

Global Financial Stability Assessment

Financial conditions have tightened since the October 2018 Global Financial Stability Report (GFSR), but remain relatively accommodative, notably in the United States.¹ After sharp declines in the fourth quarter of 2018, financial markets rebounded in early 2019. This turnaround in market sentiment has been supported by the Federal Reserve's more patient approach to monetary policy normalization. Given buoyant market sentiment, financial vulnerabilities—such as high leverage and liquidity, maturity, and currency mismatches—may continue to build, raising medium-term risks to global financial stability. Vulnerabilities in sovereign, corporate, and nonbank financial sectors are already elevated by historical standards in several systemically important countries that account for a significant share of the global economy. A sudden sharp tightening in financial conditions—triggered by investors' reassessment of the outlook for monetary policy in major advanced economies, a sharper-than-expected growth slowdown, protracted trade tensions, or a no-deal Brexit—could expose these vulnerabilities and raise near-term financial stability risks.

Markets Rally as the Cycle Matures

Since the October 2018 GFSR, near-term risks to global financial stability have risen, on balance, although they remain moderate by historical standards. The global economic expansion has weakened and risks to global growth have shifted to the downside (see the April 2019 *World Economic Outlook* [WEO]). Late last year, investors became increasingly concerned about

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¹This GFSR reflects information available as of March 21, 2019, unless otherwise noted.

weakening global economic activity and a deteriorating outlook for corporate earnings, against a backdrop of lingering trade tensions and policy uncertainty. Market anxiety about the pace of monetary policy normalization in the United States, including worries that higher interest rates would further squeeze corporate profit margins, contributed to selling pressures. As a result, risk sentiment soured, and most major asset markets sold off in late 2018, except for safe haven assets (Figure 1.1, panel 1). In some markets, price declines were exacerbated by poor market liquidity, but generally, prices appeared to have been driven mostly by fundamental factors (see Special Feature).

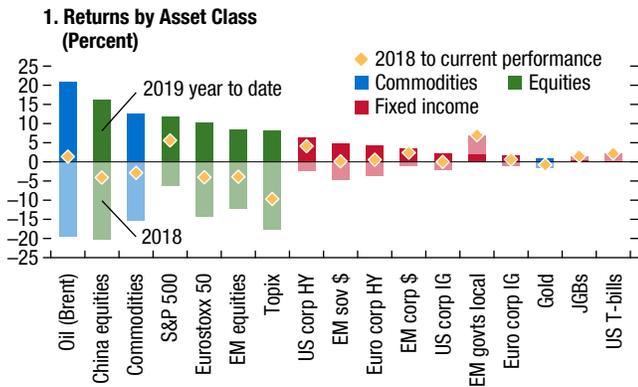
Global markets rebounded in early 2019, despite a continued deterioration in earnings expectations (Figure 1.1, panel 2). Shifting perceptions about monetary policy normalization and renewed optimism about trade negotiations between the United States and China sparked a rally in risk assets. As a result, global equities recouped most of their 2018 losses and credit spreads tightened significantly. Despite the risk-on sentiment, some investors worry that the long-lasting credit cycle may be reaching its late stage in the United States and possibly in other advanced economies (see “Late-Cycle Corporate Sector Risks in Advanced Economies” section). In the euro area, fiscal challenges in Italy have rekindled concerns about the sovereign–financial nexus (see “The Euro Area Sovereign–Financial Sector Nexus” section), while fears of a no-deal Brexit continue to weigh on UK financial assets. Emerging markets have been relatively resilient during the late 2018 sell-off, and aggregate portfolio flows have been supported by a subsequent turnaround in global risk sentiment (see “Vulnerabilities in China, Emerging Markets, and Frontier Economies” section).

Despite Tightening Late Last Year, Global Financial Conditions Remain Relatively Accommodative, though with Some Variation across Regions

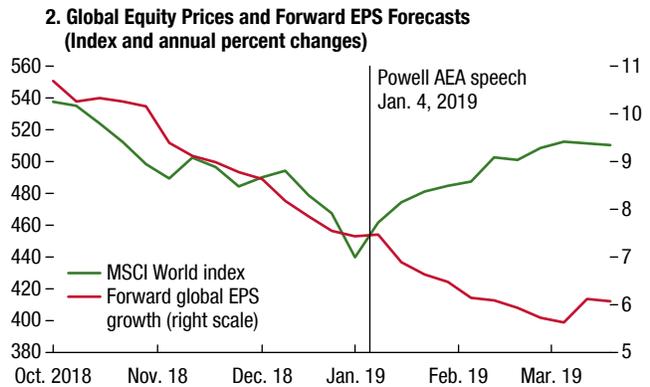
On balance, financial conditions have tightened somewhat since the October 2018 GFSR in major advanced and emerging market economies:

Figure 1.1. Global Market Developments

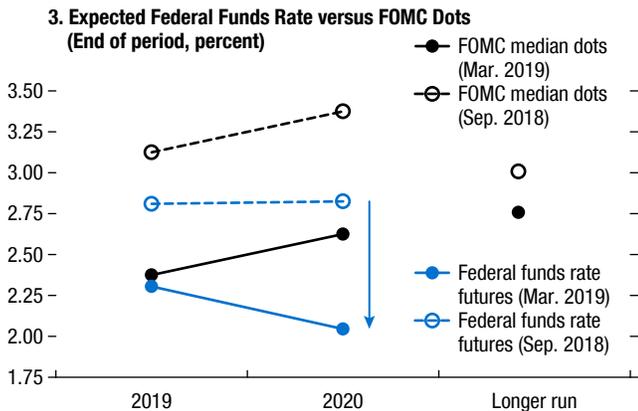
After posting negative returns in 2018, asset prices rebounded this year ...



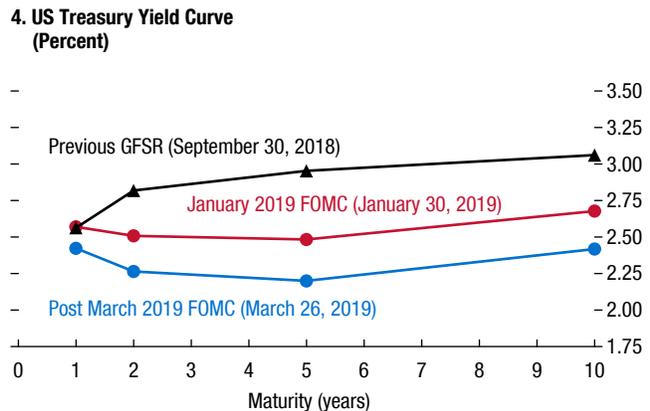
... despite continued downward revisions in corporate earnings forecasts.



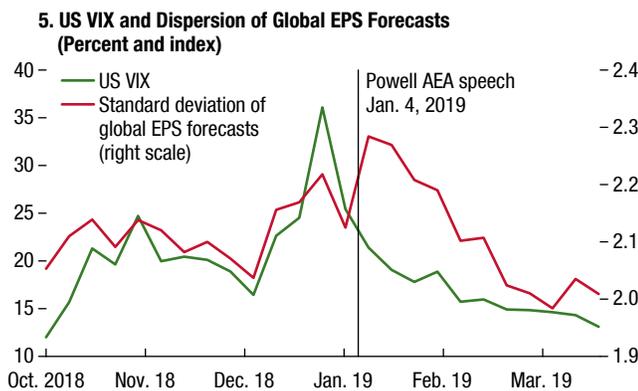
After the dovish shift in US monetary policy, markets do not expect any further rate hikes ...



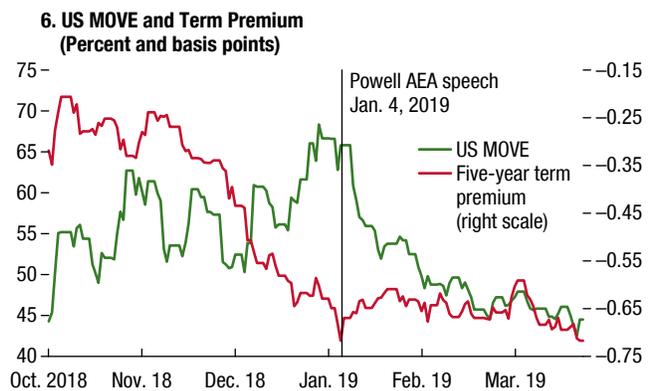
... and yields are expected to stay low for longer.



This has resulted in reduced market volatility and uncertainty around earnings forecasts ...



... as well as reduced interest rate volatility and a compressed term premium.

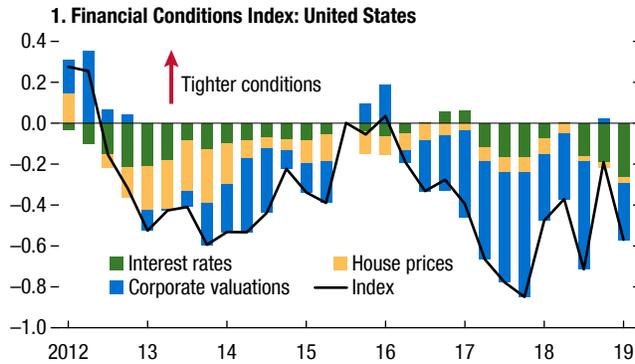


Sources: Bloomberg Finance L.P.; ICE Data Indices, LLC; Moody's; MSCI; Standard & Poor's Leveraged Commentary and Data; Thomson Reuters Datastream; Thomson Reuters I/B/E/S; and IMF staff calculations.

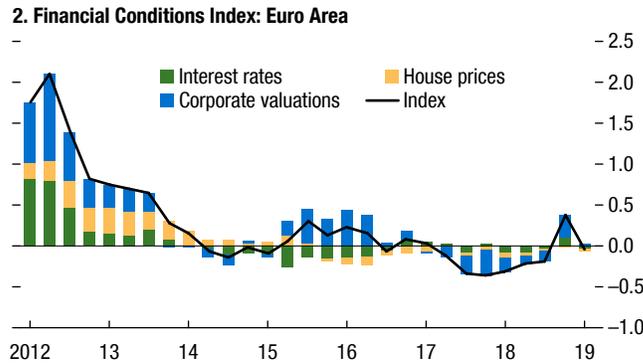
Note: In panel 3, the downward slope of the federal funds rate futures may in part reflect a negative term premium. AEA = American Economic Association; corp = corporate; EM = emerging market; EPS = earnings per share; FOMC = Federal Open Market Committee; GFSR = *Global Financial Stability Report*; govts = governments; HY = high yield; IG = investment grade; JGB = Japanese government bond; MOVE = Merrill Option Volatility Estimate; sov = sovereign; T-bills = Treasury bills; VIX = Chicago Board Options Exchange Volatility Index.

Figure 1.2. Global Financial Conditions
(Z-scores, 1996–2019)

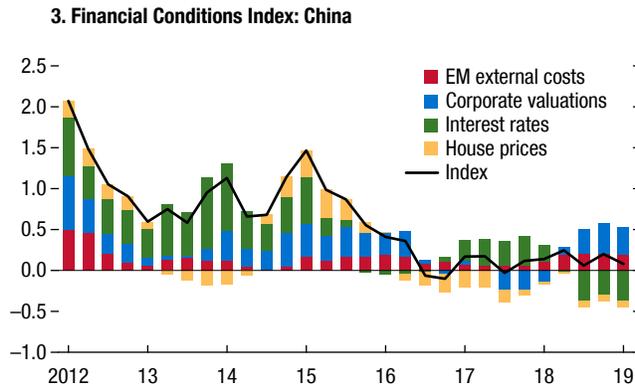
US financial conditions have tightened, on net, but remain accommodative.



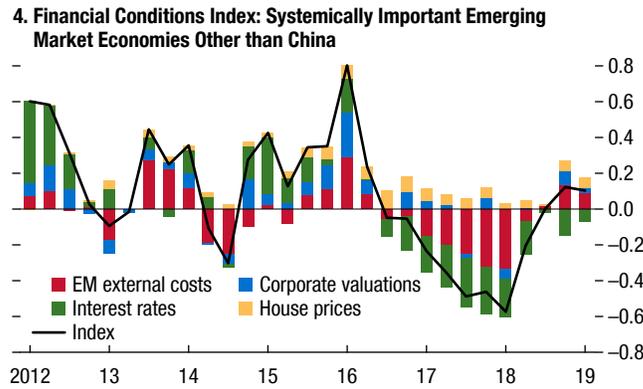
The early-2019 rebound in markets helped attenuate the tightening in financial conditions in the euro area.



In China, financial conditions remain broadly stable as market pressures have been offset by policy easing.



Financial conditions in other emerging markets have been stable in early 2019, after tightening significantly in 2018 due to higher external borrowing costs.



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; IMF, International Financial Statistics database; and IMF staff calculations. Note: The z-score indicates an observation's distance from the population mean in units of standard deviation. EM = emerging market.

- In the *United States*, the Federal Reserve indicated early this year that it would be more flexible and patient as it determines the appropriate path of monetary policy. In addition, at the March Federal Open Market Committee (FOMC) meeting, it announced that the current runoff of the balance sheet will end in September 2019. These communications led to a reassessment of the outlook for monetary policy normalization by market participants. The policy rate path shifted lower, with investors no longer anticipating any policy rate hikes in 2019–20 (Figure 1.1, panel 3), and the Treasury yield curve moved down sharply (Figure 1.1, panel 4).² These moves, together

²The Federal Funds futures rate would need to be adjusted for term premiums to provide a more accurate reading of the market expectations of the future policy rate path.

with a rebound in corporate valuations, contributed to an easing of financial conditions (Figure 1.2, panel 1). The dovish shift in US monetary policy reduced perceptions of downside risk and supported positive risk sentiment in equity markets, as reflected in declining market implied volatility (VIX) and earnings uncertainty (Figure 1.1, panel 5). In the Treasury markets, market implied volatility (MOVE) and the term premium—the premium demanded by investors for holding long-term government bonds relative to the risk-free short-term interest rate—dropped to historically low levels (Figure 1.1, panel 6).

- In the *euro area*, the rebound in financial markets early this year helped attenuate the tightening in financial conditions in late 2018 (Figure 1.2, panel 2). The European Central Bank (ECB) ended its net

purchases under its bond purchase program at the end of 2018 and reaffirmed its intention to leave policy rates unchanged at least through 2019, with investors not expecting any policy rate hikes before the end of 2020. A new series of targeted longer-term refinancing operations has been announced to help preserve favorable bank lending conditions and the smooth transmission of monetary policy.

- In *China*, financial regulatory tightening, deleveraging efforts, and concerns about trade tensions and growth reduced corporate valuations in 2018 (Figure 1.2, panel 3). In response, the Chinese authorities cut reserve requirements for banks and took other steps to ease credit conditions.³ These measures have helped lower interbank spreads, but some firms continue to face funding challenges (see “Vulnerabilities in China, Emerging Markets, and Frontier Economies” section). Chinese equities rallied early this year in response to more positive trade rhetoric and supportive policy measures. As a result, the overall financial conditions—as measured by market prices—remained broadly stable over the past six months.⁴
- In *systemically important emerging markets other than China*, aggregate financial conditions have remained stable and close to neutral levels in the first quarter of 2019 after significantly tightening in 2018 on higher external borrowing costs (Figure 1.2, panel 4). Although some country-specific concerns have re-emerged recently, overall investor sentiment has been supportive so far this year (see “Vulnerabilities in China, Emerging Markets, and Frontier Economies” section).

Medium-Term Financial Stability Risks Remain Elevated and Could Build Further

The tightening in global financial conditions has led to somewhat higher near-term risks to global

³The steps include central bank funding and regulatory incentives for banks that meet lending targets to private firms and small and medium-sized enterprises; an increase in the relending and rediscount quota for small and medium-sized enterprise financing; support for private enterprise bond issuance; relaxed margin financing rules; and softening of asset management rules.

⁴The financial conditions indices in this report include only price-of-risk measures and may not reflect policies affecting the quantity of credit (as, for example, in the case of China). See Online Annex 1.1 in the October 2018 GFSR at www.imf.org/en/Publications/GFSR.

growth and financial stability (Figure 1.3, panel 1). The impact of the net tightening in global financial conditions on the estimated probability distribution of future economic growth outcomes is assessed using the growth-at-risk (GaR) framework (see October 2017 GFSR). The range of outcomes associated with the severely adverse scenario (5th percentile of the distribution) shifted toward lower growth rates (Figure 1.3, panel 2). Despite the recent recovery in financial markets, the net increase in downside risks to growth over the near term remains statistically significant (Figure 1.3, panel 3), though these risks are moderate by historical standards (Figure 1.3, panel 4).

With global financial conditions still accommodative notwithstanding their tightening, financial vulnerabilities will likely continue to build. The recent tightening in financial conditions was too short-lived to cause a meaningful reduction in the buildup in vulnerabilities, leaving medium-term risks to financial stability broadly unchanged. Medium-term risks continue to be elevated (Figure 1.3, panel 5), suggesting that a prolonged period of easy conditions could set the stage for a more severe downturn later.

Global Financial Vulnerabilities Remain Elevated

Vulnerabilities in the sovereign, corporate, and nonbank financial sectors are elevated by historical standards in several systemically important countries and regions that account for a significant share of the global economy. Vulnerabilities arise from leverage, liquidity, maturity, and currency mismatches on the balance sheets of sovereigns, firms, households, banks, insurance companies, and other financial institutions (see Online Annex 1.1).⁵ Because these vulnerabilities tend to amplify and propagate the effects of adverse shocks, they may increase financial stability risks. Figure 1.4 highlights balance sheet vulnerabilities in these six sectors in the United States, the euro area, China, and other systemically important advanced and emerging market economies. Panel 1 shows the proportion of systemically important countries with elevated (high and medium-high) vulnerabilities weighted by their size (GDP or assets). Vulnerabilities in the corporate sector are elevated in systemically important countries accounting for about 70 percent of total GDP. Panel 2 shows the distribution of vulnerabilities across sectors

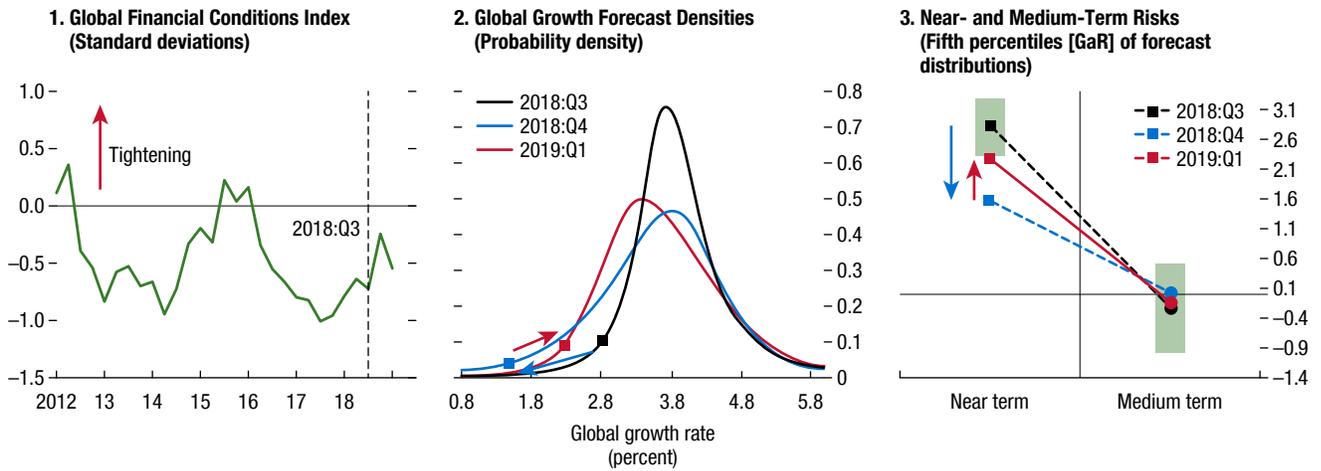
⁵See Online Annex 1.1 in the April 2019 GFSR for more details.

Figure 1.3. Growth-at-Risk Estimates

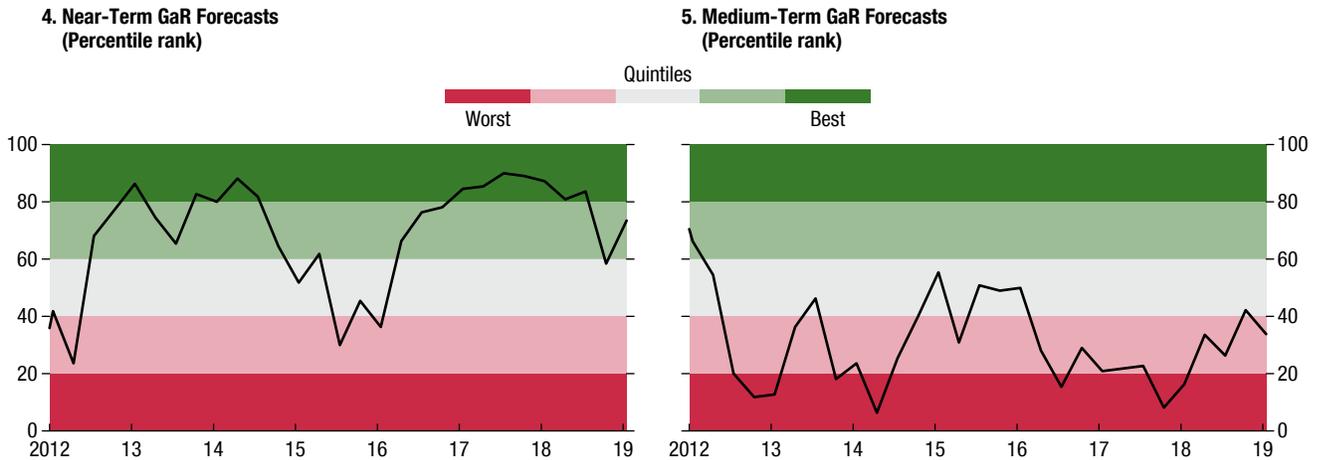
Global financial conditions have tightened since the last GFSR.

Near-term downside risks have increased on net, despite market gyrations ...

... while medium-term risks remain elevated.



The near-term GaR forecast signals deterioration from a recent historically benign peak, whereas the medium-term GaR forecast remains close to historically high risk levels.



Source: IMF staff calculations.

Note: In panel 1, upward movement reflects tightening of financial conditions. The final observation corresponds to 2019:Q1. In panel 2, forecast density estimates are centered around the respective *World Economic Outlook* forecasts. 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:Q3 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 growth forecast densities. See the April 2018 *Global Financial Stability Report* for details. GaR = growth-at-risk; GFSR = *Global Financial Stability Report*.

and regions.⁶ Selected key regional vulnerabilities are highlighted in Figure 1.5 and discussed next:

- In the *United States*, procyclical fiscal policy has led to further deterioration of public debt dynamics (Figure 1.5, panel 1; see also the April 2019 WEO).

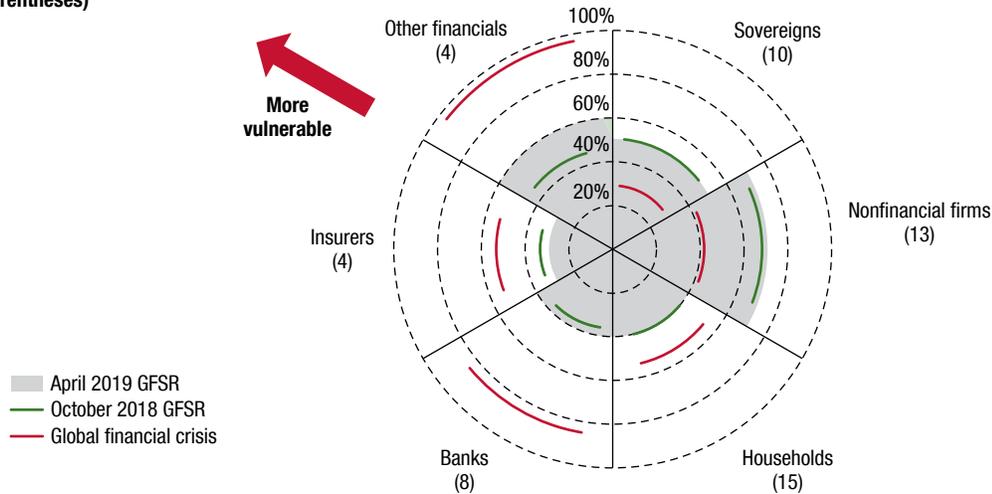
⁶Each sector in a country is compared with the same sector across a sample of 29 systemically important jurisdictions from 2000 to 2018 (latest observation). Advanced and emerging market economies are pooled separately.

Meanwhile, vulnerabilities continue to build in the corporate sector and among nonbank financial intermediaries. The corporate debt-to-GDP ratio is at a historically high level, though still lower than in some other countries (Figure 1.5, panel 2). Although the debt-service capacity of US firms has improved since the global financial crisis, this could change quickly if economic growth slows significantly or financial conditions tighten sharply (see “Late-Cycle

Figure 1.4. Global Financial Vulnerabilities

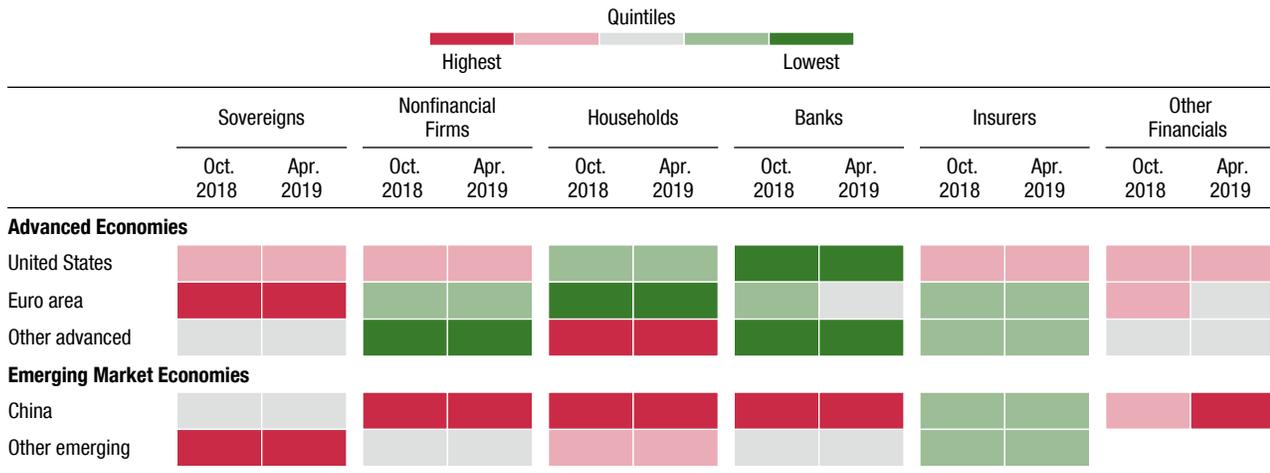
Sovereign and corporate sector vulnerabilities have increased since the global financial crisis, while vulnerabilities remain elevated in other financial sectors.

1. Proportion of GDP of Systemically Important Countries with Elevated Vulnerabilities, by Sector
(Percentage of countries in sample with high and medium-high vulnerabilities by GDP [assets for banks]; number of vulnerable countries in parentheses)



Sovereign vulnerabilities are elevated in many countries, and in China vulnerabilities are elevated in a number of sectors.

2. Financial Vulnerabilities by Sector and Region



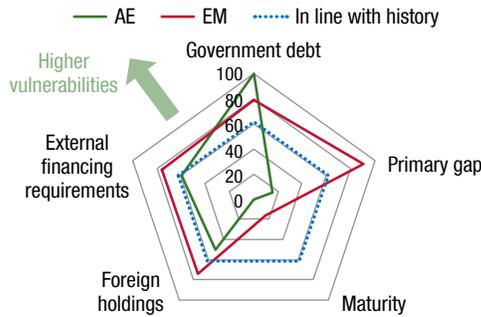
Sources: Bank for International Settlements; Bank of Japan; Bloomberg Finance L.P.; China Insurance Regulatory Commission; European Central Bank; Haver Analytics; IMF, Financial Soundness Indicators database; S&P Global Market Intelligence; S&P Leveraged Commentary and Data; WIND Information Co.; and IMF staff calculations.

Note: In panel 1, the global financial crisis reflects the maximum vulnerability value from 2007 to 2008. In panel 2, red shading indicates a value in the top 20 percent of pooled samples of advanced and emerging market economies for each sector from 2000 through 2018 (or longest sample available), and dark green shading indicates values in the bottom 20 percent. In panels 1 and 2, for households, the debt service ratio in emerging market economies is based on all private nonfinancial firms. Other systemically important advanced economies comprise Australia, Canada, Denmark, Hong Kong SAR, Japan, Korea, Norway, Singapore, Sweden, Switzerland, and the United Kingdom. Other systemically important emerging market economies comprise Brazil, India, Mexico, Poland, Russia, and Turkey. GFSR = Global Financial Stability Report.

Figure 1.5. Balance Sheet Vulnerabilities

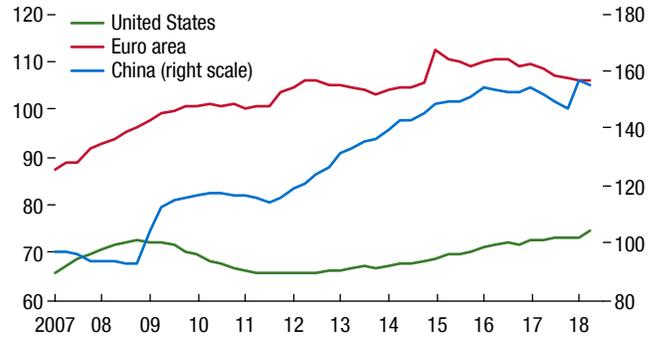
Sovereign vulnerabilities are elevated in both advanced and emerging market economies.

1. Sovereigns: Vulnerability Indicators for Advanced and Emerging Market Economies (Z-scores)



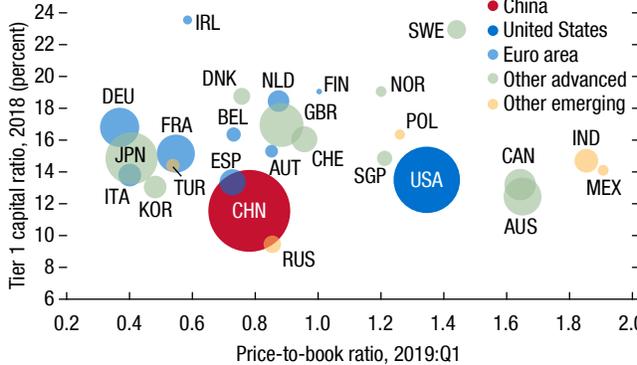
Corporate debt has expanded faster than GDP in several systemically important economies.

2. Nonfinancial Firms: Debt to GDP, by Region (Percent)



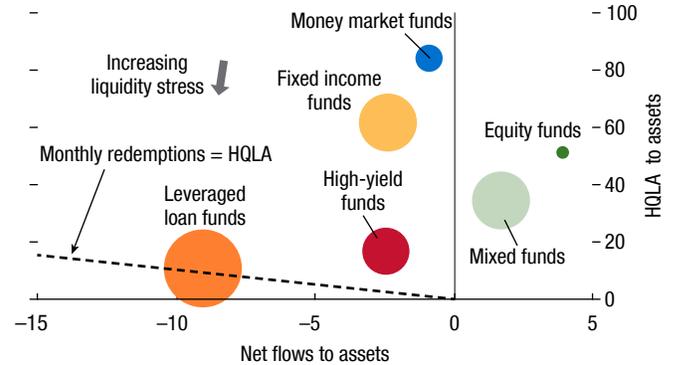
Some banking systems need to continue strengthening their balance sheets.

3. Banks: Capitalization and Market Valuation (Percent of risk-weighted assets; ratio)



Investment funds invested in less liquid assets have experienced higher redemptions during recent stress.

4. Redemptions versus High-Quality Liquid Assets, December 2018 (Percent)



Sources: Bank for International Settlements; Bloomberg Finance L.P.; Haver Analytics; IMF, Financial Soundness Indicators database; Moody's; Standard & Poor's Global Market Intelligence; Arslanalp and Tsuda (2014); Standard & Poor's Leveraged Commentary and Data; and IMF staff calculations.

Note: Panel 1 plots rescaled average z-scores for each of the parameters for 29 systemic countries over 2000 to 2018 calculated within AEs and EMs separately. For more details, see Online Technical Annex 1.1. Primary gap refers to the difference between government revenue and expenditure excluding interest payments and is measured as a percentage of GDP, as are government debt and external financing requirements. Foreign holdings are measured as a percentage of total government debt and maturity is measured as the average remaining number of years until maturity of government debt. In panel 3, the price-to-book ratio is the average for banks headquartered in each country and the size of circles is proportional to bank assets in US dollars. Data labels use International Organization for Standardization (ISO) codes. In panel 4, HQLA measures are assuming that 50 percent of equities, 67.5 percent of corporate IG bonds, and 93 percent of sovereign bonds are liquid assets. Securitized assets were split into IG and non-IG debt. The assigned values are based on Basel III liquidity coverage ratio principles. Bubble sizes indicate the degree of dispersion of observations and relate to one half of the geometric distances between sector averages and most distant observations among those with extreme values for net flows and liquidity within respective sector samples. Sample includes the 50 largest global funds within each fund category reported in Bloomberg. Average HQLA and net flows are computed on asset-weighted base. AE = advanced economy; EM = emerging market; HQLA = high-quality liquid assets; IG = investment grade.

Corporate Sector Risks in Advanced Economies⁷ section). In the nonbank financial sector, funds invested in less liquid assets have experienced larger redemptions during the recent market turbulence (Figure 1.5, panel 4).

- In the *euro area*, vulnerabilities are most pronounced in the sovereign sector, with government debt elevated or still growing in some countries (such as Italy). Although corporate sector vulnerabilities

in the euro area do not appear elevated on aggregate, corporate debt has increased significantly in a number of countries in recent years (for example, France). In some countries, corporate vulnerabilities are elevated because of lingering weaknesses among small and medium-sized enterprises. In the banking sector, sharp declines in equity valuations owing to growth concerns and continued structural challenges pose risks for some banks (Figure 1.5, panel 3) (see

“The Euro Area Sovereign–Financial Sector Nexus” section). In investment funds, liquidity and maturity mismatches have been rising since the global financial crisis. Although in aggregate the euro area insurance sector shows moderate vulnerabilities, there are concerns in some jurisdictions (see “The Euro Area Sovereign–Financial Sector Nexus” section).

- In *other advanced economies*, household leverage remains a key concern, with the ratio of household debt to GDP elevated and rising in a number of countries. Government debt remains elevated across most countries. Bank vulnerabilities are generally low in this group of countries, though there are some banking systems with high structural maturity and liquidity mismatches. In Japan, the low profitability of banks remains an ongoing concern, as does elevated risk taking by nonbank financial intermediaries.
- In *China*, nonfinancial and financial sector vulnerabilities remain elevated notwithstanding the authorities’ efforts to reduce them (Figure 1.4).⁷ Financial regulatory tightening has led to a contraction of investment vehicles’ assets, but leverage in the broker-dealer sector has risen. Liquidity and maturity mismatches in the investment vehicle sector have widened, and borrowing by these vehicles has increased. Vulnerabilities in the banking sector also remain a concern, especially given bank exposures to leveraged borrowers, with small and medium-sized banks particularly in need of balance sheet strengthening. These vulnerabilities compound the authorities’ challenge of responding to external shocks while containing the buildup of financial imbalances (see “Vulnerabilities in China, Emerging Markets, and Frontier Economies” section).
- In *other major emerging market economies*, weaker fiscal balances have been partially mitigated by reduced rollover risk as fiscal authorities have used the low-interest-rate environment to extend the maturity profile of debt. For banks, the picture is more mixed, with strains more pronounced in some emerging market economies.

⁷See IMF (2017) for a comprehensive assessment of China’s financial system.

Asset Valuations Have Declined since the October 2018 GFSR, but Remain Somewhat Stretched

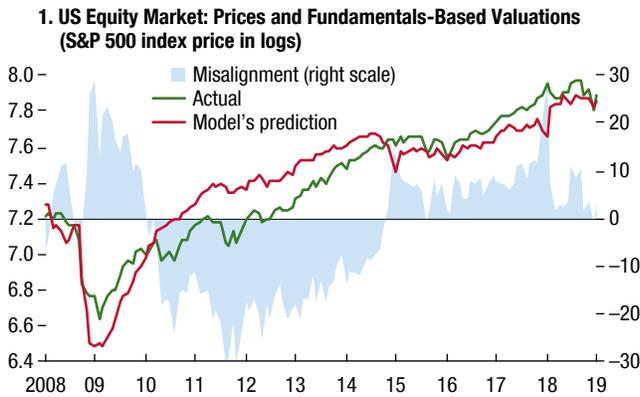
Despite market gyrations, asset valuations in some key markets currently appear to exceed the levels justified by fundamentals:

- *Price misalignments have narrowed in most major equity markets since the October 2018 GFSR.* In the United States, price declines in late 2018 helped reduce the extent of overvaluation (Figure 1.6, panel 1). Since then the recovery in equity prices has been accompanied by a reduction in earnings uncertainty (Figure 1.6, panel 2). Equity valuations in most major markets seem close to fair values (Figure 1.6, panel 3).⁸
- *On net, credit spreads have widened since the October 2018 GFSR, mostly as a result of higher credit risk premiums*—reflecting the compensation for liquidity and market risk over and above compensation for default risk (Figure 1.6, panel 4). Thus, although valuations have come down, they remain moderately elevated in US investment-grade, US high-yield, and emerging market corporate bonds. The compensation for default risk remains low reflecting low defaults and a still strong economic environment (see “Late-Cycle Corporate Sector Risks in Advanced Economies” section).
- *Term premiums are historically low but mostly fairly priced* (Figure 1.6, panel 5). Such levels typically reflect, among other things, expectations for low and stable inflation. As countercyclical variables, term premiums have historically been very low or negative ahead of economic downturns (Adrian and others 2014). However, this time the signal provided by the term premiums may be more muted due to unconventional monetary policies (as discussed in the April 2018 GFSR).
- *Real estate valuations appear elevated relative to fundamentals in some countries.* Commercial real estate is often used as collateral for corporate borrowing, so any sharp adjustment in prices could adversely affect firms’ access to financing. Commercial real estate prices have risen sharply in a number of jurisdictions over recent years. Because prices have risen faster

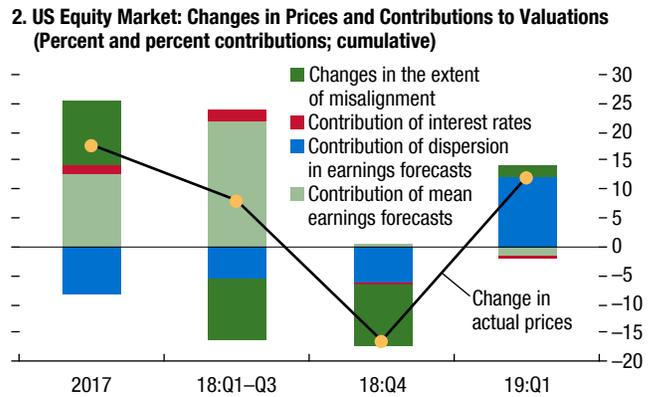
⁸Panels 1–3 in Figure 1.6 show the results from a variant of the equity valuation model used in the October 2018 GFSR based on Durham (2013). The equity valuation model includes standard corporate and economic fundamentals—expected future corporate earnings, earnings uncertainty, and interest rates. Factors that may have affected stock prices through channels other than the variables used in the model would be captured by model residuals, which are used as a measure of price misalignment.

Figure 1.6. Asset Price Misalignment

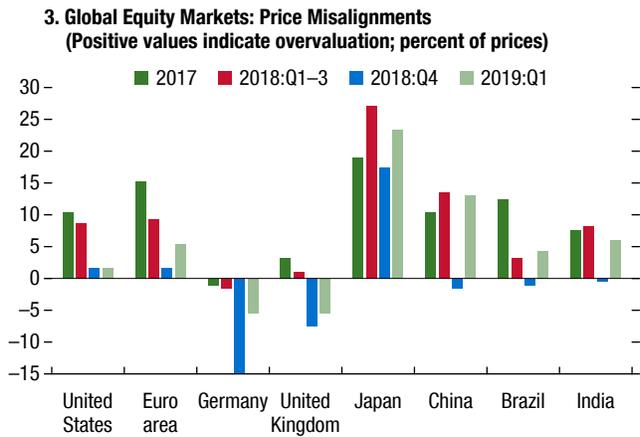
In the United States, the misalignment remained small since late 2018 ...



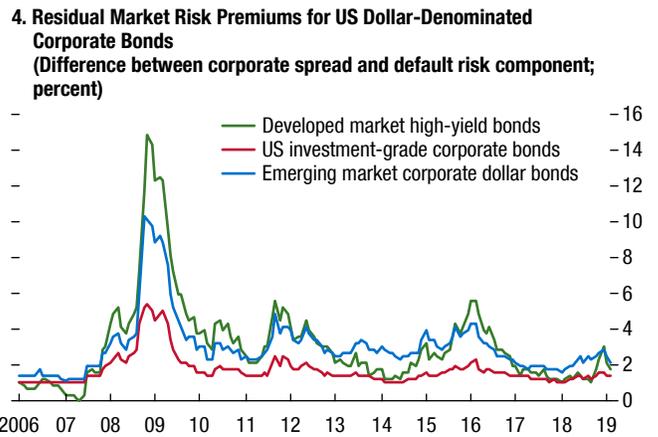
... as the recovery in equity prices has been accompanied by a reduction in earnings uncertainty.



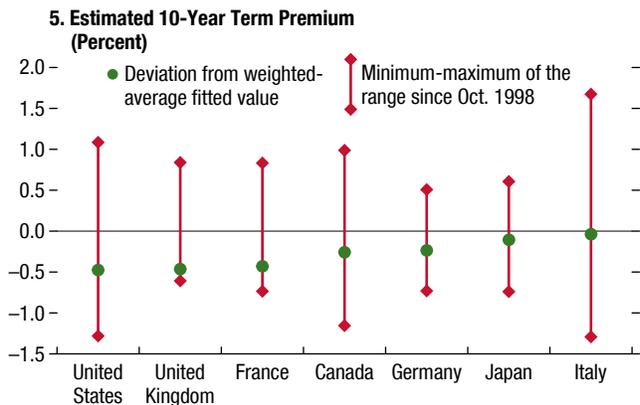
Equity valuations in most major markets seem close to fair values.



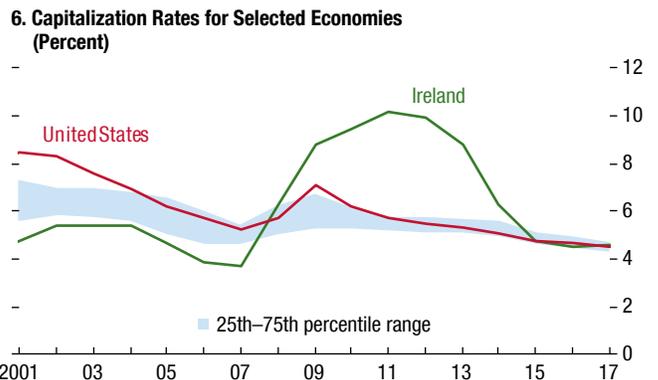
Credit risk premiums have widened, on net, since October 2018, but remain low by historical comparison.



Term premiums are broadly in line with values implied by fundamentals.



Capitalization rates in most commercial real estate markets reached all-time lows, with some signs of overvaluation.



Sources: Bloomberg Finance L.P.; IPD MSCI; JPMorgan Chase & Co.; Moody's; S&P Leveraged Commentary and Data; Thompson Reuters Datastream; Thompson Reuters I/B/E/S; and IMF staff calculations.

Note: Panels 1–3 show the results from an equity valuation model based on average expected earnings, dispersion in earnings expectations, and interest rates. Panel 4 shows the estimated risk premium, defined as the difference between the observed monthly bond spread and the estimated default risk compensation, based on default probabilities by rating. Panel 5 shows 10-year term premium estimates based on the Adrian, Crump, and Moench (2013) model relative to the value implied by fundamentals in a number of models. For explanation of the methodology, please see Box 1.2 in the April 2018 *Global Financial Stability Report*. In panel 6, the capitalization rate is the ratio of the asset's net operating income to its market value. Selected economies include Australia, Canada, Denmark, France, Germany, Ireland, Japan, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom, and the United States.

than rental values, capitalization rates—a measure of income relative to prices—have reached all-time lows in some countries, which is indicative of overvaluation, but their spread to risk-free rates is still above precrisis levels (Figure 1.6, panel 6). Concerns about downside risks to residential real estate prices remain in a number of countries (see Chapter 2).

A Number of Risks Could Trigger a Renewed Sell-Off of Risk Assets

Continued accommodative financial conditions will likely facilitate further buildup of vulnerabilities. These vulnerabilities could be exposed in the event of a sharp tightening in financial conditions. Possible triggers include the following:

- *A sharper-than-expected global growth slowdown:* Disappointing economic data releases could lead to further earnings downgrades, poor credit performance, and a repricing of risk assets. A lack of policy space (monetary or fiscal) to accommodate adverse shocks would amplify this risk.
- *Unexpected shifts to a less dovish outlook for monetary policy in advanced economies:* Investor sentiment has improved since the Federal Reserve signaled a change in its stance, and markets have rallied. A change in expectations stemming from stronger-than-expected economic data releases or the possibility that investors have taken too benign a view regarding the outlook for monetary policy in the United States could lead to a sharp repricing of risk assets. In this event, pressures on emerging markets could resume through disruptions in cross-border capital flows.
- *Protracted trade tensions:* Expectations of a positive outcome in the US-China trade negotiations have lifted asset valuations in trade-dependent sectors, even though China's export orders have ebbed. An escalation of trade tensions would likely trigger a renewed sell-off.⁹
- *Brexit:* A stalemate in the Brexit process threatens to unsettle financial markets, damage investors' confidence, adversely affect business investment, and give rise to some operational and contractual uncertainties in Europe and the United Kingdom.
 - The authorities have taken important steps to reassure markets. Risk-mitigation measures taken

⁹For a more detailed discussion of channels of spillovers and their impact on countries, please see the October 2018 *Regional Economic Outlook: Asia and Pacific*.

by the EU and UK authorities include the recent activation of currency swap arrangements between the Bank of England and the ECB to underpin market liquidity. The EU adopted time-limited equivalence decisions for UK central counterparties and central securities depositaries in the event of a no-deal Brexit. The UK has also put in place temporary permission measures. In addition, postcrisis reforms and supervisory actions have strengthened the liquidity positions of banks, dealers, and insurance companies. Authorities urged market participants to prepare for all Brexit outcomes and the private sector has reportedly undertaken a number of steps. Insurance companies are making good progress in restructuring their business in order to continue to serve their customers after Brexit and there has also been some limited private sector action to transfer derivative contracts.

- Although thus reduced compared to the previous GFSR, risks remain, including around the continued performance of lifecycle events on some uncleared derivative contracts; operational risks for banks, insurers, and asset managers; and market-wide issues such as reduced market liquidity, and risk management challenges and supervisory constraints (see Box 1.3 of the October 2018 GFSR). Market liquidity has proven resilient thus far, although there has been heightened volatility in the gilt market around significant Brexit-related announcements (see Special Feature).
- Despite intermittent strains and continued uncertainty about the ultimate Brexit outcome, trading conditions in European and UK financial markets have been orderly on the whole. While the immediate aftermath of the Brexit referendum saw outsized moves in foreign exchange and rates markets, as well as redemption pressures in some UK investment funds. More recently, most asset classes have been resilient aside from increased volatility in sterling markets and some redemptions from real estate funds. Given heightened uncertainties related to Brexit negotiations, there is a risk that volatility in financial markets may rise sharply as key deadlines approach.

Late-Cycle Corporate Sector Risks in Advanced Economies

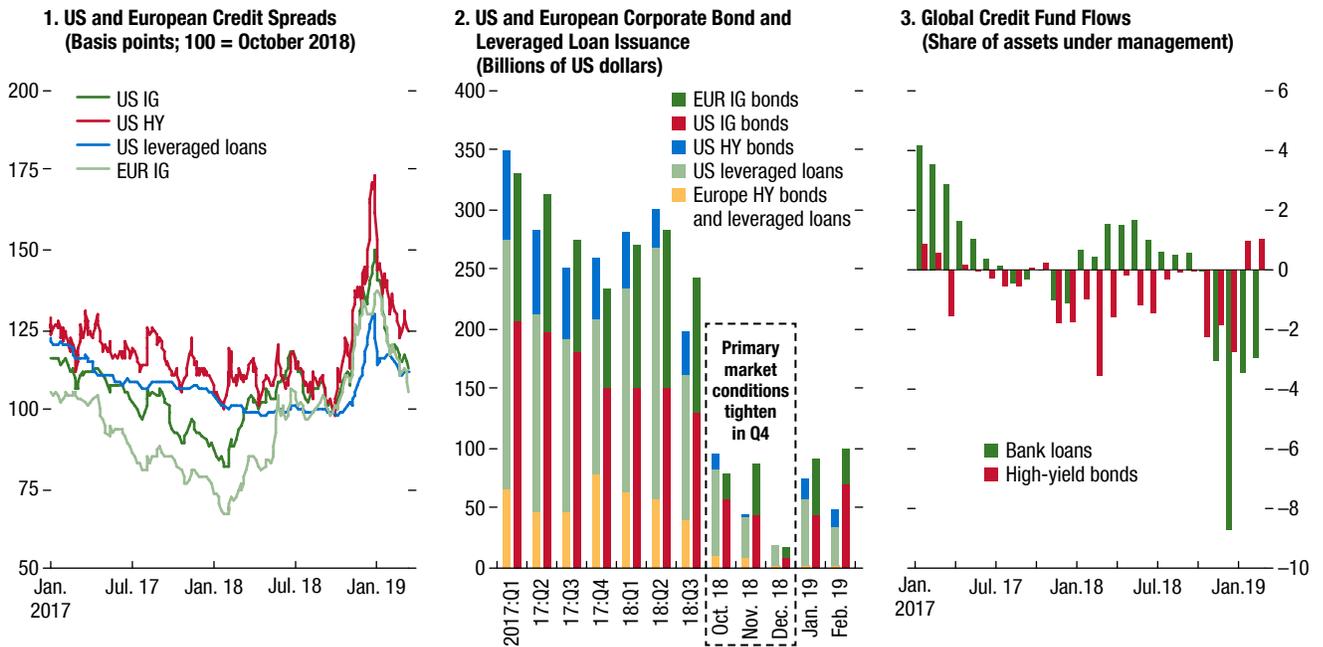
A slowing global economy and recent market gyrations have raised concerns about the resilience of nonfinancial

Figure 1.7. Credit Market Developments in the United States and Europe

In late 2018, credit spreads widened ...

... new issuance declined ...

... while fund flows decreased, before recovering in early 2019.



Sources: Bloomberg Finance L.P.; Barclay's; Dealogic; EPFR Global; Haver Analytics; S&P Leveraged Commentary and Data; and IMF staff estimates.

Note: In panel 1, IG and HY are investment-grade and high-yield option-adjusted spreads to government bonds. For leveraged loans, spread is over Libor. AUM = assets under management; EUR = European firms; HY = high yield; IG = investment grade; Libor = London interbank offered rate.

firms. In most advanced economies, debt-service capacity in the corporate sector improved during the recent cyclical upswing. Balance sheets appear strong enough to sustain a moderate economic slowdown or a gradual tightening of financial conditions. However, overall debt levels and financial risk taking have increased, and creditworthiness of borrowers has deteriorated in the investment-grade bond and leveraged loan markets. A significant downturn or a sharp tightening of financial conditions could lead to a notable repricing of credit risks and strain the debt-service capacity of indebted firms. Should monetary and financial conditions remain easy for longer, debt will likely continue to rise over the medium term in the absence of policy action, raising the risk of a sharper adjustment in the future.

After Faltering in Late 2018, Risk Sentiment in Credit Markets Is on the Rise Again

Major credit markets rebounded in early 2019 after selling off in late 2018. In December, spreads on corporate bonds and leveraged loans widened sharply in the United States and in Europe, especially

for lower-rated firms (Figure 1.7, panel 1). Leveraged finance issuance nearly dried up (Figure 1.7, panel 2), while bond and loan investment funds experienced large outflows (Figure 1.7, panel 3). In early 2019, corporate spreads tightened in parallel with the broader recovery in asset prices, and primary high-yield bond markets reopened. These market gyrations occurred against a backdrop of slowing global growth, as well as changing market expectations about future corporate earnings and the pace of monetary policy normalization in the United States.

The Unique Features of the Current Credit Cycle Imply Different Risks

Accommodative policies adopted after the global financial crisis have succeeded in supporting credit expansion, but debt has risen to historically high levels. Each of the two key segments of the credit market—investment-grade bonds and speculative-grade credit (high-yield bonds and leveraged loans)—has become riskier (see Table 1.1). Furthermore, the role of non-bank lenders, particularly investment funds and foreign

Table 1.1. How Is the Current Corporate Credit Cycle Different from Past Cycles?

Sources of Credit: The Investor Base for Corporate Debt	Uses of Credit: Credit Quality of Corporate Debt Issuers
<p><i>Market-based finance</i> has expanded faster than bank lending to the corporate sector which, may imply different market dynamics in periods of stress (Figure 1.8, panel 1):</p> <ul style="list-style-type: none"> The role of <i>investment funds</i>, including exchange-traded funds (ETFs), has increased.¹ Their holdings of corporate bonds in the United States have more than doubled since 2009, reaching about 20 percent in 2018 (Figure 1.8, panel 2). This may imply higher refinancing risks for borrowers. <i>Insurers and pension funds</i> still represent a large share of the investor base in corporate bonds. While these investors are generally viewed as stable, they typically have credit rating restrictions. <i>Foreign investors'</i> share in corporate bond holdings has increased from 25 percent to 30 percent in the United States. These investors may adjust exposures in response to higher foreign exchange hedging costs or to rating downgrades. In the US <i>leveraged loan market</i>, the share of banks declined to only 8 percent, while the share of collateralized loan obligations increased from 47 percent to close to 60 percent. 	<p>Corporate bond issuers are now generally <i>more leveraged</i> than before the global financial crisis:</p> <ul style="list-style-type: none"> In the overall credit market, the share of <i>speculative-grade credit</i> (high-yield bonds and leveraged loans) declined from 31 percent in 2007 to 25 percent in 2018.² In the investment-grade corporate bond market, the outstanding stock of <i>BBB-rated bonds</i> has quadrupled since the global financial crisis, driven by new BBB issuance, rating downgrades, and new entrants (Figure 1.8, panels 3 and 4).³ Debt-service capacity in the investment-grade market has improved, but leverage has risen (Figure 1.8, panel 5). In the high-yield bond market, the share of <i>CCC-rated bonds</i> has declined from 19 percent in 2007 to 15 percent in 2018. The <i>US leveraged loan market</i> has grown rapidly and approached the size of the high-yield bond market because of new entrants and migration from the high-yield bond market, where investor scrutiny is greater (Figure 1.8, panel 6). The leveraged loan market is now characterized by elevated leverage, limited liquidity, and reduced investor protections.

Source: IMF staff.

¹ ETFs offer daily liquidity to end-investors but may hold less liquid assets (see the April 2018 *Global Financial Stability Report*).

² Speculative-grade credit amounted to 3 percent of GDP in the euro area and 12 percent of GDP in the United States in 2018.

³ BBB-rated bonds are the lowest-rated bonds in the investment-grade category of corporate bonds.

investors, in the US and European corporate bond markets has increased. With some of these funds facing rising liquidity mismatches (as discussed in “Global Financial Stability Assessment” section), financial stability implications may be different during significant market stress or an economic downturn.

The Corporate Credit Cycle Appears to Be Advanced in the United States

The US corporate credit cycle appears to be at its highest point in recent history, and further along than in Europe (Figure 1.9, panels 1 and 2).¹⁰ Selected indicators of corporate fundamentals and financial risk taking point to late-cycle dynamics in the United States (Figure 1.9, panels 3 and 4), partly reflecting the longest economic expansion in US history. Corporate debt is skewed toward lower-rated issuers, and leverage—often a precursor of economic downturns or financial crises—is close to cycle highs across most credit ratings buckets.¹¹ In Europe, the credit cycle

¹⁰Indicators of the late stage of the credit cycle include deteriorating underwriting conditions, increased risk taking, easy credit conditions, strong profits, and high leverage. By contrast, a downturn is associated with increasing defaults, falling profits, tighter credit conditions, and a shift from shareholder- to creditor-friendly activities.

¹¹Several studies have found that elevated leverage and rapid credit growth are leading indicators of economic downturns or banking crises (see, for example, Chapters 2 and 3 of the October 2017 GFSR).

appears to have been shorter and shallower to date, partly due to the euro area debt crisis. European credit providers and firms have been more conservative than their US peers, but structural weaknesses remain in the small and medium enterprise sector.¹²

Corporate Earnings Growth May Have Peaked

Corporate profitability has improved over the past two years (Figure 1.10, panel 1). The level and growth rate of corporate profits—as measured by returns on assets—have been notably higher in the United States than in other advanced economies. The profitability of large US corporations has been boosted by tax reform, but has also been supported by strong revenue growth and wider profit margins (Figure 1.10, panel 2).¹³ However, profits declined notably in the fourth quarter last year.

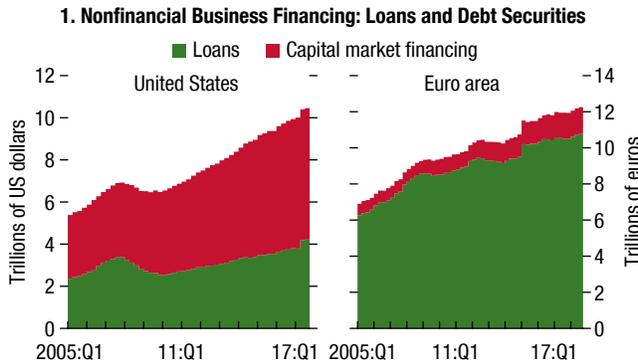
Financial risk taking has remained strong among US firms. As discussed in the April 2017 GFSR, increased financial risk taking by nonfinancial firms—mergers and acquisitions and payouts—historically follows corporate-friendly tax reforms. Large US corporations have continued to increase payouts to shareholders

¹²For example, see the European Central Bank’s November 2018 *Financial Stability Review*.

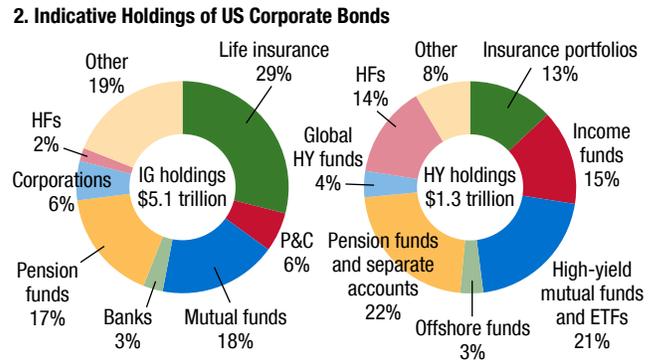
¹³Wider profit margins could be due to increased market power in large firms. See Chapter 2 of the April 2019 WEO.

Figure 1.8. The Key Features of the Current Corporate Credit Cycle

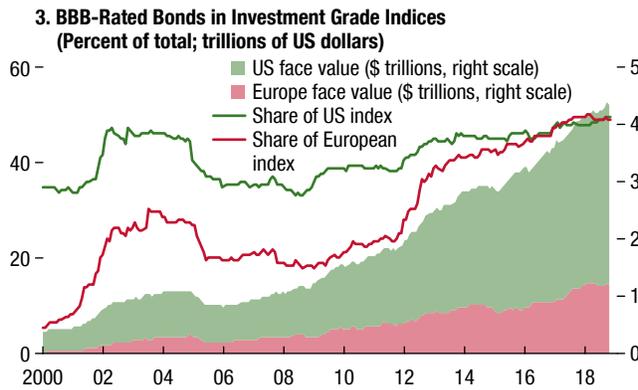
Nonfinancial business sector reliance on capital-market financing has increased.



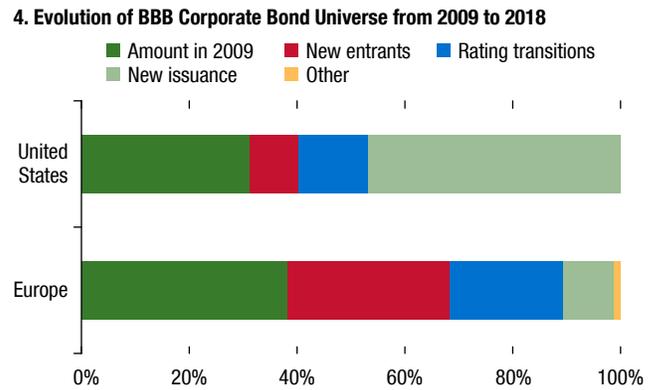
Investment funds and foreign investors account for a large share of corporate bond holdings.



The outstanding stock of BBB-rated corporate bonds has more than quadrupled since the crisis ...



... driven by new issuance, rating changes, and new entrants.



BBB issuers' debt-service capacity has improved but indebtedness has risen.

5. US Credit Fundamentals of BBBs: 2018 versus 2007 (Percent/ratio/basis points/number/percentile rank)

Credit Fundamentals	Level		Percentile Signal	
	2007	2018	2007	2018
Size (as a percentage of IG outstanding)	34.6	49.3	●	●
Gross Leverage (times)	2.4	3.0	●	●
Net Leverage (times)	2.1	2.6	●	●
Share of Companies with > 4x Leverage (percent)	16	23	●	●
Interest Coverage (times)*	7.3	7.9	●	●
EBITDA Margin (percent)*	19	21	●	●
Gross Margin (percent)*	35	40	●	●
Spread (basis points)	198	121	●	●

* = Icons are reversed
 ● 0% ● 100%

The loan market has doubled in size, but investor protections and credit quality have deteriorated.

6. US Leveraged Loan Characteristics: 2018 versus 2007

US Leveraged Loan Market Characteristics	Level		Percentile Signal	
	2007	2018	2007	2018
Outstanding Leveraged Loans (\$ billions)	554	1,147	●	●
US Issuance (percent of global issuance)	66.9	75.8	●	●
Covenant Quality Index	2.6	4.1	●	●
Covenant-Lite Share (percent of new issuance)	29.2	84.7	●	●
B-Rated (percent of new issuance)	22.6	58.0	●	●
Total Debt/EBITDA (times)	4.9	5.3	●	●
First Lien Debt/EBITDA (times)	3.5	4.3	●	●
Other Debt/EBITDA (times)	1.4	1.0	●	●
Deals with EBITDA Add-Backs (percent of new issuance)	8.4	27.1	●	●

● 0% ● 100%

Sources: Autonomous Research; Bank of America Merrill Lynch; Barclays; Bloomberg Finance L.P.; CEF Connect; EPFR Global; European Central Bank; Federal Reserve; Hedge Fund Research; ICE Bond Indices; Lipper; Moody's; SNL Financial; S&P LCD; and IMF staff estimates.

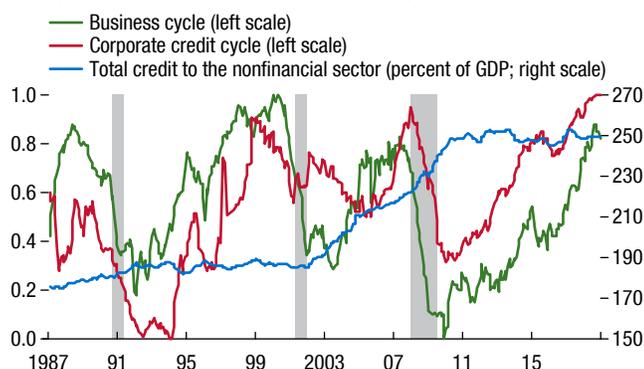
Note: In panel 2, "other" includes endowments, foundations, sovereign wealth funds, offshore funds, households, and bonds held by foreign entities. Panel 5 refers to nonfinancial issuers, with the exception of size (which includes financials). The sample is based on percentile ranks of quarterly data from 1997:Q1 through 2018:Q4. In panel 6, a higher score in the covenant quality index represents weaker covenant protection. EBITDA = earnings before interest, taxes, depreciation, and amortization; ETF = exchange-traded funds; HF = hedge funds; HY = high yield; IG = investment grade; P&C = property and casualty.

Figure 1.9. Tracking the Corporate Credit Cycle: United States versus Europe

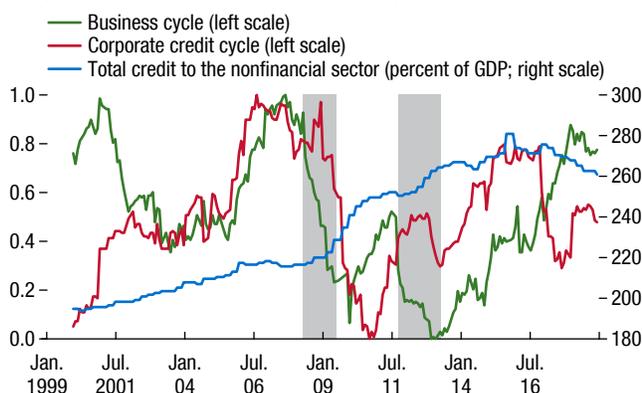
US economic indicators have climbed to postcrisis highs, but the credit cycle has advanced even faster.

European economic indicators have started to decelerate, while the credit cycle has been more muted given ongoing bank balance sheet repair.

1. US Business and Corporate Credit Cycles (Percentile rank, rescaled; percent of GDP)



2. European Business and Corporate Credit Cycles (Percentile rank, rescaled; percent of GDP)



A plethora of indicators of risk-taking point to a late stage of the credit cycle in the United States.

In Europe, financials and firms are more cautious after the sovereign debt crisis.

3. Underlying Indicators: US Business and Corporate Credit Cycles (Percentile rank)

US Credit Cycle Indicators		Latest Level	Signal	Percentile
Business Cycle	Industrial Production (YoY percent)	4.0	●	71%
	Unemployment Rate (percent)	3.9	●	99%
	Consumer Confidence Index (1985 = 100)	126.6	●	88%
	Capacity Utilization (percent of total capacity)	78.5	●	41%
	Output Gap (percent of potential GDP)	0.2	●	70%
Corporate Fundamentals	Debt/GDP - Nonfinancial Firms	74.4	●	98%
	C&I Loan Growth (YoY percent, 6MMA)	4.0	●	33%
	IG Gross Leverage (times)	6.4	●	99%
	HY Gross Leverage (times)	4.4	●	80%
	IG Interest Coverage Ratio (times)	9.8	●	58%
	HY Interest Coverage Ratio (times)	4.6	●	8%
	IG Capex/Sales	4.4	●	26%
Corporate Credit Cycle	IG Cash/Debt	13.6	●	66%
	BBB (percent of total IG)	49.3	●	99%
	CCC or Below (percent of HY new issuance)	8.4	●	45%
	HY/Loan Issuance (percent of outstanding)	9.3	●	27%
	Ex-Fin Net Stock Buyback Volumes S&P 500 (\$ billions)	427.6	●	98%
	M&A Loan Volumes (\$ billions)	157.1	●	97%
	M&A/LBO Issuance (percent of HY/loans supply)	46.4	●	61%
	LBO Loan Volume (\$ billions)	108.6	●	93%
	LBO Transactions > 6 times leverage	47.6	●	90%
	Global CLO Volume (\$ billions)	136.5	●	95%
New Issue Leverage on all First-Lien Loans (times)	4.2	●	95%	

Early Cycle ● ● ● ● Late Cycle

4. Underlying Indicators: European Business and Corporate Credit Cycles (Percentile rank)

Europe Credit Cycle Indicators		Latest Level	Signal	Percentile
Business Cycle	Industrial Production (YoY percent)	1.2	●	42%
	Unemployment Rate (percent)	8.1	●	88%
	Consumer Confidence (percent balance/diffusion index)	-6.2	●	75%
	Capacity Utilization (percent of total capacity)	83.6	●	80%
	Output Gap (percent of potential GDP)	-0.2	●	68%
Corporate Fundamentals	MFI Loans to Nonfinancial Firms Corp (YoY percent)	2.9	●	61%
	IG Net Leverage (times)	2.0	●	62%
	HY Net Leverage (times)	2.9	●	21%
	IG Int Coverage (times)	7.0	●	3%
	HY Int Coverage (times)	2.3	●	21%
	IG Capex to Sales	5.9	●	30%
	HY Capex to Sales	5.0	●	63%
	IG Cash to Debt	26.6	●	8%
	HY Cash to Debt	19.9	●	11%
	Corporate Credit Cycle	BBB (percent of total IG outstanding)	48.7	●
CCC (percent of outstanding market)		2.3	●	2%
L12M IG Nonfinancial Supply (percent of IG/HY supply)		82.6	●	64%
L12M IG Share Buybacks (EUR billions)		41.0	●	53%
L12M IG M&A (EUR billions)		153.8	●	28%
L12m Buyout Loan Volume (EUR billions)		22.0	●	47%
Cov-Lite (percent of loan issuance)		87.7	●	99%
HY Bond Use of Proceeds for Acquisitions		34.2	●	69%
Loan Use of Proceeds for Acquisitions	70.6	●	82%	

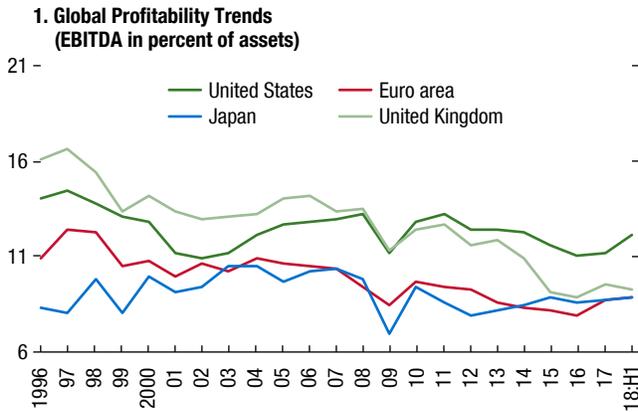
Early Cycle ● ● ● ● Late Cycle

Sources: Bank for International Settlements; Bloomberg Finance L.P.; Bond Radar; Dealogic; European Central Bank; European Commission; Eurostat; Federal Reserve; Markit; Moody's; Morgan Stanley; S&P Leveraged Commentary & Data; and IMF staff estimates.

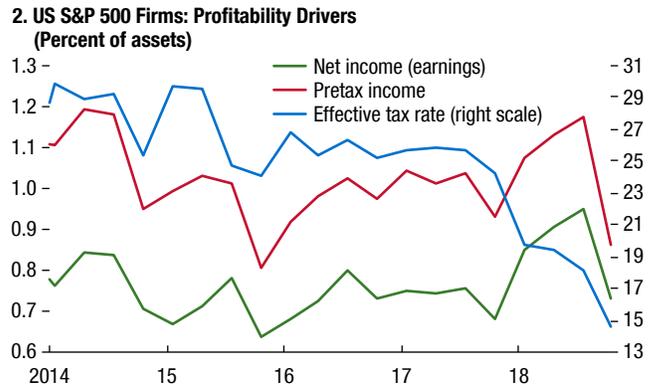
Note: In panels 1 and 2, indicators are equally weighted based on rescaled percentile ranks. Data extend from 2000 for Europe and from 1980 for the United States. Europe mostly includes the euro area. Shaded areas indicate recessions. In panels 3 and 4, icons and percentile ranks are reversed for unemployment rate, interest coverage, cash/debt, and share of investment-grade (IG) debt. BBB = BBB-rated bonds; Capex = capital expenditure; CCC = CCC-rated bonds; C&I = commercial and industrial; CLO = collateralized loan obligations; Cov-lite = relaxed covenants; EUR = euro; Fin = financial; HY = high yield; Int = interest; LBO = leveraged buyouts; L12M = last 12 months; M&A = mergers and acquisitions; MFI = monetary financial institutions; 1L = first lien; 6MMA = six-month moving average; YoY = year over year.

Figure 1.10. Corporate Profitability Indicators in Advanced Economies

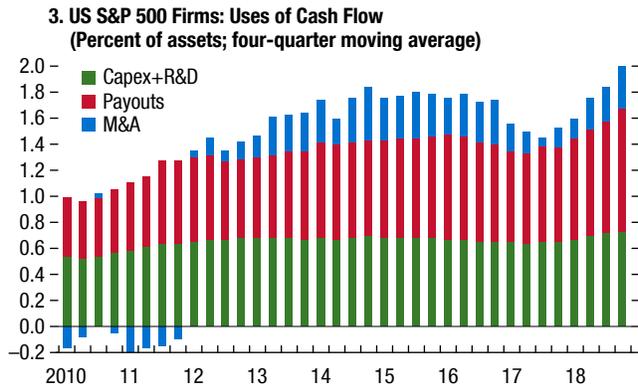
Profitability has been higher in the United States than in other advanced economies ...



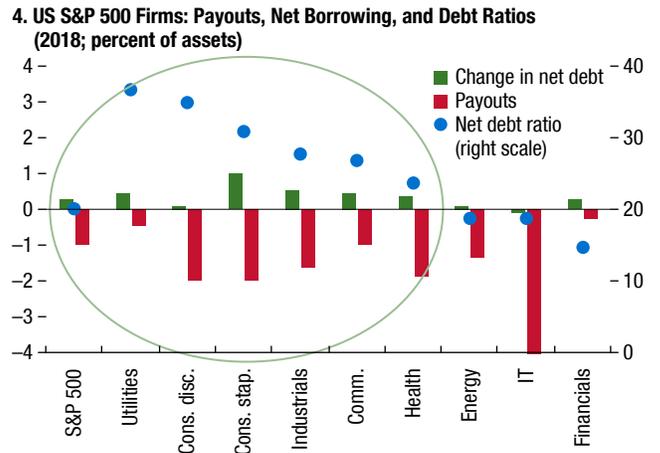
... driven by a falling tax rate and by strong revenue growth—albeit with a notable decline in the fourth quarter of 2018.



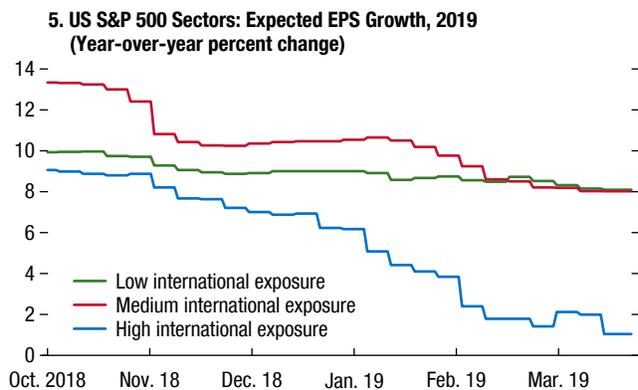
Strong profits in the United States were used for payouts and other financial risk-taking.



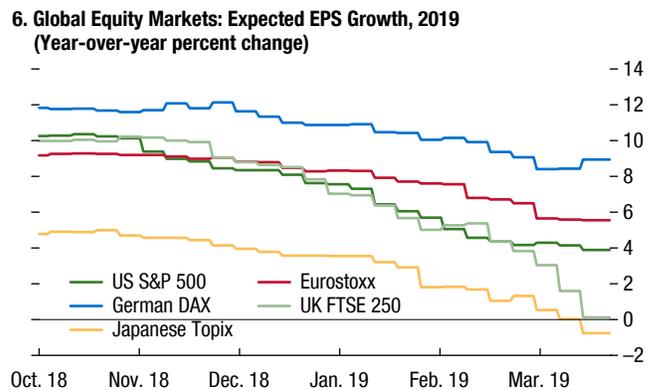
In many sectors, payouts were also financed with borrowing, despite already elevated debt ratios.



US corporate profit forecasts have been revised down, particularly at firms with significant international exposures.



Expected earnings growth has been revised down in other regions because of weaker economic data.



Sources: Bloomberg Finance L.P.; S&P Capital IQ; Thomson Reuters Datastream; Thomson Reuters I/B/E/S; and IMF staff calculations.

Note: In panel 1, the sample from S&P Capital IQ includes about 20,000 firms in the euro area, Japan, the United Kingdom, and the United States. In the euro area, they represent 23 percent of total debt in the total corporate sector; in Japan, 40 percent of total debt; in the United Kingdom, 36 percent of total debt; and in the United States, 76 percent of debt, measured as loans and debt securities. Capex = capital expenditure; Comm. = communications; Cons. disc. = consumer discretionary; Cons. stap. = consumer staples; EBITDA = earnings before interest and taxes, depreciation; and amortization; EPS = earnings per share; IT = information technology; M&A = mergers and acquisitions; R&D = expenses for research and development; SGA = sales, general, and administrative.

through dividends and share buybacks, which outstripped gains in investment and reached postcrisis highs (Figure 1.10, panel 3). In some sectors, payouts have been financed by net borrowing, adding to already-elevated debt (Figure 1.10, panel 4).

Global earnings growth has likely peaked. Market analysts' forecasts of US firms' earnings growth for 2019 have been revised down, reflecting expectations of fading fiscal stimulus, higher interest rates, rising input costs and wages, trade tensions, and slowing global demand. Sectors with high international exposures, such as information technology, have borne the brunt of earnings markdowns, while domestically oriented sectors, such as financials, have been less affected (Figure 1.10, panel 5). In other advanced economies, deteriorating global market sentiment and weaker domestic economic data have contributed to downward revisions to 2019 earnings growth as well (Figure 1.10, panel 6).

Lower Profits Will Weaken Credit Quality, Given High Debt Levels

Until recently, cyclical factors supported corporate balance sheets. A prolonged period of monetary accommodation led to a substantial reduction in the debt-servicing costs of nonfinancial firms. At the same time, the global economic recovery sustained corporate profits globally, while tax reform gave an extra boost to corporate profits in the United States (see the April 2017 and the April 2018 GFSRs). As a result, the share of debt at firms with weak debt-service capacity and significant liquidity and rollover risks, or with excessive net leverage relative to profits, is now broadly lower than both a few years ago and before the global financial crisis in most major advanced economies:¹⁴

- *Debt-service capacity*—measured by the share of debt in firms with low (below 1) and subpar (between 1 and 3) interest coverage ratios—has improved in most major advanced economies in the recent period and even more so since before the crisis (Figure 1.11, panel 1), reflecting stronger profits and lower interest expenses. One notable exception is the United Kingdom, where the share of debt in firms with low interest coverage ratios has increased.

¹⁴Other measures include the riskiness of credit allocation, which was shown to rise during periods of fast credit expansion and to signal a higher probability of economic downturn and financial stress (see the April 2018 GFSR).

- *Liquidity and rollover risks* in nonfinancial firms have declined as well. Easy financial conditions and favorable financing terms have allowed companies to refinance and restructure problem debts, extend debt maturities, and build cash buffers. For example, the share of debt owed by firms with low (below 10 percent) cash buffers relative to their short-term debt has fallen notably in most major advanced economies (Figure 1.11, panel 2).
- *Net leverage ratios*—measured by the share of debt in firms with high (above 6) net debt to earnings before interest, tax, depreciation, and amortization (EBITDA)—have improved in the United States and the United Kingdom relative to the precrisis period but have weakened in the euro area and Japan (Figure 1.11, panel 3). Easy financial conditions and relatively comfortable debt-service capacity have allowed firms to continue accumulating debt.

However, structural leverage indicators have deteriorated. *Aggregate corporate debt-to-GDP ratios* have risen to historically high levels in advanced economies. Reflecting companies' efforts to deal with problem debt after the crisis, the share of debt owed by firms with high (above 0.6) debt-to-asset ratios has declined (Figure 1.11, panel 4). However, the share of debt at firms with moderate (between 0.3 and 0.6) indebtedness has increased in both the United States and the euro area.

With debt at historically high levels, the corporate sector is vulnerable to large economic and financial shocks. Although corporate balance sheets are strong enough to sustain a moderate economic slowdown or a gradual tightening of financial conditions, a significant deceleration in earnings growth or a sharp tightening of financial conditions could lead to a notable deterioration in corporate credit quality. A policy easing—even if timely and decisive—may work with a lag to effectively counter a sudden and significant widening of credit risk premiums. A weakening in corporate credit quality would affect investors through both direct credit losses and increased market stress from potential downgrades—particularly in the oversized cohort of BBB-rated issuers.

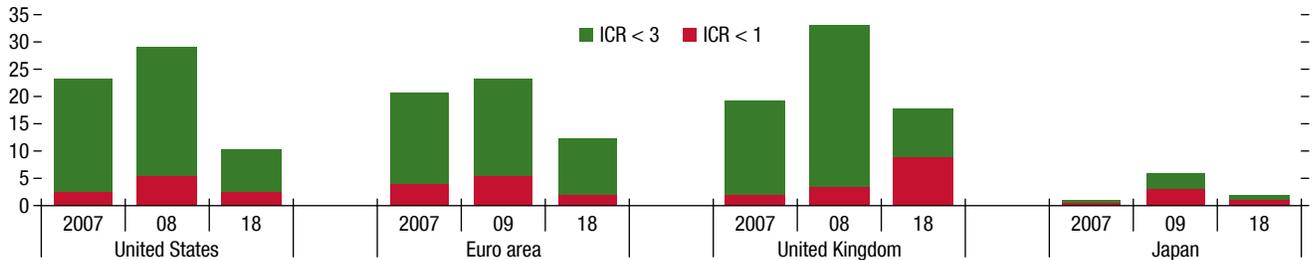
Large-Scale Downgrades of US Corporate Credits Are Possible, but the Fallout May Be Limited

Investors have recently become more concerned about credit risk. A decomposition of high-yield spreads suggests that the widening of spreads in the fourth

Figure 1.11. Corporate Credit Quality Indicators in Advanced Economies

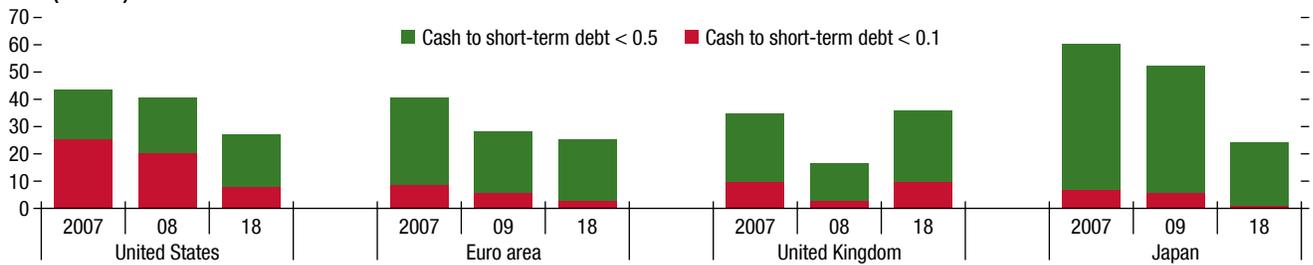
Extraordinary monetary accommodation has supported the corporate sector ...

1. Share of Corporate Debt Owed by Firms with Low (below 1) and Subpar (between 1 and 3) EBITDA-to-Interest Expense Ratios (Percent)



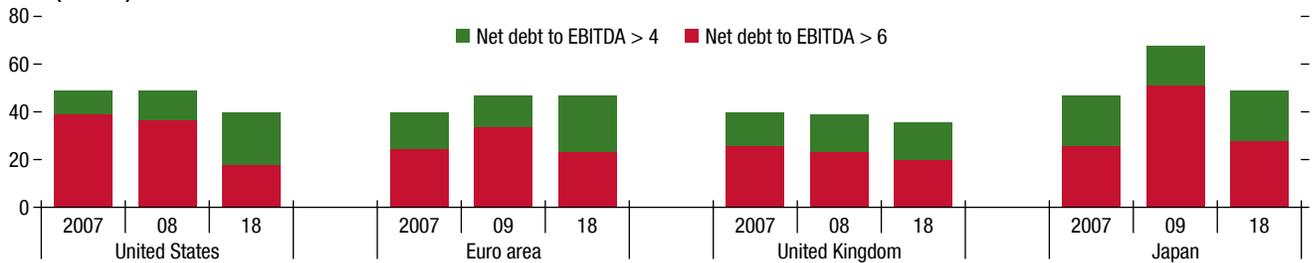
... and favorable financing terms have allowed firms to extend maturities and reduce rollover risks.

2. Share of Corporate Debt Owed by Firms with Low (below 10 Percent) and Subpar (between 10 Percent and 50 Percent) Cash-to-Short-Term-Debt Ratios (Percent)



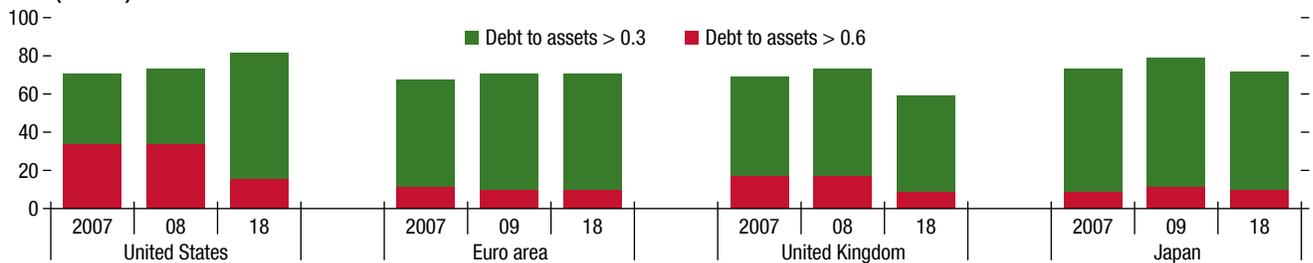
A recovery in earnings has helped restrain the increase in corporate leverage (debt-to-earnings ratios) ...

3. Share of Corporate Debt Owed by Firms with High (above 6) and Elevated (between 4 and 6) Net Debt-to-EBITDA Ratios (Percent)



... whereas debt-to-asset ratios have continued to climb at moderately indebted firms.

4. Share of Corporate Debt Owed by Firms with High (above 0.6) and Moderate (between 0.3 and 0.6) Debt-to-Asset Ratios (Percent)

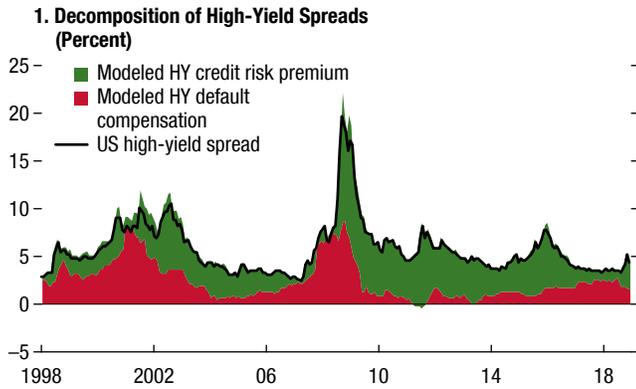


Sources: S&P Capital IQ; and IMF staff calculations.

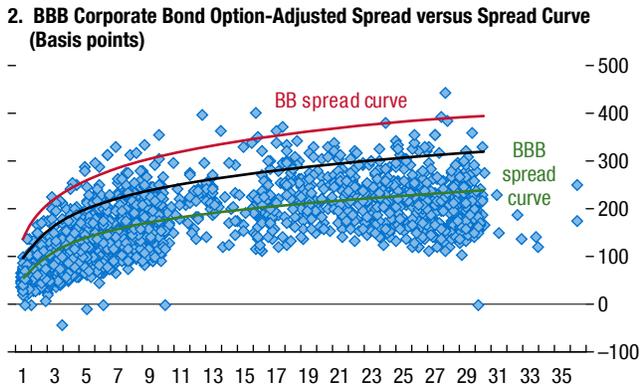
Note: The sample includes about 20,000 firms in the euro area, Japan, the United Kingdom, and the United States. In the euro area, they represent 23 percent of total debt in the total corporate sector, in Japan 40 percent of total debt, in the United Kingdom 36 percent of total debt, and in the United States 76 percent, measured as loans and debt securities. The middle bars in every panel show the worst year (in terms of corporate credit metrics) since the global financial crisis, which could be either 2008 or 2009. EBITDA = earnings before interest, tax, depreciation, and amortization; ICR = interest coverage ratio.

Figure 1.12. Potential Fallout from the BBB Bond Downgrades on the US High-Yield Corporate Bond Market

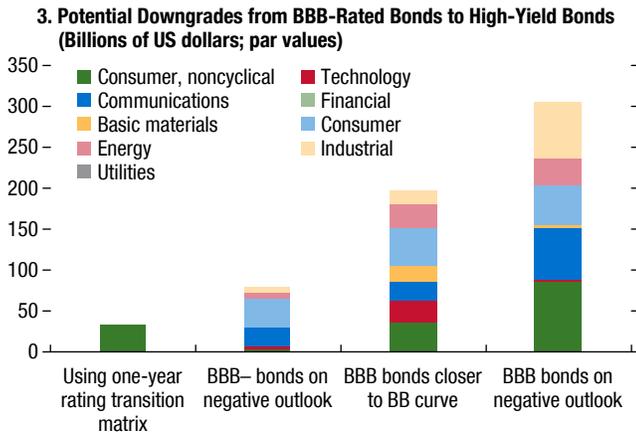
The widening in corporate bond spreads in late 2018 was driven by higher risk premiums ...



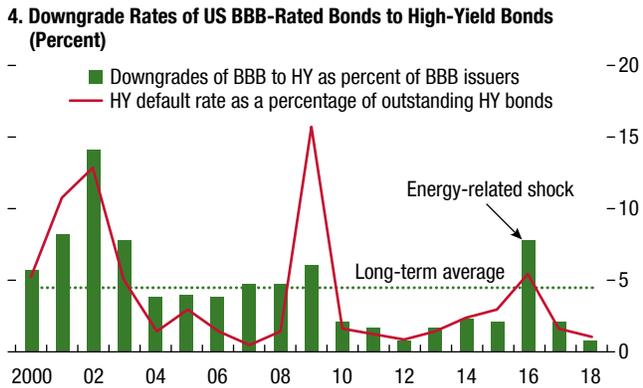
... with approximately \$200 billion in BBB-rated bonds trading closer to high yield than the BBB curve.



Market-based estimates of potential downgrades to high-yield bonds are within a range implied by rating agencies.



Waves of downgrades are not uncommon, tend to be led by certain sectors, and are not necessarily associated with recessions.



Sources: Barclays; Bloomberg Finance L.P.; Moody's; and IMF staff calculations. Note: HY = high yield.

quarter of 2018 was driven entirely by higher credit risk premiums—the compensation demanded by investors for higher uncertainty about credit risk (Figure 1.12, panel 1).¹⁵ Given that the universe of BBB-rated US corporate bonds is roughly twice the size of the entire US high-yield bond market, there are concerns that a series of downgrades from BBB to high yield could significantly increase the supply of high-yield bonds and

lead to further widening in credit risk premiums. This could significantly increase strains on the firms' ability to service their debts, forcing them to cut back investment.

Despite the relatively benign default outlook, some investment-grade companies already trade at sub-investment-grade spreads.¹⁶ About 6 percent of BBB-rated companies, or approximately \$200 billion in par value, currently trade at levels closer to high yield than to the BBB spread curve (Figure 1.12, panel 2). This market-implied estimate of the amount of BBB bonds at risk for downgrade is roughly in line with its longer-term historical average level and is within a range of estimates, such as those implied by credit ratings (Figure 1.12, panel 3). An increase in

¹⁵High-yield spreads are decomposed into compensation for default and credit risk premium. Compensation for default is defined as the product of probability of default and loss given default. A simple regression is used to explain probability of default with change in industrial production, unemployment rate, net balances reported in the SLOOS (Fed-Senior Loan Officer Opinion Survey on Bank Lending), and a recession dummy variable. Loss given default is assumed to remain fixed at 60 percent. The credit risk premium is the difference between the observed bond spreads and compensation for default.

¹⁶Also see Beinstein and others (2019).

supply of high-yield bonds is positively related to a rise in the credit risk premium, and a large downgrade wave has the potential to temporarily increase credit risk premiums for high-yield bonds by as much as an estimated 90 basis points if all bonds that are rated at BBB– with negative outlook were to be downgraded.¹⁷ Furthermore, the greatest impact on credit risk premiums may be felt in the CCC-rating space, where rollover risk would increase significantly.

Waves of downgrades to high-yield bonds happened in the past and were not always associated with downturns and recessions (Figure 1.12, panel 4). However, the investor base for corporate bonds has changed. A larger share of investment funds and rating-sensitive investors could increase the odds of fire sales leading to more adverse market dynamics. Furthermore, the high-yield bond market is less liquid than the investment-grade market and has a narrower investor base. On the positive side, because recent issuance of high-yield bonds has been relatively low, investors may be more willing and able to absorb some increase in high-yield bond supply. In addition, some BBB-rated companies may have sufficient profits and liquid assets to de-lever and preserve their investment-grade ratings.

Risks Have Risen in the Leveraged Loan Market

Over recent years, the leveraged loan market has increased in size, complexity, and riskiness (Adrian 2018). The value of leveraged loans outstanding is approaching that of high-yield bonds (Figure 1.13, panel 1). Meanwhile, the investor base for leveraged loans has shifted toward nonbank investors (Figure 1.13, panel 2). Leveraged loans are increasingly and predominantly being used to fund financial risk taking through mergers and acquisitions and leveraged buyouts, dividends, and share buybacks (Figure 1.13, panel 3). However, borrowers in the leveraged loan market are also dependent on capital markets for refinancing, which leaves them vulnerable to liquidity stress and potential defaults.

Looser underwriting standards, decreased investor protection, a higher share of weak credit, and reduced subordination increase the likelihood of distress and reduce recovery rates in the event of a sudden tightening in financial conditions or a sharp downturn

¹⁷The high-yield credit risk premium is modeled as a function of net supply, implied volatility from one-year at-the-money S&P 500 options, and the high-yield credit-default-swap-cash basis. The given estimate of spread widening from downgraded bond supply assumes an increase in net supply and holds the risk factors constant.

(see the April 2018 GFSR). However, the sources and magnitude of stress may be different this time. For example, greater participation of investment funds in the leveraged loan market means that a flood of investor redemptions could lead to additional market stress.

However, potential spillovers from distress in the leveraged loan market to the rest of the financial system are mitigated by a number of factors:

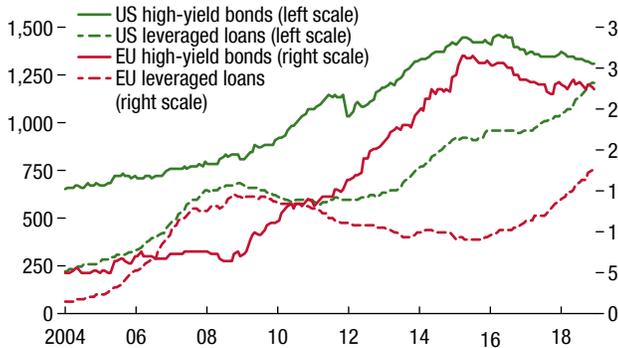
- *Banks play a smaller role in the leveraged loan market.* Loans originated and retained on banks' balance sheets account for only 2.5 percent of total tangible bank equity. Warehouse lines to collateralized loan obligation managers remain modest, estimated at about \$20 billion currently versus more than \$200 billion in 2008. Although a buyers' strike from institutional investors could always leave underwriting banks with unallocated leveraged loans in their pipeline, pipeline risk management has improved, and overall levels are generally less than one-third of peak levels before the crisis. Finally, mark-to-market losses on collateralized loan obligations should remain contained given the small value of these investments held by banks (Figure 1.13, panel 4).
- *Collateralized loan obligations are held mainly by non-bank investors.* Global banks hold about 33 percent (or \$250 billion) of the total stock of collateralized loan obligations (Graham 2018) but are estimated to hold mostly the highest-rated tranches (Figure 1.13, panel 5). While lower-rated tranches could incur substantial losses in an economic downturn, the default risk on higher rated tranches has been low based on recent history, and increased credit enhancements could further reduce defaults.
- *Foreign bank demand for collateralized loan obligations remains strong.* Estimates suggest that Japanese banks account for a sizable share of demand for highly rated tranches. Current US and EU AAA collateralized loan obligation yields, hedged into yen, have continued to provide an attractive return compared with domestic bonds (Figure 1.13, panel 6). However, if hedging costs were to increase, foreign demand could weaken, potentially leading to a widening in spreads.
- *Demand from investment funds is sizable, but there are few crossover investors.* Concentration of fund ownership is meaningful, with estimates that the top 5 and top 20 US loan products own nearly 15 percent and 30 percent of the US loan market, respectively (Caprio 2018). However, spillovers to other fixed-income markets are expected to be contained

Figure 1.13. Developments in the Leveraged Loan Market in the United States and Europe

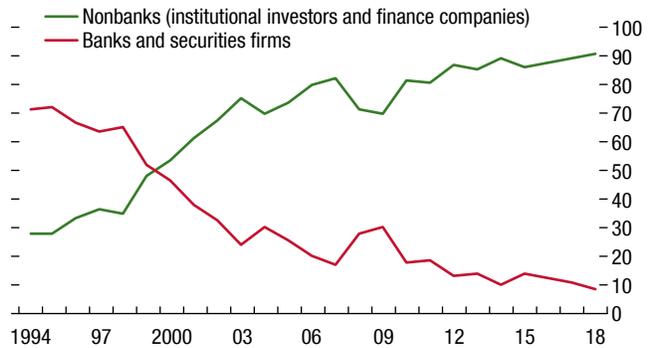
The amount of leveraged loans is almost as large as that of high-yield bonds.

Nonbanks have taken a larger role in financing highly indebted firms.

1. High-Yield Bond versus Leveraged Loan Debt Outstanding (Billions of US dollars; billions of euros)



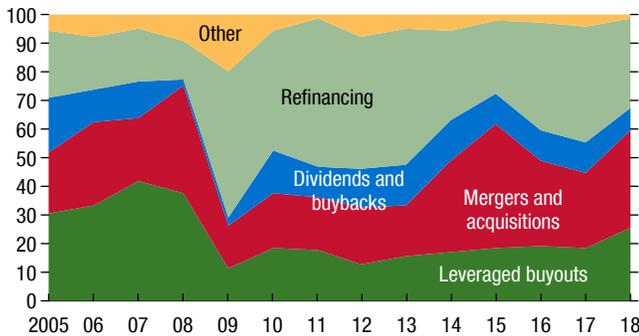
2. US Leveraged Loan Investor Base: Banks versus Nonbanks (Percent of primary market issuance)



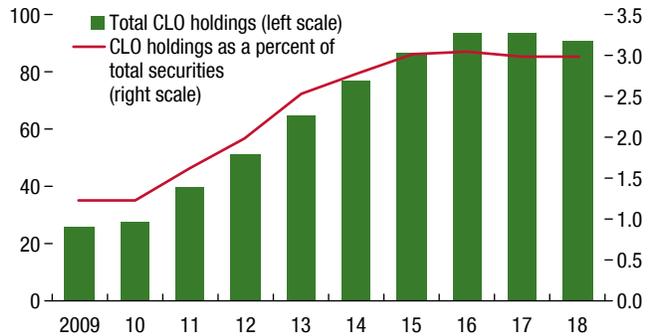
The share of proceeds used to fund acquisitions and shareholder enhancements is large.

US bank holdings of collateralized loan obligations remain relatively small.

3. Leveraged Loan Issuance by Use of Proceeds (Percent)



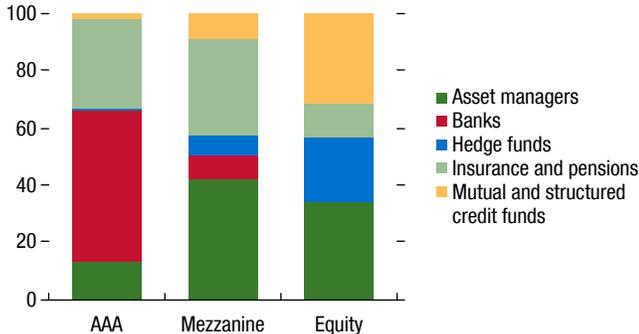
4. US Bank Holdings of Collateralized Loan Obligations (Billions of US dollars; percent)



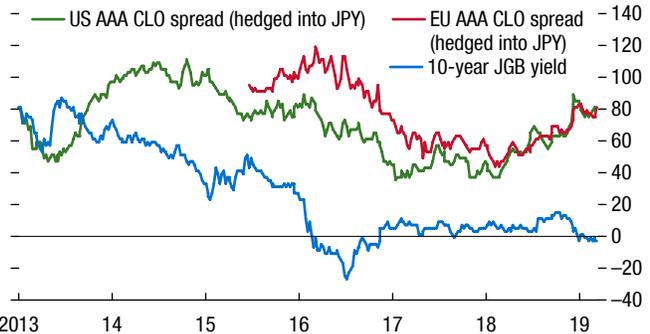
Collateralized loan obligations have enjoyed a stable bid from asset managers and banks ...

... as attractive currency-hedged returns have maintained a strong bid from foreign banks.

5. US CLO Year-End 2018 Investor Base (Percent of new CLO issuance)



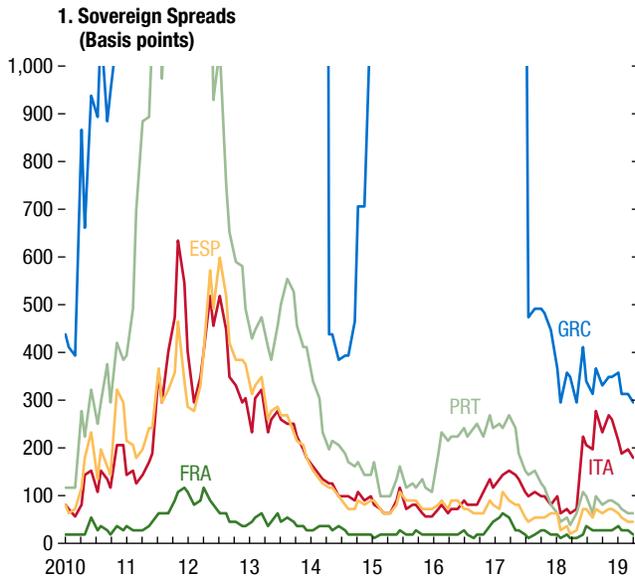
6. US and EU AAA-rated CLO Spreads Hedged to the Japanese Yen (Basis points)



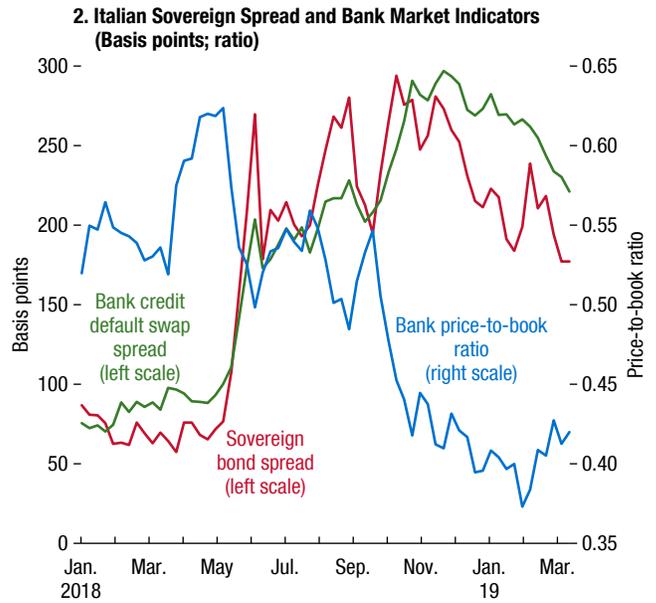
Sources: Bloomberg Finance L.P.; Citi; Federal Reserve Y-9C Reports; S&P Leveraged Commentary & Data; SNL Financial; and IMF staff calculations. Note: For panel 2, institutional investors include finance companies, insurance companies, hedge funds, distressed debt funds, loan mutual funds, and collateralized loan obligations (CLOs). Panel 5 is based on estimates from Citi. JGB = Japanese government bond; JPY = Japanese yen; LBOs = leveraged buy-outs; M&A = mergers and acquisitions.

Figure 1.14. Italian Sovereign and Banks: Recent Financial Developments

Italian sovereign spreads have widened ...



... and bank market indicators have deteriorated.



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

Note: In panel 1, the vertical axis has been set to a maximum of 1,000 basis points to show the latest data more clearly. In panel 2, the average of individual bank price-to-book ratios and credit default swap spreads is used. Data labels in the figure use International Organization for Standardization (ISO) country codes.

because some of the largest crossover credit funds have only marginal exposures to leveraged loans.

The evolving market structure raises the possibility of different dynamics during times of stress compared with 2007–08. Despite anecdotal evidence of reduced use of financial leverage, the risk remains that large-scale redemptions from end-investors could force investment funds to liquidate some of their holdings of leveraged loans. Given that these funds are important buyers of leveraged loans, large redemptions could induce fire sales and further depress prices. These dynamics may also affect the other institutional investors holding these loans, as well as the broader economy, by blocking the flow of funds to the leveraged credit market. In this event, economic activity of borrowers representing a wide range of sectors could be jeopardized because a sizable 31 percent of issuance is used for refinancing. The borrowers' ability to swiftly shift to the high-yield bond market could be hampered by the relatively large size of the leveraged loan market. Further financial stability implications will ultimately depend on whether nonbanks have retained material links to banks that could amplify the impact of market disruptions on the broader financial system.

The Euro Area Sovereign–Financial Sector Nexus

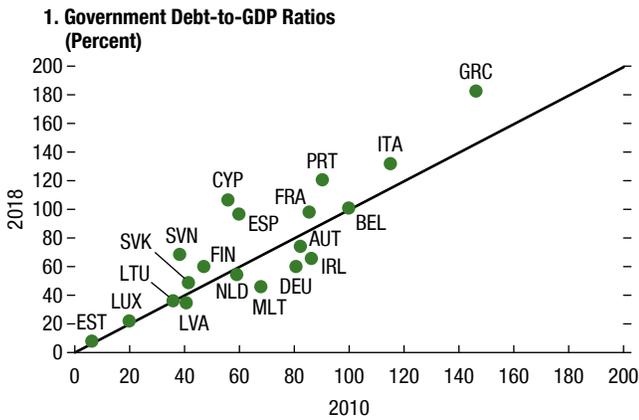
Fiscal challenges in Italy have rekindled worries about the nexus between the sovereign and financial sectors in the euro area. Bank capital ratios are now higher in the euro area and actions have been taken to reduce nonperforming loans on bank balance sheets. But if sovereign yields were to increase sharply, banks' stronger links to sovereigns in countries with high government debt could result in significant losses on bank bond portfolios. This, along with potential losses on nonperforming loans, could result in a significant hit to capital for some banks. Insurance companies could also become entangled in the nexus given their significant holdings of sovereign, bank, and corporate bonds. Against this backdrop, there is a risk that strains in the financial sector could yet again be passed on to companies and households, with negative implications for economic growth.

Concerns Have Reemerged about the Sovereign–Financial Sector Nexus in the Euro Area

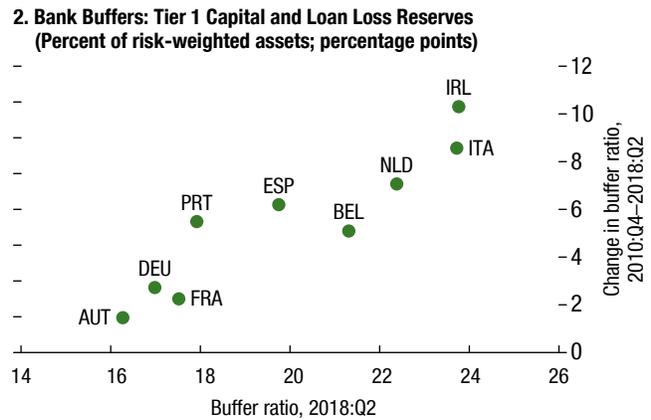
Investor concerns about the sovereign–financial sector nexus have been rekindled by fiscal challenges in Italy, and this led to a widening in sovereign spreads in the second half of 2018 (Figure 1.14,

Figure 1.15. The Euro Area Sovereign–Financial Sector Nexus

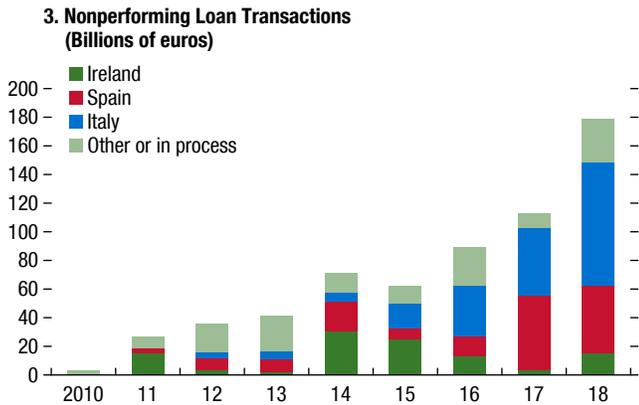
Government indebtedness has risen in several countries.



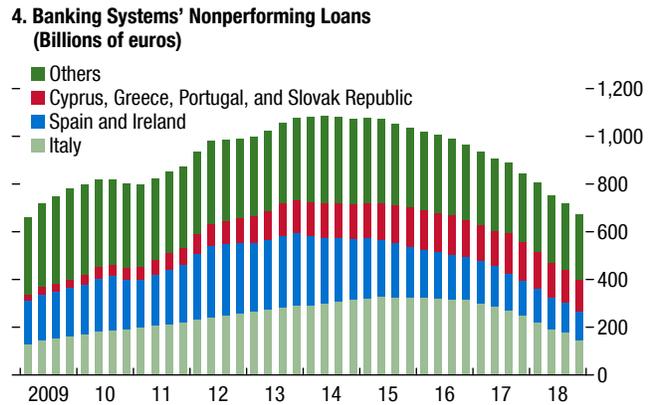
Regulators required banks to increase their buffers ...



... and efforts have been made to dispose of nonperforming loans ...



... but banks need to continue reducing the stock of nonperforming loans on their balance sheets.



Sources: Deloitte; European Banking Authority; Haver Analytics; PricewaterhouseCoopers; IMF, Financial Soundness Indicators database; IMF, World Economic Outlook database; and IMF staff analysis.

Note: Panel 2 is based on the sample of banks in the European Banking Authority's transparency exercise (EBA banks). In panel 4, the data on nonperforming loans are for banking systems in aggregate (from the IMF Financial Soundness Indicators database). Data labels in the figure use International Organization for Standardization (ISO) country codes.

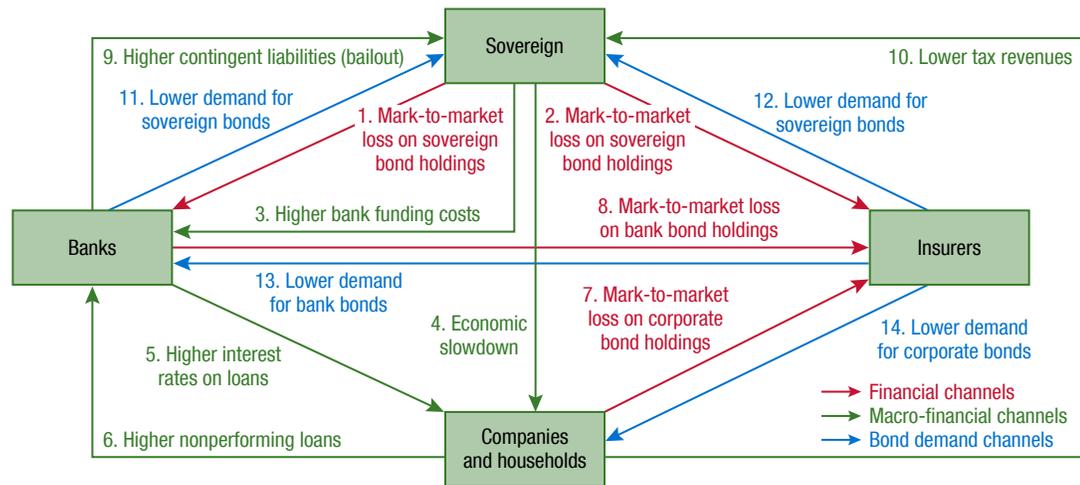
panel 1).¹⁸ These sovereign shocks spilled over to the banking sector, where bank credit default swap spreads have risen in lockstep with sovereign spreads and where equity valuations have fallen (Figure 1.14, panel 2). However, Italian sovereign spreads have partially retraced this year and so far there has been little spillover to sovereign yields in other euro area countries.

¹⁸The focus here is on the euro area given these recent developments. The sovereign–financial sector nexus could arise in other economies where banks have significant domestic government bond holdings (see Figure 1.21, panel 4, in the October 2018 GFSR) and where sovereign risks are high.

The sovereign–financial sector nexus was at the heart of the euro area crisis in 2011–12. Intense market speculation about the creditworthiness of some governments generated sharp rises in sovereign yields. This created mark-to-market losses on banks' holdings of government bonds. Bank funding costs also rose sharply, and were passed on to companies and households through higher interest rates on loans. The ensuing recession and weak growth since then induced a deterioration in government-debt-to-GDP ratios (Figure 1.15, panel 1) and engendered a substantial rise in nonperforming loans on bank balance sheets.

Several key measures were adopted to tackle the crisis. Regulators and supervisors required banks to

Figure 1.16. Channels of Contagion in the Sovereign–Financial Sector Nexus



Source: IMF staff.

increase their capital and loan loss reserves buffers (Figure 1.15, panel 2). Banks reduced the stock of nonperforming loans through a combination of sales and write-offs, though these efforts should continue (Figure 1.15, panels 3 and 4). Bank funding strains were alleviated through central bank liquidity support, and official sector asset purchases helped stabilize financial markets.

The financial sector framework has also been reinforced. The Single Supervisory Mechanism was established along with the Single Resolution Mechanism and the Bank Recovery and Resolution Directive. However, measures are still needed to fully complete the Banking Union, such as to establish a European Deposit Insurance Scheme.

There is still a risk that the sovereign–financial sector nexus could be reinvigorated. The nexus could spread sovereign strains across the financial system through a complex web of interactions and negative feedback loops that can be summarized into three main types of channels: (1) *financial channels* of mark-to-market losses on bank and insurers' bond holdings (depicted by the red arrows and channels in Figure 1.16); (2) *macro-financial channels*, where sovereign and bank shocks spill over to companies and households via an economic slowdown or higher interest rates (the green arrows and channels in Figure 1.16); and (3) *bond demand channels* that can exacerbate increases in bond yields (the blue arrows and channels in Figure 1.16).

These channels, which can operate over different horizons, are discussed in more detail below.

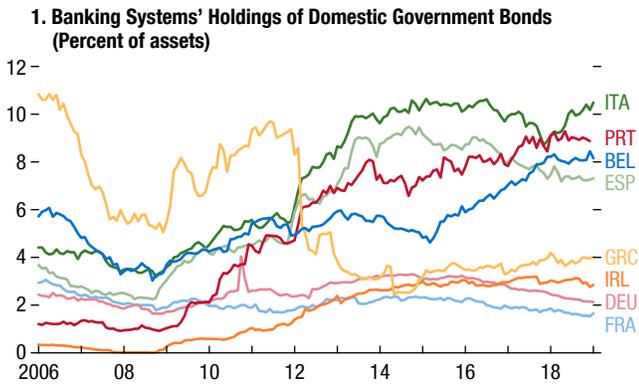
Tighter Links to Governments Have Made Some Banks More Vulnerable to a Sovereign Shock

Financial channels between sovereigns and banks have strengthened in countries with more indebted sovereigns. Domestic government bond portfolios of banking systems are large relative to assets in several countries, particularly Belgium, Italy, Portugal, and Spain (Figure 1.17, panel 1). This may partly reflect the higher yields on government bonds in many of these countries, the use of these bonds as collateral for central bank liquidity facilities, zero risk weights on sovereign bonds (which enable government bond portfolios to increase without reducing Tier 1 capital ratios), and liquidity regulations (which treat government bonds as liquid assets). Data for the banks included in the European Banking Authority's Transparency Exercise (EBA banks) also reveal that the proportion of lower-rated government bonds held by Italian and Portuguese banks, in particular, has increased following downgrades to sovereign credit ratings (Figure 1.17, panel 2).

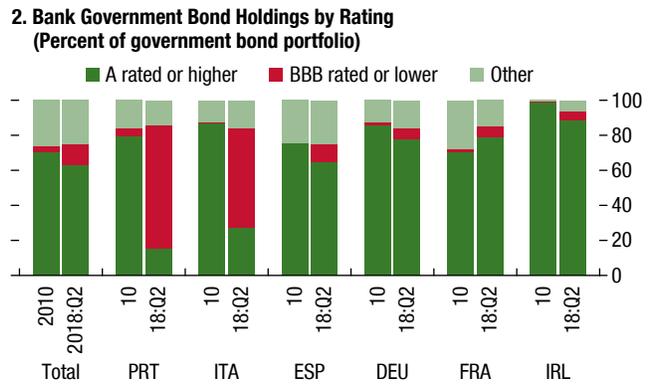
The rising exposure to government bonds, and downgrades to sovereign credit ratings, have made banks in some countries more vulnerable to sovereign shocks (channel 1 in Figure 1.16). Mark-to-market losses on government bond portfolios can be simulated

Figure 1.17. Euro Area Banks, Sovereign Shocks, and Nonperforming Loans

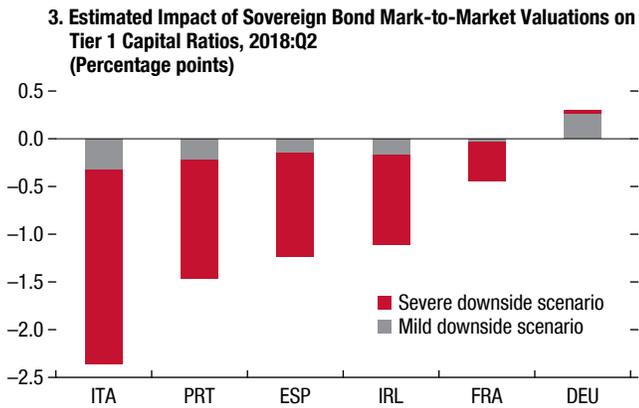
Some banks have strengthened their links to domestic sovereigns ...



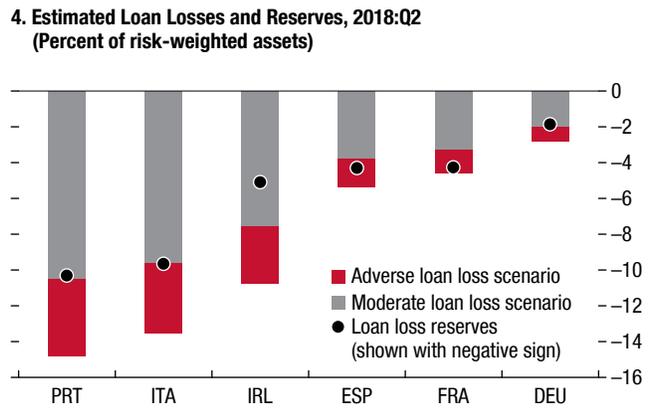
... and sovereign credit ratings have been downgraded in some countries ...



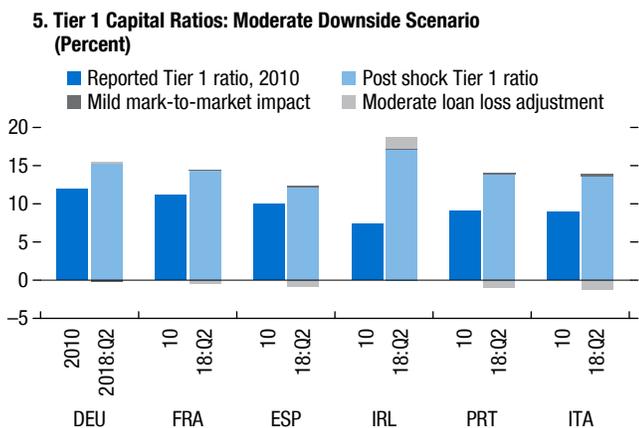
... which together could create losses for banks.



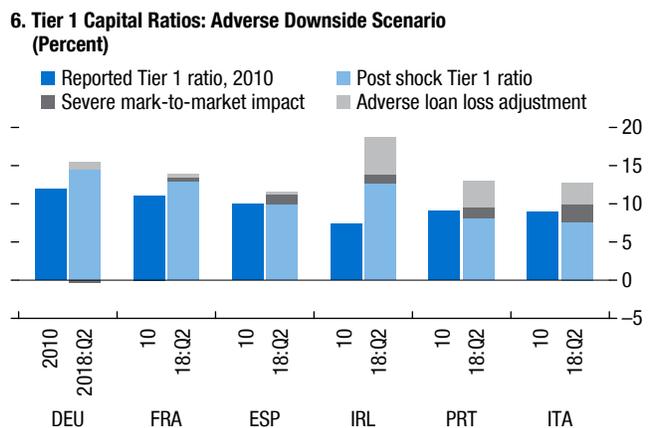
Banks may also need to recognize losses on nonperforming loans that in some countries could exceed loan loss reserves.



Higher buffers have left most banks better prepared for shocks ...



... but in an adverse downside scenario, capital ratios would come under more pressure.



Sources: Banca IFIS; Bloomberg Finance L.P.; European Banking Authority; Haver Analytics; national central banks; PriceWaterhouseCoopers; SNL Financial; and IMF staff analysis.

Note: Panel 1 is based on banking system data, while panels 2–6 are based on the sample of banks in the European Banking Authority transparency exercise (EBA banks). Panel 5 (6) shows the impact of the mild (severe) downside scenario for changes in government bond yields and the moderate (adverse) scenario for the loan loss adjustment. Positive values for the loan loss adjustment and mark-to-market impact in panels 5 and 6 represent a fall in the capital ratio; negative values represent an increase in the capital ratio. The capital ratios include the impact of reductions in risk-weighted assets related to the disposal of unsecured nonperforming loans, which can in some cases result in a negative number (an improvement in the capital ratio) for the impact of the loan loss adjustment; see Online Annex 1.1 for more details. Data labels in the figure use International Organization for Standardization (ISO) country codes.

Table 1.2. Scenario Assumptions

Downside Scenario	1. Scenarios of Changes in Sovereign Bond Yields (Basis points)					2. Loan Loss Adjustment Scenarios (Percent of face value)		
	Sovereign Credit Rating					Type of Nonperforming Loan		
	AAA	AA	A	BBB	BB	Secured	Unsecured	
Mild	-50	0	25	50	75	Moderate	48	65
Severe	-100	50	150	250	425	Adverse	70	90

Sources: Banca IFIS; Bloomberg Finance L.P.; PricewaterhouseCoopers; and IMF staff analysis.

Note: The mild (severe) bond yield scenario approximates to the 90th (99th) percentile of 3-month changes in 5-year sovereign yields over the period 2000–18. These scenarios assume a flight to quality to AAA-rated bonds, which approximates to the 10th (1st) percentile of 3-month changes over the same period. The moderate loan loss scenario assumptions are based on secondary market prices of nonperforming loans from a survey of market participants. The adverse scenario is based on data for sales of nonperforming loans in Italy.

through two scenarios—a mild and a severe scenario—affecting all sovereign bonds held by euro area banks and calibrated to past stress events in sovereign bond markets (Table 1.2). The scenarios are applied to the EBA banks, using the data available from the latest Transparency Exercise. In the severe scenario, sharp rises in government bond yields would generate significant losses for EBA banks in Italy, Portugal, and Spain, in particular (Figure 1.17, panel 3; see Online Annex 1.1 for more details on the methodology).¹⁹

However, to fully assess how well prepared banks are for a reemergence of the sovereign–financial sector nexus, the level of bank buffers should be taken into account. One way of doing this is to estimate the value of bad debts using secondary market prices and offsetting these potential losses with banks’ loan loss reserves and, if these are not sufficient, capital (Table 1.2; see Online Annex 1.1 for more details).²⁰

This exercise is not intended to suggest that all banks should dispose of the remaining stock of bad debts in one go. It is rather meant to be an illustrative assessment to explain how overall bank balance sheet health has changed over time. The analysis—which is again applied to the EBA banks—suggests that the stock of nonperforming loans remains a significant

burden that could potentially induce further losses, which in some cases may be larger than loan loss reserves (Figure 1.17, panel 4).

However, the larger capital and reserves buffers built since the euro area crisis have bolstered bank balance sheets in many euro area countries. In the moderate downside scenario, EBA bank Tier 1 capital ratios—after accounting for mark-to-market changes in government bond values in the mild downside scenario and adjusting for potential losses on nonperforming loans in the moderate scenario—would be higher than they were in 2010 (the light blue bars in Figure 1.17, panel 5). The same is also true for most banks in the adverse downside scenario, though the post shock Tier 1 ratios for Italian and Portuguese EBA banks are slightly lower than in 2010 (Figure 1.17, panel 6).

The results, however, do not account for several factors that could mitigate the impact of sovereign risks on banks. First, lack of available data prevented an assessment of any hedges that banks have in place to mitigate losses on higher government bond yields. Second, market contacts have suggested that some banks may be starting to move their government bond holdings from mark-to-market accounts to held-to-maturity portfolios to reduce the potential for losses (although such a move also reduces balance sheet flexibility). Third, the adjustment to nonperforming loans is based on transaction prices, but there are some categories of nonperforming assets that could have lower loss rates than is assumed in the exercise.²¹ Nevertheless, it

¹⁹These results may not reflect their full range of bank exposures to sovereigns because the analysis does not include loans to state-owned entities or off-balance-sheet exposures. The IMF 2019 Article IV Staff Report for Greece, which included a greater range of sovereign exposures, estimated that a 100 basis point increase in Greek sovereign yields would reduce the four largest banks’ combined common equity Tier 1 ratio by about half a percentage point.

²⁰The loss rates in the adverse scenario are similar to the data on the price of nonperforming loan sales in the Bank of Italy’s Notes on Financial Stability and Supervision, No. 13, Bad loan recovery rates in 2017 (December 2018). This note reports that the price of secured bad loans averaged 26 percent (or a loss of 74 percent of face value) and that the price of unsecured bad loans averaged 10 percent (loss of 90 percent of face value).

²¹In Italy, for example, nonperforming loans classified as unlikely to pay (UTP) could have lower loss rates than other nonperforming loans. If we were to assume that UTP loss rates are 25 percent lower than those on other nonperforming loans, estimated loan losses for Italian EBA banks would be 12 percent lower than in the adverse loan loss scenario in 2018:Q2. Assuming these loan losses, the impact on Italian EBA banks’ Tier 1 capital ratio would be about

should also be noted that this exercise considers only the larger banks in the euro area; it is possible that results could be different for smaller banks in countries where domestic government bond holdings are high.²²

Insurance Companies Could Also Face Significant Losses If the Sovereign–Financial Sector Nexus Reemerges

Insurers are large holders of sovereign and bank bonds. Euro area insurers overall own more than 15 percent of outstanding euro area sovereign bonds—slightly less than the amount owned by banks—and almost 25 percent of euro area bank bonds (Figure 1.18, panel 1). Moreover, the average exposure of European insurers to BBB-rated corporate and sovereign bonds increased from about 5 percent to more than 20 percent from 2008 to 2017 (Figure 1.18, panel 2). With a higher percentage of lower-rated bonds, insurers are potentially more exposed to the impact of a sharp rise in sovereign and corporate bond yields, as well as corporate defaults. In addition, any corporate bond downgrades—particularly to below a BBB rating—could increase capital requirements.

Across countries, insurers' exposure to lower-quality debt varies substantially. Insurers in countries with more indebted sovereigns tend to have a greater share of lower-rated securities in their corporate bond portfolios (Figure 1.18, panel 3). In addition, insurance companies in some countries have a high share of riskier securities (subordinated and hybrid debt) in their bank bond holdings (Figure 1.18, panel 4). Such riskier bank debt is more likely to be written down at times of market stress.²³

These developments have made euro area insurers more vulnerable to the *financial channels* of the sovereign–financial sector nexus (channels 2, 7, and 8 in Figure 1.16). These risks were assessed by applying two downside scenarios to insurers' balance sheets. These include the same shocks to government bond

90 basis points, compared to around 280 basis points in the adverse downside scenario. Comparable data on less impaired nonperforming loans are not consistently available for banks in other countries.

²²The Bank of Italy found in its November 2018 *Financial Stability Report* (Bank of Italy 2018) that a 100-basis-point rise in Italian government bond yields would reduce capital ratios of “significant banks” by 40 basis points, but that capital ratios of “less significant banks” would fall by 90 basis points.

²³Incipient demand for so-called bank bail-in bonds is discussed in EIOPA (2018) and Tanner (2018). Supervisors could consider whether the Solvency II framework is unintentionally motivating insurers to increase exposures to riskier bank debt.

yields that are used for banks, as well as shocks to corporate bond yields (calibrated similarly to the sovereign shocks) and to equity and real estate investments (see Online Annex 1.1 for more details).

These scenarios would imply significant losses for euro area insurers under the severe scenario, particularly for companies in more highly indebted sovereign jurisdictions (Figure 1.18, panel 5). Although most euro area insurers remain well capitalized, a severe scenario would put pressure on insurers that already have lower solvency ratios (Figure 1.18, panel 6). The ultimate impact of these shocks on insurers will, however, be alleviated somewhat by the volatility adjustment under Solvency II. This mitigation will, however, be less effective where insurers have higher-risk portfolios than the reference portfolio used in the volatility adjustment.

Banks and Insurers Could Also Act as a Conduit for Contagion between Sovereigns and the Economy

Macro-financial channels are another potential source of contagion between sovereigns and banks. One channel operates through an economic slowdown, which either cannot be offset by sovereigns with limited fiscal space or that is exacerbated by confidence effects from a sovereign facing fiscal challenges (channel 4 in Figure 1.16). The downturn in the economy would reduce company and household incomes, hampering the debt servicing capacity of these sectors.²⁴ This channel, which typically operates over a longer horizon, could kickstart two other channels of contagion: it could engender another increase in nonperforming loans on bank balance sheets (channel 6 in Figure 1.16) and it could reduce government tax revenues (channel 10 in Figure 1.16).

Another *macro-financial channel* operates through bank funding costs (channel 3 in Figure 1.16). Sovereign and bank credit spreads are tightly correlated, which has already put upward pressure on the cost of new wholesale funding for banks with lower-rated sovereigns (Figure 1.19, panel 1).²⁵ There is a risk that banks could pass on these higher funding costs through an increase in interest rates on their loans

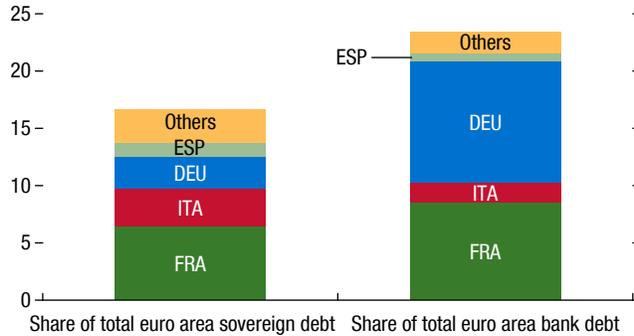
²⁴This channel could also operate through lower government expenditure and potential delays in payments from the government.

²⁵Estimates by the Bank of Italy suggest that a 100-basis-point increase in the spread on 10-year government bonds could cause the yield on new bank bonds to rise by a similar amount.

Figure 1.18. Selected Euro Area Countries: Insurers' Exposures to Sovereign, Bank, and Corporate Bonds

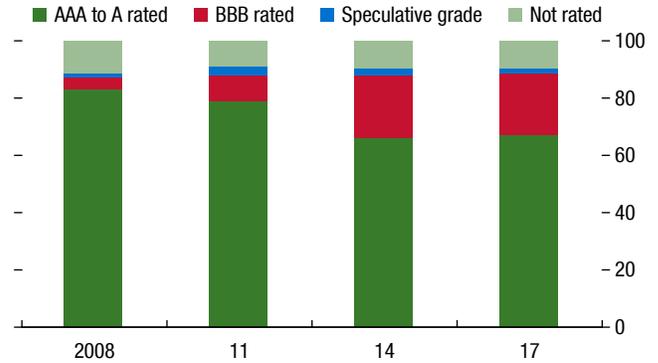
Insurers are important investors in sovereign and bank debt.

1. Holdings of Euro Area Sovereign and Bank Debt by Issuer, 2018:Q2
(Percent of total debt stock)



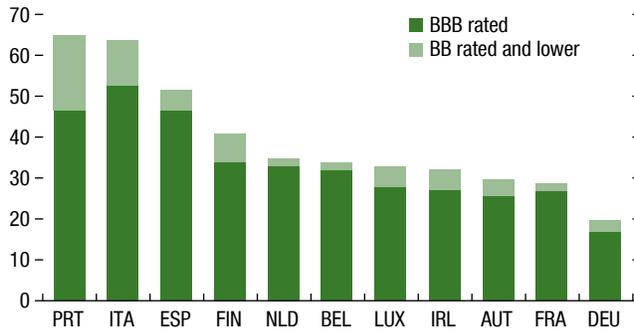
Their holdings of lower-rated bonds have increased ...

2. Sovereign and Corporate Bond Holdings by Ratings
(Percent of total bond holdings)



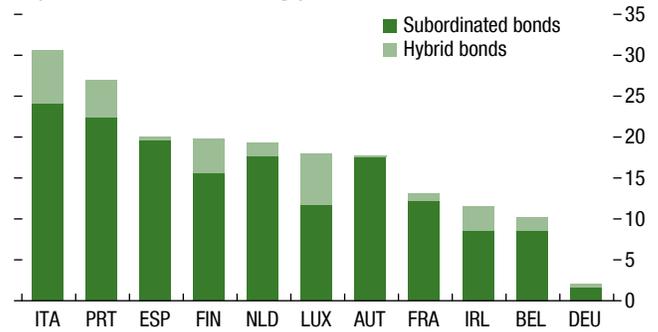
... but vary significantly across countries ...

3. Asset Allocation to Low-Rated Credit, 2018:Q2
(Percent of corporate bond holdings)



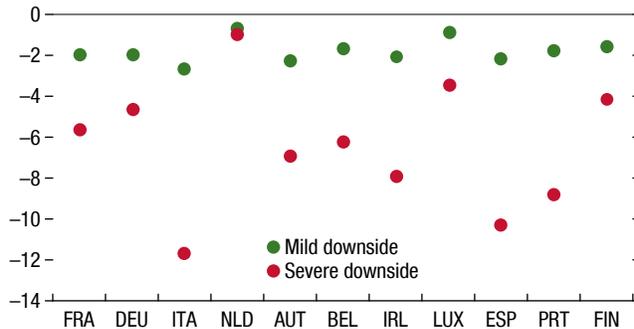
... while some also have significant holdings of riskier bank bonds.

4. Asset Allocation to Bank Subordinated and Hybrid Debt, 2018:Q2
(Percent of bank bond holdings)



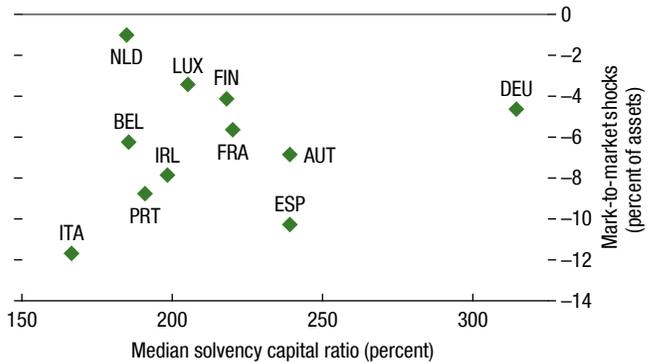
Insurers' sensitivity to shocks differs ...

5. Simulated Mark-to-Market Shocks to Assets, 2018:Q2
(Percent of assets)



... and could be particularly problematic for insurers with lower solvency ratios.

6. Solvency Ratios and Simulated Mark-to-Market Shocks to Assets in a Severe Downside Scenario, 2018:Q2



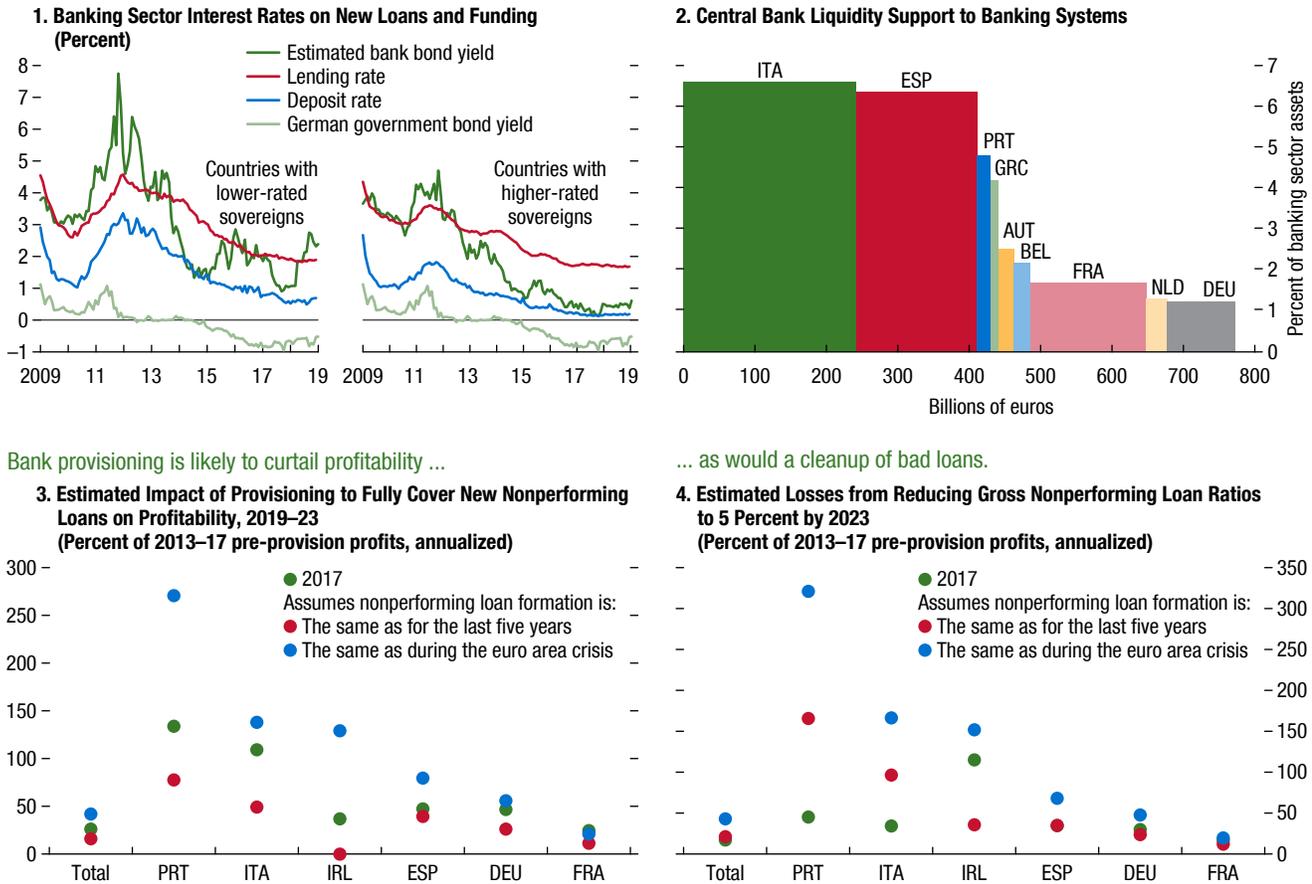
Sources: Arslanalp and Tsuda 2014, update; European Central Bank; European Insurance and Occupational Pension Authority (EIOPA); Haver Analytics; SNL Financial; and IMF staff estimates.

Note: Panel 1 uses EIOPA data for insurers' holdings, Arslanalp and Tsuda (2014, update) for total sovereign debt, and European Central Bank data for bank bonds outstanding. Panel 2 includes non-euro area European countries and includes bottom-up estimates using data from SNL Financial on selected European life insurance companies between 2008 and 2014 and EIOPA in 2017 for European life and non-life insurance companies. Panel 3 includes financial and nonfinancial corporate bonds. Panel 4 uses data included in EIOPA's Financial Stability Report, December 2018. In panels 5 and 6, shocks are applied to aggregate sector balance sheets of insurers as of 2018:Q2. The horizontal axis in panel 6 shows median solvency capital ratios for each country. See Online Annex 1.1 for a detailed explanation. Data labels in the figure use International Organization for Standardization (ISO) country codes.

Figure 1.19. Euro Area Bank Profits and Funding

Some banks are already facing rising wholesale funding costs ...

... but central bank liquidity support should limit rises in the overall cost of funding.



Sources: Bloomberg Finance L.P.; European Banking Authority; European Central Bank 2017 and 2018; Haver Analytics; national central banks; SNL Financial; and IMF staff calculations.

Note: Panels 1 and 2 are for the banking system as a whole, while panels 3 and 4 are based on the banks in the European Banking Authority transparency exercise (EBA banks). Countries with lower-rated sovereigns are those where the government currently has a credit rating of BBB or below (Cyprus, Greece, Italy, Portugal). Panel 1 shows interest rates weighted by the type of loans or deposits. Bank bond yields are estimated using average bank credit default swap spreads in each banking system. Panels 3 and 4 show the amount of pre-provision profits (based on the average profits during 2013–17) that would be absorbed each year over the period 2019–23 by provisions for losses or from the disposal of bad debts in the simulations. Data labels in the figure use International Organization for Standardization (ISO) country codes.

to companies and households (channel 5 in Figure 1.16). However, so far there is no evidence of such an increase, perhaps because central bank liquidity support through targeted longer term refinancing operations—which have recently been renewed by the ECB—has lowered overall funding costs (Figure 1.19, panel 2). Funding problems, however, could be exacerbated if a sovereign is downgraded to below investment grade by all four major rating agencies, as this would make that country’s government bonds’ ineligible to serve as collateral at central banks under current rules.

Banks and insurers could also propagate risks further in a period of stress through bond *demand channels* (channels 11–14 in Figure 1.16). If these institutions have faced significant mark-to-market losses, or if the bonds have been downgraded to below investment grade, banks or insurers’ could be less willing or able to buy.²⁶ Such a fall in demand could add further pressure to yields, raising funding costs further and

²⁶Banks and insurers not facing such losses could be a stabilizing force in markets if they were to buy into a falling market. This may have been one reason why some banks increased their holdings of domestic government bonds during the euro area crisis.

exacerbating mark-to-market losses. Although there are no signs that the end of central bank net asset purchases has affected sovereign yields, this does mean that the private sector will need to absorb a larger amount of issuance, potentially when their willingness to do so could be challenged.

Looking ahead, banks will need to continue tackling nonperforming loans following the introduction of (1) guidance for banks to raise loan loss reserve coverage to 100 percent on new nonperforming unsecured loans within two years and on new nonperforming secured loans over seven years (ECB 2018), and (2) proposals for banks with gross nonperforming loan ratios of 5 percent or above to establish a strategy to manage and mitigate nonperforming exposures (EBA 2018).

This cleanup of balance sheets is needed, but illustrative exercises suggest that it could also curtail profitability (see Online Annex 1.1 for more details). If banks were to increase reserves coverage according to ECB guidance, the required provisioning is likely to be manageable for banks if the formation of bad debt is similar to the past five years. But with a more substantial rise in nonperforming loans, such as during the euro area crisis, the extra provisioning would put a substantial drag on profits for some banks (Figure 1.19, panel 3). Furthermore, if banks were to implement a strategy to reduce their gross nonperforming loan ratios to 5 percent over five years, there would be a substantial drag on profits in countries with a high stock of nonperforming loans, particularly if there was a sharp rise in new nonperforming loans (Figure 1.19, panel 4).

Recent Policy Measures Should Reduce the Risk of Contingent Liabilities for the Sovereign

A final channel of contagion in the sovereign–financial sector nexus is the risk that public sector funds could be used to rescue failing banks, increasing a sovereign’s contingent liabilities (channel 9 in Figure 1.16).²⁷ The Bank Recovery and Resolution Directive’s associated preference for the bail-in of creditors should reduce the likelihood of bail-outs. However, recent cases of intervention in euro area banks suggest that some national authorities have shown a preference for less stringent burden sharing, at a time when loss-absorbing buffers have not been fully developed.

²⁷An additional channel in the sovereign–financial sector nexus is through government holdings of bank equities—for example, if bank profitability comes under strain and dividend revenue falls.

So while the new measures provide a good foundation, they are largely untested, and it may be too early to completely rule out the possibility of spillbacks from banks to sovereigns. In that event, there is a risk that a downside scenario of higher government bond yields could initiate a further round of contagion through the sovereign–financial sector nexus, with negative implications for economic growth.

Vulnerabilities in China, Emerging Markets, and Frontier Economies

Emerging market asset prices have recovered from their mid-2018 sell-off and were generally resilient during the turbulence in global financial markets in late 2018. As investors reassessed the outlook for monetary policy normalization in the United States, portfolio flows to emerging markets turned positive. The resilience of portfolio flows, on aggregate, has been partly due to the trend increase in passive investor flows, as well as flows to China. Given that benchmark-driven investors are more sensitive to changes in global financial conditions than other investors, the benefits of index membership may be tempered by stability risks for some countries. As these investors become a larger share of portfolio flows, external shocks may propagate to medium-size emerging and frontier market economies faster than in the past. China, where vulnerabilities remain high, is becoming an increasingly important driver of emerging market flows. Chinese authorities have been facing a difficult trade-off between supporting near-term growth in the face of adverse external shocks and containing the buildup of financial imbalances.

Recent Market Developments

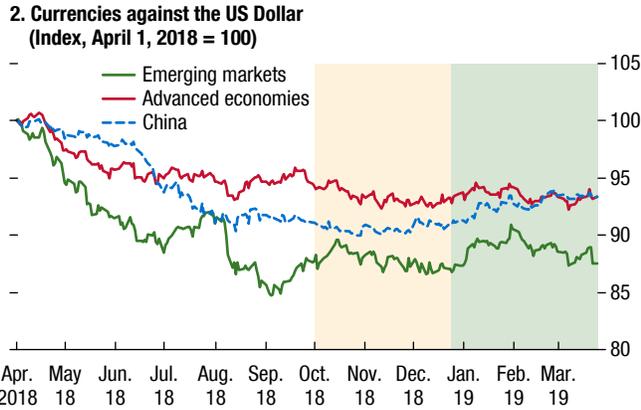
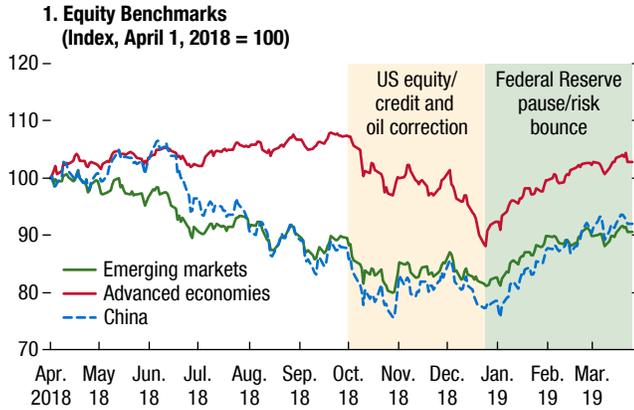
Emerging Markets Have Held Up Well

Emerging market currencies and equities have been resilient during the sell-off in mature markets in late 2018 and have rebounded in early 2019, supported by a turnaround in global risk sentiment. Their outperformance relative to advanced economy currencies and equities in October–December 2018 (Figure 1.20, panels 1–2) was driven by reduced country-specific concerns in major emerging markets (Argentina, Brazil, Turkey), as well as lighter investor positioning and more attractive valuations for emerging market assets after the April–August 2018 sell-off. Although some country-specific concerns have re-emerged recently, overall investor sentiment has been supportive so

Figure 1.20. Recent Developments in Emerging and Frontier Markets

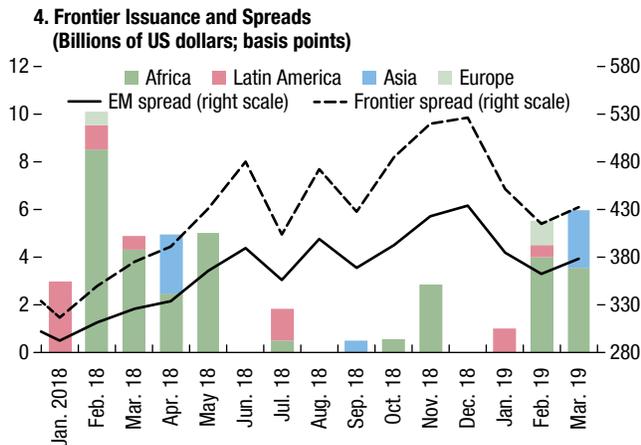
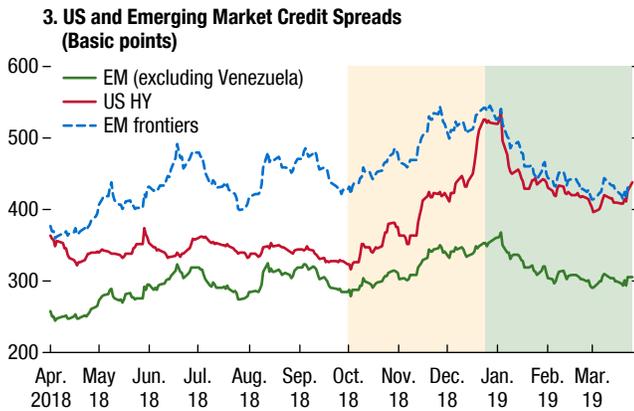
Stability in foreign exchange markets, along with hopes for a US-China trade deal, supported equities.

Currencies have been relatively stable after the sharp sell-off last year.



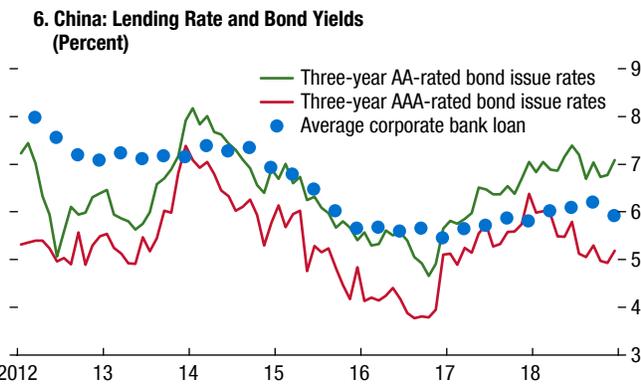
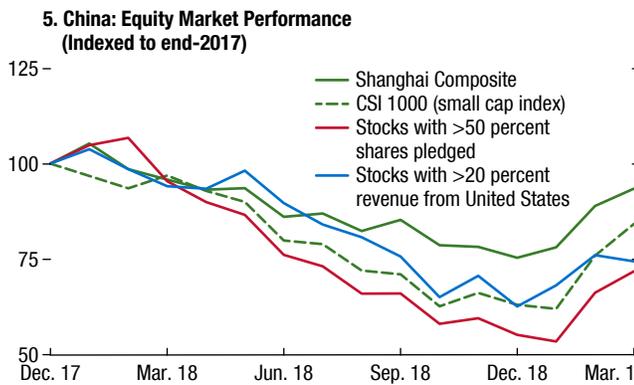
Emerging market credit came under pressure led by weaker issuers, before recovering this year.

After a lull in the second half of 2018, some frontier market issuers have come back to the market.



Chinese equities rebounded in early 2019 after declines due to trade tensions and global volatility.

Policy easing helped partly offset the tightening in financial conditions, but less so for lower-rated firms.



Sources: Bloomberg Finance L.P.; Bond Radar; Haver Analytics; JPMorgan Chase & Co; Wind Information Co.; and IMF staff estimates.
Note: CSI = China Securities Index; EM = emerging market; HY = high yield.

far this year, as investors reassessed the outlook for monetary policy normalization in advanced economies and prospects for de-escalation of US-China trade tensions.

Emerging credit markets have recovered as well but were more affected by the global market turbulence in late 2018 due to the large weight of sovereign issuers with weaker economic fundamentals in benchmark indices (Figure 1.20, panel 3). Among higher-rated issuers, Mexico was a major contributor to the sell-off amid concerns about its major oil company, PEMEX. Bond issuance was subdued in the fourth quarter of 2018. Improved market conditions in early 2019 supported a resumption of bond issuance, including by lower-rated entities, such as Ecuador selling a bond at double-digit yield and Uzbekistan issuing for the first time (Figure 1.20, panel 4). However, debt vulnerabilities remain high for many frontier markets,²⁸ and in many cases new issuance has been at a very high cost.

China's equity market sold off more sharply than other emerging markets in 2018 before rebounding in early 2019. Trade tensions and the global sell-off added to pressures from the financial regulatory tightening campaign (Figure 1.20, panel 5). Equity market declines were also compounded by pressures on share prices of firms that rely on borrowing collateralized by their own shares, which mainly include smaller, privately owned companies (see Box 1.1 for details). To offset tightening financial conditions, Chinese authorities have eased monetary and credit policies. The required reserve ratio for banks was cut three times since the October 2018 GFSR, and a variety of other credit-easing measures and liquidity injections were undertaken. These measures together with improved global risk sentiment have led to the equity market rising by more than 25 percent and nonfinancial credit growth accelerating in early 2019, while funding costs for higher-rated bond issuers and bank borrowers have declined. Yet yields at issuance for lower-rated firms remained elevated (Figure 1.20, panel 6), and bond market defaults rose sharply among private issuers.

²⁸Frontier markets refer to countries included in the J.P. Morgan NEXGEM (Next Generation Emerging Markets) index and low-income countries with international bond issuance that are not part of the index.

Portfolio Flows to Emerging Markets

Portfolio Flows to Emerging Markets Have Been Relatively Resilient

Portfolio flows to emerging markets have rebounded in recent months, after sustained outflow pressures in 2018 (Figure 1.21, panel 1). Portfolio flows had stabilized in the fourth quarter of 2018, despite a challenging external environment. Increased investor risk aversion is estimated to have reduced portfolio flows to emerging markets by some \$20 billion in the fourth quarter of 2018 (or about 10 percent of average annual inflows in 2015-18), adding to the drag from the Federal Reserve's ongoing balance sheet normalization (Figure 1.21, panel 2). The reassessment of the monetary policy normalization outlook provided some offset to these pressures, with partial data for the first quarter pointing to a sizable recovery, led by debt portfolio flows.

Steady inflows into emerging-market-dedicated exchange-traded funds (ETFs) cushioned outflow pressures last year.²⁹ These inflows are part of a longer-term trend. Assets under management in ETFs have been rising steadily as investors have been increasingly attracted by the low cost, high liquidity, and growing availability of such funds for a range of asset markets. For equity ETFs, a large share of inflows has been to China since early 2017 (Figure 1.21, panel 3). These inflows largely reflected MSCI's decision to include certain types of Chinese shares in its most followed benchmark indices. Inflows into hard currency ETFs have been fairly resilient as well (Figure 1.21, panel 4).

Benchmark-Driven Portfolio Flows Are a Growing Share of Flows to Emerging Markets

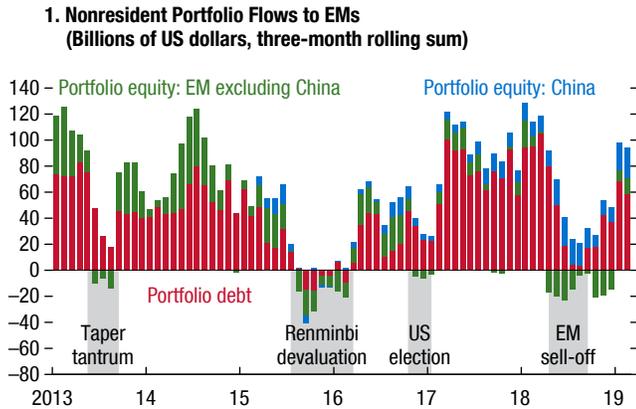
Portfolio flows to emerging markets are increasingly influenced by the behavior of benchmark-driven investors. An investment fund is "benchmark driven" if its portfolio allocation across countries is guided by the country weights in a benchmark index (Figure 1.22).³⁰ The amount of funds benchmarked against widely followed emerging market bond indices has

²⁹ETFs are used by both retail and institutional investors. Anecdotal evidence suggests that asset managers often use ETFs as a cheap, easily accessible place to temporarily "park" funds before investing directly in the underlying assets.

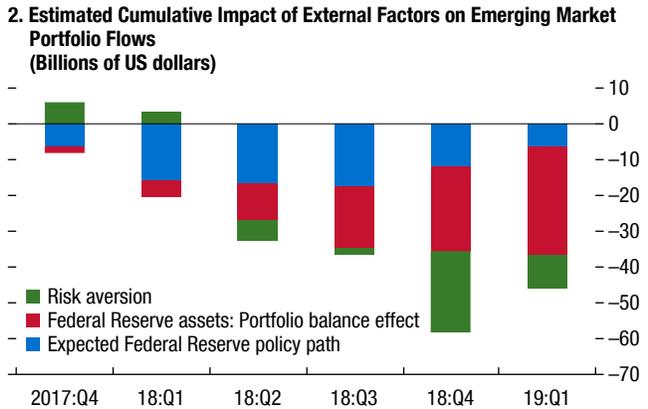
³⁰According to Arslanalp and Tsuda (2015), this differentiation of the investor base is somewhat different from the distinction between passive and active funds, or retail and institutional investors. In particular, the definition of benchmark-driven investors in this GFSR can include "passive," "closet-index," or "weakly active" funds, using the terminology of Miyajima and Shim (2014). Similarly, it can

Figure 1.21. Recent Pressures and Outlook for Portfolio Flows to Emerging Markets

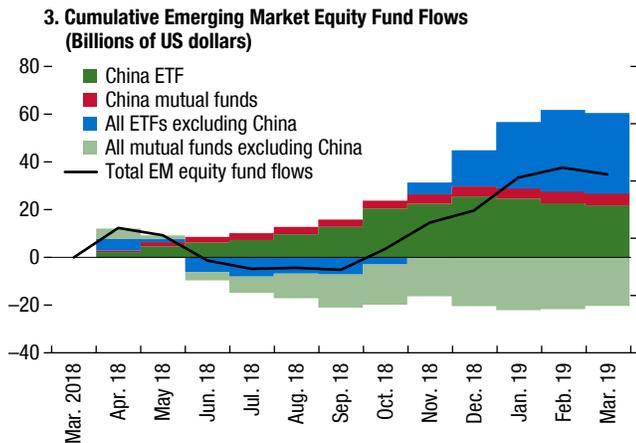
Portfolio flows have rebounded in recent months ...



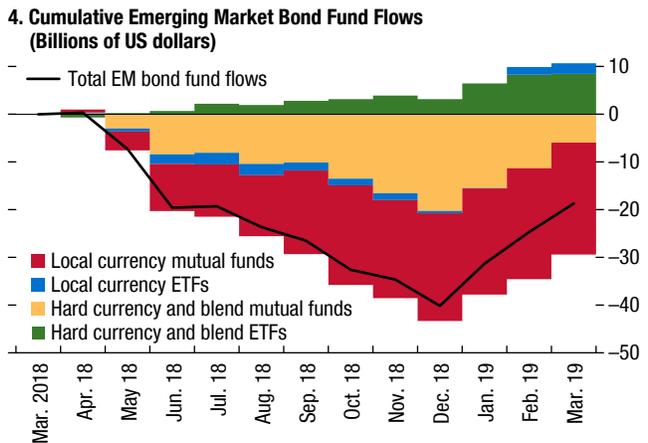
... as the drag from external factors has partially receded.



The resilience of emerging market aggregate fund flows reflected strong inflows in Chinese equities.



Bond fund flows were cushioned by resilient inflows into hard currency ETFs.



Sources: EPFR Global; Institute of International Finance; and IMF staff estimates.
Note: The model underlying panel 2 is discussed in more detail in the October 2017 *Global Financial Stability Report*. EM = emerging market; ETF = exchange-traded fund.

quadrupled in the past 10 years to \$800 billion (see Online Annex 1.1). While ETFs and index funds explicitly aim to replicate the performance of specific benchmarks, most investment funds, including mutual funds and assets managed in separate accounts, tend to follow benchmark indices fairly closely because their performance is assessed against these indices. Estimates suggest that 70 percent of country allocations of investment funds are influenced by benchmark indices (Raddatz and others 2017).

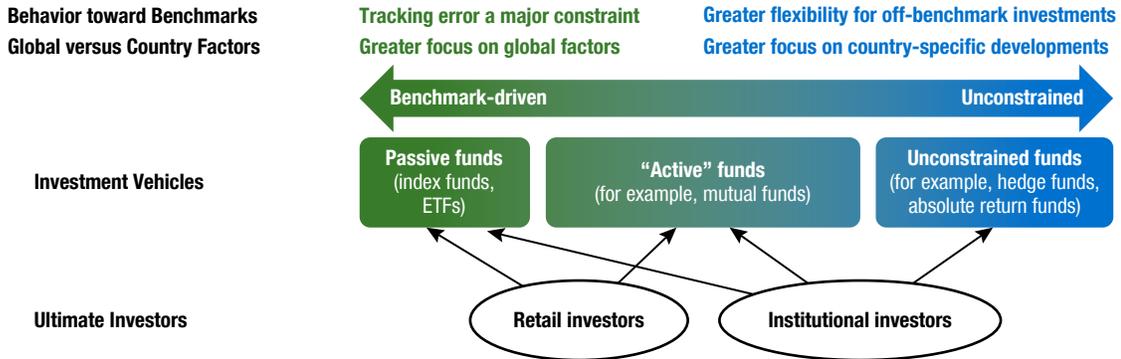
The growing role of benchmark-driven investments entails both benefits and risks for emerging markets. On the upside, inclusion in major benchmark indices provides countries with access to a larger and more diverse pool of external financing. On the downside, benchmark-driven flows to emerging markets can be highly sensitive to global factors and, more generally, to factors common to emerging markets included in benchmark indices. Because benchmark-driven investors tend to treat emerging markets as an asset class—focusing mainly on factors that affect emerging markets as a group, rather than on country-specific developments—benchmark-driven portfolio flows are more sensitive to common factors and therefore

include retail or institutional investors, depending on the investment mandate of portfolio managers.

Figure 1.22. Emerging Market Benchmark-Driven versus Unconstrained Investors

Benchmark-driven investors tend to treat EMs as an asset class.

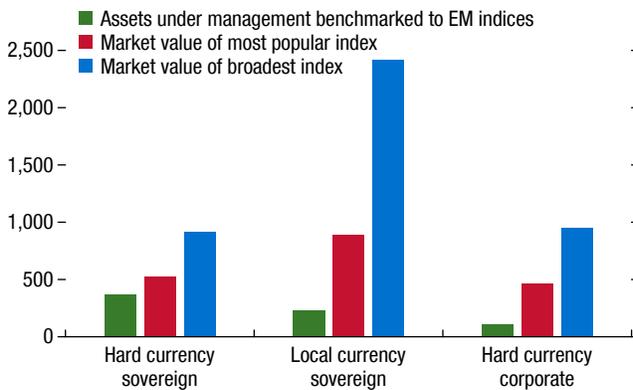
1. Schematic: EM Benchmark-Driven versus Unconstrained Investors



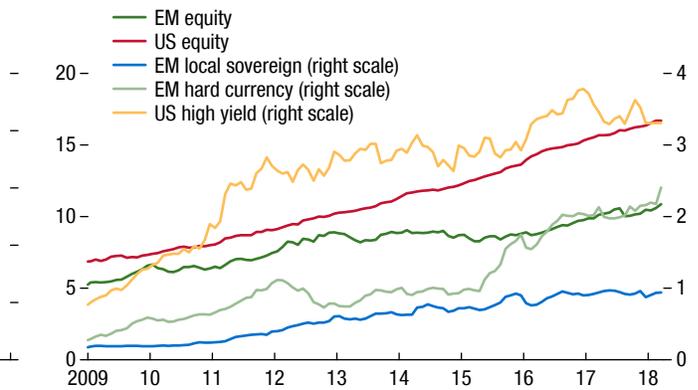
Benchmark-driven investors have a larger presence in hard currency debt than in local currency sovereign debt markets.

Passive investors are still only a small share of the overall asset class.

2. Assets Benchmarked to JP Morgan EM Indices and Market Capitalization (Billions of US dollars)



3. Share of ETFs and Passive Funds as a Percentage of Asset Class (Percent)



Sources: EPFR Global; JPMorgan Chase & Co.; and IMF staff estimates.

Note: In panel 2, "broadest index" refers to the version of the JPMorgan Index without the diversification weighting scheme and with the largest available issuer coverage. "Most popular index" refers to the version of the JPMorgan Index that is most widely followed in its asset class. EM = emerging market; ETF = exchange-traded fund.

more correlated across countries.³¹ As a result, a larger share of benchmark-driven investments in total portfolio flows could increase the risk of excessive inflows or outflows unrelated to countries' economic fundamentals and could, in some cases, have destabilizing effects.

At present, the holdings of benchmark-driven and, in particular, passive investors in emerging markets are not that large relative to the investable universe, especially for local currency debt (Figure 1.22 panel

2). Furthermore, the share of purely passive investors (such as ETFs) remains small for both hard currency and local debt, especially when compared with mature markets (Figure 1.22, panel 3). For now, active managers can still be a countervailing force in terms of flows and price effects, especially in fixed-income markets. For example, monthly surveys of investment funds still show a substantial capacity of managers to deviate from benchmark allocations. In addition, other non-benchmark-driven opportunistic funds (see the October 2018 GFSR) have continued to build large positions in some emerging markets and so far have not faced significant pressure from end-investors to unwind.

³¹For example, Miyajima and Shim (2014) show that asset managers in emerging markets tend to behave in a correlated manner. Some of this behavior is because of common or similar portfolio benchmarks and the directional comovement of end-investor flows.

A Larger Share of Benchmark-Driven Investors Increases the Sensitivity of Portfolio Flows to Global Factors

During two recent episodes of significant capital flow reversals, portfolio flows driven by benchmark investors were less sticky than other types of flows.³² The prospect of faster-than-anticipated policy normalization by the Federal Reserve in May 2013 triggered large portfolio outflows driven by emerging-market-dedicated investment funds, even as other investors (including hedge funds and global investment funds) added to their exposures.³³ Similarly, there were sharp portfolio outflows by emerging market benchmark-driven funds during the most recent emerging market sell-off (between April and August 2018), after almost two years of a steady buildup of their positions in local currency bonds (Figure 1.23, panel 1).

Benchmark-driven flows are highly correlated across countries and highly sensitive to external factors. During 2010–18,³⁴ the average pair-wise correlation between benchmark-driven flows to individual emerging markets and inflows to all other emerging markets was as high as 0.74, compared with only 0.27 for overall portfolio flows based on the balance of payments data (the last two vertical bars in Figure 1.23, panel 2). In addition, flows driven by emerging market benchmarks are about three to five times more sensitive to global risk factors than the balance of payments measures of portfolio flows. For example, a one standard deviation increase in the VIX (which corresponds to a 3.5 percentage point increase) on average reduces invested assets of benchmark-driven emerging market investors by 2 percent, compared with ½ percent for total portfolio investment (Figure 1.23, panel 3).³⁵ Similarly, a one standard deviation increase in US 10-year Treasury yields (which

amounts to 20 basis points) reduces invested assets by 1½ percent, compared with about ¼ percent for total portfolio investment. Furthermore, the sensitivity of benchmark-driven flows to external factors has increased in recent years (Figure 1.23, panel 4).

As a result, an increasingly larger share of emerging market flows may become more prone to reversals in response to shifts in the global environment. A combination of heightened sensitivity to external factors and growing assets under management (see Online Annex 1.1) means that outflows from benchmark-driven funds in response to a given shock can be much greater now than only a few years ago. For example, estimated outflows in response to a one standard deviation interest rate shock using 2013 data are about \$2 billion, whereas this number is close to \$11.5 billion using the latest estimated sensitivity and assets under management (Figure 1.23, panel 5).

The Impact on Individual Countries Depends on Their Benchmark Index Weights . . .

Some countries may be disproportionately exposed to benchmark-driven investors. This is due to index inclusion rules and discretionary choices of index providers. For example, leading benchmark indices for local and hard currency bonds use weighting schemes that cap the weights of very large issuers and boost the weights of smaller issuers. Sovereign borrowers are generally more exposed to benchmark-driven investors than are firms, especially where sovereign debt managers aim to meet the various local investability criteria of index providers (see Online Annex 1.1). Countries with sizable shares of benchmark-driven investors in local currency debt markets include, for example, South Africa and Malaysia (Figure 1.23, panel 6).

Frontier debt issuers have benefited from index inclusion and have become an important part of the emerging market debt asset class. The amount of international debt outstanding from frontier issuers has increased dramatically over the past decade, with more than 20 countries issuing foreign currency bonds for the first time. Frontier issuers account for about 13 percent of the outstanding debt eligible for inclusion in the J.P. Morgan Emerging Market Bond Index Global (EMBIG), but their weight in the more widely used version of the index that caps larger issuers (EMBIG-Diversified) is closer to 23 percent, making them a large beneficiary of benchmark-driven flows (Figure 1.24, panels 1 and 2). Given the sizable contribution of frontier markets

³²Calculations on investor base composition are based on Arslanalp and Tsuda (2015). The group of non-emerging-market benchmark-driven investors includes various unconstrained investors such as hedge funds and absolute return funds but also investors tracking global bond benchmarks. The analysis assumes that investors tracking global bond benchmarks react less to risks specific to emerging markets, given that their overall emerging market exposure is small and more highly rated.

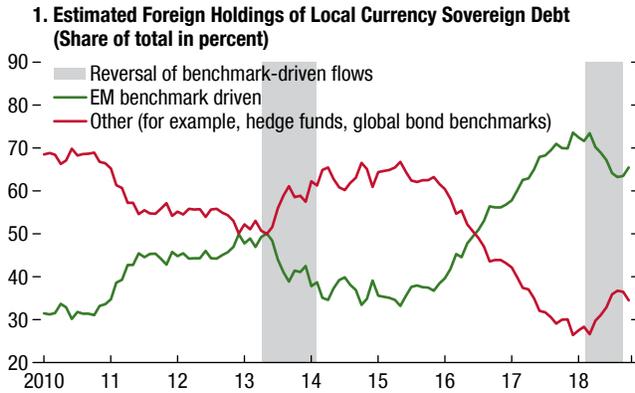
³³Additional exposures through spot and forward currency markets are not captured here.

³⁴The data set used for this analysis uses the EPFR Global flows into investment funds as a measure of benchmark-driven flows. See also the discussion in Online Annex 1.1.

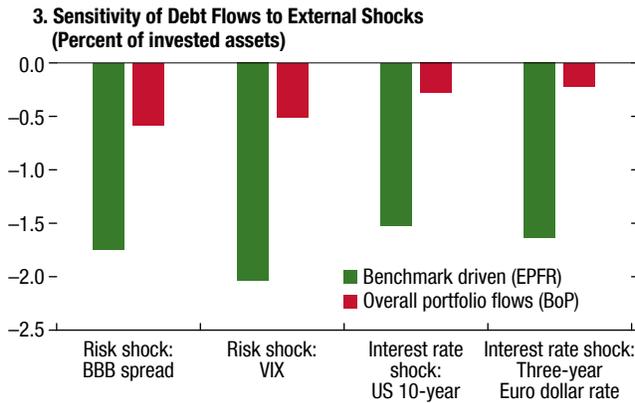
³⁵Estimates are based on a model adapted from Koepke (2018).

Figure 1.23. Benchmark-Driven Portfolio Flows to Emerging Markets

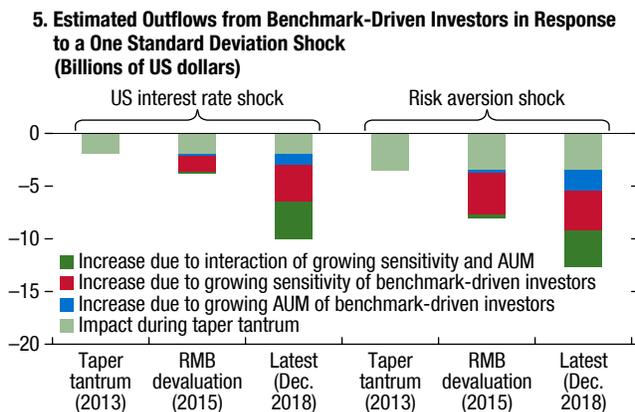
In recent outflow episodes, EM benchmark-driven investors have reduced their holdings rapidly.



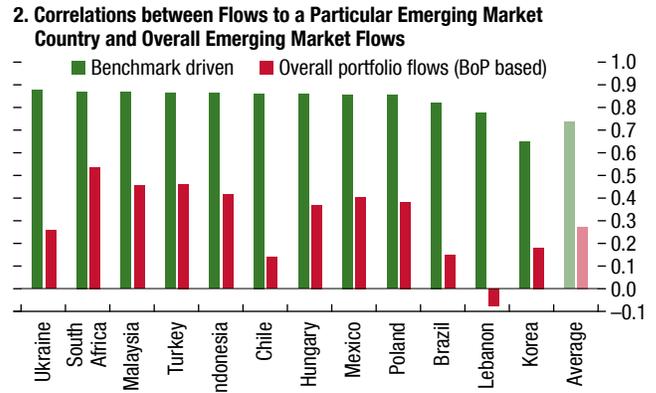
Benchmark-driven flows are highly sensitive to external factors, such as risk appetite and US rates.



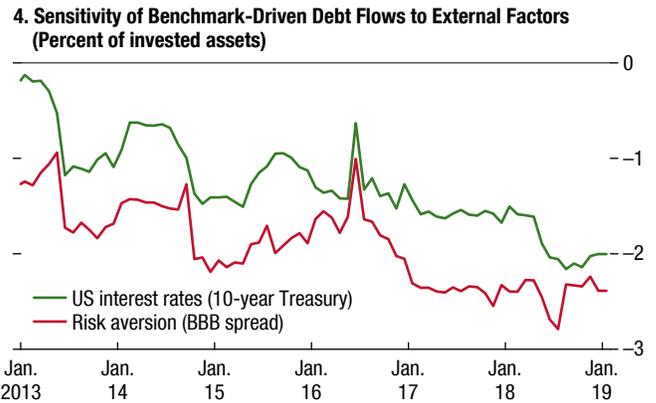
An adverse external shock would result in much larger outflows today than a few years ago.



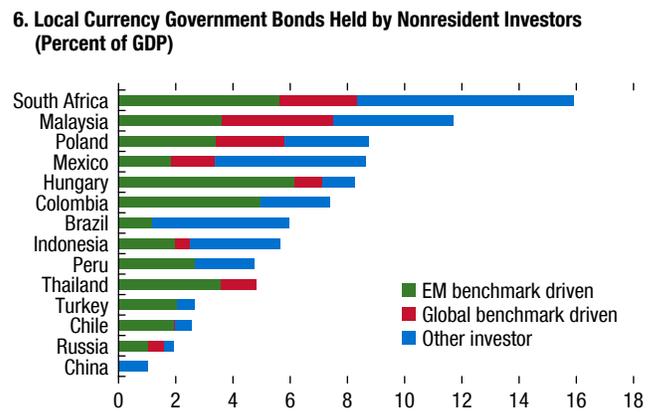
Benchmark-driven flows are highly correlated across countries.



This sensitivity to external factors has increased in recent years.



Benchmark-driven investors play a major role in some emerging market sovereign debt markets.



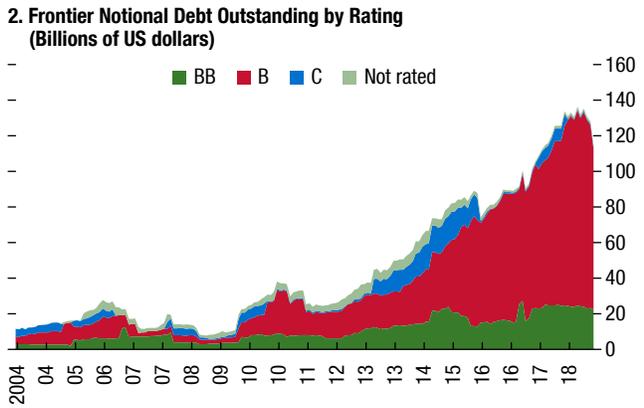
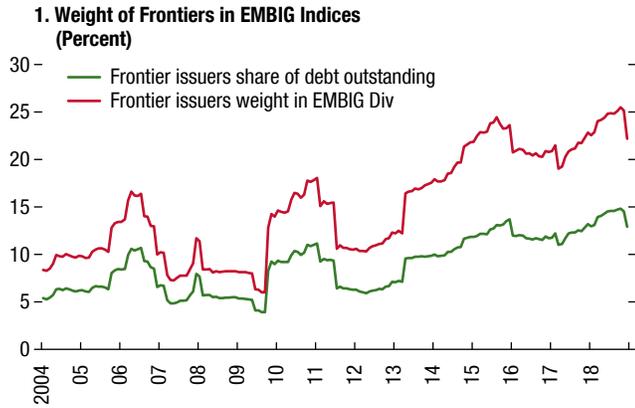
Sources: Bloomberg Finance L.P.; EPFR Global; JPMorgan Chase & Co; Arslanalp and Tsuda (2014); and IMF staff estimates.

Note: In panel 2, correlations are based on EPFR Global's data on country-level flows via investment funds. These data are subject to various measurement and sampling issues. In particular, EPFR estimates country-level flows based on certain assumptions about country portfolio weights because actual data on country-level fund flows are not reported to EPFR. This will tend to inflate estimated correlation coefficients. In addition, India and Thailand were excluded from the analysis because inflows are dominated by domestic funds investing in their own country. Separately, it is worth noting that correlation coefficients for overall portfolio flows are boosted by the fact that overall flows include benchmark-driven flows. In panels 3 and 4, coefficient estimates are calculated for a one standard deviation shock. In panels 4 and 5, coefficients are from a 36-month rolling regression. In panel 6, estimates assume that benchmark-driven investors and foreign investors follow closely the index weights. In reality, deviations for some countries can be substantial. In panel 6, the data are as of 2018:Q2. AUM = assets under management; BoP = balance of payments; EM = emerging market; EPFR = Emerging Portfolio Fund Research, Inc.; RMB = renminbi; VIX = Chicago Board Options Exchange Volatility Index.

Figure 1.24. Emerging Market and Frontier Debt Characteristics and the Impact of China's Inclusion in Benchmark Indices

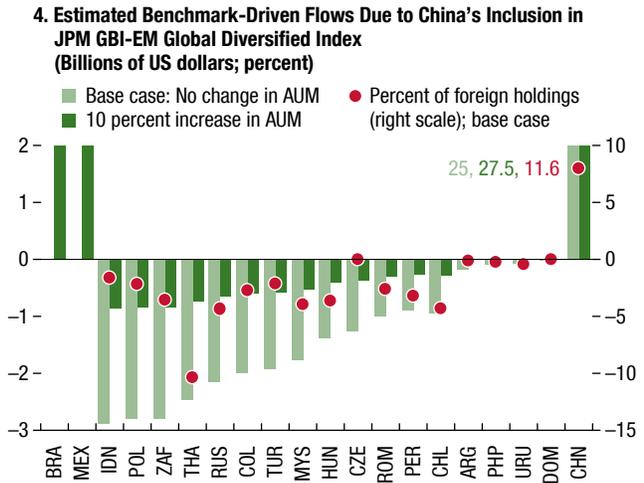
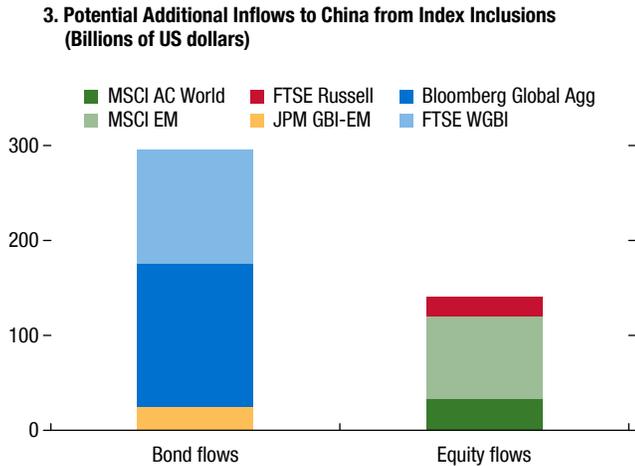
Over the past decade, outstanding frontier debt has increased substantially, with more than 20 debut issuers ...

... mainly from the lower-rated (single B) borrowers.



Increase in China's weight in global benchmark indices is expected to boost RMB portfolio flows ...

... which could lead benchmark-driven investors to reduce exposures to other emerging markets.



Sources: JPMorgan Chase & Co; Arslanalp and Tsuda (2014); and IMF staff estimates.

Note: In panel 4, Thailand's foreign holdings of government debt are predominately in local currency. China's weight in the index is assumed at 10 percent. The numbers for China refer to the values of the two bars and the dot. In panel 4, data on foreign holdings are as of 2018:Q2. Data labels in the figure use International Organization for Standardization (ISO) country codes. AUM = assets under management; Bloomberg Global Agg = Bloomberg Barclays Global Aggregate; EM = emerging market; EMBIG Div = JPMorgan Emerging Market Bond Index Global Diversified; FTSE = Financial Times Stock Exchange Group; JPM GBI-EM = JPMorgan Government Bond Index-Emerging Markets; MSCI AC World = MSCI All Country World Index; RMB = renminbi; WGBI = World Government Bond Index.

to the overall performance of emerging market external sovereign debt, increased incidents of distress among these issuers could lead to redemptions from passive and other benchmark-driven funds, and result in outflows even from countries with strong fundamentals.

... And on the Inclusion of Other Countries in Benchmark Indices

Index inclusion decisions can lead to substantial rebalancing of portfolios and can alter the risk char-

acteristics of the asset class. For example, J.P. Morgan recently included several Gulf Cooperation Council (GCC) countries in the EMBI Global index.³⁶ Given the substantial issuance by these countries over the past few years, their weight is expected to eventually rise to 12 percent. In addition to boosting flows to the GCC countries, this will also lead to an index weight

³⁶This includes Bahrain, Kuwait, Qatar, Saudi Arabia, and the United Arab Emirates. Oman was already part of the EMBI Global.

reduction for other countries and consequently to some rebalancing by benchmark-driven funds. Furthermore, including the GCC countries will also alter the risk and return characteristics of the index; that is, it will increase the average credit rating and the share of oil exporters and, therefore, potentially reduce the price and flow sensitivity of the EMBI Global to global financial conditions and increase its sensitivity to oil price developments.

The inclusion of China's local currency bonds in benchmark indices is expected to boost portfolio flows to China. The renminbi-denominated government and policy bank bonds will be added to the Bloomberg Barclays Global Aggregate Bond Index starting in April 2019 and will be phased in over a 20-month period. With about \$2 trillion to \$2.5 trillion in assets under management tracking the index and expected country weight of about 6 percent (after full inclusion), this could bring \$150 billion in additional inflows to China by 2020. Market analysts expect that inclusion in the Bloomberg index will pave the way for China's inclusion in other bond indices, which could eventually lead to inflows of closer to \$300 billion. Furthermore, the gradual inclusion of China's A-shares in MSCI and FTSE equity indices could boost portfolio flows by more than \$150 billion³⁷—a trend already visible over the past few quarters.

But other emerging markets may see a reduction in benchmark-driven flows due to China's inclusion in benchmark indices. Since emerging markets have a small weight in the global bond benchmark indices, the impact of China's inclusion will be more notable for them when China's local currency debt is included in emerging market benchmarks. For example, inclusion in the J.P. Morgan Government Bond Index-Emerging Markets (GBI-EM) may lead to a potential reduction in fund allocations of \$1 billion to \$3 billion each for most issuers because of the mechanical rebalancing of the index weights.³⁸ These fund flows can be larger for some countries, where benchmark-driven holdings constitute a significant amount of their foreign debt holdings (Figure 1.24, panel 4). In reality, the rebalancing process is likely to

be more complex. Apart from passive investors, other benchmark-driven investors can substantially deviate from the benchmark weights in an effort to outperform the index.³⁹

China's Vulnerabilities

Financial Tightening Has Slowed Credit, but Vulnerabilities Remain Elevated

While vulnerabilities remain elevated in China (Figure 1.4), regulatory tightening has succeeded in containing the buildup in risks. Since the start of a wide-ranging and welcome campaign to strengthen macro- and microprudential regulation nearly two years ago, bank asset growth has slowed considerably, driven by a sharp reduction in claims on other financial institutions (Figure 1.25, panel 1). Banks have largely stopped increasing credit via on- and off-balance-sheet investment vehicles (Figure 1.25, panel 2), leading to slower overall shadow credit growth.⁴⁰ The slowdown was led by a sharp contraction in credit by small and medium-sized banks, which were previously the biggest contributors to the shadow credit expansion.

But less progress has been made in reducing vulnerabilities related to the opaque and still-large stock of investment vehicle assets. The regulatory reforms for the asset management sector, introduced in late 2017, have been scaled back somewhat in recent months, opening opportunities for more risk taking within the sector. Bank wealth management products, the largest investment vehicle type, will be allowed to increase leverage via debt issuance, invest in a wider range of equity and loan assets, and may receive coinvestment from sponsor banks. The implementation schedule (through 2020) has also been eased substantially, delaying the most challenging and fundamental aspects of the reform, such as the reduction of illiquid credit holdings and withdrawal of implicit guarantees. As a result, wealth management products still embed significant maturity and liquidity mismatches, as well as leverage to provide yields well above corporate bond yields (Figure 1.25, panel 3). Money market borrowing by investment vehicles

³⁷The MSCI estimate assumes that the inclusion factor of A-shares rises to 50 percent over the coming years. Currently the inclusion factor is 5 percent and MSCI has announced an increase to 20 percent by the end of 2019.

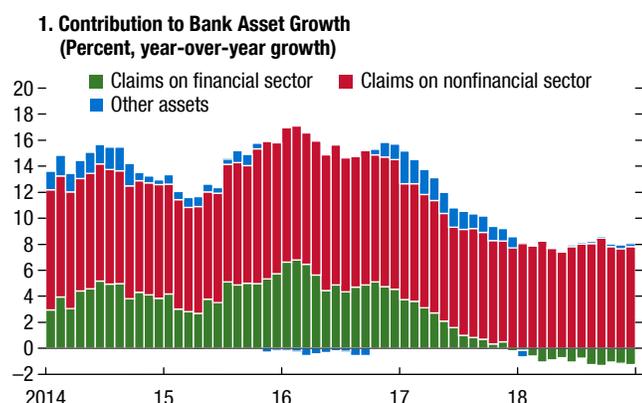
³⁸The mechanical rebalancing of index weights happens gradually over time based on a transition period.

³⁹For example, surveys show that mutual funds tend to underweight certain lower-yielding local markets. In addition, assuming Chinese bonds end up being the most liquid component of the index, they can substitute for some of the bonds of smaller and higher-rated markets and hence attract additional flows.

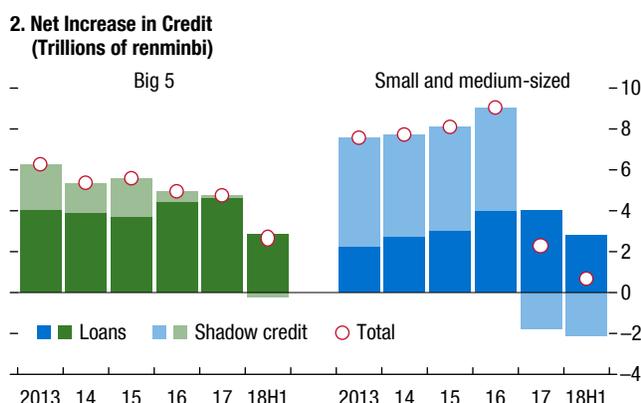
⁴⁰For further details on investment vehicles and the structure of shadow credit, see the April 2018 GFSR.

Figure 1.25. China: Impact of Regulatory Tightening on Credit Expansion

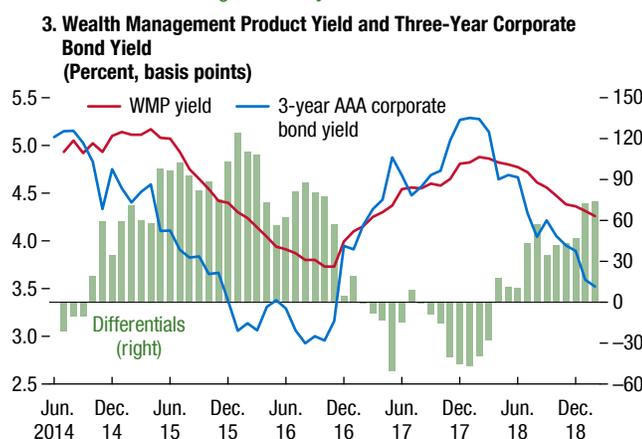
Regulatory tightening has succeeded in reducing linkages between financial institutions ...



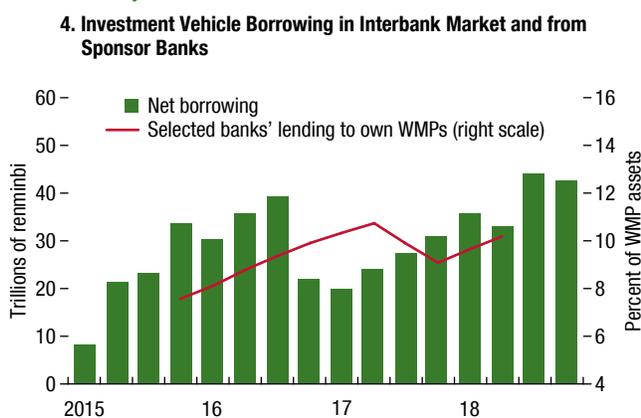
... and curbing shadow credit, especially from smaller banks ...



... but yields on wealth management products remain high, indicating continued use of leverage and risky assets to boost returns.



Investment vehicle short-term borrowing continues to rise, suggesting reforms have yet to reduce risks.



Sources: Bank annual reports; CEIC; Haver Analytics; SNL Financial; Wind Information Co.; and IMF staff calculations.

Note: In panel 2, shadow credit includes both bank-reported on-balance sheet investment vehicles (disclosed holdings of unconsolidated structured entities) and off-balance sheet investment vehicles. The latter is estimated as 65 percent of disclosed off-balance sheet wealth management products, which roughly deducts the proportion of assets that are claims on financial or public sector counterparties; as reported in China Bank Wealth Management Market Annual Report 2017. In panel 4, selected banks' lending to own WMPs based on banks with available disclosures, including for four Big 5 banks and two mid-sized banks that accounted for 43 percent of off-balance sheet WMPs as of 2018:H1. WMP = wealth management product.

remains elevated (Figure 1.25, panel 4), and conversion to net-asset-value-based wealth management products has so far been minimal (just 2.7 percent of all issuance in 2018, from 0.5 percent in 2017).

Bank Weaknesses Exacerbate the Tightening in Financial Conditions for Smaller Firms

Small and medium-sized bank balance sheets remain weak, which is contributing to tighter financing conditions for smaller firms.⁴¹ Profitability and capital

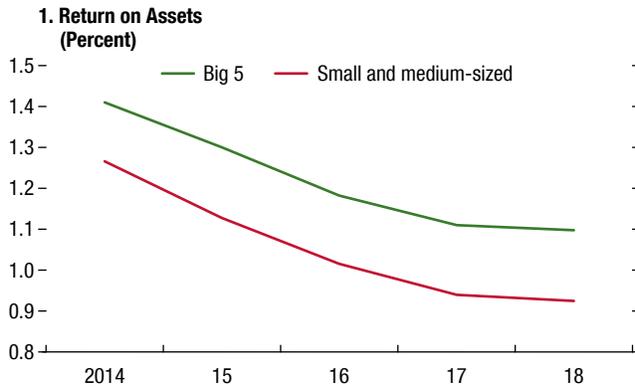
ratios at small and medium-sized banks continue to edge lower (Figure 1.26, panels 1 and 2), with many banks facing core Tier 1 capital ratios near regulatory minimums and significant future capital needs from unrecognized shadow credit positions. Funding cost pressures are also higher at these banks given that they must compete to raise deposits, limiting the benefit of loosening interbank funding conditions. These constraints have limited banks' ability to offset the sharp reduction in their shadow credit with an increase

⁴¹Small and medium-sized banks account for just over half of commercial bank assets, but more than 70 percent of commercial

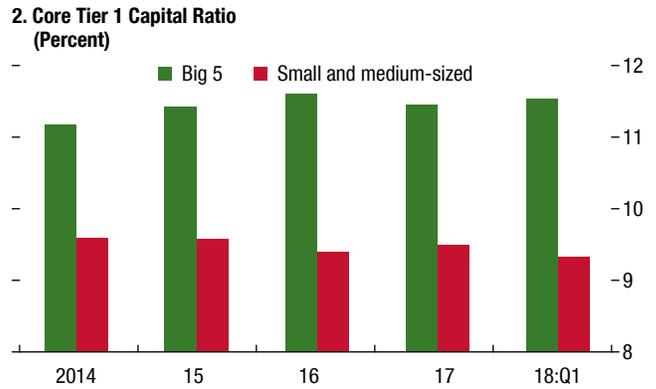
bank loans to small and medium-sized enterprises, and 80 percent of growth in loans to these borrowers since the first quarter of 2015.

Figure 1.26. China: Bank Balance Sheet Weaknesses

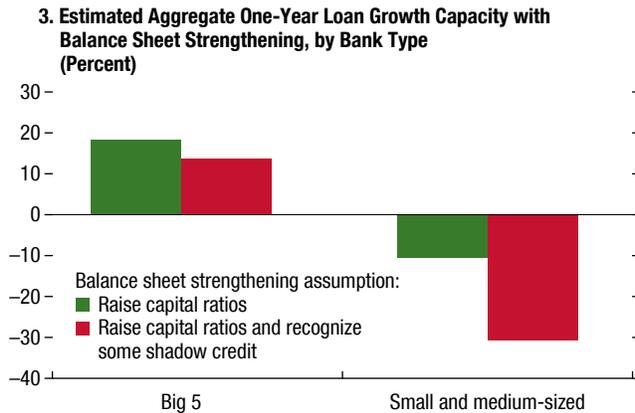
Banks' ability to extend loans to the corporate sector is limited by low profitability ...



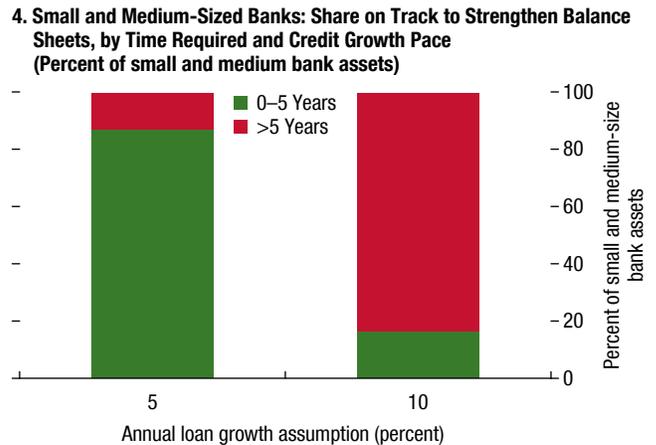
... and weak capital levels.



Banks outside the Big 5 face a trade-off between improving resilience or extending new credit.



Higher credit growth will come at a cost of delaying bank balance sheet repair.



Sources: Haver Analytics; SNL Financial; and IMF staff estimates.

Note: In panels 3 and 4, balance sheet strengthening assumes banks maintain common equity Tier 1 (CET1) ratios equivalent to higher of current ratio or the industry average (10.5 percent), and except in the green bars of panel 3, that banks must hold adequate capital against 50 percent of on-balance-sheet shadow credit and 30 percent of off-balance-sheet shadow credit (wealth management products). In both panels, bank internal capital generation is increased by a 50 percent reduction in the dividend payout ratio and data are based on a sample of Big 5 banks and 25 small and medium-sized banks representing RMB 160 trillion in assets. RMB = renminbi.

in regular loans (Figure 1.26, panel 3), which require more capital and provisioning charges. This has disproportionately affected smaller firms and those with weaker credit profiles, which tend to rely on small and medium-sized banks for credit.

Small and medium-sized banks face challenges in repairing balance sheets. Given relatively weak capital and profitability, these banks face a trade-off between improving resilience and maintaining credit growth. A hypothetical scenario analysis presented in Figure 1.26 aims to illustrate this trade-off:

- *Banks seek to improve their resilience within a year:* If banks were required to increase core Tier 1 equity

ratios to the system average (10.5 percent) and hold adequate capital against roughly half of their on- and off-balance-sheet shadow credit, small and medium-sized banks would have to shrink their current loan books about 30 percent to meet this requirement within one year (Figure 1.26, panel 3).⁴²

⁴²Assumes capital must be held against 50 percent of on-balance-sheet shadow credit and 30 percent of off-balance-sheet wealth management product assets (roughly half of the estimated 65 percent that are nonfinancial credit assets). In addition, each bank is assumed to reduce its dividend payout ratio by 50 percent relative to 2017.

- *Banks maintain credit growth and seek to build resilience over time:* If allowed to achieve the same level of balance sheet strengthening (as above) over time, most small and medium-sized banks would not be able to do so within five years, assuming loan growth of 10 percent (Figure 1.26, panel 4).⁴³ However, if credit were to grow at a lower rate of 5 percent, then most banks would be able to grow out of their problems within five years. Thus, higher loan growth will prolong balance sheet weakness, making it difficult to ease credit conditions for smaller borrowers and leaving banks vulnerable to shocks.

Further Policy Easing without Deeper Reforms May Increase Financial Vulnerabilities

Challenging financing conditions for small and private firms also reflect distortions in credit allocation. While overall nonfinancial corporate credit growth has declined in recent years, financial sector exposures to real estate (to both mortgages and developers) and infrastructure have still expanded faster than lending to other firms (Figure 1.27, panel 1). Most recently, tightening of shadow credit has accelerated this process, with nonbank investors reducing exposures mainly to sectors other than infrastructure and property (Figure 1.27, panel 2). Bond market activity also underscores domestic investors' preference for infrastructure and property exposures. Among similarly rated issuers, infrastructure and property firms consistently enjoy more favorable borrowing conditions compared with other firms, and are affected less severely when market conditions tighten (Figure 1.27, panel 3). Compared with firms in other sectors, these firms' net issuance increases more during periods of easing and declines less during periods of tightening, particularly for lower-rated firms (Figure 1.27, panel 4). This, in part, reflects the perceived government support for real estate valuations (which support lending collateral) and implicit guarantees of government-controlled fundraising entities.

The financial system's bias toward infrastructure and real estate may further increase credit risks and asset price imbalances. Even though banks report that firms involved in property and infrastructure tend to have the lowest nonperforming loan ratios, they also tend to have higher leverage and weaker debt-service capacity than other nonfinancial firms (Figure 1.27, panels 5 and

6). Residential mortgages and property developer loans may offer more collateral for lenders, but real estate and land valuations are stretched, and credit growth in these sectors is likely to worsen asset price misalignments and increase household debt.⁴⁴ Additional infrastructure projects may lack sufficient cash flow and could potentially increase contingent public debt.

Further monetary and credit easing may increase vulnerabilities by tilting credit allocation toward riskier sectors and impeding bank balance sheet repair. Trade tensions and other factors tightening financial conditions have raised downside risks to growth, which have to be carefully managed. Yet given distortions in credit allocation, looser monetary and credit policies may primarily benefit infrastructure and property firms, increasing debt at these firms and among households. Thus, further easing via monetary and credit policies may come at the cost of worsening existing vulnerabilities, undermining the impact on financial conditions and ultimately raising risks to financial stability.

Frontier Market Vulnerabilities

After a lull in the second half of 2018, bond issuance by frontier borrowers restarted early this year and is expected to remain high in 2019 (Figure 1.28, panel 2). Given higher debt vulnerabilities and lower liquidity compared with other emerging market borrowers, market access conditions of frontier and low-income issuers remain highly sensitive to changes in global risk sentiment.⁴⁵ During the risk-off episode at the end of 2018, more than two-thirds of the issuers were facing secondary market yields of 7.5 percent or more, compared with almost 10 percent of issuers a year ago (Figure 1.28, panel 3). Issuers that relied more on capital market financing over the past few years may face significant deterioration in their debt sustainability over the medium term.

Frontier markets with weak debt-management capacity tend to face more market pressures. Debt-management-capacity problems are related to gaps in reporting, recording, and monitoring of public debt (Figure 1.28, panel 1). According to the latest debt recording and monitoring capacity assessment (Group

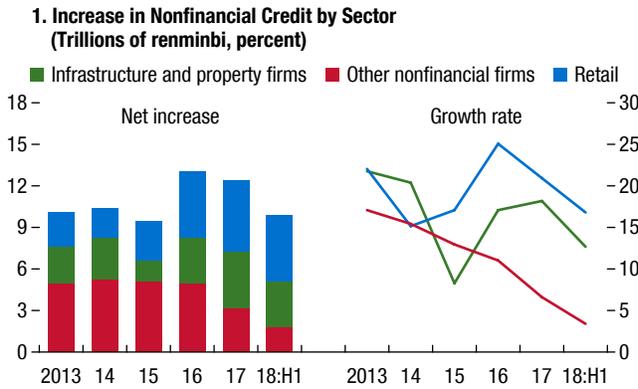
⁴⁴Please see Box 2.3 for more details on housing market vulnerabilities in China.

⁴⁵Please refer to List of Low-Income Country Debt Sustainability Analysis for Poverty Reduction and Growth Trust-Eligible Countries (<https://www.imf.org/external/pubs/ft/dsa/dsalist.pdf>) for more details.

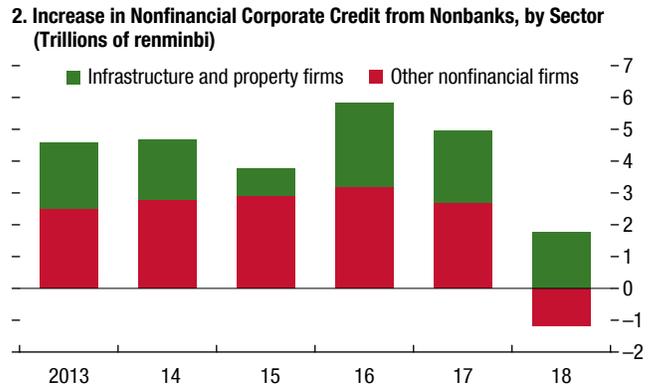
⁴³Profitability (return on assets) and risk-weighted asset density are assumed to remain constant in this scenario.

Figure 1.27. China: Impact of Tightening Financial Conditions on Nonfinancial Firms

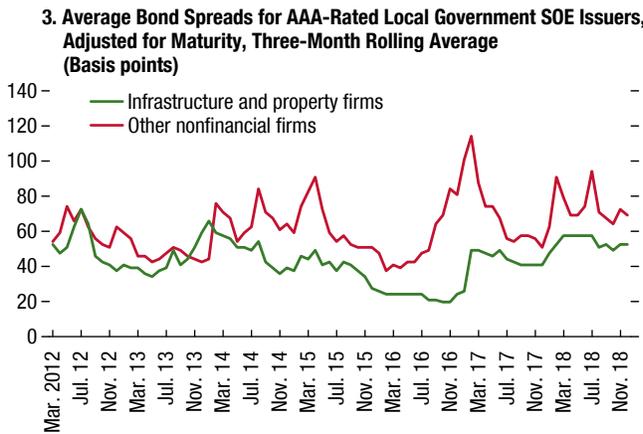
Overall lending to property and infrastructure firms has been resilient ...



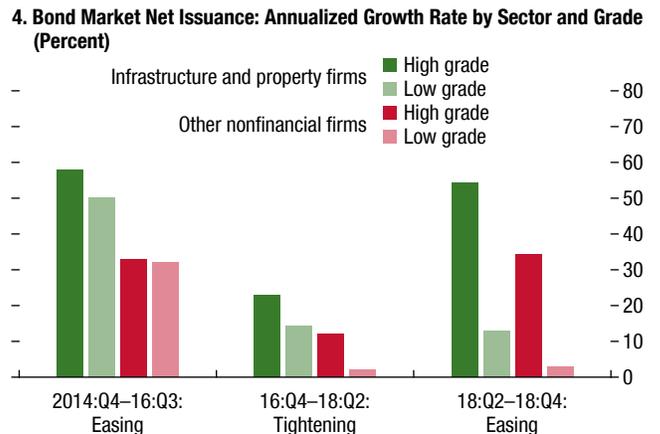
... while nonbank credit to firms in other sectors contracted in 2018.



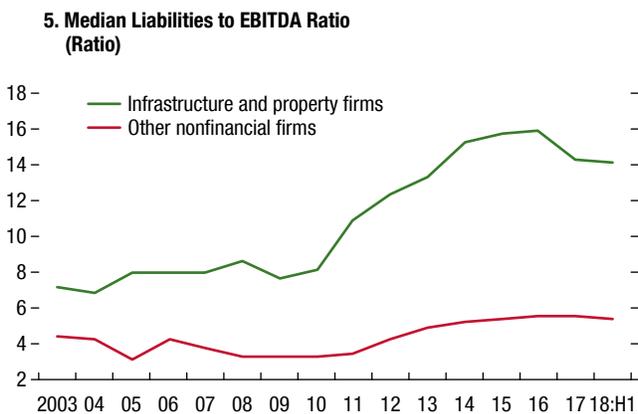
Among similarly rated issuers, infrastructure and property firms enjoy more favorable borrowing conditions ...



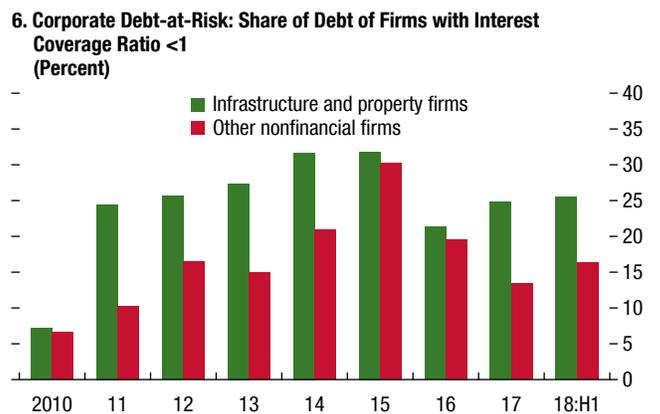
... with greater access to the bond market through the cycle, particularly for lower-rated firms.



However, property and infrastructure firms tend to be more leveraged ...



... and have a larger weak tail of firms than in other sectors.

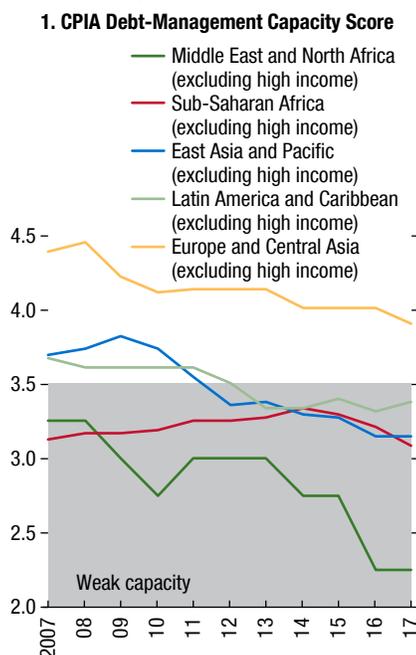


Sources: CEIC; SNL Financial; S&P Global Market Intelligence; Captial IQ database; Wind Information Co; and IMF staff calculations.

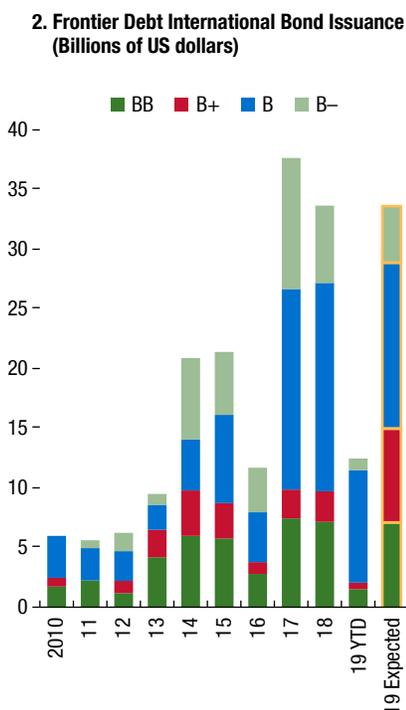
Note: In panel 1, data are based on sector allocations for bank-disclosed loans, corporate bonds, and trust company assets under management. In panel 2, data are based on corporate bonds and trust company assets under management. In panel 4, high grade is defined as AAA-rated firms (at origination), and low grade are firms rated AA+ or lower. In panel 6, firm-level interest expense is estimated using the median cost of funding (interest expense divided by interest-bearing debt) from each sector grouping and time period. Panels 5 and 6 are based on a sample of 3,700 Chinese firms from the Capital IQ database. EBITDA = earnings before interest, tax, depreciation, and amortization; SOE = state-owned enterprises.

Figure 1.28. Frontier Debt Vulnerabilities

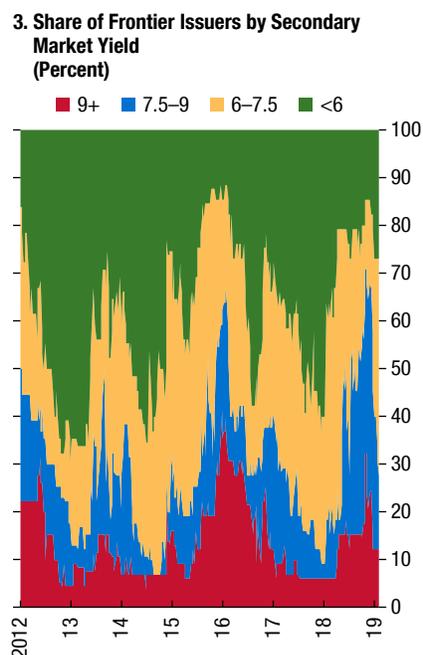
Debt-management capacity has not kept up with increasing reliance on international debt.



Issuance needs are expected to remain high in 2019 ...



... but at higher borrowing costs.



Sources: Bond Radar; JPMorgan Chase & Co; World Bank; and IMF staff calculations.

Note: In panel 1, debt policy rating assesses whether the debt-management strategy is conducive to minimizing budgetary risks and ensuring long-term debt sustainability. CPIA = Country Policy and Institutional Assessment; YTD = year to date.

of Twenty 2018), 32 out of 70 low-income countries were assessed to have weak capacity. In recent years, the Republic of Congo, Ecuador, and Mozambique recognized substantial previously undisclosed liabilities and had to face distressed funding conditions. More recently, market speculation about Zambia’s public debt, as well as uncertainty about short-term sources of financing in Costa Rica, led to a substantial repricing of credit risk and rating downgrades.

Policy Priorities

As the global economic expansion loses momentum, policymakers should aim to prevent a sharper economic slowdown while safeguarding the resilience of the financial system. Monetary policy should be data dependent, and any change in its outlook should be well communicated to avoid unnecessary swings in financial markets or undue compression of market volatility. Macroprudential policies should be used more proactively to affect financial conditions where vulnerabilities are elevated and rising.

Efforts should also focus on developing prudential tools to address risks related to rising corporate debt funded by nonbank credit and to address maturity and liquidity mismatches in nonbank financial intermediaries. Measures are needed to mitigate the sovereign–financial sector nexus. Emerging market economies should bolster their resilience to be able to cope with capital flow volatility. In China, authorities should continue financial sector de-risking and deleveraging policies and put greater emphasis on addressing bank vulnerabilities.

As the credit cycle matures and growth momentum slows, clear communication is critical to avoid a market overreaction to changes in the stance of monetary policy. Monetary policy should be data dependent, and any changes in the monetary policy stance reflecting either changes in the economic outlook or risks surrounding this outlook should be clearly communicated. Sudden shifts in investors’ outlook for monetary policy in advanced economies could lead to swings in risk sentiment and a sharp repricing of risk assets. On

Table 1.3. Availability/Use of Prudential Tools for Different Types of Vulnerabilities

Sectors	Balance Sheet Vulnerabilities							
	Leverage ¹	Liquidity ²	Maturity ³	FX Mismatch ⁴	Leverage ¹	Liquidity ²	Maturity ³	FX Mismatch ⁴
	Countries that Have Relevant Prudential Tools (as percent of all countries)				Countries with Elevated Vulnerabilities and Relevant Prudential Tools (as percent of all countries with elevated vulnerabilities)			
Banks	97	97	21	45	100	100	24	38
Nonbank financials								
Insurers	89	84	0	79	33	50	NA	NA
Other financials	55	62	3	0	50	71	0	NA
Nonfinancial sector <i>(borrower-based tools applied through banks)</i>								
Corporations	69	0	3	17	78	0	0	NA
Households	72	0	24	10	80	NA	NA	NA

Sources: Bank for International Settlements; Bank of Japan; Bloomberg Finance L.P.; China Insurance Regulatory Commission; European Central Bank; Haver Analytics; IMF, Financial Soundness Indicators database; IMF, Macroprudential Policy Survey; S&P Global Market Intelligence; S&P Leveraged Commentary and Data; WIND Information Co.; and IMF staff calculations.

Note: Based on the sample of 29 jurisdictions with systemically important financial sectors. The assessment of vulnerabilities is based on the analysis shown in Figure 1.4. Elevated vulnerabilities refer to countries/sectors with a percentile rank in the respective vulnerability exceeding 60 percent. Cells highlighted in blue have entries below 50 percent, which should be interpreted to mean that 50 percent or more of systemically important countries do not have any prudential tools to address specific vulnerabilities. Some of the reported tools can be classified as microprudential. Based on the available information, it is not always possible to clearly distinguish between availability and use. FX = foreign exchange; NA = not available; NBNI = nonbank noninsurers.

¹Tools reported to target leverage include (1) *prudential requirements for financial intermediaries*, such as capital conservation buffers, countercyclical capital buffers, leverage ratios, requirements for loan loss provisioning, caps on credit growth, limits on variable rate loans, prescriptions for risk weights, and prohibition of securitization and rehypothecation; and (2) *borrower-based tools administered through banks*, such as restrictions on loans or borrower eligibility, outright prohibitions against borrowing, loan-to-value ratios, loan-to-income ratios, and debt-service ratios. In addition, limits on insurance product guarantees are included in this category.

²Tools targeted at liquidity mismatches include liquidity coverage ratios, liquid asset ratios, levies on noncore funding, core funding ratios, reserve requirements for macroprudential purposes, redemption restrictions (for insurers and asset managers), risk management requirements and eligibility criteria (for central counterparties), and nonspecified measures reported to be targeted at liquidity mismatches.

³Tools covering maturity mismatches include net stable funding ratios, loan-to-deposit ratios, and explicit limits on maturity mismatches as well as currency-differentiated versions of those measures and limits on amortization periods.

⁴Tools reported as targeting foreign exchange mismatches comprise currency-differentiated versions of net stable funding ratios, loan-to-deposit ratios, and explicit limits on maturity mismatches as well as caps on loans denominated in foreign currencies, currency-differentiated liquidity coverage and liquid asset ratios, reserve requirements on foreign exchange positions, constraints on foreign exchange funding, and risk weights applying to foreign exchange positions.

the other hand, central banks' communications should not lead to unduly compressed financial market volatility. Central bank independence remains crucial for the credibility and effectiveness of monetary policy.

Policies to Contain Financial Vulnerabilities

Financial sector policies should tackle financial vulnerabilities in an environment in which low yields and volatility are likely to persist. These vulnerabilities include rising corporate debt, increasing house prices, and stretched asset valuations, as well as elevated maturity and liquidity mismatches in parts of the nonbank financial sector (as discussed in "Global Financial Stability Assessment" section). If prudential policies prove insufficient to mitigate medium-term risks to financial stability, consideration should be given to using monetary policy to lean against the wind in countries with strong cyclical positions and inflation at or above target.

In countries where financial vulnerabilities are elevated or rising, policymakers should be proactive in

deploying prudential tools or expanding their macroprudential toolkits as needed. Currently, policy tools to contain vulnerabilities are predominantly administered through banks, including borrower-based tools, but there are virtually no prudential tools to address risks related to rising corporate debt funded by nonbank lenders.⁴⁶ More generally, few macroprudential tools are available to contain vulnerabilities in the nonbank financial sector. Table 1.3 shows the availability and use of prudential tools to address specific balance sheet vulnerabilities (leverage, maturity, liquidity, and foreign

⁴⁶For example, in the United States, interagency guidance on leveraged lending stipulated that transactions where the borrower's total debt divided by earnings before interest, tax, depreciation, and amortization (EBITDA) exceeded six would generally raise concerns for most industries. Similar guidance has also been issued by the European Central Bank. In France, the High Council for Financial Stability has been working on measures to address corporate sector risks, including large-exposure limits for banks on highly indebted firms. There are also examples of borrower-based tools (caps on loan-to-value ratios) for firms being applied to commercial real estate (Bhutan, China, Lebanon, Mauritius, Poland, Tunisia), but those focus on bank credit.

exchange mismatches) in various sectors of the economy for a sample of 29 systemically important jurisdictions and, separately, for a subset of these countries where specific vulnerabilities are elevated based on the assessment provided in the “Global Financial Stability Assessment” section.

Where credit expansion is leading to high debt in one or more sectors of the economy, policymakers should use broad-based macroprudential tools or sector-specific tools:

- *Broad-based macroprudential tools*, such as countercyclical capital buffers, have been activated or increased in several countries,⁴⁷ but more countries would benefit from actively using them to increase their financial systems’ resilience and to cool down credit growth (especially if originating from the banking sector), where it may be posing risks to financial stability. Where credit developments are a concern in a particular sector (corporate or household), countries could consider more targeted sectoral capital buffers for banks or increase risk weights and provisions on such exposures (IMF 2014). Countries should also stand ready to permit use of these buffers when the cycle turns.
- *To mitigate financial stability risks stemming from corporate sector vulnerabilities*, countries may also consider developing prudential tools for highly leveraged firms (akin to those applied to households) where overall debt is systemically high.⁴⁸ In addition, supervisors should ensure that more comprehensive *stress tests*—that take into account macro-financial feedback effects from high corporate sector indebtedness, as well as correlated risks in related sectors (such as commercial real estate)—are conducted for banks and nonbank financial intermediaries with significant corporate exposures.
- *For leveraged loans*, supervisors should take a comprehensive view of risks, intensify oversight, and enforce sound underwriting standards and risk management

⁴⁷Some economies that had already activated a countercyclical capital buffer (Bulgaria, Czech Republic, Hong Kong SAR, Iceland, Lithuania, Norway, Slovak Republic, Sweden) have announced or implemented further tightening countercyclical capital buffers in 2018. Four countries (Denmark, France, Ireland, Luxembourg) also announced activation of the buffer in 2018. At the end of this year, three economies (Hong Kong SAR, Norway, Sweden) will have buffers at 2.5 percent.

⁴⁸A highly indebted corporate sector may pose risks to the financial system because of banks’ direct exposures to indebted firms (including through loans, deposits, and contingent liabilities such as lines of credit, warehousing, or pipeline risk) as well as because of indirect channels; higher corporate debt would tend to exacerbate an economic downturn.

practices at banks and nonbank financial intermediaries active in the market. To better align interests between intermediaries and end investors, risk retention rules applied to originating lenders should remain an important tool for improving the quality of assets being securitized and sold to nonbanks.

- *To mitigate financial stability risks linked to rising house prices*, loan-to-value ratios, debt-service ratios, and/or debt-to-income ratios should be applied more consistently and broadly to nonbank lenders and should be calibrated to increase resilience to shocks to asset prices, interest rates, and incomes. The desirability of limiting regulatory arbitrage argues for enforcing the same limits for lending by nonbank financial institutions. Applying multiple indicators provides a more holistic view and limits opportunities for regulatory arbitrage.

Further efforts are needed to develop an adequate prudential toolkit for nonbank financial institutions:

- *For insurance companies*, recent regulatory developments, such as the implementation of Solvency II in Europe, have helped strengthen insurers, but the work on global risk-based insurance capital standards should continue. Where there are concerns about specific exposures (as discussed in “The Euro Area Sovereign–Financial Sector Nexus” section), supervisors should provide guidance to insurers on enhancing their risk management practices for default risk and correlation risk, as well as on appropriate treatment of subordinated and “bail-inable” bond investments. The development of a holistic framework for the assessment and mitigation of systemic risk in the insurance sector should move forward.
- *For asset managers*, supervisors should encourage robust risk management and stress testing. Where needed, prudential policies could include harmonized methodologies for leverage calculation, as well as limits on leverage or credit extension, minimum levels for liquidity buffers, and more specific guidance on liquidity management in investment funds. Proper liquidity risk management is crucial, given rising liquidity risks in some segments of the sector. Currently, the availability of liquidity management tools varies significantly across countries.

More broadly, a rollback of regulatory reforms should be avoided, and the integrity of the institutional framework for macroprudential oversight should be maintained or further strengthened.

Policies to Address the Sovereign–Bank Nexus

Highly indebted sovereigns should take action to place their debt-to-GDP ratios on a downward trajectory. A gradual fiscal adjustment is needed to reduce fiscal risks—where they are elevated—based on policies that will support medium-term growth, as discussed in the April 2019 *Fiscal Monitor*.

Euro area banks should continue to repair their balance sheets. Efforts to reduce the level of nonperforming loans through a comprehensive approach should continue. The introduction of nonperforming loan guidance is welcome, but more action is needed to reduce backlogs in bad debt recovery processes. For example, minimum standards for insolvency and creditor rights, and rules for valuation of collateral would help the resolution of bad debts.

Policies aimed at addressing links between banks and sovereigns should be designed from a holistic perspective, as discussed in the October 2018 GFSR. For example, consideration could be given to mitigating concentration risk in banks' sovereign exposures through coordinated policies in Europe. However, policies that improve banks' resilience to sovereign shocks and discourage banks from holding excessive amounts of sovereign bonds should be designed to minimize possible procyclical effects and financial stability risks in the banking sector.

The European Commission's Bank Recovery and Resolution Directive and associated bail-in requirements aim to reduce contingent liabilities for the sovereign in the event of bank stress. Currently, there is scope to minimize bail-in through approaches that differ from the euro area resolution rules, such as resolution under national bank insolvency regimes. These national regimes should be harmonized. In addition, an alternative means of flexibility should be introduced, such as a financial stability exemption, subject to strict conditionality and appropriate governance arrangements (as advocated by the euro area Financial Sector Assessment Program). This exemption would allow departure from minimum bail-in requirements only when financial stability is clearly at risk, thereby minimizing spillbacks from banks to sovereigns.

Policies to Increase Resilience in Emerging Markets and China

Emerging markets should be prepared to cope with foreign portfolio outflows:

- *Reduce external vulnerabilities and strengthen buffers:* Emerging market sovereigns should aim to reduce excessive external liabilities and reliance on short-term debt, as well as to maintain adequate fiscal buffers, bank liquidity buffers, and foreign exchange reserves. Countries where foreign currency risks pose challenges for banks could consider phasing in currency-differentiated liquidity coverage ratios. Authorities should also monitor risks related to the foreign ownership of local currency bonds, especially when a large share of these bonds is held by benchmark-driven investors.
- *Use the exchange rate as a shock absorber (in countries with flexible exchange rate regimes) and intervene in foreign exchange markets if market conditions become disorderly:* Before intervening, policymakers should consider the level of the exchange rate relative to fundamentals, the adequacy of foreign exchange reserves, the monetary policy stance, and private sector balance sheet exposures in foreign currencies.
- *Use capital flow management measures on outflows only in crisis or near-crisis situations:*⁴⁹ These measures should not substitute for necessary macroeconomic adjustment and should be part of a comprehensive policy package to address the causes of the crisis. When warranted, such measures should be transparent, temporary, and nondiscriminatory. Given that certain capital flow management measures can lead to exclusion from benchmark indices, the externalities of such a decision should be considered carefully.

Sovereign debt managers should act to mitigate short- and medium-term rollover risk in a more challenging environment. As volatility and rates increase, markets may show limited appetite for the low-volume and higher-risk issuers that have recently experienced relatively easy market access. Such issuers need to plan ahead to avoid refinancing difficulties that could spill over to the broader emerging debt markets.

As the volume of passive and benchmark-driven investment rises, index membership may become not only a benefit, but also a financial stability consideration for some emerging markets. With the importance of benchmark-driven portfolio flows increasing, a close dialogue is needed between index providers, the investment community, and regulators. Enhanced transpar-

⁴⁹See IMF (2012, 2015, 2016).

ency by index providers, such as on eligibility criteria for index inclusion and advance communication of forthcoming index changes, can help promote greater consistency and less flow volatility. Issuers should strive for index inclusion where prudent and avoid introducing fragmentation and concentration risks by premature or partial inclusion of debt instruments in international bond indices.

In China, authorities should continue financial sector de-risking and deleveraging policies and put greater emphasis on addressing bank vulnerabilities, even as they take steps to mitigate the impact of external shocks. Authorities have had success in containing the buildup in financial risks by slowing credit growth. To build on this progress, credit growth should continue to moderate in a gradual manner consistent with orderly deleveraging. Reflecting prog-

ress so far in financial regulatory tightening, shadow banking activity has contracted, but the process of credit reintermediation has absorbed bank capital and required additional funding from nonbank financial institutions. Bank capital buffers should be further strengthened via external injections or profit retention. Timely and effective implementation of announced asset management reforms will also be important in this regard, given that it will help credibly delink banks from their sponsored investment products and associated risks and reduce implicit guarantees in the financial system. Finally, structural reforms (such as reducing the emphasis on growth targets and tightening budget constraints for state-owned enterprises) will also be critical to reduce credit misallocation, especially to sectors that benefit from perceived government support, such as property and infrastructure.

Box 1.1. China's Share-Collateralized Lending and Its Financial Stability Implications

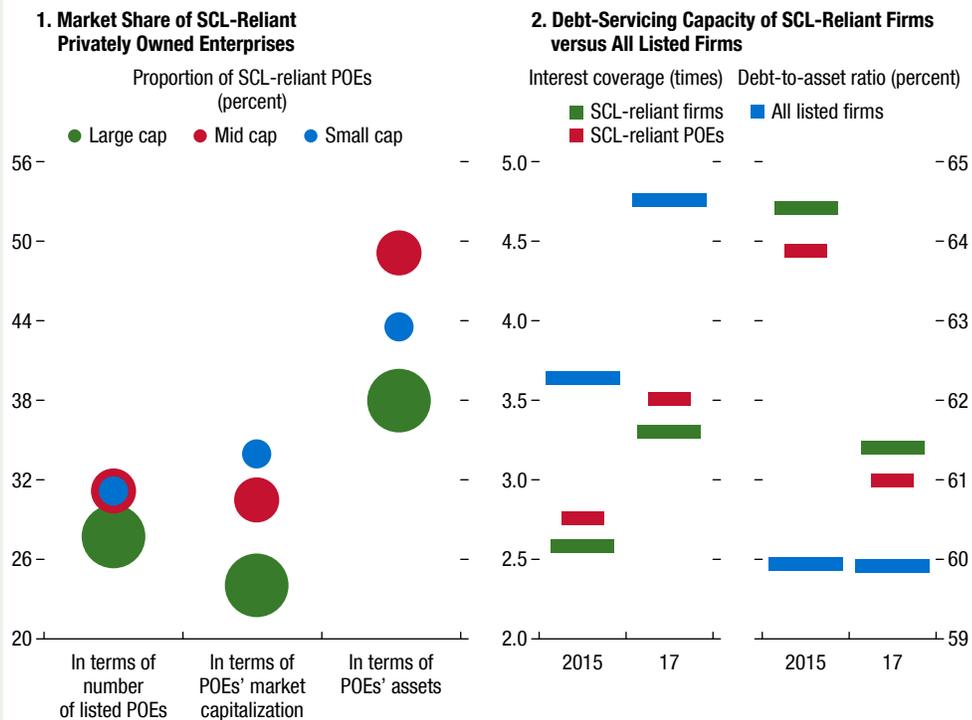
China's sharp equity market declines in 2018 were compounded by pressures on firms reliant on share-collateralized loans (SCLs). These firms saw equity prices fall by more than 40 percent at the trough, weighing on the overall stock market, which declined as much as 26 percent (see Figure 1.20, panel 5). This could have been in part due to investors selling the shares of these firms in anticipation of SCL lenders eventually doing the same to protect their collateral, or otherwise seeking additional collateral that would weaken the firms. The share price declines have likely added to liquidity pressures on SCL borrowers, creating a negative feedback loop between stock market developments and the financial positions of these firms.

This phenomenon may have exacerbated the tightening in financial conditions for smaller and privately owned firms in late 2018, as these firms appeared to be particularly reliant on SCLs.¹ About 20 percent of the market value of privately owned enterprises' listed shares are pledged for SCL, compared with 3 percent for central state-owned enterprises and 6 percent for local state-owned firms. As of the end of October 2018, SCL-reliant firms—firms with at least 30 percent of shares pledged to lenders—accounted for 44 percent of listed private firm assets and 15 percent of all listed firm assets. Notably, nearly half of all mid-cap private nonfinancial companies were SCL-reliant (Figure 1.1.1, panel 1). Widespread distress of these firms

This box was prepared by Sally Chen, Kevin Chow, and Henry Hoyle.

¹Stock pledging—the practice by major shareholders of pledging companies' shares as collateral for loans—boomed in 2016 and 2017 following authorities' deleveraging campaign, which reduced the tightening of the flow of credit to riskier borrowers.

Figure 1.1.1. China: Market Share and Debt-Servicing Capacity of Firms Reliant on Share-Collateralized Lending



Sources: WIND Information Co. database; and IMF staff calculations.

Note: SCL-reliant firms are firms with at least 30 percent of shares pledged to lenders. In panel 1, each bubble shows the share of SCL-reliant firms within each market capitalization grouping. Cap = capitalization; POE = privately owned enterprise; SCL = share-collateralized lending.

Box 1.1 (continued)**Table 1.1.1. Share-Collateralized Lending Exposures by Lender Type, as of October 2018**

	Banks	Trust Companies		Securities Firms	
In RMB billion ¹ :	434–651	318–478		1,118–1,676	
As percentage of ² :	Bank lending to firms ²	Trust company balance sheets ³	Trust company balance sheets and client assets ⁴	Securities firm balance sheets ³	Securities company balance sheets and client assets ⁴
	0.4–0.7	38.4–57.6	1.3–1.9	17.5–26.3	5.2–7.7

Source: Wind Information Co. database; and IMF staff calculations.

Note: SCL = share-collateralized lending.

¹Ranges shown are estimated loan amounts assuming loans are 50% to 75% of the market value of pledged shares as of October 2018. Loans are usually 50–60% of pledged share value at origination but must be closed out when loan-to-collateral value ratios rise above 75% due to share price declines.

²Estimated SCL extended by banks as a share of bank lending to firms.

³Estimated SCL extended by trust companies or securities firms as a share of their own assets.

⁴Estimated SCL extended by trust companies or securities firms as a share of their own assets plus client assets under management.

could put at risk the viability of a sizable segment of the sector. SCL-reliant firms also tend to have weaker balance sheets—lower debt-service capacity and higher leverage—than the broader sector (Figure 1.1.1, panel 2).

SCLs also pose risks to lenders because the value of the loan collateral is exposed to market volatility and is highly correlated with the borrower's debt-servicing capacity. The largest SCL lenders are securities firms (about 52 percent of total market value of pledged shares as of October 2018), followed by banks (about 21 percent) and trust companies (about 15 percent), with the remainder mostly nonbank financial institutions such as asset management and investment firms. Direct exposures to SCLs are relatively small for banks (0.4 percent of corporate loans) but could be more significant for securities and trust firms, depending on how much of these loans were made on balance sheet,

or otherwise implicitly guaranteed (see Table 1.1.1). Data for the seven largest securities firms imply that on-balance-sheet SCL exposures are significant at about 10 to 20 percent of assets.

Although immediate financial stability risks from this practice appear limited at this point, authorities should further tighten SCL practices to ensure that this form of lending does not pose risks to market functioning or financial stability in the future. The authorities should continue to reduce distortions favoring state-owned enterprises and reduce credit overhang at unviable borrowers. Advancing market reforms will also discourage small privately owned enterprises from more risky forms of borrowing from nonbank financial intermediaries.

Special Feature: Liquidity Risks in Capital Markets

Postcrisis financial regulatory reforms and technological innovations have reshaped the marketplace dramatically. Implications of these developments for the resilience of market liquidity are not yet well understood.¹ Although there is no clear evidence that market liquidity has significantly worsened during normal trading days, the increased incidence of “flash crashes”—when liquidity evaporates suddenly—has prompted concerns about its fragility. By muddling price discovery and amplifying swings in asset prices, poor market liquidity conditions can exacerbate tightening in financial conditions and increase financial stability risks. This Special Feature provides a brief overview of the key structural changes that may have affected market liquidity and applies the framework introduced in the October 2018 Global Financial Stability Report (GFSR) to analyze liquidity conditions in equity and sovereign bond markets over the past six months. It shows that since September 2018, incidence of liquidity strain has increased, with sovereign bond markets being more prone to episodes of liquidity strain than equity markets.

Structural Changes in the Supply of and Demand for Market Liquidity

The increased instances of flash crashes in recent years, even in the most liquid markets, have raised concerns about the fragility of market liquidity. Just over the past year, “flash” episodes include the yen spike in January 2019, the sharp drop in S&P 500 futures in early December 2018, and the flash rally in US Treasuries in June 2018. Market analysts attribute these developments to a combination of postcrisis changes in financial regulation, growth of passive investors, and technological advances, which have had profound implications for the demand for and supply of market liquidity.

Tighter financial regulation and supervision have affected banks’ incentives and ability to provide market-making services. On the one hand, postcrisis regulatory reforms have increased the resilience of systemically important financial institutions and mar-

kets. On the other hand, however, tighter leverage and capital requirements for banks have arguably increased the cost of providing capital market services and changed dealers’ incentives to make markets—leading, for example, to some dealers cutting services to less profitable clients (Adrian, Boyarchenko, and Shachar 2017). In the United States, the Volcker Rule has also curtailed banks’ proprietary trading activities. Overall, there has been a notable reduction in bank trading books across most jurisdictions during the postcrisis period (Figure 1.SF.1, panels 1 and 2).

Technological advances have changed the nature of liquidity provision. Although traditional broker-dealers still dominate the client business (Brainard 2018), they have been facing increasing competition from nonbank principal trading firms (PTFs)² as alternative market makers. The main advantages of PTFs over traditional market makers are higher speed and lower execution costs of transactions, achieved by using automated high-frequency trading strategies (Figure 1.SF.1, panel 3, and Table 1.SF.1). Other features of PTFs are as follows:

- *PTFs generally tend to be concentrated in liquid instruments.* PTFs are most prevalent in standardized, exchange-traded products, such as equities and Treasury futures (Table 1.SF.1). On US dealer-to-dealer electronic platforms, banks and broker-dealers currently account for less than 40 percent of total volumes, with PTFs making up more than half.
- *PTFs tend to use greater leverage, particularly intraday, than dealers.* Regulation of PTFs is minimal, with many jurisdictions just beginning to register them, despite their sizable share of trading volume. PTFs are not subject to capital and liquidity requirements similar to those applicable to banks.³

²A PTF is a principal investor that deploys proprietary automated trading strategies. It may be registered as a broker-dealer but does not have clients as in a typical broker-dealer business model (US Department of the Treasury and others 2015).

³In the United States, the binding capital constraint for brokers and dealers is capital requirements, mandated by the Securities and Exchange Commission. If a PTF is a designated market maker at the New York Stock Exchange, for example, it must maintain capital equal to the greater of \$1 million or 15 percent of market value of 60 trading units for each symbol for which the broker-dealer subsidiary is registered as the designated market maker.

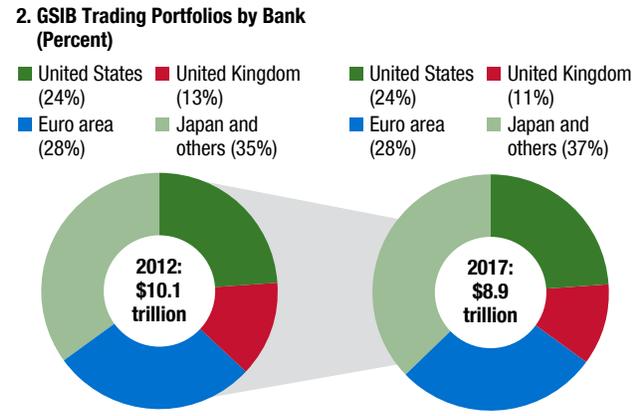
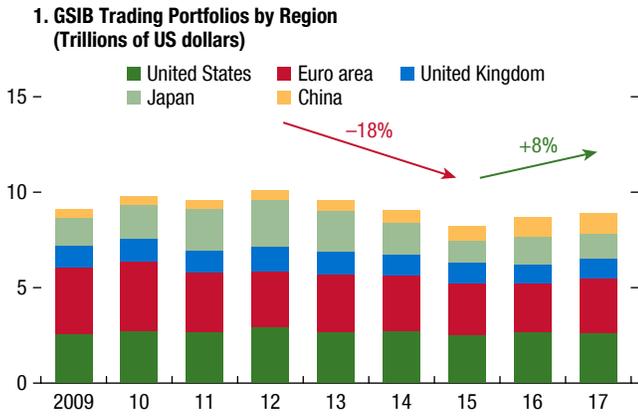
The authors of this feature are Rohit Goel, Piyusha Khot, Sheheryar Malik and Aki Yokoyama, with inputs from Rebecca McCaughrin, and Thomas Piontek.

¹The most commonly used definition of liquidity is the ability to trade a large amount in a short period of time close to the current price. See IMF (2015).

Figure 1.SF.1. Structural Changes in the Provision of and Demand for Market Liquidity

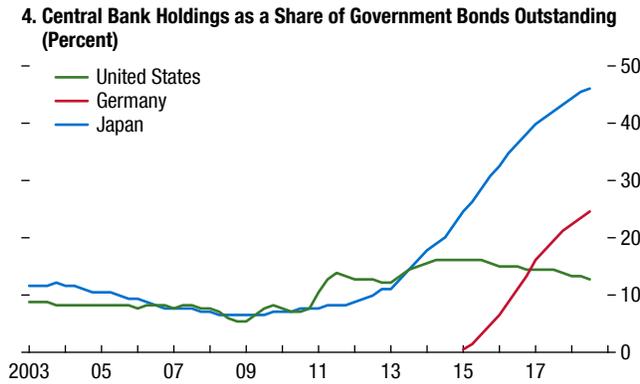
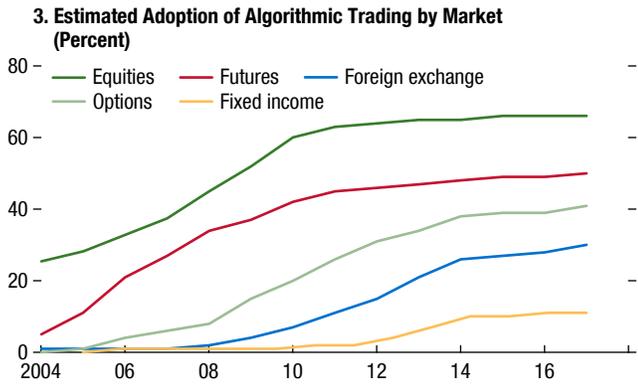
Postcrisis regulatory changes coincided with an initial reduction in bank trading books ...

... with declines occurring proportionally across most jurisdictions.



Market participants have been increasingly using algorithmic trading.

Share of central bank holding of government bonds has increased.



Sources: Aite Group; Bloomberg Finance L.P.; equity research reports; Federal Reserve Board; SNL Financial; and IMF staff calculations. Note: For panels 1 and 2, trading portfolio calculations include trading and available for sale securities. In panel 3, estimates are by Aite Group. GSIB = global systemically important bank.

On the investor side, the growing share of assets under management of exchange-traded funds (ETFs) and passive investors⁴ could affect the demand for liquidity:

- *ETFs* offer investors a liquid instrument with exposure to a portfolio of securities with varying liquidity and risk characteristics. The increasing participation of mutual funds and *ETFs* in less liquid markets may have increased their liquidity mismatches.⁵
- The growth of assets under management of *passive investors* that track market index returns could induce greater correlation of component securi-

ties (Sushko and Turner 2018). This increases the likelihood of herding behavior by market participants, implied by higher correlation, and could have adverse implications for market liquidity.

Finally, adoption of unconventional monetary policies by central banks in response to the global financial crisis—specifically, asset purchases—has also affected the supply of and demand for liquidity (Figure 1.SF.1, panel 4). On the supply side, expanding central bank holdings of safe and liquid assets (government securities) resulted, by design, in reduction of the free float of securities available for investors. On the demand side, expansionary monetary policies nudged investors to reach for yield through exposure to duration and credit risk in less liquid asset classes. This portfolio rebalancing channel

⁴See “Vulnerabilities in China, Emerging Markets, and Frontier Economies” section.

⁵See Chapter 1 of the April 2018 GFSR.

Table 1.SF.1. Penetration of Electronic, Automated, and High-Frequency Trading

The degree of “electronification” varies across markets and geographic areas.



Based on Share of Volume Traded	Equity Futures	Treasury Futures	Cash Equities	Foreign Exchange Spot	Cash Treasuries	European Cash and Futures Government Bonds	Japanese Government Bonds	Interest Rate Swaps	Investment Grade/High-Yield Corporate Cash Bonds
Electronic Trading	90%	90%	50–80%	80%	70%	60%	60%	20–50%	15–50% ¹
Automated Trading	–	–	70%	45%	55%	–	–	–	–
High-Frequency Trading	40%	60%	35–70%	25–30%	–	–	–	–	–
Major Electronic Brokering Platforms	CME, ICE, Tradeweb, Eurex, SGX, ASX	CME	Large number of platforms and dark pools	EBS/NEX Markets, Reuters, Currenex, FX Connect, Bloomberg, 360T	eSpeed/NASDAQ Fixed Income, BrokerTec, Dealerweb, Bloomberg	EuroMTS, Eurex, Tradeweb, MarketAxess	BB Super Trade, Tri-Trade, J-GATE, Osaka Exchange	Bloomberg, Tradeweb, Tullet, DTCC, Icap, ICE, CME, NYSE, Euronext, Nasdaq	MarketAxess (the largest), Tradeweb, TruMid, Bloomberg, Liquidnet (a dark pool)

Sources: Bank for International Settlements; Greenwich Associates; McKinsey; Rosenblatt Securities; and discussions with market participants.

Note: Electronic trading is characterized by trading conducted on platforms, whereas automated trading refers to a subset of electronic trading that relies on algorithms for decision making and execution of order submissions. High-frequency trading is a subset of automated trading strategies where trading is executed algorithmically and via low latency (less delay). OTC = over the counter.

¹A total of 15 percent to 20 percent of corporate bond trading in the US investment-grade corporate bond market is conducted electronically, whereas about 50 percent of trading volume is conducted electronically in European investment-grade corporate bond markets and 20 percent in high-yield markets.

may have reduced (general) risk premiums across asset classes (as intended), potentially driven by compression in liquidity risk premiums.

Standard Liquidity Metrics May No Longer Adequately Reflect Market Liquidity Conditions and Risks

Given the changes in market structure discussed above, standard daily liquidity indicators may not fully capture market liquidity risks and should be interpreted with caution:

- *Standard quantity-based market liquidity measures show some signs of deterioration, whereas price-based measures appear relatively more robust.* Turnover ratios (defined as trading volumes relative to securities outstanding) have declined across markets since the global financial crisis (Figure 1.SF.2, panel 1), along with realized volatility. In some markets, a lower free float ratio (defined as the portion of publicly traded company shares) contributed to lower turnover ratio.⁶ Meanwhile, bid-ask spreads for major markets

⁶Increased average tenors of debt since the global financial crisis could have also contributed to a lower turnover ratio.

have been relatively tight, though there has been some deterioration in a few foreign exchange markets in recent years, and in equity markets in recent months (Figure 1.SF.2, panel 1). One possible reason is that, as traditional dealers (banks) have continued to reduce market-making capacity, their main margin of adjustment has been through quantities rather than prices (for example, by reducing or cutting services to smaller, less important clients) (BIS 2016). In the foreign exchange market, bid-ask spreads widened following increased margin requirements in 2015 (PricewaterhouseCoopers LLP [PwC] 2015).⁷

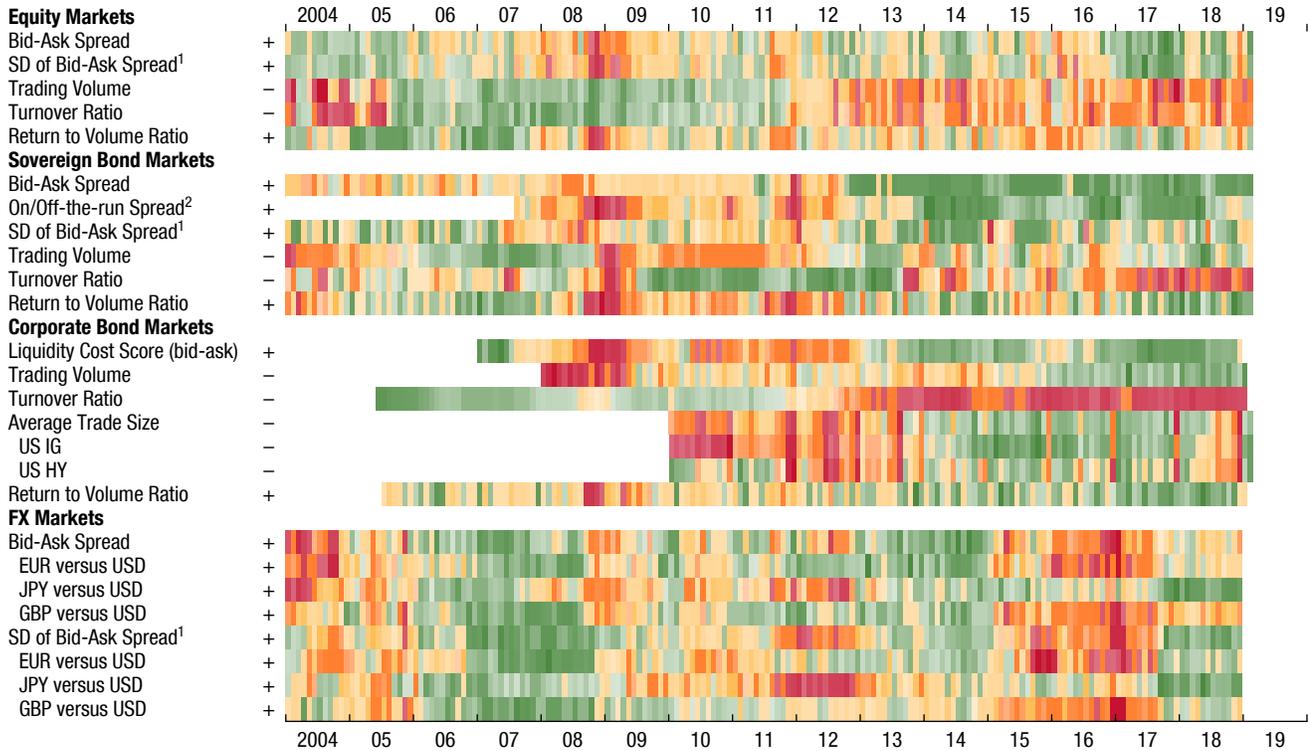
- *Divergence between highly liquid and relatively illiquid markets appears to have increased.* This may be because participation of traditional market makers, which provide liquidity across all markets, has declined, whereas participation of nontraditional market makers (such as PTFs), which tend to be

⁷The National Futures Association raised the margin requirements for transactions involving several major currencies, including the Swiss franc, Japanese yen, and Australian dollar, following the Swiss franc event of January 15, 2015 (PwC 2015).

Figure 1.SF.2. Evolution in Market Liquidity

The standard quantity-based market liquidity measures show some signs of deterioration while price-based measures seem more robust.

1. Market Liquidity Heatmap



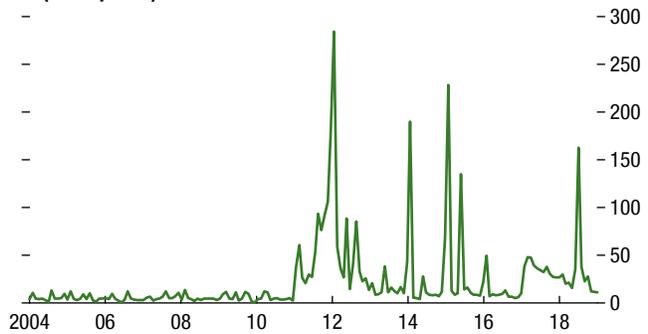
There is greater divergence in liquidity conditions across major sovereign bond markets ...

... with increased fragility in some sovereign bond markets.

2. Bloomberg Liquidity Index



3. One-Month Standard Deviation of Bid-Ask Spreads in Italy Sovereign Benchmark Bonds (Basis points)



Sources: Barclays Capital; Bloomberg Finance L.P.; Haver Analytics; Japan Bond Trading; JPMorgan Chase & Co.; MarketAxess; Reuters; Securities Industry and Financial Markets Association; and IMF staff calculations.

Note: For panel 1, indicators are based on maximum z-score among regions. Regions are the euro area, Japan, and the United States for equity markets, and Germany, Italy, Japan, the United Kingdom, and the United States for sovereign bond markets. For equities and Japan sovereign bonds, bid-ask spreads are estimated based on Corwin-Schultz (2012). Liquidity Cost Score covers the United States and euro area, and other indicators for corporate bond markets are for the United States. Cash bond data are used for bid-ask and on/off-the-run spreads, and futures market data are used for trading volume, turnover ratio, and return to volume for sovereign bond markets. FX = foreign exchange; SD = standard deviation; EUR = euro; GBP = British pound; JPY = Japanese yen; USD = US dollar.

¹One-month standard deviation of bid-ask spread.

²Bloomberg Liquidity Index.

active mainly in very liquid markets, has increased. For example, in the Italian sovereign bond market, Bloomberg's liquidity index⁸ (a proxy for aggregate on- and off-the-run spreads) has been consistently elevated in recent years, while a similar index for German bunds has been stable. This may have been partly due to non-liquidity risk-related factors, as off-the-run Italian bonds have recently reflected higher credit and redenomination risks compared to on-the-run bonds. However this could also suggest that divergence between on- and off-the-run bonds is becoming larger in Italy compared with Germany (Figure 1.SF.2, panel 2).⁹ Furthermore, bid-ask spreads in the Italian bond market appear to have become more volatile even during the periods when sovereign spreads were relatively tight and stable (Figure 1.SF.2, panel 3).

- *Liquidity conditions may be more fragile than they appear on the surface based on standard indicators.* Trading volume may not necessarily be an accurate indicator of market liquidity conditions, given that a large part of it may be driven by electronic trading aimed at taking advantage of small pricing differences across trading platforms. This is likely to be the case in foreign exchange markets, where more than three-quarters of spot trading is electronic, and there has been a significant proliferation of trading platforms.¹⁰ Some market participants cite “algorithmic market making” as a possible reason; that is, a practice in which market makers are constantly generating quotes without actual underlying transactions.¹¹

⁸The index levels are measured by the root mean squared error between bonds' market yields and theoretical yields based on cubic and exponential spline methodologies (Bloomberg).

⁹The euro area sovereign debt crisis may have contributed to the divergence.

¹⁰Because of the proliferation of trading platforms in foreign exchange markets, traders often try to arbitrage between platforms. For example, they can write a computer program to show a somewhat lower bid price on platform A conditional on the presence of a slightly higher bid price by someone else on platform B to make a profit in nanoseconds. If traders lift their indication, all other indications linked to the lifted price on other platforms may also be lifted instantaneously.

¹¹The electronic trading platform enables market makers to optimize their algorithm to generate quote prices. The practice of so-called algorithmic market making involves writing a program to show the second-best bid-ask prices constantly following the best ones with a marginal spread. That way quotes may be shown at all times without having any actual transaction. Should many traders follow the same strategy, market depth appears to be decent. If there is, however, a large flow or shock, the bid-ask spreads widen violently

High-Frequency Intraday Jump Analysis May Provide a Better Reading of Market Liquidity Conditions and Risks than Standard Liquidity Indicators

The analytical framework used here to detect liquidity strain—first introduced in the October 2018 GFSR with respect to US equity markets—relies on examining the characteristics of jumps (or discontinuities) in intraday price evolution.¹² Price jumps can be of two types: “large” jumps (finite activity) that are linked to significant news shocks (potentially related to economic fundamentals) or episodic series of “small” jumps (infinite activity). In what follows, uncovering statistically significant evidence of the latter within intraday data is interpreted as evidence of liquidity strains. Intuitively, in a market with ample liquidity, an adjustment in prices in response to a significant news shock would be expected to occur rapidly. However, if liquidity is poor, this adjustment would be relatively sluggish, reflected by periods of small jumps (see the October 2018 GFSR Online Annex 1.1 for the description of the methodology).

The *jump analysis* applied to sovereign bond and equity markets in advanced and emerging market economies during September 2018–February 2019 yielded several observations:¹³

- *The frequency of liquidity strain events has been higher in emerging markets relative to advanced economies.* Jumps—large or small—constitute a markedly larger proportion of intraday price variability in emerging markets than in advanced economies, for equities and especially sovereign bonds (Figure 1.SF.3, panel 1). Looking at individual countries, price jumps in bond markets tend to be more reflective of liquidity strain (Figure 1.SF.3, panel 2). The frequency of liquidity strained days detected each month is also higher in emerging markets than in advanced economies (Figure 1.SF.3, panel 3). These observations may reflect structural differences in market liquidity between emerging market and advanced economies.
- *Sovereign bond markets seem to have been more prone to episodes of liquidity strain than equity markets*

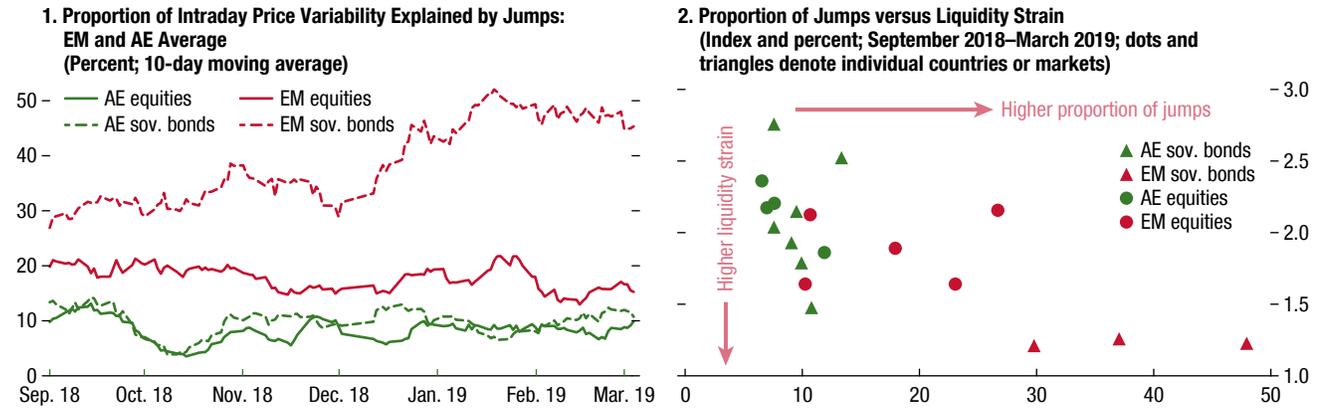
and sweep away the market depth. That is, if the best bid-ask indications are withdrawn, all second-best algorithm-based indications are also withdrawn instantaneously, with market liquidity evaporating quickly. For equity markets, see Degryse and others (2018).

¹²See the October 2018 GFSR, Box 1.4, and its corresponding Online Annex 1.1.

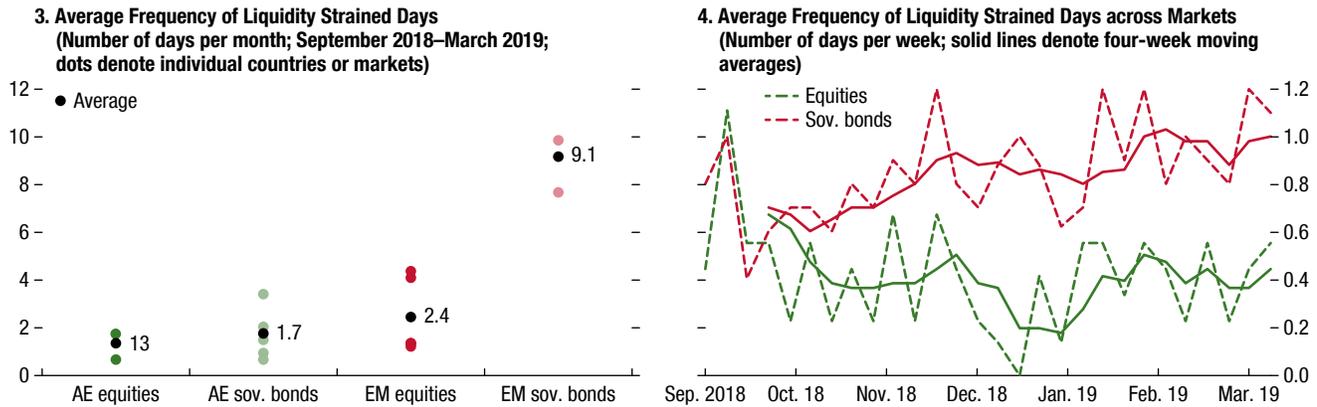
¹³The sample of countries includes Brazil, China, France, Germany, India, Italy, Korea, Mexico, Portugal, Spain, the United Kingdom, and the United States.

Figure 1.SF.3. Prevalence of Jumps and Liquidity Strain in Advanced and Emerging Markets

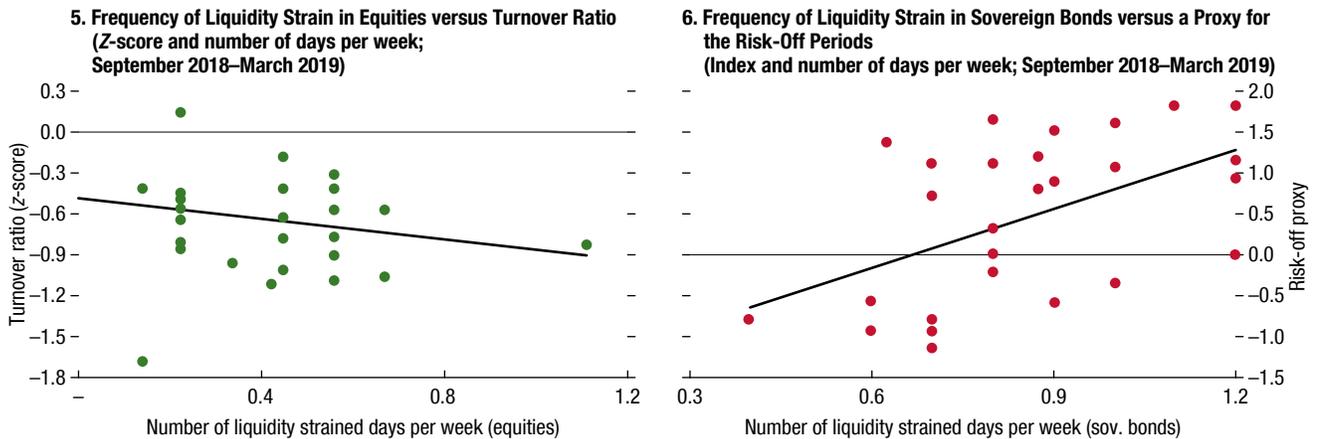
The frequency of liquidity strained days has been higher in emerging markets than in advanced economies during September 2018–March 2019. Sovereign bond markets seem to be more prone to liquidity strains than equity markets, especially in emerging market economies.



The frequency of liquidity strain in sovereign bond markets seems to have increased over the past six months.



The frequency of liquidity strain is correlated with standard liquidity metrics and a proxy for risk-off periods.



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

Note: “Jumps” refer collectively to finite activity (large) and infinite activity (small) price jumps. Uncovering significant evidence of infinite activity jumps in intraday data is interpreted as suggestive of liquidity strain. Panel 1 represents average across emerging markets (EM) and advanced economies (AE). Panel 3 considers frequency of liquidity strained days per month. In panel 6, “risk-off proxy” is the second principal component of US Treasury 10-year yields and US dollar index, both in levels. Sov. bonds = sovereign bonds.

(Figures 1.SF.3, panels 2 and 3). This may be in part due to the greater importance of dedicated market makers in bond than in equity markets. Sovereign cash markets have traditionally been traded over the counter, where the process of matching buyers and sellers requires a fair amount of intermediation and involves significant search costs (Duffie 2012). By contrast, most equity instruments are traded over exchanges. Therefore, the effects of structural changes in the provision of liquidity may be more pronounced in sovereign bond markets (for example, see PwC 2015).

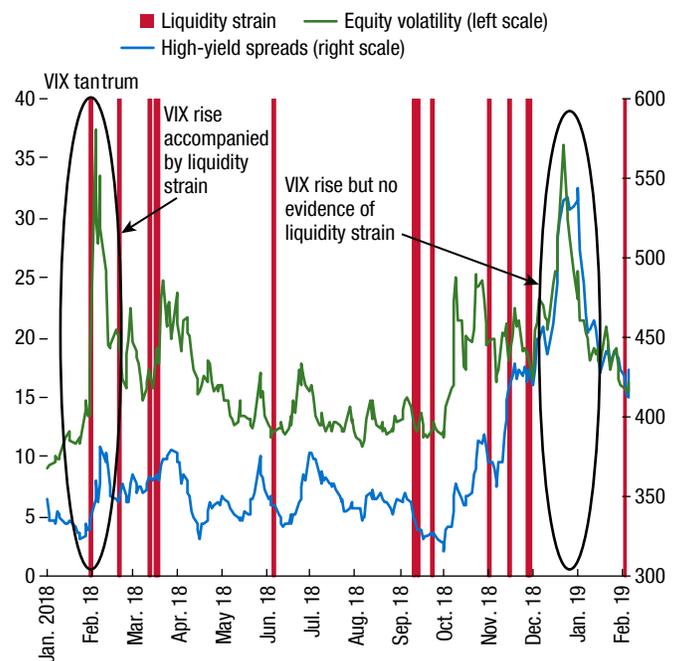
- *The incidence of liquidity strain seems to have been rising over the past few months (Figure 1.SF.3, panel 4), particularly in sovereign bond markets.* The frequency of liquidity strain in equities is loosely correlated with conventional liquidity metrics, such as the turnover ratio (Figure 1.SF.3, panel 5), while the frequency of strain in sovereign bonds is closely correlated with the risk-off proxy (Figure 1.SF.3, panel 6). In some markets, these strain episodes have coincided with extended asset price declines, underscoring the importance of monitoring liquidity conditions on a high-frequency basis, especially around key events (see below).

Liquidity Strains Tend to Rise around Key Events

The framework described in this Special Feature can be used to analyze market liquidity conditions surrounding particular events. Analysis shows that heightened uncertainty on (and around) policy-relevant news announcements has tended to result in market liquidity strains. In addition, it reveals that while some volatility spikes coincided with illiquid market conditions, others appear to have been driven by other factors. Three case studies are presented below.

VIX tantrum versus VIX spike at the end of 2018: Over the past year, the Chicago Board Options Exchange Volatility Index (VIX) surged to a very high level (around 35 points) on two occasions. The first spike was on February 2, 2018 (the so-called VIX tantrum), and the second on December 24, 2018 (see Figure 1.SF.4). While the VIX tantrum spike was accompanied by liquidity strain, the latter episode was not characterized by any meaningful deterioration in intraday market liquidity. This difference could be due to different underlying shocks that generated market volatility on these days. Whereas the VIX tantrum was

Figure 1.SF.4. Equity Volatility, High-Yield Spreads, and Days with Liquidity Strain
(Percentage points; basis points)

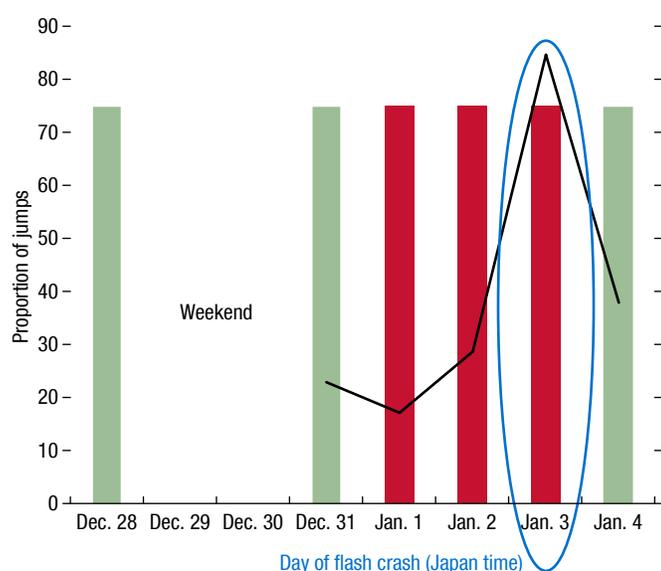


Sources: Bloomberg Finance L.P.; and IMF staff calculations.
Note: VIX = Chicago Board Options Exchange Volatility Index.

largely driven by technical factors (see the April 2018 GFSR), the most recent spike—which was preceded by a more gradual increase in market volatility over the previous few months—was more likely driven by investors' reassessment of the outlook for growth and US monetary policy normalization.

Japanese yen flash event: On January 3, 2019 (Japan Standard Time), the Japanese yen market experienced a flash event (Figure 1.SF.5). The currency surged nearly 4 percent against the dollar in a span of minutes between New York and Tokyo/Singapore trading hours, the so-called witching hours of Asian trading. Market participants attributed this to technical factors, including short covering in yen and potential amplification effects of algorithmic trading. However, jump analysis shows that liquidity strains were already present days ahead of the flash event day, possibly due in part to a public holiday in Japan. So, the impact of a flash crash during the witching hours likely exacerbated the already-strained liquidity conditions in this market. As a result, on January 3, an exceptionally high proportion of price variation (over 85 percent) was due to jumps.

Figure 1.SF.5. Proportion of Intraday Price Variation Due to Jumps: In Japanese Yen/US Dollar (Percent)



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

Note: "Jumps" refer collectively to finite activity (large) and infinite activity (small) price jumps. Uncovering significant evidence of infinite activity jumps in intraday data is interpreted as suggestive of liquidity strain. Red bars indicate days of predominantly liquidity-strained trading. Green bars correspond to days of significant news-related jumps, but not necessarily liquidity issues.

Brexit: The Brexit negotiations between the United Kingdom and the European Union have been followed closely by the markets. The analysis of intraday liquidity conditions in the 10-year UK gilt market, since September 2018, reveals that, on average, the proportion of variation explained by jumps tended to rise significantly around key events (from below 10 percent to close to 40 percent), typically accompanied by evidence of liquidity strain (Figure 1.SF.6, panel 1). Furthermore, the data show that the frequency

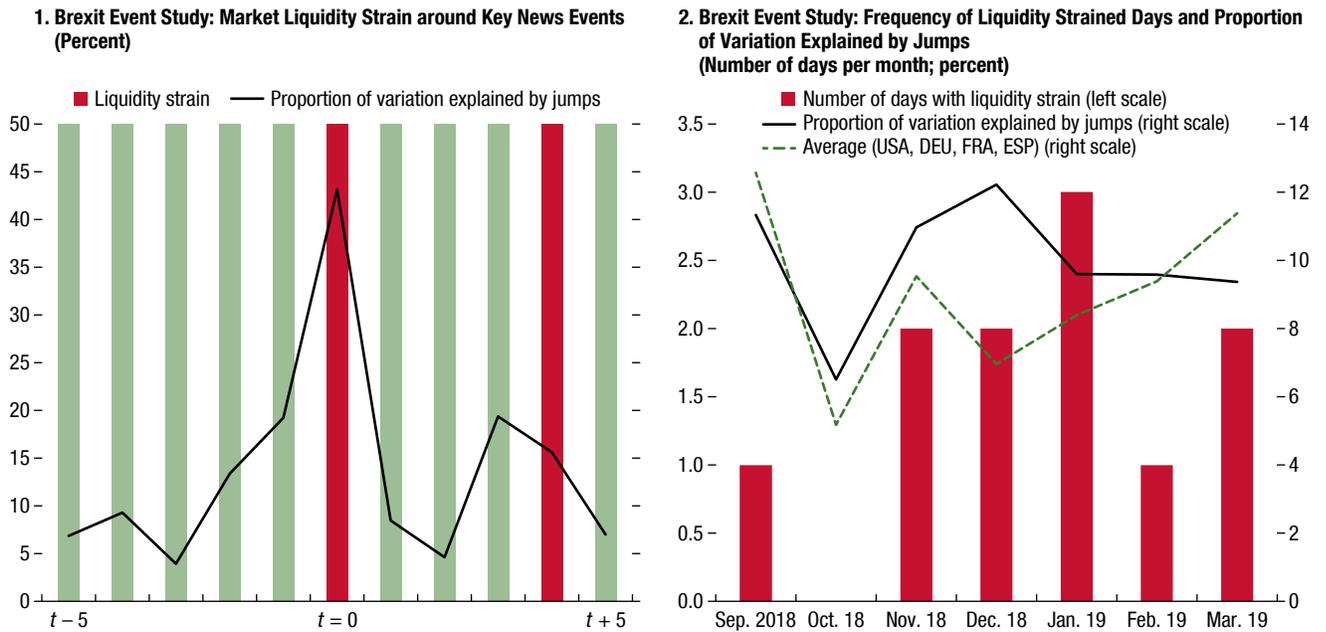
of liquidity strained days per month has risen in the UK gilt market since September 2018. For example, between November 2018 and January 2019, it has averaged 2.3 days a month (Figure 1.SF.6, panel 2), compared with an average frequency for other major advanced economy sovereign bond markets of 1.5 days a month.¹⁴

In Conclusion, Market Liquidity Conditions Merit More Scrutiny

Illiquidity events can precipitate fire sales and result in significant asset price moves, contributing to sudden and sharp tightening in financial conditions and thus raising financial stability risks. In addition, poor market liquidity impairs price discovery and increases transaction costs. Therefore, market liquidity conditions merit close scrutiny by regulators, including assessments of the robustness of trade infrastructure and supporting transparency in the marketplace. As trades transpire at ever higher frequencies, counterparties to PTFs should carefully monitor intraday activity and leverage exposures and strengthen their liquidity risk management practices. Improving availability of data on the activities of nonbank market makers would help the private and public sectors with timely assessment of liquidity risks in global capital markets.

¹⁴The Bloomberg Liquidity Index for the UK gilt market (a proxy for aggregate on- and off-the-run spreads) suggests a broadly similar pattern in liquidity conditions over the same period. However, other standard liquidity metrics, such as the turnover ratio in gilt futures, have remained relatively more resilient.

Figure 1.SF.6. Brexit Event Study on Jumps and Market Liquidity



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

Note: “Jumps” refer collectively to finite activity (large) and infinite activity (small) price jumps. Uncovering significant evidence of infinite activity jumps in intraday data is interpreted as suggestive of liquidity strain. In panel 1, key events ($t = 0$) included in the chart are: (1) confidence vote on December 12, 2018; (2) the runoff to the Commons vote on January 16, 2018; and (3) the start of European Union Summit in Salzburg on September 20, 2018. Data labels in panel 2 use International Organization for Standardization (ISO) country codes.

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