (continued)

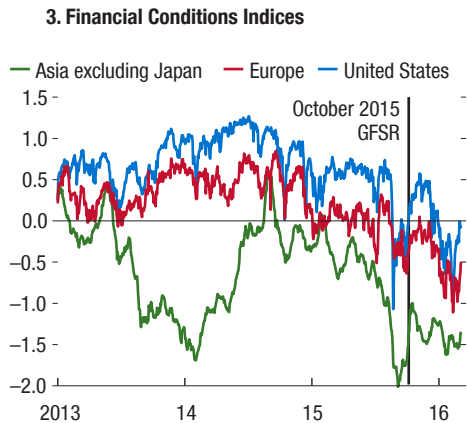
Figure 1.1.1. Financial Conditions

Lending standards have been tightening across the board since mid-2015.



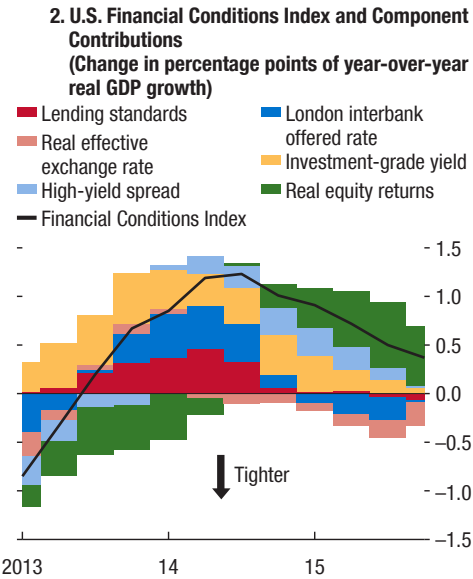
Sources: Federal Reserve; and Haver Analytics.

Financial conditions in Europe and Asia have also tightened ...



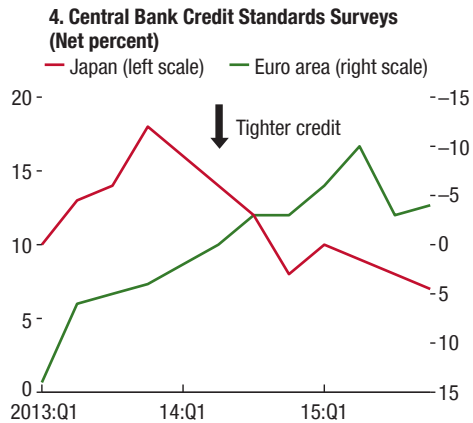
Source: Bloomberg, L.P.  
Note: GFSR = *Global Financial Stability Report*.

The U.S. financial conditions index progressively tightened since mid-2014.



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

... even as Japanese banks tightened credit standards.



Sources: Bank of Japan; European Central Bank; and Haver Analytics.

- The tightening of overall financial conditions in the United States has been exacerbated by oil sector stress and rising liquidity premiums, and has added to the impact of the first increase in policy rates in over nine years. The latest data on lending standards in the euro area and Japan suggest a lesser degree of easing in bank

lending standards in Japan, but modestly accommodative in euro area lending to enterprises (Figure 1.1.1, panel 4). It remains to be seen whether the market turmoil and subsequent recovery in market prices will translate into tighter lending standards for bank loans going forward, or were just a temporary setback.

### Box 1.2. Brazil: Financial System Risks

*Vulnerabilities threaten to worsen amid the prolonged domestic recession, weak commodity prices, and tightening market conditions. The health of Brazilian nonfinancial corporations has deteriorated across various measures, as signs of strain begin to appear in the country's relatively healthy banking system.*

Brazilian nonfinancial firms have accumulated vulnerabilities in recent years. Corporate leverage across Latin America has increased during the past five years as in other emerging market economies. Regionally, however, Brazilian firms stand out for their higher leverage and higher interest costs; the decline in their profitability has been more pronounced as well, especially among weaker firms (Figure 1.2.1).

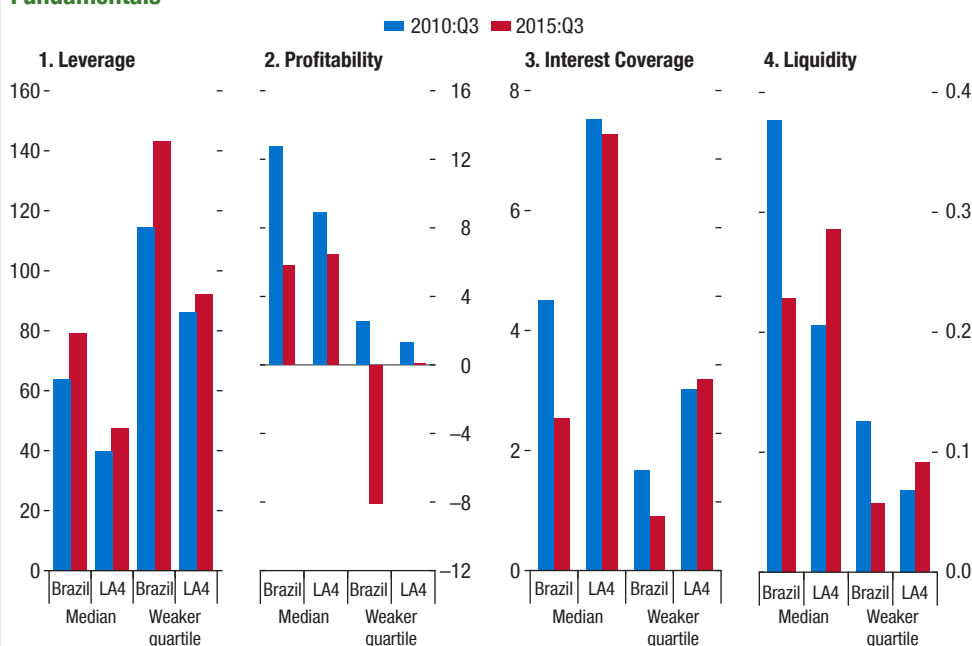
The banking system's soundness indicators appear healthy. Credit growth has decelerated from high rates in the period from 2010 to 2014 to 6.6 percent year over year in 2015, reflecting both supply and demand factors. Bank profitability indicators are still relatively

high despite higher funding costs and higher provisions for loan losses. Capital ratios remain well above the regulatory minimum in 2015. Banks are also well provisioned (150 percent of nonperforming loans [NPLs]), and liquidity risk for the system as a whole appears to be low. Banks continue to rely mainly on domestic funding sources, with the ratio of foreign funding to total funding at about 10 percent.

However, a protracted slump together with higher interest rates, rising unemployment, and falling corporate profits will likely put strains on banks' balance sheets (Figure 1.2.2). Although the overall NPL ratio remains low at about 3.5 percent, an uptick in NPLs has been recorded in some segments of nonperforming consumer and corporate loans, such as agriculture loans, overdraft loans, and credit cards. There are also nascent signs of broader asset quality issues, particularly in the corporate sector, including a notable increase in firm bankruptcy protection applications alongside a general spike in the unemployment rate. Markets have been pricing assets accordingly, with higher financing costs and implied default rates for banks rising to their highest levels since the global financial crisis.

This box was prepared by Ivo Krznar, Fabiano Rodrigues Bastos, and Christian Saborowski.

**Figure 1.2.1. Brazil versus Chile, Colombia, Mexico, and Peru: Nonfinancial Corporate Fundamentals**

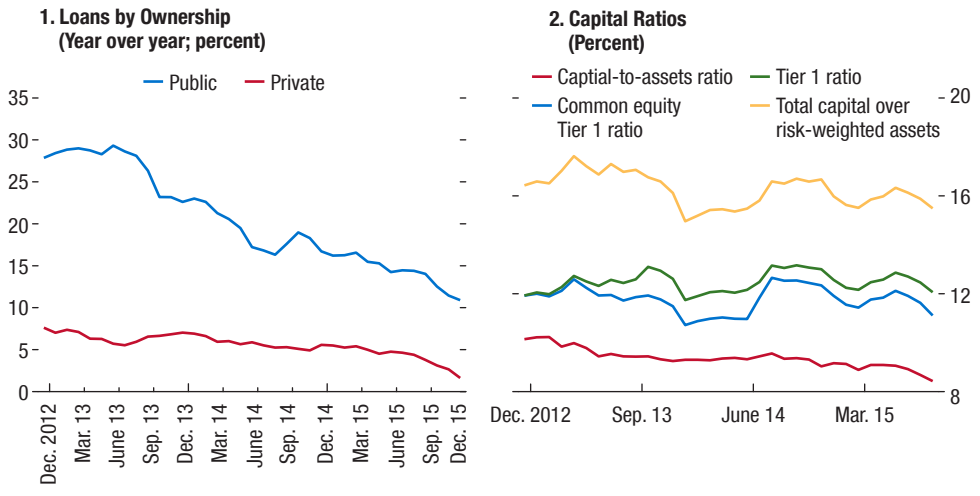


Sources: S&P Capital IQ; and IMF staff calculations.

Note: Approximately 800 firms for Brazil and 900 firms for LA4. Interest coverage = earnings before interest, taxes, depreciation, and amortization/total interest (ratio, four-quarter average); LA4 = Chile, Colombia, Mexico, and Peru; leverage = total debt to total equity (percent); liquidity = cash ratio (cash and equivalents over current liabilities, four-quarter average); profitability = return on equity (percent, four-quarter average).

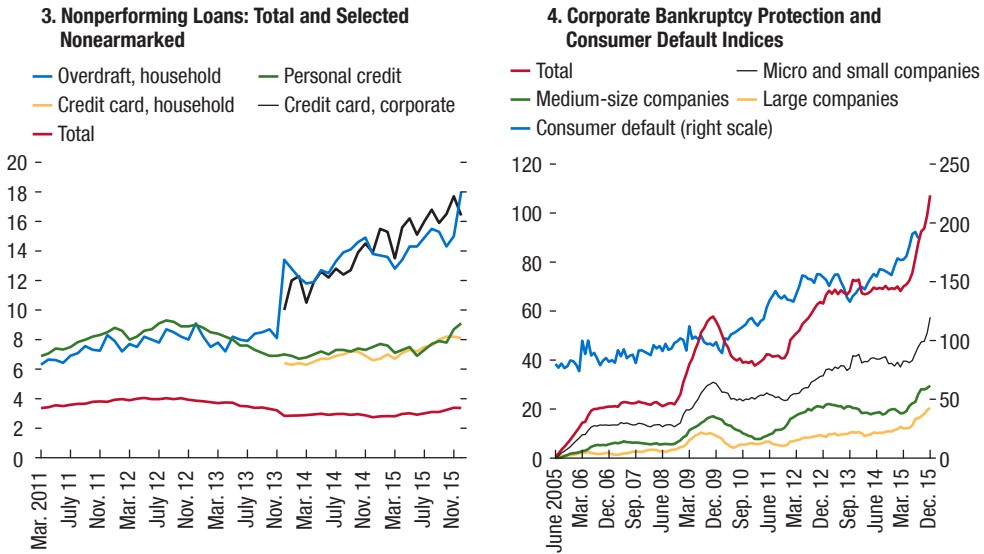
Box 1.2. (continued)

Figure 1.2.2. Performance of the Banking System in Brazil



Source: Banco Central do Brasil.

Source: Banco Central do Brasil.



Source: Banco Central do Brasil.

Source: Serasa.

### Box 1.3. Impact of Low and Negative Rates on Banks

#### *Impact of low and negative rates varies across banking systems*

Unconventional monetary policies, including quantitative easing and negative policy rates, continue to be crucial to address the weak macroeconomic environment. Banks are key beneficiaries of these policies overall, as improved price stability and growth lead to stronger borrower creditworthiness, a decline in nonperforming assets, reduced provisioning costs, capital gains on bond holdings, as well as declining wholesale funding costs.

Markets and policymakers have little historical basis for understanding the full benefits and costs that may arise over a prolonged period of low or of negative rates. The interests of banks and the broader economy may diverge in some respects. Credit easing, driven by low or negative rates, may lower costs to households and firms, support asset prices, and boost growth—good news for the real economy. But there may be some adverse side effects for banks. By driving down costs of borrowing for the real economy, unconventional monetary policy appears to compress banks' net interest margins, a key source of bank income. Negative interest rates may be unique in accelerating this margin compression over time, as banks have so far proven unwilling or are legally unable to pass on negative rates to retail depositors. As negative policy rates bring asset yields lower, *deposit* funding costs may get “stuck” at zero, squeezing the margin between the two.

The extent of the pressure on profitability is difficult to estimate, but certain types of banks will be more vulnerable than others. The impact will depend on banks' capacity to pass on costs through the repricing of loans and deposits and other liabilities, the relative importance of net interest income to profitability, and the ability to generate other income.

- *Liability repricing.* One key benefit of low rates for banks is the repricing of nondeposit liabilities—lowering the cost of funding. Repricing of wholesale funding provides a quick pass-through to banks, providing cost relief. Repricing of deposits is less straightforward. A zero lower bound on deposits will have the largest negative impact on those banks with the largest household and corporate deposit bases, as more of their funding base will get stuck at zero interest rates. It may also have more impact in countries with lower household and corporate time deposit

The authors of this box are Jennifer Elliott, Henry Hoyle, and Andreas Jobst.

interest rates, which implies the zero lower bound will become binding sooner. At the country level, there is widespread variation in both of these metrics, suggesting some banking systems may be more vulnerable than others (Figure 1.3.1, panel 1). Germany, Italy, Portugal, and Spain stand out as relatively more vulnerable than the euro area average on both these issues, whereas banks in France, the Netherlands, and even the United Kingdom may be better positioned in this regard. Nordic banks benefit from a uniquely low share of deposits in total liabilities, which may be one reason why banks there have not been acutely affected by negative interest rates so far.

- *Asset repricing.* Profitability pressure from negative interest rates is likely to be more pronounced in countries where loan books reprice the quickest. For instance, the aggregate interest rate on bank loans in Italy, Portugal, and Spain exhibit elevated sensitivity to changes in the benchmark interbank rate (Figure 1.3.1, panel 2), suggesting asset yields will drop quickest in these markets, partially reflecting the high level of variable rate mortgages (Figure 1.3.1, panel 3), but also shorter loan maturities or high levels of competition between banks. By contrast, banks in Sweden and Switzerland have been able to maintain sufficient asset yields during periods of negative interest rates, protecting lending margins (Figure 1.3.1, panel 4). Corporate loan books generally reprice toward the interbank rate more quickly, reflecting heightened competition with capital market finance for larger corporations.
- *Net interest margin and profit profile.* Equal amounts of net interest margin compression may also have different effects on overall profitability given the wide variation in profit margins. Germany, Italy, and Japan may be relatively more sensitive to low or negative rates because of a weaker starting point for profitability. Figure 1.3.1, panel 5, shows the impact of a 10-basis-point decline in net interest margins on banks across the world. The decline in net interest income is roughly similar for most countries on a weighted average basis. However, the impact on overall pretax profits, shown in the blue bars, would be much higher for European banks, and to a lesser extent Japanese banks, as thin overall profit margins amplify the impact of lost net interest income.
- *Ability to generate other income.* Replacing income lost through shrinking margins will be challenging. Analysis suggests, for example, that euro area banks are unlikely to be able to generate the volumes of

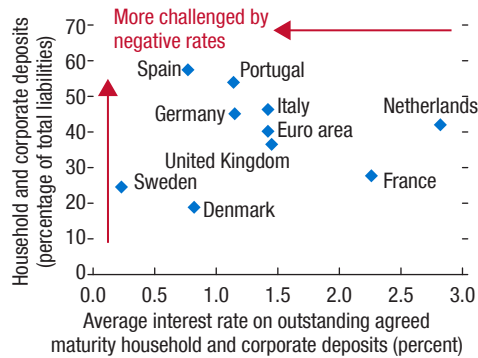
Box 1.3. (continued)

**Figure 1.3.1. The Impact of “Low-for-Long” May Vary across Countries**

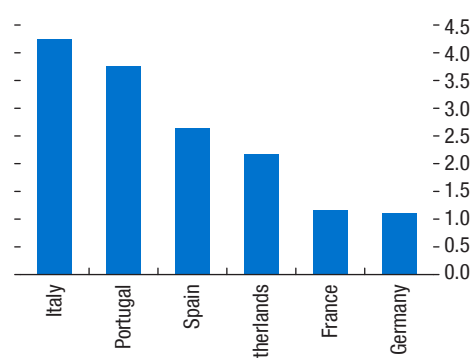
Continued low rates could bring pressure on other financial institutions ...

... and some will have less ability to reprice loans to make up earnings.

**1. Household and Corporate Deposits as a Share of Total Monetary Financial Institution Liabilities and Interest Rates on Outstanding Agreed Maturity Deposits, January 2016**



**2. Estimated Changes in Outstanding Loan Book Interest Rates for a 10-Basis-Point Change in the Interbank Rate, by Country (Basis points)**



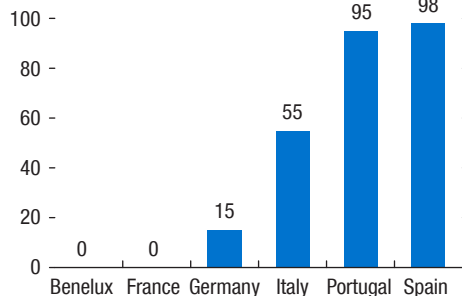
Sources: European Central Bank; Haver Analytics; and IMF staff calculations.

Sources: Haver Analytics; and IMF staff calculations.

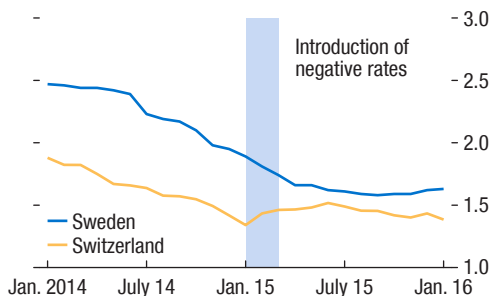
Banks with a large proportion of mortgages priced to reference rates cannot raise mortgage rates ...

... but some banks have been better able to maintain asset yields and protect lending margins.

**3. Tracker Mortgage Loans (Percent of total mortgages)**



**4. Sweden and Switzerland: Bank Mortgage Rates (Percent)**



Source: Morgan Stanley.  
Note: Tracker mortgages are variable-rate mortgages following a reference rate. Benelux = Belgium, Netherlands, and Luxembourg.

Source: Haver Analytics.  
Note: Introduction of negative rates and in Denmark denotes cut to certificate of deposit rate from -5 basis points to -50 basis points. Swiss data is a simple average of rates on new 1- to 10-year fixed rate mortgages, whereas Swedish data reflects the weighted average interest rate on new fixed rate mortgages of all tenors.

lending required to offset margin compression (see Figure 1.3.1, panel 6) in the context of the tepid pace of new credit creation in recent years and regulatory pressures to raise capital. There is room to boost fee and commission income. Large European banks only earn half to three-quarters of what their American peers do relative to their asset base. This

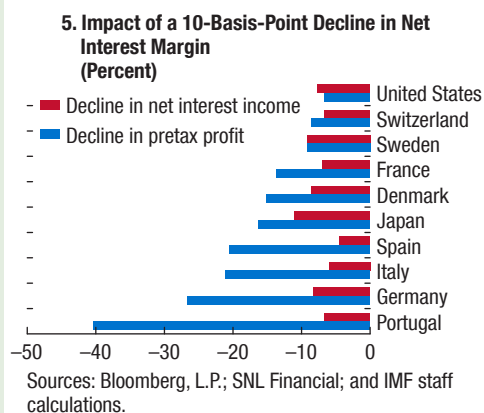
process will likely be slow, however, particularly in many euro area markets where competition dynamics limit banks' ability to charge fees.

Reflecting these concerns, and to mitigate costs while enhancing the benefits, the European Central Bank added a number of measures when it reduced

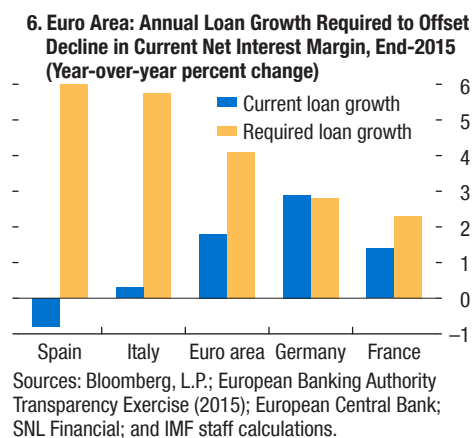
**Box 1.3. (continued)**

**Figure 1.3.1. (continued)**

Declining net interest margins will hit profits of European banks more strongly.



Substantial loan growth would be required to make up loss of net interest income.



rates further into negative territory in March. These included providing long-term funding to support credit easing at low costs, along with other measures. In Japan, the Bank of Japan announced a system of tiered reserves so only a limited portion of excess reserves would be at negative rates.

*Continued low rates could put pressure on other financial institutions*

The weakening of the baseline and implied market pricing of very low inflation suggests central banks will maintain and even deepen monetary support. Low and negative rates will, therefore, be a feature of the landscape, with a negative impact on return on savings. If prolonged, this could undermine the viability of life insurers, pensions, and savings vehicles. Low rates mean low returns, making it difficult for insurers to meet guaranteed returns, and with substantial duration mismatches this will eventually force losses on life insurance policyholders (see Chapter 3). According to the European Insurance and Occupational Pensions Authority (EIOPA), more than half of European life insurers are guaranteeing an investment return to policyholders that exceeds the yield on the local 10-year government bond, thereby incurring undesirable negative investment spreads (EIOPA 2013). Countries that

suffer both from large duration mismatches and from negative investment spreads are particularly vulnerable to a prolonged low interest rate environment. According to EIOPA, Germany and Sweden suffer from duration mismatches of more than 10 years and negative investment spreads. Even where these concerns are not present, profitability remains a significant challenge and could prompt excess risk-taking, including in portfolios and by taking on nontraditional activities. As described in the April 2015 *Global Financial Stability Report*, this excess risk taking already appears to be happening in the U.K. and U.S. markets.

Defined benefit pension plans, already challenged by the longevity of their beneficiaries, would be severely damaged in a sustained low interest rate environment. Recent EIOPA tests showed sizable shortfalls in plans in some European countries. A similar study in the United States also revealed serious underfunding (Pension Benefit Guaranty Corporation Data Book 2012). But in a stress scenario of continuing low rates in a recession, sponsors may become insolvent, in which case losses would be shared with pension recipients and other defined benefit schemes covered by insurance companies, further raising the need for precautionary savings by firms and households.

### Box 1.4. Euro Area Financial Architecture—Progress, but Gaps Remain

There has been substantial progress toward filling the gaps in the European Union's financial architecture. The successful completion of the first year of the Single Supervisory Mechanism, the transition to a fully operational Single Resolution Mechanism, and the full entry into force of the bail-in provisions of the European Commission's Bank Recovery and Resolution Directive are important milestones in the construction of the Banking Union. The European Commission has also issued an action plan for building a capital markets union.

The banking union architecture, however, remains incomplete without a common deposit insurance scheme. The European Commission's proposal for a common European Deposit Insurance Scheme will go a long way toward lowering the risk of deposit flight, help weaken the link between local sovereign and banking sector risks, and unify deposit insurance across banking union member states. Risk sharing through the common deposit insurance scheme should go hand in hand with other measures to reduce banking sector risks.

The new mandatory bail-in regime under the Bank Recovery and Resolution Directive could raise implementation challenges. Building sufficient institution-specific buffers will take time, and in the meantime the new legal framework limits the use of public funds without creditor bail-in at a time when

pockets of weakness are still to be found in banks. Moreover, national discretion remains in key areas that affect loss allocation, such as the hierarchy of creditors in insolvency, which could affect creditors differently across European Union countries.

A common fiscal backstop is missing from the Single Resolution Fund and the proposed common European Deposit Insurance Scheme. In the absence of such a backstop, there is a risk that in a crisis, national authorities themselves would have to support banks established in their jurisdictions, leading to the reemergence of the sovereign-bank risk nexus and financial fragmentation.

Whether the macroprudential framework will allow for strong action when risks rotate to nonbanks is not clear. Greater clarity on responsibilities for system-wide financial stability is needed. National frameworks to contain systemic risk are now largely in place, and a framework for cooperation through reciprocity across the union of national measures is being established. Furthermore, the European Central Bank has the mandate to top up some macroprudential measures taken by Single Supervisory Mechanism members, but these measures apply only to banks. At the euro area level, there is no truly effective coordinating framework for macroprudential policy relating to nonbank financial institutions. The European Systemic Risk Board—which has European Union-wide mandate—has only warning and recommendation powers to influence the approach to nonbank activities and institutions. Addressing this gap should be an important priority.

The authors of this box are Shekhar Aliyar, John Bluedorn, Michaela Erbenova, Marina Moretti, Aditya Narain, and Erlend Nier.

**Annex Table 1.1.1. Chinese Nonfinancial Firms in Sample: Companies, Borrowing, and Debt-at-Risk**

Industry	Number of Companies	Total Borrowing (US\$ millions)	Number of Companies at Risk	Debt-at-Risk (US\$ millions)	Debt-at-Risk over Total Borrowings (percent)
Information Technology	377	147,229	71	12,576	9
Retail and Wholesale	321	157,113	73	55,145	35
Manufacturing	1,231	501,659	240	88,525	18
Leasing/Commercial	43	5,342	6	142	3
Utilities	109	369,881	9	3,086	1
Steel	72	115,484	28	45,396	39
Construction Materials	43	59,841	9	11,625	19
Transportation	104	152,096	10	27,548	18
Mining	52	135,163	15	47,598	35
Energy	43	224,845	15	2,357	1
Real Estate	407	850,737	100	96,412	11
Others	69	55,558	14	1,642	3
Total	2,871	2,774,948	590	392,053	14

Sources: S&P Capital IQ; and IMF staff estimates.

Note: Debt-at-risk is defined as the debt of corporates with interest coverage ratio of below 1. Interest coverage ratio is EBITDA/interest expense of the corporate. EBITDA = earnings before interest, taxes, depreciation, and amortization.

## Annex 1.1. China: Corporate Loans Potentially at Risk

This report considers the potential for debt at risk in the corporate sector to result in bank losses. It uses a bottom-up approach to identify stress at the individual firm level to form an aggregate view of associated debt at risk.<sup>28</sup>

The approach begins by isolating a population of companies for which accounting information is available. Companies are drawn from the S&P Capital IQ database, covering the universe of all publicly listed companies. For China, the data set includes 2,871 companies, including 2,607 listed firms and 264 unlisted firms, which together

account for \$2,775 billion of total borrowing (see Annex Table 1.1.1).

A company is then defined as “at risk” if in 2015<sup>29</sup> it generated insufficient earnings before interest, taxes, depreciation, and amortization to cover its reported interest expense. Such firms have an interest coverage ratio (ICR) of < 1. The debt-at-risk ratio across a sample is therefore

$$\frac{\Sigma \text{Borrowings of companies with ICR} < 1}{\Sigma \text{Borrowings of all companies in the sample}}$$

On this basis, the debt-at-risk ratio is computed for the listed universe sample, as shown in Annex Figure 1.1.1.

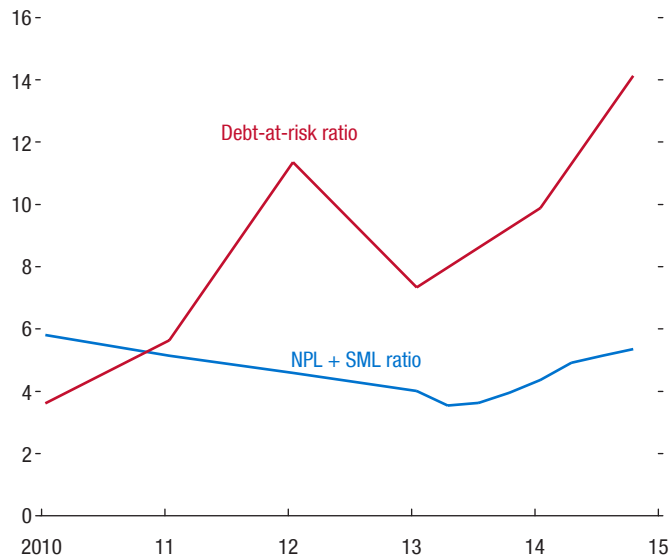
Judgment is required for setting the threshold conditions for identifying a borrower as being at risk. Some have argued that ICR < 1 is too narrow a standard and misses identifying companies that could fail to meet obligations if conditions deteriorate. The April 2014 GFSR uses a threshold of ICR < 2, and Chivakul and Lam (2015) use ICR < 1.5. Here, ICR < 1 is used for its explanatory simplicity, insofar as the inability to cover interest expense from operating cash flow indicates distress. But it is acknowledged that this approach is narrow and may understate debt at risk.

<sup>29</sup>All 2015 figures are for the latest 12 months available.

<sup>28</sup>A number of other approaches to estimating problem loans could be used. Top-down analyses (see, for example, Dell’Ariccia and others, 2012) examine the relationship between a country’s credit growth and subsequent nonperforming loans. In bottom-up analyses, credit stress in a lending portfolio is identified by tracking median leverage (either debt to equity or median debt to earnings before interest, taxes, depreciation, and amortization), or the population mean (or “weak tail”) typically defined as the weakest quintile or decile. However, in these latter approaches there is no definite relationship between leverage and borrower default, that is, no threshold criterion for default or trigger for nonpayment on obligations because appropriate levels of debt to equity and debt to earnings before interest, taxes, depreciation, and amortization differ across firms. Moreover, these approaches address system averages (even if the average is within deciles).



**Annex Figure 1.1.1. China: Reported NPL + SML Ratio, and Debt-at-Risk Ratio**



Sources: People’s Bank of China; S&P Capital IQ; and IMF staff estimates.  
 Note: 2015 debt-at-risk ratio is last 12 months. NPL = nonperforming loan; SML = special mention loan.

Conversely, insufficient cash generation during a single period may overstate risks since a single year of negative earnings before interest, taxes, depreciation, and amortization, for example, might simply indicate a cyclical problem, an investment loss, or some other singular issue. To address this concern, the consecutive periods over which a cash flow test is applied is varied, and the impact on identified borrowers at risk and credit is quantified. Annex Figure 1.1.2 shows the sensitivity of at-risk debt by varying both ICR and number of periods.

Industry-level debt-at-risk ratios from the listed universe are applied to the industry loan mix from the entire banking system. This step is performed primarily for completeness, specifically to forestall concerns about the listed companies’ industry mix being unrepresentative of the broader banking system even though the data do not make for a perfect one-to-one mapping.<sup>30</sup> This step assumes that the debt-at-risk ratio calculated for listed firms applies to all firms (listed and unlisted) in that sector. This procedure raises the overall average ratio of loans

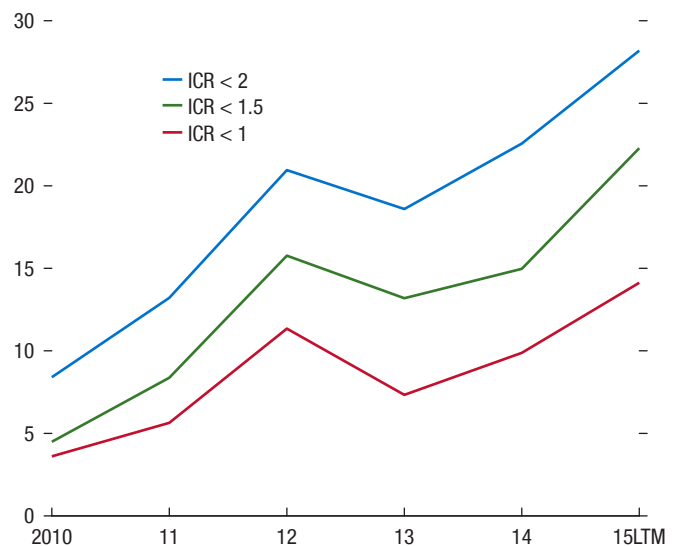
<sup>30</sup>There is not perfect matching across industries partly because the People’s Bank of China’s industry loan mix data on which the analysis relies are available only up to 2013, and also because the People’s Bank of China’s loan categories are somewhat broader and do not map perfectly to the industry categories used in this analysis.

**Annex Figure 1.1.2. Sensitivity of Variations in Interest Coverage Threshold**

**1. Sensitivity to Variation in Interest Coverage Threshold and Consecutive Periods of ICR Insufficiency**

Consecutive Periods	Interest Coverage Threshold			
	0.5	1.0	1.5	2.0
One Year	8.9	14.1	22.3	28.2
Two Years	4.8	8.6	14.4	21.4

**2. Debt-at-Risk History under Alternative Threshold Conditions (Percent of debt)**



Sources: S&P Capital IQ; and IMF staff estimates.  
 Note: ICR = interest coverage ratio; LTM = last 12 months.

potentially at risk from 14.1 percent across the listed universe to 15.5 percent across the RMB 52.6 trillion (\$8.1 trillion) of commercial banks’ total corporate loans. On this basis, total loans potentially at risk on commercial banks’ balance sheets at the end of 2015 are estimated to be RMB 8.2 trillion (\$1.3 trillion).

The estimates for bank loans potentially at risk to the corporate sector are partial in several respects. First, the analysis does not cover all bank lending because only bank loans to the corporate sector are considered, nor does the analysis cover the impact of corporate stress on nonbank lending. Lending by policy banks and lending by commercial banks to local government financing vehicles is not included, because policy banks are wholly government owned, while a large portion of the debt of local government financing vehicles are explicitly backed or guaranteed by the government. Furthermore,

it is assumed that the asset quality of both listed and nonlisted firms is equivalent, despite evidence of greater repayment stress for nonlisted firms (see footnote 11).

The base case assumes a loss of 60 percent on loans potentially at risk, leading to an estimated loss of \$756 billion (approximately 6.9 percent of GDP). A plus or minus 15 percentage point deviation from the assumed 60 percent loss rate changes losses by \$189 billion, in either direction. In addition, a number of bank exposures to the corporate sector were omitted from the estimates (Annex Figure 1.1.3):

- *Policy banks.* Applying the average ratio of loans potentially at risk to the \$1.6 trillion of corporate loans by policy banks and an estimated \$1.5 trillion of bank loans to local government financing vehicles boosts estimated losses on loans potentially at risk by about \$150 billion and \$144 billion, respectively.
- *Shadow products.* Applying the average ratio of loans potentially at risk from banks' corporate loan books to their shadow credit product exposures (trusts' beneficiary rights, directional asset management plans, and others) results in additional losses of \$98 billion.

### Annex 1.2. Successful Normalization and Global Market Disruption Scenarios<sup>31</sup>

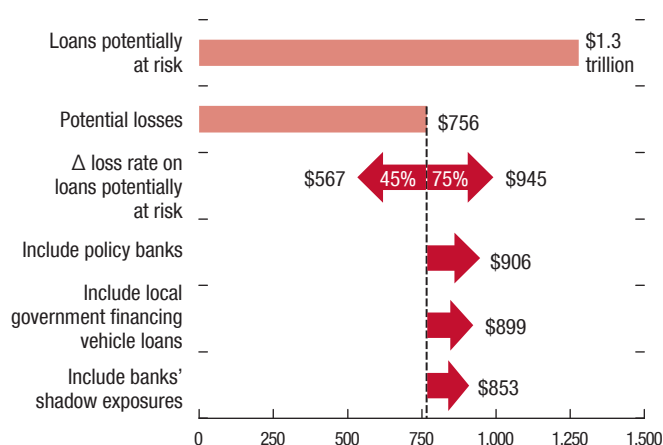
This annex provides further information on the successful normalization and global market disruption scenarios. These scenarios are simulated using the Global Macrofinancial Model, a structural macroeconomic model of the world economy, disaggregated into 40 national economies, documented in Vitek (2015). This estimated panel dynamic stochastic general equilibrium model features a range of nominal and real rigidities, extensive macrofinancial linkages with both bank- and capital market-based financial intermediation, and diverse spillover transmission channels.

#### The Successful Normalization Scenario

The successful normalization scenario features a rebound in economic risk taking and confidence in the systemic advanced economies supported by balance sheet repair and fiscal stimulus. It assumes confidence gains by nonfinancial firms and households, which reduce their saving rates and bring forward

<sup>31</sup>Annex 1.2 prepared by Francis Vitek.

**Annex Figure 1.1.3. Corporate Sector Loans Potentially at Risk**  
(Billions of U.S. dollars)



Sources: Bank financial statements; CEIC; People's Bank of China; S&P Capital IQ; and IMF staff estimates and analysis.

their expenditures. In particular, private investment increases by 4 percent while private consumption rises by 1 percent in all of the systemic advanced economies over two years. The reflation this generates accelerates smooth exits of monetary policy from the effective lower bound, inducing gradual policy interest rate increases in the United States immediately, and in the euro area, Japan, and the United Kingdom after one year. 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 all of the systemic advanced economies, residually induced by term premium decompression. There are also gradual and moderate stock price increases, with the real equity price rising by 10 percent in all of the systemic advanced economies, residually driven by higher risk appetite. This rebound in economic and financial risk taking in the systemic advanced economies is supported by balance sheet repair in high-spread euro area economies, and by fiscal stimulus elsewhere. In high-spread euro area economies, credit cycle upturns follow nonfinancial corporate debt restructuring initiatives, with the default rate on bank loans to nonfinancial corporations falling by 2 percentage points. In the systemic advanced economies less the high-spread euro area economies, expenditure-based fiscal stimulus measures lower the primary fiscal balance ratio by 2 percentage points.

**Annex Table 1.2.1. Successful Normalization Scenario Assumptions**

<i>Layer 1: Rebound in Economic Risk Taking and Confidence in Systemic Advanced Economies, 2016:Q3–18:Q2</i>	
Private Investment, Investment Demand Shocks	+4 percent
Private Consumption, Consumption Demand Shocks	+1 percent
Long-Term Government Bond Yield, Duration Risk Premium Shocks	+50 basis points
Real Equity Price, Equity Risk Premium Shocks	+10 percent
Loan Default Rate, Loan Default Shocks	
High-Spread Euro Area	–2 percentage points
Primary Fiscal Balance Ratio, Fiscal Expenditure Shocks	
Low-Spread Euro Area, Japan, United Kingdom, United States	–2 percentage points
<i>Layer 2: Smooth Financial Liberalization and Orderly Deleveraging, 2016:Q3–18:Q2</i>	
Money Market Interest Rate Spread, Credit Risk Premium Shocks	+50 basis points
Real Equity Price, Equity Risk Premium Shocks	–10 percent
Primary Fiscal Balance Ratio, Fiscal Expenditure Shocks	–2 percentage points

Source: IMF staff.

Note: All scenario assumptions are expressed as deviations from the April 2016 *World Economic Outlook* baseline. All endogenous variable adjustments peak in 2018:Q2 and dissipate by 2021:Q4. The high-spread euro area economies are Greece, Ireland, Italy, Portugal, and Spain. The low-spread euro area economies are Austria, Belgium, Finland, France, Germany, and the Netherlands.

This scenario also features a smooth financial liberalization and orderly deleveraging in China supported by fiscal stimulus. Financial liberalization gradually widens the spreads of the deposit and money market interest rates over the policy interest rate by 50 basis points over two years. A moderation in risk appetite gradually lowers the real equity price by 10 percent. This smooth financial liberalization and equity risk premium decompression induces a gradual increase in the default rate on bank loans to nonfinancial corporations, 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. This smooth financial liberalization and orderly deleveraging in China is supported by expenditure-based fiscal stimulus measures that lower the primary fiscal balance ratio by 2 percentage points (Annex Table 1.2.1).

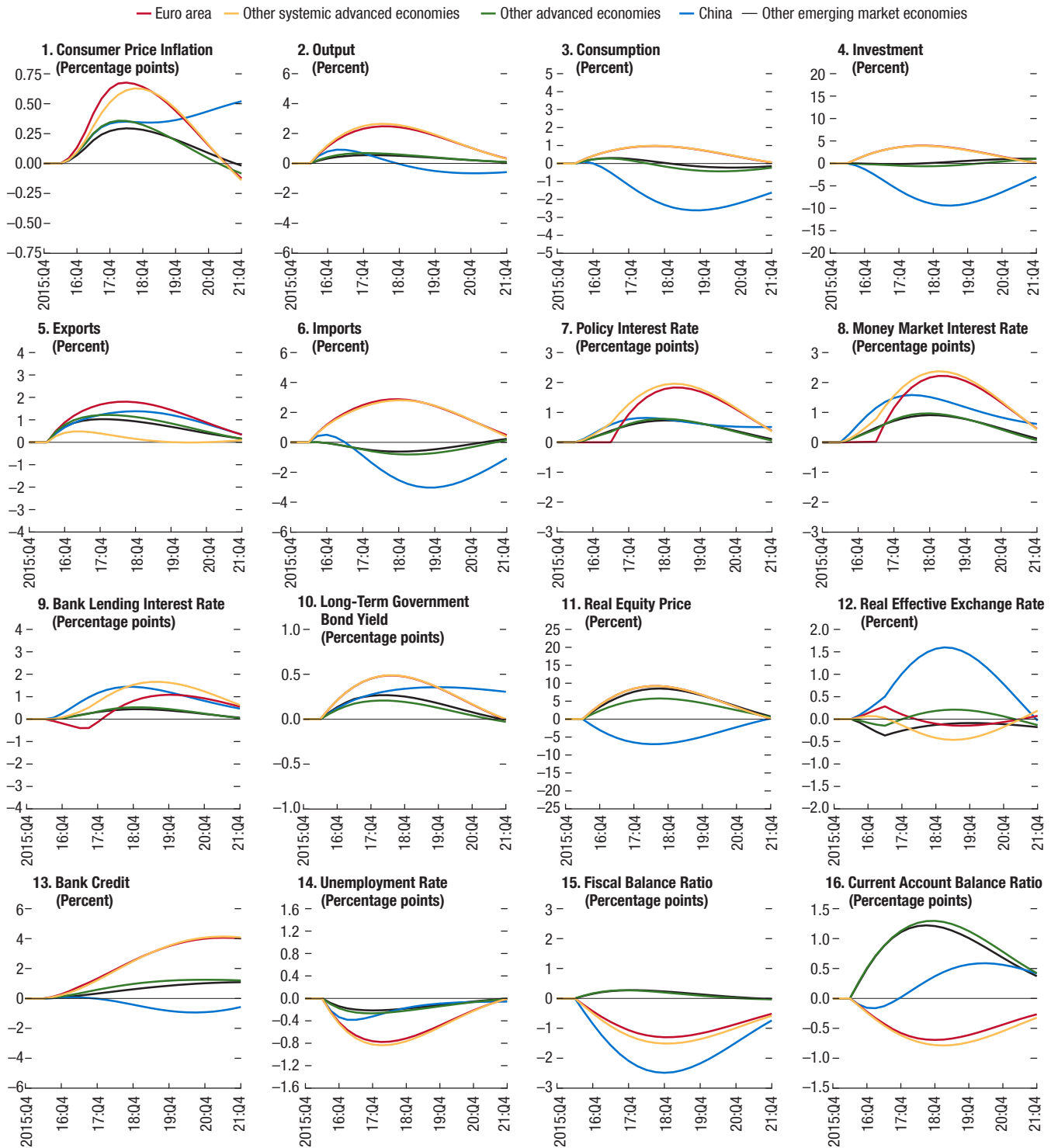
This scenario is generally positive for banking sector capitalization and government debt sustainability worldwide. Largely reflecting higher economic risk taking, stronger credit supply, and reduced costs of equity, output increases by 0.1 to 3.3 percent relative to the baseline across economies by 2018, while consumer price inflation rises by 0.1 to 0.8 percentage points, and the unemployment rate falls by 0.1 to 1 percentage points. These inflationary macroeconomic expansions are concentrated in the systemic

advanced economies, where the rebound in economic and financial risk taking occurs. Accordingly, they induce policy interest rate hikes of 0.3 to 2.1 percentage points across economies by 2018, concentrated in the systemic advanced economies. The banking sector accommodates and contributes to increases in private investment with 0.6 to 4.6 percent rises in bank credit by 2020, except in China, where bank credit falls by 0.9 percent. Bank capital ratios rise by 1 to 1.3 percentage points across high-spread euro area economies by 2019, given lower credit loss rates following nonfinancial corporate debt restructuring initiatives. Government debt ratios rise by up to 2.5 percentage points by 2019 in the systemic advanced economies less the high-spread euro area economies given fiscal stimulus, but fall by up to 5 percentage points in other economies less China given higher nominal output. In aggregate, world output increases by 1.7 percent by 2018, while energy and non-energy commodity prices rise by 13.6 and 6.8 percent, respectively (Annex Figure 1.2.1).

**The Global Market Disruption Scenario**

The global market disruption scenario is initiated by a loss of market confidence that causes an increase in asset risk premiums in systemic economy stock markets, a rise in credit stress in the banking sectors of high-spread euro area economies with some spillovers

**Annex Figure 1.2.1. Successful Normalization Scenario Simulation Results**



Source: IMF staff estimates.

Note: Depicts variable paths expressed as output-weighted average deviations from baseline. Real effective exchange rate increases represent currency depreciations in real effective terms.

**Annex Table 1.2.2. Global Market Disruption Scenario Assumptions**

<i>Layer 1: Rising Risk Premia and Credit Spreads in Systemic Economies, 2016:Q3–18:Q2</i>	
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, High-Spread Euro Area	+100 basis points
Low-Spread Euro Area	+50 basis points
Long-Term Government Bond Yield, Duration Risk Premium Shocks	
High-Spread Euro Area	+50 basis points
Low-Spread Euro Area	–25 basis points
<i>Layer 2: Balance Sheet Vulnerabilities in Euro Area and Emerging Market Economies, 2016:Q3–19:Q2</i>	
Regulatory Bank Capital Ratio, Capital Requirement Shocks	
Euro Area	+2 percentage points
Loan Default Rate, Loan Default Shocks	
Emerging Market Economies	+0.3 to +4.7 percentage points
<i>Layer 3: Secular stagnation worldwide, 2016:Q3–21:Q4</i>	
Private Investment, Investment Demand Shocks	–8 percent
Private Consumption, Consumption Demand Shocks	–2 percent

Source: IMF staff.

Note: All scenario assumptions are expressed as deviations from the April 2016 *World Economic Outlook* baseline. Endogenous variable adjustments peak in 2018:Q2 or 2019:Q2 where indicated and one-quarter dissipate by 2021:Q4. The high-spread euro area economies are Greece, Ireland, Italy, Portugal, and Spain. The low-spread euro area economies are Austria, Belgium, Finland, France, Germany, and the Netherlands.

to their sovereign debt markets, and a disorderly deleveraging by the corporate sector in China. A weakening in stock markets sees real equity prices fall by 20 percent in China, the euro area, Japan, the United Kingdom, and the United States over two years. Credit and banking sector stress is represented by a widening of funding spreads on banking counterparties, by 100 basis points in China and high-spread euro area economies, and by 50 basis points in low-spread euro area economies. Finally, the reemergence of sovereign strains in high-spread euro area economies as a result of rising debt burdens is represented by a 50 basis point increase in long-term government bond yields there, versus a 25 basis point decrease in low-spread euro area economies given safe haven capital inflows.

Banking and corporate sector balance sheet legacy vulnerabilities pose challenges to the euro area and emerging market economies under this scenario. This includes regulatory pressure to build bank capital buffers in the euro area, where we assume that regulatory bank capital ratio requirements rise by 2 percentage points over three years. It also includes credit cycle downturns in all emerging market economies to varying degrees, as default rates on bank loans to nonfinancial corporations

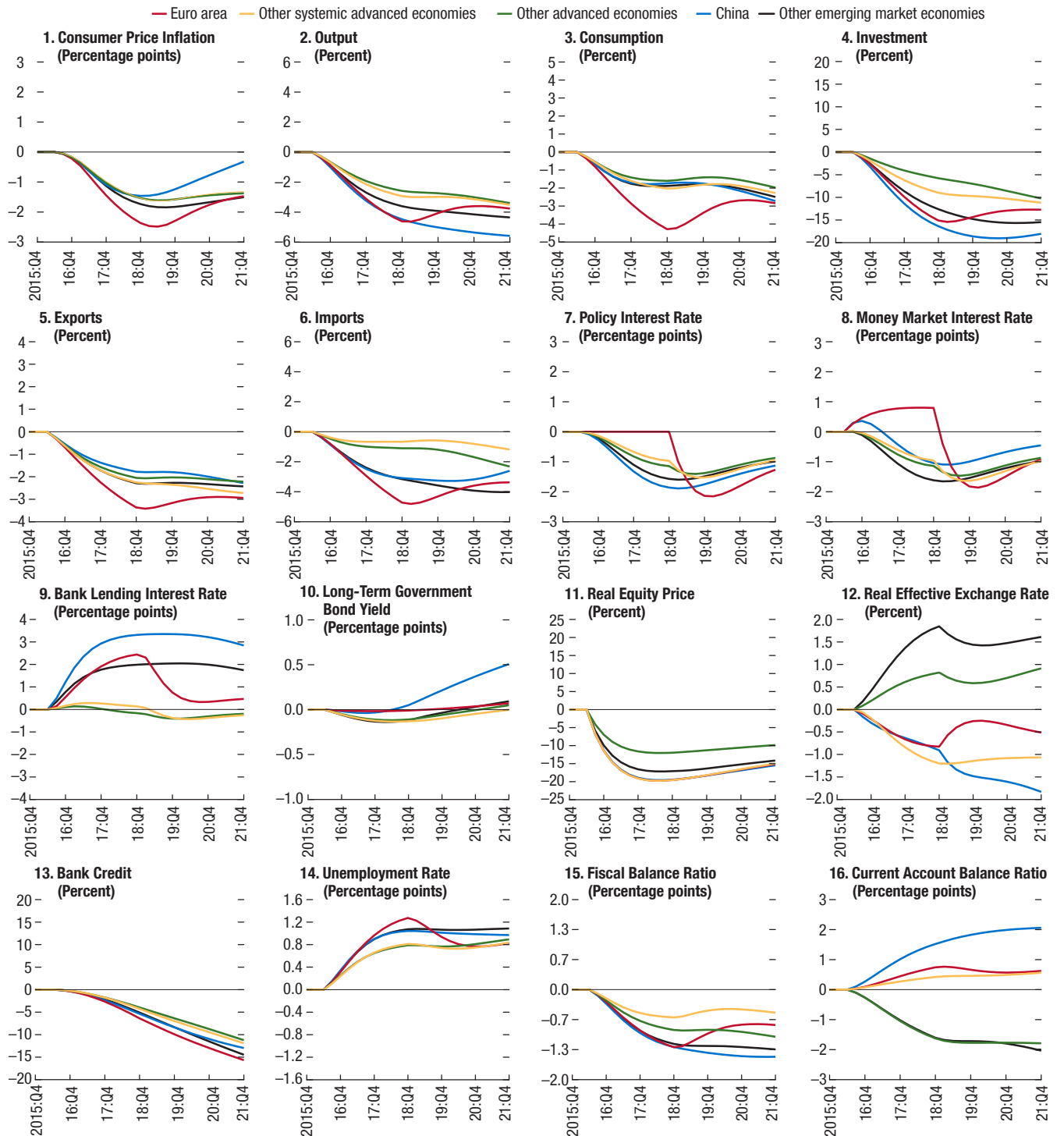
rise above and beyond what is induced by business cycle downturns (exogenous default rate increases average 2 percentage points across emerging market economies and are proportional to their estimated share of corporate debt at risk).

The global market disruption scenario entrenches secular stagnation worldwide, given constrained macroeconomic policy responses as outlined in the WEO. This is generated by suppressed economic risk taking worldwide, represented by confidence losses by nonfinancial corporations and households that raise their saving rates and delay their expenditures. In particular, we assume that private investment falls by an additional 8 percent while private consumption declines by a further 2 percent in all economies over five years. Under this scenario, conventional monetary policy remains at or near the effective lower bound in the systemic advanced economies, while we interpret the calibration of global financial market adjustments as net of the effects of unconventional monetary policy responses where warranted, in particular in the euro area and Japan. Finally, we allow automatic fiscal stabilizers to operate fully but abstract from discretionary fiscal stimulus measures worldwide (Annex Table 1.2.2).

Largely reflecting lower economic and financial risk taking, under this scenario output falls by 2.4 to 6.8 percent relative to the baseline across economies by 2021. Given these steadily accumulating output losses, consumer price inflation declines by 1.2 to 2.8 percentage points across economies by 2019, and the unemployment rate rises by 0.6 to 1.6 percentage points. These disinflationary macroeconomic contractions induce policy interest rate cuts of 1.1 to 1.9 percentage points across economies by 2019, mitigating inflation reductions and output losses. This scenario negatively affects banking sector capitalization and credit availability. The banking sector accommodates and contributes to reductions in private investment with 8.6 to 16.6 percent decreases in bank credit by 2021. Bank capital ratios fall by 0.4 to 4.5 percentage points across emerging market economies by 2019,

where credit loss rates generally increase more given larger rises in default rates on bank loans to non-financial corporations, versus at most 0.4 percentage points across advanced economies. Government debt sustainability is significantly eroded in some advanced economies. Largely reflecting lower nominal output, government debt ratios rise by 4 to 22.9 percentage points across advanced economies by 2021, where initial government debt ratios are generally higher and conventional monetary policy space constraints are widely binding, versus 3.9 to 15 percentage points across emerging market economies. In aggregate, world output falls by 3.9 percent by 2021, of which 2.5 percent is accounted for by the secular stagnation layer from the WEO, while energy and nonenergy commodity prices fall by 40 and 22.4 percent, respectively (Annex Figure 1.2.2).

Annex Figure 1.2.2. Global Market Disruption Scenario Simulation Results



Source: IMF staff estimates.

Note: Depicts variable paths expressed as output-weighted average deviations from baseline. Real effective exchange rate increases represent currency depreciations in real effective terms.

## References

- Chivakul, Mali, and W. Raphael Lam. 2015. "Assessing China's Corporate Sector Vulnerabilities." Working Paper No. 15/72, International Monetary Fund, Washington.
- Dastidar, Siddhartha, and Bruce Phelps. 2009. "Liquidity Cost Scores for U.S. Credit Bonds." Barclays Capital, October 6. Web page.
- Dattels, Peter, Rebecca McCaughrin, Ken Miyajima, and Jaime Puig Forne. 2010. "Can You Map Financial Stability?" Working Paper 10/145, International Monetary Fund, Washington.
- Dell'Ariccia, Giovanni, Deniz Igan, Luc Laeven, Hui Tong, Bas Bakker, and Jerome Vandenbussche. 2012. "Policies for Macrofinancial Stability: How to Deal with Credit Booms." Staff Discussion Note No. 12/06, International Monetary Fund, Washington.
- European Banking Authority. 2015. "2015 EU-Wide Transparency Exercise: Aggregate Report." November 25. London: European Banking Authority.
- European Insurance and Occupational Pensions Authority. 2013. "Pension Benefit Guaranty Corporation Data Book." European Insurance and Occupational Pensions Authority, Frankfurt.
- Federal Financial Institutions Examination Council. 2015. "E.16 Country Exposure Lending Survey and Country Exposure Information Report." September 30. Virginia: Federal Financial Institutions Examination Council.
- International Monetary Fund. 2010. "Financial Sector Stability Assessment Report, United States." Country Report 10/247, International Monetary Fund, Washington.
- . 2015a. "Financial Sector Stability Assessment Report, United States." Country Report 15/170, International Monetary Fund, Washington.
- . 2015b. "The Fund's Lending Framework and Sovereign Debt—Further Considerations." Policy Paper, International Monetary Fund, Washington.
- . 2015c. "People's Republic of China Article IV Consultation Report." Country Report 15/234, International Monetary Fund, Washington.
- Lukonga, Inutu, Moez Souissi, Kusay Alkhunaizi, Rafik Selim, Nombulelo Duma, Kay Chung, Nkunde Mwase, Jonah Rosenthal, Amir Sadeghi Emamgholi, and Brian Hilland. Forthcoming. "Low Oil Prices, Macro Financial Linkages and Financial Stability in the CCA and MENA." International Monetary Fund, Washington.
- Panigirtzoglou, Nikolaos, and Robert Scammell. 2002. "Analysts' Earnings Forecasts and Equity Valuations." *Bank of England Quarterly Bulletin*, Spring, London.
- Sahay, Ratna, Martin Čihák, Papa N'Diaye, Adolfo Barajas, Bi Ran, Diana Ayala, Yuan Gao, Annette Kyobe, Lam Nguyen, Christian Saborowski, Katsiaryna Svirydzhenka, and Seyed Reza Yousefi. 2015. "Rethinking Financial Deepening: Stability and Growth in Emerging Markets." Staff Discussion Note No. 15/08, International Monetary Fund, Washington.
- Swiston, Andrew. 2008. "A US Financial Conditions Index: Putting Credit Where Credit Is Due." Working Paper No. 161, International Monetary Fund, Washington.
- Vitek, Francis. 2015. "Macrofinancial Analysis in the World Economy: A Panel Dynamic Stochastic General Equilibrium Approach." Working Paper No. 15/227, International Monetary Fund, Washington.
- Wright, Jonathan. 2011. "Term Premia and Inflation Uncertainty: Empirical Evidence from an International Panel Dataset." *American Economic Review* 101 (4): 1513–44.