IMPROVING THE BALANCE BETWEEN FINANCIAL AND ECONOMIC RISK TAKING

Overall, this report's assessment is that current stability risks call for increased vigilance. According to the **World Economic Outlook** *(WEO) baseline, the global economic recovery is expected to proceed slowly, supported by ongoing monetary accommodation in advanced economies and less fiscal drag. The extended period of monetary accommodation and the accompanying search for yield are leading to credit mispricing and asset price pressures, increasing the chance that financial stability risks could derail the recovery. Concerns have shifted to the shadow banking system, especially the growing share of illiquid credit in mutual fund portfolios. Should asset markets come under stress, an adverse feedback loop between outflows and asset performance could develop, moving markets from a low- to a high-volatility state, with negative implications for emerging market economies. Such stress might be triggered as part of the exit from unconventional monetary policy or by other sources, including a sharp retrenchment from risk taking due to higher geopolitical risks.*

Relative to the April 2014 *Global Financial Stability Report* (GFSR), the Global Financial Stability Map indicates that the locus of risks has shifted because an increase in *risk appetite* has driven the search for yield and pushed up market and liquidity risks (Figures 1.1 and 1.2). *Credit risks* in the global financial system have declined, reflecting favorable funding conditions and

improved asset quality. Responding partly to regulatory initiatives, the global banking system is now much better capitalized than at the onset of the financial crisis in 2008. However, adapting to the new business realities, including strengthened regulatory requirements, has made profitability a challenge for banks. Although lower profitability partly reflects cyclical factors and lower risk taking, it signals the need for a deeper overhaul in many global banks' business models, which would include a combination of repricing existing business lines, reallocating to higher-risk activities, and retrenching from some products (discussed in the section "Global Banks in Transition: Reprice, Reallocate, or Restructure").

Macroeconomic risks are unchanged, with the global economic recovery proceeding slowly. Reflecting several setbacks, the growth projections have been marked down for 2014, although they remain largely unchanged for 2015, as detailed in the October 2014 *World Economic Outlook*. Moving from liquidity- to growth-driven markets, discussed in the April 2014 GFSR, requires a greater balance between economic and financial risk taking. So far in 2014, economic risk taking has been lagging in most advanced economies. In the United States, a better investment outlook provides more evidence of "green shoots," but recent macroeconomic data for the euro area and other advanced economies have dashed hopes for a quickening of the recovery. In emerging markets, economic risk taking has been rising, but with signs of a continued buildup of leverage and deteriorating credit quality. The imbalances between economic and financial risk taking are examined further in the section "Are Economic and Financial Risk Taking Balanced?"

Monetary and *financial conditions* continue to be accommodative because the recovery is not yet fully self-sustaining, and markets anticipate low interest rates for longer. The market's central expectation of the U.S. policy rate path remains broadly in line with the smooth exit scenario outlined in the April 2014 GFSR. Both market- and survey-based expectations continue pointing to about the middle of 2015 for the first policy rate hike (Figure 1.3, panel 1). The decline

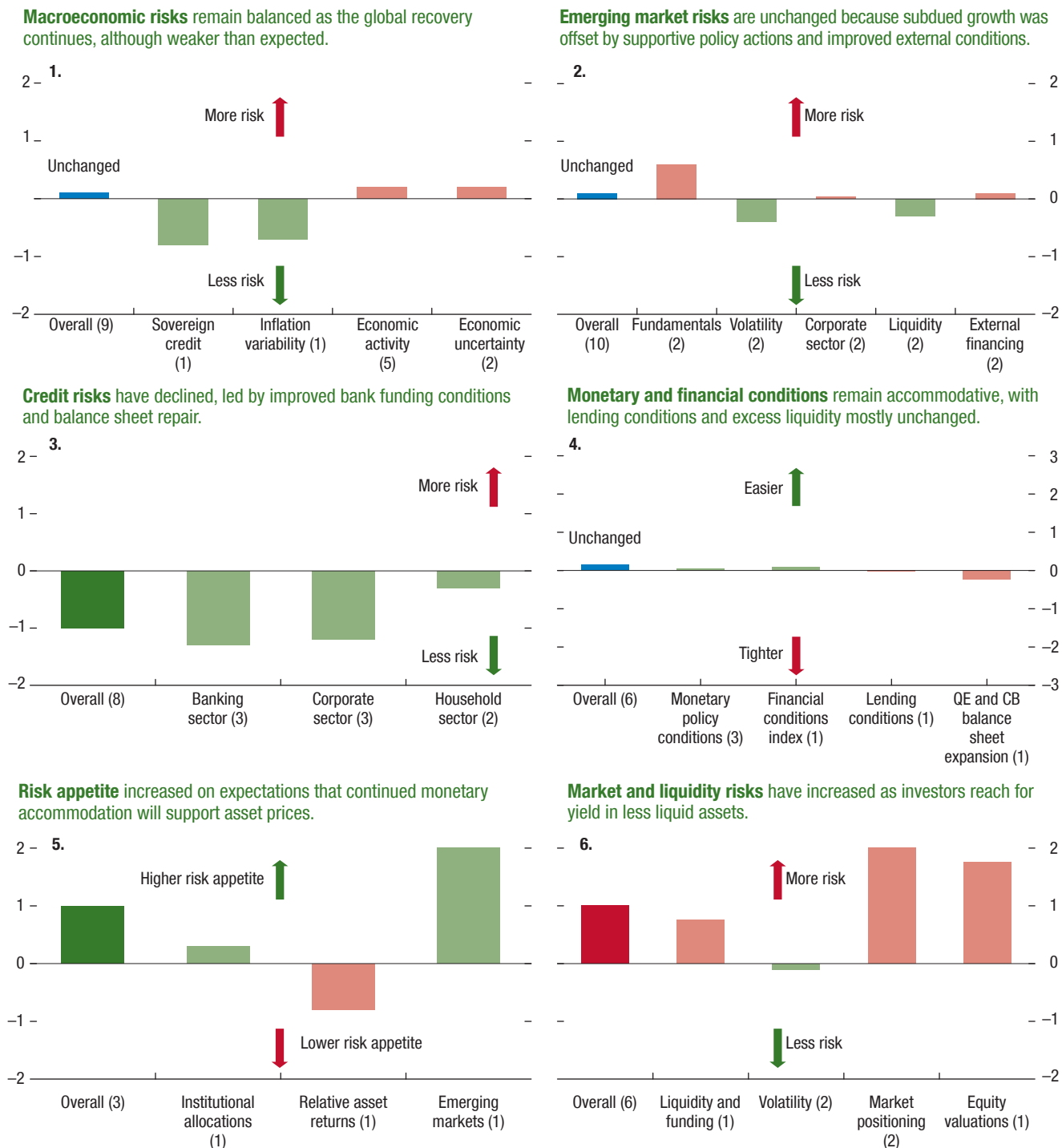**Figure 1.1. Global Financial Stability Map**
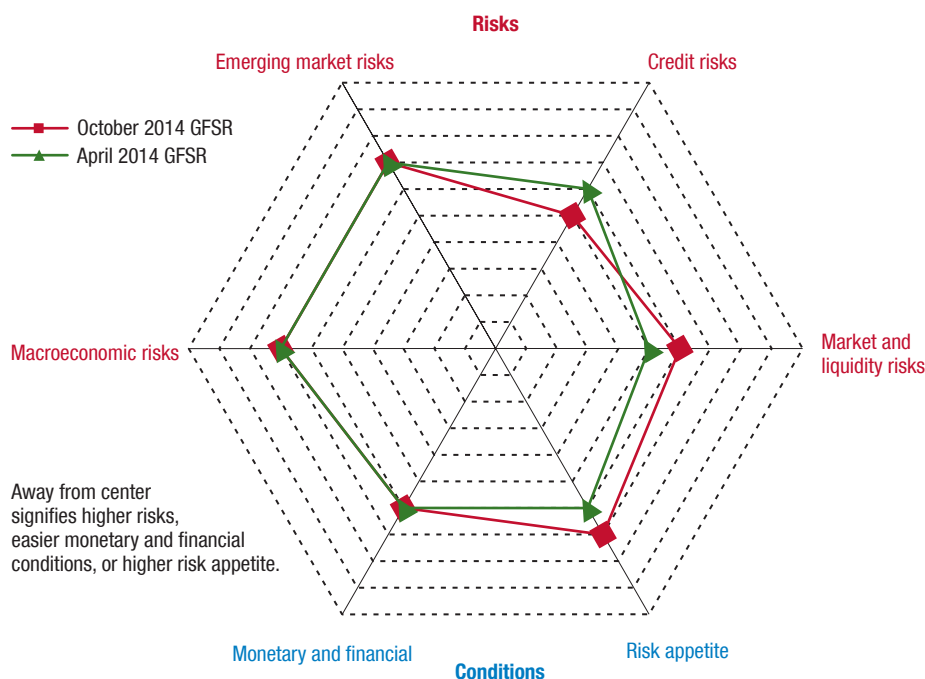
Source: IMF staff estimates.

in the 10-year Treasury rate since April 2014 has been driven equally by a decline in the term premium and a reduction in the expected terminal federal funds rate (Figure 1.3, panels 3–5). The lower term premium may be temporary, given that it remains low relative to historical averages, but the lower terminal rate could be structural, reflecting weaker trend growth expectations. In turn, lower rates for longer extend the search for yield and the buildup of financial stability risks discussed throughout this chapter.

Emerging market risks are unchanged because more favorable external financing conditions are set against a rise in regional geopolitical risks (in particular the increase in tensions surrounding Ukraine and Russia and the heightened tensions in the Middle East, with potential impacts on global financial, trade, and commodity markets), pockets of domestic imbalances, and idiosyncratic factors, such as Argentina's debt litigation proceedings. External imbalances that led to currency and bond sell-offs in 2013 have improved in 2014, although some current accounts are still deeply in deficit (Figure 1.4, panel 1). Recent improvements in inflation expectations for some emerging markets provide welcome monetary policy space, and the decline in global interest rates is reflected in the favor-

able performance of emerging market assets this year (Figure 1.4, panel 4). Nevertheless, inflation in several major emerging markets remains elevated and warrants caution. As discussed in the April 2014 GFSR, rising leverage may expose households, banks, and nonfinancial firms to additional strains, especially if rates rise and growth slows.

Market and *liquidity risks* have increased significantly. Financial markets have rallied, despite relatively disappointing performance of the real economy (Figure 1.5), reflecting the ongoing search for yield, which has increased asset prices and compressed spreads. A bird's-eye view provided by the global asset heat map (Figure 1.6, panel 1) shows that across most asset classes, prices have become elevated. Except for emerging market high-yield bonds and equities, asset prices are elevated (and spreads are narrow) relative to their behavior of the past 10 years. Beyond valuations, strong flows into mutual funds have boosted liquidity in credit markets, masking the deterioration of other liquidity measures, such as the depth and breadth of liquidity. Furthermore, structural features of the asset management industry (discussed in the section "Rising Market Liquidity Risks") may amplify the impact of liquidity shocks.
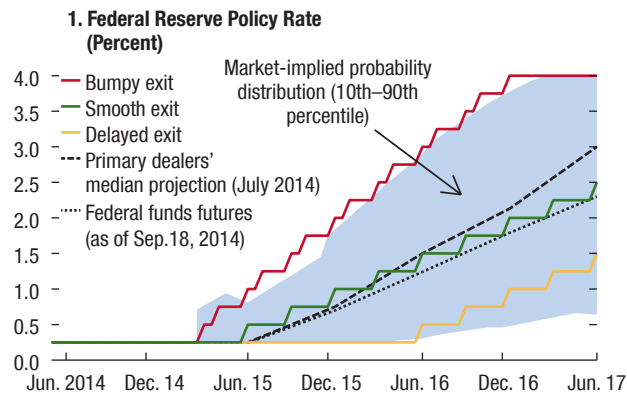
Figure 1.2. Global Financial Stability Map: Risks and Conditions
(Notch changes since the April 2014 GFSR)

Macroeconomic risks remain balanced as the global recovery continues, although weaker than expected.

Emerging market risks are unchanged because subdued growth was offset by supportive policy actions and improved external conditions.

Credit risks have declined, led by improved bank funding conditions and balance sheet repair.

Monetary and financial conditions remain accommodative, with lending conditions and excess liquidity mostly unchanged.

Risk appetite increased on expectations that continued monetary accommodation will support asset prices.

Market and liquidity risks have increased as investors reach for yield in less liquid assets.

Source: IMF staff estimates.
Note: Changes in risks and conditions are based on a range of indicators, complemented with IMF staff judgment (see Annex 1.1. in the April 2010 GFSR 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 next to each legend indicates the number of individual indicators within each subcategory of risks and conditions. For lending conditions, positive values represent slower pace of tightening or faster easing. CB = central bank; QE = quantitative easing.

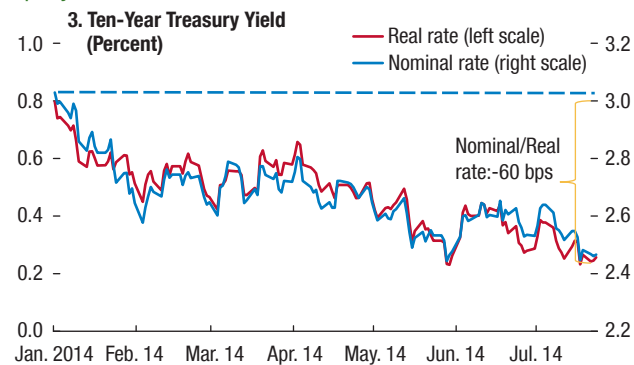## Figure 1.3. United States: How Far along the Exit Process?

Both market- and survey-based expectations of the liftoff date still center around the middle of 2015...

1. Federal Reserve Policy Rate
(Percent)

...while the pace of rate hikes is still expected to be about 300 basis points over a three-year period.

2. Expected Cumulative Changes in the Federal Funds Rate
(Basis points, after June 2015)

Sources: Bloomberg L.P.; Federal Reserve Bank of New York; and IMF staff calculations.
Note: Market implied probability distribution is derived from eurodollar options as of September 18, 2014.
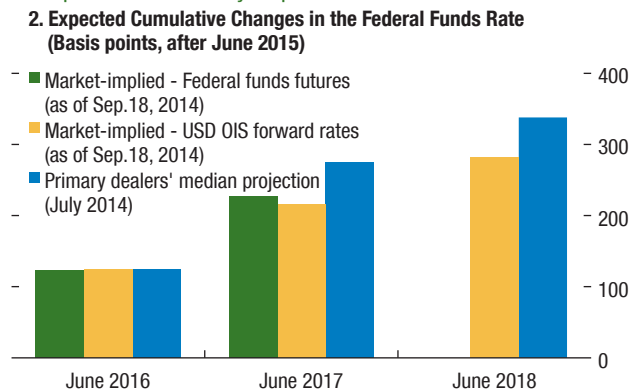
Sources: Bloomberg L.P.; and Federal Reserve Bank of New York.
Note: Federal funds futures are not available beyond July 2017. USD OIS = U.S. dollar overnight indexed swap.

The 10-year rate has declined in the first half of the year due equally to two factors...

3. Ten-Year Treasury Yield
(Percent)

...a decline in the term premium...

4. Ten-Year Term Premium
(Percent)

Sources: Bloomberg L.P.

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

...and a decline in the expected terminal Federal funds rate to about 3.50–3.75 percent.

5. Terminal Federal Funds Rate
(Percent)

The second factor could be structural and may depress 10-year rates and prolong the search for yield.

6. Ten-Year Treasury Rate Projection
(Percent; average over next 10 years)

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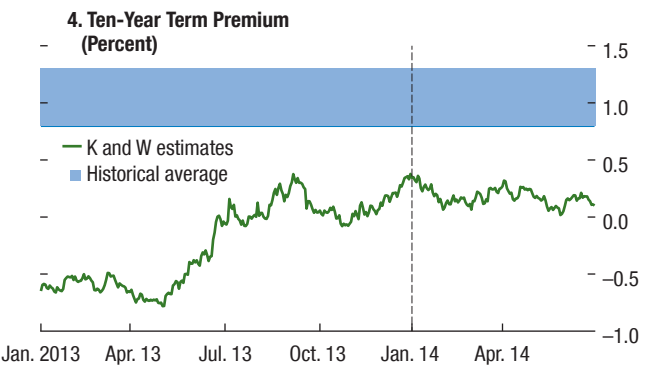Note: The market-implied terminal rate is derived from the 10-year Treasury rate, the 10-year term premium (Kim and Wright, 2005), and the expected months to liftoff in the federal funds rate. The pace of rate hikes is assumed to be 100 basis points per year until the terminal rate is reached. FOMC =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

Source: IMF staff projections

Figure 1.4. Emerging Market Developments

Improvements in external balances...

1. WEO 2014 Forecast Current Account Balance
(Percent of GDP)

As of October 2013 WEO   Current
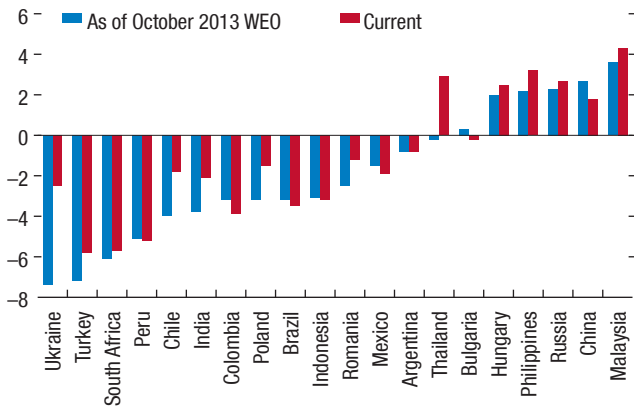
Source: IMF, World Economic Outlook database.

...and, for some, in inflation...

2. WEO 2014 Forecast Headline Inflation Expectations
(Percent, year-over-year)

As of April WEO   Current   ● Change

Inflation expectations decline
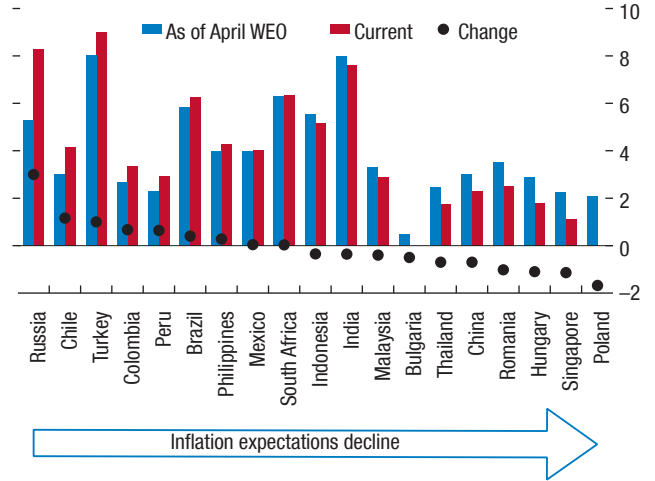
Source: IMF, World Economic Outlook database.

...have allowed the market to reprice the monetary policy space...

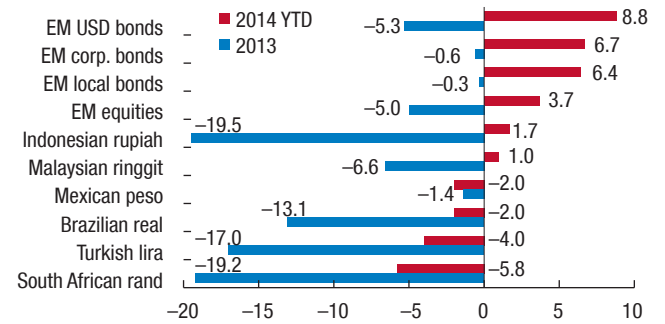**3. Expected Policy Rates by end of 2015:Q1**

As of March 26, 2014
As of Sept 18, 2014

POL THA HUN CHL MEX PHL COL ZAF IDN TUR BRA

Change in the expected policy rate is due to changes in:

■ Market expectations   ■ Policy rate   ● Total
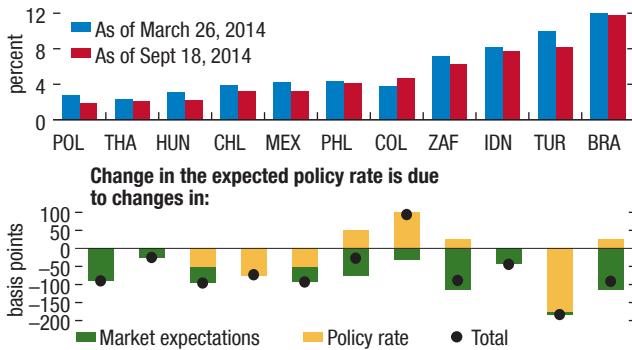
Sources: Haver Analytics; IMF, Economic Data Sharing System database; and IMF staff calculations.
Note: Data labels use International Organization for Standardization country codes.

...which has been reflected in asset performance so far in 2014.

4. Major Emerging Market Asset Performance
(Returns; percent)

■ 2014 YTD
■ 2013

	2013	2014 YTD
EM USD bonds	−5.3	8.8
EM corp. bonds	−0.6	6.7
EM local bonds	−0.3	6.4
EM equities	−5.0	3.7
Indonesian rupiah	−19.5	1.7
Malaysian ringgit	−6.6	1.0
Mexican peso	−1.4	−2.0
Brazilian real	−13.1	−2.0
Turkish lira	−17.0	−4.0
South African rand	−19.2	−5.8

Sources: Bloomberg L.P.; and JPMorgan Chase & Co.
Note: EM = emerging market; USD = U.S. dollar; YTD = year to date.

But corporate leverage and household indebtedness have continued to rise.

5. Bank Credit and Household Debt Levels
(Percent of GDP)

Bank credit to corporations
Household debt (right scale)
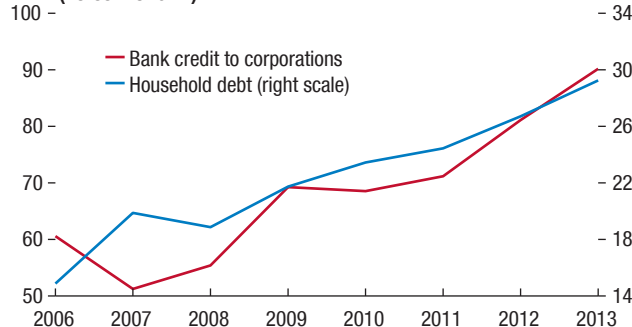
Sources: Bank for International Settlements; CEIC; IMF, Financial Soundness Indicators database; and IMF staff calculations.

Figure 1.5. Financial Markets Are Buoyant, Despite Economic Disappointments
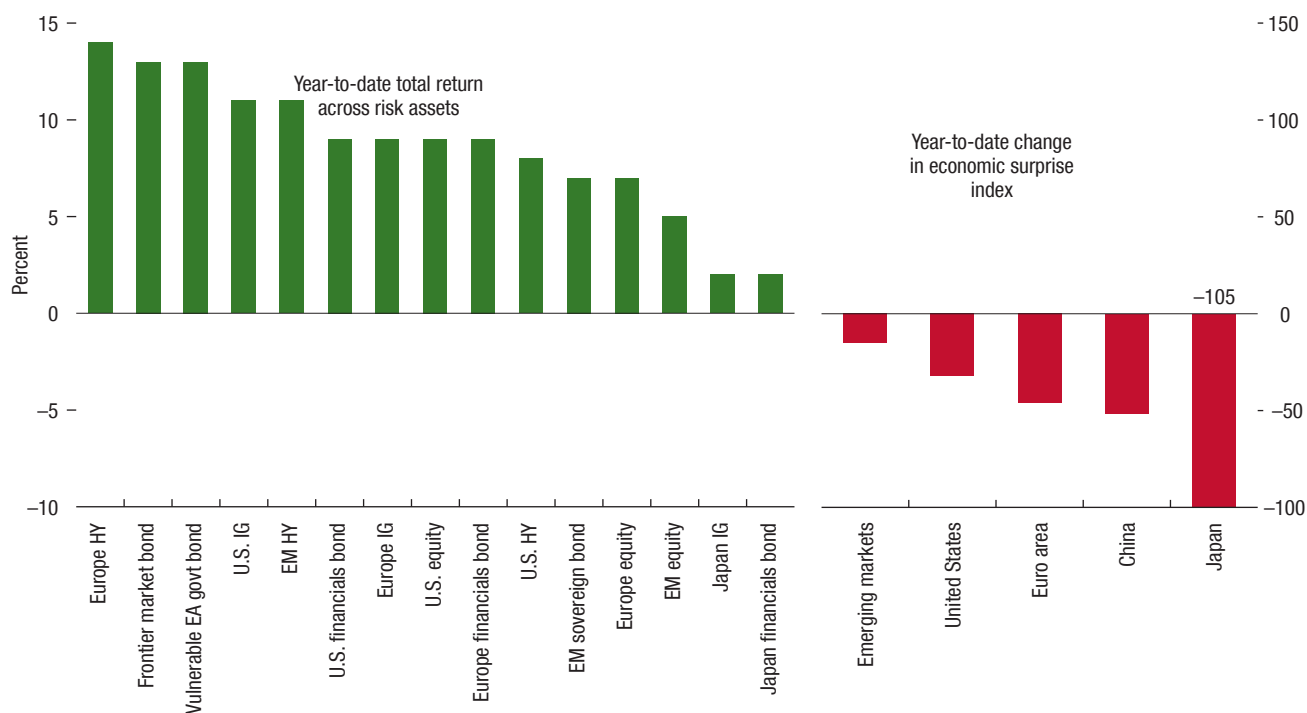
Source: IMF staff calculations.
Note: EM = emerging markets; EA = euro area; HY = high yield; IG = investment grade.

Although there do not appear to be extreme valuations in any single asset class, valuations in virtually all the major asset classes are simultaneously stretched relative to norms, which is historically rare; moreover, volatility has reached record lows across the asset spectrum (Figure 1.6, panel 2). The search for yield, leverage, innovation, and high dependence on common factors across markets all lead to highly correlated mispricing and low volatility across assets last observed in the run-up to the global financial crisis.

- *In almost all fixed income classes, prices are higher than long-term norms and risk premiums are unusually low.* In advanced economy sovereign bonds, term premiums remain low across the board relative to expectations for growth and inflation. They are particularly low for bonds in Germany, Japan, and other advanced economies (Figures 1.27 and 1.28 in Annex 1.1).
- *Sovereign bond spreads in some countries have become compressed by more than predicted by models of fair value.* Annex 1.1 presents different model-based estimates of valuation. Although any modeling exercise of this type faces methodological issues that create

uncertainty around the estimates, it is clear that there is some evidence of overpricing in sovereign bond markets.

- *The high-yield sector, and in particular low-rated corporate credit, is beginning to look worrisome based on valuations.* U.S. high-yield spreads are no longer sufficient to compensate for default (based on an average default cycle). Issuance patterns for bonds are stretched more than average and are becoming increasingly so as the cycle extends. Based on historical experience, the rising share of riskier issues in total credit issuance foreshadows subpar returns. Indeed, high-yield issuance has taken off in both the United States and the rest of the world, and both in absolute terms and as a ratio of total corporate debt issuance, while underwriting standards continue to weaken, with growth in covenant-lite loans and payment-in-kind notes.
- *Equity prices in some advanced economies are stretched relative to historical norms, but not across the board.* Annex 1.1 shows that implied real equity yields are compressed in the United States and in several other advanced economies. At the same time, real equity

Figure 1.6. Global Heat Maps

1. Asset Price Heat Map
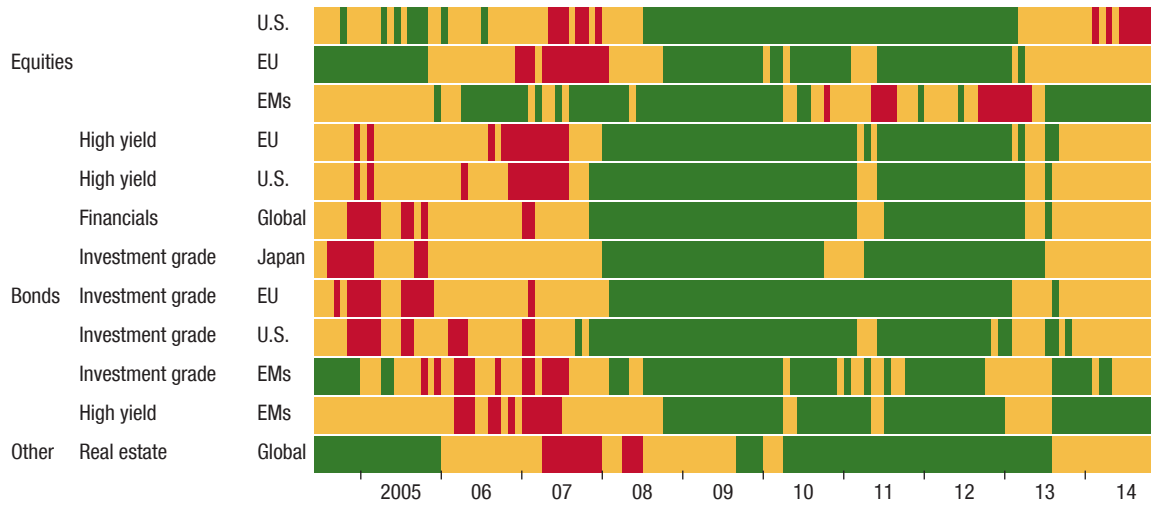
Source: IMF staff calculations.
Note: red = top (bottom) 10 percent of equity prices (bond spreads); green = bottom (top) 50 percent of equity prices (bond spreads); yellow = remainder of the price (spread) distribution over July 2004–September 2014. EM = emerging market; EU = European Union; U.S. = United States.

2. Volatility Heat Map
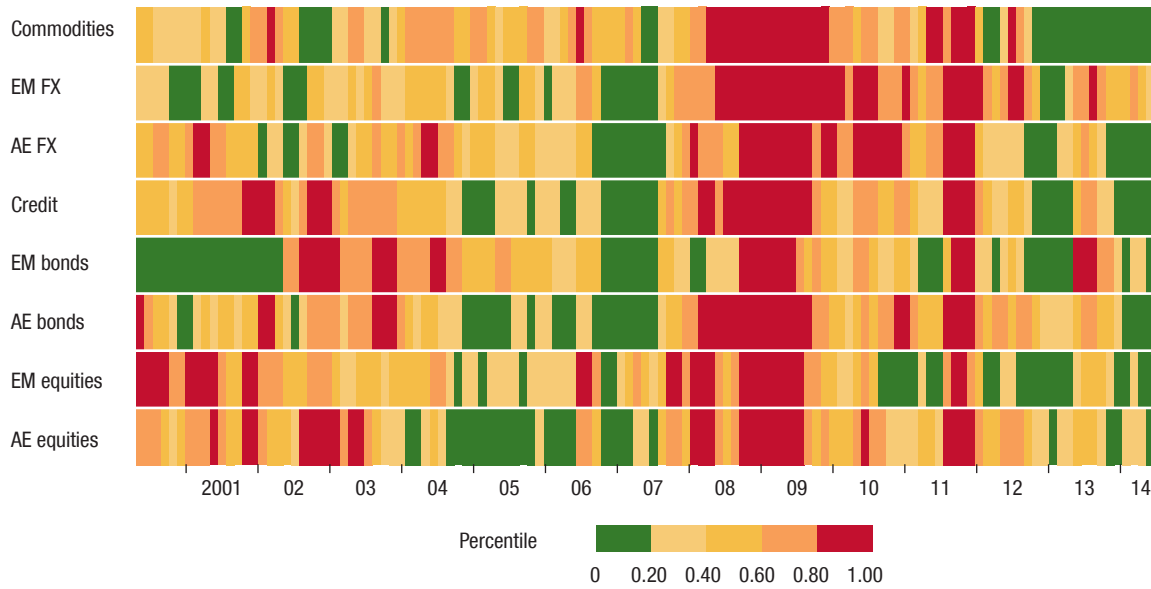
Sources: Bloomberg L.P.; and IMF staff calculations.
Note: Percentiles of three-month realized volatility. AE = advanced economy; EM = emerging markets; FX = foreign exchange. Percentile value of 1 corresponds to the maximum level of asset volatility for the entire period; 0 corresponds to the minimum.

yields are relatively high in other countries, including many emerging markets, indicating that equities in those markets are relatively cheap vis-à-vis historical norms. Overall, except for the United States (see next section), relatively little evidence is to be found of "bubble-like" behavior in nonprice data, such as investor fund flows, issuance patterns, and surveys of expected future returns.

- *Real estate and other assets offer a mixed story, with elevated prices and pockets of overvaluation.* At the global level, real estate imbalances are not as widespread as in the run-up to and the early stages of the global financial crisis; however, country-level vulnerabilities are still evident. After a period of decline in the initial stages of the global financial crisis, the IMF's Global House Price Index has been inching up, with strong rebounds in house prices in many countries. During the past 12 months, house prices have increased in about half of the advanced economies and about two-thirds of the emerging market economies included in the index, and key valuation metrics, such as house price-to-income and house price-to-rent ratios, remain greater than historical averages for many countries (Annex 1.1).

- *Across asset classes, volatility has reached record lows.* Realized volatilities have declined to 15-year lows (Figure 1.6, panel 2), despite a few idiosyncratic risk-off episodes in emerging market economies. Even more striking is that volatility has become highly correlated across most major asset classes, which has coincided with the simultaneous and widespread pattern of prices exceeding historical norms.

Are Economic and Financial Risk Taking Balanced?

Accommodative monetary policies in advanced economies have facilitated balance sheet repair and increased economic risk taking, contributing to a brighter outlook for capital expenditure, especially in Japan, the United Kingdom, and the United States. At the same time, however, accommodative policies may be causing too much financial risk taking, as reflected in compressed credit spreads, low volatility, and asset prices that are both elevated and highly correlated. Corporate leverage in the United States has risen, and default cushions have eroded in lower-rated segments of high-yield corporate bond markets as underwriting standards have weakened. In emerging markets, strong investor risk appetite has fueled corporate borrowing

at low spreads, while bond issuance continues to grow rapidly. Overall, in the absence of a large adverse shock, leverage does not yet appear to be at critical levels across companies in emerging markets, but corporate vulnerabilities are more pronounced in China.
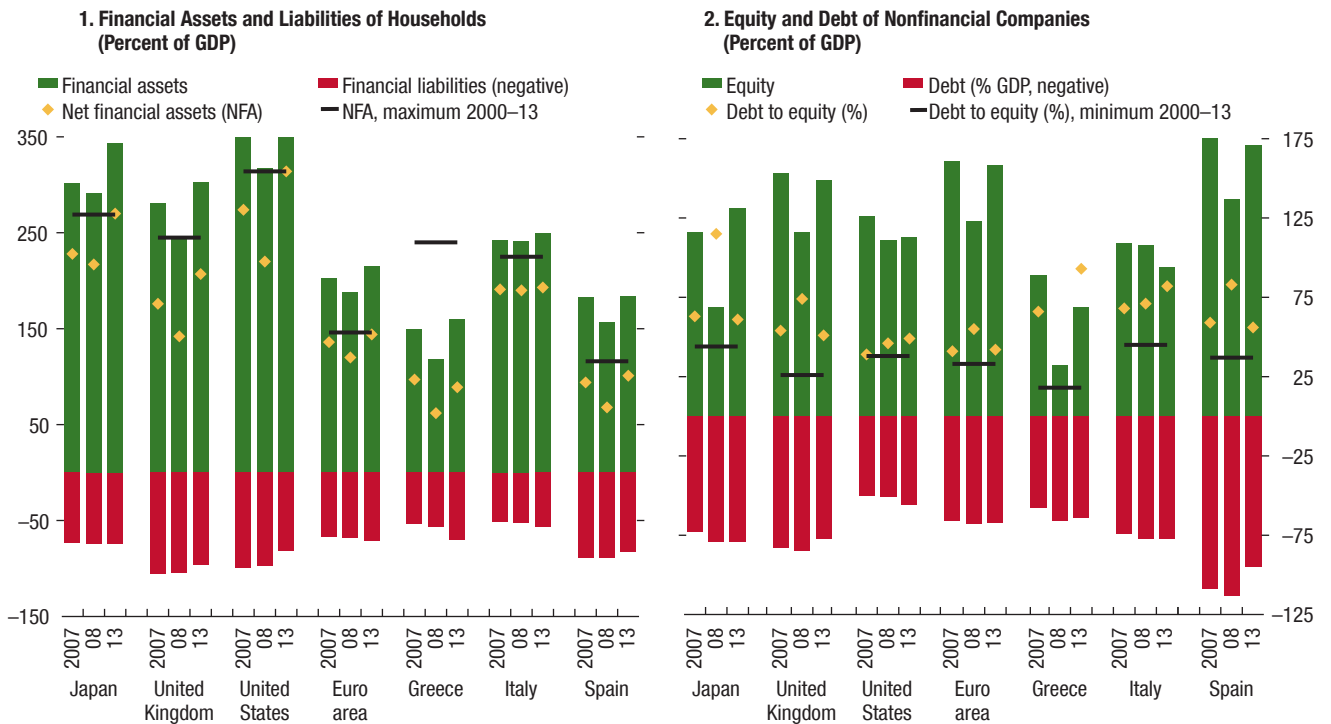
The use of accommodative conventional and unconventional monetary policies involves a trade-off between the upside benefits from support for balance sheet repair and economic risk taking, and the downside stability risks from an extended period of financial risk taking. Too much financial risk taking raises financial stability risks that may undermine growth, while too much economic risk taking can result in overconsumption or overinvestment and increased leverage as households and firms ramp up borrowing. This section assesses this balance, focusing on the corporate sector, balance sheet metrics, and credit and equity markets in advanced and emerging market economies.

Despite improvements, balance sheet repair is incomplete

Monetary policy actions and other remedial steps have supported asset valuations and balance sheet repair in advanced economies since 2008, but progress remains uneven across countries:

- Household balance sheets in the United States and the United Kingdom have improved since the global financial crisis, with a decline in household liabilities coupled with gains in household financial assets from higher equity prices (Figure 1.7, panel 1). The net asset position of Japanese households has also improved noticeably compared with 2007, mainly reflecting a sharp rise in the market value of financial assets, with household debt as a share of GDP little changed. By contrast, the recovery in household net financial assets has lagged in the euro area. Gross financial assets of euro area households have surpassed 2007 levels but so have household liabilities in France, Greece, and Italy, indicating substantially smaller net gains compared with other countries. Household liabilities as a share of GDP are high in Ireland, Portugal, and Spain.

- Corporate leverage has dipped from crisis highs as equity markets have recovered, but leverage generally remains well above recent lows (Figure 1.7, panel 2). Large-scale asset purchases by the Federal Reserve pushed down long-term borrowing costs, and U.S. nonfinancial firms have increased their debt loads, with the result that U.S. corporate leverage remains

Figure 1.7. Indebtedness and Leverage in Selected Advanced Economies

1. Financial Assets and Liabilities of Households
(Percent of GDP)

- Financial assets
- Financial liabilities (negative)
- Net financial assets (NFA)
- NFA, maximum 2000–13

2. Equity and Debt of Nonfinancial Companies
(Percent of GDP)

- Equity
- Debt (% GDP, negative)
- Debt to equity (%)
- Debt to equity (%), minimum 2000–13

Sources: National statistics; Haver Analytics; IMF World Economic
Outlook database; and IMF staff estimates.
Note: Last quarter scaled by GDP in year.

Sources: European Central Bank; national statistics; Haver Analytics;
IMF World Economic Outlook database; and IMF staff estimates.
Note: Debt calculations include an adjusment for estimated intercom-
pany loans, where necessary. Credit market debt over net worth
(market value) for United States.

relatively high compared with the precrisis average. In Japan, the financial health of the corporate sector has continued to improve as firms have paid down debts and rebuilt liquidity buffers (Kang 2014). In a number of European countries, the corporate sector remains highly leveraged because countries have been slow to address corporate debt overhangs although some recent progress has been made. In these countries, the benefits of unconventional monetary policy have been transmitted only very gradually given the still fragmented state of euro area financial markets.

Economic risk taking is lagging financial risk taking

Low rates have encouraged firms to take on greater levels of debt, but the effect on investment and productive capacity has been muted. Despite reasonable earnings growth (in some countries) and access to funding at very low interest rates, corporations in advanced economies have, until recently, been reluctant to accelerate capital investment. This reflects the backdrop of uneven

balance sheet repair, impaired credit transmission, and weak business confidence and outlook for medium-term growth, as discussed in the WEO.
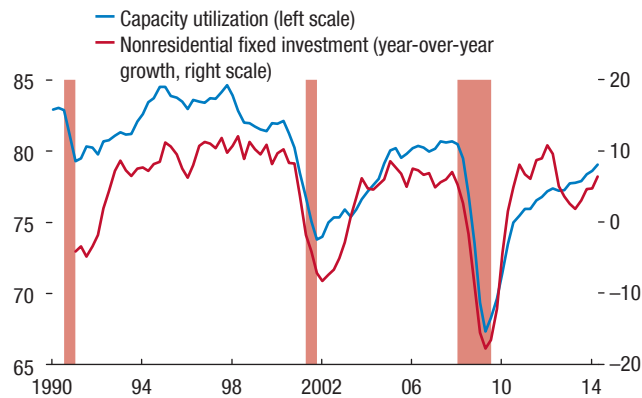
A review of past investment cycles across a range of countries offers some hopeful indications.[1] This analysis shows that where balance sheet repair and monetary policy are more supportive, there are better prospects for economic risk taking and capital expenditure. Gains in both earnings and stock market valuations since 2009 augur well for capital investment. So does the deleveraging that has occurred in some countries and sectors, given the negative correlation between existing leverage and investment. But the picture across different regions is still decidedly mixed.

[1]Employing a broad panel of 1,200 firms in five countries (France, Germany, Japan, the United Kingdom, the United States) for the past 15 years, analysis of corporate balance sheets shows a persistent, robust relationship between earnings, expected profits, leverage, and cost of funds on the one hand, and capital investment on the other. Both current earnings, in the form of return on assets, and expected future profits, as gauged by the ratio of a company's stock market value to its book value (sometimes called "Tobin's q"), are shown to have a positive and statistically significant relationship to capital investment (see Annex 1.2).

Figure 1.8. United States: Capital Expenditure Developments in Nonfinancial Firms

Investment is picking up as capacity utilization is getting back to precrisis levels...
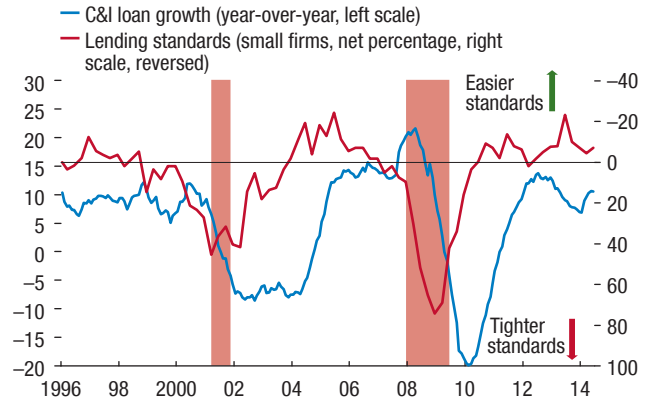
1. Capacity Utilization and Business Fixed Investment
(Percent)

- Capacity utilization (left scale)
- Nonresidential fixed investment (year-over-year growth, right scale)

Sources: Federal Reserve; and IMF staff estimates.
Note: Pink bars indicate National Bureau of Economic Research recession dates.

...and banks are loosening lending standards.

2. Lending Standards for Corporate Loans and Commercial and Industrial (C&I) Loan Growth
(Percent)

- C&I loan growth (year-over-year, left scale)
- Lending standards (small firms, net percentage, right scale, reversed)

Easier standards

Tighter standards

Source: Federal Reserve Senior Loan Officer Survey.
Note: Pink bars indicate National Bureau of Economic Research recession dates.
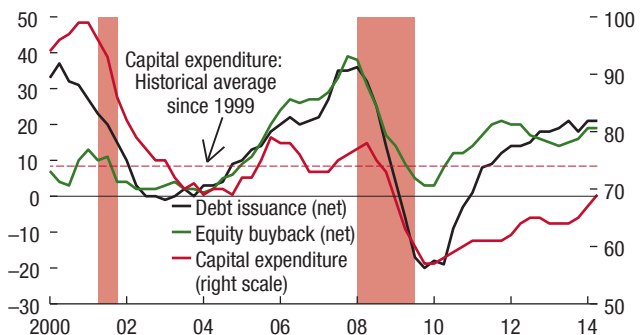
Economic policy uncertainty is declining...

3. Economic Policy Uncertainty Index
(1985–2009=100, 6-month moving average)

Sources: Baker, Bloom, and Davis (2012); Haver Analytics; and IMF staff estimates.
Note: Pink bars indicate National Bureau of Economic Research recession dates.

...while more debt issuance is now getting used for capex.

4. NFCs: Debt Issuance, Capex, and Equity Buybacks
(Percent of operating cash flows on a four-quarter trailing basis)

Capital expenditure: Historical average since 1999

- Debt issuance (net)
- Equity buyback (net)
- Capital expenditure (right scale)

Sources: Federal Reserve; and IMF staff estimates.
Note: Capex = capital expenditure; NFC = nonfinancial corporation. Pink bars indicate National Bureau of Economic Research recession dates.

Most advanced is the United States, where business fixed investment is picking up, although at a more muted rate than in previous recoveries. Capacity utilization is returning to precrisis levels, banks are loosening lending standards on commercial and industrial loans, and economic policy uncertainty is declining (Figure 1.8). As a result, loan growth has accelerated recently, and the Philadelphia Federal Reserve's capital expenditure outlook has turned up, while corporate debt issuance has been increasingly used more for investment (raising future earnings) than equity buybacks (increasing financial leverage). If sustained, these trends could lead to further gains

in capital investment and economic risk taking in the United States in the coming months.

In Japan, business confidence was boosted by the implementation of extraordinary monetary accommodation by the Bank of Japan in 2013 (the monetary "first arrow" of "Abenomics"), leading to a recovery of nonresidential investment. An aging capital stock and high capacity utilization rates have also contributed to the investment recovery, along with stronger corporate earnings and easier financing conditions. Healthy balance sheets have enabled firms to respond to stepped-up growth expectations.

Figure 1.9. Euro Area Nonfinancial Firms: Capital Expenditure Developments

Bank lending remains anemic as...

1. Euro Area Credit Conditions
(Percent)
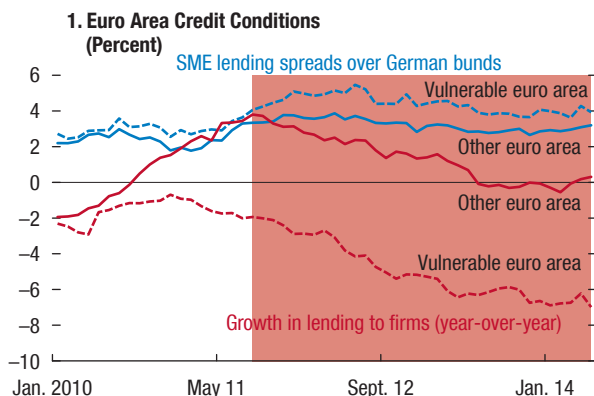
Sources: European Commission; Eurostat; and IMF staff estimates.
Note: Shows spreads of one- to five-year corporate loans of less than €1
million to five-year German bunds. SME = small- and medium-sized
enterprises. Vulnerable euro area countries are those that have faced a
sharp fall in bank lending. In this chart, the group includes Greece, Ireland,
Italy, Portugal, and Spain. Other euro area comprises Austria, Belgium,
France, Germany, and Netherlands.

... tight lending standards and elevated economic uncertainty...

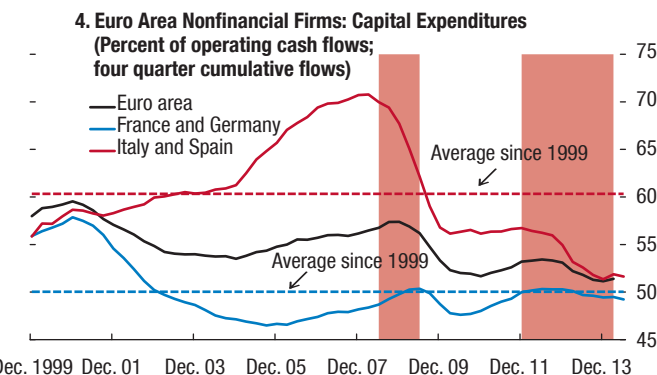**2. European Economic Policy Uncertainty and Lending Standards**
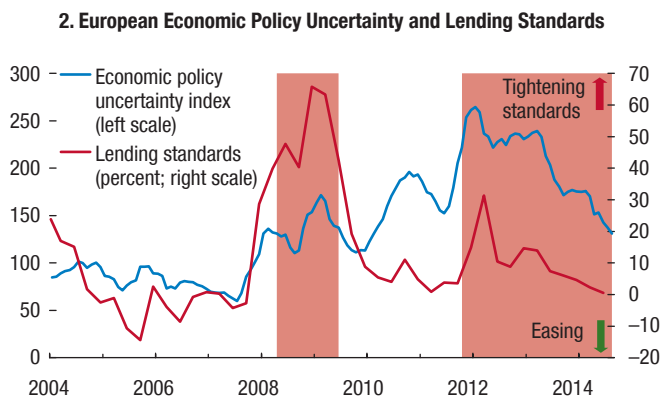
Sources: Baker, Bloom, and Davis (2012); Haver Analytics; and IMF staff estimates.
Note: Lending standards show the change in credit standards for SME loans over
the past three months, on a net percentage basis. SME = small- and medium-
sized enterprises. Pink bars indicate Center for Economic Policy Research
recession dates.

... continue to dampen prospects for capital expenditure, while
incoming data do not point to a strong pickup either.

3. Euro Area Companies' Investment and PMI
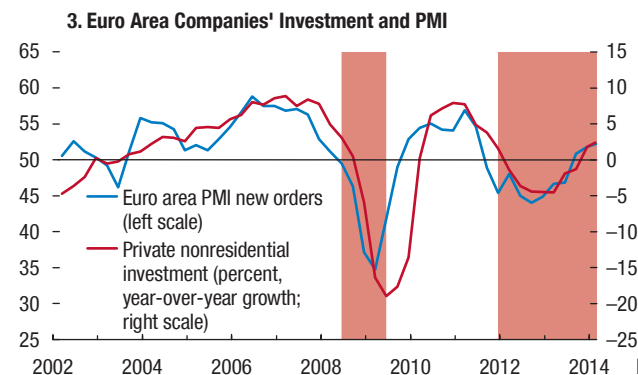
Sources: Haver Analytics; and IMF staff calculations.
Note: PMI = Purchasing Managers' Index. Pink bars indicate Center for
Economic Policy Research recession dates.

Capital expenditure remains below its historical average.

4. Euro Area Nonfinancial Firms: Capital Expenditures
(Percent of operating cash flows;
four quarter cumulative flows)

Sources: European Central Bank; Haver Analytics' and IMF staff estimates.
Note: Figures for Germany include both nonfinancial and financial firms.

In contrast, in the euro area, business fixed invest-
ment—although trending up—remains weak. Capacity
utilization is still below precrisis levels, bank lending
standards have been tightening until recently, and
economic policy uncertainty remains elevated relative
to the precrisis period. As a result, growth in bank
lending to euro area firms continues to be anemic.
The outlook is also clouded by macroeconomic risks,
including weak demand and geopolitical risks, sup-
pressing corporate capital expenditures (Figure 1.9,
panels 1–3), as well as the corporate debt overhang in
some economies (as discussed in past GFSRs). Overall,

euro area corporate capital expenditures, as a percent-
age of operating cash flows, remain below their histori-
cal average (Figure 1.9, panel 4).

In a number of major emerging market economies
capital expenditures by nonfinancial firms have declined
across the board in 2013, amid weakening export growth,
tightening credit standards, and deteriorating business
confidence. As a result, growth in corporate borrow-
ing from banks has decelerated from about 10 percent
(precrisis average) to 5 percent, in real terms, and leading
indicators do not point to a strong pickup in capital
expenditures in the near future.

Figure 1.10. Financial Risk Taking and Volatility

Unconventional policies shift the normal risk-return trade-off of monetary policy.

Low volatility and high asset prices are highly synchronized.

1. Risk-Return Trade-offs under Different Monetary Policies

2. Volatility and Asset Price Percentiles
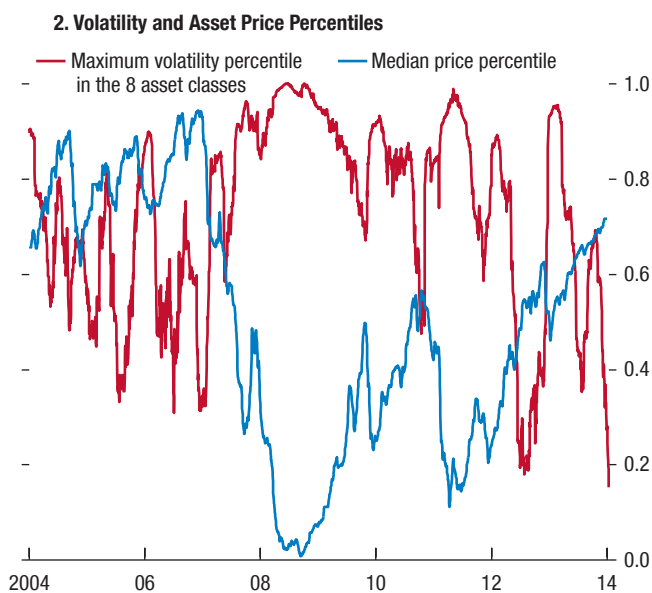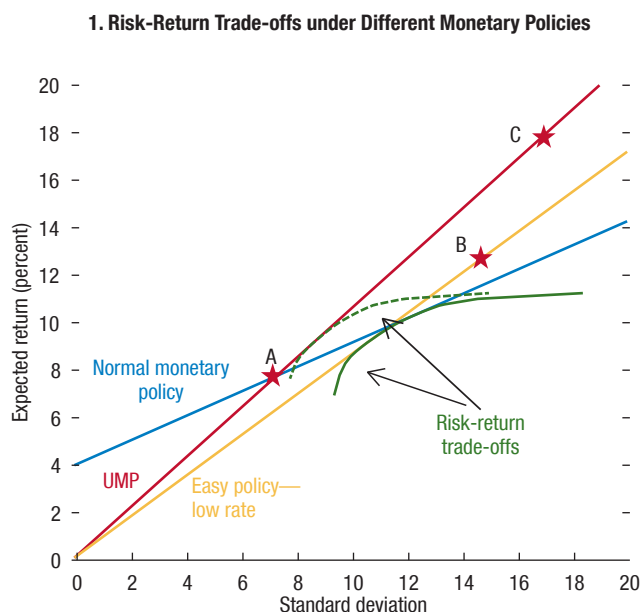
Sources: Bloomberg L.P.; and IMF staff calculations.
Note: A decline in the policy rate shifts the efficient frontier (from blue to orange) and moves the optimal portfolio from A to B. A decline in volatility with UMP shifts the efficient frontier again (from orange to red) and the optimal portfolio moves from B to C. UMP = unconventional monetary policy.

Sources: Bloomberg L.P.; and IMF staff calculations.
Note: The eight asset classes are advanced economy equities; emerging market equities; advanced economy bonds; emerging market bonds; corporate credit; advanced economy foreign exchange rates; emerging market foreign exchange rates; and commodities.

Financial risk taking is on the rise

With the shift to accommodative and unconventional monetary policies, the incentives faced by some investors also shift, and this can lead them to take on greater financial risks. A version of the capital asset pricing model (CAPM) illustrates the channels through which conventional and unconventional monetary policies can promote financial risk taking by some investors—for example, asset managers who have relatively unrestricted capacity to leverage. The consequences of this behavior are most evident in the markets for higher-risk fixed-income assets.

Under normal monetary policy, when the policy rate is significantly higher than zero and asset price volatility is normal, an investor will be able to construct portfolios with normal risk and return combinations (Figure 1.10, panel 1, blue line, point A).[2] As the

"safe" interest rate declines with policy easing under monetary accommodation, the return available from the safe asset falls, but so does the cost of borrowing, changing the available risk-return combinations (from the blue line to the orange line) and inducing investors who have the capacity to do so to increase leverage (from point A to B).[3] As unconventional monetary policy is implemented, financial volatility diminishes, further shifting the risk-return possibilities (to the red line). In addition to holding greater leverage because of lower interest rates, leveraged investors become even more willing to hold risky assets (point C) because the volatility of those assets has declined. In practice, this portfolio rebalancing channel of monetary policy has encouraged some investors to "search for yield" and take on more financial risks. Asset volatility has continued to fall steadily in 2014, with realized

---

[2]This example assumes an investor with mean-variance utility and the capacity to take on leverage. Relative risk aversion is held constant through the policy changes. Efficient frontiers for the basket of risky assets are calculated based on daily price changes in a basket of 11 different asset classes for the period 2001–13, while "safe" rates are based on

prevailing policy rates. The shift in the risk-return trade-off depicted by the move from the solid to the dashed green curve in Figure 1.10 corresponds to the decline in portfolio volatility in the 2011–13 period.
[3]An increase in borrowing on the part of some investors must be matched by an increase in lending from other participants in the financial system, such as the banking sector.

volatilities declining to 15-year lows (Figure 1.10, panel 2), despite a few idiosyncratic risk-off episodes in emerging market economies.[4] Even more strikingly, the declines in volatility toward record low levels have been highly correlated across most major asset classes. Asset prices show a pattern similar to that of volatilities, with a simultaneous and widespread pattern of prices above historical norms, although, as highlighted earlier, there are no extreme valuations in major asset classes.

Corporations also may engage in financial risk taking. With improved debt profiles, high interest rate coverage, and easy refinancing conditions, U.S. nonfinancial firms do not face imminent debt-repayment problems (Figure 1.11, panel 1). However, U.S. corporate leverage—measured by both gross debt and net debt (that is, excluding cash holdings) as a percentage of assets—has risen during the past three years. The ratio of net debt to internal cash flows, which has been a good predictor of credit spreads and turning points in the credit cycle—at least until recently—is now greater. Moreover, as corporate leverage has risen, credit spreads have continued to narrow, diverging from the traditional, more fundamental relationship between leverage and spreads observed during the past 25 years (Figure 1.11, panel 2).

As a result, spread cushions in the lower-rated U.S. corporate bond market have eroded (Figure 1.11, panel 3).[5] For U.S. corporate bonds rated B- and CCC, current credit spreads are no longer sufficient to protect against an average default cycle. Meanwhile, underwriting standards in the leveraged loan market continue to deteriorate, despite supervisory concerns raised by the Federal Reserve, the Office of the Comptroller of the Currency, and the Federal Deposit Insurance Corporation. For instance, about 30 percent of leveraged loan transactions this year had leverage ratios (LRs) more than six times earnings before interest, taxes, depreciation, and amortization (Figure 1.11, panel 4), a level deemed risky by supervisors. Meanwhile, covenant-lite issuance of leveraged loans (often used as an indicator of weaker underwriting standards) continues to grow because origination activity is starting to shift from

banks to nonbanks that are less tightly regulated.[6] A further indication of the uptick in financial risk taking is the acceleration in mergers and acquisitions by U.S. companies, with 2014 trending to be a potentially record year.

Pricing in some equity markets also points to a greater degree of financial risk taking. In the U.S. equity market, valuations are now higher than historical averages by most standard measures (Figure 1.12, panel 1). It is estimated that about half of the rise in U.S. equity prices since end-2012 has come from a decline in the equity risk premium rather than an increase in earnings, in contrast to the euro area and Japan (Figure 1.12, panel 2). Moreover, the quality of earnings is deteriorating. Recent gains in S&P 500 earnings have been driven primarily by rising operating profit margins that are now at peak levels, while sales growth is decelerating (Figure 1.12, panels 3–4). Given the limited potential for further profit margin improvements, especially as the labor market strengthens, earnings growth will have to come increasingly from top-line revenue (sales) growth.

In the euro area the risks associated with financial excesses are more limited. Corporate leverage, measured by both gross debt and net debt, has been on the decline for the region as a whole, suggesting that euro area firms are at a different stage of the credit cycle than their U.S. counterparts, and some face further pressures to deleverage. Reduced reliance on short-term debt funding and rising cash balances relative to short-term debt mean that nonfinancial firms do not face short-term debt-repayment issues. Yet some exuberance is shared with the United States—the pace of European high-yield issuance has exceeded that of U.S. issuance this year, as banks retreat and companies turn increasingly to the bond markets. However, an important distinction is that the credit quality of the European high-yield market is generally better than its U.S. counterpart (that is, with a higher share of bonds rated BB), suggesting that the search for yield has yet to penetrate to the lowest-rated borrowers in the euro area. Meanwhile, trailing and forward-looking price-earnings ratios suggest that equity valuations for the region as a whole are now broadly in line with historical standards, after being depressed for the past three years.

---

[4]The CAPM exercise implies that, even as the volatility of individual assets declines, there is an increase in the volatility of portfolios held by investors who can take on leverage. Intuitively, the increase in their portfolio "betas" more than compensates for the decline in asset volatility.

[5]Spread cushions are calculated as the credit spread during a five-year period minus expected losses during the same period. Expected losses are derived from a distribution of cumulative realized default and recovery rates over a rolling five-year cycle since 1985 based on data from Moody's.

[6]A recent study by Moody's (2014) shows that covenant-lite loans can defer defaults, but over time, these loans have default rates similar to those of other loans.

Figure 1.11. United States: Nonfinancial Corporations' Credit Fundamentals

U.S. firms do not face imminent debt repayment problems...
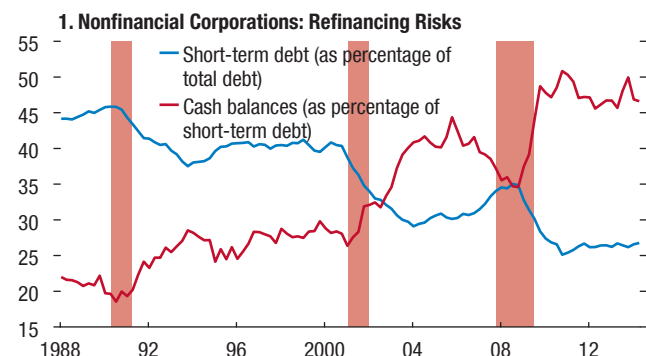
1. Nonfinancial Corporations: Refinancing Risks

Sources: Federal Reserve; and IMF staff estimates.
Note: Pink bars indicate National Bureau of Economic Research recession dates.

...but corporate leverage has risen and credit spreads no longer follow leverage.

2. Nonfinancial Corporations: Leverage and Spreads

Sources: Bank of America Merrill Lynch; Federal Reserve; and IMF staff estimates.
Note: Pink bars indicate National Bureau of Economic Research recession dates.

Default cushions have eroded in lower-rated segments of high-yield corporate bonds...

3. B-Rated Corporate Bond Spreads (Basis points)
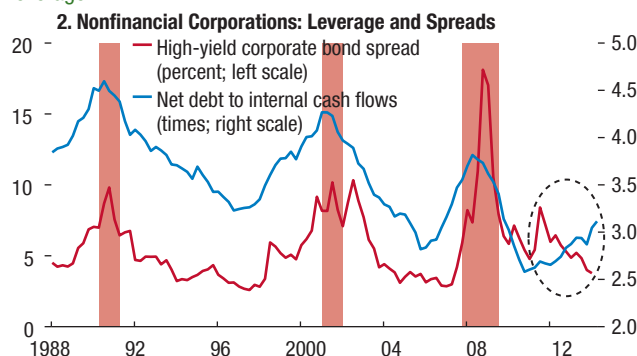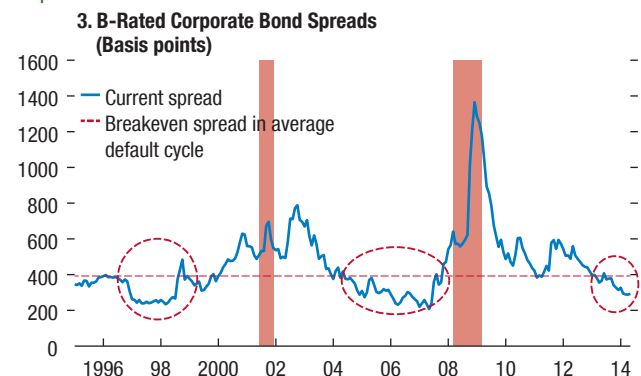

Sources: Bank of America Merrill Lynch; Moody's; and IMF staff estimates.
Note: Pink bars indicate National Bureau of Economic Research recession dates.

...while underwriting standards continue to weaken, despite supervisory concerns.

4. Leveraged Loan Transactions Greater than Six Times Earnings (Percent of sample)
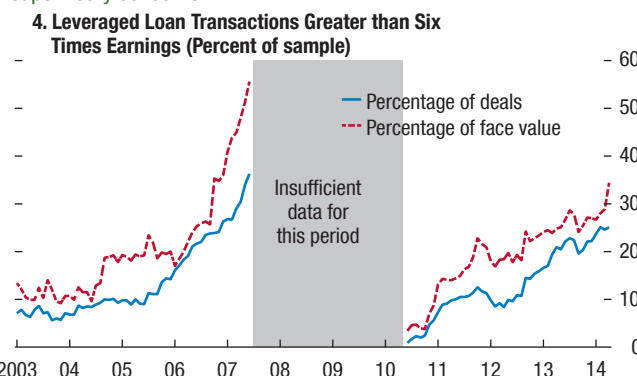
Sources: Deutsche Bank; and IMF staff estimates.

Corporate bond and leveraged loan indicators show deterioration.

5. Search-for-Yield Heat Map
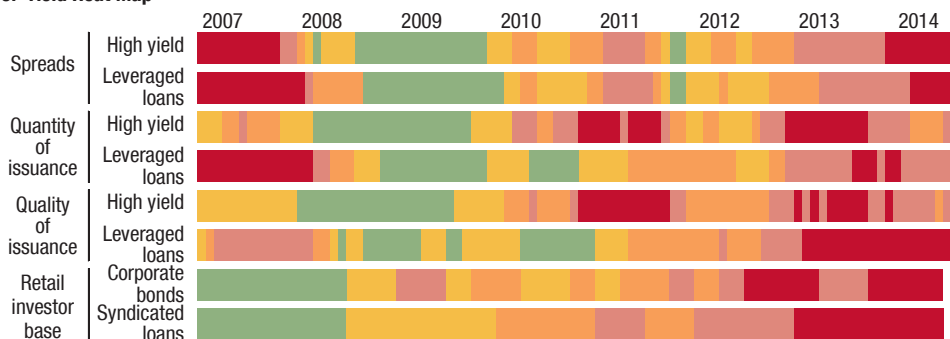
Sources: Bank of America Merrill Lynch; Bloomberg L.P.; Haver Analytics; JPMorgan Chase & Co.; Securities Industry and Financial Markets Association; and IMF staff calculations.
Note: High-yield spread is from Bank of America Merrill Lynch U.S. high-yield master II index (H0A0). Leveraged loan spread is from JPMorgan Chase & Co. leveraged loan index. Quantity of issuance measures the 12-month trailing gross issuance as a share of outstanding amount. Quality of issuance measures the share of high-yield corporate bonds in total corporate bond issuance, and the share of second-lien and cov-lite loans in total leveraged loan issuance (both on a 12-month trailing gross issuance basis). Investor base measures the share of holdings by households, mutual funds, and exchange-traded funds. All observations are measured as a percentile over the period from January 2007 to August 2014. Color coding is based on the percentile, with red (green) indicating lower (higher) spreads, higher (lower) quantity of issuance, lower (higher) quality of issuance, and higher (lower) retail investor base.

Figure 1.12. United States: Equity Market Fundamentals

U.S. equity valuations are rising beyond historical averages.

1. S&P 500 Price-to-Earnings Ratio

— Shiller P/E   — 1-year trailing P/E   — 1-year forward P/E
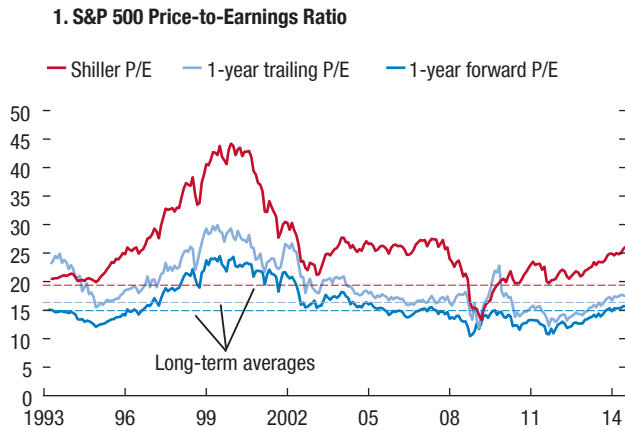
Long-term averages

Sources: Haver Analytics; I/B/E/S; IMF staff calculations.
Note: Long-term averages are from 1954 for Shiller and 1-year trailing P/E,
and from 1985 for 1-year forward P/E. P/E = price-to-earnings.

Growth in earnings accounts for only about half of the rise in U.S.
equity prices.

2. Decomposition of Equity Performance
(Percent contribution from December 2012 through July 2014)

Risk-free rate   Equity risk premium
Earnings (current and projected)   ◆ Total return

United States   Euro area   Japan   Emerging markets
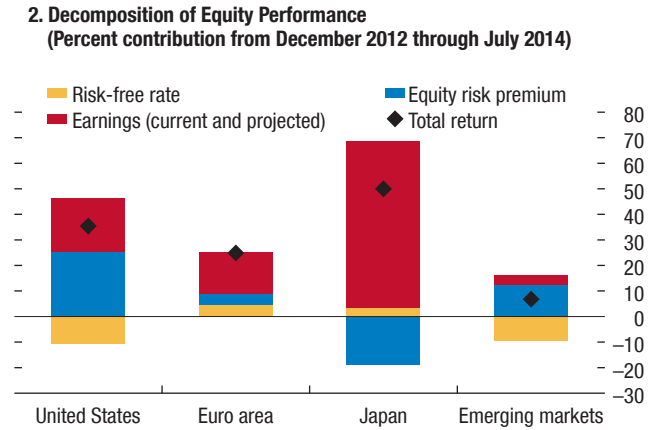
Sources: Haver Analytics; I/B/E/S; J.P. Morgan Chase & Co.; and IMF staff
estimates.
Note: Based on a standard three-stage dividend discount model.

Earnings have been boosted by rising profit margins...

3. Decomposition of S&P 500 Earnings per Share Growth
(Percent, on a 12-month trailing basis)

■ Profit margin
■ Sales per share
● Earnings per share

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

...which are at peak levels, but sales growth is anemic.

4. S&P 500 Sales per Share Growth and Profit Margin
(Percent, on a 12-month trailing basis)

— Sales per share growth (left scale)
-- Operating profit margin (right scale)
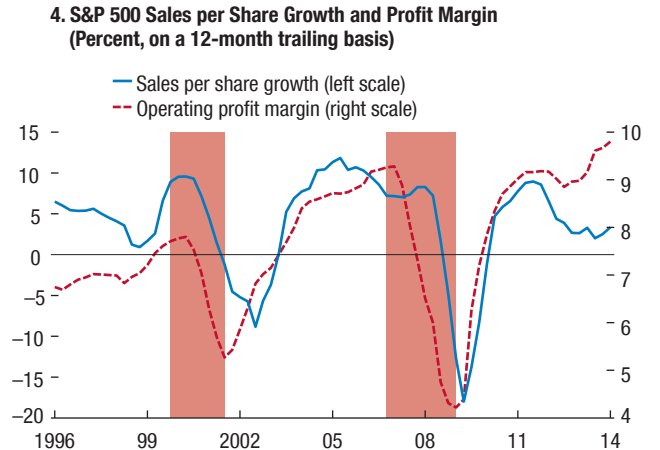
Sources: Standard & Poor's; and IMF staff calculations.
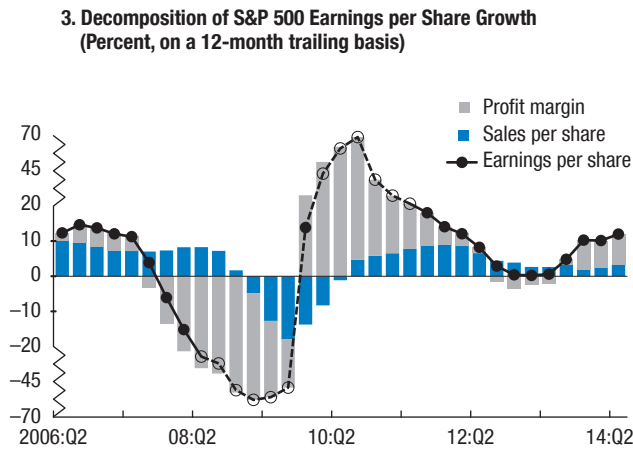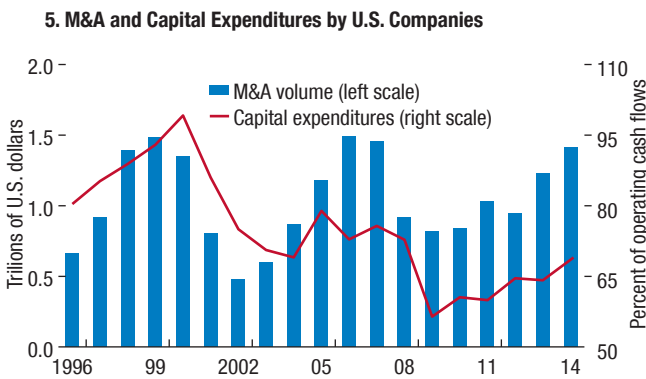Note: Pink bars indicate National Bureau of Economic Research recession dates.

Corporates are turning to M&A activity to boost sales and earnings,
while capital expenditures growth has been modest.

5. M&A and Capital Expenditures by U.S. Companies

■ M&A volume (left scale)
— Capital expenditures (right scale)

Trillions of U.S. dollars

Percent of operating cash flows

Sources: Dealogic; Federal Reserve; and IMF staff calculations.
Note: Capital expenditures as of 2014:Q2. M&A volume for 2014 annualized as
of 2014:Q2. M&A = mergers and acquisitions.

Corporations have to increase sales further to meet earnings
expectations.

6. S&P 500 Earning per Share and Sales per Share Growth
(Percent, on a 12-month trailing basis)

Projections

— Earnings per share
— Sales per share
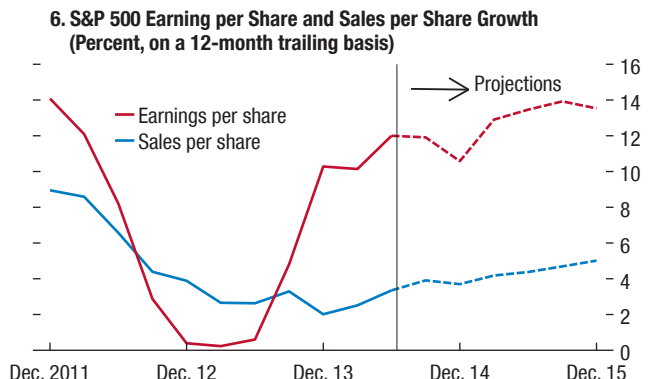
Sources: Standard & Poor's Blue Chip Survey; and IMF staff estimates.
Note: Projected earnings per share growth is based on market expectations
compiled by S&P. Projected sales per share growth is derived from expected
GDP growth from Blue Chip Survey.

Emerging markets: Waning economic risk taking in some, rising financial risks in many

As in many advanced economies, financial risk taking is increasing in emerging market economies. Strong risk appetite continues to fuel corporate borrowing at low spreads, with bond issuance growing 23 percent on an annualized basis in the first half of 2014, close to the five-year annual average growth rate of 28 percent (Figure 1.13, panel 1). The April 2014 GFSR found that firms have become more sensitive to external financing conditions as a result of higher debt loads. This report updates and deepens that analysis, with a particular emphasis on China.

Overall, leverage does not yet appear to be at critical levels (Table 1.1), but some countries and sectors have high and rising debt levels that may complicate the adjustment when financial conditions eventually tighten. Boosted by persistently low interest rates, debt-service capacity has improved in some countries (Chile, Mexico, Indonesia, Thailand, and the Philippines) even as it has declined in others (Argentina, Brazil, China, India, Poland, and Turkey). At the same time, however, the recent slowdown in many economies has eroded profitability, and weak firms—highlighted as a vulnerability in previous GFSRs—continue to post material losses (Figure 1.13, panel 3). Earnings have deteriorated across most sectors (Figure 1.13, panel 4), pushing down interest coverage ratios (Figure 1.13, panel 5). As a consequence, in 2013, the share of total debt-at-risk owed by weak firms in Europe, the Middle East, and Africa (EMEA) and in Latin America has continued to rise, whereas in Asia it stabilized at relatively high levels (Figure 1.13, panel 6).[7] In China, corporate debt-service capacity and profitability have weakened in tandem with slowing growth.

Corporate vulnerabilities in China are rising

Corporate vulnerabilities are rising in China, in large part due to the rapid increase in corporate debt from less than 100 percent of GDP in 2008 to 141 percent in the second quarter of 2014.[8] These vulner-

abilities reflect not only the level but also the distributions of debt and leverage, which are now concentrated in certain segments, including a weak tail in the real estate and construction sectors and among state-owned enterprises (IMF 2014b). Furthermore, deteriorating returns on assets and weaker cash flows have affected debt-servicing capacity across several sectors (Figure 1.14, panels 1 and 2).

Notwithstanding these developments, only one small issuer has defaulted in the history of China's corporate bond market, well below the long-term global default rate of 1.5 percent, and bond spreads have been declining (Standard & Poor's Credit Research 2014). Nonperforming loan ratios have also remained remarkably low at slightly more than 1 percent, within the bottom tenth of a sample of 89 countries. To assess whether corporate vulnerabilities are indeed rising, default probabilities for individual firms that have either listed public equity or issued bonds were estimated using contingent claims analysis. The sample covers about 4,500 firms including state-owned enterprises, private firms, and local-government-financing vehicles (LGFVs). This method uses option pricing theory, equity market prices, and firms' balance sheets to estimate the probability that the value of a firm's assets will drop below a specified distress barrier—defined as short-term liabilities plus 50 percent of long-term liabilities—during the next 12 months.[9]

Default probabilities currently appear to be low with a median for the full sample of firms of well below 1 percent, in part reflecting record-low equity price volatility in common with other global markets. To test robustness, a stress scenario of a fall in equity prices and a rise in volatility calibrated to the 90th percentile from each firm's default probability history (events that, in practice, are clustered around the

---

[7]Debt-at-risk is defined as debts of weak firms with interest coverage ratios (the ratio of earnings before interest, taxation, depreciation and amortization to interest expense) of less than two.

[8]Including bank loans to firms, trust loans, and nonfinancial corporate bonds outstanding. Also includes borrowing by local-government financing vehicles (LGFV) for which debt stands at an estimated 30 percent of GDP. The status of LGFV liabilities, includ-

ing whether they should be considered as public or corporate debt, remains the subject of discussion (IMF 2014b).

[9]Based on the methodology described in Jobst and Gray (2013) and Gray (2009). The results presented are actual one-year default probabilities. The distributions for asset values were estimated using a jump diffusion model to account for skew and kurtosis and fitted on the empirical distribution of changes in equity markets with an additional adjustment suggested by Gray (2009) to better reflect expected default frequencies. This method does not consider the impact that state ownership or implicit guarantees from third parties may have on actual default probabilities. Total liabilities were adjusted to reflect majority stakes and consolidated accounting by non-listed state-owned enterprise parents that have issued bonds. For firms that have only issued bonds, the analysis used the equity prices of a listed counterpart that was matched based on similarities in terms of industry classification, asset size, and leverage.

Figure 1.13. Emerging Market Corporate Debt and Fundamentals

Strong investors' appetite continues to fuel corporate bond issuance...

1. Nonfinancial Corporate Bond Issuance in Hard Currencies
(Billions of U.S. dollars)

■ Noninvestment grade
■ Investment grade
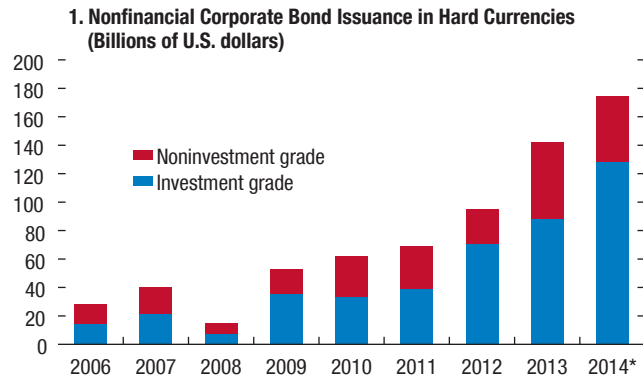
Source: Bond Radar.
Note: Includes bond issuance from Argentina, Brazil, Bulgaria, Chile, China, Colombia, India, Indonesia, Malaysia, Mexico, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey, Ukraine, and Vietnam.
*As at end-June 2014, annualized.

...prompting leverage to rise further.

2. Total Debt, 2011 and 2013
(Percent of total equity)

Source: Capital IQ.
Note: Based on sample median.

Weak firms are still earning negative returns...

3. Return on Assets
(Percent)

● Median of weak firms (five-year average)   ■ Median of weak firms (2013)
● Median of sample (five-year average)   ■ Median of sample (2013)
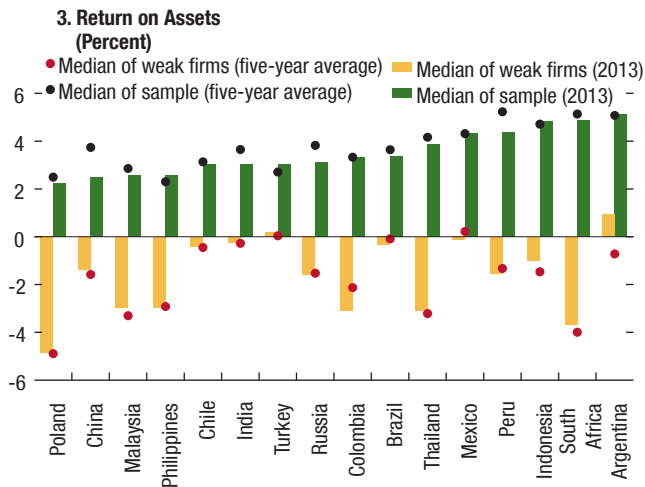
Source: Capital IQ.
Note: Weak firms refer to those with interest coverage ratios (earnings before interest, taxes, depreciation, and amortization divided by interest expense) below 2.

...with earnings falling across sectors.

4. Return on Assets, 2011 and 2013
(Percent)

● Weakest firms   ▲ Strongest firms   ◆ Median
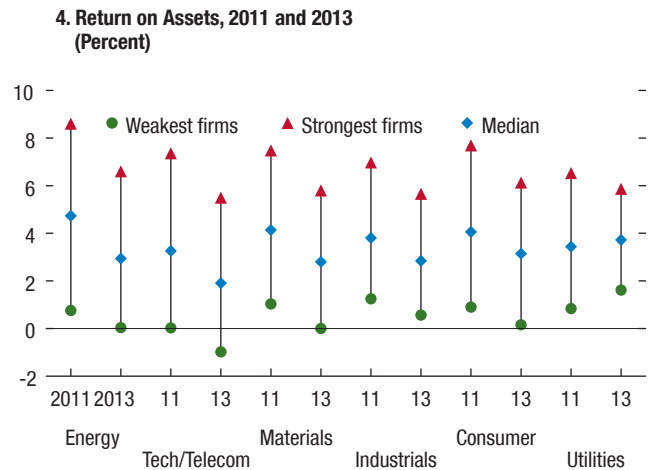
Source: Capital IQ.
Note: Weakest firms are based on the 25th percentile, strongest firms are 75th percentile.

Debt servicing capacity has weakened...

5. Interest Coverage Ratio by Sector, 2011 and 2013

● Weakest firms   ▲ Strongest firms   ◆ Median
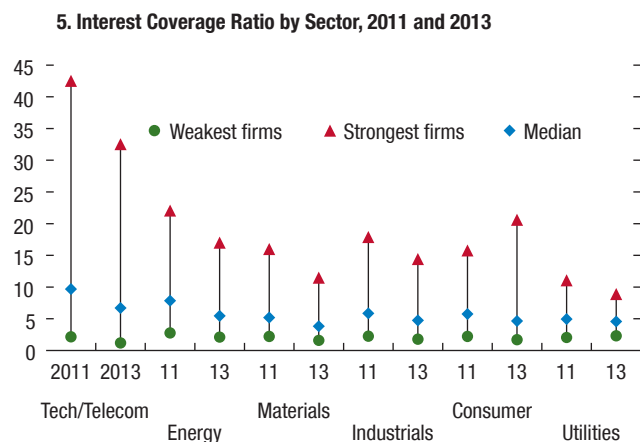
Source: Capital IQ.

...and debt-at-risk is still high or rising.

6. Share of Debt from Firms with Interest Coverage below 2
(Percent of total debt)
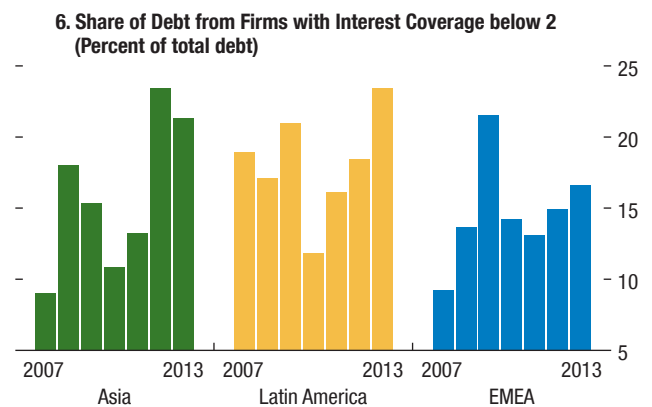
Source: Capital IQ.
Note: EMEA = Europe, Middle East, and Africa.

Table 1.1. Corporate and Banking Sector Fundamentals

	Latin America				Asia						Europe, Middle East, and Africa			
	Argentina	Brazil	Chile	Mexico	China	India	Indonesia	Malaysia	Philippines	Thailand	Poland	Russia	South Africa	Turkey
Change in corporate credit spreads (basis points)[1]	−282	−29	−24	−19	−3	−82	−81	−57	−28	−20	−12	35	−78	−109
Real GDP growth, 2014	−1.7	0.3	2.0	2.4	7.4	5.6	5.2	5.9	6.2	1.0	3.2	0.2	1.4	3.0
Corporate sector[2]														
Leverage: Total debt-to-total equity	64	79	54	54	29	66	52	24	22	34	25	56	33	57
Profitability: Return on assets	5.1	3.4	3.0	4.3	2.5	3.0	4.8	2.6	2.6	3.9	2.2	3.1	4.9	3.0
Debt service capacity: EBITDA-to-interest expense	2.4	3.1	6.2	6.5	6.6	2.8	6.1	7.4	7.9	9.6	6.0	6.4	7.3	2.7
Banking sector														
Assets:														
Asset quality: Gross NPL ratio	1.7	2.9	2.1	3.2	1.0	4.0	1.7	1.8	2.9	2.3	8.6	6.0	3.6	2.6
Profitability: Return on assets	5.0	1.4	1.5	2.1	1.3	0.7	3.1	1.5	1.6	1.4	1.1	1.9	1.5	2.0
Funding:														
Reliance on noncustomer deposit funding[3]	5	23	49	47	22	18	8	16	33	27	26	44	52	29
Liquidity buffers: Total loan-to-total deposit	68	99	115	113	57	78	96	80	55	110	115	148	106	119
Buffers:														
Loss-absorbing buffers[4]	12.6	13.9	9.8	14.5	10.0	7.4	17.4	11.8	16.0	13.5	11.8	9.5	10.6	12.9
Provision coverage[5]	148	161	109	148	283	47	51	30	119	170	68	71	45	76

Sources: Bloomberg L.P.; Capital IQ; Haver Analytics; JPMorgan Chase & Co.; national authorities; IMF, Financial Soundness Indicators; and IMF staff estimates.

Note: Definitions of capital (for example, Basel II vs. Basel III), provisioning, and NPL vary across countries; therefore, caution is recommended when comparing these data across countries. EBITDA = earnings before interest, taxes, depreciation, and amortization; NPL = nonperforming loans. Indicators are based on 2013 financial statements. Red denotes deterioration relative to five-year average (2009–13); green indicates improvement relative to the five-year average, except for "Change in Corporate Credit Spreads" for which deterioration or improvement is for 2014:H1.

[1]Change in JPMorgan's Corporate Emerging Markets Bond Index (CEMBI) spreads for 2014:H1.
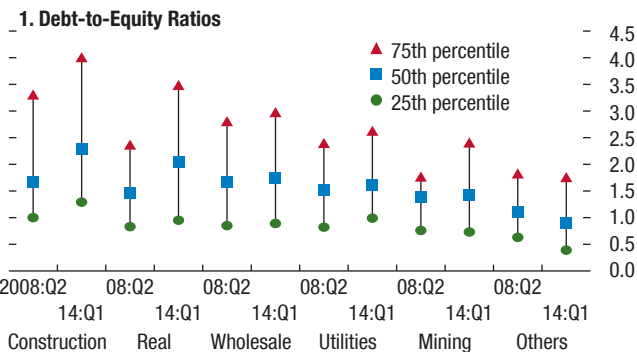
[2]Sample median.

[3]Total Liabilities *minus* Tier 1 Capital *minus* Customer Deposits, all *divided* by Total Liabilities *minus* Tier 1 Capital.

[4]Tier 1 Capital *plus* Loan Loss Reserves *minus* NPL, all *divided* by Risk-Weighted Assets.

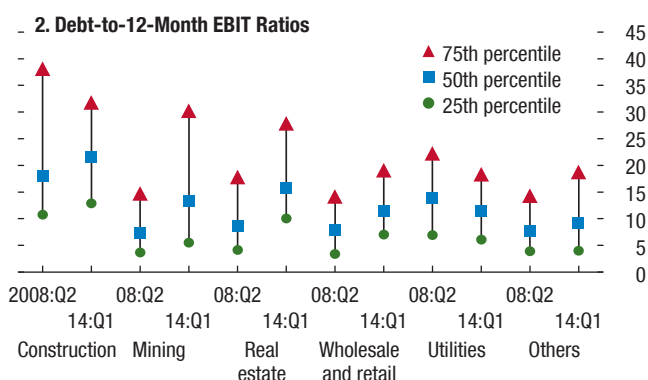[5]Refers to the ratio of specific provisions to NPL, as defined by the Financial Soundness Indicators.

Figure 1.14. China Corporate Indicators

Leverage appears not to have increased significantly...

1. Debt-to-Equity Ratios

▲ 75th percentile
■ 50th percentile
● 25th percentile

Construction   Real estate   Wholesale and retail   Utilities   Mining   Others

2008:Q2   08:Q2   08:Q2   08:Q2   08:Q2   08:Q2
14:Q1   14:Q1   14:Q1   14:Q1   14:Q1   14:Q1

Sources: WIND; and IMF staff calculations.
Note: Sample of firms with available debt and equity data that were listed on a stock exchange or had issued bonds by 2008:Q2 (about 2,412 firms) and 2014:Q1 (about 3,412 firms).

...but debt-servicing capacity is worse, particularly in property-related sectors...

2. Debt-to-12-Month EBIT Ratios

▲ 75th percentile
■ 50th percentile
● 25th percentile

Construction   Mining   Real estate   Wholesale and retail   Utilities   Others

2008:Q2   08:Q2   08:Q2   08:Q2   08:Q2   08:Q2
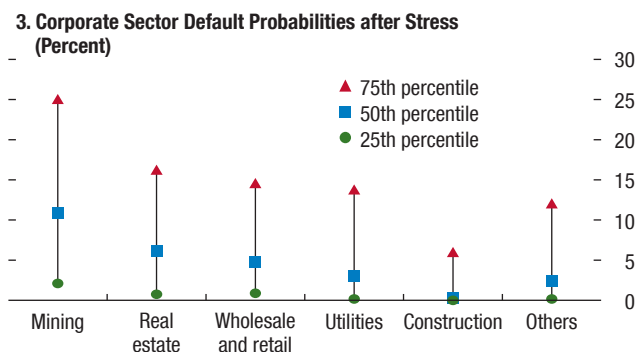14:Q1   14:Q1   14:Q1   14:Q1   14:Q1   14:Q1

Sources: WIND; and IMF staff calculations.
Note: Sample of firms with available debt and EBIT data that were listed on a stock exchange or had issued bonds by 2008:Q2 (about 2,172 firms) and 2014:Q1 (about 3,161 firms). EBIT = earnings before interest and taxes.

...increasing risk of default.

3. Corporate Sector Default Probabilities after Stress
(Percent)

▲ 75th percentile
■ 50th percentile
● 25th percentile

Mining   Real estate   Wholesale and retail   Utilities   Construction   Others

Sources: WIND; and IMF staff calculations.

third and fourth quarters of 2008) was applied. This combination is equivalent to a rise in asset volatility of about 10 percentage points and a 15 percent drop in equity prices for the firm in the upper quartile of default probabilities. In this scenario, default probabilities would rise sharply in some vulnerable sectors. Mining and real estate would see the largest increases, with default probabilities for the upper quartile firms (the weak tail) rising by 24 and 16 percentage points, respectively (Figure 1.14, panel 3). The results are broadly similar when the 581 LGFVs with recent balance sheet data are excluded from the sample. However, for some sectors the default probability for the weak tail rises even further, especially for real estate, which increases by 23 percentage points.

This stress scenario would trigger a substantial increase in the proportion of debt owed by vulnerable firms. For example, the total value of liabilities owed by firms with a default probability of 25 percent or more—equivalent to a highly speculative credit rating for which issuers are considered vulnerable and dependent on favorable conditions to meet their financial obligations—would rise from very low levels to about 21 percent of total liabilities among sample firms (25 percent excluding LGFVs). Overall, a shock to asset values and volatility similar to the one experienced in 2008 would now have a more adverse impact on the corporate sector's credit profile, mainly due to higher leverage in some segments.

These illustrative estimates are based on an extreme (although historical) scenario and do not consider the substantial state backing that many firms would receive in the event of financial distress. At the same time, such explicit and implicit guarantees, by encouraging the flow of credit to more leveraged sectors, are themselves contributing to rising corporate sector vulnerability. For example, during the past 18 months, as medium- and long-term onshore corporate bond yields have increased, bond issuance has been increasingly dominated by LGFVs. A sustainable reduction in corporate vulnerabilities will require more efficient risk pricing, which, in turn, will depend on a gradual rolling back of guarantees, defaults by nonviable firms, and a rebalancing of credit allocation toward more productive areas of the economy.

Risks of default are concentrated in the nonbank sector

Progress has been made in China during 2014 to address some potential vulnerabilities, particularly with

Figure 1.15. China's Shadow Banking and Real Estate Markets

Recent measures to curtail interbank funding of shadow banks have slowed credit growth...

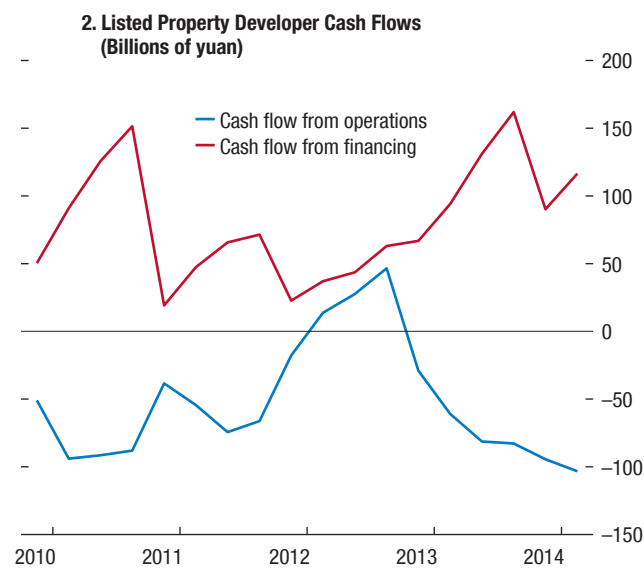...contributing to the slowdown in real estate activity.

1. Interbank Claims and Trust Loans
(Annual percent change)

2. Listed Property Developer Cash Flows
(Billions of yuan)
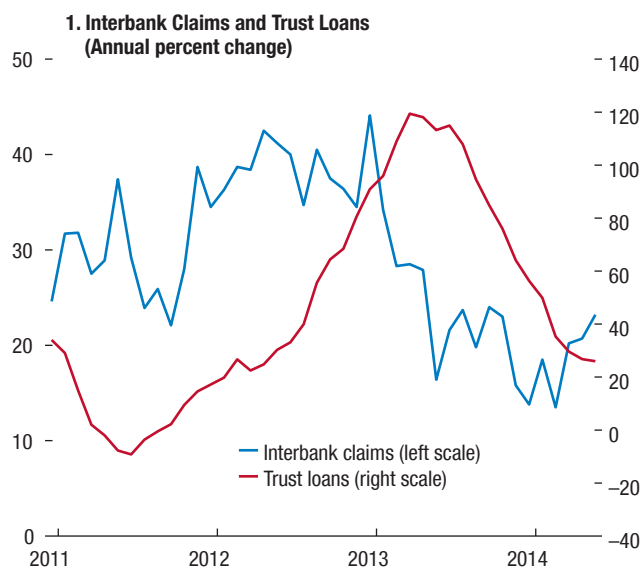
Sources: CEIC; WIND; and IMF staff calculations

regard to credit provided through shadow banking. Measures aimed at restoring the interbank loan market as a tool for short-term liquidity management (instead of a source of cheap funding) appear to have been effective (Figure 1.15). Anticipating tighter rules, banks began to curtail the interbank funding of nonbank credit, slowing down the growth in trust loans. This slowdown has contributed to a welcome cooling off in property market activity, which has come to rely heavily on nonbank funding. Nonetheless, weaknesses in China's property market remain a key risk. At the same time, some parts of the shadow banking sector, including firm-to-firm entrusted loans and funding from wealth management products, continue to expand quickly.

Although banks appear to be prepared for some pickup in corporate defaults, the nonbank (shadow banking) sector is more directly exposed because of a combination of higher-risk lending (especially to the real estate sector) and thin capital cushions. As described in the April 2014 GFSR, nonbanks often lend to borrowers cut off from bank credit because regulators consider them too risky. For example, trust exposures, mainly loans, to property and infrastructure (typically LGFV borrowers with revenues linked to land sales) account for 4 trillion yuan ($647 billion), or more than one-third of total trust assets. Firms

in other sectors also lend to and invest in real estate through entrusted loans which are expanding at 40 percent in annual terms.[10] The capacity for nonbanks to absorb losses is limited—for example, the ratio of assets under management to equity for the trust sector has now risen to 41—which suggests that third-party bailouts, including by banks that sponsored or distributed nonbank products, would be needed if investors are to continue to avoid large-scale losses.

Cross-border spillover risks are on the rise

The risk of direct spillovers to advanced economies from elevated stress in China's financial system continues to rise with the growth in cross-border bank lending. Claims by foreign banks on all sectors in China, including offshore borrowers, have more than tripled in three years to $1.3 trillion, of which one-third is to the nonbank sector. Potential spillovers may also propagate through the bond market given that mainland Chinese firms issued a net $164 billion of international bonds in the four quarters through the

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[10]This rapidly growing form of credit now accounts for 16 percent of GDP, and recent studies suggest that up to 20 percent may be exposed to real estate.

second quarter of 2014, bringing the outstanding stock to about $335 billion.

Global Banks in Transition: Reprice, Reallocate, or Restructure

The ability of financial institutions to provide credit to the economy is essential for channeling financial risk taking into economic risk taking. Much-needed regulatory initiatives have contributed to a strengthening of the banking system, which is now much better capitalized than before the financial crisis. Some global banks, however, are also struggling to adapt to new business realities, with low profitability raising concerns about their ability to build capital buffers and meet credit demand. These banks will require a fundamental overhaul of their business models, including a combination of repricing existing business lines, reallocating capital across activities, or retrenching altogether. More limited bank balance sheet capacity could create headwinds for the economic recovery in some countries, and it will take time for nonbank entities to fill the gap, particularly for financial systems that have traditionally been reliant on bank lending. Policymakers need to ensure that they are fully cognizant of the risks that could develop as the financial system evolves and that these risks are effectively mitigated and managed.

Regulatory reforms have strengthened the global banking system

The global financial crisis uncovered major fault lines in the financial regulatory landscape. Large banks with overleveraged and complex balance sheets, financed by short-term wholesale funding, were at the heart of the problem. Adjustment proceeded in different stages, with the first stage focusing on stabilization through emergency measures, including bank recapitalization and central bank liquidity provision.

In the second phase, regulators all over the world have worked hard to address these vulnerabilities, developing stronger regulatory standards and inducing banks to adjust strategies and accelerate balance sheet repair. Today, banks hold significantly more capital than at the height of the global financial crisis and are also much less leveraged than before the crisis (Figure 1.16, panels 1 and 2).[11]

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[11]Although Basel III (common equity) Tier 1 capital is becoming the key capital benchmark, this chapter focuses on Tier 1 common capital reported by banks because of data limitations.

Progress has been uneven across banks, with some banks still focusing on derisking their balance sheets, whereas others, particularly North American and some European banks, are further along in the balance sheet cleanup and deleveraging process and are in a position to again rerisk their balance sheets (Figure 1.16, panels 3 and 4).
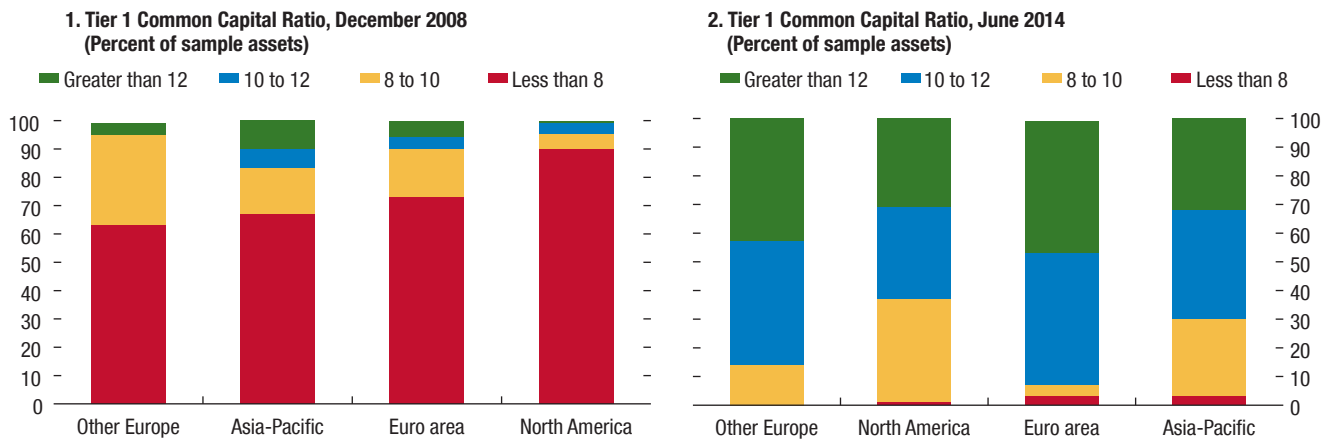
Regulatory reforms have also sought to increase bank resilience by reducing risks associated with wholesale funding and proprietary trading. This has helped strengthen the banking system. Higher capital requirements for market risk, structural restrictions on certain trading activities, and measures increasing the transparency of over-the-counter derivatives markets will undoubtedly strengthen the system. But these reforms have also had the unintended consequence of contributing to subduing market-making and repo activities, reflected in reduced trading activity (Figure 1.17, panels 1 and 2). These developments have also reduced the role of banks as providers of liquidity at times of stress, with potentially important financial stability implications, as discussed in the section entitled "Rising Market Liquidity Risks." Bank resilience to liquidity shocks has been strengthened by a more than doubling in holdings of liquid assets since 2006 (Figure 1.17, panel 1). In some cases, these reforms have led banks to hold more domestic government bonds, maintaining the bank-sovereign link and potentially crowding out private credit. Key recent regulatory reforms are summarized in Annex 1.3.

Banks are struggling to adapt to new realities

Now large banks are entering the third phase—they have become stronger and are emerging from postcrisis balance sheet repair, but need to adjust their business models to new economic realities. Overall, their much-strengthened balance sheets carry higher costs. Bank return-on-equity has fallen to a historically low level, excluding the peak of the financial crisis, because underlying profitability (return on assets) has declined and the capital base has increased (Figure 1.17, panels 3 and 4). Low profitability is partly the price of moving to lower-risk, lower-return activities. It also reflects cyclical factors—a sluggish economy, the burden of nonperforming loans, litigation costs from past misdeeds and low interest margins from near-zero policy rates—structural market changes resulting from

Figure 1.16. Bank Capitalization

Bank core Tier 1 ratios have improved substantially since the global financial crisis...

1. Tier 1 Common Capital Ratio, December 2008
(Percent of sample assets)

Legend: Greater than 12 | 10 to 12 | 8 to 10 | Less than 8

Categories: Other Europe, Asia-Pacific, Euro area, North America

2. Tier 1 Common Capital Ratio, June 2014
(Percent of sample assets)

Legend: Greater than 12 | 10 to 12 | 8 to 10 | Less than 8

Categories: Other Europe, North America, Euro area, Asia-Pacific

...driven in large part by recapitalization...
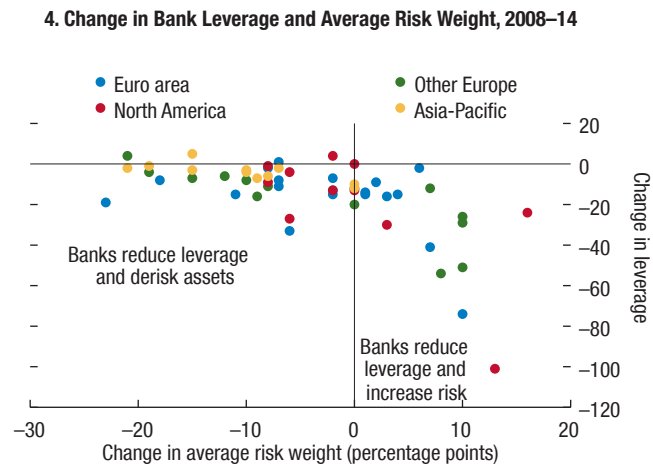
...but progress has been uneven.

3. Change in Tier 1 Capital Ratio, 2008–14
(Percent of risk-weighted assets)

Legend: Derisking | Deleveraging | Recapitalization | Ratio (Dec. 2008) | ◆ Ratio (June 2014)

Categories: Other Europe, Other euro area, North America, Vulnerable euro area, Asia-Pacific

4. Change in Bank Leverage and Average Risk Weight, 2008–14

Legend: Euro area | Other Europe | North America | Asia-Pacific

Banks reduce leverage and derisk assets

Banks reduce leverage and increase risk

Change in leverage

Change in average risk weight (percentage points)

Sources: SNL Financial; and IMF staff calculations.
Note: Panels 1–3 are based on a sample of more than 1,500 advanced economy banks. Panel 4 is based on a sample of about 90 large banks. 2014 data are for 2014:Q2 or latest available. Vulnerable euro area countries are those that have faced a sharp fall in bank lending. In this figure, vulnerable euro area = Cyprus, Greece, Portugal, Ireland, Italy, 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.

regulatory reforms, and acute competition in the context of excess capacity.[12]

At the same time, investors demand high returns from banks, with the cost of equity having risen since before the crisis.[13] According to Bloomberg estimates, after a spike in 2010, the cost of equity of 300 large banks has been slowly trending downward to 13 percent but is still 5 percentage points higher than its 2000–05 historical average as of end-March 2014
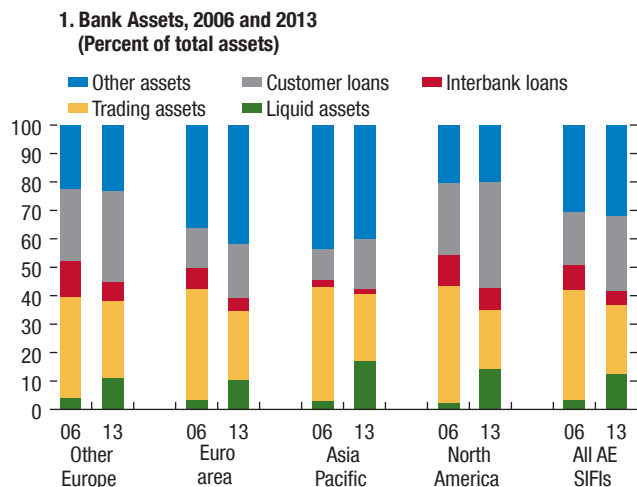
[12]In Europe, the ongoing European Central Bank (ECB) Comprehensive Assessment and related European Banking Authority stress test exercise will help address part of the backlog of nonperforming assets, particularly in the vulnerable euro area, but more needs to be done, including strengthening the bankruptcy and insolvency procedures for firms and accelerating the resolution of nonviable banks, as discussed in the April 2014 GFSR.

[13]The cost of equity represents the rate of return required by shareholders to compensate for the underlying risk of their investment. It can be estimated with the capital asset pricing model as the risk-free rate plus the correlation between the risk premium of the equity in question and that of the overall market (beta) multiplied by the market risk premium.
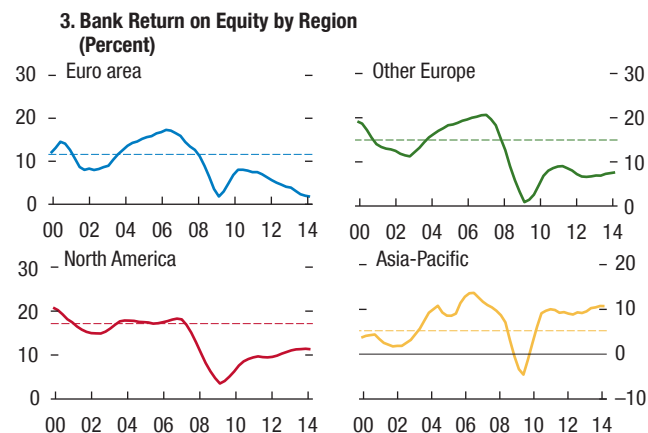
Figure 1.17. Bank Balance Sheets and Profitability

Bank balance sheets have moved in the same direction...

1. Bank Assets, 2006 and 2013
(Percent of total assets)

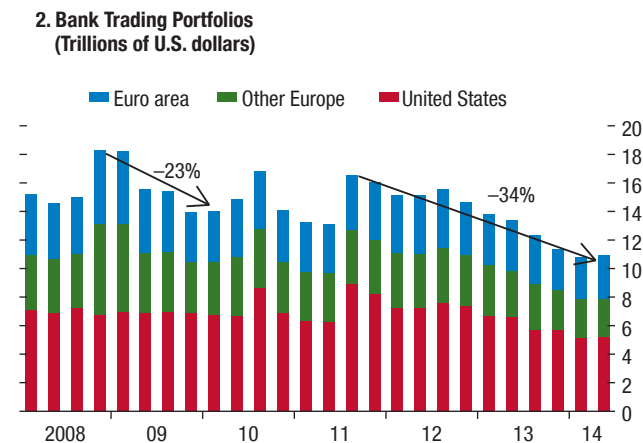■ Other assets ■ Customer loans ■ Interbank loans
■ Trading assets ■ Liquid assets

Sources: Bankscope; and IMF estimates.
Note: Other assets include nongovernment securities in the banking book, reverse repo, and fixed assets. Based on 90 large banks. AE SIFI = advanced economy systemically important financial institution. See note to Figure 1.16 for the countries in each region.

...while trading books have declined since the crisis.

2. Bank Trading Portfolios
(Trillions of U.S. dollars)

■ Euro area ■ Other Europe ■ United States

Sources: SNL Financial; and IMF staff estimates.
Note: Figure drawn for 27 advanced economy banks identified by the Bank for International Settlements as systemically important.

Return on equity is generally lower...

3. Bank Return on Equity by Region
(Percent)

Euro area
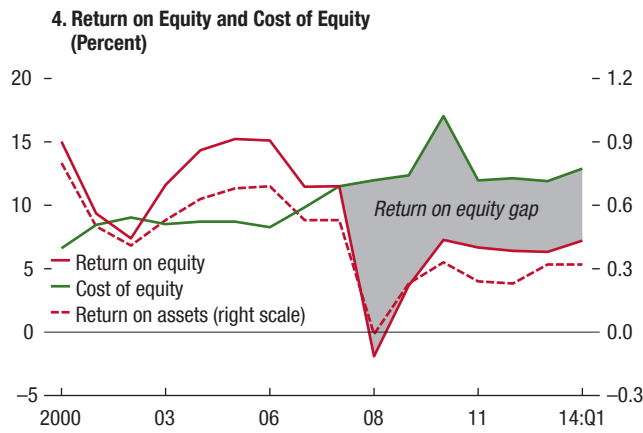Other Europe
North America
Asia-Pacific

Sources: Bloomberg L.P.; and IMF staff estimates.
Note: Shows four-quarter asset-weighted averages. Based on a sample of about 300 large banks. Dotted line shows the 2000–05 average. See note to Figure 1.16 for the countries in each region.

...against a high cost of capital...

4. Return on Equity and Cost of Equity
(Percent)

Return on equity gap

— Return on equity
— Cost of equity
--- Return on assets (right scale)

Sources: Bloomberg L.P.; and IMF staff calculations.
Note: Cost of equity derived from the capital asset pricing model, with the risk-free rate plus the market risk premium multiplied by the nondiversifiable risk (beta). Shows asset-weighted averages. Based on a sample of about 300 large banks.

(Figure 1.17 continues)

(Figure 1.17, panel 4). This higher cost reflects market concerns about the outlook for bank earnings, including from weak and opaque balance sheets, possible litigation costs, and the uncertain impact of regulatory reforms.[14] As a result, banks accounting for 80 percent

of total assets of the largest institutions currently have a so-called return-on-equity gap, in which their return on equity is lower than the cost of capital demanded by shareholders (Figure 1.17, panel 5).[15]

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[14]For example, the top four U.S. banks incurred about $80 billion in legal costs in 2013, while the top 25 European banks spent $37 billion during the same period (Credit Suisse 2014). These costs have pertained largely to sales of mortgage-backed bonds, practices around

the fixing of interest rate benchmarks, and mis-selling of payment protection insurance.

[15]There is a close relationship between banks with a large return-on-equity gap and those with a low price-to-book ratio (that is,

Figure 1.17. Bank Balance Sheets and Profitability *(continued)*

...leading many banks to miss return expectations.

5. Banks with Return on Equity Lower than the Cost of Equity
(Percent of sample assets)
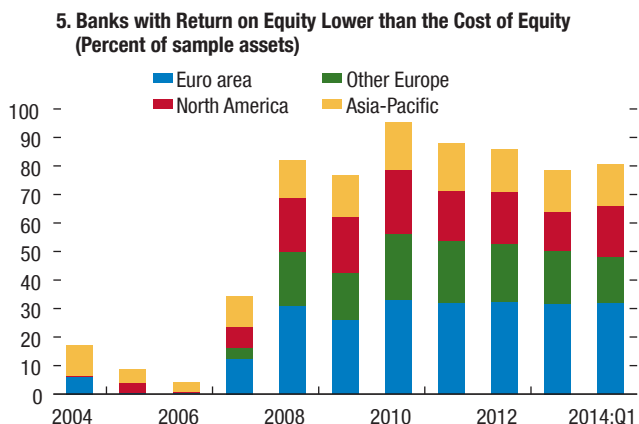
Sources: Bloomberg L.P.; and IMF staff calculations.
Note: Based on a sample of about 300 large banks. See note to Figure 1.16 for the countries in each region.
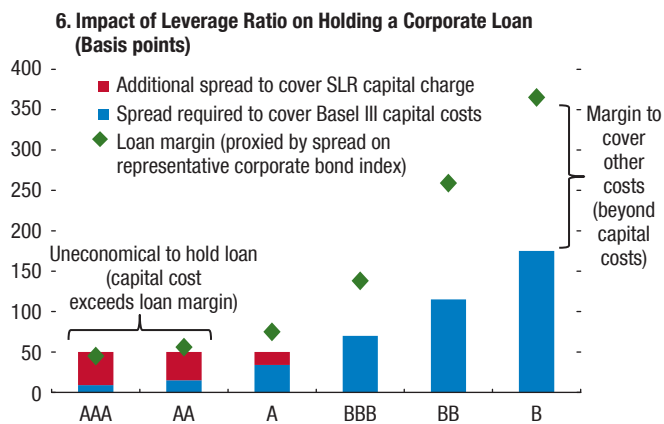
Regulatory reforms are changing banks' incentives.

6. Impact of Leverage Ratio on Holding a Corporate Loan
(Basis points)

Sources: Bloomberg L.P.; European Central Bank; and IMF staff calculations.
Note: The blue bars measure the minimum return over U.S. dollar Libor (London Interbank Offered Rate) necessary to cover the Basel III capital costs associated with a U.S. corporate loan for a representative large bank under the Internal Ratings Based model. In this stylized example, the capital cost for an A-rated loan is about 33 basis points (bps) (assuming a 35 percent risk weight × 9.5 percent Tier 1 ratio × 10 percent return on equity target). The red bars measure the additional spread (over U.S. dollar Libor) to cover the Supplementary Leverage Ratio (SLR) capital costs. The 50 bps floor is equal to 100 percent leverage exposure × 5 percent SLR × 10 percent return on equity target. The diamonds represent the current loan margin proxied by a representative U.S. corporate bond index spread (over U.S. dollar Libor). The difference between the loan margin (diamonds) and the bars must be sufficient to cover operating expenses, other regulatory costs, and expected losses.

Until now, banks have focused primarily on raising capital and derisking their balance sheets to meet risk-based requirements. Their focus, however, has now broadened to include other elements of the Basel III regime, often ahead of the mandated schedule (see Table 1.7 in Annex 1.3). For example, the LR and the supplementary leverage ratio in the United States (both mandatory beginning January 2018), which penalize size, will make it more costly for banks to hold lower-risk assets. New liquidity requirements, such as the liquidity coverage ratio and the net stable funding ratio will induce banks to hold more liquid (low-risk) assets and to rely more on stable funding sources. And the recent stress test exercises (for example, the Comprehensive Capital Analysis and Review in the United States and the ECB Comprehensive Assessment in the euro area), which emphasize "stressed capital," are inducing banks to ask for more high-quality collateralization of loans to help absorb losses under stress

scenarios, potentially tightening nonprice lending conditions. These new regulations have increased the strength and resilience of national banking systems, and this report does not advocate backing away from these reforms. But there is merit in analyzing how the adjustment to a safer system will affect the provision of financial services as bank business models change.

In this new paradigm—in which banks are facing a combination of low profitability and new regulatory requirements—banks need to change the way they operate to ensure that they can build and maintain capital buffers without taking excessive risk and still meet credit demand. During the past few years, banks have undertaken a number of measures to address these challenges. They have raised capital. They have also worked in other areas, including running off portfolios, selling noncore businesses, and cutting operating costs. But there may be only limited room left for further gains in these areas and more needs to be done.[16] Additional steps are likely

where equity market valuation is close to or below book valuation) across both time and type of bank.

[16]Substantial cost-cutting efforts have taken place, with the average cost-to-income ratio of 300 large banks having fallen by 7 per-

to entail a combination of repricing current business lines, reallocating capital away from low-risk assets, and—in some cases—selective retrenchment or even restructuring.

As banks adjust to the new environment, they will reallocate capital across activities. Banks with low risk-weights are likely to shift to higher-risk activities until regulatory capital constraints are hit. For example, some banks, particularly in the euro area, exhibit very low risk-weights and will see their ratio of risk-weighted assets to total assets naturally rise as they shift from zero-risk-weighted public bonds to higher-risk-weighted loans (Figure 1.16, panel 4). Other banks, such as U.S. banks, have already strengthened and rerisked their balance sheets to precrisis levels, including by expanding their loan portfolios. These banks may be able to shift to higher-risk activities, although doing so will require increasingly higher capital as they move up along the risk scale.

New regulatory requirements may induce banks to retrench from some activities if they are unable to reprice. For example, when binding, the leverage ratio could make it uneconomical to hold or acquire lower-risk assets.[17] This is shown in Figure 1.17, panel 6, in which the supplementary leverage ratio, which is applicable to large U.S. banks, introduces a spread floor of 50 basis points (red bars) on top of the standard risk-based capital charges (blue bars) needed to meet a 10 percent target return on equity. In this example, it becomes uneconomical to hold U.S. corporate loans rated AAA and AA in the absence of repricing. Activities most affected by this type of constraint include Treasuries and other fixed-income trading, general collateral repo markets, and hedging and arbitrage activities, with a possibly adverse impact on the corporate sector, which may no longer be able to access critical services, such as financial commitments or derivative instruments to hedge their long-term investments.

Banks have already increased loan margins significantly since the onset of the global financial crisis, but some banks will need to do more to regain profitability and be in a position to lend. Repricing is likely to be easier with bank-dependent borrowers, such as in small and medium-sized enterprises and consumer credit. With regard to products, the cost of mortgage loans and other lower-risk longer-term loans, such as infrastructure finance, are likely to rise as banks adjust to the leverage ratio, the net stable funding ratio, and the higher regulatory cost of holding long-dated derivatives used for hedging purposes. In contrast, repricing will be more difficult in investment grade corporate segments, in which margins are tight and borrowers have access to capital market funding.

Banks' ability to reprice will also depend on their market power. For example, they may not be able to reprice much if they are surrounded by stronger competitors that do not need to reprice or by weaker banks that underprice risk to maintain market share. Promptly restructuring weak banks when necessary and resolving unviable ones will help remove competitive distortions and allow remaining banks to move to sustainable business models. This process can be further supported by supervisory pressure to move toward a more transparent product-based transfer-pricing mechanism that aligns the price of an activity to its underlying risks and away from the more traditional product cross-subsidization approach, whereby revenues are computed at the product level but a significant part of the costs is spread across the wider firm.[18] A more transparent transfer-pricing mechanism would help regulators identify loss-making activities, assess the banks that do not offer sustainable risk-based pricing, and facilitate the balance sheet restructuring of weak banks and the exit of unviable banks.

Global banks have already begun their transition to new business models (Table 1.2). First, many global banks are shrinking or exiting from capital market activities, especially in fixed income, currencies, and commodities. Only a few large investment banks are expected to maintain a strong presence in these activities. Second, most global banks are also rebalancing their business models away from capital-intensive activities to more fee-based activities, such as mergers and acquisitions and securities-underwriting activities, as well as asset management and private wealth management. Third, a large number of global banks are retrenching selectively from international markets and refocusing on commercial banking activities in home markets and regional markets where they enjoy a leading presence. A

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centage points to 66 percent since 2008, in line with the 1995–2005 historical average of 65 percent.

[17]The regulatory leverage ratio is binding for some large banks. At end-December 2013, based on a conservative "fully loaded" capital definition, 11 percent of 227 surveyed banks were not meeting the 3 percent Basel III Tier 1 leverage ratio (BCBS 2014). But the pricing and capital allocation decisions of all banks are likely to be affected, as banks strive to achieve or maintain the leverage ratio requirement.

[18]Banks have typically maximized their returns on a client (rather than product) basis, so that low-margin, loss-making products (such as current accounts or mortgages) are offered as part of a suite of products, which, on aggregate, compensate for losses on some activities.

Table 1.2. Changes in Business Models and Strategic Direction (Stylized Heat Map)

Legend: Exit | Selectively shrinking | No or little change | Expanding | No critical business

	Commercial bank			Investment bank			Asset management and private wealth
	Retail and small and medium-sized enterprises	Corporate	Infrastructure finance	Fixed income, currencies, and commodities	Equities (market making and proprietary trading)	M&A and securities underwriting	
European banks							
Barclays	U.K. focus (selectively Africa), exit retail Europe	Greater U.K. focus		Exit from bespoke derivatives. Going forward, standardized centrally cleared products only		U.K. and U.S. focus	
BNP Paribas	Growth focus on Asia	Reallocating portfolio, except growth in Asia and United States	Selectively reduced, except growth in Asia	Selectively expanding	Growing in Europe and Asia	France and U.K. focus	Growth in Asia
Credit Agricole	Focus on France			Selective with securitization focus		Bond focus	France focus
Credit Suisse	Heavily Swiss focused	Heavily Swiss focused		Selective, focus on securitization (U.S.), emerging market & global credit (U.K.), and introducing capital light fixed income agency model	Cash equities (U.K.)	Europe focused	Slow growth with wealth focus
Deutsche Bank	Heavily German focused	Reallocating portfolio, except growth in Asia	Selectively reduced	Selective reductions (structured credit, large foreign exposures, derivatives book), but still broad based (U.K., U.S.). Top-three player in securitization	Large offering (U.K., U.S.)	Top three in bonds	Growth with asset management focus
RBS	U.K. leader in SME; second in retail	U.K. leader in corporates	Exited 2009	Selective; continuous derisking and deleveraging		Bond focus	U.K. focus
Standard Chartered	Expand multi-local trade finance leadership		Selectively active	Selective, expanding in commodities		Bond focus (for example, number 1 in renminbi bonds)	Asia and Middle East focus
UBS	Heavily Swiss focus	Heavily Swiss focus		Exited 2012	Broad offering (Europe, U.S.), strong distribution	Equity and Europe focus	Strong growth with wealth focus
U.S. banks							
Goldman Sachs				Selectively shrinking	Rebalancing balance sheet use from financial instruments toward direct investments	Expand global leadership (number 1 in equity; Number 2 in bonds)	Growth with wealth focus
JPMorgan	U.S. focus, market leader by total assets	Maintain global leadership (for example, in syndicated loans)		Maintain global leadership in G-10 rates and securitization, selective capital use by clients and products	Selective international growth; equity derivative focus	Expand global leadership in corporate bonds (number 1) and growing in equity (number 2)	Growth with focus on institutional and retail asset management
Morgan Stanley				Selectively shrinking; move toward hybrid principal and agency model		Maintain leadership in equity and M&A (top three)	Growth with wealth focus; taking advantage of large broker sales force

Sources: Annual reports; company presentations; and IMF staff.
Note: M&A = mergers and acquisitions. Indicative rankings as of end-2013.

notable exception is infrastructure finance, where many global banks are reducing their presence or exiting.

Retrenchment and repricing could add headwinds to the recovery

The transition to new business models could have important implications for the capacity and willingness of banks to supply credit to the real economy, potentially creating a headwind against the recovery in some countries. This transition is likely to be uneven across banks and those with a greater return-on-equity gap, which includes some of the largest banks, will have a greater transition to make (Figure 1.18, panel 1). The impact of this transition for credit recovery is likely to be particularly relevant where banks with significant transitioning needs are large providers of credit.

These transition challenges are illustrated through a balance sheet simulation. The simulation, which is based on more than 300 advanced economy banks (representing about two-thirds of the banking sector assets of the sample countries), explores the extent to which banks have made progress in their transition to new business models.[19] The simulation has two stages. In the first stage, the potential size and profitability of balance sheets is estimated at end-2015, not to estimate how much balance sheets are expected to grow, but to assess the capacity of banks to adapt balance sheets, generate earnings, and supply credit.[20] The second stage assesses how much interest margins would need to rise to close any remaining return-on-equity gaps in 2015.[21] The idea here is not to predict how much margins will actually rise, but to use the required increase in margins as a gauge of how far banks still have to go in their transition to new business models.

The simulation offers several key insights into the transition of bank business models. It first suggests

that many banks have the capacity to supply more credit, given their increased levels of capitalization. But there are a significant number of institutions for which this potential capacity is somewhat limited by their available capital buffers and expected profitability. For example, about 35 percent of the sample, by assets, cannot deliver more than 5 percent annual credit growth (Figure 1.18, panel 2). Some of these banks are not able to expand their balance sheets because they are constrained by low capital buffers. Also, a few small institutions may need to deleverage—or shrink balance sheets and cut back lending—to meet the capital targets. It is important for banks to have adequate capital buffers to meet credit demand when the economy recovers.

A second insight is that many banks will need to increase lending margins, or use alternative measures, to close their return-on-equity gaps and generate sustainable profits.[22] But for a number of banks in the simulation, the repricing needed is very large and may not be realistic, particularly if done on a stand-alone basis and not followed by other market participants. For example, banks with a required increase in margins of more than 50 basis points on their entire loan books—in addition to the repricing already envisaged in analysts' profit forecasts—account for about 20 percent of assets in the sample (Figure 1.18, panel 3).

The results are confirmed at the country level, where the largest transition needs are concentrated in some euro area countries and, to a lesser extent, in the United Kingdom and Japan (Figure 1.18, panel 5). Transition needs are not concentrated in any particular type of bank but affect both global and large domestic institutions (Figure 1.18, panel 6).

A further insight is that even among the banks that have the capacity to supply more credit, a group of institutions have high repricing needs (Figure 1.18, panel 4). Because these repricing needs may be unrealistic for individual institutions to implement, these banks may not be willing to expand lending, and therefore may not be able to generate retained earnings and build capital buffers to support future credit. Many of these banks are from the euro area and have been slower to adjust, weighed down by cyclically poor asset quality and profitability, as well as a wholesale-based funding model (see also Chapter 1 of the April 2014 GFSR).

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[19]The sample includes the largest banks in each of the sample countries. The reported sample size relative to total banking sector assets is an approximation, given the lack of consistent cross-country data on banking system assets on a consolidated basis.
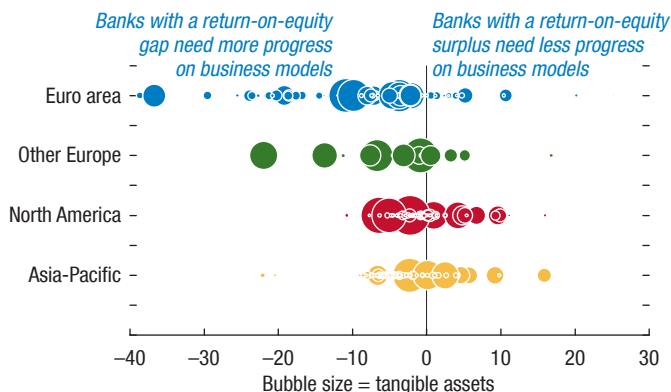
[20]The simulation is based on banks' meeting a Tier 1 common capital ratio of 7 percent, plus a 1.0–3.5 percentage point buffer for global systemically important banks and a 0.5 percentage point buffer for large domestic banks, as well as a 3 percent unweighted leverage capital ratio (for U.S. banks a 1 percentage point buffer is added). The expected return on equity in 2015 is based on analysts' forecasts.

[21]For the sake of presentation, the simulation assumes a uniform cost of equity of 10 percent. To test the sensitivity of the results to this assumption, the simulation was replicated using bank-specific cost of equity estimates (from Bloomberg and IMF staff).

[22]Further cost cutting would also help banks reduce their return-on-equity gaps, although room for maneuver may be limited given cost cuts achieved in recent years and already factored into financial plans for the coming years.

Figure 1.18. Where Are Banks in Their Transition to New Business Models?

Transition needs are large.

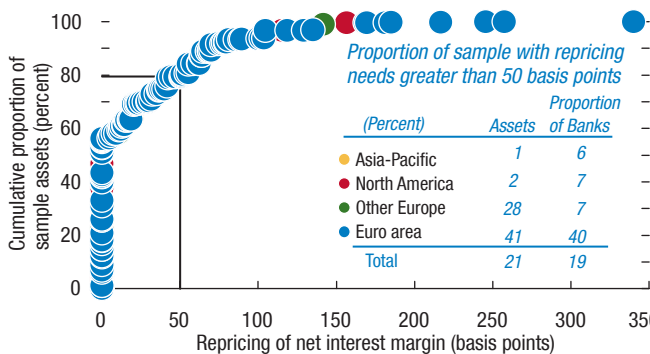**1. Bank Return-on-Equity Gap, 2014:Q2**
(Percentage points)

Banks with a return-on-equity gap need more progress on business models

Banks with a return-on-equity surplus need less progress on business models

Euro area

Other Europe

North America

Asia-Pacific

Bubble size = tangible assets

While lending capacity varies...

2. Potential Credit Supply Expansion, by Cumulated Assets

Proportion of sample that cannot deliver credit growth of more than 5 percent

(Percent)	Assets	Proportion of Banks
Asia-Pacific	27	46
North America	16	6
Other Europe	28	7
Euro area	59	46
Total	36	25

Cumulative proportion of sample assets (percent)

Potential credit supply expansion (percent, annualized)
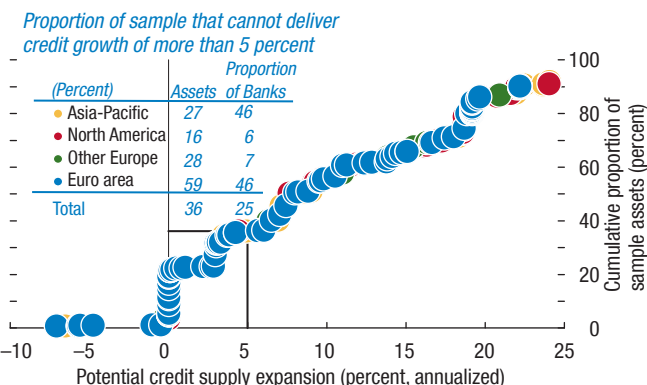
...some banks have unrealistic repricing needs ...

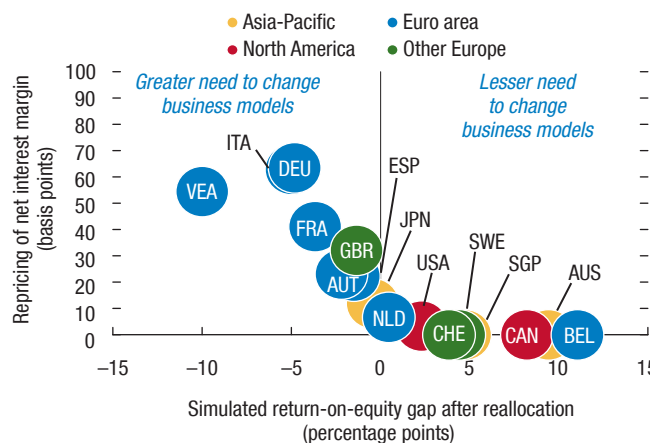**3. Required Repricing of Loans, by Cumulated Assets**

Cumulative proportion of sample assets (percent)

Proportion of sample with repricing needs greater than 50 basis points

(Percent)	Assets	Proportion of Banks
Asia-Pacific	1	6
North America	2	7
Other Europe	28	7
Euro area	41	40
Total	21	19

Repricing of net interest margin (basis points)

...raising a question about credit supply.

4. Required Repricing and Potential Credit Supply Expansion

● Euro area   ● North America
● Other Europe   ● Asia-Pacific

Business model change needed (38%)

Resolution or recapitalization needed (4%)

Better positioned to support recovery (58%)

Repricing of net interest margin (basis points)

Potential credit supply expansion (percent, annualized)
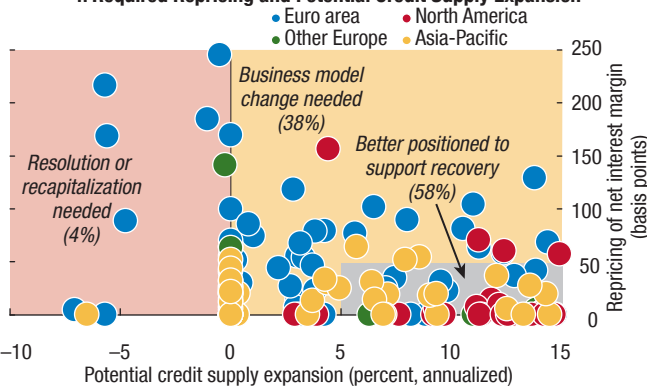
Transition needs differ across countries...

5. Required Repricing, by Country

● Asia-Pacific   ● Euro area
● North America   ● Other Europe

Repricing of net interest margin (basis points)

Greater need to change business models

Lesser need to change business models

ITA   DEU   ESP
VEA   FRA   JPN   SWE
GBR   USA   SGP   AUS
AUT   NLD   CHE   CAN   BEL

Simulated return-on-equity gap after reallocation
(percentage points)

...and by type of banks.

6. Required Repricing, by Type of Bank

● Domestic SIB   ● Large investment bank
● Global SIB   ● Other banks

Greater need to change business models

Lesser need to change business models

Repricing of net interest margin (basis points)

Simulated return-on-equity gap after reallocation
(percentage points)
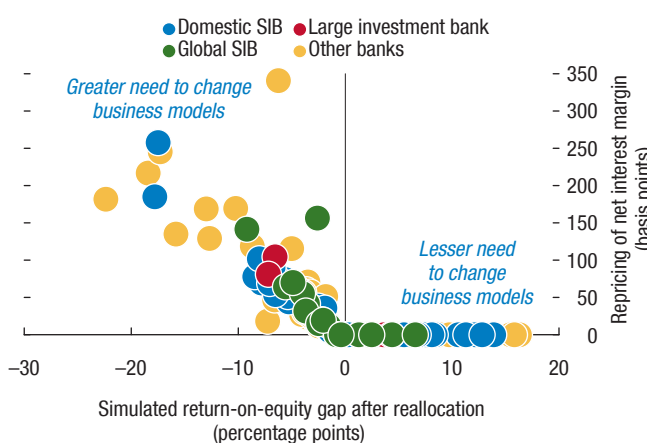
Sources: Bloomberg L.P.; SNL Financial; and IMF staff estimates.
Note: Based on a sample of more than 300 advanced economy banks. The return-on-equity (RoE) gap is RoE less a cost of capital of 10 percent. Panel 1 shows 2014:Q2 or latest available data. The other panels are based on simulations. See note to Figure 1.16 for the countries in each region. Panel 5 uses International Organization for Standardization country codes, except for VEA, which is vulnerable euro area countries (in this case Cyprus, Greece, Ireland, Portugal, Slovenia). In panel 6, SIB = systemically important banks. There are 21 global SIBs (average tangible assets of $1,691 billion), 7 large investment banks ($1,494 billion), 68 domestic SIBs ($320 billion), and 213 other banks ($45 billion).
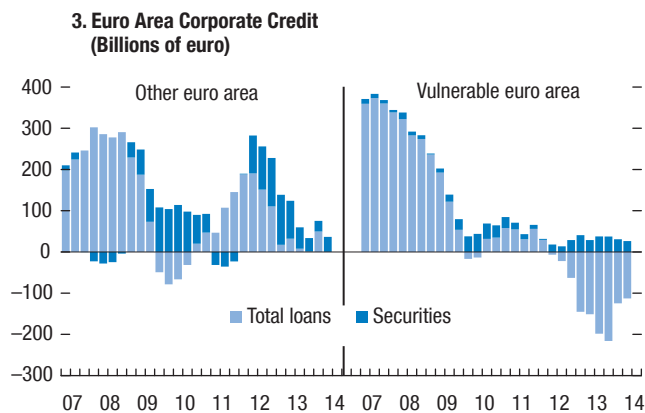
Figure 1.19. Bank Lending and Nonbank Sources of Credit

Bank lending remains lackluster in Europe.
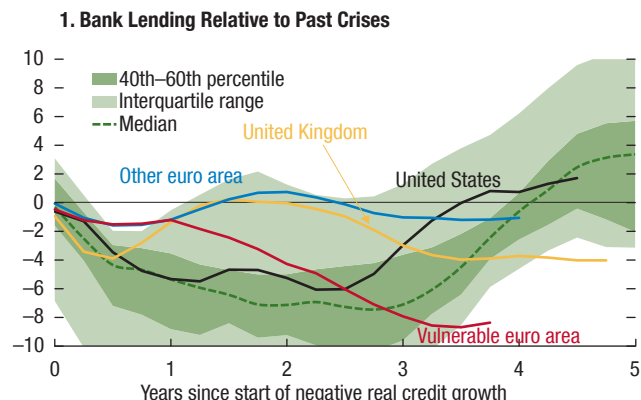
1. Bank Lending Relative to Past Crises

Sources: Haver Analytics; IMF, World Economic Outlook database; and IMF staff calculations.
Note: Green shaded area is for past crisis periods in advanced and emerging economies from the late 1980s to the period before the global financial crisis. Vulnerable euro area countries are those that have faced a sharp fall in bank lending. In this chart, the group includes Greece, Ireland, Italy, Portugal, and Spain. Other euro area comprises Austria, Belgium, Finland, France, Germany, Luxembourg, and Netherlands.
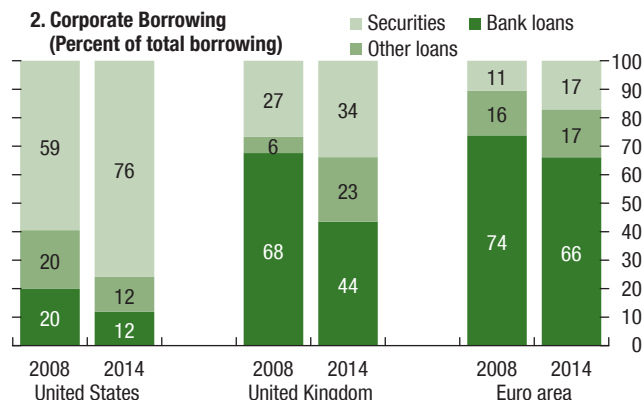
Large firms turn to nonbank credit...

2. Corporate Borrowing (Percent of total borrowing)

Sources: National central banks; and IMF staff estimates.
Note: Excludes estimated value of intercompany loans. Rest of World bank loans are included in bank loans in the United States and United Kingdom but are included in other loans in the euro area.

...but this is not enough to offset the fall in bank lending.

3. Euro Area Corporate Credit (Billions of euro)

Sources: National central banks; and IMF staff estimates.
Note: Shows a four-quarter sum of changes in levels. Vulnerable euro area countries are those that have faced a sharp fall in bank lending. In this chart, the group includes Ireland, Italy, Portugal and Spain. Other euro area comprises Austria, Belgium, France, Germany and Netherlands.
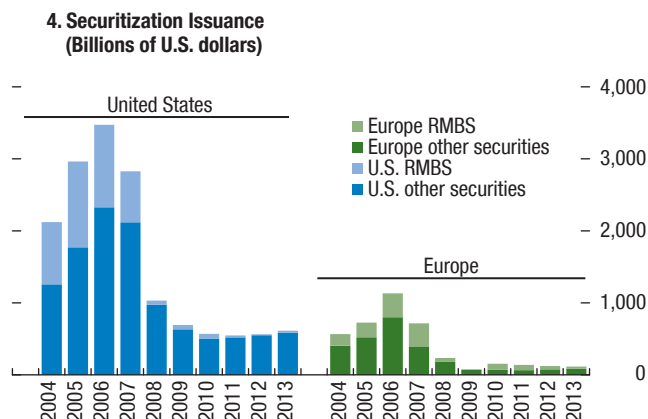
Nonbanks can help diversify the provision of credit, including through securitization.

4. Securitization Issuance (Billions of U.S. dollars)

Sources: Association for Financial Markets in Europe; Commercial Research Finance Council; Inside Mortgage Finance; JPMorgan Chase & Co.; Federal Reserve; and IMF staff calculations.
Note: All data are issuance volumes, except for asset-backed commercial paper, which are end-period outstanding. RMBS = residential mortgage-backed securities.

The ECB's Comprehensive Assessment and introduction of the Single Supervisory Mechanism provide a golden opportunity to clean up balance sheets, restructure weak institutions, and resolve nonviable banks—where necessary—to produce a strong cross-border banking system.

The simulation exercise, therefore, suggests that although many banks have the capacity to supply more credit, challenges lie ahead for bank lending, particularly in economies that most need a recovery in credit. Indeed, real credit growth is already lagging behind the average recovery path in past banking crises in the euro area and the United Kingdom (Figure 1.19, panel 1). Although bank credit growth should accelerate over time, the recovery of credit, which also depends on the demand for lending, could be modest in some economies and continue to be a headwind for the economic recovery.

Nonbank sources of credit cannot fully compensate for sluggish bank credit

Nonbanks see strong opportunities to compete with banks and are increasing their market share in credit intermediation. A wide and rapidly growing range of nonbank entities are providing lending services. These entities include large asset managers (such as pension funds, credit mutual funds), business development companies, private equity firms, and traditional brokerage firms.[23] Levered private debt funds are investing in loan portfolios and are providing cofinancing. Balance sheet constrained banks are partnering with nonbanks—such as insurance companies and pension funds, asset managers, and private equity and credit funds—in new intermediation models that allow banks to provide their origination capacity and credit-related expertise, and nonbanks to provide the capital needed to warehouse credit risk. As developed in Chapter 2, shifting toward greater nonbank financial intermediation will help support the provision of financial services but also requires the strengthening of the regulatory framework for nonbanks. Supervisors must be in a position to adequately monitor credit developments, assess the buildup of risks, and have the authority and the tools to address the attendant risks.

Yet, it is not clear whether nonbanks can provide sufficient financing to compensate for the retrenchment by banks. Although bank loans account for only 12 percent of corporate credit in the United States, they represent more than 40 percent of corporate borrowing in the United Kingdom and more than 60 percent in the euro area (Figure 1.19, panel 2). In the euro area, the steady rise in securities issued by nonfinancial companies since 2008, partly as a result of the falling cost of issuing bonds relative to bank loans, has not been sufficient to offset the steep decline in bank lending, particularly in some euro area economies (Figure 1.19, panel 3).

Furthermore, the substitution of nonbank credit for bank credit will take time. So far, only banks have financed greenfield projects given their complex construction-period risks, and refinancing by nonbanks has been slow, including because of insurers' risk policies and solvency requirements. Nonbank appetite for lending to small and medium enterprises is mixed

because of unfamiliarity with the risks (even when central bank data on these enterprises are made available), and joint ventures between banks and insurers are only developing slowly.

Regulatory frameworks explain some of the regional differences in the use of nonbank credit. In the United States and in Japan, insurance companies and pension funds are directly lending to borrowers, as reflected by their large commercial real estate loan portfolios, whereas insurers in some European countries are prevented from extending credit to the corporate sector. Likewise, mutual funds can purchase loans in the United States (so-called loan funds[24]), which is not allowed in Europe by the Undertakings for the Collective Investment in Transferable Securities directive.[25] In Europe, lending by nonbanks is mostly provided by private equity firms, which focus primarily on real estate. As a result, there is a greater risk in Europe that nonbanks may not be able to compensate for the retrenchment of bank credit, particularly for customers without alternative funding sources.

Filling the credit gap left by banks' more limited balance sheets requires efforts to increase the use of securitization or other forms of fee-based originate-to-distribute models but on a safer basis. Since the global financial crisis, securitization issuance has been declining sharply in Europe—to about one-eighth of the issuance in 2008—in contrast to the fairly stable volumes in the United States (Figure 1.19, panel 4). Kick-starting safe securitization could help diversify funding sources for the real economy and help reinvigorate credit supply. Trade finance, for example, as a short-dated and low-risk asset, may be well suited to this shift toward an originate-to-distribute model.

The expansion of securitization markets, however, faces a number of challenges. Structural market factors (for example, high cost of issuance, heterogeneity of

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[23]These partnerships are likely to strengthen links between banking and shadow banking activities, as will the reported refocusing of global banks on asset management activities.

[24]In the United States, mutual funds can invest up to 15 percent of their assets in illiquid securities.

[25]In Europe, funds that are not sold to retail investors are not subject to authorization under the Collective Investment in Transferable Securities Directive but are subject to a number of requirements under the less stringent Alternative Investment Funds Management Directive. They may also be subject to additional national regulation by individual EU member states. The volume of funds investing in loans is still small, and there is debate about their use as loan originators in view of the limited capacity of policymakers to identify and address a potential buildup of risks arising from such funds (see, for example, Central Bank of Ireland 2014). The Central Bank of Ireland has, for example, in September 2014 introduced additional national rules that seek to address those particular loan origination risks.

loan portfolios across countries), adverse cyclical factors (for example, sluggish economic recovery), and impediments to effective debt restructuring reduce the incentives for issuance. Regulatory requirements in Basel III (for banks) and Solvency II (for insurance companies) should not provide negative incentives for these institutions to buy high-quality securitization instruments.[26] In this context, the recent announcement by the ECB that it will purchase asset-backed securities and covered bonds is a welcome step in the right direction, and providing targeted fiscal support (guarantees by pan-European agencies) would further encourage this type of market-based funding.

Rising Market Liquidity Risks

Capital markets are now more important providers of credit than in the past, with a growing share of credit instruments held by mutual funds. Inflows into mutual funds have provided an illusion of liquidity in underlying credit markets, but structural changes in the industry may exacerbate illiquidity in times of stress. More investors are now following benchmarks, and retail investors are playing a greater role in credit markets. The asset management industry is also highly concentrated, with features that may amplify liquidity risks. At the same time, emerging markets have grown in importance as a destination for investors from advanced economies. Together, these trends will likely magnify market shocks and liquidity risks and provide additional challenges to the execution of a smooth exit for monetary policy.

Credit is increasingly being provided outside the banking system through funds

Accommodative monetary policies have induced greater risk taking by market participants, as reflected in rising asset flows into mutual funds and exchange-traded funds (ETFs) focused on less liquid, high-yield global fixed-income assets (Figure 1.20, panels 1 and 2). The nonbank sector,[27] particularly mutual funds and ETFs, has become an increasingly important supplier of credit,

as many banks continue to have limited balance sheet space to support private sector credit. Since 2007, mutual funds, ETFs, and households have become the largest owners of U.S. corporate and foreign bonds, accounting for 30 percent of total holdings.

Credit intermediation provided by asset managers is heavily reliant on market liquidity

Inflows into mutual funds have enhanced flow liquidity, or the capacity to trade assets cheaply, as measured by narrower bid-ask spreads (Figure 1.20, panel 3).[28] Indeed, in the U.S. high-yield bond market there is a statistically significant relationship between net inflows into mutual funds and measures of the bid-ask spread.[29]

Although steady inflows have boosted one dimension of liquidity, other more structural market liquidity measures, such as its depth and breadth, have deteriorated. This is reflected in lower trading volumes, smaller trading size, a smaller share of large trades, and less frequent trading of many securities in less liquid fixed-income markets such as corporate bonds (Figure 1.20, panels 4–6). This deterioration in underlying structural liquidity may only become apparent when inflow liquidity disappears at times of stress, and thus inflows could be providing a false sense of comfort to investors about underlying liquidity in several fixed-income markets.

Structural features of the asset management industry amplify liquidity risks[30]

In the postcrisis financial landscape—in which the banking and insurance sectors have been more constrained by regulation—investment funds have been

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[26]For example, Basel III imposes higher capital charges for securitized assets relative to loans or corporate bonds of similar risk and limits their eligibility for liquidity purposes. See Bank of England and European Central Bank (2014), IMF (2014a), and Segoviano and others (forthcoming) for a comprehensive discussion on regulatory impediments for securitization in Europe.

[27]See Chapter 2 for a detailed analysis of and conceptual framework for shadow banking around the world.

[28]An asset is said to be liquid if (1) it can be cheaply traded (also called "flow liquidity"); (2) it can be transacted in any amount without having a significant price impact (often referred to as "depth" or "resiliency"); (3) it can be traded in a short time ("immediacy of execution"); and (4) it is more easily traded than other assets with a similar risk profile ("breadth").
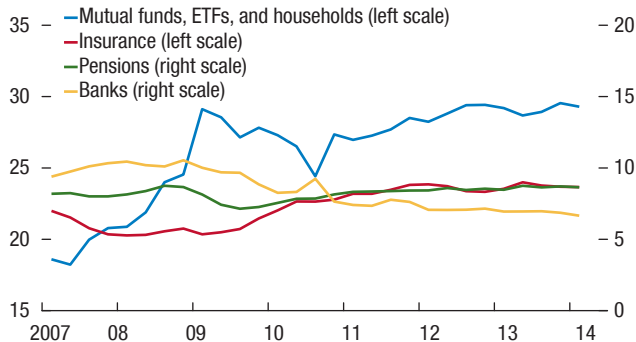
[29]Flow liquidity is represented here by the Liquidity Cost Score (LCS) from Barclays Capital, capturing the loss incurred by simultaneously buying and selling the same bond. $\Delta LCS_T = \alpha + \beta_1 \times \Delta NF_{T-1} + \beta_2 \times \Delta VIX_T + \varepsilon$; in which NF = net inflows/assets under management and VIX = average monthly value of the VIX index. $\Delta LCS = 0.03 + (-7.55) \times \Delta NF + (0.07) \times \Delta NS + \varepsilon$, with both factors statistically significant at the 95 percent level and an adjusted $R^2 = 0.623$.

[30]This section is based on the work of Brown, Dattels, and Frieda (forthcoming).

Figure 1.20. Market Liquidity: Rising Flow but Deteriorating Depth

Households, mutual funds, and ETFs are owning a rising share of risky assets...

**1. Ownership of Corporate and Foreign Bonds**
(Percent, total corporate and foreign bonds held by all sectors)

- Mutual funds, ETFs, and households (left scale)
- Insurance (left scale)
- Pensions (right scale)
- Banks (right scale)

Sources: Federal Reserve; and IMF staff calculations.
Note: ETF = exchange-traded fund.

...predominantly in less liquid credit and emerging market fixed-income markets.
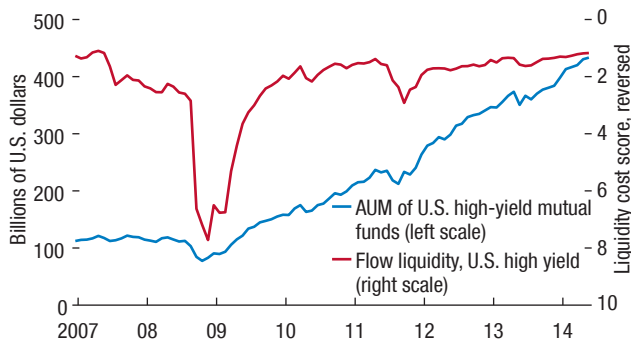
2. Assets under Management of Mutual Funds and ETFs
(Trillions of U.S. dollars)

- Emerging market fixed income
- European high yield
- U.S. loans
- U.S. high yield
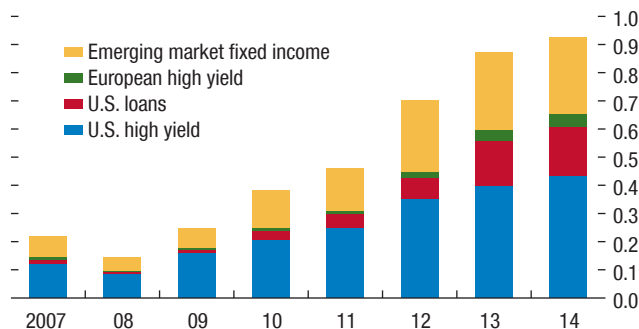
Source: EPFR Global.
Note: ETF = exchange-traded fund.

Flow liquidity has improved with large flows into high-yield mutual funds...

3. Assets under Management versus "Flow Liquidity"

- AUM of U.S. high-yield mutual funds (left scale)
- Flow liquidity, U.S. high yield (right scale)

Billions of U.S. dollars

Liquidity cost score, reversed

Sources: Barclays; and EPFR Global.
Note: AUM = assets under management.

...but lower trading volumes...

4. Turnover: Trading Volumes versus Outstanding
(Ratio)

- U.S. corporate bonds (left scale)
- Emerging market sovereign bonds (right scale)
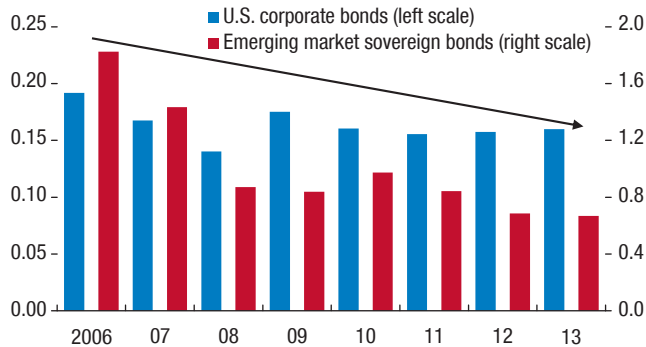
Sources: EMTA; JPMorgan Chase & Co.; Securities Industry and Financial Markets Association; TRACE; and IMF staff calculations.
Note: Quarterly average turnover per year.

...lower trading size...

5. Six-Month Average Size of TRACE IG/HY Trades of more than $5 Million
(Millions of U.S. dollars)

- Investment grade (left scale)
- High yield (right scale)
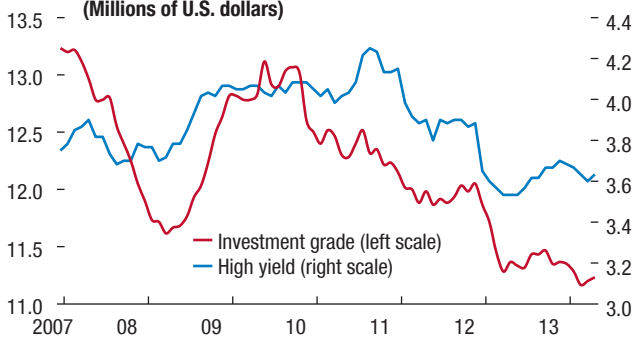
Source: TRACE.
Note: HY = high-yield; IG = investment grade.

...and infrequent trading suggest less market depth.

6. Percent of Trading Days per Quartile: Barclays High-Yield Index Constituents

Percent of trading days

Percent of index constituents

- CEMBI
- High yield

Less liquid ← → More liquid
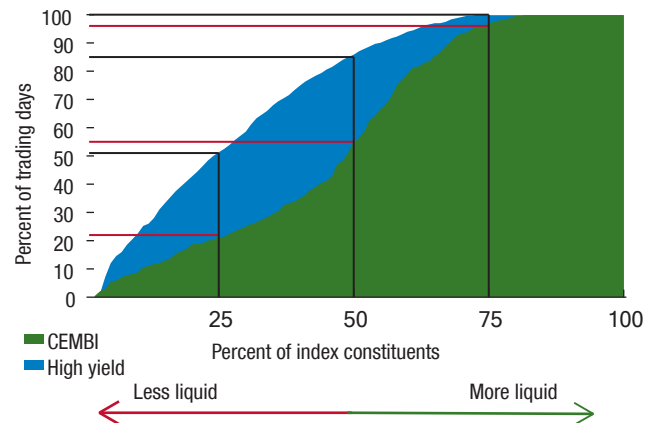
Source: Barclays.
Note: CEMBI = Corporate Emerging Markets Bond Index.

the main sector accumulating issuance by nonfinancial companies. From a financial stability perspective, credit intermediation through asset managers and markets has advantages over that through banks.[31] For example, the investment risk is borne largely by investors in the fund, not the asset manager because there are no public guarantees like those the banking system has for deposits. Liquidity is provided mostly by markets, and not from bank holdings of liquid assets backed by central bank facilities. Finally, funds generally do not raise liabilities to fund assets and are therefore less leveraged than banks.

Despite these advantages, funds investing in credit instruments have a number of features that could result in elevated financial stability risks.

- First is a mismatch in liquidity offered by investment funds with redemption terms that may be inconsistent with the liquidity of underlying assets. Many credit funds hold illiquid credit instruments that trade infrequently in thin secondary markets.
- Second is the large amount of assets concentrated in the hands of a few managers. This concentration can result in "brand risk," given that end-investor allocation decisions are increasingly driven by the perceived brand quality of the asset management firm. Sharp drawdowns in one fund of an asset manager could propagate redemptions across funds for that particular asset manager if its brand reputation is damaged, for example through illiquidity or large losses.
- Third is the concentration of decision making across funds of an individual fund manager, which can reduce diversification benefits, increase brand risk, or both.
- Fourth is the concentrated holdings of individual issuers, which can exacerbate price adjustments.
- Fifth is the rise in retail participation, which can increase the tendency to follow the herd.

These features could exacerbate the feedback loop between negative fund performance and outflows from the sector, leading to further pressure on prices and the risk of runs on funds (Figure 1.21). These risks could become more prominent in the coming year as the monetary policy tightening cycle begins to gain traction.

Figure 1.21. Feedback Loop between Performance, Flow, and Illiquidity
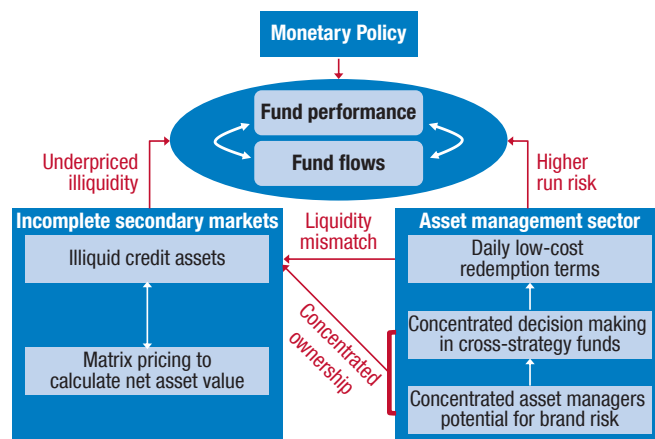
Source: IMF staff calculations.

Within many fixed-income markets, a large proportion of the market trades infrequently, providing an illusion of price stability and presenting challenges to the calculation of a net asset value (NAV) for funds that provide daily liquidity (Figure 1.20, panel 6). The computation of a daily NAV from a portfolio consisting of infrequently traded securities often relies on third-party "matrix pricing" services that use algorithms and assumptions to generate estimates of fair value. In stable markets, this approach may reinforce correlations between similar assets. In more volatile markets, prices may be subject to discrete jumps as traded prices diverge from assumptions or pricing providers incorporate new information and methodologies into estimates. For end-investors unaware of the limited liquidity of underlying instruments, large price drops may encourage further redemptions, potentially exacerbating selling pressures during periods of market stress.
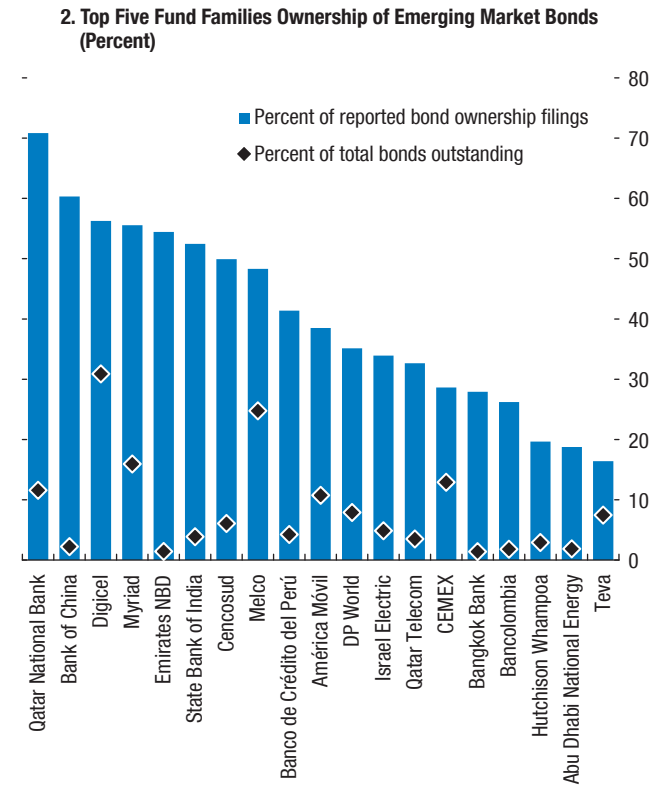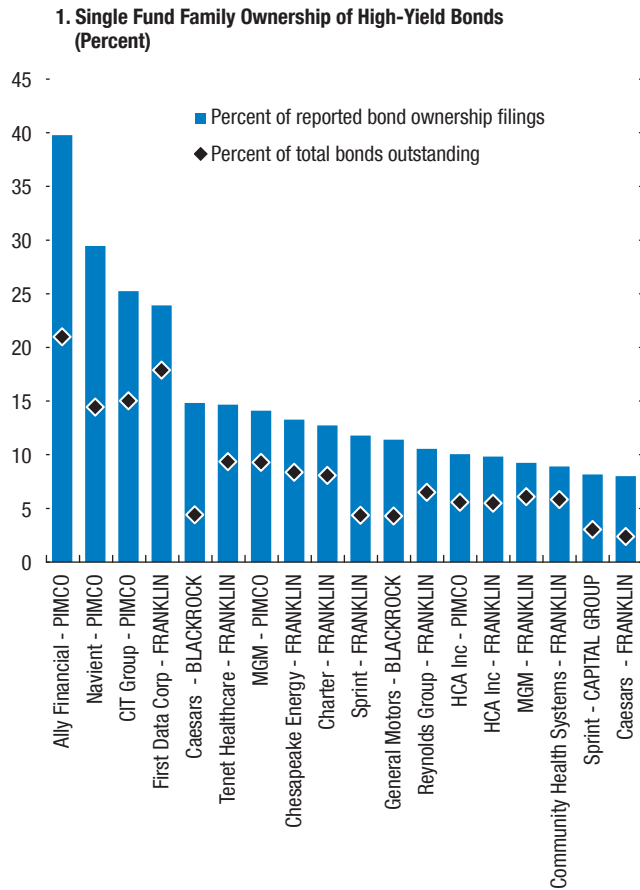
Asset management holdings are now concentrated in a small number of large managers, resulting in increased "brand risk." The top 10 asset managers account for $19 trillion in assets under management globally.[32] These trends toward increased concentration could lead to brand risk and price distortions in the event of sharp drawdowns in a particular fund. For ETFs, whose primary value to end-investors is liquid-

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[31]However, both asset managers and banks share the same tendency toward procyclicality. One reason for their procyclical behavior is that asset managers are subjected to trading restrictions based on measures of risks similar to those used by banks.

[32]See Haldane (2014), who shows this represented almost 30 percent of the total assets under management of the whole industry, as of the end of 2012.

Figure 1.22. Asset Management Industry Impact on Liquidity

Corporate holdings are concentrated in a few asset managers in high-yield...

...and in emerging market corporate debt.

1. **Single Fund Family Ownership of High-Yield Bonds**
   (Percent)

2. **Top Five Fund Families Ownership of Emerging Market Bonds**
   (Percent)

Sources: Bloomberg, L.P.; and Moore Capital.
Note: The reported bond filings cover all publicly available bond holdings in Bloomberg.

Sources: Bloomberg, L.P.; and Moore Capital.
Note: The reported bond filings cover all publicly available bond holdings in Bloomberg.

ity, market dislocations that limit redeemability could also undermine product appeal and brand reputation.

Another trend in the asset management industry is the high degree of concentrated holdings in individual securities issues. A reduced number of asset managers hold a significant amount of the debt of large corporate issuers across advanced and emerging market economies (Figure 1.22, panels 1 and 2). For example, 50 percent or more of all reported bond ownership filings by a number of large nonresource firms in the JPMorgan Corporate Emerging Markets Bond Index is held by the top five fund families. From the asset manager's perspective, concentrated holdings in a single issue may not be troublesome alongside a large amount of commingled assets. However, the concentration of asset holdings can pose difficulties for the ultimate

borrowers should redemptions from a small number of funds result in the closure of market access in times of stress. A high concentration of asset holdings leads to a high degree of dependence by corporate and emerging market sovereign issuers on a small number of asset managers for their market funding.

The concentration of decision making within some of the largest asset management firms can also lead to increased risks and reduced diversification benefit across funds. To the extent that asset managers centralize portfolio management decisions across different funds and deploy similar strategies, common holdings across a family of funds can lead to more highly correlated returns. Large-scale redemptions in one sector may precipitate losses in unrelated asset classes and indeed across multiple funds of a single asset manager,

increasing and magnifying selling pressures across markets.

The risk of a run may be intensified by the increased holdings of mutual funds. Qi and others (2010) find that funds held mostly by large institutional investors are less likely to exhibit run risk than funds held mostly by retail investors.[33] During the past five years, however, the share of credit instruments held by mutual funds, ETFs, and households has increased substantially, and now represents more than a third of total credit holdings, which may also increase the risk of contagion across asset classes. Manconi, Massa, and Yasuda (2012) find that when securitized bonds became problematic in August 2007, mutual funds with liquidity needs increasingly retained these securities and sold other assets, such as corporate bonds, to raise liquidity, which played a role in creating contagion from securitized assets to corporate bonds.

Less liquidity is available from traditional liquidity providers

In contrast to banks, this new class of retail and ETF investors is more benchmark-centric (that is, they are highly sensitive to the direction of the market) and thus are less likely to provide liquidity in times of stress (Figure 1.23, panel 1). Even though a majority of mutual funds are not leveraged, the impulse of benchmark-centric investors may be further amplified by the reported increase in leverage by large mutual funds through their use of derivatives (Figure 1.23, panel 2).[34] At the same time, regulatory pressures on banks and market pressures on institutional investors and hedge funds have reduced their roles as liquidity providers.

- Banks have less capacity to absorb liquidity shocks. Changes in their business models in the wake of the crisis, and regulatory developments (for example, higher capital charges under Basel 2.5 and regulatory restrictions on proprietary trading),[35] have

reduced their market-making activities and dealer inventories. The resulting increase in liquidity mismatches is reflected in the increasing number of days it would take for an asset manager to liquidate a credit fund (Figure 1.23, panel 3) for a given daily turnover.

- Hedge funds are also increasingly behaving in a more benchmark-centric manner,[36] as reflected by their higher sensitivity to market direction (Figure 1.23, panel 4). Since the global financial crisis, hedge fund managers have become less willing to warehouse losses by buying assets when prices fall in return for gains when the market turns. This reluctance is due to a number of factors, including restricted access to leverage from the prime brokerage units of banks,[37] investors demanding tighter risk management and greater transparency, and lower arbitrage trading opportunities because of record-low volatility across many asset classes.
- Pension funds and insurance companies may be playing less of a countercyclical role in financial markets, making it more difficult to provide liquidity in times of stress (Bank of England and the Procyclicality Working Group 2014).[38]

The mutual fund industry is highly interconnected with the rest of the financial system

Mutual funds and ETFs have become key players in credit intermediation, particularly in high-yield debt markets, and have become highly interconnected with the rest of the financial system. Between January 2008 and March 2014, the percentage contributions of fixed-income mutual funds to the vulnerability of the banking sector has more than doubled, particularly

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[33]For evidence that retail-oriented mutual funds can be more sensitive to global financial shocks, see Chapter 2 of the April 2014 GFSR.

[34]This derivative exposure is often achieved by the regular use of credit default swaps (CDS), with academic research reporting that, among large mutual funds, the use of CDS has increased significantly during the past decade (see, for example, Guettler and Adam 2010). Interest rate futures, swaps, and options, which can carry large notional leverage, are also regularly deployed by these funds, a process that can enhance returns to manage their exposures given the difficulty of transacting in large sizes in the secondary bond markets.

[35]Authorities have made banks safer by raising liquidity requirements and strengthening capital standards. However, by drawing starker and more severe limits on banks' ability to take risks, these

regulations have also diminished banks' capacity to provide liquidity to markets during times of stress. Dealers have reduced inventories and are less willing to make markets when volatility increases, particularly in less liquid markets with higher regulatory capital expenses, such as high-yield credit and emerging market bonds.

[36]For further discussion on this issue, see Jones (forthcoming).

[37]Leverage restrictions for banks are transferred to hedge funds in the form of higher costs and less availability of leverage.

[38]Also, increased regulatory emphasis on asset-liability matching can make institutional investors more procyclical. If these investors are minimizing the liability shortfall, they may become increasingly risk averse during periods of stress as their liability gap increases in down markets. Capital requirements for insurance companies and pension funds should therefore feature countercyclical measures while promoting adequate matching of long-term liabilities. Solvency II, as an example, embeds such measures with the matching adjustment, volatility adjustment, and countercyclical capital charges for equity risk, depending on the level of share prices.

Figure 1.23. Liquidity Risk Amplifiers

The benchmark-centric nature of mutual funds and ETFs fuels high correlations...

1. Correlation of Returns: Top 10 Global High-Yield Mutual Funds and ETFs versus the Global High-Yield Index
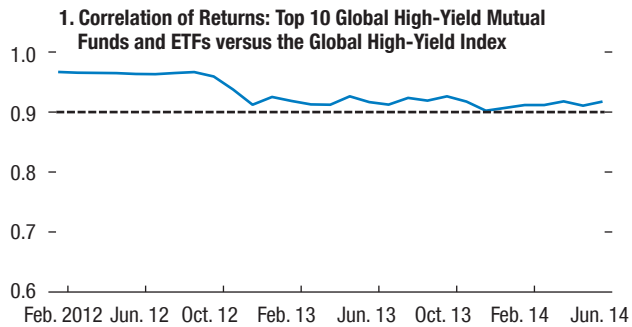
Sources: Bank of America Merrill Lynch; Bloomberg L.P.; EPFR Global; and IMF staff calculations.
Note: Twelve-month rolling correlation of the returns of the top 10 global high-yield mutual funds as measured by assets under management. ETF = exchange-traded fund. Dashed line shows a correlation of 0.9.

...which are amplified by the reported rise in synthetic leverage by large crossover mutual funds.

2. Assets under Management to Large Crossover Fixed-Income Funds (Billions of U.S. dollars)
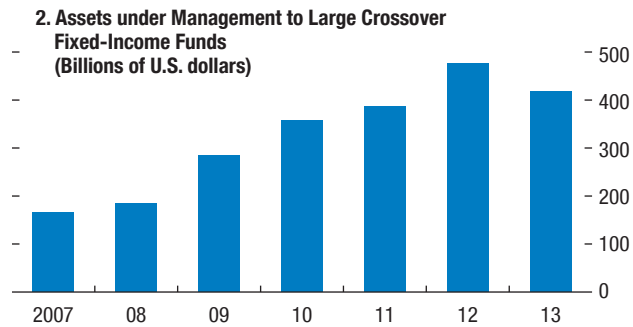
Sources: Bloomberg L.P.; EPFR Global; and IMF staff calculations.
Note: Sample of mutual funds with unconstrained mandates across fixed-income sectors and with assets under management exceeding $5 billion.

Liquidity mismatches are rising, as redemption-prone vehicles invest in less liquid assets...

3. Number of Days for the Full Liquidation of U.S. Credit Mutual Funds and ETFs
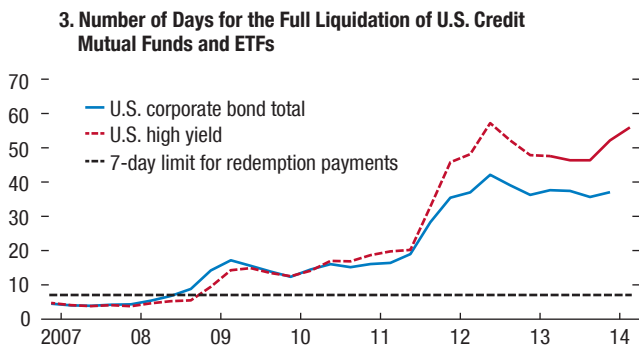
Sources: EPFR Global; Federal Reserve; and IMF staff calculations.
Note: The number of days to liquidate is the ratio of assets of mutual funds and ETFs (exchange-traded funds) per daily dealer inventories. Under the Investment Company Act of 1940, Section 22(e), U.S. open-end mutual funds may not postpone the payment of redemption proceeds for more than seven days following receipt of a redemption request. Because there are no data for U.S. high-yield bond dealer inventories before April 2013, the dashed red line assumes a constant ratio of this amount to total corporate bonds before this date.

...with hedge funds less likely to take short positions and provide liquidity during stressed markets.

4. Correlation and Alpha of Hedge Fund Returns
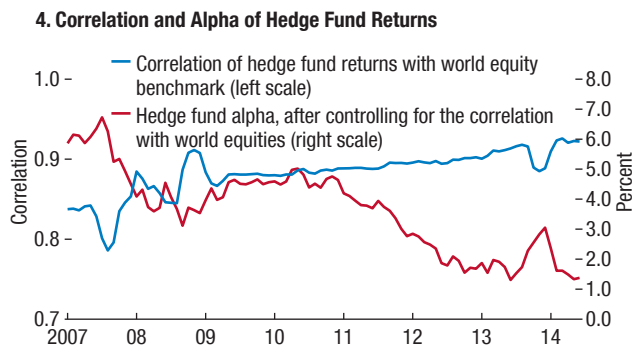
Sources: Bloomberg L.P.; Hedge Fund Research; and Morgan Stanley Capital International.
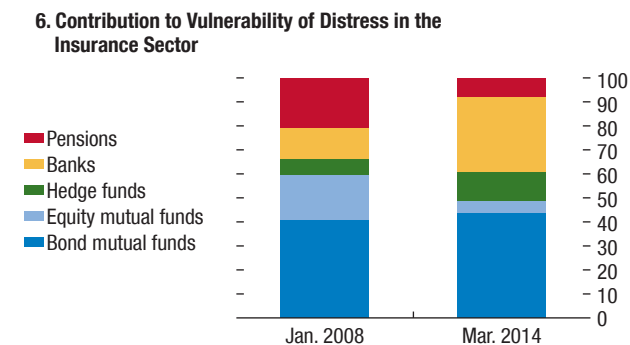Note: Monthly returns measured over a rolling five-year observation window. Hedge fund returns are based on the Hedge Fund Research Fund-Weighted Composite Index.

Bond mutual funds are now more highly interconnected with the banking system...

5. Contribution to Vulnerability of Distress in the Banking Sector
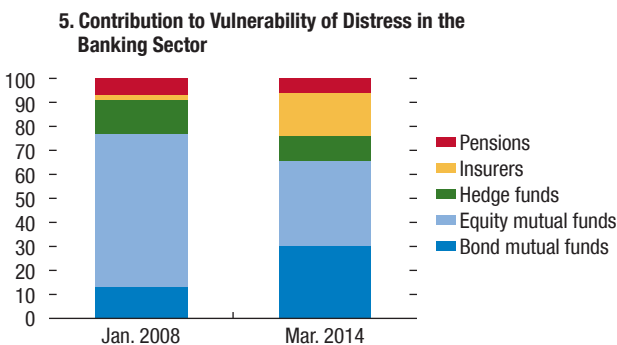
Source: Segoviano and others (forthcoming).

...and with the insurance sector.

6. Contribution to Vulnerability of Distress in the Insurance Sector

Source: Segoviano and others (forthcoming).

in high-yield credit markets (Figure 1.23, panels 5 and 6).[39] Furthermore, market and liquidity pressures in segments in which mutual funds and ETFs are active may negatively affect the banking and insurance sectors both through direct balance sheet exposures and indirectly through common mark-to-market exposures.

Emerging market economies are more vulnerable to shocks from advanced economies

While some emerging market economies have greater buffers, they now absorb a much larger share of the outward portfolio investment from advanced economies than before the financial crisis (Figure 1.24, panels 1 and 2). Equity portfolio allocations to emerging market economies from advanced economies have increased substantially, from 7 percent of the total stock of advanced economy portfolio investment in 2002 to almost 20 percent in 2012 (latest available survey results). Similarly, fixed-income allocations of advanced economies to emerging market economies grew from 4 percent of the total stock of outward portfolio investment from advanced economy markets in 2002 to almost 10 percent in 2012.[40]

These portfolio allocations to emerging market economies are highly concentrated in a few destination countries (Figure 1.24, panels 4 and 6). Of the $2.4 trillion stock of portfolio allocations to emerging market equities in 2012, about 80 percent was invested in only 12 of the 190 emerging market economies. China was the destination for $980 billion of that stock—more than to any other emerging market economy. Concentration patterns are similar in fixed-income markets, with 12 emerging market economies absorbing $1.2 trillion of the $1.6 trillion stock of advanced economy bond allocations.

Furthermore, the concentration among the advanced economies as the source of portfolio investment is even more striking (see Figure 1.24, panels 3 and 5). As of 2012, four of the world's most financially integrated

countries, Hong Kong SAR, Singapore, the United Kingdom, and the United States, sourced at least half of all equity portfolio investment to the major emerging market economies, and at least a third of the total advanced economy fixed-income portfolio investment. Portfolio allocations from U.S. residents alone account for more than a third of equity portfolio investment in most major emerging market economies. Given the degree of concentration for portfolio allocations, the prospects for tighter monetary policies in the United Kingdom and the United States could have a significant impact on portfolio flows to the largest emerging market economies.

An unintended consequence of these stronger financial links between advanced and emerging market economies in recent years is the increased synchronization of asset price movements and volatilities. Shocks emanating from advanced economies can now more quickly propagate to emerging market economies via the portfolio investment channel and changes in underlying market liquidity. The increasing correlation in recent years between asset prices of emerging market and advanced economies (in both equities and bonds) is consistent with this increased synchronization (Figure 1.25, panel 1). This synchronization is also found in volatility; global low volatility, particularly for emerging market fixed-income assets, can be linked to low volatility in U.S. fixed-income markets, a by-product of unconventional monetary policies. Conversely, when volatility in U.S. Treasuries switches to a higher level, the knock-on impact on the volatility of other asset classes is also very rapid, as shown in the May 2013 risk-off episode (see Annex 1.4).

Normalization of monetary policy could trigger a significant disruption in global markets

A wide variety of possible events could trigger a sharp reversal of risk appetite and increase volatility in credit markets. Such events include major geopolitical flare-ups or sudden shocks to large, systemically important emerging market economies. Perhaps the most plausible trigger for a broad-based market repricing is the expected reduction in monetary accommodation in the United States.

If monetary normalization and interest rate adjustment proceeds smoothly, the impact on asset market volatility may be well contained, leading to a smooth adjustment of asset allocations over time. However, the change in U.S. policy could have repercussions

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[39]Estimates are based on Segoviano and others (forthcoming) and capture how sectoral interlinkages affect the vulnerability of a particular sector to distress in other sectors (distress dependence). The same framework is used in Chapter 2 to estimate the contribution of shadow banking to systemic risk.

[40]This stock of fixed-income allocations from advanced economies was $275 billion, or 4 percent of aggregate emerging market economy nominal GDP in 2002, and grew to $1.65 trillion in 2012, or 6 percent of emerging market GDP. The share of fixed-income allocations has likely increased even more in 2013 and 2014, based on higher-frequency surveys of portfolio flows.

Figure 1.24. Evolution and Concentration of Asset Allocation to Emerging Markets

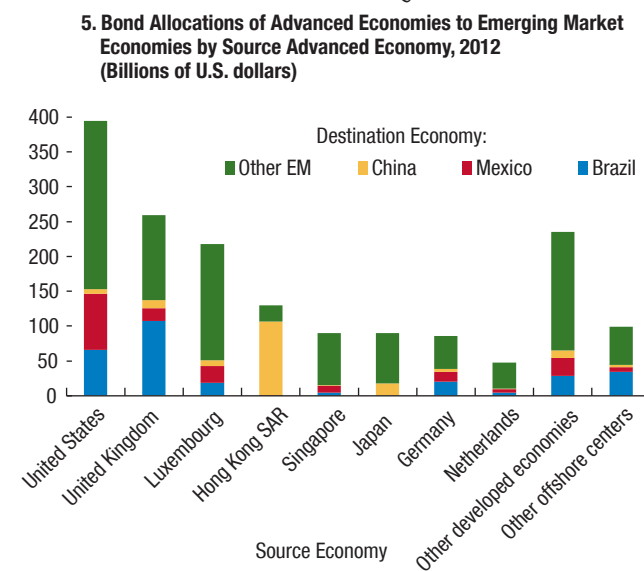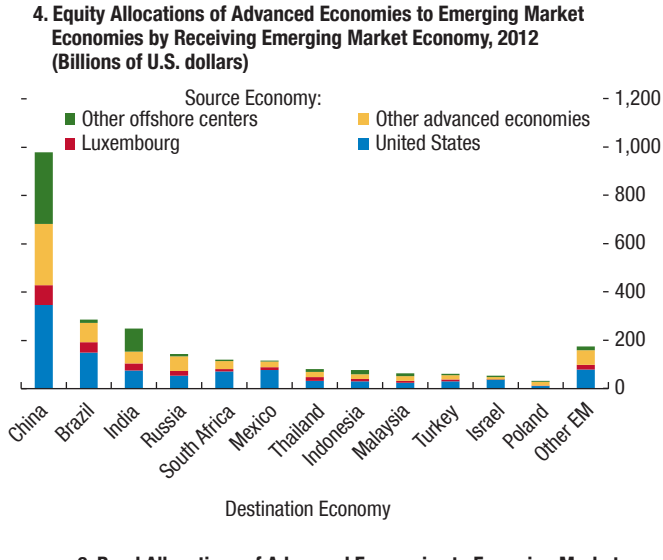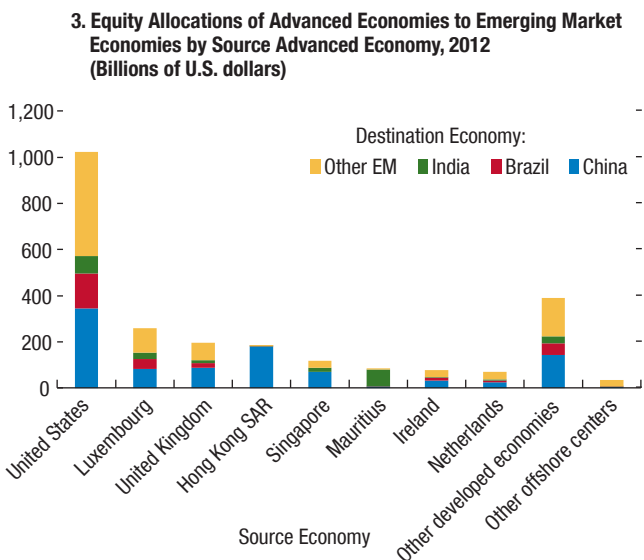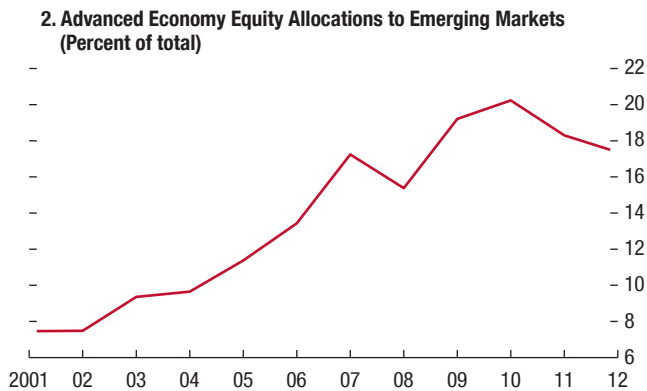Portfolio allocations from developed markets to emerging market bonds have risen...
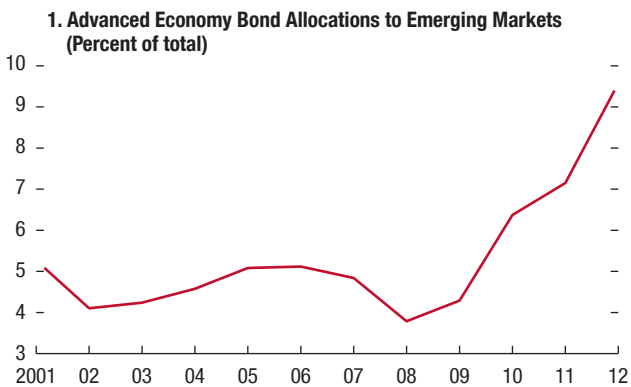
...as have allocations to emerging market equities.

1. Advanced Economy Bond Allocations to Emerging Markets (Percent of total)

2. Advanced Economy Equity Allocations to Emerging Markets (Percent of total)

3. Equity Allocations of Advanced Economies to Emerging Market Economies by Source Advanced Economy, 2012 (Billions of U.S. dollars)

4. Equity Allocations of Advanced Economies to Emerging Market Economies by Receiving Emerging Market Economy, 2012 (Billions of U.S. dollars)

5. Bond Allocations of Advanced Economies to Emerging Market Economies by Source Advanced Economy, 2012 (Billions of U.S. dollars)

6. Bond Allocations of Advanced Economies to Emerging Market Economies by Receiving Emerging Market Economy, 2012 (Billions of U.S. dollars)
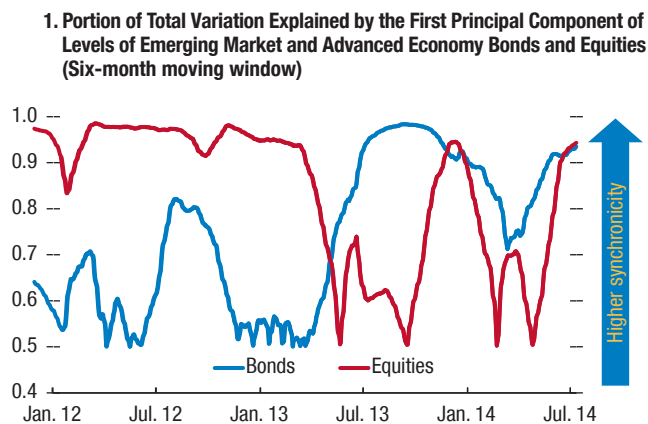

Sources: IMF, Coordinated Portfolio Investment Survey; and IMF staff calculations.
Note: In 2012, advanced economies held $2.4 trillion of emerging market equities and $1.6 trillion of emerging market bonds. Portfolio stocks include revaluation effects.

Figure 1.25. Volatility Developments

Advanced economy and emerging market asset prices are increasingly synchronized.

1. Portion of Total Variation Explained by the First Principal Component of Levels of Emerging Market and Advanced Economy Bonds and Equities (Six-month moving window)


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

Volatility has become more sensitive to price declines for sovereign bond and credit markets ...

2. News Impact on Asset Volatility
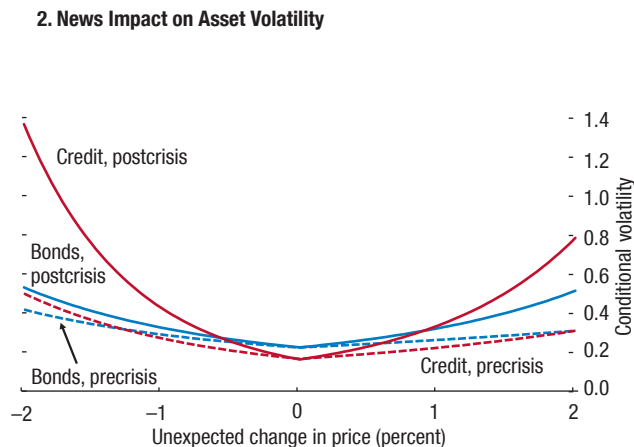
Source: IMF staff calculations.
Note: See Annex 1.4 for more information.

... and volatility increases a lot more for emerging market than for advanced economy assets during periods of high risk aversion.

3. Increase in Volatility between Low and High Volatility Regimes (Multiples)
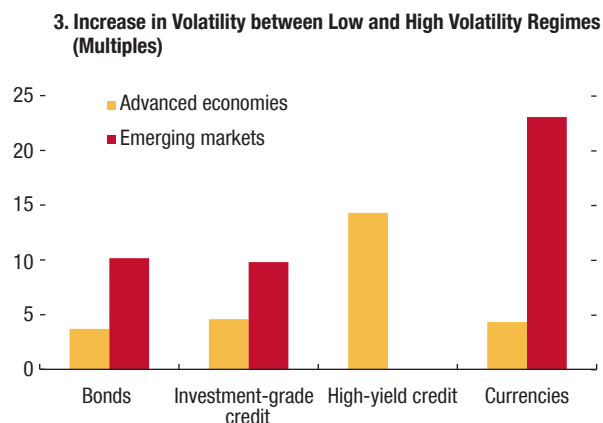
Source: IMF staff calculations.
Note: See Annex 1.4 for more information.

Longer-term implied volatility remains very low.

4. S&P 500 Implied Volatility Term Structure (Daily average)
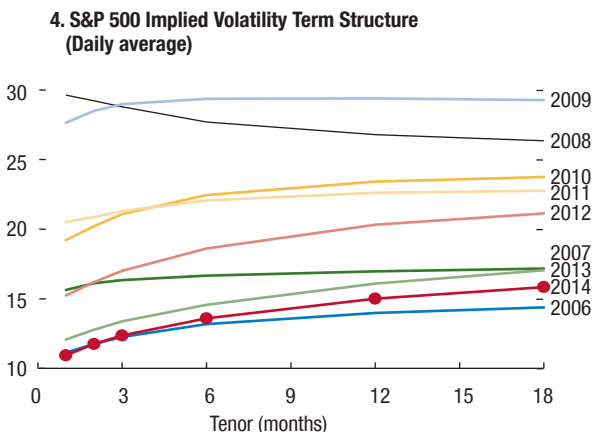
Sources: Bloomberg L.P.; and IMF staff calculations.

extending to all major markets, radiating out from global bond and credit markets. As shown in Annex 1.4, shifts in volatility in U.S. Treasury markets to a high level tend to rapidly drive up volatility in other asset classes to a correspondingly high level. Given the increased role of redemption-prone investors in rate-sensitive credit markets, and the numerous amplifying factors described in this report that could reduce liquidity during times of stress, the monetary policy exit process may be accompanied by significant bouts of increased volatility. Reflecting these developments,

the sensitivity of volatility to price shocks has already increased since the crisis (Figure 1.25, panel 2), especially for credit products, which can lead to faster sell-offs.[41] The increased sensitivity of volatility to negative

[41]For most assets, volatility tends to react differently to positive and negative price shocks, a phenomenon known as the "news impact" effect (Engle and Ng 1993). Assets that generally appreciate during periods of low risk aversion (for example, equities, corporate bonds, emerging market currencies, and commodities) usually have larger volatility shocks from a price decline than from a price increase. This sensitivity is now greater than before the crisis. Annex 1.4 shows the impact of unexpected price shocks on the volatility of

news is also true for emerging market and advanced economy equities (see Annex 1.4).

Under these circumstances, the situation could be pushed to the "bumpy exit" scenario described in the April 2014 GFSR, with global repercussions. The observed increase in volatility between periods of low and high volatility since the crisis began is greater for more leveraged asset classes, namely, emerging market sovereign and corporate bonds, high-yield corporate credit, and emerging market currencies (Figure 1.25, panel 3). Although markets are expecting volatility to rise in the future in several key asset classes (such as bonds, foreign exchange, and equities), the long end of volatility curves remains relatively low in absolute terms. For instance, the volatility term structure for the S&P 500 equity index is now at its lowest level since 2006 (Figure 1.25, panel 4), suggesting that markets may be underpricing the risk of higher volatility in the future.

The result of a rapid switch to a high-volatility scenario would likely be a faster rise in term premiums, widening credit spreads, and a rise in financial volatility that spills over to global markets. For example, an unexpected 100 bps increase in the 10-year term premium, coupled with a 100 bps rise in credit spreads, could rapidly push up U.S. Treasury and speculative-grade bond yields (Figure 1.26, panel 1). This occurrence would bring the term premium closer to historical averages and credit spreads to levels that would be consistent with expected losses under an average default cycle.

A normalization of monetary policy could trigger instability in the fund sector if it results in sustained losses for investors. Monetary policy tightening has been a key trigger for losses in fixed-income markets in the past, resulting in highly persistent outflows as policy normalizes (Figure 1.26, panel 2, shows that three-quarters of losses were during tightening cycles). This reflects a well-known phenomenon that fund flows follow performance (Feroli, Schoenholtz, and Shin 2014). With interest rates low and credit spreads having narrowed as the search for yield intensified, credit market performance is likely to be more driven by changes in the risk-free rate than by underlying fundamental credit developments. Indeed, relative to previous policy cycles, current yields in many sectors of fixed-income markets are unlikely to offset principal losses from a return to more normal interest rates over a short horizon. Thus,

the probability of losses to fixed-income portfolios has increased substantially in the event of a normalization of volatility and a rise in rates (Figure 1.26, panel 3).

To illustrate these potential risks to credit markets, Table 1.3 shows the impact of a rapid market adjustment that causes term premiums in bond markets to revert to historical norms (increasing by 100 bps) and credit risk premiums to normalize (a repricing of credit risk by 100 bps). Such a shock could reduce the market value of global bond portfolios by more than 8 percent, or in excess of $3.8 trillion.[42] If losses on this scale were to materialize over a short time horizon, the ensuing portfolio adjustments and market turmoil could trigger significant disruption in global markets. A 100 bps increase in the yield would lead to a loss of 6.1 percent in the global bond aggregate index and a loss of 6.6 percent in the index for U.S. investment-grade corporate bonds (Table 1.3).

Emerging market economy local-currency bond yields are also sensitive to such increases in U.S. rates and volatility. Panel 4 of Figure 1.26 shows the effect on emerging market local currency government bond yields from a 100 bps increase in the yield of the 10-year U.S. Treasury note, 65 point increase in interest rate volatility, and a switch of the local bond yield volatility state to high from its current low state (see Annex 1.4). For many emerging market economies the yield increase is more than 200 bps, and for most the bulk of the increase comes from the volatility shock. Outflows from redemption-prone investors under this high-volatility scenario could be significant, if previous tightening cycles are any indication.

Table 1.3 shows the potential increase in volatility if markets switch to such a high-volatility state (which would be consistent with a bumpy exit), suggesting that such a scenario could entail significant spikes in volatility for high-yield corporate debt markets and emerging market debt. This analysis suggests that the structural changes in market liquidity, investor behavior, and volatility could provide significant additional challenges to engineering a smooth exit for monetary policy. These challenges would substantially compromise the ability of the financial system to support the recovery.

[42]The October 2013 GFSR referenced a $2.3 trillion loss from a 100 bps increase in the Barclays Global Bond Aggregate index. Currently the loss from a 100 bps increase in the same index would amount to $2.8 trillion, stemming from the higher interest rate sensitivity (duration has increased from 6.2 to 6.4) and larger market value of the index (increased from $42 trillion to $45 trillion).

different assets for the periods before and after the global financial crisis, using a standard econometric volatility model.

Figure 1.26. Monetary Policy Normalization

The impact of an accelerated monetary policy normalization
on yields can be significant.

**1. Impact on U.S. 10-Year Treasury and Speculative-Grade
    Bond Yields under Shock Scenarios
    (Percent)**
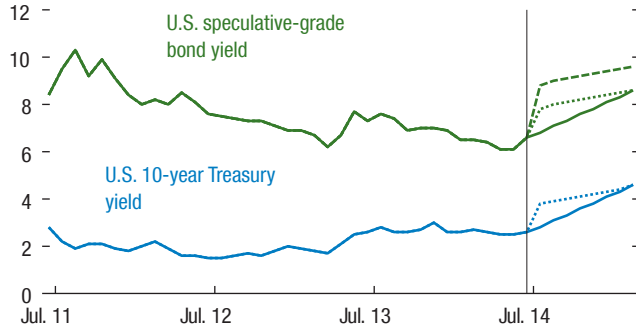
Sources: Federal Reserve; Bloomberg L.P.; and IMF staff calculations.
Note: The dotted lines show a term premium shock. The dashed line shows
an additional credit premium shock.

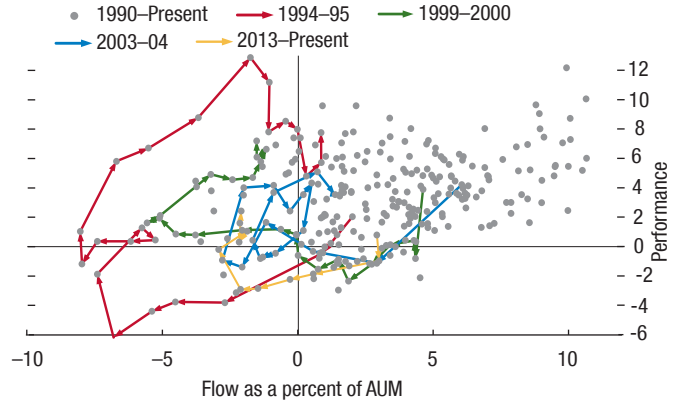...and the risk of market losses is high.

**3. Probability of Quarterly Loss
    (Percent)**
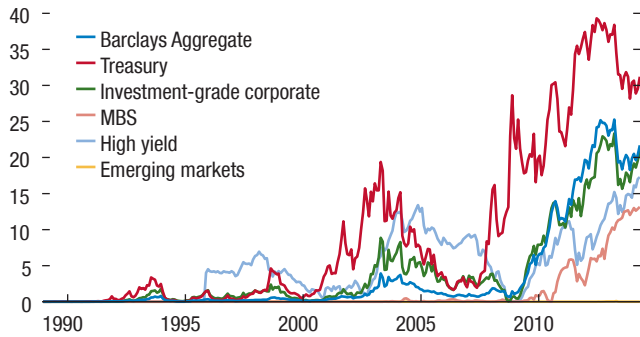
Sources: Barclays; and IMF staff calculations.
Note: MBS = mortgage-backed securities.

Monetary normalization could trigger outflows...

2. Barclays Aggregate Six-Month Flows versus Return

Source: Barclays.
Note: AUM = assets under management.

Sensitivity of emerging market bond yields to volatility is generally higher
than rates.

**4. Estimated Impact on Increase in Volatility and U.S. Rates on
    Emerging Market Local-Currency Government Bond Yields
    (Basis points)**
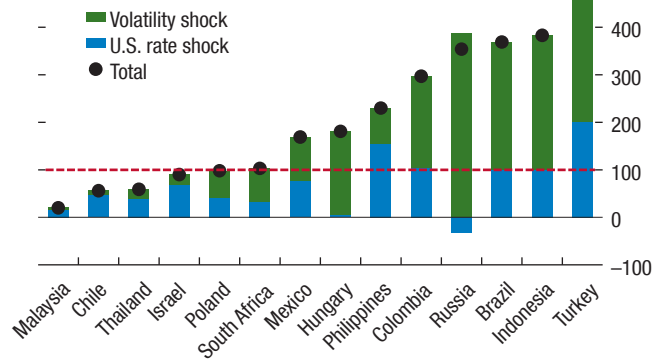
Source: IMF staff calculations.
Note: The figure shows the increase in yield of several emerging market
10-year local currency government bonds (10-year cross-currency swap for
Turkey and Russia, 10-year TIIE [Tasa de Interés Interbancaria de Equilibrio]
130x1 swap for Mexico, and five-year DI [depositos interfinanceiros] futures
for Brazil) with respect to an increase in the yield of the 10-year U.S.
Treasury note by 100 basis points, an increase of the MOVE (Merrill Option
Volatility Estimate) index to 125, corresponding to its June 2013 level, and a
switch of each country's yield volatility state to high (see Annex 1.4 for
more information).

Improving the Balance between Financial and Economic Risk Taking

*Monetary accommodation remains critical to support
the recovery by encouraging economic risk taking, but
prolonged monetary ease is leading to some financial
excesses. Continued financial risk taking and struc-
tural changes in credit markets have shifted the locus
of financial concerns from the banking system to the
shadow banking system—particularly to asset manag-
ers—thereby increasing market and liquidity risks. The
banking system has been strengthened substantially,*

Table 1.3. Major Bond Index Sensitivities

	Global bond aggregate	Advanced economy government bonds	U.S. bond aggregate	U.S. corporate IG	U.S. corporate HY	Agency MBS	Municipal	Global IG	Global HY	Emerging market hard currency	Emerging market local currency[1]	Emerging market corporate
Duration (years)												
Average for last three tightening cycles[2]	5.0	5.4	4.8	5.8	4.7	4.0	7.2	...	4.4	4.0	...	...
August 2014	6.4	7.3	5.6	7.2	4.1	4.8	6.8	6.2	4.1	5.9	5.0	5.2
Breakeven yield change (August 2014; basis points)[3]	45	31	55	57	165	76	65	62	162	91	105	98
Total market value ($ billions)												
Average for last three tightening cycles[2]	13,319	6,705	5,833	1,155	474	1,960	814	...	592	265	...	...
August 2014	45,059	22,196	17,303	4,053	1,336	4,981	1,314	7,699	2,182	1,459	1,890	918
Present-level losses from (percent of total market value)												
100 bps increase	–6.1	–6.7	–5.6	–6.7	–4.1	–5.7	–7.7	–5.9	–4.1	–5.6	–4.7	–5.0
200 bps increase	–11.7	–12.4	–11.2	–12.4	–8.4	–13.2	–17.0	–11.0	–8.3	–10.5	–8.9	–9.4
Present-level market value loss from ($ billions)												
100 bps increase	–2,766	–1,492	–970	–271	–55	–285	–101	–451	–90	–82	–89	–46
200 bps increase	–5,267	–2,750	–1,938	–501	–113	–659	–224	–843	–180	–154	–169	–86
Losses from shock scenario to term (100 bps) and credit risk (additional 100 bps) premiums ($3.8 trillion)	...	–1,492	...	...	...	–659	–224	–843	–180	–154	–169	–86
Increase in volatility from low to high state[4] (multiples)	...	...	2.8	5.3	11.4	...	...	...	...	7.2	13.1	...

Sources: Barclays Capital; Bloomberg L.P.; and IMF staff calculations.
[1]Data are unavailable before July 2008.
[2]Cycles include 1994–95, 1999–2000, 2004–06. For municipal, U.S. corporate HY, and emerging market hard currency, only the latter two cycles are used.
[3]The breakeven yield change is the maximum increase in the bond index yield before the portfolio has more losses than the annualized coupon.
[4]See Annex 1.4 for more information.
Note: bps = basis points; HY = high yield; IG = investment grade; MBS = mortgage-backed security.

as capital buffers have increased and regulation has reduced leverage. But markets are now more significant providers of credit, and their responses to shocks are likely to be more synchronized and rapid across advanced and emerging market economies, against a backdrop of structurally weaker underlying market liquidity. Policy recommendations must rely on two pillars: (1) strengthening the credit transmission channels by improving the monetary policy trade-off between financial and economic risk; and (2) using macroprudential policies to contain new and evolving financial stability risks, including growing market and liquidity risks emerging from the shadow banking system.[43]

Is easy money increasing financial stability risks?

This chapter has focused on the trade-off between the benefits of monetary accommodation in support of economic activity and balance sheet repair, and the downside risks associated with financial excesses that could, if they become systemic, pose risks to the real economy. The chapter asks, is easy money growth increasing financial stability risks?

The answer is different in each economic region, owing to differences in the stage of economic recovery, the buildup of financial excesses, and the structure of the financial system (which determines the vulnerability to an unwinding of those excesses).

The United States and the United Kingdom are approaching economic liftoff as confidence in the recovery has progressed, and these economies are closest to exiting monetary accommodation. Growing signs of financial excesses are emerging in the United States, as asset price appreciation, spread compression, and low volatility have reached levels that diverge from fundamentals, potentially complicating the timing of exit and posing risks for a bumpy exit. The broad-based shift of portfolios into fixed-income assets and an extension of duration well above historical norms could magnify the impact of these financial excesses, with ramifications for global asset markets.

Particular focus in this report has been on the high-yield segment. Some argue that the market is too small to be systemic—not unlike commentary in 2007 surrounding the U.S. subprime mortgage segment. We argue that the high-yield segment is systemic for several reasons. First, high-yield and

other illiquid asset holdings in fixed-income mutual funds that may be prone to run risks are growing. Second, liquidity risks are being underpriced, owing to the prolonged search for yield and structural and regulatory changes. Third, the risk of a volatile repricing and portfolio rebalancing is heightened by credit spreads that are overly compressed and do not compensate adequately for duration or default risk. Finally, financial links between advanced and emerging market economies are now stronger, exposing emerging market economies to shocks emanating from advanced economies.

In the euro area and Japan, in contrast, the need for monetary accommodation to support growth is much higher, while the risks associated with financial excesses are lower. In the euro area, the high-yield market is small and credit intermediation is largely bank based, so systemic risks are lower. Indeed, current economic data argue for more not less monetary accommodation. In Japan, the Bank of Japan correctly remains on the path of monetary accommodation.

What policies can improve the balance between financial and economic risk taking?

The policy challenge is to remove impediments to economic risk taking and strengthen monetary and credit transmission to the real economy. Efforts in this direction must go hand in hand with structural reforms in product and labor markets to increase the return on capital and support a sustainable recovery.

In Europe, Japan, and the United States, the strengthening of bank balance sheets, as discussed in previous GFSRs, now needs to be reinforced by moving to new business models that strengthen the transmission of monetary policy and encourage the efficient allocation of credit. Ensuring that nonviable banks exit in an orderly way would help relieve competitive pressures in a context of excess capacity and allow viable banks to establish sustainable business models by repricing and reallocating their activities. In this process, regulators can encourage banks to abandon old practices of cross-subsidizing products and move to a more transparent pricing mechanism in which products are priced along product lines and reflect the underlying economic risks and regulatory requirements.

Looking ahead, authorities need to gain a comprehensive view of the interplay of the different regulations and potential implications for the provision of credit

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[43]A more granular discussion of overall IMF policy advice is provided in the Managing Director's *Global Policy Agenda*.

and financial stability. Banks must operate in an environment in which they can adjust their business models, regain profitability without taking excessive risk, and support the economy through lending, and in which a new balance between bank and capital market financing can be found. Realization of this new environment may require recalibrating some regulations, supporting and monitoring the development of safe nonbank activities, and putting in place safety nets to deal with potential adverse macrofinancial developments.

Furthermore, more efforts, particularly in Europe, will be needed to encourage greater market-based access, including through safe securitization. In this context, the recent announcement by the ECB to purchase asset-backed securities and covered bonds is a welcome step in the right direction, and providing targeted fiscal support (such as guarantees by pan-European agencies) would further encourage this type of market-based funding. Removing impediments to nonbank participation in credit origination will require solid regulatory frameworks for nonbanks. Strengthening the recovery and bankruptcy frameworks will help address heavy debt burdens in the corporate sector, as discussed in previous GFSRs.

Macroprudential policies to safeguard financial stability

Against this backdrop, and in addition to having in place adequate microprudential regulations, it is important to deploy a suite of macroprudential tools (MPTs) aimed at mitigating the financial stability risks identified in this chapter. These tools may be targeted at particular sectors in which financial excesses are apparent, such as the asset management segments, and are equally relevant for advanced and emerging market economies.

Timely deployment of well-designed MPTs will not just reduce the need to tighten interest rates earlier than warranted by the needs of the real economy but will also make systemic institutions more resilient, help contain procyclical asset price and credit dynamics, and cushion the consequences of liquidity squeezes when volatility returns. The conduct of macroprudential policy is far from easy. Implementation is still in its infancy, and its effectiveness is not yet necessarily well understood. But in a world in which financial stability risks are likely to continue to build if left unaddressed, MPTs should prove to be invaluable complements to conventional policy tools in building the resilience of the financial system.

The effective deployment of MPTs entails three steps to monitor, prepare, and act against the buildup of vulnerabilities:

- Policymakers need the information flow and data to adequately *monitor* and assess where financial stability risks are building.

- Policymakers need to *prepare* the suite of MPTs that may need to be deployed on the basis of the information obtained from the monitoring step. This preparation may entail building internal expertise in assessing credit, collateral, and liquidity risks across a number of markets, and having the legal and regulatory powers to implement and use MPTs. Where these tools are associated with bank capital, liquidity, and credit risk requirements, bank regulators are likely to already have such powers, but may need statutory authority to use them purely for macroprudential purposes. In the case of MPTs for nonbanks, however, the regulatory framework may need to be put in place or extended to tackle the emerging risks. Greater coordination between the macroprudential authorities and market and securities regulators may be needed to ensure a systemic orientation in prudential supervision. An adequate governance mechanism should give macroprudential authorities the ability to override objections from securities regulators that macroprudential measures are not warranted on microprudential grounds. But however carefully designed and skillfully deployed, it is unrealistic to expect macroprudential policy to address underlying mispricing that arises from significant policy distortions elsewhere.[44]

- Policymakers need the courage to *act*. Use of MPTs is often highly unpopular with practitioners (for limiting market growth and activity), customers (for raising the cost of credit or limiting its availability), and politicians (for dampening asset values or economic growth). Effective and balanced communication of the measures undertaken will also be needed. Macroprudential policymakers therefore need to have not only instrument independence but also an explicit mandate and requirement to act when needed, in close dialogue with monetary policymakers. Similarly, courage will be needed on the downswing when MPTs may need to be relaxed for

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[44]For instance, tax advantages given to mortgages and property ownership in many countries or a structural shortage of housing supply in others will contribute to elevated house prices. If such distortions are not addressed at their source, MPTs will not easily or sensibly achieve their objectives.

countercyclical purposes even if backward-looking headline indicators of risks may appear to be rising.

Following this monitor, prepare, and act framework, Table 1.4 summarizes key macroprudential policy recommendations to address the risks identified in this chapter and offers recent country examples for each broad category of policy objectives. See also Chapter 2 for policy recommendations to address risks emerging from shadow banking developments.

Macroprudential policies can improve the trade-off between financial and economic risk taking and indeed are a first line of defense. However, they cannot eliminate the trade-off. Macroprudential policy cannot be fully relied on to prevent systemwide financial excesses, and prolonged use could lead to circumvention. In this context, monetary policy may need to adjust to address a systemic buildup of financial risks, especially when countries' cyclical positions improve. Adjusting correctly, however, is a complex exercise that requires careful analysis and must take into account country-specific realities.

Improving the resilience of market structures

This report discusses potential vulnerabilities in the asset management sector to liquidity shocks with wider ramifications for credit markets. A central concern is the liquidity risk arising from the mismatch between the liquidity promised to fund owners in good times and the cost of illiquidity when meeting redemptions in times of stress. The policy remedy should seek to address this mismatch, by removing incentives of asset owners to run, enhancing the accuracy of NAVs, and improving the liquidity and transparency of secondary markets, specifically for longer-term debt markets.

Regulators should consider a granular approach in judging the relative liquidity of specific asset classes compared with the redemption terms offered by funds. For example, in markets with frequently observed transactions and substantial depth, such as advanced economy money markets and sovereign debt, the current practice of striking a daily NAV and redemption terms may be appropriate. In less frequently traded markets in which bid-ask spreads are large, lower frequency redemption terms are more appropriate.

Redemption fees that benefit remaining shareholders are another option, but the calibration of such fees is challenging and, to the extent possible, should be time invariant to discourage asset flight. Similarly, gates to limit redemptions appear to solve some incentive prob-

lems, but may simply accelerate redemptions ahead of potential imposition.

Improving the accuracy of NAV calculations should also reduce stability risks associated with commingled investment vehicles. Initiatives to improve transparency, such as expanding trade reporting initiatives to all global fixed-income sectors, should help alleviate the opacity of secondary markets. If transactions are infrequent, the shift to less frequent redemption terms and NAV pricing should reduce the reliance on interpolated prices of similar securities. Regulators and industry bodies should codify best practices globally to ensure that pricing standards are uniform across jurisdictions.

Finally, reviewing liquidity and investment policy requirements for mutual funds invested in less liquid assets would help mitigate liquidity mismatches. This requirement may include limits on investments in illiquid assets, minimum liquidity buffers, and greater scrutiny of the use of derivatives and the embedded leverage they carry. Increased liquidity-risk-management requirements, such as those proposed by the International Organization of Securities Commissions for money market funds, may be helpful to improve the resilience of funds to liquidity volatility. Moreover, greater emphasis should be placed on asset managers' communication with investors about the risks inherent in mutual funds invested in certain markets that may be subject to greater liquidity risks and volatility, particularly during stress periods.

Given the complexity of these issues, it is crucial that regulators pursue a harmonized effort to examine the universe of mutual funds when considering prudential policies and develop best practices for addressing redemption risks as well as the supervision of liquidity and pricing of illiquid securities.

Managing market liquidity risks and vulnerabilities in advanced economies...

Policymakers and markets need to prepare for structural higher market volatility. Doing so requires strengthening the system's ability to absorb sudden portfolio adjustments, as well as addressing structural liquidity weaknesses and vulnerabilities.

Advanced economies with financial markets at risk for runs and fire sales may need to put in place mechanisms to unwind funds should they come under substantial pressure that threatens wider financial stability. As discussed in the October 2013 GFSR, in the event of adverse shocks, contingency backstops may be

Table 1.4. Key Macroprudential Policy Recommendations and Recent Country Examples

Objectives	Monitor	Prepare	Act	Recent country examples
Contain risks in nonbank institutions arising from market illiquidity	• Strengthen capacity to assess and monitor credit developments at the sectoral and systemwide level. • Monitor holdings of mutual funds and exchange-traded funds and their linkages with the rest of the financial system. • Strengthen the monitoring capacity of policymakers by improving the accuracy of net asset value (NAV) fund valuations and improve pricing transparency of secondary markets. • Introduce mandatory stress tests on cash and liquidity buffers held by funds, particularly high-yield and less liquid funds. • Monitor the rise in embedded leverage in nonbank institutions through securities lending and the use of derivatives.	• Ensure effective powers to designate large asset management companies as systemically important and explore the need to extend designation powers to cover products that may be a source of systemic risk. • Ensure effective governance and inter-agency coordination arrangements to identify and address possible risk shifting from banks to nonbanks. • Strengthen communication to investors about the underlying risk of instruments, including in stress periods.	• Introduce liquidity requirements on money market funds, including minimum liquidity buffers, investment concentration limits, leverage ratios, margin requirements on securities lending and derivative transactions, and tougher liquidity risk management guidelines (for example, euro area, United Kingdom, United States). • Apply redemption fees or liquidity gates, either at all times or set based on triggers or regulatory intervention, recognizing that trigger-based instruments can lead to pre-emptive runs.	**Canada:** Introduced rules to reduce counterparty credit risks for financial institutions dealing in derivatives (effective January 2014). **European Union:** Proposed new rules to make money market funds more resilient, including a 3 percent cash buffer for constant NAV money market funds (September 2013). **United States:** Imposed floating NAV requirement for institutional prime money market funds and introduced the ability for funds to impose new fees and "gates" to mitigate runs on a fund (July 2014), effective after a two-year transitional period.
Strengthen the resilience of the system to the eventual normalization of interest rates and contain excessive leverage in the household, corporate, and banking sectors	• Monitor and contain high household and corporate leverage (particularly in the euro area and emerging market economies), including vulnerability to foreign exchange (FX), maturity, and duration risks. • Conduct annual macroprudential stress tests to assess banks' shock-absorption capacity for identified risks. • Monitor and identify unsustainably high credit intermediation growth, including in the shadow banking system (for example, China).	*To strengthen the resilience of the system to corporate defaults:* • Ensure effective corporate insolvency regimes. • Provide ability to tighten risk weights, provisions, and capital requirements on banks' sectoral exposures. *To strengthen the resilience of the system to excessive household indebtedness:* • Put in place ability to tighten loan-to-value (LTV) and debt-to-income (DTI) requirements. *To strengthen the resilience of banks to shocks:* • Ensure strict capital and provisioning requirements, rapid loan loss recognition, and risk-based loan pricing. • Ensure adequate public backstops to restructure weak banks and resolve unviable banks.	• Finish bank balance sheet cleanup, especially in the euro area, and promote orderly exit of banks with nonviable business models. • Where there are concerns about excessive mortgage debt, increase resilience of borrowers to shocks by ensuring that LTV and DTI requirements are sufficiently stringent (for example, Netherlands, Sweden, Switzerland, United Kingdom) and remove policy distortions (for example, tax incentives, structural housing supply shortages). • Hold large banks to capital requirements above the regulatory minimums, including under stress scenarios (similar to the European Central Bank Comprehensive Assessment and the U.S. Comprehensive Capital Analysis and Review [CCAR] and Dodd-Frank Act stress testing). • In China, contain high domestic credit growth, partly intermediated by the large shadow banking sector.	**China:** Raised bank provisioning requirements and risk weights on local-government-financing vehicles, tightened regulation of nonstandard credit products, and restricted off-balance-sheet funding. **Euro Area:** Introduced the Comprehensive Assessment exercise (asset quality review and supervisory stress test) aimed at increasing transparency of bank balance sheets (November 2013–October 2014). **Indonesia:** Imposed lower LTV ratio on second and third mortgages to curb loan growth and property speculation (September 2013). **Netherlands:** Imposed 1 percentage point annual reduction in LTV ratio cap on new mortgage loans to 100 percent by 2018 (2013), introduced systemic capital buffer requirement (1 to 3 percent of risk-weighted assets) on four largest banks to be phased in between 2016 and 2019 (April 2014). **Russia:** To increase bank loss-absorbing buffers, raised risk weights for consumer loans and provisioning requirements for uncollateralized retail loans (September 2013). **Sweden:** Raised risk weight floors on mortgage assets to 25 percent from 15 percent (effective fall 2014), proposed countercyclical buffer for all banks, and introduced additional capital buffers for four largest banks (3 percent common equity Tier 1 systemic capital buffer and a 2 percent Pillar 2 capital buffer). **Turkey:** To contain growth of household indebtedness, introduced credit card and installment limits, increased provisioning rates and risk weights for consumer loans after 2011. **United States:** Introduced regular CCAR and Dodd-Frank Act stress testing (2011–14) and supplementary leverage ratio for the largest U.S. banks (2014).

(continued)

Table 1.4. Key Macroprudential Policy Recommendations and Recent Country Examples *(continued)*

Objectives	Monitor	Prepare	Act	Recent country examples
Strengthen the resilience to asset price shocks and contain excessive credit mispricing	• Monitor financial cycles, assess asset price developments, and identify deterioration in credit underwriting standards. • Collect more comprehensive data on flows, including through over-the-counter markets	• Put in place counter-cyclical buffers and the power to activate them effectively when needed. • Ensure that banks apply risk-based pricing to their products and assess benefits and costs of moving to product-based transfer pricing mechanisms for greater transparency in pricing products.	• Where housing dynamics are strong, contain unsustainable increases in household debt (for example, Sweden), ensure that LTV and DTI requirements are sufficiently stringent (for example, Switzerland, United Kingdom), and remove policy distortions, such as tax incentives (for example, Switzerland) and structural housing supply shortages. • Take measures to increase household resilience to interest rate shocks, such as by introducing heightened DTI requirements on interest-only loans (for example, Hong Kong SAR, Israel). • Encourage safe securitization and remove other roadblocks that prevent provision of sustainable credit by adequately supervised and regulated nonbanks.	**Belgium:** 5 percentage point rise in risk weight floors on residential mortgages for internal ratings model banks (December 2013). **Canada:** Imposed 25-year cap on amortization period for insured mortgages with high LTV loans, 5 percent minimum down payment for new mortgages and 20 percent down payment for non-owner-occupied properties and mortgage refinancing, and a 44 percent cap on total debt service ratios; tightened LTV ratios on refinancing loans and loans to non-owner-occupied homes; and withdrew government insurance backing on home-secured lines of credit (2008–13). **Hong Kong SAR:** To mitigate real estate overheating, applied a 10 percentage point lower maximum LTV on all mortgages; required stressed debt service ratio calculation based on a 10 percentage point lower LTV for real estate properties and a 300 basis point higher mortgage rate, and introduced a 15 percent risk-weight floor on new residential mortgages secured on Hong Kong properties (February 2013). **Israel:** Tightened mortgage capital and provisioning requirements; imposed a cap on repayment period (30 years), floating component of mortgages (two-thirds of loan), and DSI ratio on new loans (50 percent); added capital surcharges on mortgages with DSI ratio between 40 and 50 percent (August 2013). **Korea:** Ongoing adjustments of LTV limits (including recent relaxation in July 2014) and DTI ratios. **New Zealand:** Imposed 10 percent cap on share of new housing loans with LTV ratio above 80 percent (October 2013). **Singapore:** Tightened LTV ratios depending on the number of existing loans, the tenor of the loan, and the age of the borrower and adjusted DTI limits on bank mortgages. **Switzerland:** Activated and subsequently increased countercyclical capital buffer targeting residential property mortgages (2013–14). **United Kingdom:** Recommended that supervisors (1) apply a 15 percent cap for each lender on the share of new residential mortgages with a loan-to-income ratio at or greater than 4.5; and (2) ensure mortgage lenders include a 300 basis point stress test when assessing affordability (June 2014). **United States:** Enhanced monitoring of leveraged loan exposures and updated supervisory guidance on leveraged lending (2013–14).
Strengthen resilience of financial systems to global wholesale funding shocks and exposures to exchange rate shocks	• Monitor the share of noncore funding (short-term, FX, wholesale) in total liabilities. • Ensure adequate reporting and monitor private sector exposures and funding mismatches in foreign currencies. • Close data gaps in bank and nonbank financial flows.	• Intensify supervisory scrutiny and step up communication to inform of potential risks. • Tighten capital requirements for banks on exposures of households and corporations, particularly when leveraged in foreign currency. • Encourage banks to set up committed borrowing and swap lines with other major domestic and foreign banks to increase their liquidity-shock-absorption capacity.	• Bolster defenses against sudden reversal of foreign capital flows in context of U.S. monetary policy exit (for example, maturity lengthening of bank-based FX funding, including through net-stable-funding-ratio (NSFR)-type measures, as in New Zealand, or levies, as in Korea). • Maintain bilateral and multilateral swap line arrangements to ensure access to foreign currency funding in times of stress. • For emerging markets, be ready to access multilateral resources such as IMF facilities in case of need.	**Hungary:** A ban was imposed on FX mortgage lending in August 2010, which was lifted in mid-2011. **Korea:** To contain short-term FX funding, implemented a levy on noncore FX liabilities. **New Zealand:** To contain bank reliance on wholesale funding, tightened by 10 percentage points to 75 percent the core funding ratio (similar to a Basel-type NSFR measure) introduced in 2010. **Serbia:** A higher risk weight was applied to FX loans to unhedged borrowers in 2008 (125 percent compared with 50 percent to local-currency mortgage loans). **Sweden:** Implemented a Basel-based liquidity coverage ratio requirement for the largest credit institutions and financial groups (January 2013).

Sources: IMF staff based on Article IV reports, Financial System Stability Assessments, and information from country authorities.

needed to address the risk of fire sales in some market segments and to manage orderly unwinding or liquidation. In a severe crisis scenario, a mechanism (such as a resolution authority) that can manage an orderly and appropriately timed unwinding or liquidation of funds and assets may be warranted. Bilateral and multilateral swap line arrangements could reduce excess volatility by ensuring access to foreign currency funding in times of stress, and multilateral resources such as IMF facilities could provide additional buffers.

…and in emerging market economies

In the event of a bumpy exit from unconventional monetary policy and its normalization, the principal volatility transmission channel is likely to be through liquidity strains on sovereigns and financial institutions associated with capital outflows. In light of the recent slowdown in economic activity in many emerging market economies, policymakers should take preemptive measures to safeguard financial stability in the event of a further deterioration in the corporate sector, including by strengthening provisioning practices and loss-absorbing buffers in banks and enforcing proper and timely reporting of hidden corporate liabilities and funding mismatches in foreign currencies. Banks with excessive reliance on wholesale funding or on potentially volatile large corporate deposits must remain vigilant in mitigating pressures associated with liquidity risks, including through net-stable-funding-ratio-type

measures, higher reserve requirements, or levies on volatile short-term funding.

In the event of significant capital outflows, some countries may need to focus on ensuring orderly market functioning. Possible actions include using cash balances, lowering the supply of long-term debt, and conducting switching auctions to temporarily reduce supply on the long end of yield curves. Bilateral and multilateral swap line agreements could reduce excess volatility by ensuring access to foreign currency funding in times of stress, and close networking with foreign investors and ongoing communication with markets (for example, on government action plans) could help maintain investor confidence and encourage inflows. Multilateral resources such as IMF facilities could provide additional buffers. Keeping emerging market economies resilient calls for an increased focus on domestic vulnerabilities, as discussed in previous GFSRs.

In China, policymakers should carefully monitor and contain the rapid growth of corporate leverage, particularly in the real estate and construction sectors and in state-owned enterprises. Rebalancing credit allocation toward more productive areas of the economy requires moving to more efficient risk pricing, a gradual rolling back of guarantees, and the default of nonviable firms. Building on current policy efforts to contain financial stability risks in the nonbank financial system is a top priority, as noted in the April 2014 GFSR.

Annex 1.1. Asset Valuations and Sovereign Spreads[45]

An in-depth look at sovereign spreads

To further examine the considerable compression in sovereign bond spreads, econometric models were estimated using sovereign spreads for France, Italy, and Spain. The models aim to identify how far the spreads are from plausible medium-term equilibrium relationships ("fair values"). Previous related work, including the October 2013 GFSR, suggests that equilibrium sovereign spreads are driven by (1) the economy's fiscal position, captured by the debt-to-GDP ratio (Poghosyan 2012); (2) price-to-book ratios or Moody's expected default frequencies (Sun, Munves, and Hamilton 2012) in the banking sector (see also Zoli [2013] and the October 2013 GFSR); (3) the state of the business cycle, which influences the path of fiscal revenues, approximated by the industrial production index (log changes); (4) inflation, which, given its persistence, influences expectations of inflation and the path of debt (ease of deleveraging; see also IMF [2014a]); and (5) a measure of external imbalances (TARGET2 or real effective exchange rates), which became focal points of attention during the crisis. In addition, money market rates, a proxy for global market risk and liquidity (the VIX index), and a measure for flight to quality enter the model exogenously (see the October 2013 GFSR).

Methodology

Autoregressive specifications, namely vector error correction models (VECMs), were estimated on monthly data since 2001 for France, Italy, and Spain (130–140 observations). The VECM specification rationalizes spreads as driven by the adjustment toward equilibrium, determined by the factors listed above.[46] In this configuration, each cointegrated variable has a corresponding autoregressive equation, and each variable is treated symmetrically as endogenous. Hence, the first two equations of the six-equation baseline VECM

system for economy j, corresponding to the spread and debt dynamics, can be written as follows:

$$s10_t^j = \alpha_{11}^j[s10_{t-1}^j - \beta_1 \Delta Dbty_{t-1}^j - \beta_2 pbk_{t-1}^j \\ - \beta_3 \Delta ip_{t-1}^j - \beta_4 infl_{t-1}^j - \beta_5 reer_{t-1}^j - \upsilon_{11}^j] \\ + \gamma_{11}\Delta s10_{t-1}^j + \gamma_{12}\Delta_2 Dbty_{t-1}^j + \gamma_{13}\Delta pbk_{t-1}^j \\ + \gamma_{14}\Delta_2 ip_{t-1}^j + \gamma_{15}\Delta infl_{t-1}^j + \gamma_{16}\Delta reer_{t-1}^j \\ + \chi_{11}\sigma_{t-i} + \varepsilon_1 \qquad (1.1)$$

$$\Delta Dbty_{t-1}^j = \alpha_{11}^j[s10_{t-1}^j - \beta_1 \Delta Dbty_{t-1}^j - \beta_2 pbk_{t-1}^j \\ - \beta_3 \Delta ip_{t-1}^j - \beta_4 infl_{t-1}^j - \beta_5 reer_{t-1}^j \\ - \upsilon_{11}^j] + \gamma_{21}\Delta s10_{t-1}^j + \gamma_{22}\Delta_2 Dbty_{t-1}^j \\ + \gamma_{23}\Delta pbk_{t-1}^j + \gamma_{24}\Delta_2 ip_{t-1}^j + \gamma_{25}\Delta infl_{t-1}^j \\ + \gamma_{26}\Delta reer_{t-1}^j + \chi_{21}\sigma_{t-i} + \varepsilon_2 \qquad (1.2)$$

in which $s10_t^j$ is the 10-year sovereign yield spread against the German bund; $\Delta Dbty_{t-1}$ denotes changes in the debt-to-GDP ratio; pbk_{t-1}^j are price-to-book ratios in the banking sector; Δip_{t-1}^j captures the business cycle, as approximated by (log) changes in the industrial production index; $infl_{t-1}^j$ is the annual rate of inflation; and $reer_{t-1}^j$ is the real effective exchange rate.

The common cointegrating vector shared by the system's six equations is given by equation (1.3):

$$s10_t^j = \upsilon_{11}^j + \beta_1 \Delta Dbty_{t-1}^j + \beta_2 pbk_{t-1}^j + \beta_3 \Delta ip_{t-1}^j \\ + \beta_4 infl_{t-1}^j + \beta_5 reer_{t-1}^j + \xi_{t-1}, \qquad (1.3)$$

so that when $\xi_{t-1} = 0$, spreads are at their equilibrium level, captured by the horizontal axis in the panels on the left side of Figure 1.29. Because the focus of the exercise is the behavior of sovereign spreads, equation 1.1 is the most relevant. The beta coefficients associated with the model's cointegrating relationship are the same for each equation in the system because all the endogenous variables share the same cointegrating equilibrium. The speed of adjustment toward equilibrium is captured by the model's factor loadings, denoted α_{ij}. In addition, the model incorporates lagged rates of change for each endogenous variable. The constants υ_{ij} and the error terms ε_i complete the specification. The vector σ_{t-i} includes exogenous variables such as money market rates and Germany's asset swap spread (a proxy for flight-to-quality episodes).

The cointegrating equilibrium level is used as the indicator of fair value. The overvaluation ranges shown in Figure 1.29 reflect variation arising from the use of alternative specifications (such as the specification using Moody's expected default frequencies rather than price-to-book ratios). The cointegrating equilibrium spread was filtered using the asymmetric Christiano-Fitzgerald

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[45]The authors of this annex are Martin Čihák and Vladimir Pillonca.

[46]Following the Johansen methodology, trace and maximum eigenvalue tests were performed alongside diagnostic testing; the specification search was general to specific. Reduced-form models aim to capture the dynamics of the data-generating process; parameter values have no deep causal or structural interpretation.

Figure 1.27. Stretched Valuations across Asset Classes (z–scores)

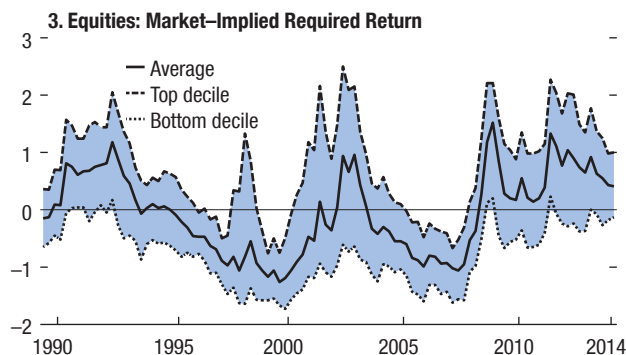1. Sovereign Bonds: Market–Implied Term Premiums
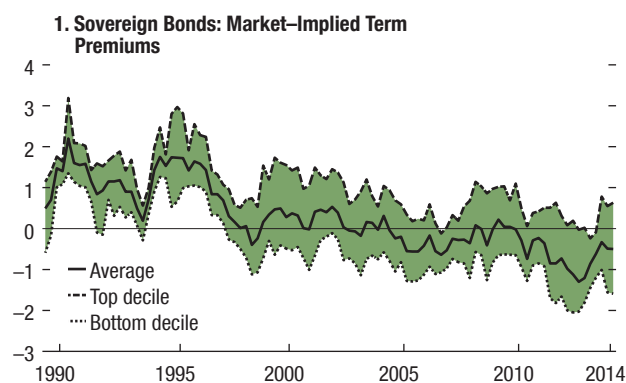
Sources: Consensus Economics; and IMF staff calculations.
Note: The z-scores for the implied bond term premium across 15 advanced economies and 9 emerging markets. The implied ("Wicksellian") bond term premium is the 5-year-5-year sovereign bond yield in local currency terms, minus the 5-year-5-year surveybased expectation of real GDP growth and inflation. See Jones (2014).


2. Investment-Grade and High-Yield Credit Spreads
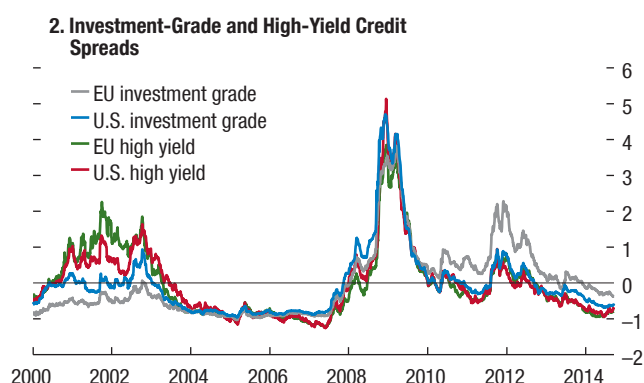
Source: IMF staff calculations.
Note: Z-scores relative to the historical distribution of the respective option-adjusted spreads. EU = European Union.

3. Equities: Market–Implied Required Return

Sources: Consensus Economics; and IMF staff calculations.
Note: The z-scores for the implied required return on equity across 15 advanced economies and 10 emerging markets. The implied equity discount rate is the average of three model estimates backed out of current prices (a running yield based on cyclically-adjusted earnings, a single-stage dividend discount model, and a multi-stage dividend discount model). See Jones (forthcoming).

4. House Prices: Ratio to Rents
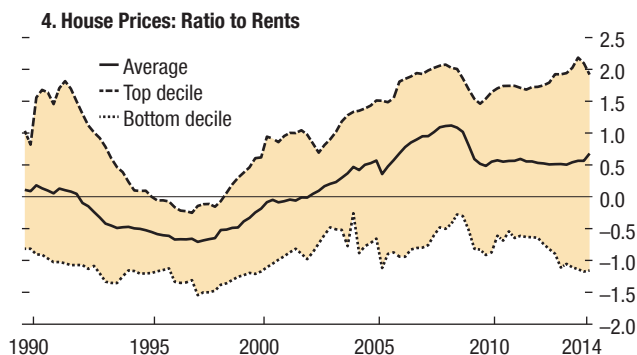
Sources: Haver Analytics; Organisation for Economic Co-operation and Development data; and IMF staff calculations based on Global Property Guide.
Note: Z-scores calculated over the respective historical distribution of the house price-to-rent ratio for each jurisdiction using data going back to 1970

band pass (Christiano and Fitzgerald 2003) to smooth the trajectory, reduce its volatility, and control for outliers (a moving average yields similar results).

Results

It is possible that progress in fiscal frameworks at the European level has offset the prolonged deterioration in public finances, and that the EU Bank Recovery and Resolution Directive has helped reassure investors about the destabilizing nexus between contingent liabilities in the financial sector and government finances. The European Central Bank's (ECB's) forthcoming Asset Quality Review may raise confidence about

banks' progress toward balance sheet transparency and capital adequacy. Nonetheless, there is no hard evidence that market participants have revised downward their medium-term forecasts of public debt ratios in view of lower future contingent liabilities. According to the IMF's October 2014 *Fiscal Monitor* projections, general government debt ratios in the three countries are poised to increase further in 2014 and remain high thereafter. Despite some improvements, imbalances, such as TARGET2 levels and real exchange rates, remain at elevated levels and still exert upward pressure on fair value spreads.

The estimated valuation paths appear historically plausible and consistent with other approaches (such

Figure 1.28. Cross-Country Distribution

1. Sovereign Bonds: Market-Implied Term Premiums
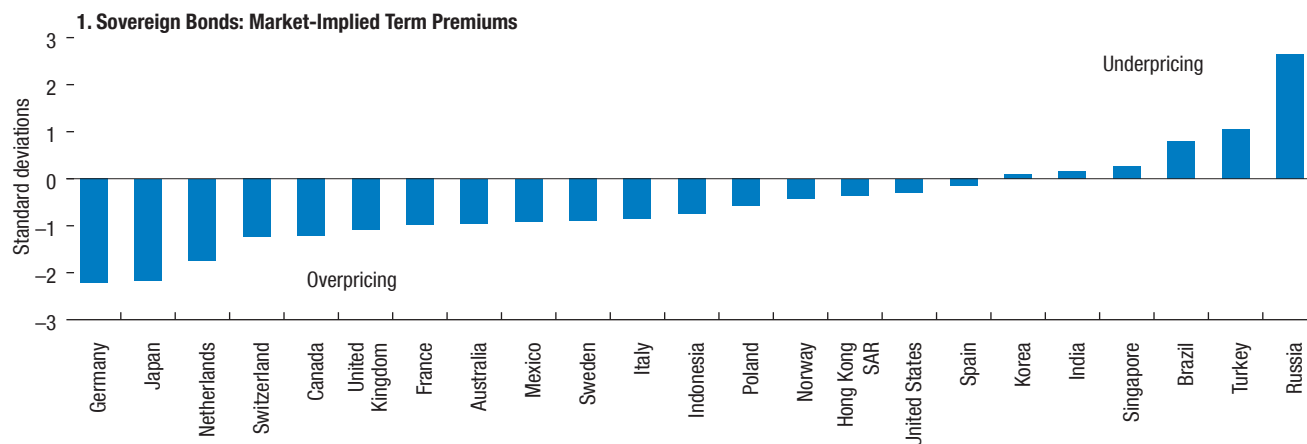
Source: IMF staff calculations.
Note: The implied bond term premium is defined as 5-year-5-year rates (local currency terms) minus five-year-five-year survey-based expectations for real GDP growth and inflation. It is expressed as the number of standard deviations from the country-specific long-term average. Data start in 1989 (1953 for the United States). See Jones (forthcoming).

2. Equities: Market-Implied Required Return
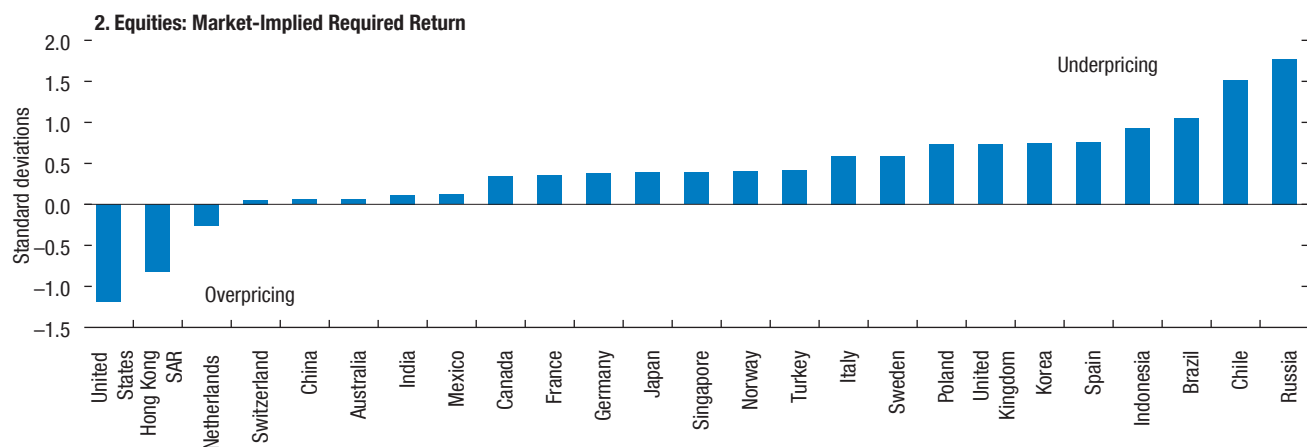
Source: IMF staff calculations.
Note: The implied real equity yield is the cost of capital for equities (or the required return to hold stocks), expressed as the number of standard deviations from the country-specific long-term average. Data start in 1989 (1953 for the United States). See Jones (2014).

3. House Price Fundamentals
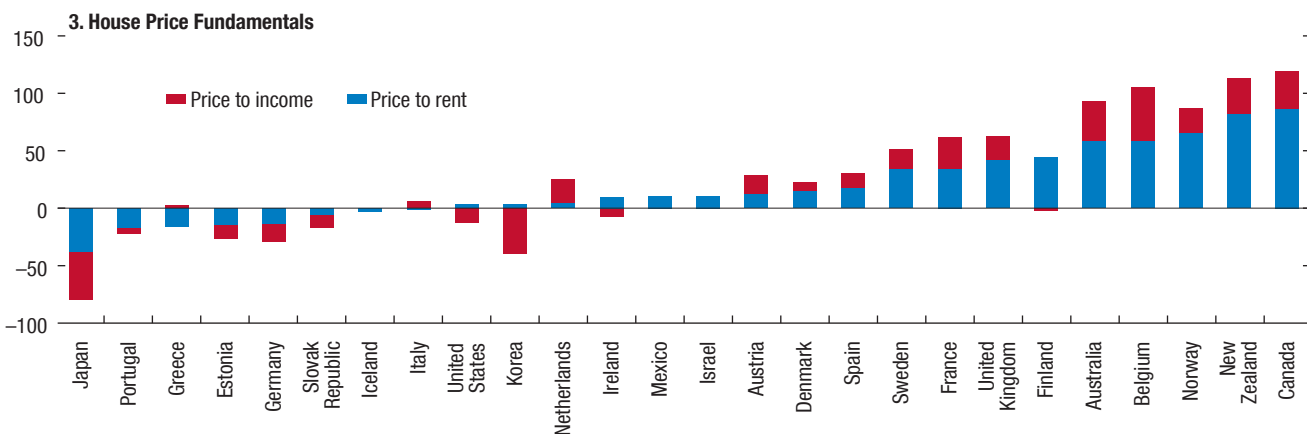
Source: IMF staff calculations based on Organisation for Economic Co-operation and Development data.
Note: Figure shows 2014:Q1, or latest, deviation from historical average, in percent.

Figure 1.29. Analysis of Selected European Spreads

ITALY

1. Bond Yield Spread to Bunds
(Basis points)

Overvaluation risk:
40–70 bps

Deviations from equilibrium

2. Factor Contributions
(Basis points)

- Imbalances/Competitiveness
- Inflation
- Fiscal and banking stress factor

SPAIN

3. Bond Yield Spread to Bunds
(Basis points)

Deviations from equilibrium

Overvaluation risk:
30–60 bps

4. Factor Contributions
(Basis points)

- Imbalances/Competitiveness
- Inflation
- Fiscal and banking stress factor

FRANCE

5. Bond Yield Spread to Bunds
(Basis points)

Deviations from equilibrium

Overvaluation risk:
10–20 bps

6. Factor Contributions
(Basis points)

- Imbalances/Competitiveness
- Inflation
- Fiscal and banking stress factor

Source: IMF staff calculations.
Note: bps = basis points.

as seemingly unrelated regressions), despite the large shocks during the sovereign and banking crises. As illustrated in Figure 1.29, spreads ultimately revert toward this notion of fair value.[47] It is clear that the unwinding of the overvaluation of some sovereigns

may affect banks and their funding costs. This effect, possibly combined with uncertainties about the pending results of the ECB's Comprehensive Assessment of banks, could lead to increased volatility in some banks' funding costs.

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[47]The speed of adjustment is measured using the factor loadings of the error correction vector. The cointegration-based estimates of

fair values for sovereign spreads are within the ranges provided by Di Cesare and others (2012).

Annex 1.2. Corporate Conditions and Investment[48]

Complementing and deepening the work of Chapter 1 on the connection between financial and economic risk taking, a detailed econometric analysis was performed using corporate balance sheet data to identify the main determinants of investment from a company perspective. The analysis focused on factors that, for financial or economic reasons, are generally considered to affect firms' investment capacity and incentives. These factors include existing levels of debt (leverage), current profitability (return on assets), the anticipated future profitability of current investment (Tobin's q), and cost of funds (the interest rate at which the firm borrows).

A panel fixed effects strategy was used, drawing on corporate balance sheet data in five major advanced economies: France, Germany, Japan, the United Kingdom, and the United States. Data are quarterly, corresponding to the frequency of firms' financial statements, and cover the period 1999:Q1 to 2014:Q2. The sample consists of 895 firms, comprising members of the major equity indices in each country. All data are obtained from the S&P Capital IQ database.

Individual variables are derived as follows: Investment is captured as capital expenditure normalized by total assets. Return on assets (ROA) is calculated as operating income divided by total assets. Cost of funds is measured as interest payments divided by total debt. Leverage is defined as the stock of debt divided by the book value of equity. Leverage is a stock variable, but it is also useful to gauge the effect of debt flows on capital expenditure. Accordingly, the change in debt is defined as the increase (decrease) in debt from the previous quarter, normalized by total assets.

The baseline investment model is given by equation (1.4):

$$I_{ict} = \beta_1 \times r_{i,c,t} + \beta_2 \times ROA_{i,c,t} + \beta_3 \times Leverage_{i,c,t-1} + \beta_4 \times \Delta Debt_{i,c,t} + Firm\ FE + Time\ FE + Country\ FE + \varepsilon_{i,c,t}, \qquad (1.4)$$

in which I is investment for firm i in country c at time t, r is the cost of funds, and $\Delta Debt$ is the change in debt stock from the previous quarter. Beta coefficients are estimated by linear panel regression with firm fixed effects over shorter and longer periods.

It is expected that the coefficient on ROA will be positive and the coefficient on the cost of funds will be negative. Debt stocks and debt flows are expected to have opposite effects in the investment equations. The flow of debt in the period preceding investment would normally be positively related to capital expenditure, given that a major reason for issuing debt is to fund investment projects. However, existing high debt levels are likely to slow investment flows because of the higher risk premiums and resulting higher cost of financing they normally entail. Although the cost of funds should capture some of the negative effects of risk premiums on investment, the company-specific measure used corresponds more closely to the average than to the marginal cost of funds. The latter, however, is more relevant for funding decisions, and it is expected that the leverage level would catch some of the gap between the marginal and average cost of funds, as well as any unobserved unwillingness of creditors to provide funds to highly leveraged firms.

As shown in models 1 and 2 of Table 1.5, all four coefficients turn out to be statistically significant at the 1 percent level and have the expected signs for both sample period specifications.

Tobin's q is incorporated in models 3 and 4 to capture the effect of expected investment returns on firm investment decisions. Inclusion of Tobin's q does not change either the sign of the coefficients or their statistical significance level. Consistent with the theory, which holds that firms invest when the expected marginal return on additional capital is higher than its cost, the coefficient of Tobin's q is significantly positive in the estimation. Because the marginal return on investment is not observed directly, the ratio of market value to the book value of firm assets is used as a proxy for marginal Tobin's q. The estimation results are consistent with theoretical implications and findings in previous empirical studies (Fazzari, Hubbard, and Petersen 1988; Kaplan and Zingales 1997).

The panel regressions provide robust evidence that firms increase capital expenditure with profitability and expected capital productivity, and reduce it with higher costs of funds and leverage. An important implication is that, on the whole, firms in advanced economies are currently in favorable conditions to ramp up investment with recent improvement in profitability, appreciation in stock price, and low cost of funds. However, one source of concern, as indicated in the main text of Chapter 1, is the uncertainty associated with the future path of U.S. interest rates.

Table 1.5. Capital Investment Regressions

Dependent variable = Investment	Model 1 2004:Q1–2014:Q1	Model 2 1999:Q1–2014:Q1	Model 3 2004:Q1–2014:Q1	Model 4 1999:Q1–2014:Q1
ROA	0.04731***	0.07948***	0.02304**	0.05565***
	(0.01066)	(0.00972)	(0.01118)	(0.00930)
Lagged leverage	−0.00065***	−0.00067***	−0.00064***	−0.00065***
	(0.00015)	(0.00014)	(0.00014)	(0.00013)
Change in debt	0.02222***	0.01851***	0.02137***	0.01758***
	(0.00416)	(0.00353)	(0.00417)	(0.00352)
Cost of funds	−0.02269***	−0.02320**	−0.02321***	−0.02377***
	(0.00809)	(0.00827)	(0.00820)	(0.00832)
Tobin's Q			0.00198***	0.00150***
			(0.00034)	(0.00023)
Constant	0.00314***	0.00311***	0.00284***	0.00281***
	(0.00006)	(0.00005)	(0.00008)	(0.00007)
Observations	23,232	32,081	23,232	32,081
R^2	0.01574	0.02129	0.02567	0.03440
Number of companies	794	803	794	803
Time FE	YES	YES	YES	YES
Country FE	YES	YES	YES	YES
Firm FE	YES	YES	YES	YES

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

Note: FE = fixed effects; ROA = return on assets. All variables are Winsorized at the 1st and 99th percentiles. Firm-clustered standard errors are in parentheses.

*, **, and *** indicate significance at the 10 percent, 5 percent, and 1 percent level, respectively.

Estimating default probabilities for China's corporate sector

The contingent claims analysis in Chapter 1 is based on the standard Merton (1974) structural model of credit risk as described by Jobst and Gray (2013). Equity prices and balance sheet fundamentals are used to calculate the probability that the market value of a firm's assets V will fall below some prespecified distress barrier DB. Using the methodology outlined by Zhou (1997), V is assumed to follow a jump diffusion process to allow for the possibility of sudden large changes in asset values and "unexpected" defaults. The risk-neutral probability of default denoted PD (or the probability that V/DB ≤ ξ) over some horizon T (12 months in this case) is calculated from equation (1.5):

$$PD = \sum_{i=0}^{\infty} \frac{e^{-\lambda T}(\lambda T)^i}{i!}$$

$$\times N\left(\frac{\ln(\xi) - \ln\left(\frac{V}{DB}\right) - \left(r - \frac{\sigma^2}{2} - \lambda\upsilon\right)T - i\mu_\pi}{\sqrt{\sigma^2 T + i\sigma_\pi^2}} \right),$$

(1.5)

in which i denotes the total number of jumps over T, σ is the estimated volatility of asset value, λ is the jump intensity, μ_π is the jump size, and υ is the expected jump size. Two adjustments are made to

provide a more accurate estimate of actual default probabilities as described in Gray (2009). First, to better approximate Moody's KMV expected default frequencies—which incorporate evidence from actual default histories—the asset volatility in equation (1.5) was calculated as a positive linear function of the fitted volatility σ. Second, to convert risk-neutral to actual default probabilities, the risk-free rate r in equation (1.5) was replaced by a linear function of the fitted asset drift μ and an estimated time-varying price of risk.

Data

The sample comprised 4,483 nonfinancial firms, including 2,441 firms with listed public equity and 2,042 nonlisted firms, for the period 2006:Q1–2014:Q1. The listed firms are those traded on China's onshore equity market, and the nonlisted firms cover all bond issuers available in the WIND database that are not listed on an equity exchange. In the absence of equity prices, nonlisted firms were matched to a listed peer firm based on subindustry classification and a minimum distance procedure incorporating asset size and debt-to-equity ratios. The jump diffusion parameters for these nonlisted firms were then taken from the fitted distribution of the listed peer firm.

The total liabilities of firms in the sample accounted for about 70 percent of total bank loans, or 48 percent of the estimated stock of total social financing as of the end of 2014:Q1; the sample size dropped to 61 percent and 42 percent of loans and total social financing, respectively, in the stress scenario because of difficulties in estimating PD for some firms. The data set is an unbalanced panel because of different listing dates for listed firms and some missing quarterly numbers for nonlisted firms. Balance sheet variables are taken from the WIND database (see Table 1.6 for the data as of 2014:Q1 and the 2008 crisis period). Total liabilities of each firm consist of current liabilities and noncurrent liabilities.

Following Moody's KMV and previous studies, balance sheet variables with a one-quarter lag are used in the estimation, and the distress barrier DB is set to be current liabilities plus half of noncurrent liabilities. Estimated asset volatility is based on the rolling four-quarter standard deviation of equity price returns and the jump diffusion parameters, which were estimated from an iterative maximum likelihood procedure. Daily market capitalizations of listed firms are extracted from Bloomberg and are used as initial values to fit the jump diffusion process. To adjust for cross-ownership and possible double counting of debt, the total liabilities of listed state-owned firms are reduced by the share of their parent's holding (as proxied by the largest shareholding) when the parent is included in the database.

Table 1.6. Summary of Capital Structure of Sample Firms

	2014:Q1		2008 crisis[1]	
	Median	Std. Dev.	Median	Std. Dev.
Listed nonfinancial firms				
Total assets (RMB billion)	2.83	68.97	2.05	40.35
Total liabilities (RMB billion)	1.16	38.82	1.06	18.27
Current liabilities (RMB billion)	0.92	28.03	0.83	12.82
Noncurrent liabilities (RMB billion)	0.11	13.57	0.09	5.98
Market cap (RMB billion)	3.85	32.93	1.86	70.33
Number of firms	2,411		1,390	
Nonlisted nonfinancial firms				
Total assets (RMB billion)	7.55	185.07	9.32	120.48
Total liabilities (RMB billion)	4.34	111.56	5.00	56.68
Current liabilities (RMB billion)	2.37	47.35	3.17	30.90
Noncurrent liabilities (RMB billion)	1.07	75.68	1.53	29.60
Number of firms	1,586		675	

Sources: WIND Info; and IMF staff calculations.
Note: RMB = renminbi; Std. Dev. = standard deviation.
[1] 2008:Q3 for listed firms and 2008:Q4 for nonlisted firms.

Annex 1.3. Regulatory Reform Agenda: State of Play ahead of the G20 Summit in Brisbane, Australia[49]

Work on the Group of Twenty (G20) regulatory reform agenda has focused on addressing the shortcomings revealed by the global crisis, paving the way for more effective regulation and supervision. The agenda is ambitious and much has been achieved to date, but progress remains uneven. In particular, political commitment is needed to advance reforms on resolution of global systemically important financial institutions and harmonization of cross-border application of over-the-counter derivatives rules.

The main elements of the Basel III framework—capital, liquidity, and leverage—have largely moved from agreement to implementation. A recent major step is the new standard on large exposures, which was published in April and is to be implemented by 2019. The new standard establishes the first international definition and benchmark for large exposure limits and aims at protecting banks from losses caused by the sudden default of an individual counterparty or a group of connected counterparties. In addition, a new standard for calculating regulatory capital for banks' exposures to central counterparties (CCPs) will take effect on January 1, 2017. This standard introduces a single approach for calculating capped capital requirements for a bank's exposure that arises from its contributions to the mutualized default fund of a qualifying CCP.

To help restore trust in banking and Basel capital standards, the Basel Committee on Banking Supervision (BCBS) is working to address the high variability across risk-weighted assets reported across banks. Although actual difference in risk is an important driver of differences in risk weights used by banks, the BCBS is considering policy alternatives to limit variability—such as introducing floors and benchmarks and constraining modeling practices—as well as providing additional guidance and reviewing Pillar 3 disclosure requirements to enhance comparability across banks.

Addressing the issue of "too big to fail" remains a key challenge. Notwithstanding progress since 2011, many jurisdictions have yet to fully align their resolution regimes with international best practices. Further efforts are needed to (1) make progress on living wills

[49]The authors of this annex are Jennifer Elliott, Michaela Erbenova, Mamoru Yanase, Fabiana Melo, Cristina Cuervo, Oliver Weunsch, and Nobuyasu Sugimoto.

and identify and remove barriers to firms' resolvability; (2) firm up agreement on banks' total loss-absorbing capacity, providing clarity on the nature, quantity, and location of eligible liabilities; (3) address obstacles to cross-border cooperation and recognition of resolution measures; and (4) advance the agenda on recovery and resolution of nonbanks, including CCPs.

Uneven progress has been made by the International Accounting Standards Board on key accounting reforms. Two new standards—International Financial Reporting Standard (IFRS) 9 on financial reporting for financial instruments and IFRS 15 on revenue from contracts with customers—were published this year, with two remaining reforms (on insurance contracts and leases) still in progress. IFRS 9 introduces a forward-looking credit loss recognition model, which is expected to facilitate international convergence on recognition of impairment losses. This approach to loss recognition will help enhance investor confidence in bank balance sheets and improve capital market transparency and integrity.

Progress on the nonbank side of the global reform agenda has been made but measures, in most part, have not yet been implemented. The International Association of Insurance Supervisors is aiming to finalize, in time for the G20 summit, a groupwide basic capital requirement for global systemically important insurers. The Financial Stability Board has carried on its work on draft methodologies for identifying nonbank and noninsurer global systemically important financial institutions. A second public consultation is expected around end-2014. National regulators are also making efforts to implement agreed-on standards on shadow banking, and important progress has been made by the U.S. Securities and Exchange Commission on money market fund reform, including adopting mandatory floating net asset value or liquidity fees (or both) for nongovernment nonretail money market funds. The Financial Stability Board is now working to finalize minimum haircut requirements on securities lending and repurchase agreements.

Work continues toward improving the regulatory framework for securitization. Two consultative documents have been published, aiming at reducing mechanistic reliance on external ratings, enhancing the framework's risk sensitivity, and reducing cliff effects. A new joint BCBS–International Organization of Securities Commissions Task Force on Securitization Markets will assess the development and functioning of securitization markets and define criteria to assist in the identification and development of simple and transparent securitizations.

Application of new OTC derivatives rules across borders remains challenging pending regulatory decisions on equivalence. Increased central clearing volumes emphasize the need for policy decisions on possible emergency liquidity assistance to CCPs and their recovery and resolution. Trade reporting requirements have been adopted in key countries, but legal barriers to reporting and to foreign authorities' access to data held by trade repositories remain a problem. Progress on trading standardized contracts on exchanges and electronic trading platforms continues to lag the original timetable.

Table 1.7. Major Recent Regulatory Measures and Potential Impacts on Select Bank Business Lines

Legend:
- Restricted or directly affected
- Indirectly affected and may make some operations uneconomical
- Indirectly affected but may become uneconomical in certain circumstances
- Limited or no impact

Regulatory Measures (entry into force)	Commercial Banking (Bank lending)					Investment Banking (Market-related business)		Asset Management and Private Wealth
	Trade Finance	Retail and SME Lending	Corporate Lending	Residential Mortgages	Long-Term Infrastructure Finance	Fixed-Income, Currencies, and Commodities (FICC)	Equities (market making and proprietary trading)	
Basel III								
Basel 2.5 (2011)						Significantly higher capital charge on trading book, particularly driven by stressed value at risk	Significantly higher capital charge on trading book, particularly driven by stressed value at risk	
Capital (including G-SIB surcharge) (2013)		Higher capital charge for G-SIBs across lending products, particularly affecting higher-risk-weighted assets (such as retail and SME lending, on average)	Higher capital charge for G-SIBs across lending products, particularly affecting higher-risk-weighted assets (such as retail and SME lending, on average)		Higher capital charge on long-dated noncleared hedge instruments	Higher risk charges (credit valuation adjustment for counterparty risks; asset value correlation multiplier for large bank exposures)	Higher risk charges (credit valuation adjustment for counterparty risks; asset value correlation multiplier for large bank exposures)	
Leverage ratio and U.S. Supplementary Leverage Ratio (2018)			Higher capital charge for low-risk-weighted exposures and unsecured commitment lines	Higher capital charge for low-risk-weighted exposures	Higher capital charge for low-risk-weighted exposures	Significantly higher capital charge for high-quality assets, derivatives, off-balance-sheet items, and securities financing (for example, repos)	Significantly higher capital charge for derivatives and off-balance-sheet items	
Liquidity Coverage Ratio (2015)						Increased liquidity requirements for short term liabilities (for example, repos, commercial paper)	Increased liquidity requirements for short term liabilities (for example, repos, commercial paper)	
Net Stable Funding Ratio (2018) Consultation issued as of April 2014		85 percent required stable funding (RSF) for average quality loans not maturing within one year	85 percent required stable funding (RSF) for average quality loans not maturing within one year	65 percent RSF for fully secured mortgages not maturing within one year	85 percent RSF for loans not maturing within one year	50 percent RSF for repos involving nonbanks		
OTC derivatives reforms					Higher capital charge on long-tenure hedging derivatives	Increased margin and transparency requirements	Increased margin and transparency requirements	Increased margin and transparency requirements
Structural measures (U.S. Volcker Rule Final, 2014)							Restrictions on proprietary trading and ownership of hedge funds	Restriction on ownership of hedge funds
U.S. foreign banking organization rule U.K. and EU structural measures	Higher cost of maintaining capital and liquidity, pressuring banks toward lower balance sheet size, fewer activities, or retreat							
Conduct rules (anti–money laundering and combating the financing of terrorism, know your clients); Litigation	Increase in operational risks							

Potential Impact to Bank Business Lines

Source: IMF staff.

Note: EU = European Union; G-SIB = global systemically important bank; OTC = over the counter; repos = repurchase agreements; RSF = required stable funding; SME = small- and medium-sized enterprise.

Annex 1.4. Volatility[50]

This annex elaborates on the volatility modeling results presented in the main text of Chapter 1.

Realized volatility

The daily annualized realized volatility σ_t of an asset with price P_t on day t is expressed as

$$\sigma_t = \sqrt{\sum_{i=1}^{n}(\log(P_{t-i+1}/P_{t-i}))^2 \; 252/n}, \tag{1.6}$$

in which n is the number of days in the volatility tenor and log is the natural logarithm (that is, $\log e = 1$). The volatility heat map in Figure 1.6, panel 2, is a visual representation of how low the three-month realized volatility of equities, bonds, credit, and commodities was in 2014:Q3. The aggregate realized volatility indices for the advanced and emerging market equities, bonds, and currency asset classes were constructed from the first principal component of the three-month realized volatilities of the following sets:

- *Advanced economy equities and bonds:* Austria, Canada, France, Germany, Italy, Japan, Norway, Spain, Sweden, Switzerland, United Kingdom, and United States.
- *Emerging market equities:* Argentina, Brazil, Chile, China, Colombia, Hungary, India, Indonesia, Malaysia, Mexico, Peru, Philippines, Poland, Romania, Russia, South Africa, Thailand, Turkey, and Ukraine.
- *Emerging market bonds:* Total returns of the JP Morgan EMBI Global Diversified (U.S. dollar–denominated sovereign bonds) and the JP Morgan GBI-EM (local-currency-denominated government bonds) indices.
- *Advanced economy currencies (all against the U.S. dollar):* Australian dollar, Canadian dollar, euro, Norwegian krone, U.K. pound sterling, Swedish krona, Swiss franc, and Japanese yen.
- *Emerging market currencies (all against the U.S. dollar):* Argentine peso, Brazilian *real*, Chilean peso, Chinese yuan, Colombian peso, Hungarian forint, Indian rupee, Indonesian rupiah, Malaysian ringgit, Mexican peso, Peruvian sol, Philippine peso, Polish zloty, Romanian leu, Russian ruble, South African rand, Thai baht, Turkish lira, and Ukrainian hryvnia.

[50]The author of this annex is Evan Papageorgiou.

Modeling volatility

This report borrows from the rich literature on volatility. A common feature among volatility time series is that they tend to exhibit clustering through time, in that instances of low volatility are more likely to be followed by more low volatility, and vice versa. Furthermore, volatility time series are usually mean-reverting over long periods. These behaviors were incorporated in early applications of volatility modeling in the works of Engle (1982) and Bollerslev (1986), with the autoregressive conditional heteroscedasticity (ARCH) and generalized ARCH (GARCH) models.

A modeling approach building on these common features is the switching ARCH (SWARCH) methodology developed by Hamilton (1989) and Hamilton and Susmel (1994). In a simple SWARCH framework, volatility is modeled as an ARCH model, but with the ability to provide different specifications for different *states of volatility*. As a result, SWARCH models are able to capture structural shifts in the drivers of volatility, with the added benefit of providing statistical identification of these shifts. Given that increases in volatility tend to be sudden and distinctly recognized, the ability to identify these switches and measure their effect on volatility is particularly relevant for the current environment of low volatility ahead of expected monetary policy normalization.

The SWARCH model used here has two volatility states and order-one conditional volatility autoregression (also called SWARCH(2,1) model), and is given by

$$r_t = a_0 + a_1 r_{t-1} + \varepsilon_t; \tag{1.7}$$

$$\varepsilon_t = \sqrt{\gamma_{s_t}} u_t; \tag{1.8}$$

$$u_t = h_t v_t; \tag{1.9}$$

$$h_t^2 = \alpha_0 + \alpha_1 u_{t-1}^2, \tag{1.10}$$

in which $\alpha_0 \geq 0$, $\alpha_1 \geq 0$; $r_t = \log(P_t/P_{t-1})$ for prices, or $r_t = y_t - y_{t-1}$ for yields; s_t takes value 1 when volatility is in the low state and 2 when it is in the high state; and γ_{s_t} is the volatility scale parameter at state s_t. The error terms $(v_t)_{t=1,2,\dots}$ are assumed to be independent and identically normally distributed with mean 0 and variance 1. The state of volatility evolves according to a two-state Markov chain, independent of the process r, so that

$$\mathbb{P}\{s_t = j | s_{t-1} = i, s_{t-2} = k, \dots, r_t, r_{t-1}, \dots\}$$

$$= \mathbb{P}\{s_t = j | s_{t-1} = i\}, \text{ for } i, j, k \text{ in } \{1,2\}. \tag{1.11}$$

Figure 1.30. Volatility Multiples between High and Low States (γ factors of SWARCH model)
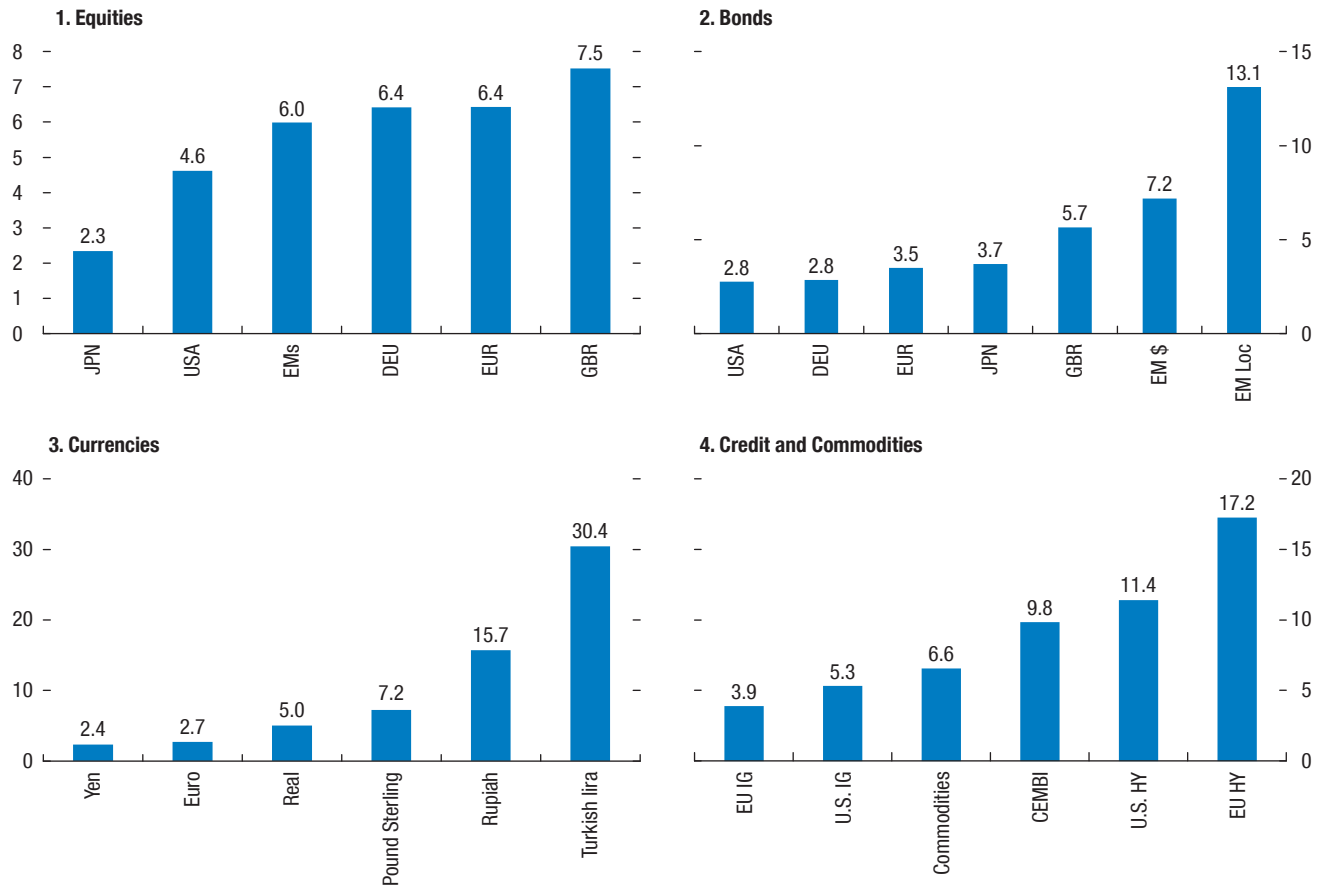
Source: IMF staff calculations.
Note: CEMBI = JPMorgan Corporate Emerging Markets Bond Index; EM = emerging market; EM Loc = emerging market local currency government bonds; EM $ = JPMorgan EMBI Global index; HY = high yield; IG = investment grade.

Process *u* is known as an ARCH(1) process. The parameter γ scales the entire ARCH process between the states, but otherwise *u* is identical between the low and high volatility states.

Disruptions arising from monetary policy normalization in the United States are likely to be more pronounced in emerging markets and other leveraged asset classes. Indeed, the magnitude of the volatility increase between the high and low volatility states for emerging market bonds and currencies and high-yield credit is much greater compared with advanced economy bonds, currencies, and investment-grade credit as shown in Figure 1.30. For example, panel 2 shows that during the past 15 years the instantaneous (weekly) volatility in the high state of U.S. Treasuries is, on average, 2.8 times larger than in the low state, but within local-currency-denominated emerging market government bonds volatility at the high state is, on average, 13 times larger than in the low state. There-

fore, although high-volatility episodes for emerging market assets and high-yield credit are short lived, they tend to be much stronger.

Quantifying the effect of negative surprises on volatility and prices

For most assets, volatility tends to react differently to positive and negative price shocks, a phenomenon known as the *news impact* effect (Engle and Ng 1993).[51] Assets that generally appreciate during periods of low risk aversion tend to have larger volatility shocks from a price decline than from a price increase. Safe haven assets such as U.S. Treasuries and other advanced economy government bonds tend to have the opposite behavior.

[51]This is also known as the leverage effect in econometric volatility modeling.

Table 1.8. Results of Tests for Independence between Assets' Volatility and the Volatility of the U.S. Treasury Total Return Index when the Latter Acts as an Originator of Shocks

	S&P 500	European equities (EURO STOXX)	Emerging market equities (MSCI Emerging Markets)	U.S. IG credit	GBI-EM (local currency emerging market bonds)
Log-likelihood, independent model	–2,186	–2,365	–2,420	–874	–438
Log-likelihood, fully specified SWARCH model	–2,231	–2,396	–2,438	–924	–446
Full SWARCH likelihood ratio (p value)	91(< 0.001)	61(< 0.001)	35(< 0.001)	100(< 0.001)	17 (0.028)

Source: IMF staff calculations.
Note: GBI-EM = JPMorgan Government Bond Index–Emerging Markets; IG = investment grade; SWARCH = switching autoregressive conditional heteroscedasticity. See Edwards and Susmel (2001) for more information.

In the aftermath of the global financial crisis, it appears that the changing nature of risk and monetary policy has affected the news impact of volatility. Based on an exponential GARCH(1,1) model, which allows for asymmetric news impact on volatility, the sensitivity of volatility with respect to price shocks appears to have increased for most assets in the post-global-financial-crisis period. The steepness of the news impact curve for U.S. Treasuries in this period has also risen and has become more symmetric for negative and positive price shocks (less flight-to-safety-like), consistent with the Federal Reserve's asset purchase programs, which have tempered the directional impact of price shocks on bond volatility.

There is strong evidence that the Federal Reserve's policies have suppressed volatility in the equity market via reduction in bond market volatility. Table 1.8 presents the results of the tests of the null hypothesis that the evolution of the assets' realized volatility is independent of the volatility process for the 10-year U.S. Treasury note. The null hypothesis is strongly rejected for all asset classes considered here, lending support to the view that unconventional monetary policies have suppressed volatility in other major asset classes.

References

Baker, Scott, Nicholas Bloom, and Steve Davis. 2012. "Measuring Economic Policy Uncertainty." Stanford University, Stanford, California.

Bank of England and European Central Bank. 2014. "The Case for a Better Functioning Securitisation Market in the European Union." Joint Bank of England/ECB Discussion Paper.

Bank of England and the Procyclicality Working Group. 2014. "Procyclicality and Structural Trends in Investment Allocation by Insurance Companies and Pension Funds." Bank of England and Procyclicality Working Group Discussion Paper, London.

Basel Committee on Banking Supervision (BCBS). September 2014. Basel III Monitoring Report. Basel: Bank for International Settlements.

Bollerslev, Tim. 1986. "Generalized Autoregressive Conditional Heteroskedasticity." *Journal of Econometrics* 31 (3): 307–27.

Brown, Keith, Van Harlow, and Laura Starks. 1996. "Of Tournaments and Temptations: An Analysis of Managerial Incentives in the Mutual Fund Industry." *Journal of Finance* 51 (1): 85–110.

Brown, Stephen, Peter Dattels, and G. Frieda. Forthcoming. "Asset Management Behavior, Market Structure and Financial Stability."

Central Bank of Ireland. 2014. "Consultation on Loan Originating Qualifying Investor AIF." Consultation Paper CP 85, Dublin.

Chevalier, Judith, and Glenn Ellison. 1997. "Risk Taking by Mutual Funds as a Response to Incentives." *Journal of Political Economy* 105 (6): 1167–1200.

Christiano, Lawrence J., and Terry J. Fitzgerald. 2003. "The Band Pass Filter." *International Economic Review* 44 (2): 435–65.

Credit Suisse. 2014. "Litigation—More Risk, Less Return." Ideas Engine Series. Equity Research Europe (June 4).

Dattels, Peter, Rebecca McCaughrin, Ken Miyajima, and Jaume Puig. 2010. "Can You Map Global Financial Stability?" Working Paper 10/145, International Monetary Fund, Washington.

Di Cesare, Antonio, Giuseppe Grande, Michele Manna, and Marco Taboga. 2012. "Recent Estimates of Sovereign Risk Premia for Euro-Area Countries." Occasional Paper 128, Bank of Italy, Rome.

Edwards, Sebastian, and Raul Susmel. 2001. "Volatility Dependence and Contagion in Emerging Equity Markets." *Journal of Development Economics* 66: 505–32.

———. 2003. "Interest-Rate Volatility in Emerging Markets." *Review of Economics and Statistics* 85 (2): 328–48.

Engle, Robert. 1982. "Autoregressive Conditional Heteroskedasticity with Estimates of the Variance of U.K. Inflation." *Econometrica* 50 (4): 267–88.

———, and Victor Ng. 1993. "Measuring and Testing the Impact of News on Volatility." *Journal of Finance* 48 (5): 1749–78.

Fazzari, Steven, R. Glenn Hubbard, and Bruce Petersen. 1988. "Financing Constraints and Corporate Investment." *Brookings Papers on Economic Activity* 19 (1): 141–95.

Feroli, Michael, Kermit L. Schoenholtz, and Hyun Song Shin. 2014. "Market Tantrums and Monetary Policy." *U.S. Monetary Policy Forum Report 8*, Initiative on Global Markets, University of Chicago Booth School of Business, Chicago.

Ferreira, Miguel A., Aneel Keswani, Antonio F. Miguel, and Sofia B. Ramos. 2012. "The Flow-Performance Relationship around the World." *Journal of Banking and Finance 36* (6): 1759–80.

Ghalanos, Alexios. 2014. "Rugarch: Univariate GARCH Models." R package version 1.3-1.

Gray, Dale. 2009. "Understanding Moody's KMV Application of Contingent Claims Analysis for Financial Institutions and Corporates and Use in Stress Testing." Unpublished.

Gruber, Joseph, and Robert Vigfusson. 2013. "Interest Rates and the Volatility and Correlation of Commodity Prices." International Finance Discussion Paper 1065, Board of Governors of the Federal Reserve System, Washington.

Guettler, Andre, and Tim Adam. 2010. "The Use of Credit Default Swaps by U.S. Fixed Income Mutual Funds." FDIC Working Paper 2011-01, Federal Deposit Insurance Corporation, Washington.

Gungor, Sermin, and Jesus Sierra. 2014. "Search-for-Yield in Canadian Fixed-Income Mutual Funds and Monetary Policy." Working Paper 2014–3, Bank of Canada, Ottawa.

Haldane, Andrew. 2014. "The Age of Asset Management." Presentation at the London Business School, London, April 4.

Hamilton, James. 1989. "A New Approach to the Economic Analysis of Nonstationary Time Series and the Business Cycle." *Econometrica* 57 (2): 357–84.

———, and Raul Susmel. 1994. "Autoregressive Conditional Heteroskedasticity and Changes in Regime." *Journal of Econometrics* 64 (1–2): 307–33.

International Monetary Fund (IMF). 2014a. "Capital Market Development: SME Financing in the Euro Area." Country Report 14/199, International Monetary Fund, Washington.

———. 2014b. "People's Republic of China: 2014 Article IV Consultation—Staff Report." Country Report 14/235, International Monetary Fund, Washington.

Jobst, Andreas A., and Dale Gray. 2013. "Systemic Contingent Claims Analysis—Estimating Market-Implied Systemic Risk." Working Paper 13/54, International Monetary Fund, Washington.

Jones, Bradley. Forthcoming. "Identifying Speculative Bubbles: A Two-Pillar Surveillance Framework." IMF Working Paper, International Monetary Fund, Washington.

Kang, J. S. 2014. "Balance Sheet Repair and Corporate Investment in Japan." Working Paper 14/19, International Monetary Fund, Washington.

Kaplan, Steven, and Luigi Zingales. 1997. "Do Investment Cash Flow Sensitivities Provide Useful Measures of Financing Constraints?" *The Quarterly Journal of Economics* 112 (1): 169–215.

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

Manconi, Alberto, Massimo Massa, Ayako Yasuda. 2012. "The Role of Institutional Investors in Propagating the Crisis of 2007–08." *Journal of Financial Economics* 104 (3): 491–518.

Merton, Robert C. 1974. "On the Pricing of Corporate Debt: The Risk Structure of Interest Rates." *Journal of Finance* 29 (2): 449–70.

Moody's. 2014. "Covenant-Lite Defaults and Recoveries–Time Is Catching Up with Covenant-Lite." Special Comment series. Moody's Investors Services.

Poghosyan, Tigran. 2012. "Long Run and Short Run Determinants of Sovereign Bond Yields in Advanced Economies." Working Paper 12/271, International Monetary Fund, Washington.

Qi, Chen, Itay Goldstein, and Wei Jiang. 2010. "Payoff Complementarities and Financial Fragility: Evidence from Mutual Fund Outflows." *Journal of Financial Economics* 97 (2): 239–262.

Segoviano, Miguel, Bradley Jones, Peter Lindner, and Johannes Blankenheim. 2013. "Securitization: Lessons Learned and the Road Ahead." Working Paper 13/255, International Monetary Fund, Washington.

Segoviano, Miguel, Sheheryar Malik, Fabio Cortes, Antoine Bouveret, and Peter Lindner. Forthcoming. "Systemic Risk and Interconnectedness Measures across the Banking and Non-bank Financial Sectors: A Comprehensive Approach." IMF Working Paper, International Monetary Fund, Washington.

Sirri, Erik, and Peter Tufano. 1998. "Costly Search and Mutual Fund Flows." *Journal of Finance* 53 (5): 1589–1622.

Standard & Poor's Credit Research. 2014. "Default, Transition, and Recovery: 2013 Annual Global Corporate Default Study and Rating Transitions." RatingsDirect. McGraw-Hill Financial, New York.

Sun, Zhao, D. Munves, and D. T. Hamilton. 2012. "Public Firm Expected Default Frequency Credit Measures: Methodology, Performance, and Model Extensions." Moody's Analytics—Capital Market Research.

Zhou, Chunsheng. 1997. "A Jump-Diffusion Approach to Modeling Credit Risk and Valuing Defaultable Securities." Finance and Economics Discussion Series 1997-15, Board of Governors of the Federal Reserve System, Washington.

Zoli, Edda. 2013. "Italian Sovereign Spreads: Their Determinants and Pass-through to Bank Funding Costs and Lending Conditions." Working Paper 13/84, International Monetary Fund, Washington.