

Global Financial Stability Assessment

The global economic expansion continues but it has become less even. While global financial conditions remain broadly accommodative and supportive of growth in the near term, financial conditions in some emerging market economies have tightened since the April 2018 Global Financial Stability Report (GFSR). This tightening has been driven by a combination of country-specific factors, worsening external financing conditions, and trade tensions. As a result, near-term risks to financial stability have increased modestly, while medium-term risks remain elevated because of persistent financial vulnerabilities linked to high debt levels and stretched asset valuations. Looking ahead, a further escalation of trade tensions, as well as rising geopolitical risks and policy uncertainty in major economies, could lead to a sudden deterioration in risk sentiment, triggering a broad-based correction in global capital markets and a sharp tightening of global financial conditions.

The Resilience of the Global Financial System Has Yet to Be Tested

Since the April 2018 GFSR, near-term risks to global financial stability have risen modestly, while medium-term risks remain elevated. The global economic expansion remains strong, but has become less balanced and with more downside risks (see the October 2018 *World Economic Outlook* [WEO]). Since mid-April, rising U.S. interest rates and a stronger U.S. dollar—coupled with intensified trade tensions—have triggered a reversal in portfolio flows, an increase in

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borrowing costs, and a weakening in local currencies in some emerging markets (Figure 1.1). Increased political and policy uncertainty in several countries has weighed on market sentiment as well. In some emerging markets, notably Turkey and Argentina, external vulnerabilities and country-specific risks have led to outsized currency depreciations, intensifying concerns about the health of domestic banks and possible spillovers to other countries. Increased balance of payments pressures in Argentina prompted the request for external assistance. In advanced Europe, Italian government bond spreads have widened and risky asset prices have fallen, while concerns about ongoing Brexit negotiations remain high.

Despite these developments, global financial conditions remain accommodative and supportive of near-term growth, albeit somewhat tighter than six months ago. The monetary policy normalization by a number of major central banks has advanced since the last GFSR. Nonetheless, global interest rates continue to be low by historical standards, even after accounting for the increase in some advanced economies. Over the recent years, accommodative financial conditions have supported the recovery in growth, employment, and incomes, providing an opportunity to strengthen balance sheets and rebuild buffers.

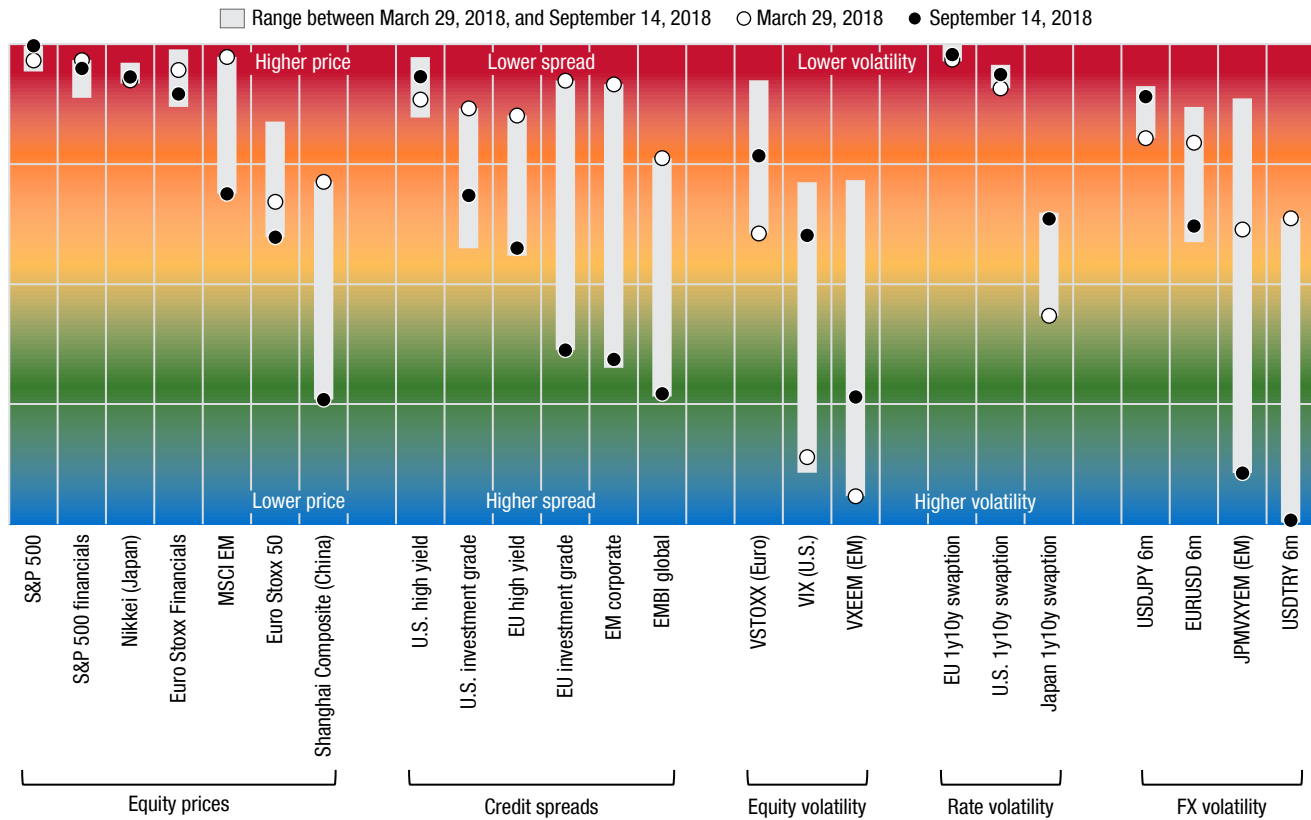
Looking ahead, market participants will be increasingly focused on how continued monetary policy normalization and escalating trade tensions will affect asset valuations and economic fundamentals. As central banks proceed with the withdrawal of monetary accommodation, financial conditions will eventually tighten. Such a tightening could reveal financial vulnerabilities that have built up over the years of accommodative policies and may also expose fragilities in the financial system that have emerged since the global financial crisis. These risks are discussed in the rest of this chapter. The second section focuses on fragilities in emerging and frontier markets. The third section highlights a number of risks faced by banks, including their exposure to nonfinancial sector debt. The final section concludes with a discussion of policies for safeguarding financial stability.

Figure 1.1. Recent Market Developments

Risk appetite has remained strong, as reflected in low volatility and higher U.S. equity valuations. However, higher U.S. interest rates and a stronger U.S. dollar have led to lower emerging market equity prices and wider debt spreads.

Market Performance Dashboard

(Each marker is a 30-day moving average of daily percentile rank in relation to the asset’s five-year history. Closer to red represents higher equity prices and lower corporate bond spreads and volatility, and closer to blue is vice versa)



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

Note: EM = emerging market; EURUSD = euro-U.S. dollar; FX = foreign exchange; JPMVXYEM = JPMorgan’s Emerging Market Volatility Index for foreign exchange; MSCI = Morgan Stanley Capital International; USDJPY = U.S. dollar-Japanese yen; USDTRY= U.S. dollar-Turkish lira; VIX = Chicago Board Options Exchange Market Volatility Index; VSTOXX = Dow Jones Euro STOXX 50 Volatility Index; VXEEM = Chicago Board Options Exchange Market Emerging Markets Exchange-traded Fund Volatility Index.

Financial Conditions in Advanced and Emerging Market Economies Are Diverging

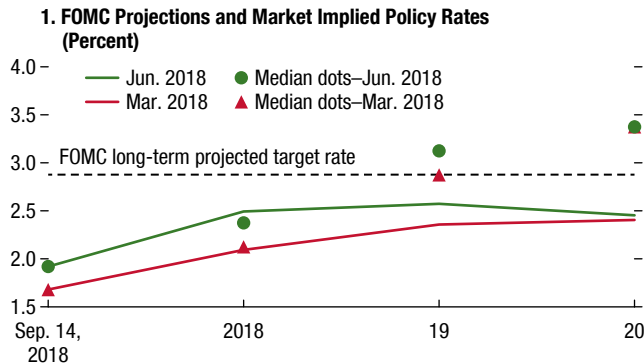
Financial conditions in advanced economies have remained accommodative, while conditions have tightened in emerging markets (Figure 1.2):¹

¹Financial conditions indices are based on the methodology presented in the October 2017 and April 2018 GFSRs. Figure 1.2 shows the price-of-risk financial conditions indices, which include real short-term rates, term spreads, interbank spreads, sovereign and corporate spreads on domestic and external debt, equity market price-to-book ratios, equity market volatility, house prices, and exchange rates. The regional aggregates are calculated using purchasing-power-parity GDP weights. See Online Annex 1.1 at www.imf.org/en/Publications/GFSR for details.

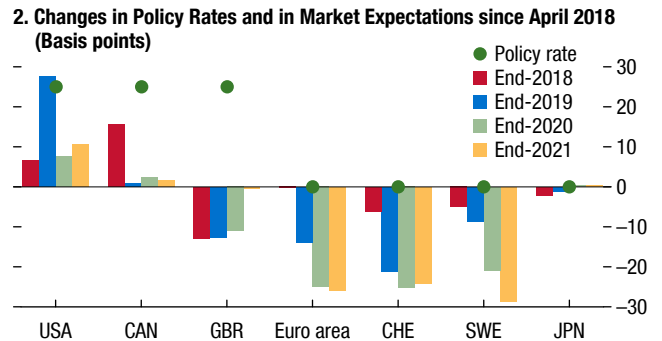
- In the *United States*, the Federal Reserve has raised its policy rate 25 basis points since April, marking the seventh hike in the tightening cycle, reflecting growing confidence in the economic outlook. Near-term market-implied interest rate expectations have drifted higher, but still lag the median policy rate expectations of the Federal Open Market Committee (Figure 1.2, panel 1). The current tightening cycle remains atypical: despite monetary policy tightening, financial conditions have eased further as a result of continued strong risk appetite and rising asset valuations (Figure 1.2, panel 3). U.S. equity market performance—partly boosted by

Figure 1.2. Global Financial Conditions

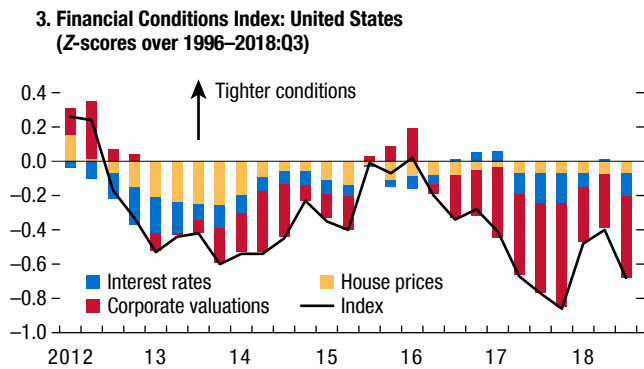
Market expectations of U.S. rates have drifted higher but remain below the Federal Reserve’s dot plot.



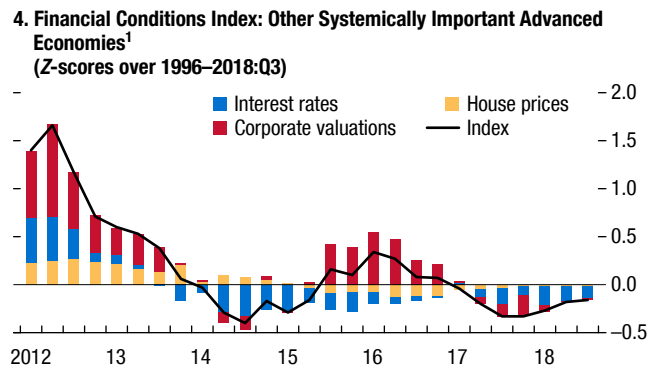
In other advanced economies, markets have pushed out the expected timing of interest rate hikes.



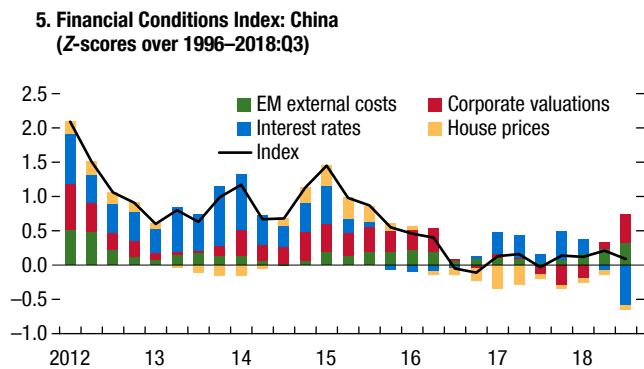
Despite continued monetary policy tightening, U.S. financial conditions have eased further.



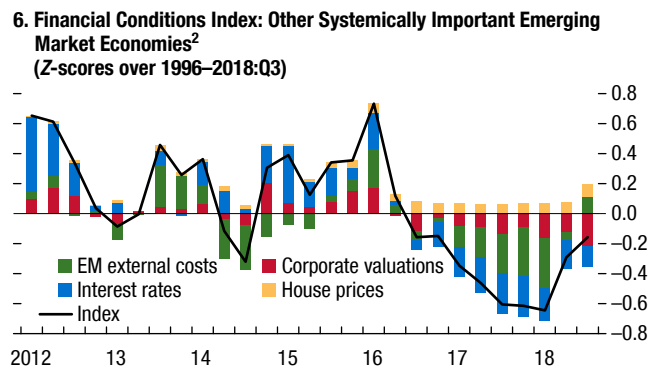
In the euro area and other systemically important advanced economies, financial conditions have remained relatively easy.



In China, monetary policy easing has offset the impact of external pressures.



In contrast, financial conditions in other emerging markets have tightened.



Sources: Bloomberg Finance L.P.; Haver Analytics; IMF, Financial Soundness Indicators; official sources; and IMF staff calculations.

Note: The construction of the Financial Conditions Indices is explained in Online Annex 1.1. Panel 1 projections refer to the end of the period. In panels 3–5, values less than zero represent financial conditions that are loose relative to the historical average of 1996 or earliest data available through 2018; the interest rates category includes the real short-term rate, the term spread for the United States and Germany or the sovereign spread on local currency debt for other countries, and the interbank spread; the corporate valuations category includes the equity market price-to-book ratio, the local currency corporate bond spread, and the implied volatility index, where available; and the emerging market external costs category includes the sovereign spread and the corporate spread on external debt, and the external debt-weighted exchange rate. Financial conditions relate to price of risk in 29 jurisdictions with systemically important financial sectors (<https://www.imf.org/external/np/fsap/mandatoryfsap.htm>). Data labels in the figure use International Organization for Standardization (ISO) country codes. EM = emerging market; FOMC = Federal Open Market Committee.

¹“Other systemically important advanced economies” include Australia, Canada, Denmark, Hong Kong SAR, Japan, Korea, Norway, Singapore, Sweden, Switzerland, and the United Kingdom.

²“Other systemically important emerging market economies” include Brazil, India, Mexico, Poland, Russia, and Turkey.

the tax reform—has been remarkably strong, with U.S. stocks seeing the longest rally in recent history. Concurrently, the slope of the U.S. Treasury yield curve has flattened to its lowest level since before the global financial crisis (Box 1.1).

- In the *euro area and other major advanced economies*, financial conditions have remained relatively easy (Figure 1.2, panel 4), primarily because of still-accommodative monetary policies and strong global risk appetite (Figure 1.2, panel 2), and despite political uncertainty. In Italy, policy uncertainty has led to a renewed focus on the bank-sovereign nexus. In the United Kingdom, with the approaching deadline for completing negotiations on the post-Brexit arrangements, market concerns about a no-deal Brexit appear to have increased, driving sterling volatility to a five-month high and suppressing corporate valuations. Given the dissipation of deflation risks, the European Central Bank (ECB) announced its intention to end its bond purchase program by the end of 2018. However, with growth momentum weakening, it said it would keep interest rates on hold at least through summer 2019, subject to incoming data. As a result, investors have pushed out the expected timing of the first ECB policy rate hike, and German long-term yields have fallen since April. In part because of weak inflation, the Bank of Japan signaled it would maintain the current extremely low levels of interest rates for an extended period, while allowing for a wider band around its long-term target for 10-year government bond yields.
- In *China*, financial conditions have remained broadly stable, with an easing in monetary policy largely offsetting the impact of external pressures (Figure 1.2, panel 5). China's equity markets have weakened on rising trade tensions. Tighter liquidity resulting from earlier regulatory efforts to de-risk and deleverage the financial system has led to pockets of stress in corporate bond markets, which prompted Chinese authorities to ease monetary policy. The central bank injected liquidity via cuts to the required reserve ratio and through lending facilities. The exchange rate weakened further, down 7 percent against the U.S. dollar (and down 5 percent compared with a basket of 24 currencies) since mid-June, prompting authorities to reintroduce a 20 percent reserve requirement for foreign exchange forwards.
- In *other systemically important emerging market economies*, a combination of country-specific political or policy uncertainties and worsening external financing

conditions have led to a significant tightening of financial conditions, particularly in more vulnerable economies, though on aggregate, financial conditions are still broadly accommodative relative to historical levels (Figure 1.2, panel 6). However, the 2019 growth forecasts for emerging markets have been revised down compared to six months ago (see the October 2018 WEO). Most emerging market economies have responded to market turbulence during the U.S. dollar rally and escalating trade tensions by hiking policy rates or by effectively ending their monetary easing. In addition, some countries have intervened in the foreign exchange market, while others have allowed the exchange rate to absorb the shock (see “Fragilities in Emerging and Frontier Markets” section).

Near-Term Risks to Global Financial Stability Have Increased Modestly . . .

Overall global financial conditions have tightened a notch, on balance, relative to six to twelve months ago, despite a notable easing in financial conditions in the United States. The impact of changes in global financial conditions on future growth and financial stability is assessed using the growth-at-risk (GaR) approach (Figure 1.3).

The application of the GaR approach suggests that the near-term risks to global financial stability have increased modestly compared with the last GFSR, while medium-term risks remain elevated. The impact of the tightening of global financial conditions over the past six months (Figure 1.4, panel 1) on the estimated distribution of global growth outcomes one year ahead suggests a modest increase in near-term risks to global financial stability compared with the April 2018 GFSR (Figure 1.4, panels 2 and 3). Relative to historical norms, near-term risks are still fairly subdued (Figure 1.4, panel 4), while medium-term risks continue to be elevated (Figure 1.4, panel 5).

. . . But Financial Stability Risks Could Rise Sharply

Looking ahead, a sharp tightening of global financial conditions could be triggered by a further escalation of trade tensions or by a sudden shift in risk sentiment caused by rising geopolitical risks or policy uncertainty in major economies. Key risks include the following:

- *Growing concerns about resilience and policy credibility of emerging markets* in the face of external headwinds

could lead to further capital outflows and possibly rising global risk aversion, which could send shock waves across broader risky asset markets. In that scenario, countries with high external debt, substantial financing or rollover needs, limited policy space, and weak reserve buffers would be particularly vulnerable (see “Fragilities in Emerging and Frontier Markets” section).

- *An escalation of trade tensions* to levels deemed systemic could pose further risks to global growth (see “Scenario Box 1—Global Trade Tensions” in the October 2018 WEO). So far, the impact of trade concerns on market valuations has been limited to specific sectors. Because most of the escalating trade tensions have centered around China-U.S. relations, Chinese corporations with significant exposure to proposed U.S. tariffs have been disproportionately affected by trade announcements, and U.S. shares of companies with large exposures to China have underperformed (Figure 1.5, panels 1 and 2). Should market participants start pricing in the possibility of protracted trade tensions, financial conditions could tighten significantly, increasing the tail risk to global growth and financial stability (see Box 1.2).
- *A rise in political and policy uncertainty* could adversely affect financial market confidence. For example, uncertainty about fiscal policy in some highly indebted euro area countries could damage confidence in financial markets, while growing anxiety about a breakdown in Brexit negotiations could give rise to contractual and operational uncertainties in the United Kingdom and elsewhere in Europe (see Box 1.3).
- *Faster-than-anticipated monetary policy normalization* in advanced economies could lead to sudden tightening of global financial conditions. Such tightening could, for instance, be caused by firmer-than-expected inflation in the United States stemming from capacity constraints created by procyclical fiscal policy or increases in import tariffs. Emerging market economies will remain vulnerable to spillovers from monetary policy normalization in advanced economies.

Financial Vulnerabilities Remain Elevated, with High Debt Being a Key Challenge

Debt levels have risen significantly across countries and sectors. The unconventional monetary policies implemented since the global financial crisis were aimed

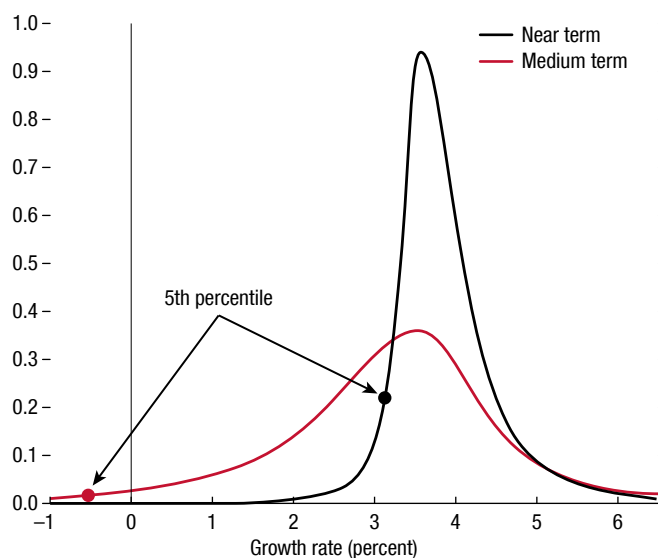
Figure 1.3. The Growth-at-Risk Approach

The growth-at-risk (GaR) approach links current financial conditions to the distribution of future growth outcomes. The forecasted range of severely adverse growth outcomes (those that occur with 5 percent probability, also called the “tail” of the distribution) provides a metric with which to assess the degree of concern about risks to growth and financial stability.

To illustrate how the GaR approach works, Figure 1.3 shows a stylized distribution of one-year-ahead growth forecasts (in black) and a stylized distribution of three-year-ahead growth forecasts (in red), conditional on current financial conditions and vulnerabilities. The medium-term growth distribution has a similar mode but a fatter left tail than the near-term growth distribution, which means that the downside risk is higher in the medium term than in the near term. Furthermore, if certain changes in financial conditions or vulnerabilities lead to a leftward shift of the forecasted growth distribution, this means that the downside risks to growth increase. For example, if a tightening of financial conditions results in a shift of the 5th percentile of the near-term growth distribution (shown by the black dot and referred to as the GaR threshold) further to the left, this implies that the GaR threshold below which growth could fall with 5 percent probability is lower and, hence, the downside “tail” risk to growth and financial stability is higher (for details, see the April 2018 GFSR).

Growth Forecast Distributions

(Probability density)

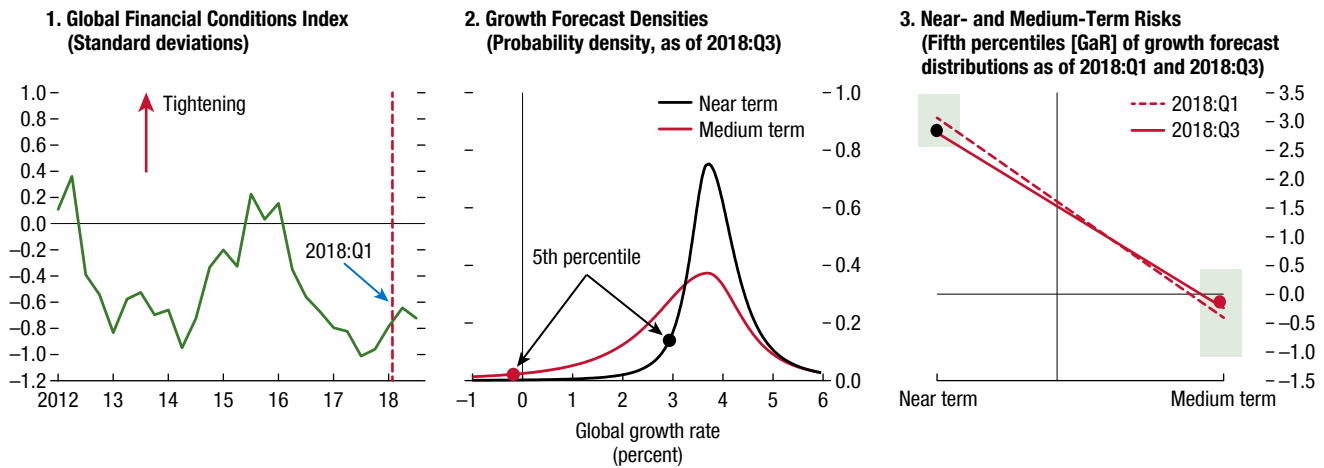


Source: IMF staff estimates.

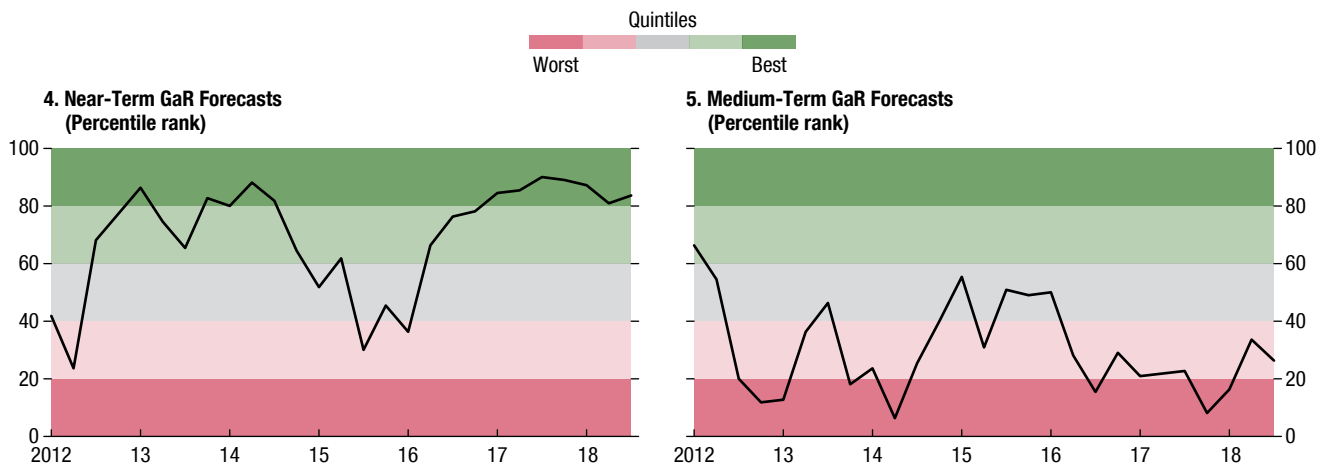
at easing financial conditions to support the economic recovery. In such an environment, total nonfinancial sector debt—borrowings by governments, nonfinancial companies, and households—has expanded at a much faster pace than the growth rate of the economy. As a result, total nonfinancial debt in countries with systemically important financial sectors now stands at \$167 trillion, or over 250 percent of aggregate GDP, compared with \$113 trillion (210 percent of GDP) in 2008 (Fig-

Figure 1.4. The Growth-at-Risk Estimates

Global financial conditions have tightened somewhat since 2018:Q1. Near-term downside risks have increased modestly, while medium-term risks remain elevated compared with six months ago.



The latest near-term GaR forecast is still near historical highs, while the medium-term GaR forecast is close to historic lows.



Source: IMF staff estimates.

Note: In addition to the price-of-risk components (shown in Figure 1.2), the global financial conditions index used to estimate GaR includes two additional variables—credit growth and the ratio of credit to GDP. An upward movement reflects tightening of financial conditions. In panel 3, the lines indicate the pairs of near- and medium-term forecasts and do not assert a linear relationship between the two periods. The shaded regions correspond to ± 1 standard error bands around 2018:Q1 predictions. In panels 4 and 5, the color shading depicts the percentile rank for the 5th percentile threshold (GaR) of near-term and medium-term forecast growth densities. See the April 2018 GFSR for details. GaR = growth-at-risk.

ure 1.6, panel 1).² Higher debt has made the nonfinancial sector more sensitive to changes in interest rates.

But the specific debt-related vulnerabilities differ across countries. Figure 1.7 highlights balance sheet leverage across six sectors—banks, nonbank financial firms, nonfinancial corporations, households, sovereigns, and the external sector (for emerging markets)—in major advanced and emerging market economies. For each

²The latest numbers are preliminary estimates for 2017 from the IMF Global Debt Database. For more information on the evolution of public sector balance sheets, see the October 2018 *Fiscal Monitor*.

jurisdiction and sector, the figure shows the percentile rank based on a pooled sample across 29 countries from 2000 through the first quarter of 2018. Some of the key debt-related vulnerabilities are highlighted below:

- In the *United States*, risks continue to build in the public sector. Public sector debt has continued to climb, with the anticipated expansion in the federal deficit further exacerbating already-unsustainable debt dynamics.³ This contrasts with a decline in

³See the 2018 U.S. Article IV consultation (IMF 2018g).

Figure 1.5. Impact of U.S.-China Trade Tensions on Asset Prices

Rising trade tensions may have affected corporate earnings' expectations in selected sectors in China ...

**1. Chinese Corporate Earnings Revisions
(Percent, index of upgrades relative to downgrades)**



... and have started to affect selected U.S. firms.

**2. U.S. Companies: Equity Price Performance
(March 2018 = 100)**



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

Note: "U.S. firms with high China sales" includes the 15 large-cap U.S. public companies with the highest proportion of their revenue coming from China. "U.S. firms with high international sales" includes 15 of the largest multinational firms with the highest proportion of their revenue generated overseas. "U.S. firms with high Chinese inputs" shows the relative performance of those sectors that rely most on intermediate goods from China versus those sectors that rely least on Chinese imports. MSCI = Morgan Stanley Capital International.

household debt ratios (Figure 1.6, panel 2) and a moderation in overall corporate sector leverage since 2015–16 due to improved profitability. However, the share of highly levered and speculative-grade firms in new debt issuance has grown, fueled by strong investor demand, looser underwriting standards, and compressed spreads (Figure 1.6, panels 3 and 4). Notably, highly leveraged deals account for a growing share of new leveraged loan issuance and have surpassed precrisis highs. Bank balance sheets have strengthened (Figure 1.6, panel 5), but non-bank financial entities have increased their leverage, including through the use of derivatives.

- In the *euro area*, leverage in the corporate and sovereign sectors remain elevated (Figure 1.7). The share of lower-rated companies has increased because compressed spreads have encouraged the buildup of leverage. Public sector debt, in part a legacy of postcrisis efforts at fiscal accommodation, remains elevated in several euro area economies. Capital positions among banks have improved in recent years, though some weaknesses remain,

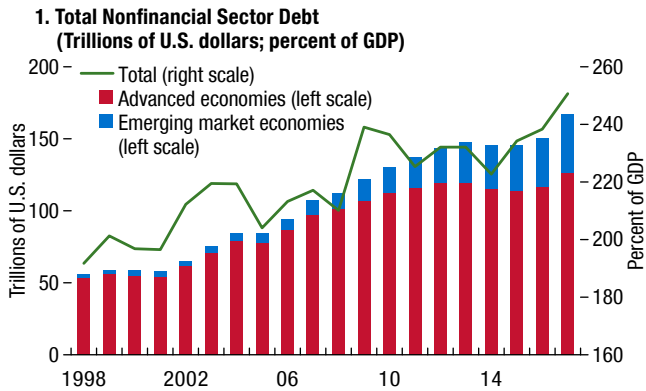
including tight sovereign-bank links and declining but still-elevated nonperforming loans in some banks (see "Banks—Stronger, but Not Yet Out of the Woods" section). Most recently, market participants have become concerned about cross-border exposures of euro area banks to vulnerable emerging market borrowers.

- In *other advanced economies*, leverage remains at moderate to high levels across several sectors (Figure 1.7). However, household leverage stands out as a key area of concern, with the ratio of household debt to GDP on an upward trajectory in a number of countries, especially those that have experienced increases in house prices (notably, Australia, Canada, and the Nordic countries).⁴ In Japan, household and corporate balance sheets appear sound. But the low-profitability environment has created potential vulnerabilities in the financial sector. These include foreign currency funding positions as the search

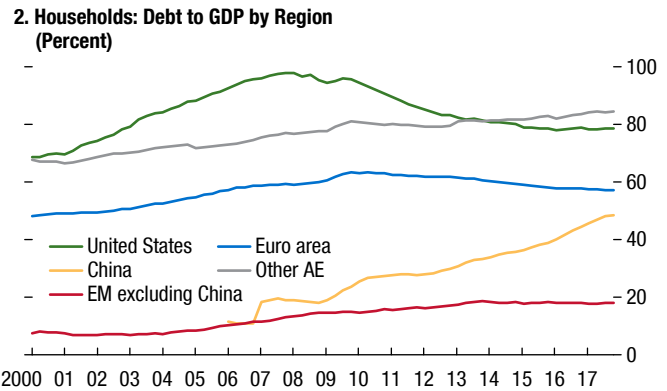
⁴In Australia, house prices have started to reverse course in major cities and nationwide since late 2017.

Figure 1.6. Balance Sheet Vulnerabilities

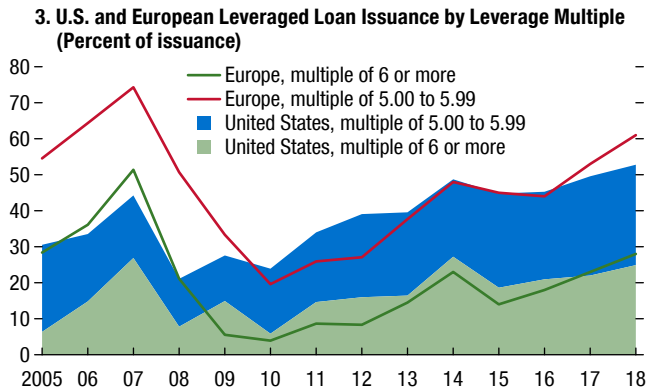
Total nonfinancial sector debt has continued to swell since the global financial crisis.



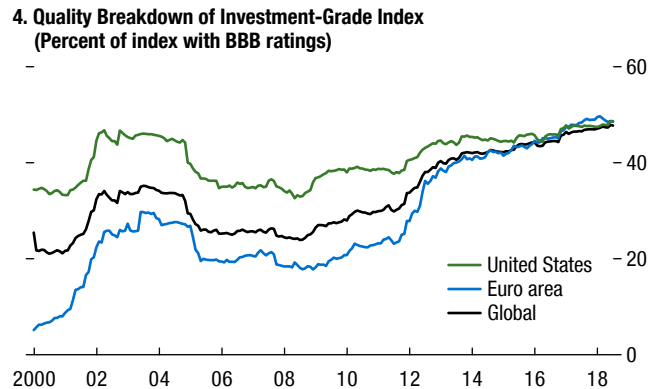
Household debt to GDP remains on an upward trajectory in a number of countries.



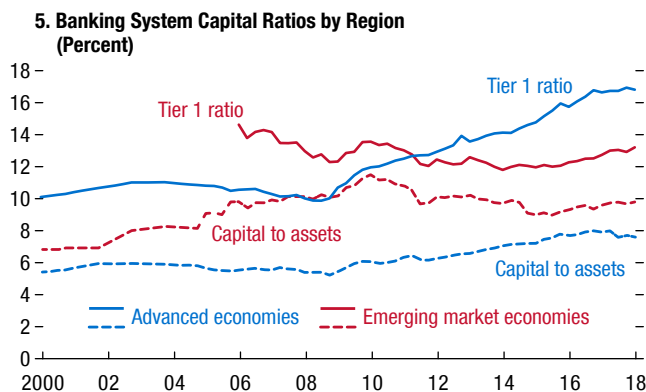
Highly leveraged loan deals have grown as a share of new corporate issuance in the United States and Europe ...



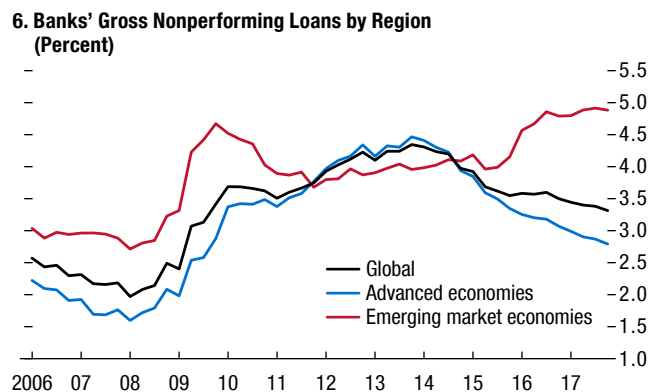
... accompanied by broad-based growth in riskier borrowing.



Capital positions of banks in advanced economies have improved, but are less robust in some emerging market economies ...



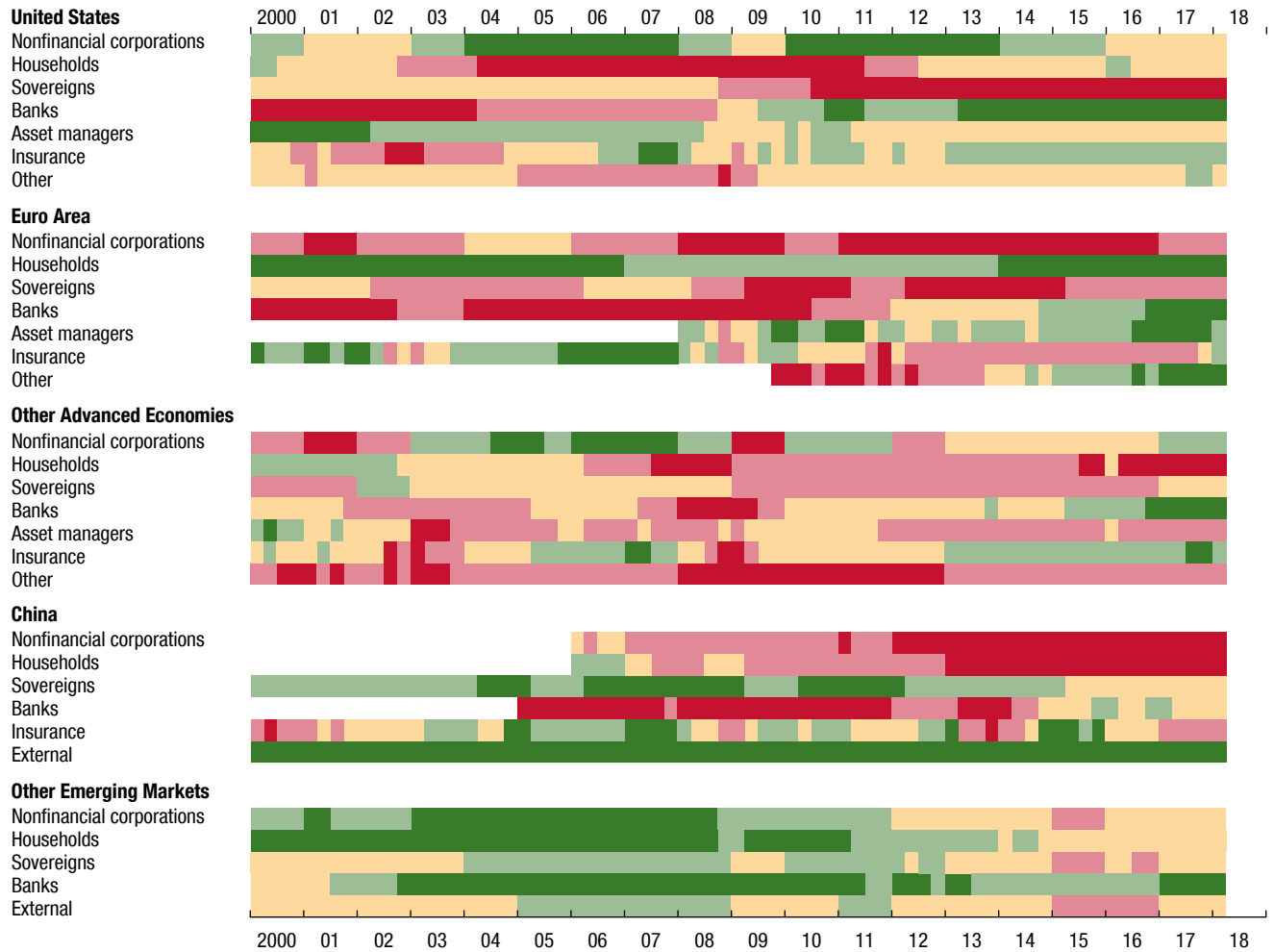
... where weak underwriting standards have led to rising nonperforming loans.



Sources: Bloomberg Finance L.P.; Haver Analytics; IMF, Global Debt Database (2018) preliminary estimates; S&P Leveraged Commentary and Data; and IMF staff calculations.

Note: In panels 1, 2, 5, and 6, aggregates refer to 29 jurisdictions with systemically important financial sectors. Leverage multiple is defined as the ratio of total debt-to-earnings before interest, taxes, depreciation, and amortization after the issuance of the loan. AE = advanced economy; EM = emerging market.

Figure 1.7. Balance-Sheet Leverage Metrics by Sector and Region



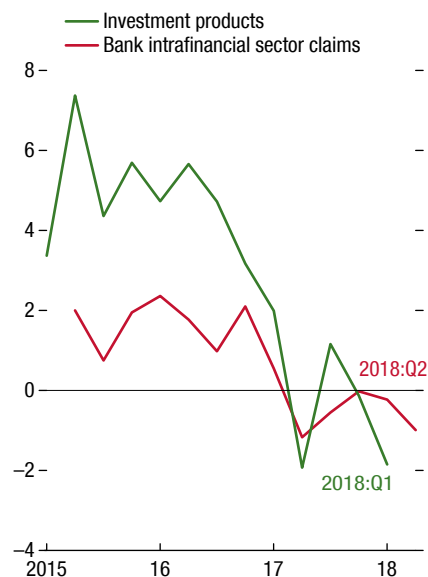
Sources: Bank of Japan; Bloomberg Finance L.P.; China Insurance Regulatory Commission; European Central Bank; Haver Analytics; IMF, Financial Soundness Indicators; S&P Capital Market Intelligence; University of Singapore Risk Institute; and IMF staff calculations.

Note: Red shading indicates a value in the top 20 percent of pooled samples of advanced or emerging market economies for nonfinancial corporations, households, and the external sector, and of all countries for the remaining sectors shown in the figure from 2000 through 2018 (or longest sample available). Dark green shading indicates values in the bottom 20 percent. Other systemically important advanced economies include Australia, Canada, Denmark, Hong Kong SAR, Japan, Korea, Norway, Singapore, Sweden, Switzerland, and the United Kingdom. Other systemically important emerging economies include Brazil, India, Mexico, Poland, Russia, and Turkey. Leverage is measured as the ratio of net debt to earnings before interest, taxes, depreciation, and amortization (EBITDA), EBITDA to assets, interest coverage ratios, and corporate debt to GDP in the corporate sector; household debt-to-GDP and debt-service ratios (nonfinancial sector for emerging market economies) in the households sector; gross public debt to GDP in the sovereign sector; equity to assets and Tier 1 capital ratio in the banking sector; external debt to GDP in the external sector; assets to equity, credit to assets, portfolio fraction of bonds rated BBB or lower, and default probabilities within the next three years in the insurance sector; and assets to equity, credit to assets, incurred debt to assets, and loans to assets for asset management and other nonbank financial sectors. The category "other" includes broker-dealers, securitization companies, finance companies, funding companies, and holding companies depending on data availability (not all sectors are available for all countries). Indicators are aggregated within regions using GDP-weighted averages and within sectors using equal-weighted averages. Within sectors, indicators for existing subsectors are aggregated using assets to GDP as weights.

Figure 1.8. China: Deleveraging and De-risking Progress

Regulatory tightening has slowed the buildup of risks in the financial sector ...

1. Investment Products and Small-to-Medium Bank Claims on Financial Institutions (Three-month change, trillions of renminbi)



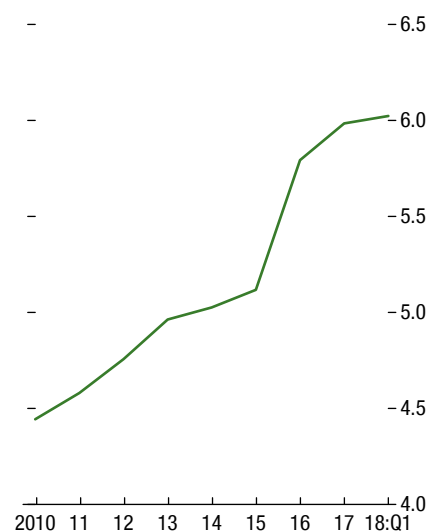
... and led to tighter credit conditions for weaker borrowers ...

2. Corporate Defaults and Corporate Bond Spreads (Billions of renminbi, basis points)



... but the deleveraging process is far from complete.

3. Leverage at Nonfinancial Traded Companies (Top 100 Chinese firms by assets)



Sources: Asset Management Association of China; Bloomberg Finance L.P.; CEIC; People's Bank of China; S&P Global Market Intelligence; and IMF staff calculations. Note: In panel 3, leverage is measured as the ratio of liabilities to common equity.

for yield has led some banks to grow their overseas activities and to expand their foreign securities investments (see IMF 2017a).

- In *China*, nonfinancial corporate sector leverage has been rising and is currently well above global historical benchmarks (Figure 1.7). Despite low loan-to-value ratios, the rapid pace of growth of household debt, which is now at the high end for emerging markets, also raises concerns. The largest banks appear better capitalized, but vulnerabilities at small and medium-sized banks are high.⁵ Strong demand for high-yielding investment products has led to rapid growth in complex investment vehicles, which the authorities tried to curb through new asset management rules. Overall, tighter financial regulation aimed at deleveraging and de-risking *China's* financial system has led to less favorable credit conditions for weaker borrowers (Figure 1.8). To cushion the impact of regulatory tightening on

⁵For details, see “People’s Republic of China: Financial System Stability Assessment” (IMF 2017c).

the economy, authorities have responded by easing monetary policy and softening the implementation of proposed new rules. Although these recent steps may help support economic growth in the near term in the face of rising external pressures, they may entail greater risks to financial stability over the medium term should they set back progress toward reducing financial vulnerabilities.

- In other major *emerging market economies*, credit quality remains a key concern. In the corporate sector, the share of debt at risk—debt owed by firms whose interest expenses exceed earnings—is higher in emerging markets than in other regions. Rising levels of nonperforming loans may weigh on bank capitalization going forward (Figure 1.6, panel 6).⁶ Gross public debt has increased substantially in Brazil in recent years and remains elevated in India. Finally, among major

⁶Emerging market banks are, on average, above critical thresholds for their Tier 1 ratio and ratio of capital to assets, even though their Tier 1 ratio is lower compared with advanced economy banks. Banks in advanced economies have Tier 1 ratios well above critical thresholds, but capital-to-assets ratios are roughly in line with thresholds.

emerging market economies included in Figure 1.7, external debt buildup has been most prominent in Turkey, though external debt accumulation has also been worrisome for a broader universe of emerging and frontier markets (as discussed in the next section on “Fragilities in Emerging and Frontier Markets”).

Asset Valuations Remain Stretched in Major Markets, and Could Adjust Abruptly

Asset valuations appear to be relatively high in some markets, notably in the United States. Although some asset price models suggest that global equity valuations in major markets are broadly consistent with economic and earnings prospects, these models are sensitive to the underlying assumptions related to corporate earnings, GDP growth, and inflation. A reappraisal of currently favorable conditions could lead to an increase in the compensation required by investors. With the same caveats, government bond valuations appear similarly consistent with economic fundamentals. Some cases of notable deviations of market prices from estimated fundamental values are discussed below:

- *U.S. equity market valuations appear to be stretched.* Standard valuation metrics, such as cyclically adjusted price-to-earnings ratios, show that equity valuations in the United States have continued to be elevated well beyond precrisis levels despite trade tensions (Figure 1.9, panel 1). Outside the United States, trade tensions have had a significant negative impact on equity markets, particularly in China and the rest of Asia. U.S. equity prices now appear modestly higher than their model-based values, based on alternative measures of S&P 500 earnings expectations as well as proxies for both the risk-free rate and the equity risk premium components of the discount factor (Figure 1.9, panel 2).⁷
- *Market-priced equity volatility appears to be too low relative to model-based forecasts* (Figure 1.9, panel 3). Future volatility implied by option prices across most major equity markets and over different time horizons is notably below levels consistent with model-based forecasts using realized swings in equity prices.
- *Term premiums remain at historically low levels, but they appear relatively close to fundamentals* (Figure 1.9, panel 4). Term premiums—the compensation investors demand for holding long-term government bonds in excess of risk-free short-term

interest rates—in advanced economies remain very low by historical standards. However, they appear to be largely explained by fundamentals—investors’ expectations for growth, inflation, the current stance of monetary policy, economic uncertainty, and the variability of returns on financial assets. Looking ahead, such models suggest that term premiums can adjust meaningfully to revisions in expectations and uncertainty around the future path of inflation, growth, and monetary policy.

- *High-yield corporate bond spreads remain close to historically low levels in absolute terms* as well as when scaled by leverage. In addition, bond spreads appear to be too low after accounting for expected default rates (Figure 1.9, panel 5). Spreads on leveraged loans have narrowed appreciably, and markets may be underpricing the deterioration in covenant quality, which is at the weakest level on record (Moody’s 2018).
- *Housing market valuations are relatively high in several advanced economies.* Valuations based on the price-to-income and price-to-rent ratios, as well as mortgage costs, have been on the upswing over the past six years across major advanced economies, with valuations relatively high in Australia, Canada, and the Nordic countries (Figure 1.9, panel 6).

The New Financial Structure That Has Emerged since the Global Financial Crisis Is Untested

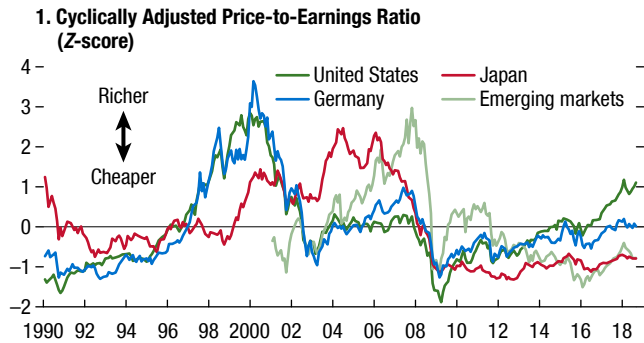
The postcrisis decade has witnessed notable structural changes in market liquidity. There are indications that liquidity may have become more segmented across different trading platforms, and more dependent on high-frequency trading firms, benchmark-driven institutional investors, as well as less price-sensitive market participants (such as central banks). Assessing liquidity is important because poor market conditions could amplify shocks and exacerbate asset price adjustments, potentially leading to financial instability.

So far, there does not appear to be clear evidence of a meaningful deterioration of market liquidity in major capital markets, albeit extraordinarily accommodative monetary conditions of the past decade could be masking underlying frictions. Liquidity has evaporated briefly during a few specific events, but at least so far, such flash crashes have had minimal lasting impacts on asset prices, much less on real activity (see Box 1.4 for an analysis of such events in U.S. equity markets). Looking forward, liquidity conditions should continue to be closely monitored.

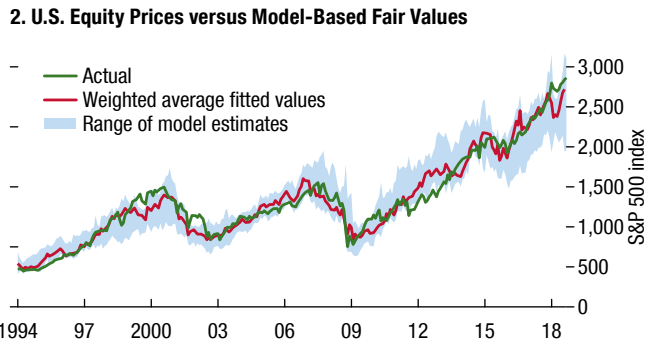
⁷For a similar approach to dividend-discount models of the S&P 500, see Durham (2013).

Figure 1.9. Asset Valuations

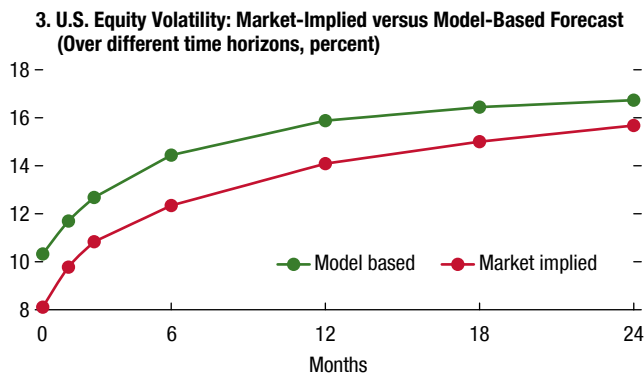
Equity valuations in the United States have continued to rise well above precrisis highs ...



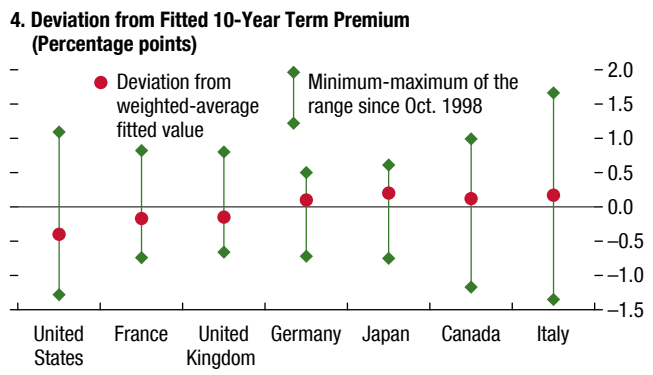
... and appear to be stretched relative to the underlying fundamentals.



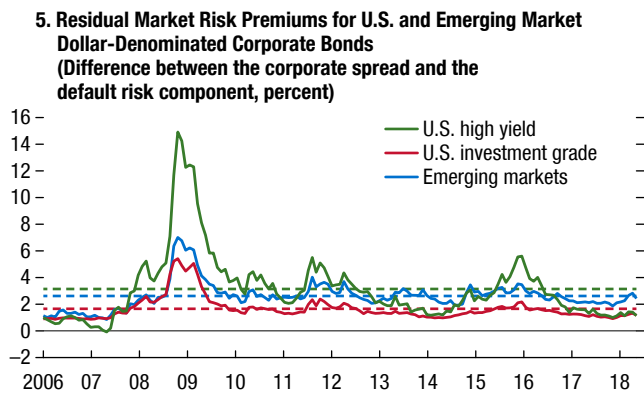
Market implied volatility is lower than that from model-based forecasts.



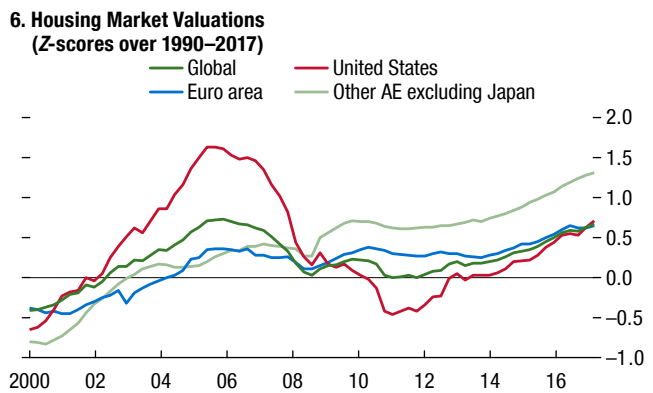
Term premiums are historically low but are mostly fairly priced based on fundamentals.



Corporate spreads remain very low, given creditworthiness of borrowers.



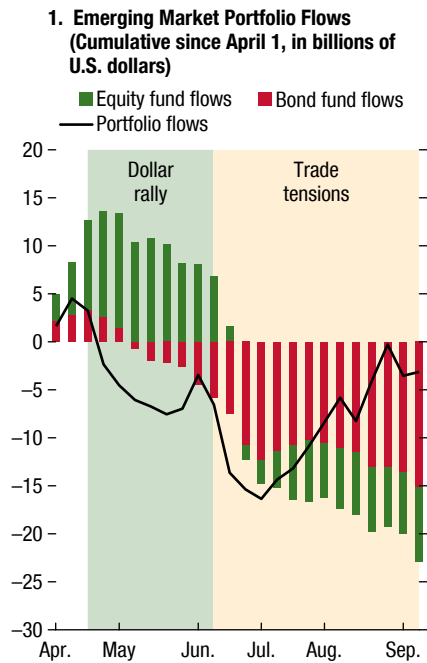
Housing market valuations have surged in many advanced economies.



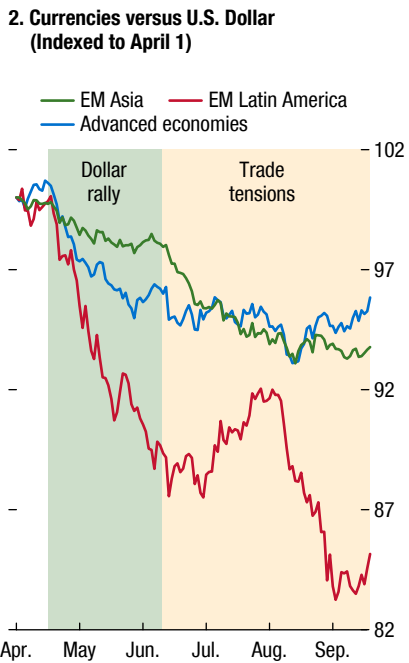
Sources: Bank of International Settlements; Bloomberg Finance L.P.; Consensus Economics; Datastream; Thomson Reuters I/B/E/S; ICE Bank of America Merrill Lynch; JP Morgan Chase & Co.; IMF, International Financial Statistics database; Standard & Poor's; and IMF staff calculations.
 Note: In panel 2, the shaded bank refers to the range of estimates for a wide array of models. In panel 3, the model-based forecast is based on Glosten, Jagannathan, and Runkle (1993). Panel 4 shows spreads between 10-year term premium estimates based on the Adrian, Crump, and Moench (2013) model, and weighted-average fitted term premium based on fundamental variables. For details of the fitted model, see Box 1.2 of the April 2018 *Global Financial Stability Report* (GFSR). Panel 5 shows the estimated risk premium (see October 2017 GFSR) defined as the difference between the observed monthly bond spread and the estimated default risk compensation based on default probability by rating. Dashed lines are period averages. Panel 6 shows the average z-scores based on pooled data for house price-to-income ratio, house price-to-rent ratio, and inverse of mortgage rates. AE = advanced economy.

Figure 1.10. Emerging Markets: Portfolio Flows and Asset Market Performance

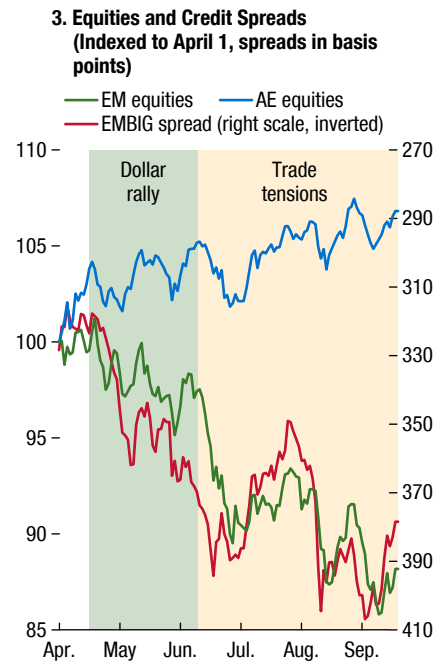
Portfolio outflows from EMs began in mid-April ...



... with the strengthening of the U.S. dollar ...



... but pressures shifted to equity markets as trade tensions flared up in June.



Sources: Bloomberg Finance L.P.; EPFR Global; Institute of International Finance (IIF); and IMF staff estimates.

Note: In panel 1, fund flows are net inflows into EM-dedicated investment funds, including mutual funds and ETFs, as reported by EPFR Global. Portfolio flows are net nonresident purchases of emerging market stocks and bonds, obtained from the IIF daily flows database. The main differences between these two datasets include (1) fund flows data are sample-based and mainly capture retail investors, (2) different country samples, and (3) limited coverage of hard currency flows in the IIF data. AE = advanced economy; EM = emerging market; EMBIG = JP Morgan's Emerging Market Bond Index Global; ETF = exchange-traded funds.

A less favorable macroeconomic environment, continued monetary policy normalization, and further financial stress in emerging markets may test new market structures.

Fragilities in Emerging and Frontier Markets

Financial conditions in emerging markets have tightened since mid-April, driven by a stronger dollar, rising idiosyncratic political and policy risks, and an escalation in trade tensions.⁸ Market pressures have been more pronounced in countries with larger external imbalances and weaker policy frameworks, or in those more exposed to escalating trade tensions. Although overall vulnerabilities in emerging market economies remain moderate compared with historical levels, external leverage has continued to rise across most countries. Looking ahead, the external environment will likely

⁸This section focuses on emerging markets that are part of main debt benchmark indices, such as JPMorgan's EMBIG (Emerging Market Bond Index Global) index.

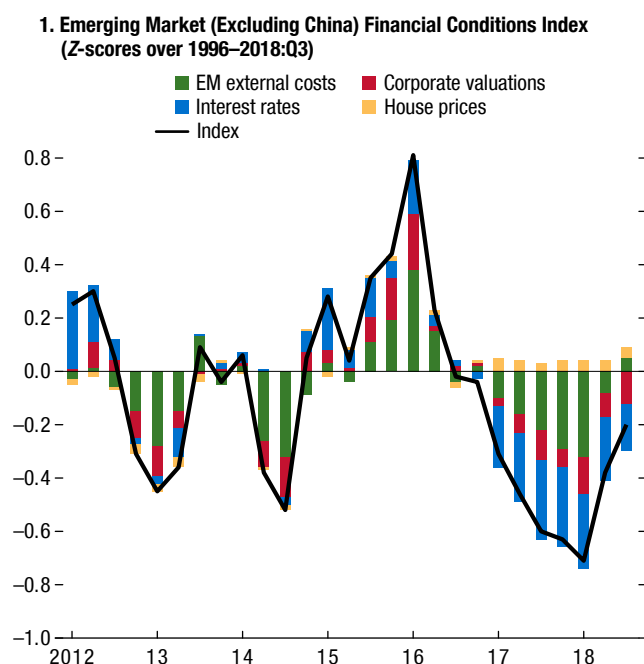
remain challenging: with monetary policy normalization in advanced economies gaining pace, emerging and frontier markets will likely face reduced portfolio flows. In the event of a sharp deterioration in global risk sentiment, portfolio outflows could intensify.

Financial Conditions in Emerging Markets Have Tightened, Denting Their Growth Outlook

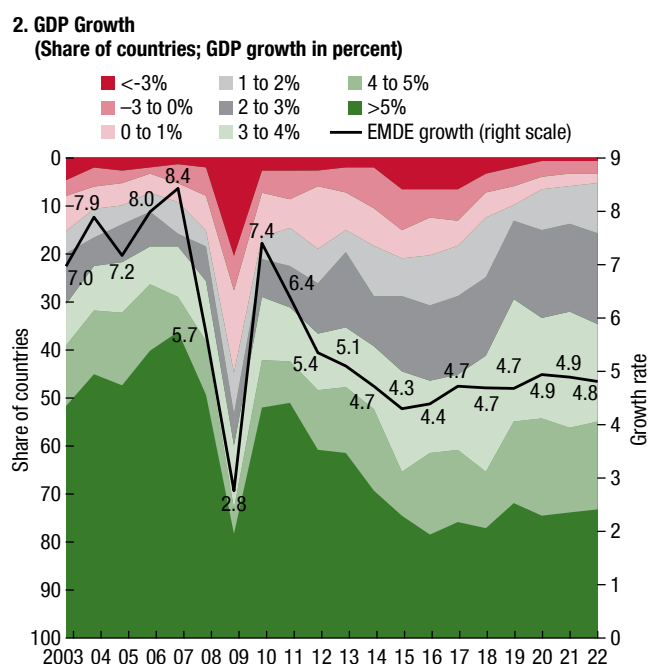
Emerging markets have come under pressure since mid-April. Initially, as the U.S. dollar rallied and U.S. long-term yields drifted higher, countries with large external vulnerabilities and weaknesses in policy frameworks (such as Argentina and Turkey) saw their currencies depreciate and external credit spreads widen more sharply than those of their peers. As trade tensions escalated in June, market pressures shifted to currencies of export-oriented economies, mostly in Asia, and emerging market equities, whose benchmark indices are more weighed toward Asia (Figure 1.10, panels 2 and 3). In August, selling pressures intensified in a few major

Figure 1.11. Emerging Market and Developing Economies: Financial Conditions and GDP Growth

External developments have led to a notable tightening in financial conditions ...



... but the growth outlook has been relatively resilient.



Sources: Bloomberg Finance L.P.; Haver Analytics; IMF, International Financial Statistics database; national statistical agencies; and IMF staff estimates. Note: Panel 1 is based on a sample of countries including Argentina, Brazil, Chile, Colombia, Egypt, Hungary, India, Indonesia, Kazakhstan, Lebanon, Malaysia, Mexico, Nigeria, Peru, the Philippines, Poland, Russia, South Africa, Turkey, and Ukraine. Panel 2 is based on all emerging market and developing economies, as defined in the *World Economic Outlook* classification. EM = emerging market; EMDE = emerging market and developing economies.

emerging markets (Brazil, Turkey, South Africa) on increased political risks and policy uncertainty.

Nonresident capital flows to emerging markets have slowed in recent quarters. Portfolio flows reversed starting in mid-April, led by retail investors, after strong inflows in 2017 and early 2018. Since then, emerging market stock and bond funds have seen about \$35 billion of outflows (Figure 1.10, panel 1), though outflow pressures eased in late July and August. Consistent with evolving market concerns, pressures were initially more pronounced in bond markets, with equity outflows accelerating in June primarily on fears of escalating trade tensions. Compared with past episodes of market stress, the recent outflows from investment funds so far have been more shallow.⁹

Facing external pressures, central banks in several emerging market economies responded with inter-

est rate hikes and interventions in currency markets. Argentina and Turkey reacted by raising policy rates sharply, while countries already in a tightening cycle (including Indonesia, Mexico, and the Philippines) hiked rates by more than markets had expected. Foreign exchange interventions were carried out in the spot market (Argentina, Indonesia) and via derivatives (Argentina, Brazil, India, Turkey). In contrast, Chinese authorities maintained a more accommodative monetary policy by injecting liquidity via cuts in reserve requirements and by guiding short-term rates lower. However, as trade tensions increased, they also adjusted their policies to support the currency (see “Global Financial Stability Assessment” section).

While financial conditions in emerging markets remain broadly accommodative, on aggregate, the recent tightening has already had an impact on the growth outlook. The combination of a stronger dollar, higher credit spreads, weaker equity prices, and higher domestic interest rates has led to a tightening of financial conditions that is similar, on aggregate, to the taper tantrum

⁹Fund outflows during the taper tantrum episode in 2013 and the China devaluation episode in 2015 were closer to \$60 billion from peak to trough.

episode in 2013 (Figure 1.11, panel 1). In contrast with other emerging markets, China's financial conditions have remained easy, following policy loosening (as discussed in the "Global Financial Stability Assessment" section). According to the October 2018 WEO, GDP growth in emerging market and developing economies is set to remain at 4.7 percent in 2018–19 (Figure 1.11, panel 2). However, the growth outlook has been revised down (about 0.3 percentage points in 2018 and roughly 0.4 percentage points in 2019) compared with the April 2018 WEO, reflecting a more subdued outlook for large economies in Latin America (Argentina, Brazil, Mexico) and a sharp slowdown in Turkey, given the ongoing market turmoil.

Investors Have Been Differentiating among Emerging Markets So Far

While global factors affected all countries, the overall spillovers across emerging markets have so far been relatively contained and idiosyncratic factors explained much of the outsized asset price moves. In credit markets, the widening of spreads on hard currency sovereign bonds has been more pronounced in lower-rated issuers (Figure 1.12, panel 1), suggesting that investors have continued to differentiate between borrowers based on economic fundamentals and other country-specific factors. Figure 1.12, panel 2 shows that the large depreciations in some emerging markets (such as Argentina and Turkey) can be largely explained by idiosyncratic factors.¹⁰ In contrast, the currencies of some other countries benefited from positive country-specific political developments (Mexico, Colombia), which partly offset the depreciation pressures from global factors. Figure 1.12, panel 3 shows that although emerging market exchange rates have become, on average, more correlated since early July, the correlation between their idiosyncratic components remains very low. In addition, a few of the emerging market currencies have been significantly more volatile than others (Figure 1.12,

panel 4). Spillover indices¹¹ in emerging currency and equity markets—which measure the extent to which asset returns in one emerging market are driven by shocks to other emerging markets—have picked up recently but remain below the highs seen in recent years (Figure 1.12, panels 5 and 6).

Low-Income and Frontier Market Borrowers Have Been Most Affected¹²

First-time and lower-rated international bond issuers have been hit hard during the recent sell-off. Following a record monthly pace of about \$70 billion for all emerging market borrowers between January and April 2018, international bond issuance slowed, with summer issuance falling below \$20 billion per month. The slowdown in issuance has been evident for low-income and other frontier market issuers (Figure 1.13, panel 1), with some having to delay their external issuance plans or turn to the international financial institutions for support. New issuers that had rapidly increased their stock of international bonds in recent years appear to have been penalized by markets during the recent sell-off, in part because foreign investors had built up overweight exposures to such issuers that had to be adjusted during the period of market stress.

Low-income and other frontier market borrowers would be most vulnerable at times when adverse external conditions coincide with spikes in their external refinancing needs. On the positive side, the amount of hard currency sovereign bonds maturing is set to rise only marginally in 2019 and remain small for many issuers until the end of 2021 (also see the October 2017 GFSR). For some frontier market sovereigns, however, a sudden tightening of global financial conditions could coincide with large external rollover needs (Figure 1.13, panel 2).¹³

¹⁰Exchange rate changes were fitted using a multivariable regression with systematic components driven by a carry factor and a dollar factor, and with the error terms representing idiosyncratic moves. This is based on the approach outlined in Verdelhan (2018). The carry factor measures performance of a basket of high-yielding currencies funded by short positions in low-yielding currencies. The idiosyncratic risk premiums are calculated for selected countries depending on data availability.

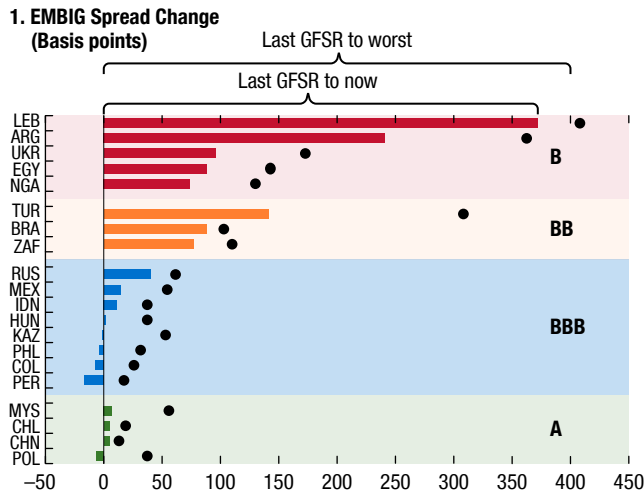
¹¹Spillover indices are calculated using the approach in Diebold and Yilmaz (2009, 2012), in which time-varying spillovers are constructed using rolling generalized forecast error decompositions. The index is the contribution from a shock to market X to the overall variability in any other market Y . Figure 1.12 presents spillover indices for asset returns; results for asset volatility are similar.

¹²The sample of frontier markets consists of countries included in the JP Morgan NEXGEM (Next Generation Emerging Markets) index.

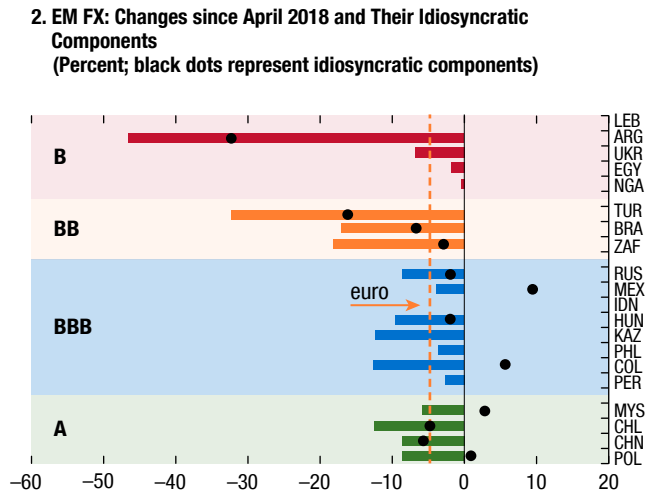
¹³Frontier market borrowers with sizable hard-currency bond redemptions over the next five years compared with their reserve buffers include Ecuador, Pakistan, Sri Lanka, and Zambia.

Figure 1.12. Investor Differentiation among Emerging Markets

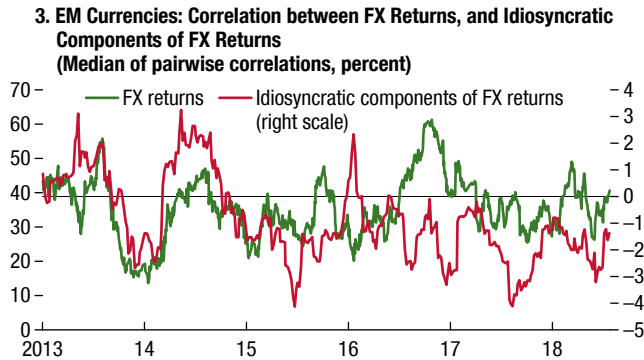
In credit markets, spreads of lower-rated borrowers have widened more than their peers.



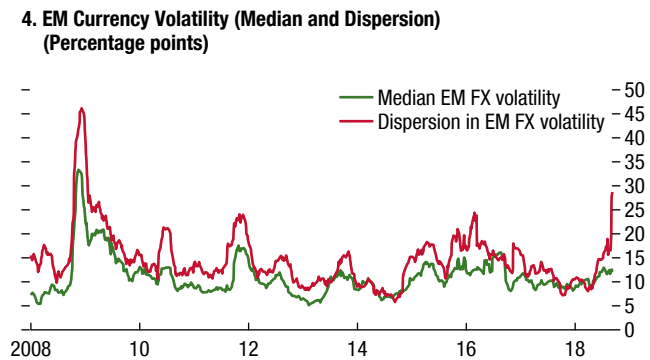
Idiosyncratic factors explain a large proportion of exchange rate changes in cases of large currency depreciations.



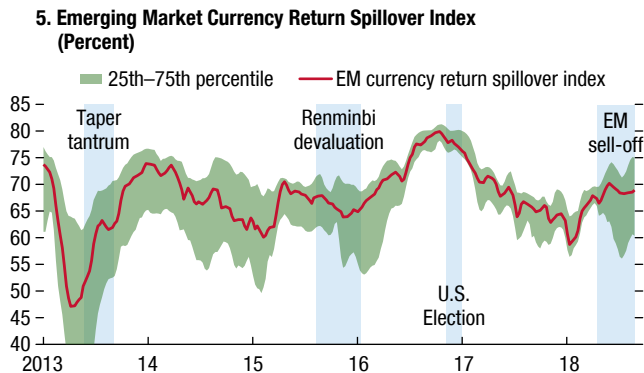
EM exchange rates have become more correlated since early July, but correlation between idiosyncratic components is low/negative.



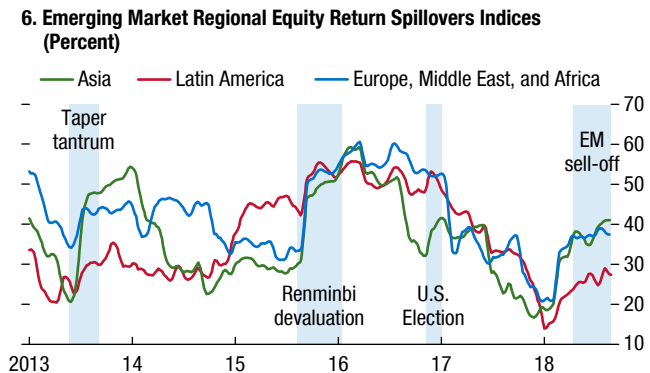
While median EM foreign exchange volatility has inched up recently, there is a significant dispersion across countries.



The directional spillover indices show a modest increase in the level of spillovers but a large variation.



Spillovers in equity markets have increased as well but have remained below levels seen in past sell-offs.



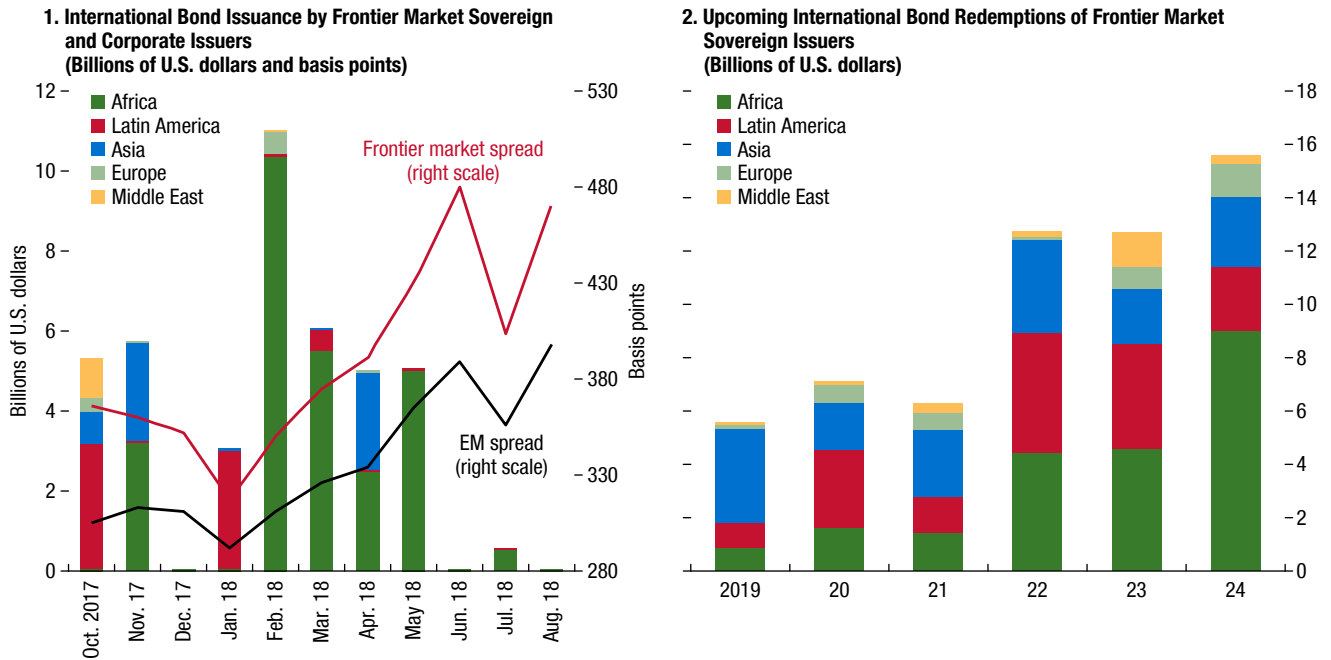
Sources: Bloomberg Finance L.P.; and IMF staff estimates.

Note: In panel 2, the idiosyncratic risk premiums are the unexplained residuals from the model, in which emerging market currency returns are regressed on two systematic factors (a carry factor and the U.S. dollar) (see footnote 10). Panel 4 plots 60-day realized volatility: dispersion is calculated as the difference between the 90th and 10th percentiles. In panels 5 and 6, the spillover indices are based on the methodology by Diebold and Yilmaz (2009), using emerging market equity returns (MSCI indices) and currency returns (local currency versus USD exchange rates), respectively (see footnote 11). Data labels in the figure use International Organization for Standardization (ISO) country codes. EM = emerging market; EMBIG = JPMorgan EMBIG Bond Index Global; FX = foreign exchange; MSCI = Morgan Stanley Capital International.

Figure 1.13. Frontier Markets: Bond Issuance and Redemptions

Frontier market debt issuance slowed down in 2018:Q3 after reaching record highs in early 2018.

Rollover needs will rise after 2021, with some countries facing more challenging redemption profiles.



Sources: Bloomberg Finance L.P.; Bond Radar; and IMF staff estimates.
 Note: Frontier markets are all countries included in JPMorgan Next Generation Emerging Market Index. EM = emerging market.

The External Environment Will Likely Remain Challenging

Looking ahead, emerging markets will continue to face headwinds from the monetary policy normalization in advanced economies, as well as trade tensions and other political developments that might give rise to policy uncertainty and higher risk aversion (see Figure 1.14). These risks will weigh on capital flows and will exert greater pressures on economies with higher vulnerabilities and weaker buffers, as will be discussed below.

Emerging Markets Remain Vulnerable to Further Capital Flow Reversals

U.S. monetary policy normalization had been expected to weigh on portfolio flows to emerging markets, but actual outflows were greater than expected.¹⁴ Retail outflows have been sizable and inflows

¹⁴In this section, portfolio flows refer to net nonresident purchases of emerging market stocks and bonds.

from institutional investors have slowed considerably (Figure 1.15, panel 1). The outflow pressures observed in recent quarters were greater than anticipated in part because over the past year, market participants have substantially revised upward their expectations for the likely path of interest rates, pricing in about 90 basis points of additional interest rate hikes over the next two years. As a result, the drag from the Federal Reserve’s interest rate hiking cycle is now estimated to have been more front-loaded than laid out in the baseline scenario in the October 2017 GFSR.¹⁵ Given current market pricing for the path of interest rates relative to the WEO projections for the federal funds rate, there could be a further drag on portfolio flows

¹⁵The October 2017 GFSR baseline assumed that market pricing for the federal funds rate three years into the future would shift up by about 40 basis points over the first 12 months and another 45 basis points by the end of 2019. This assumption compares to a realized upward shift of about 90 basis points from October 2017 to August 2018. The new GFSR baseline assumes an additional upward shift in market expectations for the future federal funds rate of 50 basis points. Moreover, investor risk aversion (as measured by U.S. credit spreads) is assumed to remain unchanged going forward.

Figure 1.14. Emerging Markets: Key Risks and Vulnerabilities

Risks	Vulnerabilities	Buffers
Faster monetary policy normalization in advanced economies <ul style="list-style-type: none"> • Strong U.S. dollar • Rising interest rates 	<ul style="list-style-type: none"> • High leverage • Large external financing needs • Short-term foreign currency debt 	<ul style="list-style-type: none"> • Sound policy frameworks • Foreign exchange reserves
Political risks <ul style="list-style-type: none"> • Trade tensions • Policy uncertainty 	<ul style="list-style-type: none"> • Flighty investors 	<ul style="list-style-type: none"> • Fiscal buffers • Deep and liquid local markets
Contagion	<ul style="list-style-type: none"> • Trade exposures 	<ul style="list-style-type: none"> • Strong local investor base

Source: IMF staff.

of about \$10 billion by the end of 2019, in addition to a realized impact so far of an estimated \$20 billion (Figure 1.15, panel 2).

Although the Federal Reserve's policy rate hiking cycle is already well under way, the pace of balance sheet contraction is still accelerating. This pace is to hit its maximum in the fourth quarter of 2018. Based on the estimates in Figure 1.15, the deterioration in external factors could lead to a \$50 billion reduction of inflows in 2018, which will ease only modestly to an additional \$40 billion in 2019. This drop in inflows will pose challenges to countries that rely heavily on external financing.

To complement the baseline scenario analysis of portfolio flows to emerging markets, this section also uses a new empirical approach to assess the tail risks to capital flows. The approach focuses on the predictive content of current financial conditions for portfolio debt flows, the dominant component of capital inflows in the postcrisis period (aside from foreign direct investment). A quantile regression framework is used to assess *capital flows at risk* over the near term (defined as the current and the next two quarters) and the medium term (defined as five to eight quarters into the future).¹⁶ Three main factors have good predictive power for portfolio debt flows to emerging markets—risk appetite, U.S. market interest rates, and the U.S. dollar. Downside risks to capital flows (defined as the 5th percentile of the probability distribution) vary over time, reflecting fluctuations in these and other factors.

The current outlook for medium-term portfolio flows is relatively unfavorable. High downside risks to medium-term capital flows are driven by relatively

elevated U.S. interest rates, a strong dollar, and favorable global risk appetite. Strong risk appetite tends to boost portfolio flows in the near term but foreshadows weaker inflows in the medium term. This explains why near-term risks to capital flows are estimated to be relatively limited, while medium-term risks are elevated. The analysis suggests that under a severely adverse scenario (namely the 5th percentile in the probability distribution), medium-term debt outflows could reach 0.6 percent of the combined GDP of emerging market economies (excluding China), on par with the outflows seen during the global financial crisis (also measured over a four-quarter period) (Figure 1.15, panel 3). This tail-risk scenario would likely have a severe impact on economic performance in emerging markets, especially for sovereign and corporate borrowers that are dependent on external financing. The estimated outflows under this scenario are much higher than, for example, in the fourth quarter of 2011, at the height of the European sovereign debt crisis, when U.S. interest rates were low and the dollar was weaker, but risk aversion was high (Figure 1.15, panel 4).

So far, the increased asset price volatility in emerging markets has not been accompanied by a spike in risk aversion in global markets. However, should there be a broad-based rise in risk aversion,¹⁷ the near-term outlook for capital flows would deteriorate significantly, with a material risk of a sharp reversal of portfolio debt flows. Near-term capital flows at risk would drop from less than –0.1 percent of GDP to –0.7 percent of GDP (Figure 1.15, panel 5). Medium-term risks to capital flows would abate, but the magnitude of the

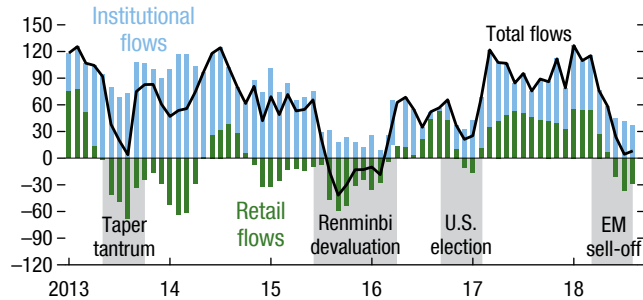
¹⁶See Online Annex 1.1 at www.imf.org/en/Publications/GFSR for more details.

¹⁷In this scenario, the spreads on U.S. corporate bonds rise by 100 basis points, while U.S. 10-year yields fall 30 basis points and the U.S. dollar appreciates by 5 percent on safe haven flows.

Figure 1.15. Emerging Market Vulnerabilities to Portfolio Flow Reversals

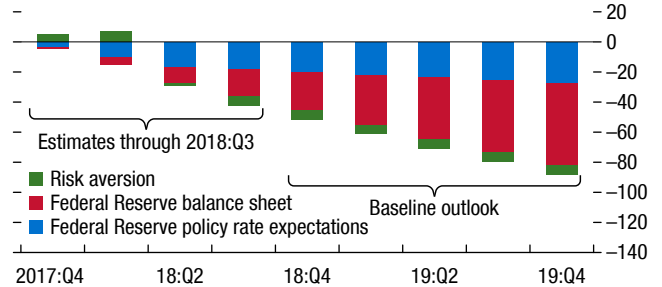
Portfolio flows to emerging market economies have been under pressure in recent months.

1. Emerging Market Portfolio Flows by Investor Type (Billions of U.S. dollars, three-month rolling sum)



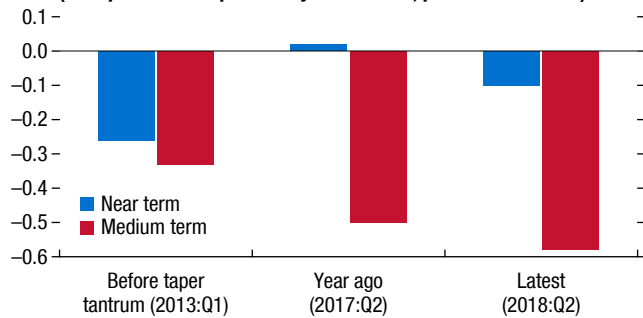
Portfolio flows are expected to remain subdued given the external backdrop.

2. Estimated Cumulative Impact of External Factors on Portfolio Flows to Emerging Markets (Billions of U.S. dollars)



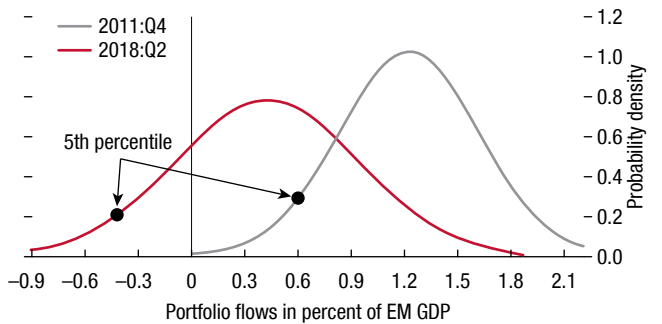
Downside risks to debt portfolio flows in the medium term have increased ...

3. Model Estimates for Debt Portfolio Flows under a Severely Adverse Scenario (Fifth percentile of probability distribution, percent of EM GDP)



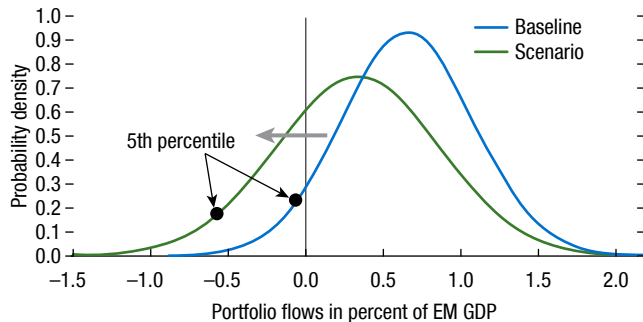
... suggesting that there would be large outflows under a severely adverse outcome.

4. Medium-Term Debt Portfolio Flows Forecast Densities (Debt portfolio inflows, percent of EM GDP)



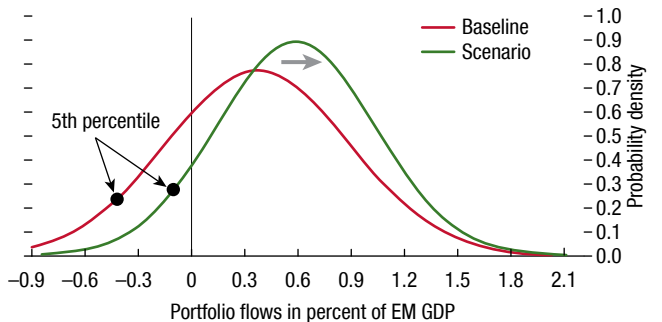
Under a scenario of a sharp rise in risk aversion, near-term risks to capital flows increase significantly ...

5. Risk-Aversion Scenario: Near-Term Debt Portfolio Flows Forecast Densities



... while medium-term risks to capital flows ease.

6. Risk-Aversion Scenario: Medium-Term Debt Portfolio Flows Forecast Densities



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

Note: The sample of countries used in the capital flows-at-risk analysis comprises all emerging market and developing countries for which quarterly portfolio debt flows data are available (about 60 countries). China is excluded from this analysis because of its unique country characteristics, including its size relative to the rest of emerging markets. “Near-term” refers to the period from the current quarter to two quarters into the future; “medium-term” refers to the period five to eight quarters ahead. The fifth percentile estimates reported in the text and panel 3 are obtained from the empirical densities and may be somewhat different from the fitted densities shown in panels 4 to 6. For more details on the methodology, see Online Annex 1.1. EM = emerging market.

improvement would be more moderate compared with the adverse near-term impact (Figure 1.15, panel 6).

High Levels of External and Foreign Currency Debt Are a Source of Vulnerability

Emerging market external vulnerabilities appear moderate compared with the levels seen during the Asian crisis (1997–98) though external debt levels have increased since the global financial crisis. Figure 1.16, panel 1 shows the share of emerging market economies that failed critical threshold levels on various external vulnerability indicators, such as current account balances, total external debt relative to exports, private sector external debt, and foreign exchange reserve adequacy.¹⁸ Looking at recent history, current account imbalances of emerging market economies have decreased since 2013, on aggregate, with China and oil exporters seeing their current account surpluses narrow, and other countries (such as Brazil, India, Indonesia, Mexico, and South Africa) shrinking their current account deficits (IMF 2018b). However, supportive global financial conditions have led to a sharp rise in external borrowing, with external debt increasing much faster than exports in many emerging markets. As a result, countries where external debt is too high relative to exports now account for roughly 40 percent of aggregate GDP of emerging markets (excluding China) (Figure 1.16, panel 1). A combination of high external debt and relatively weak reserve coverage levels would make a country particularly vulnerable to external shocks (see the shaded red area in Figure 1.16, panel 3).

The sovereign sector vulnerabilities have increased since the global financial crisis, especially in low-income countries. Figure 1.16, panel 2 shows the share of emerging markets that failed critical thresholds on a number of public sector vulnerability indicators, such as the overall level of public debt, external public debt, and foreign-currency-denominated public debt. In particular, it shows that the share of countries with high public debt in aggregate GDP of emerging markets (excluding China) has more than doubled since 2008. In addition, roughly one-third of countries exhibit a high share of foreign currency debt. On a positive side, countries that have both high public sector debt and a high share of foreign currency debt are relatively few, including Lebanon, Tunisia, and Ukraine (Figure 1.16,

¹⁸The thresholds used as critical levels are chosen to minimize the combined percentages of missed crises and false alarms, in an empirical model over 1993–2013. For details on the methodology, see Ahuja, Wiseman, and Syed (2017).

panel 4). In contrast, most large emerging market economies with high sovereign debt (Brazil, India) still maintain a low level of foreign currency debt. Among the low-income countries, the number of countries with debt-to-GDP ratios above critical levels has continued to rise. As of August 2018, over 45 percent of low-income countries were at high risk of, or already in, debt distress, as measured by the IMF's debt-sustainability ratings, compared with one-third in 2016 and one-quarter in 2013 (see the April 2018 GFSR).

The corporate sector leverage levels remain close to historical highs in many emerging market economies, despite moderating somewhat over the past year. Firm-level data across a sample of 14,000 non-financial firms suggest that high leverage has stretched debt-repayment capacity of firms in some economies—as indicated by average interest coverage ratios as well as the proportion of debt owed by firms with interest coverage ratios of less than 1—that is, debt at risk (see the April 2017 GFSR). While the median debt at risk has declined recently across regions, challenges persist in some countries in Latin America and in emerging Asia.

Strong Reserve Buffers Help Increase Resilience to External Shocks

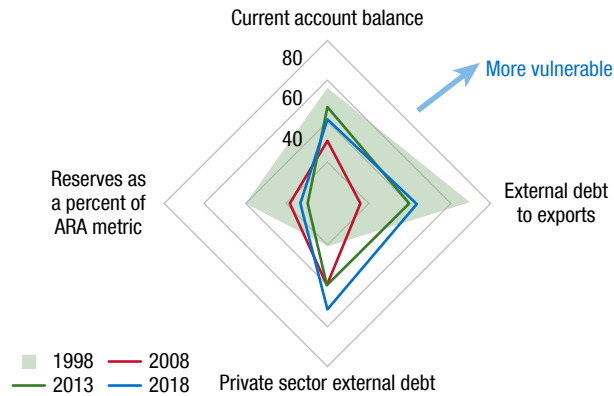
Given the challenging external environment, having adequate buffers against potential foreign exchange liquidity drains becomes even more critical. According to the IMF's assessment of reserve adequacy (ARA) metric, countries with large stocks of external liabilities relative to their foreign exchange reserves include Argentina, South Africa, and Turkey (Figure 1.17, panel 1).¹⁹ Looking at the composition of debt liabilities (Figure 1.17, panel 2), Turkey and Argentina stand out as having increased their shares of external foreign currency debt since 2013, further exposing them to foreign exchange mismatch and rollover risks. South Africa, by contrast, has maintained a large share of local currency liabilities. In addition, pressures on the balance of payments could come from reduced external demand, for example, because of trade tensions. In that regard, more vulnerable countries would include those that have large

¹⁹The assessment of reserve adequacy (ARA) metric reflects the reserve coverage taking into account potential foreign exchange liquidity needs in adverse circumstances. The relative risk weights for each component (export income, broad money, short-term debt, and other liabilities) are based on the 10th percentile of observed outflows from emerging markets during exchange market pressure episodes (see IMF 2015a).

Figure 1.16. Emerging Market Vulnerabilities

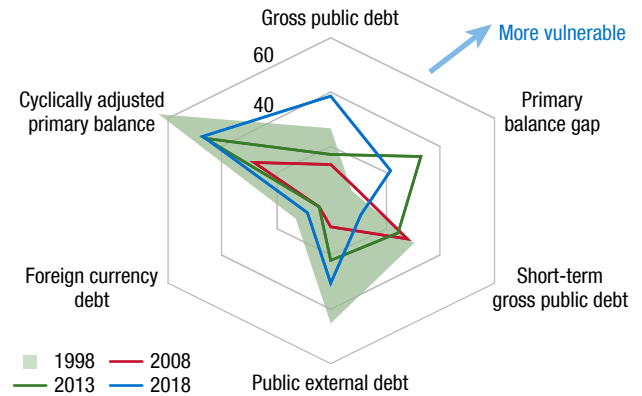
Current account imbalances have declined since 2013, but external leverage has increased.

1. External Sector Heatmap
(Share of countries failing the critical threshold for each metric as a percentage of EM GDP)



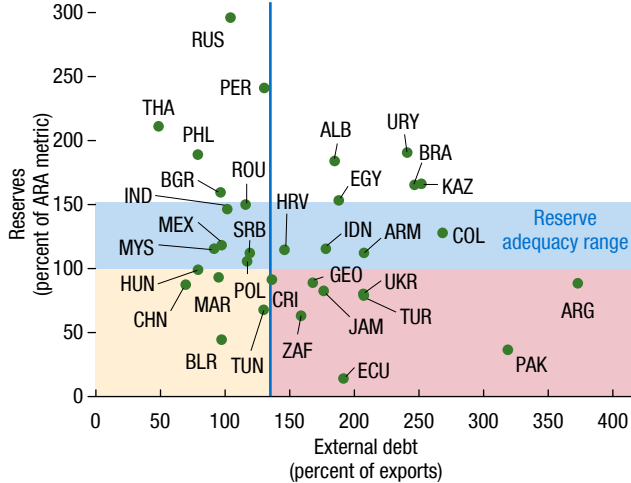
Public sector debt has increased in many emerging market economies in recent years.

2. Public Sector Heatmap
(Share of countries failing the critical threshold for each metric as a percentage of EM GDP)



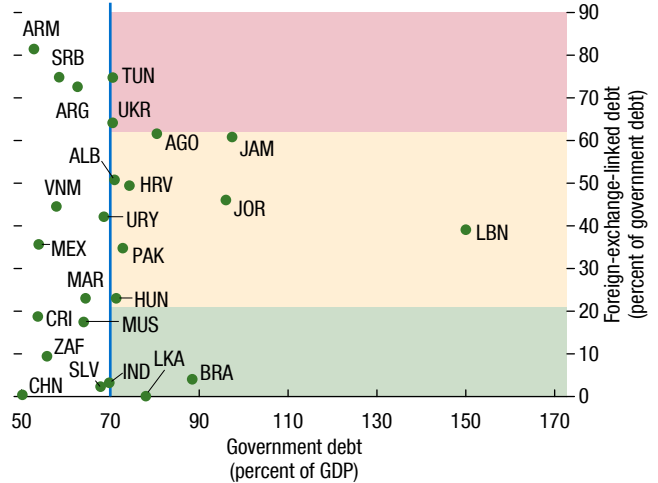
Several countries have both high external debt and low foreign exchange reserves ...

3. External Debt versus Foreign Exchange Reserve Coverage
(Percent; vertical line = median; 2018 estimated)



... but it is mostly frontier markets that have both high public debt and a high share of foreign currency debt.

4. Sovereign Debt versus Foreign Exchange Linked Debt
(Percent; lines = 25th and 75th percentiles; 2018 estimated)



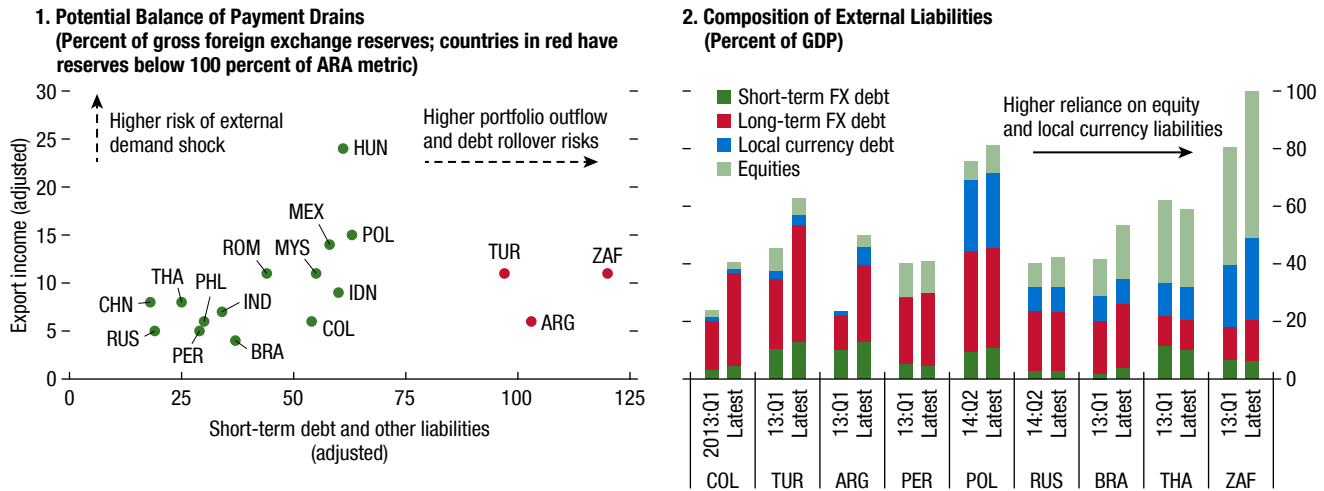
Sources: Haver Analytics; national central banks; and IMF staff estimates.

Note: In panels 1 and 2, vulnerability indicators and thresholds are chosen to minimize the combined percentages of missed crises and false alarms, based on an empirical model estimated over the period of 1993–2013 (see Ahuja, Wiseman, and Syed 2017). All indicators are scaled by GDP, unless specified otherwise. The sample includes 50 emerging market and developing economies. Both panels 1 and 2 show the combined GDP of those countries that failed the thresholds in percent of aggregate GDP of all sample countries, excluding China. For panel 2, data as of end-2017. The ARA metric (panels 1 and 3) reflects potential balance-of-payment foreign exchange (FX) liquidity needs in adverse circumstances and is used to assess adequacy of FX reserves against potential FX liquidity drains (see IMF 2015a). The metric used is not adjusted for capital control measures. In panel 3, the blue vertical line corresponds to the 50th percentile for the entire sample. In panel 4, the blue vertical line corresponds to the 75th percentile. Yellow shading corresponds to the values between the 25th and 75th percentiles. Data labels in the figure use International Organization for Standardization (ISO) country codes. ARA = assessment of reserve adequacy; EM = emerging market.

Figure 1.17. Reserve Buffers and Potential Foreign Exchange Liquidity Needs

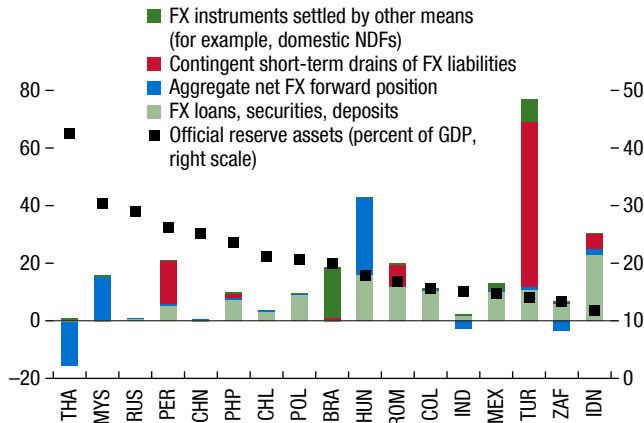
Large short-term debt liabilities to foreigners or a loss of export income could lead to substantial foreign exchange liquidity needs.

Countries with a high share of short-term foreign currency debt liabilities are most vulnerable to portfolio outflows.



Derivatives-related liabilities not captured by reserve adequacy metrics could lead to a sudden increase in foreign exchange liquidity needs.

3. Reserves and Potential Foreign Exchange Drains Due to the Use of Derivatives
(Percent of gross foreign exchange reserves, latest 2018 figures)



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

Note: In panel 1, the indicators are adjusted using the ARA weights. The numbers are as of end 2017. The ARA metric (panel 1) reflects potential balance-of-payment FX liquidity needs in adverse circumstances and is used to assess the adequacy of FX reserves against potential FX liquidity drains (see IMF 2015b). In panel 3, NDFs are nondeliverable forwards where counterparties settle the difference between contract rate and the prevailing rate without exchanging the notional value. Data labels in the figure use International Organization for Standardization (ISO) country codes. ARA = assessment of reserve adequacy; FX = foreign exchange.

export-to-GDP ratios or those that are tightly integrated into global supply chains (Figure 1.17, panel 1).

Further potential drains on foreign exchange reserves could stem from contingent liabilities of the central bank or its operations in the derivatives markets.²⁰ Foreign exchange reserves linked to derivatives transactions (such as reserves borrowed through a short-term for-

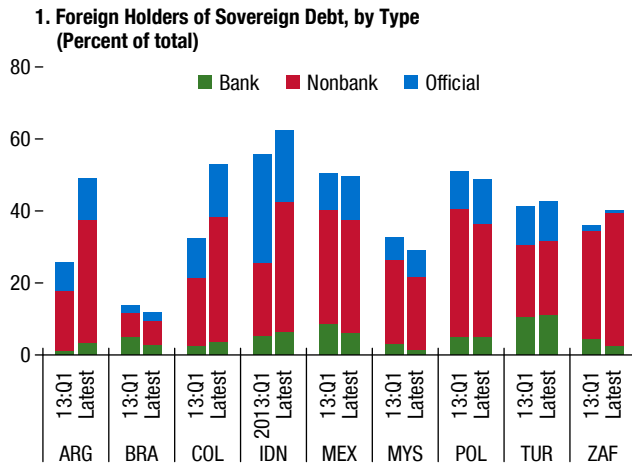
oreign exchange swap) or to provisions that allow banks to meet their reserve requirements in foreign currency may not be available for balance of payments purposes during stress periods. Potential foreign exchange liquidity drains linked to derivatives exposures may pose risks, especially for countries with low reserve adequacy (Figure 1.17, panel 3).

Over the past year, several countries (such as Argentina, Brazil, Mexico, and Turkey) have increased the use of derivatives settled in local currency to provide hedg-

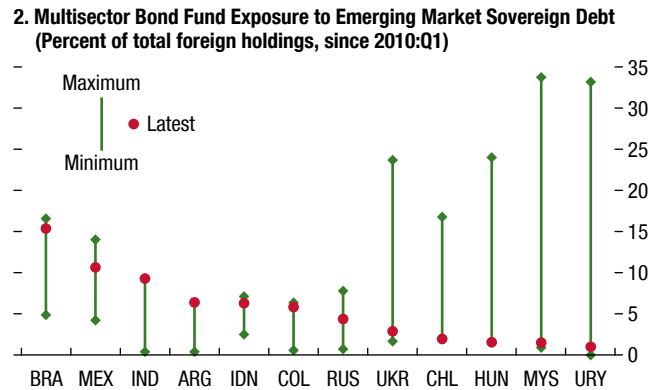
²⁰The IMF's data template on International Reserves and Foreign Currency Liquidity is useful in assessing these risks.

Figure 1.18. The Investor Base for Emerging Market Sovereign and Corporate Debt

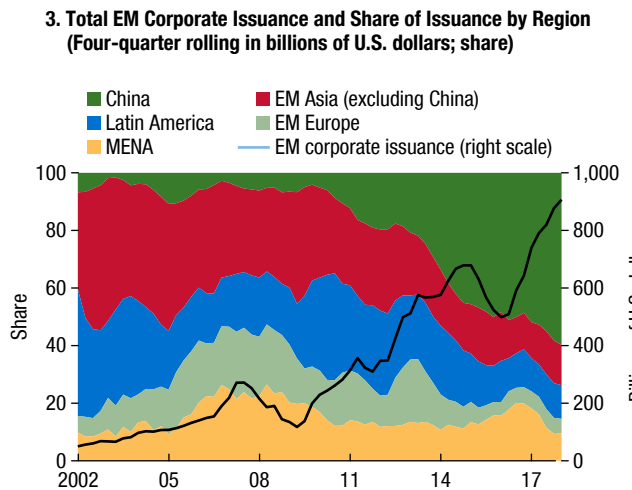
The share of nonbank foreign holders of sovereign debt has increased in many emerging markets since 2013.



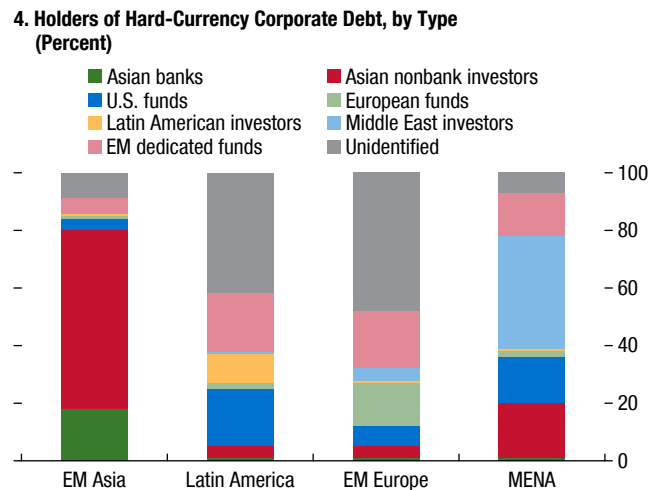
Among them, multisector bond funds hold concentrated positions in some emerging markets.



International corporate debt issuance in emerging markets has reached new highs, led by China and the rest of EM Asia ...



... where the investor base is dominated by regional investors.



Sources: Arslanalp and Tsuda (2014, update); Asian Development Bank; Bank for International Settlements; Bloomberg Finance L.P.; Bond Radar; JPMorgan Chase & Co; and IMF staff estimates.

Note: The data in panel 2 are calculated using Bloomberg's PORT function for a sample of 40 multisector bond funds. Data labels in this figure use International Organization for Standardization (ISO) country codes. EM = emerging market; MENA = Middle East and North Africa.

ing instruments against foreign exchange risk to market participants, thereby alleviating pressures on reserves. Although evidence so far suggests that the effectiveness of such operations can be comparable to spot market foreign exchange interventions (for example, see Nedeljkovic and Saborowski 2017), this is the case insofar as market participants remain confident that convertibility and fiscal solvency risks are low. Under a scenario of a sharp tightening of global financial conditions, this assumption may not hold, especially for countries with high overall exter-

nal and sovereign vulnerabilities. In that case, selling pressures in the foreign exchange spot market may resume.

The Composition of the Investor Base Matters, Particularly in Periods of Market Stress

The share of foreign nonbank investors in sovereign debt markets has been rising in recent years, making emerging markets potentially more susceptible to a reversal of capital flows (Figure 1.18, panel 1).

However, different types of nonbank investors (such as pension funds, insurance companies, and mutual funds) have different risk appetites and investment mandates. As highlighted in the April 2018 GFSR, an increasing proportion of investors are now operating through mutual funds and exchange-traded funds (ETFs). Such funds, in particular, could increase the volatility of portfolio flows because of their greater sensitivity to global financial conditions. In contrast, large institutional investors tend to be more sticky, but can also react more strongly to large shocks than retail investors (as discussed in the April 2014 GFSR).

In addition, some opportunistic global funds have built up large positions in certain emerging markets, increasing the risk of dislocations if these fund managers suddenly shift their asset allocations. Among foreign holders with large concentrated positions, the assets of multisector bond funds have more than doubled since the global financial crisis to well over \$1 trillion (more than 10 percent of the entire bond mutual fund sector globally). Their aggregate emerging market investment stands at more than \$150 billion and, unlike most dedicated emerging market investors that track emerging market benchmark indices, these funds can have highly concentrated positions, which are currently at historical highs in a few countries (Figure 1.18, panel 2). Sudden shifts in asset allocations of the multisector bond funds may amplify asset price comovements across bond markets.²¹ In addition, concentrated positions in certain segments of the local sovereign bond market can render parts of the domestic yield curve illiquid, which could potentially impair monetary policy transmission and exacerbate market pressures.²² On the flip side, to the extent that large positions may be hard to unwind, such funds may turn out to be more sticky—albeit temporarily and not by choice—during periods of low liquidity.

In contrast with sovereign bond markets, investors in corporate bond markets tend to be mainly local or

regional. Hard currency corporate bond markets have grown rapidly in recent years, with issuance dominated by Asian and, in particular, by Chinese firms (Figure 1.18, panel 3). The investor base in emerging Asia largely consists of either local or regional Asian accounts, whereas global and out-of-region investors play a larger role in Latin America, emerging Europe, and to a lesser extent in the Middle East and North Africa region (Figure 1.18, panel 4). In local currency corporate bond markets, which are larger than hard currency markets and are growing fast, especially in Asia (Figure 1.19, panel 1), investors remain predominantly domestic. Data from emerging Asian economies with large domestic corporate bond markets suggest a growing role of local institutional investors, including pension funds and insurers, relative to banks. A deep domestic or regional investor base provides stability, given that such investors often act as buyers of last resort. However, the buy-and-hold approach of these investors can also contribute to low market liquidity. Low liquidity can be a potential source of risk in times of stress because less-liquid domestic markets can amplify the price impact of capital outflows. Low liquidity could also lead to other negative externalities, such as amplification of shifts in financial conditions (see Box 1.5 for a discussion of these issues in the context of China's bond market).

Deeper and More Liquid Domestic Markets Could Be a Buffer against External Shocks

Empirical evidence indicates that the impact of global risk factors on emerging markets could be mitigated by the existence of large banking sectors, deeper capital markets, and broader domestic institutional investor bases (see the April 2014 GFSR). That said, there are also speed limits to the pace of deepening. Deepening too quickly can lead to economic and financial instability. Developing sound institutional and regulatory frameworks can help mitigate these challenges (IMF 2015c). In addition, an overreliance on holdings of sovereign debt by domestic banks may lead to increased risks in times of stress as bank solvency may become challenged.

The lack of deep local markets or local institutional investor base could compound market pressures in times of stress (Figure 1.19):

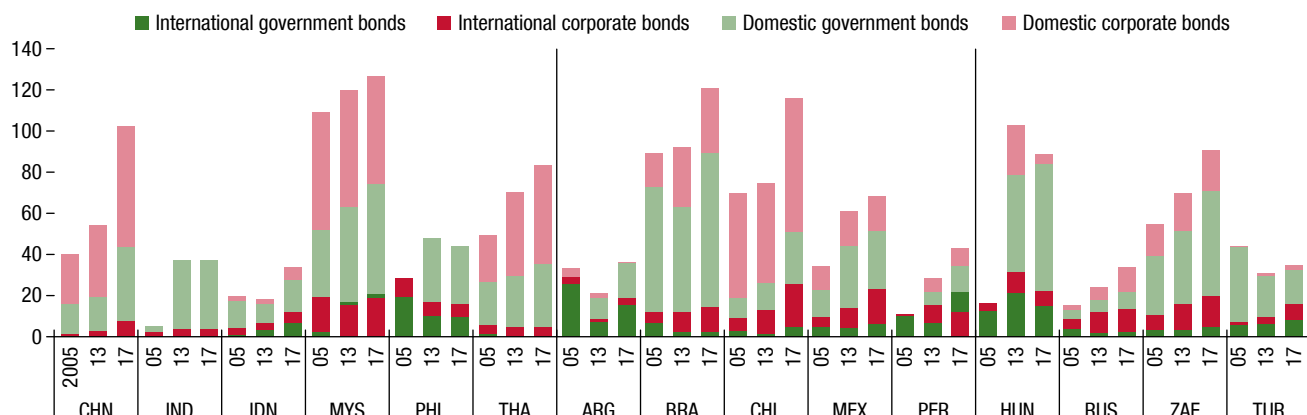
- Countries like South Africa and Malaysia have relatively large domestic investor bases and liquid currency markets (compared with the size of their local bond markets). These features make asset

²¹This potential risk of contagion may be exacerbated by their active use of derivatives with embedded leverage. Over two-thirds of the investment in emerging markets of a sample of 40 large multisector bond funds is managed by funds that have derivatives leverage in the 90 percent to 850 percent range. Excess leverage in their derivatives positions could further amplify the impact of losses from emerging market investments and spill over to other fixed-income exposures when managers have to unwind investments to meet redemptions. See Chapter 1 of the April 2018 GFSR for further explanation of the risks associated with derivatives leverage.

²²See Lu and Yakovlev (2018) for analysis of concentrated foreign holdings in selected countries in specific segments of the local currency yield curve.

Figure 1.19. Market Size and Domestic Investor Base

While bond markets in many emerging market economies have grown significantly ...

**1. Size of International and Domestic Bond Markets
(Percent of GDP)**


... overall financial deepening varies across countries.

2. Foreign Investors, Domestic Investor Base, and Market-Liquidity Measures

	Foreign Investors		Domestic Investor Base				Market Liquidity/Depth			
	Debt	Equities	Mutual funds	Insurance	Pension funds	Banks assets	FX turnover (Spot)	FX turnover (Forwards, Swaps, Options)	Equity turnover	International debt trading volume
	% GDP	% GDP	% GDP	% GDP	% GDP	% GDP	% GDP	% GDP	% Mkt Cap	% GDP
	2018:Q1	2018:Q1	2017	2016	2016	2017	Apr. 2016	Apr. 2016	2017	2018:Q1
China	3	6	14	20	1	308	0.3	0.4	192	1
India	4	6	12	17	1	75	0.7	0.9	43	1
Indonesia	16	11	3	4	2	57	0.3	0.2	18	10
Malaysia	29	26	60	20	60	188	0.5	2.3	28	3
Philippines	8	17	2	8	4	101	0.4	0.4	12	12
Thailand	9	29	30	22	6	186	1.0	1.6	59	1
Argentina	22	4	5	5	...	34	0.2	0.0	7	30
Brazil	11	18	60	13	13	191	0.4	0.7	70	10
Chile	25	12	20	22	70	114	1.6	1.4	12	10
Colombia	25	3	...	7	22	70	0.7	0.6	11	18
Mexico	32	13	10	7	14	67	0.6	1.3	27	19
Peru	19	11	4	6	21	63	0.4	0.4	6	20
Hungary	29	13	12	8	4	99	0.6	2.1	32	14
Poland	25	10	8	10	8	94	0.4	1.5	34	12
Russia	5	11	0.2	2	4	90	1.5	2.0	23	7
South Africa	26	57	52	66	100	114	1.0	6.1	31	17
Turkey	15	6	2	5	2	105	0.8	1.8	172	14
Median	19	11	11	8	7	99	0.6	1	28	12

Sources: Bank for International Settlements; CEIC; EMTA; IMF, International Financial Statistics database, World Economic Outlook database; Investment Company Institute; national authorities; World Bank, Global Financial Development database; World Federation of Exchanges; and IMF staff calculations.

Note: Pension fund data include private and funded plans. Mutual fund data exclude closed-end funds and exchange-traded funds. For each indicator, the “best” and the “worst” quartile values are highlighted in green and red, respectively, across a snapshot of different countries, with the assumption that it is better to have deeper domestic investor base and market liquidity. In panel 2, FX turnover is quoted on a daily basis. Data labels in panel 1 use International Organization for Standardization (ISO) country codes. FX = foreign exchange; Mkt Cap = market capitalization.

prices in these markets generally less sensitive to global conditions. However, having a deep local financial market in the emerging market space could entail temporary spikes in capital flow volatility if investors use these markets as “proxies” for scaling back their overall emerging market exposures during periods of emerging market stress.

- In Asia, despite substantial progress in financial deepening since the early 2000s, foreign exchange liquidity remains low compared to the size of the economy or of the local debt market (including in China, India, and Indonesia), while in some cases the size of their domestic mutual, insurance, and pension funds is also among the lowest. In such cases, a significant foreign investor presence may result in higher volatility of capital flows and asset prices, including the exchange rate. As a counterbalancing factor, central banks typically aim to maintain a high level of reserves and tend to be more active in their foreign exchange interventions.
- The lack of market depth and limited size of local institutional investor base compared to the size of countries’ bond and currency markets may compound market stress in vulnerable countries. For example, Argentina and Turkey have narrow domestic investor bases and Argentina has low foreign exchange liquidity, but unlike economies in Asia, they also have low reserve buffers, making it more challenging for them to absorb external shocks.

Banks—Stronger, but Not Yet Out of the Woods

Banks have strengthened their balance sheets since the global financial crisis: they now have higher levels of capital and more liquidity in aggregate. But weaknesses in the global banking system are still apparent. Increasing debt in the household and corporate sectors has left banks in some countries exposed to borrowers with high debt-service burdens. The combination of some highly indebted sovereigns and bank holdings of government bonds risks reigniting the sovereign bank nexus. In addition, some banks are exposed to opaque and illiquid assets, or are reliant on foreign currency funding.

Bank Balance Sheets Are Stronger, but Some Weak Links Remain

In the 10 years since the onset of the global financial crisis, a number of reforms have been implemented to strengthen the banking system. The

new regulatory, supervisory, and market environment that has developed over the past decade has boosted capital buffers, as discussed in Chapter 2 (Figure 1.20, panel 1).

However, market measures point to some concerns about banks. In the euro area, China, Japan, and the United Kingdom, bank aggregate price-to-book ratios are less than one (Figure 1.20, panel 2). This means that the market value of equity is less than the amount of capital booked on bank balance sheets. If market valuations are used to calculate capital ratios—in place of the balance sheet value of capital used in the regulatory ratios—a number of banks would have a market-adjusted capitalization of less than 3 percent, the minimum level in the Basel III framework (Figure 1.20, panel 3).²³

Another way to assess bank health is through simulations of bank capital ratios in periods of stress. Such an exercise (see Online Annex 1.1 for more details) estimates bank capital needs in stress scenarios through simulations of bank profits and losses. Figure 1.20, panel 4, shows the proportion of banks in the sample, by assets, that have a 20 percent or higher probability of a capital need in the simulations (dark shaded areas in panel 4 of Figure 1.20).²⁴ Although the latest simulated capital needs are now far lower than before and during the crisis, the results suggest that some bank balance sheets could be strengthened further. Overall, institutions representing 7 percent of sample bank assets have a simulated stress capital need in 2018; most of these institutions are in the euro area.²⁵

Banks Face a Series of Different Vulnerabilities

Banking systems in some countries are exposed to a highly indebted nonfinancial private sector. As

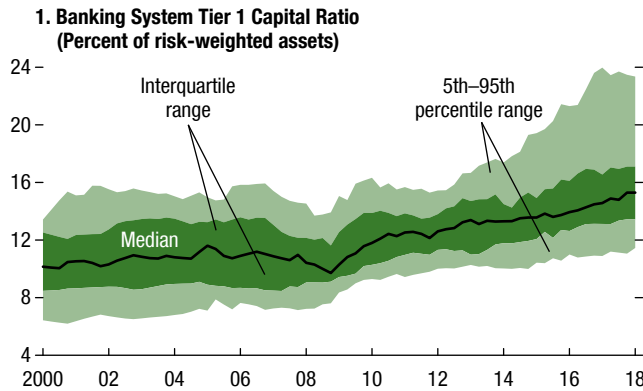
²³Bank market valuations can be affected by differences in business models and expectations of bank profitability, as discussed in previous GFSRs. A low price-to-book ratio is also likely to make it more difficult for banks to raise capital in markets if they needed to do so.

²⁴Capital needs are assessed against a common equity Tier 1 ratio of 4.5 percent (plus the capital surcharge for the global systemically important banks in the sample) and a leverage ratio of 3 percent. These thresholds are used over time so that the results are comparable, although these were not the standards in place in the precrisis and crisis years.

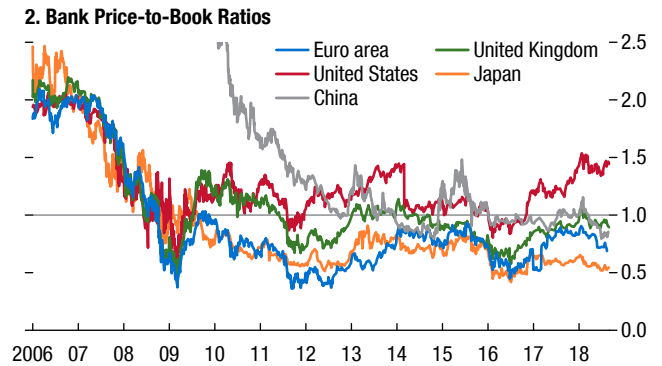
²⁵The results for the euro area are broadly consistent with the latest Financial Stability Assessment (IMF 2018a), which found that the capital buffers are, in aggregate, sizable relative to immediate threats, but some banks are especially vulnerable to credit risk and others to market risks, including a substantial rise in risk premiums.

Figure 1.20. Banking Sector Resilience

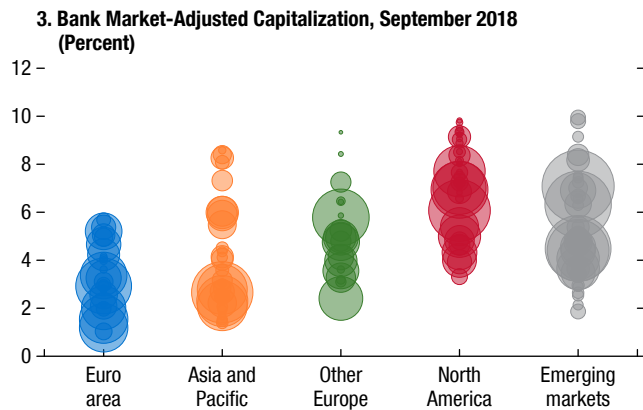
Banks have more capital relative to the precrisis period ...



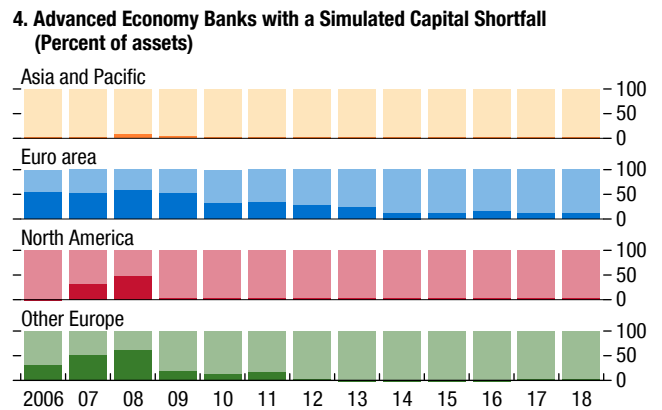
... but equity market valuations are mixed.



Some banks have a low market value of equity.



Simulations find there are still some weak banks.



Sources: Bloomberg Finance L.P.; Haver Analytics; IMF, Financial Soundness Indicators; Organisation for Economic Co-Operation and Development Banking Statistics database; S&P Global Market Intelligence; and IMF staff estimates.
 Note: Panel 1 shows ratios for banking systems in 29 systemically important countries. In panel 3, market-adjusted capitalization = (min {price-to-book ratio, 1} × tangible common equity)/adjusted tangible assets. U.S. bank assets are adjusted for derivatives netting. The size of the circles is proportional to adjusted tangible assets. The dark shaded areas in panel 4 show the simulated fraction of banks in a sample of about 600 advanced economy banks with a 20 percent or higher probability of a capital shortfall measured against a common equity Tier 1 ratio threshold of 4.5 percent and a leverage ratio threshold of 3 percent. See the Online Annex 1.1 for details. Asia and Pacific = Australia, Hong Kong SAR, Japan, Korea, New Zealand, and Singapore; North America = Canada and the United States; Other Europe = Denmark, Norway, Sweden, Switzerland, and the United Kingdom; Emerging markets = Brazil, China, India, Mexico, Poland, Russia, South Africa, and Turkey.

discussed in the October 2017 GFSR, debt-service ratios—nonfinancial private sector interest and debt repayments relative to income—are already higher than their long-term average in a number of economies (particularly in Belgium, Canada, China, France, Hong Kong SAR, Russia, and Turkey, where the current debt-service ratio is more than 1 percentage point above each country’s long-term average).²⁶ The credit provided by banks in these countries amounts to more

than \$30 trillion, or about half of total borrowing from banks by the nonfinancial private sector of major economies (Figure 1.21, panel 1).

Borrowers with stretched debt-service ratios are likely to have greater difficulty paying their debts if interest rates rise or if incomes fall. This difficulty could foster a further rise in nonperforming loans, in addition to the increases discussed in the “Global Financial Stability Assessment” section (Figure 1.21, panel 2). Moreover, some companies have borrowed

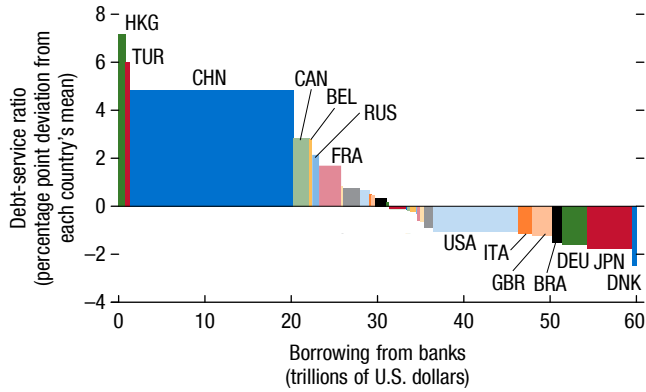
²⁶Some authorities have taken action in response to these risks. For example, in China steps have been taken to reduce credit growth (see the April 2018 GFSR), and the French authorities have implemented macroprudential measures to limit large exposures

to indebted corporations (also see IMF 2018c for a discussion of corporate risks in France).

Figure 1.21. Banking System Exposures to the Nonfinancial Sector

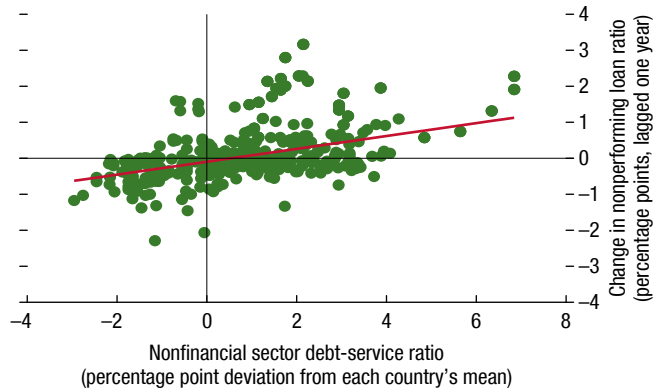
Banks are exposed to countries with high debt-service ratios.

1. Private Nonfinancial Sector Debt-Service Ratios and Debt Levels, 2017:Q4



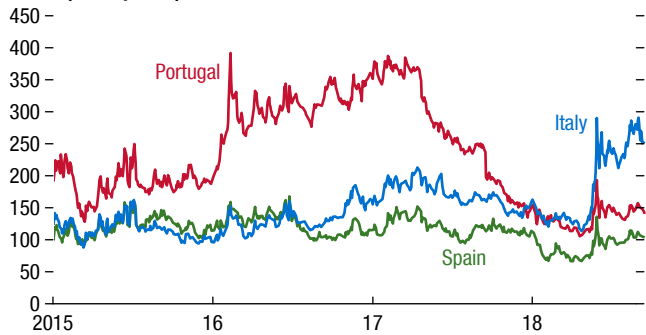
Asset quality could deteriorate as a result.

2. Private Nonfinancial Sector Debt-Service Ratios and Nonperforming Loans, 2006:Q1–2017:Q4



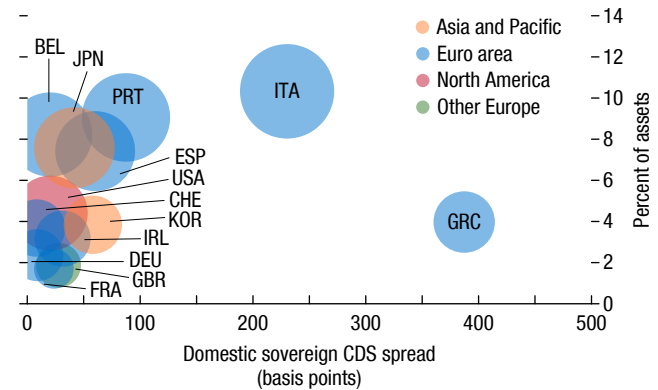
Sovereign risk has risen in Italy ...

3. Ten-Year Sovereign Spreads to German Government Bonds (Basis points)



... and could spill over to banks.

4. Banking System Exposure to Domestic Governments, 2018



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; IMF, Financial Soundness Indicators; national central banks; and IMF staff calculations.

Note: Panel 2 presents historical data for a sample of 17 advanced economies. Panel 4 is based on the latest available data in 2018. The size of the circles is proportional to the banking systems' exposure to their domestic government (relative to assets). Data labels in the figure use International Organization for Standardization (ISO) country codes. CDS = credit default swap.

from banks in foreign currencies and may find it difficult to pay back those loans, especially when they are experiencing a sharp currency depreciation (as seen recently in Turkey). These risks are first and foremost likely to affect local banks, but they could also spill over to foreign banks that have lent to highly indebted companies and households in other countries. For example, the market has recently focused on the exposures of a number of European banks to Turkey.

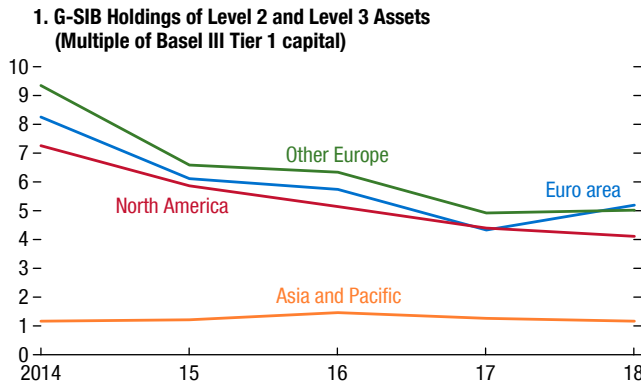
Bank holdings of bonds issued by highly indebted domestic sovereigns are another potential vulnerability. The dangers of the sovereign-bank nexus were clearly demonstrated in the euro area crisis. Since then, changes

to regulations have, on the one hand, increased incentives for banks to hold government bonds (which count as liquid assets under the Basel III liquidity coverage ratio), and, on the other hand, reduced incentives for banks to hold additional government bonds through the introduction of the leverage ratio. Moreover, several measures have sought to reduce the sovereign-bank nexus and the likelihood of government bail-outs.

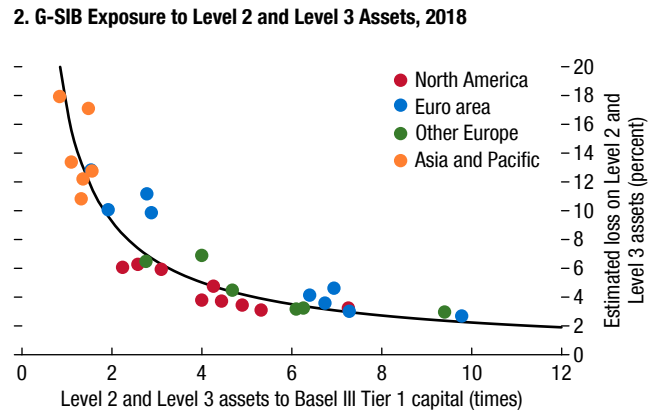
Recent events in Italy suggest that the sovereign-bank nexus remains an important risk transmission channel. Government bond spreads rose sharply in May, reflecting market concerns about sovereign risks (Figure 1.21, panel 3). This induced a rise in Ital-

Figure 1.22. Bank Exposures to Opaque and Illiquid Assets, Interconnectedness, and Funding

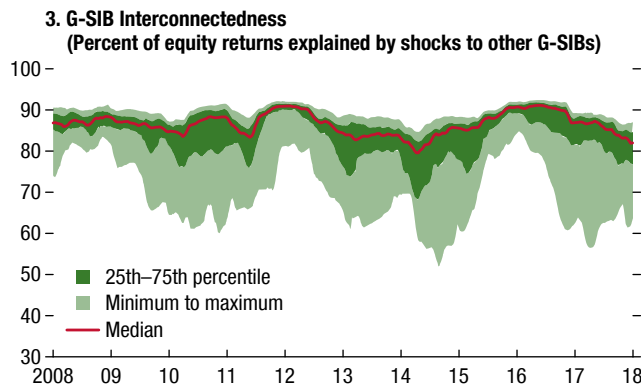
G-SIB holdings of Level 2 and Level 3 assets have fallen ...



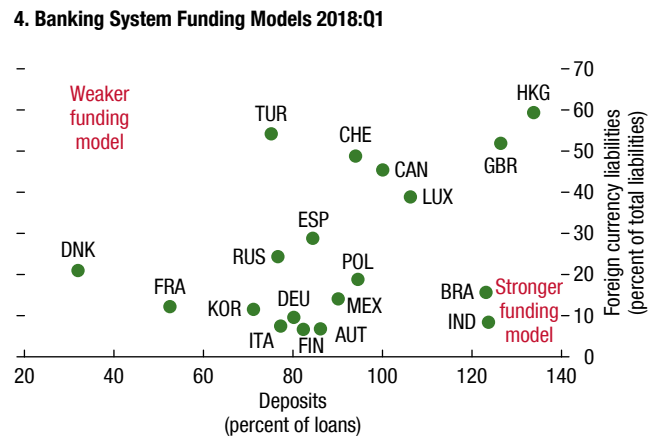
... but holdings are still large relative to capital at some G-SIBs.



Market prices suggest G-SIBs continue to be interconnected.



Bank funding models have improved but remain uneven.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; IMF, Financial Soundness Indicators; S&P Global Market Intelligence; and IMF staff calculations. Note: The vertical axis in panel 2 shows the estimated loss on Level 2 and Level 3 assets that would result in a 1 percentage point reduction in each bank's leverage ratio. The panel is based on 2018:Q2 or, if not available, the latest available data. Panel 3 shows the range of outward spillovers from one G-SIB to another, captured by the percentage of variance in equity returns in one G-SIB that can be explained by the variation in equity returns in other G-SIBs, based on Diebold and Yilmaz (2009). Panel 4 uses data from the IMF Financial Soundness Indicators (FSI) database. Reporting countries compile these data using different methodologies, which may vary across time. The metadata accompanying the FSI database explains the definitions used. The panel is based on 2018:Q1 or, if not available, the latest available data and reflects the most recent revisions submitted by authorities to the IMF FSI database. Data labels in panel 4 use International Organization for Standardization (ISO) country codes. G-SIB = global systemically important bank.

ian bank credit default swap spreads. Should market concerns about fiscal policy reemerge, there is a risk of reigniting the sovereign-bank nexus given banks' holdings of Italian government bonds and their exposure to the domestic economy (Figure 1.21, panel 4). In such a scenario, market tensions could spread to other government bond markets in Europe, as happened in the euro area crisis and, to a limited extent, in May.

Some banks may also face vulnerabilities through their holdings of opaque and less liquid assets. Such assets are known as Level 2 assets (securities and derivatives that are valued using models with market prices as inputs)

and Level 3 assets (securities and derivatives valued using models that are not based on observable market data). Global systemically important bank (G-SIB) holdings of these assets have fallen over the past few years (Figure 1.22, panel 1). But Level 2 and Level 3 assets still represent significant multiples of capital in many G-SIBs.²⁷ To illustrate the potential risk of these holdings, Figure 1.22, panel 2 estimates the size of the decline

²⁷IMF (2018a) notes euro area authorities' recent work on Level 3 assets (as well as some Level 2 assets) and suggests that this work should be extended to all Level 2 instruments.

in value of the portfolio of Level 2 and Level 3 assets at individual G-SIBs that would reduce their leverage ratio (capital as a proportion of assets) by 100 basis points. In some cases, Level 2 and Level 3 assets would need to fall by an amount that would be highly unlikely, but for other G-SIBs with large holdings of Level 2 and Level 3 assets, this impact could result from a decline of less than 5 percent in the value of these portfolios.

Interconnectedness between banks raises a risk that problems in one institution could spill over to others. Equity market prices imply that there is a core set of G-SIBs that either have exposures to each other or are exposed to similar risks. Figure 1.22, panel 3 shows the outward spillovers in equity markets, based on Diebold and Yilmaz (2009). The figure shows the range of outward spillovers from one G-SIB to another, captured by the percentage of variance in equity returns in one G-SIB that can be explained by the variation in equity returns in other G-SIBs. The results suggest that markets still view most of the G-SIBs as being interconnected, although there are a few global banks, outside of a core group, that seem less interconnected than in the past (shown by the light green area in Figure 1.22, panel 3).

Bank liquidity buffers have improved in aggregate since the global financial crisis, but challenges remain. Chapter 2 finds that average liquidity buffers have grown and reliance on wholesale funding is trending downward, though some banking systems in major jurisdictions still rely significantly on wholesale funding.²⁸ Figure 1.22, panel 4 shows the variation in funding positions using two metrics, the loan-to-deposit ratio and the proportion of liabilities in foreign currencies. Banks that have large foreign currency and wholesale borrowing, as well as significant foreign currency mismatches, could find it difficult to roll over this financing if their local currency has depreciated significantly, as has been seen in some emerging market economies. Furthermore, in periods of stress, liquidity problems strike at individual entities within banking groups, so it is important to assess liquidity positions at the individual entity level, as discussed in the special feature on international banking groups. Indeed, the dollar balance sheets of internationally active banks headquartered outside the United States often have

²⁸Chapter 2 notes that reliance on wholesale funding was highlighted in the Financial Sector Assessment Program for France in 2012, Korea in 2014, and Japan and the Netherlands in 2017. IMF (2018a) finds that euro area banks are, for now, resilient to stressed liquidity conditions. Going forward, tighter financial conditions would unevenly affect banks' funding costs and access to liquidity.

worse liquidity positions than would be suggested by their consolidated balance sheets (see the April 2018 GFSR). Institutions that rely on correspondent banking relationships to conduct their business have also been under pressure because these relationships have been cut back, as discussed in Box 1.6.

Policies to Safeguard Financial Stability

The buildup of financial vulnerabilities raises the urgency for policymakers to step up efforts to boost the resilience of financial systems and ensure they have adequate policy tools for dealing with potential systemic risks and market pressures. Global policy coordination is critical to safeguarding global financial stability.

Policyholders Should Proactively Address Potential Systemic Risks

Given elevated financial vulnerabilities and increased downside risks to the global growth outlook, there is a greater urgency for policymakers to build buffers, strengthen resilience, and tackle long-standing problems (see “Global Financial Stability Assessment” section and the October 2018 WEO). Advanced economy central banks should continue to gradually withdraw monetary accommodation, where appropriate, and communicate intentions clearly. Countries with high public sector debt burdens should aim to improve debt sustainability and enhance fiscal buffers. Jurisdictions with high and rising nonfinancial sector leverage should mitigate attendant vulnerabilities through a combination of macroeconomic and prudential policies.

To further increase bank resilience, microprudential policies should aim to bolster bank balance sheets against solvency and liquidity risks:

- Regulators should continue to monitor bank lending to highly indebted private nonfinancial and sovereign borrowers, as well as exposures to opaque or illiquid assets, and take measures to reduce banks' excessive risk taking (see “Banks—Stronger, but Not Yet Out of the Woods” section).
- To lessen the risk of funding strains, regulators should develop currency-specific liquidity risk frameworks,²⁹

²⁹In the Basel framework, the liquidity coverage ratio (LCR) is required to be met in the single currency of use, but it is also suggested that to better capture potential currency mismatches, banks and supervisors should monitor the LCR in all significant currencies. A currency is considered “significant” if the aggregate liabilities denominated in that currency amount to 5 percent or more of the bank's total liabilities. In countries where monitoring has revealed

while central bank swap lines should be available to provide liquidity in periods of stress (see the April 2018 GFSR). Net stable funding ratios could be implemented in more countries.

- Asset quality problems should be addressed in a comprehensive way. In the euro area, efforts to tackle legacy nonperforming loans have borne some fruit, yet challenges remain (see “Banks—Stronger, but Not Yet Out of the Woods” section). In some emerging markets where nonperforming loans have risen, efforts should be made to strengthen banking systems, starting with comprehensive and credible asset quality reviews (see “Global Financial Stability Assessment” section).

Macroprudential tools should be deployed proactively to address systemic risks, in conjunction with macroeconomic policies. Given rising debt levels, loosening underwriting standards, and stretched housing market valuations in a number of countries, it is imperative for policymakers to deploy macroprudential policy tools in a timely and effective manner:

- Given that financial conditions are still accommodative but risks are rising, more active use of broad-based tools, including countercyclical capital buffers, has merit. These tools could help reduce exuberance and slow the pace of credit growth in the near term, and at the same time, increase bank resilience ahead of the eventual tightening of financial conditions.
- Rising foreign currency debt in emerging market economies calls for more active use of tools that mitigate foreign exchange mismatches. Usually such tools involve limiting borrowers’ access to debt denominated in foreign currency through eligibility criteria or required regulatory approval, or, alternatively, limiting the exposure of lenders to nonfinancial sector foreign currency borrowers through additional risk weights. The adoption of currency-differentiated liquidity coverage ratios could provide additional foreign currency buffers to be used in the event of capital outflows.

high and persistent mismatches in significant currencies, recent Financial Sector Assessment Programs (FSAPs) have recommended implementing currency-specific LCR requirements. For example, IMF FSAPs for Romania (IMF 2018e) and Mexico (IMF 2016b) proposed currency-differentiated LCRs and net stable funding ratios. Liquidity stress tests for significant foreign currencies and the holding of sufficient counterbalancing capacity in the form of high-quality liquid assets were recommended for Japan (IMF 2017a).

Regulators should continue to improve the availability of data and to develop new tools with which to address emerging vulnerabilities outside the banking sector. Macroprudential frameworks have been established in many countries since the global financial crisis (see Chapter 2) and tend to be more developed in advanced economies than in emerging market economies—with more tools available for banks than for other entities (Figure 1.23). Efforts to close gaps in macroprudential toolkits should focus on areas in which vulnerabilities are high and rising:

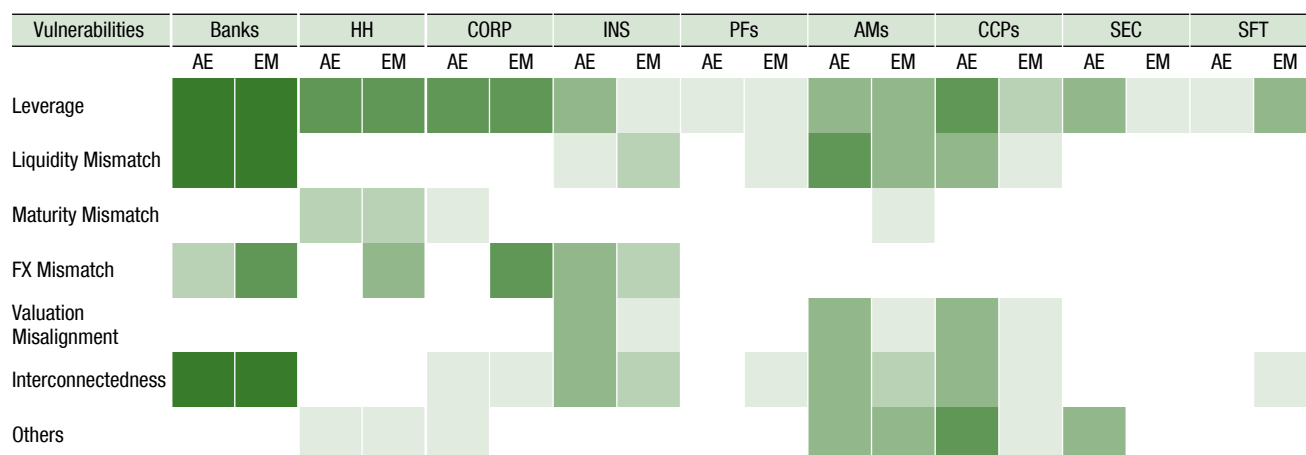
- *Corporate sector vulnerabilities:* In most economies, excessive buildup of leverage in nonfinancial sectors is typically addressed indirectly through loan-to-value limits and similar restrictions on debt levels imposed on bank lenders.³⁰ Macroprudential tools affecting demand for credit intermediated through capital markets are rare.³¹ In economies that are experiencing a rapid increase in corporate debt, authorities may also need to develop tools to limit credit intermediated through nonbank lenders. Emerging market economies need to develop a broader set of instruments to limit foreign currency risk exposures in the corporate sector, which could include foreign exchange reserve requirements, currency-specific risk weights, and hedging requirements.³²
- *Household sector vulnerabilities:* With household leverage high and rising in many countries, authorities—especially those in jurisdictions experiencing lasting booms in house prices—should consider recalibrating and expanding the relevant policy tools. A periodic recalibration of tools limiting households’ access to credit or lenders’ exposures to households may be needed to effectively limit the continued buildup of household indebtedness.
- *Nonbank financial sector:* Regulators should aim to improve and harmonize prudential regimes. For

³⁰For instance, in France, risks of spillovers from corporations’ balance sheets to banks have recently been addressed by reducing the large exposure limit of systemic banks to large indebted corporations to 5 percent of capital.

³¹Notable exceptions include requirements for the hedging, liquidity, and credit ratings of corporations’ external borrowing through international capital markets in Indonesia.

³²Similar proposals, such as higher risk weights for foreign currency lending to nonfinancial corporations, are included, for example, in the recent Article IV Report on Turkey (IMF 2018f). The 2018 euro area FSAP and the 2017 Luxembourg FSAP recommended further developing borrower-based components of the macroprudential toolkit, for example, through sectoral risk weights, also to be levied on nonbank and nonfinancial lenders.

Figure 1.23. Availability of Macroprudential Tools for Addressing Key Vulnerabilities



Sources: IMF, 2017 Macroprudential Policy Survey; and IMF 2018d.

Note: Colors depict number of countries reporting at least one macroprudential tool: <20% 20–40% 40–60% 60–80% >80%

White shading means policy tools are unavailable or not reported. “Others” includes prudential tools such as risk management requirements, reporting duties, and, less frequently, fiscal measures. Many tools reported in the database are microprudential instruments to which macroprudential tools are attributed. The table covers the 29 economies with systemically important financial sectors. AE = advanced economies; AMs = asset managers; CCPs = central counterparties; CORP = nonfinancial corporate sector; EM = emerging market economies; FX = foreign exchange; HH = households; INS = insurance; PFs = pension funds; SEC = securitization; SFT = security financing transactions.

insurers, there is a need to establish a global capital standard and to strengthen resolution regimes, given the potential for systemic risk (see Chapter 2). There are relatively few macroprudential tools for asset managers.³³ Implementing comprehensive and globally consistent standards for asset managers would give regulators both the data and the tools to better identify and mitigate risks, particularly those related to liquidity mismatches and leverage.³⁴ In particular, there is scope for more rigorous limits on concentration risks. Chapter 2 provides more details on macroprudential tools to address risks in central counterparties, securitization markets, and global securities financing markets.

³³In many jurisdictions, asset managers are subject to prudential limitations on redemptions, leverage, counterparty exposures, and portfolio concentration, as well as liquid asset ratios. In some jurisdictions regulators’ mandates for securities markets and asset managers are limited to investor protection.

³⁴The 2016 Ireland FSAP recommended the development of stress tests for money market funds, the analysis of leverage in investment funds, and the discouragement of constant net asset valuation in money market funds. Similarly, the 2017 Luxembourg FSAP recommended supervisory guidance on liquidity stress testing and management in investment funds. See Chapter 1 of the October 2015 and April 2018 GFSRs for analysis of risks stemming from increasing financial leverage.

Emerging Market Economies Should Be Prepared to Cope with Portfolio Outflows

Given continued monetary policy normalization in advanced economies and escalating trade tensions, policymakers in emerging market economies should be prepared to face portfolio flow reversals. To reduce the likelihood and severity of outflows, countries should maintain sound macroeconomic, structural, financial, and macroprudential policies, taking into account their cyclical position, balance sheet vulnerabilities, and policy space available (see the October 2018 WEO).

During periods of market stress, exchange rate flexibility often serves as a key shock absorber, but central bank interventions could also be used to prevent disorderly market conditions. When deciding whether to intervene, policymakers should consider a range of factors, including banks’ and corporations’ balance sheet exposures in foreign currencies, how the exchange rate is valued relative to fundamentals, the level of foreign exchange reserves, and whether alternative policy measures, such as policy rate hikes, are desirable. Foreign exchange interventions through derivatives can have effects comparable to those of spot market interventions, but the potential fiscal implications (including fiscal costs arising from losses) and monetary implications (such as the need to sterilize

the liquidity injection when settling losses) from such interventions should be carefully considered beforehand. In addition, convertibility risks (for instruments settled in local currency) may impair the effectiveness of such interventions.

Given the outlook for a sustained, challenging external environment, a key policy priority for emerging market economies should be to build and maintain adequate foreign exchange reserves and use reserves judiciously. For example, when faced with moderate outflow pressures, policymakers should consider the trade-off between using reserves today to smooth volatility versus preserving policy space to stem more significant outflow pressures in the future. Efforts to build reserve buffers could be complemented by steps toward making the exchange rate regime more flexible, where appropriate.

In the context of outflow pressures, capital flow management measures should be implemented only in crisis or near-crisis situations and should not substitute for any needed macroeconomic adjustment (IMF 2012, 2015b, 2016a). Moreover, capital flow management measures should be part of a broader policy response that addresses the underlying causes of the crisis. When warranted, such measures should be transparent, temporary, and nondiscriminatory, and should be lifted once crisis conditions abate.

To further increase resilience to external shocks, policymakers in emerging markets should focus on developing local bond markets and promoting a stable local investor base (IMF and World Bank 2016). Deeper and more liquid local markets would increase countries' resilience to capital flow volatility and help reduce currency mismatches. A strong and diversified local investor base helps reduce reliance on foreign investors. While foreign investors play a critical role in financial deepening in emerging market economies, excessively high levels of participation may increase the sensitivity of emerging asset markets to external shocks. The analysis of risks related to the foreign ownership of local currency bonds should cover exposures of foreign investors through derivatives.

Multilateral Policy Coordination Is Critical to Safeguarding Global Financial Stability

In the aftermath of the global financial crisis, global policy coordination was key to restoring market con-

fidence, addressing financial stability challenges, and supporting economic recovery. However, in the face of waning support for multilateralism, as well as regulatory fatigue and growing pressure to roll back reforms, there is a risk that financial sector policies could become less coordinated in the future.

Insufficient multilateral policy coordination would increase policy uncertainty, raise the risk of policy missteps, and provide incentives for regulatory fragmentation and regulatory arbitrage.

- Coordinated policy action—including monetary policy communication—sends a strong signal to markets in times of stress. Losing such an ability could weaken the international policy response to future crises.
- Policy actions taken by individual countries might not account for externalities and spillovers to other economies, and so might not be optimal from a global perspective. Examples examined in this chapter include risks from an unwinding of unconventional monetary policy in advanced economies to capital flows to emerging markets, risks that host country subsidiarization and ring-fencing measures pose to the fragmentation of liquidity in international banking groups, and risks of disruption to financial services and market fragmentation during Brexit.
- An increase in private and non-Paris Club lending to emerging market and low-income economies could make any needed debt restructuring or resolution more complicated, as discussed in the April 2018 GFSR.
- A more disjointed financial regulatory policy could spawn opportunities for regulatory arbitrage. Although an evaluation of the effectiveness and efficiency of postcrisis regulatory reforms is welcome, any competitive deregulation could undo past gains and lead to a race to the bottom in regulation and supervision.

The international regulatory community must therefore continue its crucial work to tackle future policy challenges with cooperative solutions, including in the external debt sphere. As one of the pillars of the global financial safety net, the IMF will continue to promote cooperative financial policymaking as part of its agenda to strengthen the global financial system.

Box 1.1. Implications of the U.S. Yield Curve Slope for the GDP Growth Distribution

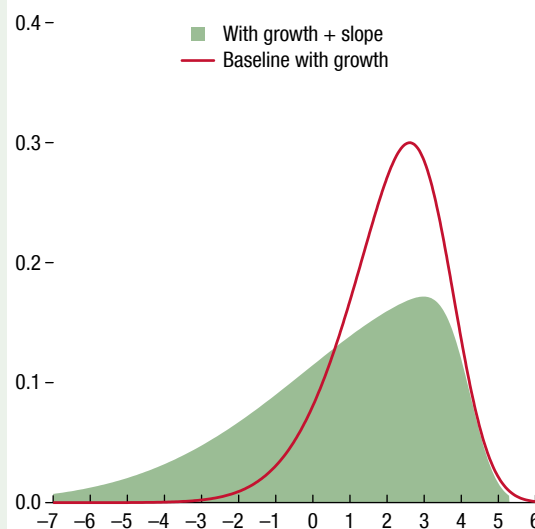
The slope of the U.S. Treasury curve—defined as the spread between longer- and shorter-dated yields—has narrowed meaningfully over the past several quarters, and now stands at less than 30 basis points between 2 and 10 years, near its lowest level since before the global financial crisis. Given that outright curve inversions, when shorter-dated yields exceed long rates, have typically tended to precede recessions, such narrowing of the slope has prompted worries about the longevity of the current recovery.

Previous econometric analyses have considered the impact of the yield curve slope on the mean of future growth forecasts, as well as the discrete outcome of outright recessions using probit regressions, but not on the full distribution around those projections. A lingering key question is whether the slope may have implications for overall uncertainty or asymmetry around anticipated outcomes.

Simple quantile time-series regressions at various horizons afford forecasts of not just the mean, but also the distribution of future real GDP growth. Using the simplest model, the red line in Figure 1.1.1 shows a baseline density forecast for one-year-ahead real GDP growth that includes the latest quarterly real GDP growth as well as an estimated linear trend, using quarterly data beginning in 1975. The shaded region shows the resulting density when the model also includes the most recent slope between 10- and one-year nominal constant-maturity U.S. Treasury yields. Adding the slope lowers expected GDP growth and increases the odds of a recession substantially, a familiar finding. But the inclusion of the slope also considerably boosts uncertainty around the conditional forecast, and it tilts the distribution markedly toward worse outcomes. This result holds even after con-

The author of this box is J. Benson Durham.

Figure 1.1.1. Conditional Real GDP Growth Forecast Distributions
(Four quarters ahead)



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

trolling for other financial variables besides the term structure.

Another potential explanation for the current narrow slope of the U.S. yield curve is the very low level of term premiums. As noted in the April 2018 GFSR, distant-horizon term premiums across major bond markets have been more closely correlated in recent years. Global factors, perhaps related to unconventional monetary policies, have put downward pressure on longer-dated U.S. Treasuries. As a result, the signal from the flatter term structure is likely more ambiguous today.

Box 1.2. Escalating Trade Tensions and Growth at Risk

The recent rise in trade tensions has so far mostly affected sectors directly exposed to the announced trade measures. However, further rounds of trade measures and countermeasures could lead to a broader tightening of financial conditions, with negative implications for the global economy and financial stability.

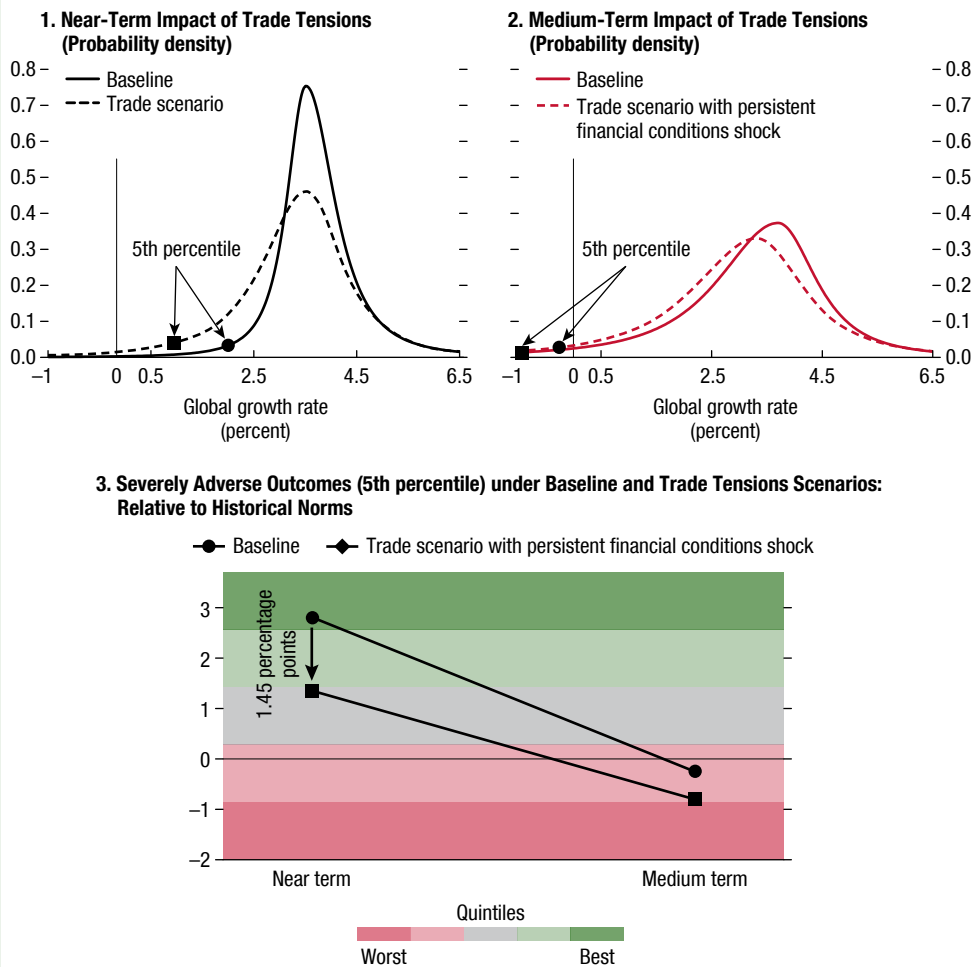
In the October 2018 *World Economic Outlook* (WEO) (“Scenario Box 1—Global Trade Tensions”), the escalating trade tensions are modeled as a multiple-layer impact, including additional tariffs as

well as a confidence shock and a financial conditions shock. As shown in the WEO box, the full scenario, including real, confidence, and financial shocks, can have a marked impact on global growth, with global GDP potentially coming in nearly 0.8 percent less than its current baseline forecast by the end of 2019.

The analysis presented here is complementary to the WEO box. It focuses on the impact of the financial conditions shock on the downside risks to future global growth using the growth-at-risk (GaR) approach. Given that GaR incorporates information on a larger set of financial indicators, a more comprehensive assessment incorporating a broader constella-

This box was prepared by Jeffrey Williams and Shehryar Malik.

Figure 1.2.1. Trade Tensions Scenario Analysis Using the Growth-at-Risk Approach



Source: IMF staff estimates.

Note: The bands are based on the interquartile range of GaR predictions (near and medium term), based on historical data since 1990:Q1. Baseline distributions correspond to the latest GaR assessment, as of 2018:Q3, presented in Figure 1.3 of the main text. The lines indicate the pairs of near- and medium-term forecasts and do not assert a linear relationship between the two periods. GaR = growth-at-risk.

Box 1.2 (continued)

tion of asset prices is possible. In addition, to account for the possibility that further trade measures (beyond those included in the WEO) may be considered, the shock to financial conditions is assumed to be more persistent. This results in a more protracted impact on the downside risk to growth over the medium term.

This shock is modeled as a widening of corporate credit spreads reflecting market participants' expectations of a significant escalation of trade tensions between the United States and China.¹ The effects of escalating trade tensions on market valuations are assumed to be persistent, lasting throughout a three-year horizon.²

¹The widening of the U.S. credit spread is commensurate with market analysts' expectations of a decline in U.S. corporate earnings of 15 percent in the event of an extreme escalation of trade tensions. Based on historical relationships, this decline in earnings corresponds to a roughly 100 basis point widening of aggregate U.S. credit spreads and a 12 percent drop of U.S. equity prices. For other Group of Twenty countries, the widening of credit spreads and the decline of equity prices is based on their credit ratings and stock market correlations (betas), respectively.

²The WEO analysis assumes that the full impact of the financial shock occurs in 2019, dissipating by half by 2020, and has no impact over the medium term.

Figure 1.2.1 shows the impact of escalating trade tensions on the distribution of future global growth:

- *Over the near term*, the financial conditions shock leads to a meaningful increase in the likelihood of severely adverse growth. Compared with the baseline, growth rates in the lower 5th percentile of the distribution shift leftward by about 1.5 percentage points (Figure 1.2.1, panel 1).
- *Over the medium term*, the tightening of financial conditions leads to both a leftward shift in the mode of the growth distribution and greater downside risks (i.e., a fatter left tail Figure 1.2.1, panel 2). Normally in the GaR framework, a tightening of financial conditions in the near term tends to mitigate downside risks to growth over the medium term by curtailing the buildup of vulnerabilities. In this box, however, the financial condition shock is assumed to be more persistent, increasing downside risk across horizons. This more pronounced downside risk more than offsets the reduction of vulnerabilities. Overall, the range of severely adverse growth outcomes shifts into negative territory, a relatively adverse level compared with the past three decades (Figure 1.2.1, panel 3).

Box 1.3. Brexit—Financial Stability Considerations

This box analyzes Brexit-related financial stability risks to the United Kingdom and the rest of the European Union (EU).¹ Considerable uncertainty remains as to the future relationship between the two jurisdictions.² It is still hard to gauge Brexit's impact on financial activity and the change in employment, since much will depend on the nature of the final agreement.³ In general, the likelihood and severity of financial stability risks will be reduced by a closer relationship between the United Kingdom and the EU during the transition period and beyond, but will be heightened in the event of a hard Brexit. European and UK authorities have highlighted Brexit-related risks and called for adequate private-sector preparations. In addition, the European Central Bank and Bank of England have convened a joint technical working group on risk management in the area of financial services.

Short-Term Risks

EU and UK financial institutions will face two broad categories of transitional risks: contractual and operational. The transition period, which envisions maintaining current arrangements between March 29, 2019, and December 31, 2020, has been agreed to in principle but not legally sealed. This may help attenuate short- and medium-term risks, but not eliminate them.

Contractual risks relate to unexpected changes to the legal framework governing financial services agreements:

- For **derivatives**, ensuring the continuity of contracts is one of the most pressing issues. While over-the-counter (OTC) derivatives contracts remain valid in principle, “lifecycle events”

This box was prepared by Jeroen Brinkhoff, Pierpaolo Grippa, Trygvi Gudmundsson, Juan Sole, Ilan Solot, Richard Stobo, Froukelien Wendt, and Peter Windsor.

¹Some references to the EU in this box also encompass countries belonging to the European Economic Area (EEA) that apply the EU regulatory framework under the EEA Agreement. Passporting rights refer to the legal ability of financial institutions that are authorized to do a certain business in one EEA member country to conduct the same business across the whole EEA.

²Even though there is no definition of soft and hard Brexit, the former is understood to refer to arrangements that are relatively close to the status quo, whereas the latter refers to outcomes in which disruptions and dislocations of current agreements are more prevalent.

³For example, TheCityUK and Oliver Wyman estimate 31,000–35,000 jobs driven out of the United Kingdom across all financial services under a hard Brexit scenario.

built into such contracts could create challenges. According to International Swaps and Derivatives Association (ISDA, 2017), lifecycle events include novations, certain types of portfolio compression, maturity extension of open positions, material amendments, and some types of position unwinds. Lifecycle events can turn a legacy trade into a new transaction, thus falling under the umbrella of the permissions or authorizations in place at the time the new transaction occurs. Once the United Kingdom becomes a third country, UK financial firms would require an EU equivalence decision or an explicit national authorization or waiver in some EU27 member states to continue performing these events.⁴ There is uncertainty about the amount of derivatives that could be subject to lifecycle events. The Bank of England estimates that a total notional amount of £29 trillion of uncleared OTC derivative contracts between the United Kingdom and European Economic Area (EEA) counterparties could be affected, of which £16 trillion mature after March 2019 (Bank of England 2018). With respect to cleared OTC derivatives contracts, the total notional amount potentially affected is estimated by the Bank of England to be around £67 trillion, of which £38 trillion mature after March 2019. According to Bank for International Settlements data, 78 percent of OTC foreign exchange derivatives globally and 45 percent of interest rate derivatives have a maturity of one year or less. Assuming a similar maturity structure among EU-based instruments, a transition period would thus substantially reduce the scale of the issue as maturing contracts run off. With respect to OTC derivatives contracts cleared by central counterparties (CCPs), an additional issue is that, following the UK's exit, CCPs in either jurisdiction will need to seek recognition to continue to provide their services cross border to clearing members. EEA clearing members and their clients currently heavily rely on CCPs based in the UK to clear contracts in certain products.

- Absent a specific arrangement, the Bank of England estimates that £55 billion worth of **insurance contracts** by UK insurers to EU policyholders could be disrupted because UK insurers will lose the authorization to service these contracts in the

⁴This latter option is already available to third-country firms and used by non-EU counterparties. The applicability to UK firms is unknown at this point.

Box 1.3 (continued)

EU. The UK government has committed to pass legislation to allow EU insurers to temporarily continue to service insurance policies held by customers in the United Kingdom. The European Insurance and Occupational Pensions Authority (EIOPA) has published an opinion detailing available options to ensure contract continuity and called on national supervisory authorities to ensure that appropriate contingency plans are being implemented. Although recent data are not available, anecdotal evidence suggests a sizable value of insurance contracts have already moved to the EU27.

Operational challenges stem from uncertainties regarding the regulatory environment in which financial institutions will operate during the transition (for example, changes to licensing requirements, risk management, ability to hire talent, and so on):

- **Banks** and investment firms will lose passporting rights and may no longer be able to rely on branches or cross-border provision of services to operate across jurisdictions. They will instead require new operational structures and licenses, which the EU will only grant once institutions provide proof of “substantial presence.” Furthermore, banks could need to maintain higher capital buffers related to positions in central counterparties (CCPs) outside their jurisdictions.⁵ UK-based investment banks, the largest of which are subsidiaries of global systemically important banks, may also have to relocate some activities to the EU. Overall, the loss of passporting rights may amount to nontrivial adjustment costs on many business lines.
- **Asset managers** may face restrictions in their ability to delegate investment management to or market investment funds in different jurisdictions. For example, EU-domiciled funds may no longer be allowed to be managed from the United Kingdom.
- **Insurance companies** that do not rely on subsidiaries to conduct their cross-border business may also face restrictions on their ability to operate across jurisdictions. These insurers may need to restructure or apply for an authorization to maintain their cross-border business. This may increase costs, but large consolidated balance sheet adjustments are not expected.

⁵European Commission (2018), https://ec.europa.eu/info/sites/info/files/180208-notice-withdrawal-uk-post-trade-services_en.pdf.

- **Supervisory authorities** may also face higher operational needs. Large relocations from the United Kingdom could require additional supervisory and regulatory capacities (for example, regarding the process of granting licenses to applicants, validating risk models, and ensuring that entrants adhere to local regulations). Supervisory authorities have indicated that they are preparing for possible operational challenges.

Medium-Term Challenges

Depending on the final EU27-UK post-Brexit arrangement, Brexit could have financial stability implications for the EU and UK financial systems that go beyond the transition period:

- **Market liquidity** could be fragmented in the medium term, raising the cost of funding in capital markets and disrupting existing market-making arrangements. For derivatives, a forced relocation of large amounts of central clearing services to the EU could also lead to higher trading costs, reduced market liquidity, and increased margin requirements due to losses in efficiencies. This would pose challenges for financial institutions in both jurisdictions.
- **Onshore and offshore markets:** Trading venues could be duplicated given that a meaningful share of euro-denominated instruments are traded among non-EU financial institutions. A forced relocation policy may not succeed in pushing all trading of these instruments to within the EU27. Global banks may be forced to perform more back-to-back deals internally, which would complicate their risk management practices and pose some challenges to supervisors.
- Challenges to **risk management** will be posed because institutions will become more complex alongside a more fractured landscape for European financial markets.
- Current arrangements for **data storing and sharing** between the EU27 and the United Kingdom could breach national laws after Brexit. Limitations on data sharing may curtail regulators’ capacity to monitor risks effectively, unless legal solutions and cross-border agreements are found.

Recommendations

- Financial institutions should step up their preparations for a post-Brexit landscape. In addition to maintaining momentum in their applications for

Box 1.3 (continued)

licenses, institutions should also ensure they have the necessary operational structures in place, including staffing arrangements and adequate information technology systems. Such plans should even include measures for a no-deal outcome in as much detail as possible, even if such a scenario is not considered likely.

- Authorities in both jurisdictions should continue to work with private parties to reduce the risks of disruption to financial services, paying special attention to needed arrangements in case of a no-deal outcome. Contractual aspects are a key area in which cooperation is crucial and the explicit commitment from authorities to legislate temporary waivers may be required.
- More clarity from authorities on which aspects fall exclusively under institutions' responsibility should be provided, and authorities should provide clear communication about their intention to mitigate possible cliff-edge risks and facilitate continuity of services. Recent steps from UK authorities to create temporary permission and recognition regimes for EEA firms operating in the UK are likely to help reduce uncertainty.
- Authorities should create permanent consultative bilateral bodies on financial regulatory and supervisory matters. A permanent forum for cooperation should be considered to replace existing temporary groups. International venues for cooperation already exist (for example, the Committee on Payments and Market Infrastructures, the International Organization of Securities Commissions, and the Financial Stability Board), but bilateral channels for day-to-day interaction will have to be expanded, given the greater complexity that could result from Brexit.
- Central banks should stand ready to provide liquidity assistance in case of disruption surrounding the United Kingdom's exit. Disruption via macroeconomic channels could also arise, so central banks should also be prepared to use available instruments as needed. On the external side, a disorderly exit could lead to capital outflows. Authorities should closely monitor such developments and be aware of the potential for sharp asset price moves.

Box 1.4. Jumps and Liquidity in the U.S. Stock Market

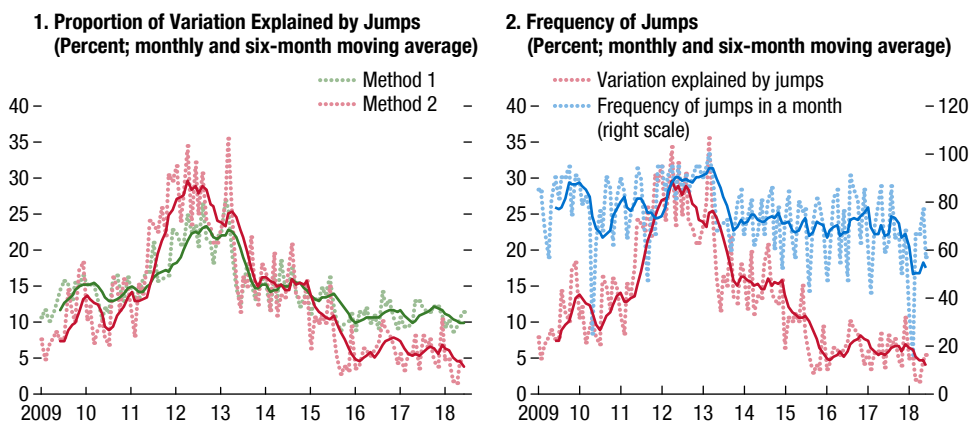
Intraday data on asset price movements can help shed some light on whether very high-frequency price disruptions may have seeped through to lower frequencies, which are ultimately most relevant for broader financial conditions and longer-term real effects.

This box was prepared by Rohit Goel and Sheheryar Malik.

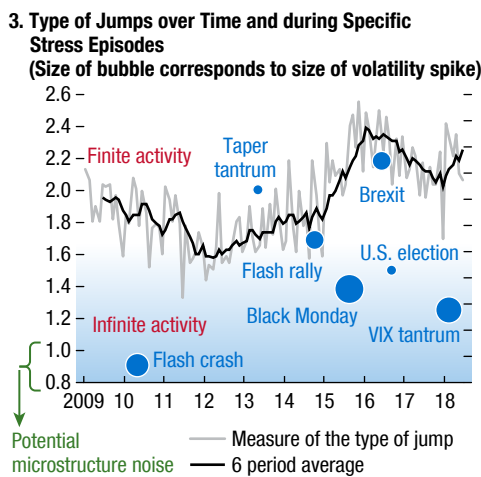
To examine this issue, the U.S. equity market may be an especially informative sample, given the marked penetration of High Frequency Trading (HFT) activity, both for market-making and active algorithmic trading. Using S&P 500 prices starting in January 2009 and recorded at 30-second time intervals, total daily price variation can be decomposed into a continuous component and a jump component, which

Figure 1.4.1. Jumps and U.S. Stock Market Liquidity

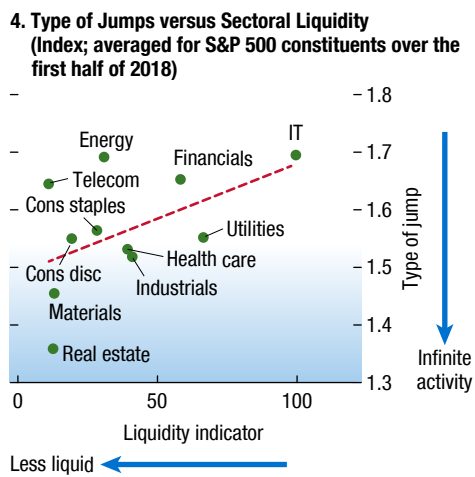
The proportion of overall price variation explained by jumps is at historical lows ...



However, infinite activity jumps tend to be prevalent in stress episodes ...



... and tend to be characteristic of relatively illiquid sectors.



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

Note: In panel 1, “Method 1” is based on Huang and Tauchen (2005) and Andersen and others (2006); “Method 2” is based on Ait-Sahalia and Jacod (2012). In panel 2, frequency of jumps is based on the former method, and variation explained by jumps is based on the latter method. In panel 3, the black and gray lines measure the type of jump: finite activity (that is, news-related shocks) versus infinite activity (that is, a series of small jumps reflecting insufficient liquidity); the size of circles depicts the level of the Chicago Board Options Exchange Volatility Index (VIX) on selected stress event days. In panel 4, trading volumes serve as a proxy for liquidity. Cons = consumer; cons disc = consumer discretionary; IT = information technology; telecom = telecommunications.

Box 1.4 (continued)

reflects discontinuities in prices. In turn, overall jumps can be characterized by so-called infinite activity, or small jumps, or finite activity, or large jumps.

Whereas large jumps reflect news-related shocks, a series of small jumps correspond to price moves that are significant over a period of few seconds, but not necessarily at a lower frequency. These small jumps likely reflect insufficient liquidity, insofar as markets cannot absorb orders without price impact.¹ Of course, both small and large jumps can occur within a day.² A news event can generate a large price move, but small jumps may nonetheless follow and reflect poor liquidity as prices drift after an announcement.

The analysis, explained in Online Annex 1.1, suggests that the proportion of daily price variation explained by jumps (either small or large) is currently at a historical low, notwithstanding a number of flash crash events in recent years (Figure 1.4.1, panel 1). Furthermore, the frequency of significant jump days per month has also declined, to about one

standard deviation below historical norms (Figure 1.4.1, panel 2).

These results point to a decline in the proportion of price variations explained by jumps. In addition, small jumps, which are more likely to be related to poor liquidity, are less common than news-related large jumps on most days (Figure 1.4.1, panel 3). However, but not surprisingly, when volatility spiked dramatically—including during the VIX Tantrum, Black Monday, and the Flash Crash—small jumps were most prevalent. Overall, these findings suggest that liquidity has not materially deteriorated in the U.S. equity market.³

Beyond these findings on the aggregate index, analysis of sectoral S&P indices suggests that relatively “illiquid” sectors, as measured by the trading volume, tend to display a higher share of small jumps (Figure 1.4.1, panel 4). This finding points to an intuitive link between market liquidity and the type of jumps.

Overall, evidence from the U.S. equity market seems to indicate that flash crashes may not be a harbinger of sustained market liquidity strains. Yet caution is warranted. Although stock markets are arguably an important benchmark for risky assets, similar analyses of fixed income, foreign exchange, or global corporate bond markets may imply more worrying inferences for market liquidity.

¹To detect significant jumps, the methodology developed by Huang and Tauchen (2005) and Andersen, Bollerslev, and Diebold (2006) is used. The so-called spectral analysis methodology proposed by Ait-Sahalia and Jacod (2012) is used to categorize the finite or infinite activity of jumps. Astrophysicists use similar techniques to distinguish components of light spectrum emanating from stars.

²The methodology based on Ait-Sahalia and Jacod (2012) usefully defines a range of possible distributional properties, from Poisson process, on the one extreme (defining finite activity jumps); different Levy processes (infinite activity); and Brownian motion (continuous evolution), at the other extreme.

³These results are consistent with recent research on high-frequency commodity futures activity (CFTC 2018) and a recent study on the UK equity market (Acquilina, Eyles, Shao, and Ysusi (2018)).

Box 1.5. Trading Activity in China's Bond Market

Trading activity in China's bond market exhibits a cyclicity that may pose risks to financial stability. In the context of steadily growing repurchase (repo) market borrowing linked to the roughly RMB 75 trillion (85 percent of GDP) investment vehicle

The author of this box is Henry Hoyle.

sector, fluctuations in trading can amplify shifts in financial conditions. Improving market liquidity should therefore be an important part of the agenda to reduce financial vulnerabilities.

Trading activity in China's bond market, the world's third largest, is volatile by international standards. For government and corporate bonds, each roughly

Figure 1.5.1. Chinese Bond Market Developments

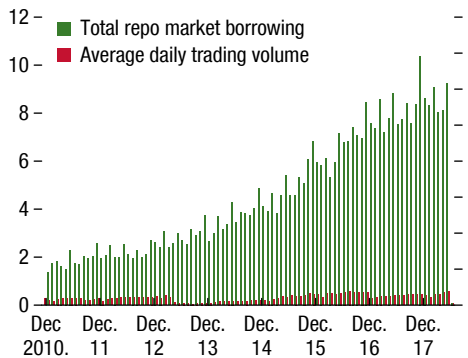
Trading turnover fluctuates more than in other countries ...

1. Annual Growth in Three-Month Average Bond Trading Volumes, by Country and Bond Type (Percent)



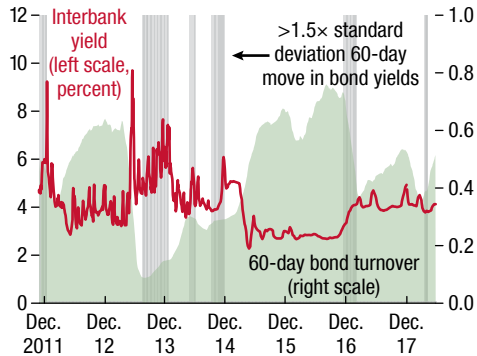
Declines in trading volumes pose risks in the context of growing short-term borrowing ...

3. Chinese Bond Market: Repo Borrowing Outstanding and Trading Volumes (Trillions of renminbi)



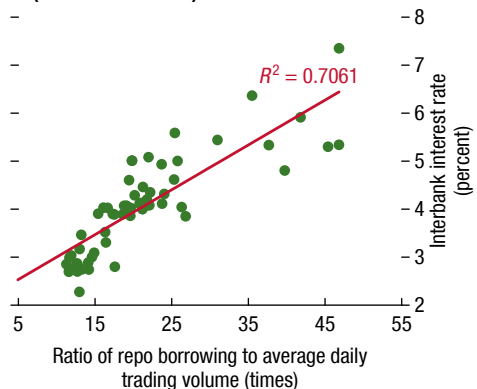
... and volumes tend to fall when interbank rates rise.

2. Rolling 60-Day Sum of Daily Bond Trading to Outstanding Total and One-Month SHIBOR Interbank Interest Rate



... because more borrowing must be rolled over and portfolios become more illiquid, reinforcing upward pressures on short-term interest rates.

4. One-Month SHIBOR Interbank Interest Rate and Repo Borrowing Outstanding Relative to Average Daily Trading Volume, June 2013–June 2018 (Percent and times)



Sources: Bloomberg Finance L.P.; CEIC; ChinaBond; Federal Reserve; Financial Industry Regulatory Authority; WIND Information Co.; and IMF staff calculations.
 Note: Government bonds includes policy bank bonds but not local government bonds, which have negligible trading. For panel 2, bond turnover and yields are based on government bonds. SHIBOR = Shanghai interbank offered rate.

Box 1.5 (continued)

one-third of the overall market, trading volumes fluctuate considerably more than in the United States (Figure 1.5.1, panel 1).¹

These shifts in volume occur in part because much trading appears to reflect cycles of leveraged carry trade-type activity. Trading volumes are tightly correlated with repo market volumes, suggesting that most purchases are financed with short-term borrowing and are therefore sensitive to interest rates.²

Trading volumes also fluctuate because the market's largest investors—banks and investment vehicles—do not actively hedge or short bonds. These firms mostly do not mark to market their holdings and have few suitable hedging instruments with which to manage market risks, so they often hold to maturity rather than sell bonds at a loss.³ As a result, the market typically experiences one-way positioning during periods of stable or declining interbank interest rates, but trading declines and bond prices shift rapidly when interbank conditions tighten or become volatile (Figure 1.5.1, panel 2).

Reduced trading may pose risks in the context of growing levels of maturity-mismatched short-term borrowing (Figure 1.5.1, panel 3). Repo borrowing outstanding has reached nearly RMB 9 trillion, reflecting growing demand from investment vehicles that rely on such financing to bridge the maturity gap between their largely illiquid long-term assets and short-term liabilities. This borrowing was about 15 times larger than average daily trading volumes in 2017, more than double the peak ratio reached in the U.S. repo market of seven times in September 2008.⁴

¹The remainder of the market comprises local government bonds, which have negligible trading, and issuance by financial institutions. In this box, Chinese government bonds include policy bank bonds.

²The correlation holds when excluding bond purchases and repo borrowing volumes by securities firms, which suggests that the relationship is not due to market-making activity.

³Investment vehicles here refer to bank wealth management products and similar privately issued asset management products. For more information, see the April 2018 GFSR. The government bond futures market does not allow participation by banks, which are the largest investors in government bonds, and there is no futures market for policy bank bonds (bonds issued by development banks), which are more widely traded. Until August 2018, futures were only available at the 5- and 10-year tenors, and there are no option markets. Corporate bonds lack credit default swap markets.

⁴U.S. repo market and trading volumes are based on primary dealer-reported transactions from the Federal Reserve's FR 2004 data series.

The growing imbalance means that maturing repo borrowing exceeds total trading volumes by about RMB 3 trillion each day, on average, implying at least that much needs to be rolled over or repaid with liquid assets such as deposits. When trading volumes decline, a larger share must be rolled over or repaid with deposits, putting upward pressure on short-term interest rates and weakening borrowers' ability to raise liquidity by selling bonds. As a result, money market rates tend to rise as trading declines relative to total borrowing outstanding (Figure 1.5.1, panel 4).

This procyclical link between bond trading and financial conditions represents a significant vulnerability in China's financial markets, and highlights the ongoing importance of implicit guarantees. When investment vehicles face liquidity needs, they have been met largely via repo borrowing, often facilitated with bank credit. This approach averts the need to sell their largely illiquid corporate bonds into a thinning market, which could create a destabilizing feedback loop between bond prices and funding market pressures. Yet it creates upward pressure on short-term interest rates, often requiring authorities to inject liquidity to prevent a pernicious deleveraging cycle. This reinforces moral hazard and leads to rising borrowing.

Improving bond market liquidity will help ease this trade-off between distortionary implicit guarantees and financial instability, and should be a priority for addressing financial vulnerabilities and enhancing the transmission channel of monetary policy. Specific steps should include (1) deepening markets for derivatives and other instruments to hedge and short bonds, to encourage more balanced, two-way market positioning; (2) fostering the development of market makers to facilitate trading and price discovery; (3) increasing the share of mark-to-market investors, who have greater incentives to manage interest rate risk, including by increasing foreign participation from a low base;⁵ and (4) facilitating a transition to a more stable, price-oriented financial system.

⁵Given low foreign participation levels and the large absolute size of China's bond market, at this time the marginal benefits to market deepening would outweigh any (small) risk from increased volatility or external spillover risks.

Box 1.6. Correspondent Banking Relationships

Correspondent banking relationships (CBRs), which facilitate global trade and economic activity, have been under pressure in several countries. A complete loss of CBRs would affect the ability of banks' clients to receive and make cross-border payments to conduct their economic activity. The latest data indicate that CBRs decreased globally during 2011–17. However, this decline has been largely offset by rechanneling the flows through remaining relationships and by financial institutions' putting alternative arrangements in place (Figure 1.6.1, panels 1 and 2). As a result, the global value of cross-border payment flows has not been affected so far.

Although banks have lost correspondent accounts across all regions, regional pockets of pressures on CBRs have been identified in Africa, the Caribbean,

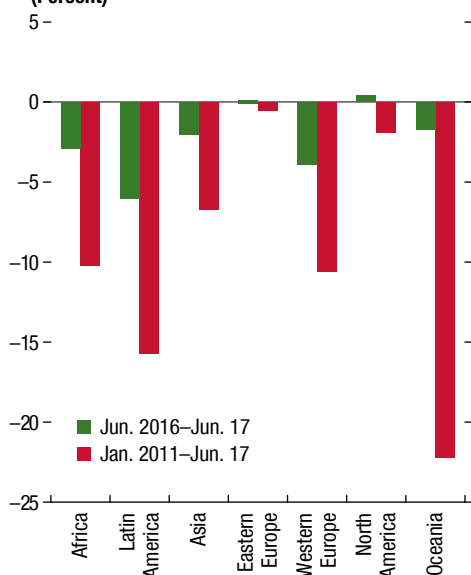
the Middle East, and the Pacific islands. The implications may be macro-critical for some jurisdictions. Concentration through fewer CBRs allows for economies of scale, which is relevant for cost-effective implementation of anti-money laundering/combating the financing of terrorism (AML/CFT) requirements in particular, but it also accentuates financial fragilities in some countries. These fragilities could undermine affected countries' long-term growth and financial inclusion by increasing the costs of financial services and negatively affecting bank ratings. These fragilities could also tighten domestic liquidity conditions and increase the cost of finance. The drivers of CBR pressures are multiple and interrelated. Financial integrity issues related to corruption, difficulties around entity transparency, and the introduction of new sanctions are motivations that have gained attention recently. Ultimately, though, the decision to end a CBR comes

This box was prepared by Prasad Ananthakrishnan, Dirk Jan Grolleman, Yumi Kuramochi, and Alejandro Lopez Mejia.

Figure 1.6.1. Correspondent Banking

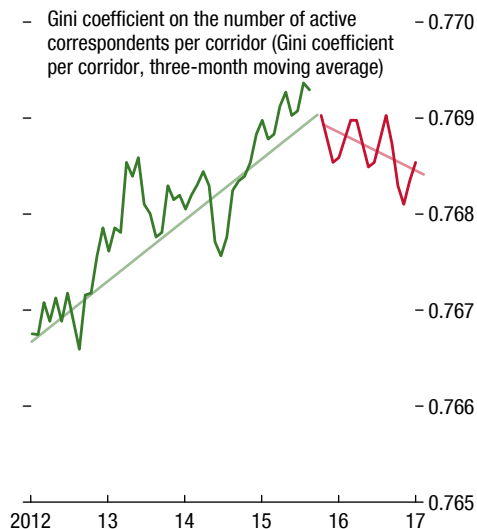
The declining trend in correspondent banking relationships remains a concern.

1. Regional Breakdown of Active Counterparty Countries (Percent)



While the number of active corridors is decreasing, concentration within remaining corridors appears to decline.

2. Concentration of Active Correspondents



Sources: Financial Stability Board Correspondent Banking Data Report Update (March 2018); and IMF staff estimates.
 Note: An active corridor (or counterparty country) is a country pair where at least one SWIFT transaction has taken place in either direction during the observed time period. In a corridor, multiple correspondent banks can be active and transact with respondent banks.

Box 1.6 (continued)

down to an individual bank's assessment of the risk and profitability of the business relationship.

Several measures have been identified to address the withdrawal of CBRs. Enhanced monitoring of CBRs; strengthening regulation and supervision, particularly of AML/CFT; and removing impediments to information sharing are key. Outreach efforts by regulators and banks can dispel misperceptions about regulatory expectations and clarify expectations and risk tolerance. The IMF will continue following a multipronged approach

to support member countries faced with withdrawal of CBRs based on (1) facilitating dialogue among stakeholders to foster a mutual understanding of the issues; (2) engaging with affected countries as part of IMF surveillance; and (3) implementing capacity-development programs to strengthen legal, regulatory, and supervisory frameworks, including on AML/CFT, and assisting supervisory agencies in the analysis of CBR trends through a new CBR data-monitoring tool developed by IMF staff (see, among others, IMF 2017d).

Special Feature: International Banking Groups—Centralized versus Decentralized Business Models

Banks' international branch networks are a crucial element of international banking. Branches rely on flexible and efficient cross-border liquidity management to provide global corporate banking services and liquidity to other entities within banking groups. Host regulators are tightening branch liquidity standards. There are benefits to this approach from a host regulator's perspective, particularly in the context of resolution during periods of stress. But there could also be unintended global spillovers. Liquidity in banking groups could be fragmented and international banking credit could be impaired. This transition to tighter branch liquidity is occurring at a time when global financial conditions are also tightening, and the combination of the two could create strains in funding markets.

Foreign Banks Are a Key Channel for Liquidity Flows across the Global Banking System

This special feature focuses on foreign bank offices (FBOs)—defined here as branches and subsidiaries outside the home country of their parent bank. FBOs can be organized according to two stylized models. In a centralized model, a banking group largely operates through a network of international branches, primarily supervised by its home regulator. The decentralized model mainly comprises subsidiaries, which are legal entities incorporated in host countries and supervised by the host regulator (McCauley and others 2010; CGFS 2010).

FBOs are an important element of the international financial system. FBOs account for more than 40 percent of the more than \$20 trillion total of foreign claims for the 19 banking systems for which data on branches and subsidiaries are available (depicted by the blue and red portions of the bar in Figure 1.SF.1, panel 1).¹ FBOs,

The authors of this feature are John Caparusso, Yingyuan Chen, and Will Kerry.

¹The Bank for International Settlements publishes information on aggregate international credit exposures intermediated through foreign bank branches and subsidiaries for the following banking systems: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Hong Kong SAR, Indonesia, Ireland, Italy, Japan, Korea, Luxembourg, the Netherlands, Sweden, Switzerland, and Turkey. However, information on the balance sheet composition of foreign bank branches and intermediaries are available only through the permission of host country authorities in the following countries: the United States, the United Kingdom, Japan, Germany, Canada, Hong Kong, Korea, South Africa, Chile, Poland, and Turkey.

particularly branches, play a prominent role in foreign currency intermediation of both assets and liabilities (Figure 1.SF.1, panel 2). Global systemically important banks often use branches to deliver corporate and investment banking services (capital markets, hedging, international payments, clearing and settlement, custody, and treasury services) to multinational companies (see, for example, CGFS 2010 and the October 2015 GFSR).

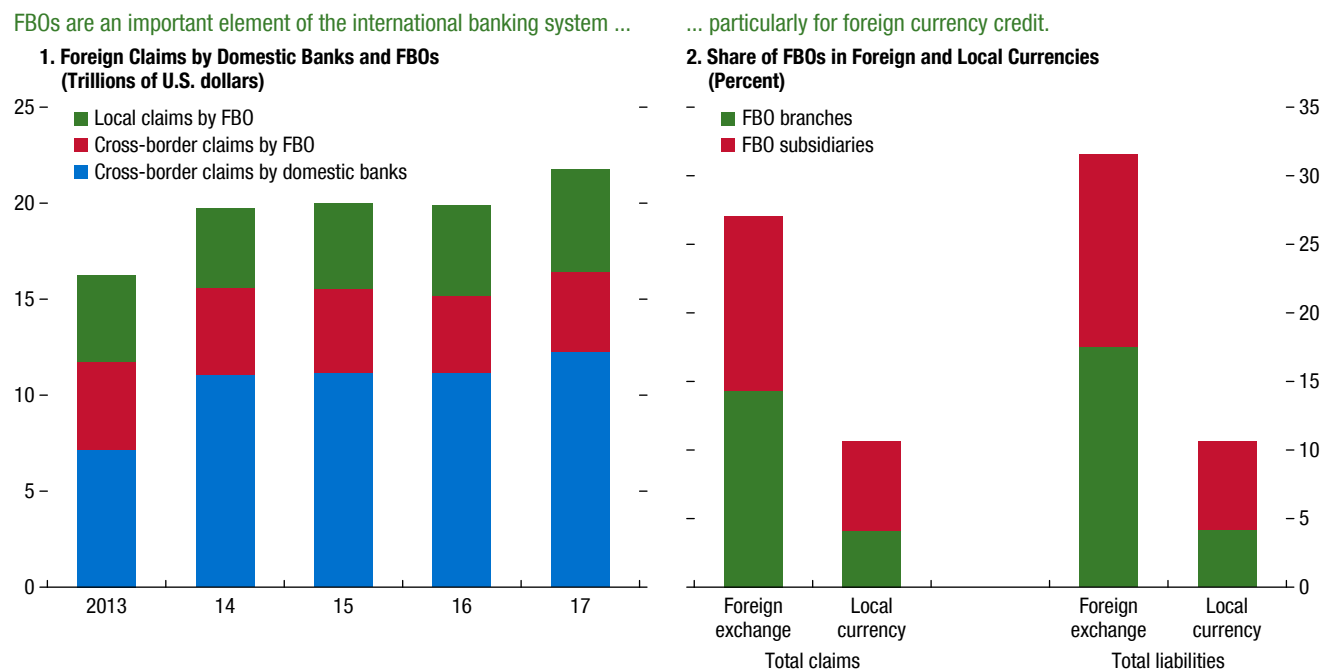
Branches are the fulcrum of international intragroup liquidity management. Subsidiaries, however, are hindered by legal restrictions and exposure limits; thus branches facilitate cross-border deployment of liquidity by borrowing from and lending to group-related entities. Balance sheets reflect these differences: both branches and subsidiaries provide credit via loans and investments in securities, but only branches lend to intragroup counterparties (Figure 1.SF.2, panels 1 and 2). Similarly, branches avail themselves of intragroup borrowing to supplement short-term wholesale funding, while subsidiaries largely fund themselves through local deposits from companies and households (Figure 1.SF.2, panels 3 and 4).²

Centralized and decentralized banking models pose different financial stability benefits and costs. In centralized models, branches can tap intragroup funding in the event of liquidity problems, making them less sensitive to idiosyncratic shocks (Table 1.SF.1). However, their interconnectedness makes them more exposed to contagion within banking groups. In contrast, restrictions on transferring intragroup liquidity help shield subsidiaries in decentralized banking groups from shocks that affect other group entities, but make them more susceptible to local liquidity pressures. Because they are separate legal entities, subsidiaries are also easier to resolve.

Host regulators are likely to prefer a more decentralized international banking model. Local subsidiaries are less affected by liquidity problems in other parts of banking groups that are beyond the control of the local regulator. Furthermore, international banking groups are often complex, making it more difficult for host regulators to assess risks. Branches can pose complex problems for host regulators if a foreign bank needs to

²The deposits available to branches are not covered by deposit insurance schemes and are therefore likely corporate deposits.

Figure 1.SF.1. Indicators of the Importance of Foreign Banking Offices



Sources: Bank for International Settlements; and IMF staff estimates.

Note: In panel 1, foreign claims follow the Bank for International Settlements' (BIS) definition, which equals the sum of the three bars. The calculation is based on 19 BIS reporting countries that provide data according to the type of reporting bank in the locational banking statistics. Cross-border claims by domestic banks are made by domestic banks in their home country to counterparties in other countries. FBO local claims are made by foreign branches and subsidiaries to counterparties in their host country. FBO cross-border claims are made by foreign branches and subsidiaries to counterparties in a third country. FBO = foreign banking office.

be resolved—in particular, liquidity can be transferred out of branches before resolution takes place. By contrast, subsidiaries can be more easily resolved.

The choice of international banking model is less clear from a global perspective. The relative merits of branch and subsidiary networks from a global perspective depend on trade-offs between the branch model's flexibility to mitigate local funding problems and branches' greater openness to global shocks. In theory, subsidiaries are more readily resolvable because they have lower spillover costs should a local shock compromise their solvency; but in practice, a global group may support a troubled subsidiary to contain potential reputational damage. Uncertainty over global banks' response to local subsidiaries is crucial in countries under pressure (for example, in Turkey, five foreign banking groups have local operations that together account for a 25 percent share of the domestic banking market).

With their local perspective, many host regulators have gradually tightened their regulation and supervision of foreign bank branches. Such tightening was

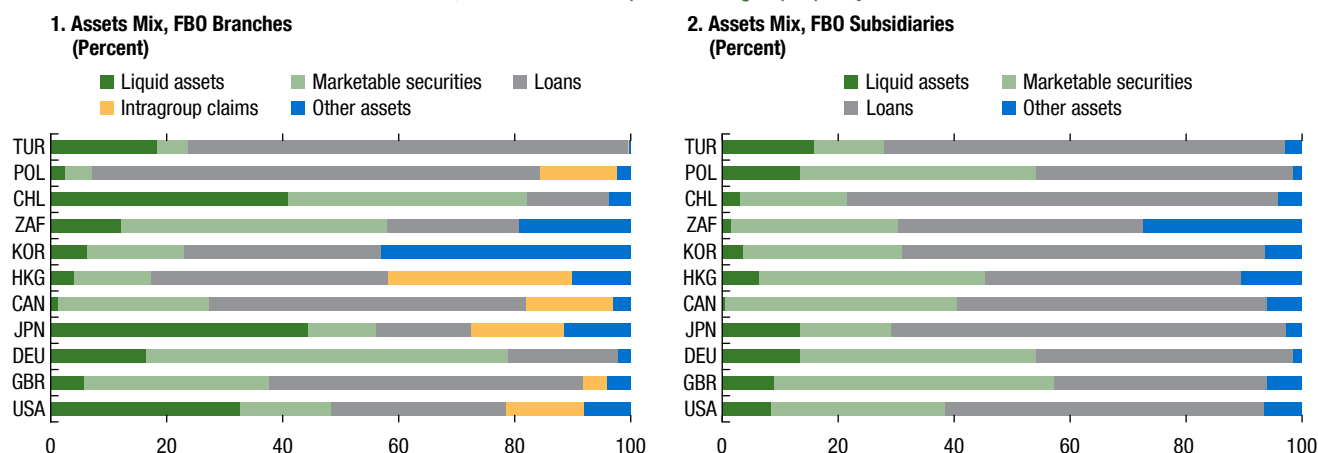
partly in response to excessive risk taking by some FBOs before the global financial crisis, allowed by weak governance and limited supervision, as well as difficulties with sharing relevant supervisory information across borders during the crisis. A few countries (Brazil, Mexico, Russia, South Africa) have disallowed branches altogether, but more often local policymakers have tightened branches' financial, operating, and governance requirements to converge with the stricter rules governing subsidiaries. This approach has proceeded on several fronts, such as tighter liquidity requirements at the branch level, structural subsidiarization initiatives, and other measures including resolution planning, stress testing, and informal guidance (Table 1.SF.2).

Global Banking Is Becoming More Decentralized and Fragmented at a Time When Financial Conditions May Tighten Further

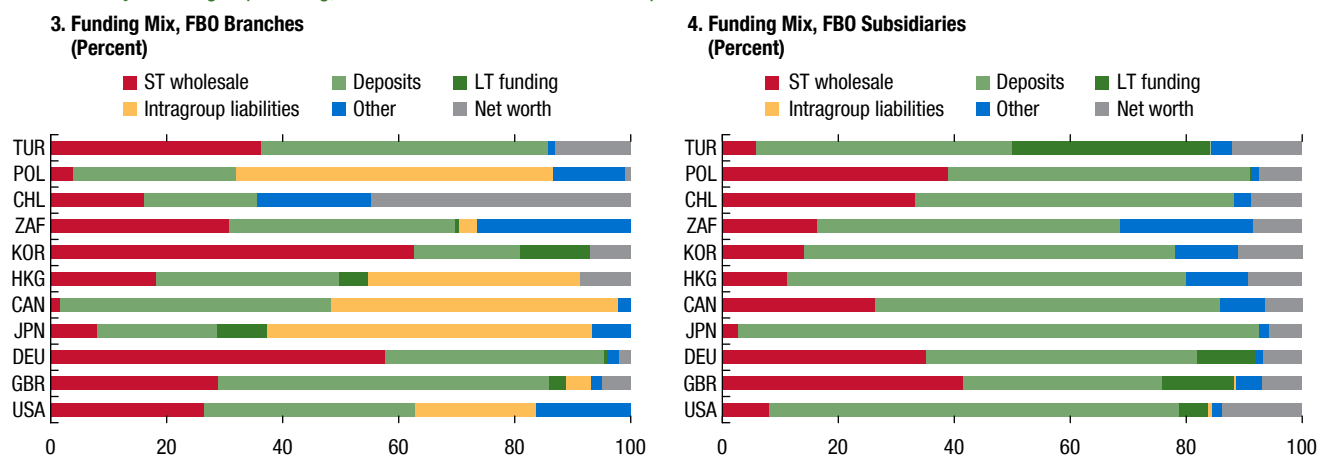
Foreign branches have increased their liquid assets in a number of banking systems since 2010. Branches

Figure 1.SF.2. Foreign Bank Branches and Subsidiaries: Balance Sheet Structures (End-2017)

Both branches and subsidiaries lend to customers, but branches also provide intragroup liquidity.



Branches rely on intragroup funding, while subsidiaries have broader deposit bases.



Sources: KPMG; national regulators and supervisors; S&P Global Market Intelligence; and IMF staff analysis.
 Note: This figure is based on a selected number of countries for which data on branches and subsidiaries are available, and shows foreign bank offices operating in each country. Liquid assets include cash, reserves at the central bank, and holdings of government securities. Data labels in the figure use International Organization for Standardization (ISO) country codes. FBO = foreign banking office; LT = long term; ST = short term.

Table 1.SF.1. Main Advantages and Disadvantages of Centralized and Decentralized International Banking Models

Provision of Services	Centralized models have greater flexibility to transfer funds across borders, helping banking groups provide services to multinational companies. However, research suggests that lending provided by subsidiaries can be less procyclical than credit supplied by branches.
Resilience of Banking Groups	Centralized banking groups are more susceptible to contagion because distress in one entity can be transmitted more readily to other entities in the banking group. In decentralized models, banking groups can be shielded from distress in local entities. However, if the parent bank supports the local entity to limit reputational risk, this benefit is reduced. Although subsidiaries operating in decentralized models might receive limited liquidity support from the rest of the group, the fact that they are separate legal entities may mean they have more resilient funding profiles than branches.
Resolution	Subsidiaries, as separate legal entities, can be more easily resolved than branches.

Sources: Beck and others 2015; Berrospide and others 2016; Ervin 2018; Faykiss, Grosz, and Szigel 2013; Fiechter and others 2011; Goldberg and Gupta 2013; Hoggarth, Hooley, and Korniyenko 2013; Vinals and others 2013; discussions with market contacts; and IMF staff analysis.

Table 1.SF.2. Examples of Changes in the Regulation of Foreign Branches

	Structural Subsidiarization	Other Measures
Before 2015	<p>A series of structural measures were introduced:</p> <ul style="list-style-type: none"> • United Kingdom: Ring-fencing provisions recommended in ICB (2011) aka The Vickers Report and Liikanen and others (2012). • United States: Dodd-Frank Act and Volcker Rule (2010). <p>These measures do not explicitly restrict cross-border funding, but they are intended to insulate activities vital to the real economy from reputation- or exposure-related contagion from elsewhere in the banking group, and tend to bring foreign banks' branches further toward domestic regulatory and supervisory oversight.</p>	<p>Of 31 countries in an OECD survey,</p> <ul style="list-style-type: none"> • 22 impose local financial requirements on FBO branches. • 14 have changed regulation of FBO branch operations. • 4 effectively require local entities. • Nearly half may require systemic operations to convert to subsidiaries, depending on size, complexity, and other considerations. <p>In emerging market economies, specific requirements on branch operations exist in Indonesia, India, and Singapore.</p>
2015–Present	<p>In the United States,</p> <ul style="list-style-type: none"> • Regulation YY (implemented in 2016) requires FBOs with assets greater than \$50 billion to establish intermediate holding companies subject to capital and liquidity rules as well as stress tests. • The Intermediate Holding Company framework includes branches within the “responsible officer” governance perimeter. 	<p>The framework in the United States includes:</p> <ul style="list-style-type: none"> • A 14-day liquidity buffer for U.S. branch operations. • A 30-day liquidity buffer for the U.S. Intermediate Holding Company.
Emerging and Future	<p>New measures are emerging:</p> <ul style="list-style-type: none"> • The European Union is currently defining an Intermediate Parent Undertaking framework. • The United Kingdom is updating its approach to authorization and supervision of FBO branches, emphasizing a pragmatic balance between safety and openness. 	<p>In the United States,</p> <ul style="list-style-type: none"> • In an effort to tailor regulation, many of the FBOs are permitted to submit limited or reduced resolution plans in 2018. • In 2018, for the first time, systemic FBO branches of six non-U.S. global systemically important banks must be explicitly recognized in resolution plans. • 2018 guidance requires FBOs to conform to resolution liquidity requirements, including intragroup liquidity tracking. Intragroup liquidity transfers are permitted, but should be supported by financial and legal impact analyses. • Material branches must identify and map financial and operational interconnections that affect other group entities or the U.S. resolution strategy.

Sources: Cleary Gottlieb 2017; Financial Stability Board 2014; Gambacorta and van Rixtel 2013; Ichiue and Lambert 2016; IMF 2014; OECD 2017; Vinals and others 2013; interviews with market participants; and IMF staff.

Note: FBO = foreign bank operations; OECD = Organisation for Economic Co-operation and Development.

have therefore faced trade-offs between holding liquidity, extending credit to customers, and lending to group entities. Where liquid assets have increased significantly, branches have tended to reduce either lending (for example, Japan and Germany), gross intragroup claims, or net lending to group affiliates (for example, the United States), fragmenting intragroup activity (Figure 1.SF.3, panels 1 and 2).³

These trends—either a cutback in credit or fragmentation of intragroup activity—could continue.

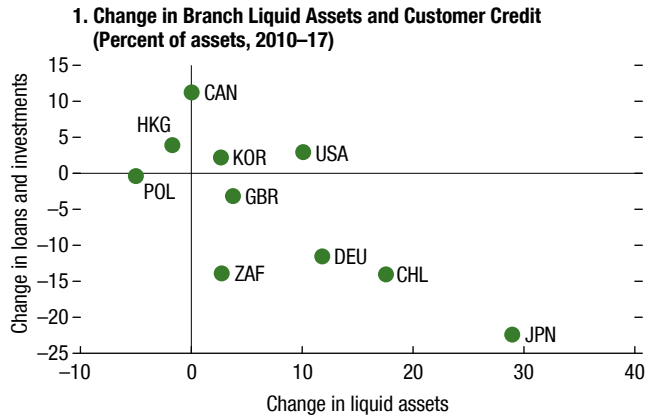
³In Turkey, branches have increased credit, but at the cost of a drop in liquid assets.

Simulations based on branch balance sheets suggest that a further increase in branch liquidity ratios is likely to result in a significant reduction of loans to customers or intragroup claims (Figure 1.SF.3, panels 3 and 4). The simulations are run by assuming an increase in holdings of liquid assets—which increases the branch's liquidity ratio—and then calculating how much loans (intragroup credit) would need to drop if intragroup credit (loans) is held constant, increases (by 10 percentage points of assets), or falls (by 10 percentage points of assets).

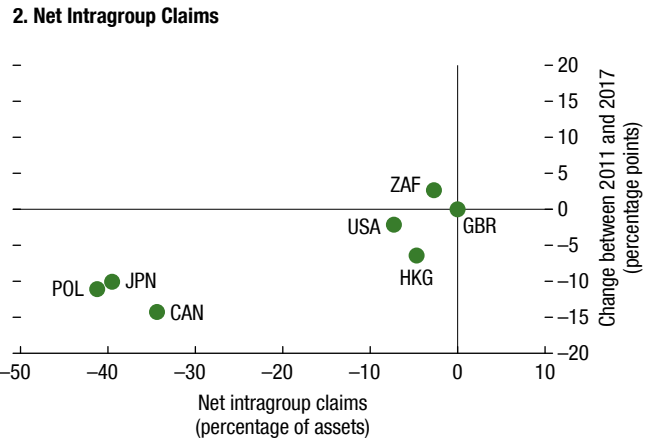
Higher branch liquidity may reflect a number of drivers. There have been commercial incentives in some countries to hold more liquid assets, such as

Figure 1.SF.3. Liquidity, Lending, and Intragroup Positions of Foreign Bank Branches

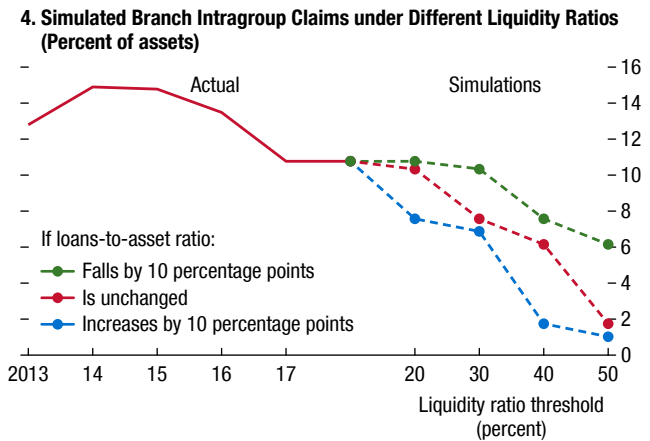
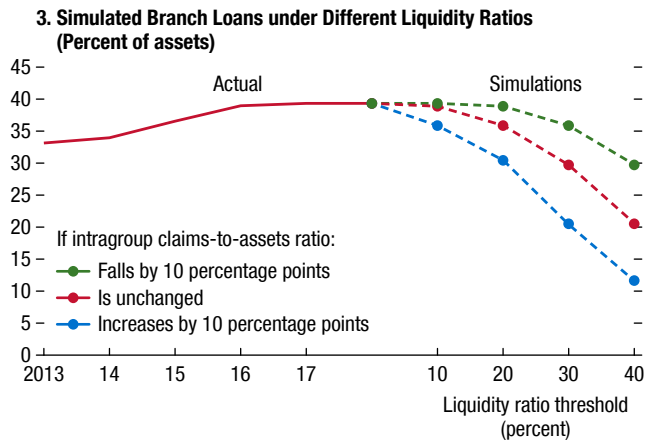
Liquid assets have risen while either credit has fallen ...



... or intragroup net claims have declined.



Further tightening of liquidity could prompt branches to continue reducing loans and intragroup lending.



Sources: Bank for International Settlements; KPMG; national regulators and supervisors; S&P Global Market Intelligence; and IMF staff analysis. Note: Data labels in the figure use International Organization for Standardization (ISO) country codes. Liquidity ratio = liquid assets divided by total assets. Liquid assets include cash, deposits with central banks, and government securities.

foreign banks seeking higher-yielding government bonds in the United States or foreign banks in Japan depositing swap proceeds. Bank liquidity positions could also reflect unconventional monetary policies, which result in the banking system in aggregate having elevated levels of reserves at central banks. Banks may also be looking to reduce liquidity risks by holding more liquid assets compared with the period before the global financial crisis. But conversations with bank treasury professionals suggest these changes also reflect host regulators' guidance and pressures.

Fragmentation of the international banking system could heighten systemic risks. Ring-fencing can help

prevent contagion from spreading within banking groups and enhances the protection of local depositors in the event of a crisis overseas. However, heightened local control also weakens the ability of foreign banks to direct liquidity into country offices experiencing stress (Cetorelli and Goldberg 2016; Reinhart and Riddiough 2014; Kerl and Niepmann 2016). If branch access to intragroup support is curtailed, the ability of foreign banks to access central bank liquidity assistance becomes more important. A study by the Bank for International Settlements (2017a) finds that eligibility of FBOs for central bank liquidity varies across jurisdictions; in several countries, subsidiaries are eligible but branches are not.

Table 1.SF.3. Policy Recommendations to Manage Risks in Banking Groups

Home-Host Collaboration	Where home-host collaboration does not currently take place, regulators should more actively coordinate. Where home-host collaboration agreements already exist, regulators should assess whether changes are needed to make them more effective. For example, BIS (2017b) reports that although there has been progress on the sharing of information, challenges remain and more work is needed to improve the flow of information.
Regulatory Coordination	Greater coordination is needed to ensure that measures adopted in individual countries do not impose significant costs on the global financial system. International standards for regulatory and supervisory regimes applied to large, internationally active banks should be consistently implemented. Subsidiarization and ring-fencing measures should be assessed to see whether they provide incentives for risk migration into the less regulated nonbank sector.
Enhanced Resolution	Harmonization of creditor hierarchies would facilitate cross-border resolution. Significant differences in creditor hierarchies between jurisdictions, particularly in the treatment of deposits, constitute a potential obstacle to cross-border resolution of branches in an international banking group. If a home country's legal regime ranks depositors lower (or deposit insurance is less) than the host country's regime, the host authorities may have an incentive to ring-fence the branch. In addition, better dissemination of information about international bank branches and their exposures—including through more regular, consistent, and comprehensive use of legal entity identifiers by all supervisors involved—can improve host country authorities' visibility into the full range of risks to which a branch in the host country is exposed.
Central Bank Liquidity Support	Host central banks may also consider providing liquidity assistance to foreign branches if they do not already do so. Home supervisors should facilitate host liquidity support by providing enhanced information about banking group conditions and risks.

Source: IMF staff.

Changes in the regulation of branch liquidity need to be managed carefully at a time when monetary policy changes are also tightening foreign currency liquidity conditions. The collision between structural and cyclical tightening could make a sudden spike in funding costs more likely. Alternatively, banking groups could respond to restrictions on branch networks by increasing their cross-border lending, which has historically been a more procyclical supply of credit than lending through branches (Correa, Goldberg, and Rice 2015). Local banks might look to fill the gap left by FBOs, but might need to finance a sharp expansion in credit with less stable short-term funding.

Finally, this regulatory tightening might result in lower provision of some services for which multina-

tional corporate clients currently have few effective substitutes. This could cause these companies to turn to nonbank substitutes whose risks are not fully understood (Beck and others 2015; Vinals and others 2013).

Policy Initiatives Could Help Manage Risks at the Local Entity and Group Level

A number of policies should be adopted to manage risks in banking groups (Table 1.SF.3). A holistic regulatory approach can help mitigate branch risks and reduce the need for ring-fencing measures. This should involve better home-host collaboration, regulatory coordination, enhanced resolution, and central bank liquidity support.

References

- Adrian, Tobias, Richard Crump, and Emanuel Moench. 2013. “Pricing the Term Structure with Linear Regressions.” Federal Reserve Bank of New York Staff Report 340, New York.
- Ahuja, Ashvin, Kevin Wiseman, and Murtaza H. Syed. 2017. “Assessing Country Risk: Selected Approaches.” IMF Technical Notes and Manuals 17/08, International Monetary Fund, Washington, DC.
- Ait-Sahalia, Yacine, and Jean Jacod. 2012. “Analyzing the Spectrum of Asset Returns: Jump and Volatility Components in High Frequency Data.” *Journal of Economic Literature* 50 (4): 1007–50.
- Andersen, Torben G., Tim Bollerslev, and Francis X. Diebold. 2006. “Roughing It Up: Including Jump Components in the Measurement, Modeling, and Forecasting of Return Volatility.” *The Review of Economics and Statistics* 89 (4): 701–20.
- Aquilina, Matteo, Brian Eyles, Jia Shao, and Carla Ysusi. 2018. “How Do Participants Behave during Flash Events? Evidence from the UK Equity Market.” Financial Conduct Authority Research Note, London.
- Arslanalp, Serkan, and Takahiro Tsuda. 2014. “Tracking Global Demand for Emerging Market Sovereign Debt.” IMF Working Paper 14/39, International Monetary Fund, Washington, DC.
- Bank of England. 2018. *Financial Stability Report*. Issue 42. London: Bank of England.
- Bank for International Settlements (BIS). 2017a. “Designing Frameworks for Central Bank Liquidity Assistance: Addressing New Challenges.” Committee on the Global Financial System Paper 58, Basel.
- . 2017b. “Fixed Income Market Liquidity.” Committee on the Global Financial System Paper 55, Basel.
- . 2017c. “Progress Report on the Implementation of Principles for Effective Supervisory Colleges.” Basel Committee on Banking Supervision, Basel.
- . 2017d. “Repo Market Functioning.” Committee on the Global Financial System Paper 59, Basel.
- Beck, Roland, John Beime, Francesco Patermo, Jolana Peeters, Julio Ramos-Tallada, Cyril Rebillard, Dennis Reinhardt, Lisa Weissenseel, and Julia Worz. 2015. “The Side Effects of National Financial Sector Policies: Framing the Debate on Financial Protectionism.” ECB Occasional Paper 166, European Central Bank, Frankfurt.
- Berrospeide, Jose, Ricardo Correa, Linda Goldberg, and Friederike Niepmann. 2016. “International Banking and Cross-Border Effects of Regulation: Lessons from the United States.” Federal Reserve Bank of New York Staff Report 793, New York.
- Cetorelli, Nicola, and Linda Goldberg. 2016. “Organizational Complexity and Balance Sheet Management in Global Banks.” Working Paper 22169, National Bureau of Economic Research, Cambridge, MA.
- Cleary Gottlieb Steen & Hamilton LLP. 2017. “New Resolution Plan Guidance for 2018 Plans for Largest Foreign Banks & Feedback for December 2017 Plans for 16 Domestic Banks.” Alert Memorandum, March 27.
- Committee on the Global Financial System (CGFS). 2010. “Funding Patterns and Liquidity Management of Internationally Active Banks.” CGFS Paper 39, Basel.
- Commodity Futures Trading Commission (CFTC). 2018. “Sharp Price Movements in Commodity Futures Markets.” CFTC Staff Report. June.
- . 2012. “Banking Globalization and Monetary Transmission.” *Journal of Finance* 67 (5): 1811–43.
- Correa, Ricardo, Linda Goldberg, and Tara Rice. 2015. “International Banking and Liquidity Risk Transmission: Evidence from the United States.” *IMF Economic Review* 63 (3): 626–43.
- Diebold, Francis, and Kamil Yilmaz. 2009. “Measuring Financial Asset Return and Volatility Spillovers, with Application to Global Equity Markets.” *Economic Journal* 119 (534): 158–71.
- . 2012. “Better to Give Than to Receive: Predictive Directional Measurement of Volatility Spillovers.” *International Journal of Forecasting* 28: 57–66.
- Durham, J. Benson. 2013. “Which Component of Treasury Yields Belongs in Equity Valuation Models?” *The Journal of Portfolio Management* 39 (4): 80–90.
- Ervin, Wilson. 2018. “Understanding ‘Ring-Fencing’ and How It Could Make Banking Riskier.” Brookings Institution, Washington, DC. <https://www.brookings.edu/research/understanding-ring-fencing-and-how-it-could-make-banking-riskier/>.
- European Commission. 2018. “Notice to Stakeholders: Withdrawal of the United Kingdom and EU Rules in the Field of Post-Trade Financial Services.” Brussels.
- Faykiss, Peter, Gabriella Grosz, and Gabor Szigel. 2013. “Transforming Subsidiaries into Branches—Should We Be Worrying about It?” MNB Occasional Papers 106, Central Bank of Hungary, Budapest.
- Fiechter, Jonathan, Inci Otker-Robe, Anna Ilyina, Michael Hsu, Andre Santos, and Jay Surti. 2011. “Subsidiaries or Branches: Does One Size Fit All?” IMF Staff Discussion Note, International Monetary Fund, Washington, DC.
- Financial Stability Board. 2014. “Structural Banking Reforms: Cross-Border Consistencies and Global Financial Stability Implications.” Basel.
- . 2018. “FSB Correspondent Banking Data Report—Update.” Basel.
- Gambacorta, Leonardo, and Adrian van Rixel. 2013. “Structural Bank Regulation Initiatives: Approaches and Implications.” BIS Working Paper 412, Bank for International Settlements, Basel.
- Glosten, Lawrence R., Ravi Jagannathan, and David E. Runkle. 1993. “Relationship between the Expected Value and Volatility of the Nominal Excess Returns on Stocks.” *Journal of Finance* 48: 1779–801.
- Goldberg, Linda, and Arun Gupta. 2013. “Ring-Fencing and ‘Financial Protectionism’ in International Banking.” *Liberty Street Economics* blog, January 9. Federal Reserve Bank of New York. <http://libertystreeteconomics.newyorkfed>

- .org/2013/01/ring-fencing-and-financial-protectionism-in-international-banking.html.
- Hoggarth, Glenn, John Hooley, and Yevgeniya Korniyenko. 2013. "Which Way Do Foreign Branches Sway? Evidence from the Recent UK Domestic Credit Cycle." BOE Financial Stability Paper 22, Bank of England, London.
- Huang, Xin, and George Tauchen. 2005. "The Relative Contribution of Jumps to Total Price Variance." *Journal of Financial Econometrics* 3 (4): 456–99.
- Ichiue, Hibiki, and Frederic Lambert. 2016. "Post-Crisis International Banking: An Analysis with New Regulatory Survey Data." IMF Working Paper 16/88, International Monetary Fund, Washington, DC.
- Independent Commission on Banking (ICB). 2011. "Final Report: Recommendations." September.
- International Monetary Fund (IMF). 2012. "The Liberalization and Management of Capital Flows: An Institutional View." IMF Policy Paper, Washington, DC.
- . 2014. "Cross-Border Bank Resolution: Recent Developments." IMF Policy Paper, Washington, DC.
- . 2015a. "Assessing Reserve Adequacy—Specific Proposals." IMF Policy Paper, Washington, DC.
- . 2015b. "Managing Capital Outflows: Further Operational Considerations." IMF Policy Paper, Washington, DC.
- . 2015c. "Rethinking Financial Deepening: Stability and Growth in Emerging Markets." IMF Staff Discussion Note 15/80, Washington, DC.
- . 2016a. "Capital Flows—Review of Experience with the Institutional View." IMF Policy Paper, Washington, DC.
- . 2016b. "Ireland: Financial System Stability Assessment." IMF Country Report 16/258, Washington, DC.
- . 2016c. "Mexico: Financial System Stability Assessment." IMF Country Report 16/361, Washington, DC.
- . 2017a. "Japan: Financial System Stability Assessment." IMF Country Report 17/244, Washington, DC.
- . 2017b. "Luxembourg: Financial System Stability Assessment." IMF Country Report 17/122, Washington, DC.
- . 2017c. "People's Republic of China: Financial System Stability Assessment." IMF Country Report 17/358, Washington, DC.
- . 2017d. "Recent Trends in Correspondent Banking Relationships—Further Considerations." IMF Policy Paper, Washington, DC.
- . 2018a. "Euro Area Policies: Financial System Stability Assessment." IMF Country Report 18/226, Washington, DC.
- . 2018b. *External Sector Report: Tackling Global Imbalances amid Rising Trade Tensions*. Washington, DC: World Bank.
- . 2018c. "France: Selected Issues." IMF Country Report 18/244, Washington, DC.
- . 2018d. "The IMF's Annual Macprudential Policy Survey—Objectives, Design, and Country Responses." IMF Policy Paper, Washington, DC.
- . 2018e. "Romania: Financial Sector Assessment Program." IMF Country Report 18/160, Washington, DC.
- . 2018f. "Turkey: 2018 Article IV Consultation—Press Release; Staff Report; and Statement by the Executive Director for Turkey." Washington, DC.
- . 2018g. "United States 2018 Article IV Consultation." IMF Country Report 18/207. Washington, DC.
- International Monetary Fund (IMF) and World Bank. 2016. "Development of Local Currency Bond Markets: Overview of Recent Developments and Key Themes." Staff Note for the G20 International Financial Architecture Working Group, Washington, DC.
- International Swaps and Derivatives Association. 2017. "Brexit and Contractual Certainty." New York. <https://www.isda.org/2017/10/09/brexit-and-contractual-certainty/>.
- Kerl, Cornelia, and Friedericke Niepmann. 2016. "What Determines the Composition of International Bank Flows?" International Finance Discussion Paper 1170. Board of Governors of the Federal Reserve System, Washington, DC.
- Liikanen, Eriikki, Hugo Banziger, Jose Manuel Campa, Louis Gallois, Monique Goyens, Jan Pieter Krahn, Marco Mazzucchelli, Carol Sergeant, Zdenek Tuma, Jan Vanhevel, Herman Wijffels. October 2, 2012. "High-Level Group Reforming the Structure of the EU Banking Sector." EU, Brussels, Belgium.
- Lu, Yinqiu, and Dmitry Yakovlev. 2018. "Instruments, Investor Base, and Recent Developments in the Malaysian Government Bond Market." IMF Working Paper No. 18/95, International Monetary Fund, Washington, DC.
- McCauley, Robert, Patrick McGuire, and Goetz von Peter. 2010. "The Architecture of Global Banking: From International to Multinational." *BIS Quarterly Review*. March.
- Moody's. 2018. "North American Loan Covenant Quality Indicator: Protections Hit Weakest Level on Record as Conditions Continue to Favor Borrowers." Moody's, New York.
- Nedeljkovic, Milan, and Christian Saborowski. 2017. "The Relative Effectiveness of Spot and Derivatives Based Intervention: The Case of Brazil." IMF Working Paper 17/11, International Monetary Fund, Washington, DC.
- Organisation for Economic Co-operation and Development (OECD). 2017. "The Conditions for Establishment of Subsidiaries and Branches in the Provision of Banking Services by Non-Resident Institutions." January, OECD, Paris.
- Reinhardt, Dennis, and Steven J. Riddiough. 2014. "The Two Faces of Cross-Border Banking Flows." BOE Working Paper 498. Bank of England, London.
- Verdelhan, Adrien. 2018. "The Share of Systematic Variation in Bilateral Exchange Rates." *Journal of Finance* 73: 375–418.
- Vinals, Jose, Ceyla Pazarbasioglu, Jay Surti, Aditya Narain, Michaela Erbenova, and Julian Chow. 2013. "Creating a Safer Financial System: Will the Volcker, Vickers and Liikanen Structural Measures Help?" IMF Staff Discussion Note 13/4, International Monetary Fund, Washington, DC.

