OFR
OFFICE OF FINANCIAL RESEARCH

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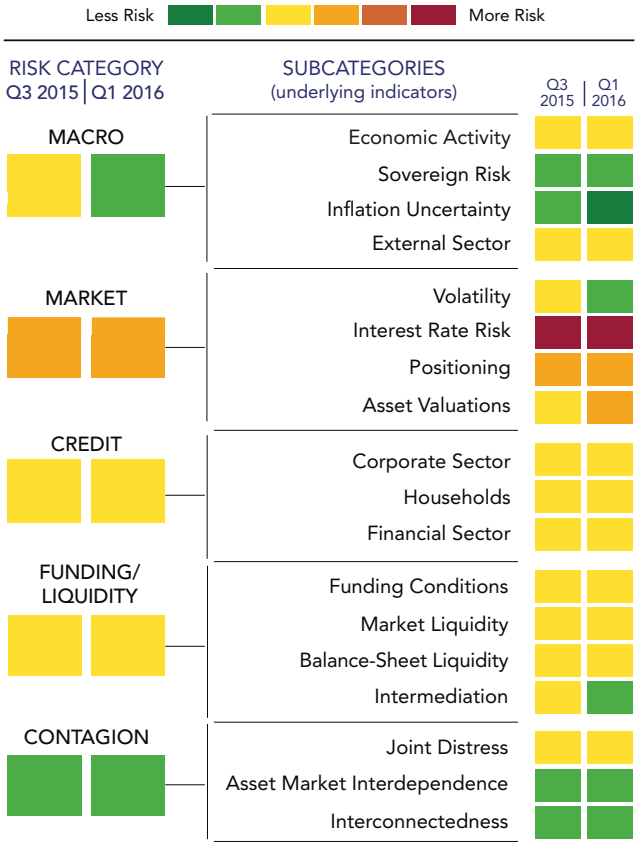
A biannual update of the risks to financial stability

Risks Still in the Medium Range, But Pushed Higher by U.K. Referendum Result

Overall risks to U.S. financial stability remain in the medium range. However, they have been pushed higher by the vote in the United Kingdom (U.K.) to exit the European Union (EU). The result surprised financial markets and was a negative shock to investor confidence. It introduces months or years of uncertainty about the rules governing the U.K.'s investment, financing, and trade relations. Larger shocks to confidence are possible as those deliberations and negotiations play out. Because the U.K. economy and especially the U.K. financial system are highly connected with the rest of Europe and the United States, severe adverse outcomes in the U.K. could pose a risk to U.S. financial stability.

The key vulnerabilities discussed last December in the OFR's *2015 Financial Stability Report* also remain. Credit risks in U.S. nonfinancial businesses and in some major foreign markets are still elevated. Long-term U.S. interest rates have declined to ultra-low levels, which can motivate excessive risk-taking and borrowing; many key foreign interest rates are now negative, with uncertain consequences for financial stability. Uneven resilience persists in the U.S. financial system. These vulnerabilities are weaknesses in the financial system that can originate, amplify, or transmit shocks, whether those shocks come from the United States, U.K., or elsewhere.

Figure 1: OFR Financial Stability Monitor



Note: Based on data available July 8, 2016. Q3 2015 results reflect data not previously available. The figure summarizes information from underlying indicators of financial stability risk, which are aggregated as subcategories, then categories. The colors reflect the position of risk indicators within their long-term ranges (beginning on Jan. 1, 1990 or earliest available date thereafter). The colors reported here and in past editions are subject to change due to newly reported data, data revisions, or changes in the historical range due to new observations.

Sources: Bloomberg L.P., Haver Analytics, SNL Financial, OFR analysis

This document summarizes the OFR's current assessment of U.S. financial stability. It supplements the OFR's comprehensive Financial Stability Report, published at the end of each year.

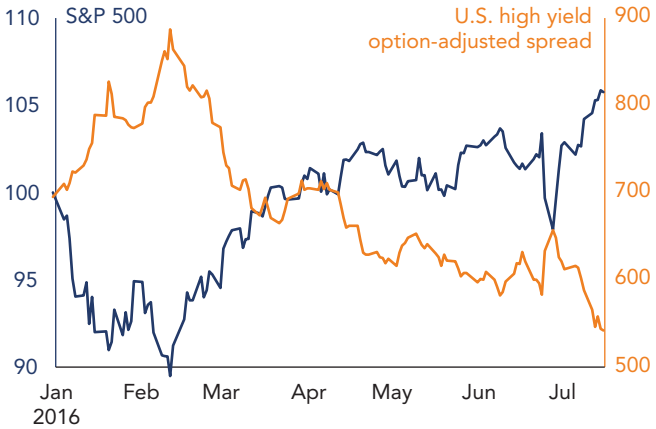
A key tool for summarizing and analyzing those threats is the Financial Stability Monitor (see **Figure 1**). The monitor is a heat map of key risk indicators, organized into five risk categories: macroeconomic, market, credit, funding and liquidity, and contagion. The heat map contains diverse measures, including many slow-moving indicators that are reported with some time lag. The current heat map contains data through the first quarter of 2016, so it does not reflect the impact of the U.K. referendum.

The heat map is just one input in OFR's assessment of financial stability. Our assessment also draws on a much wider analysis of financial system data, surveillance and intelligence gathering, and investigation of key vulnerabilities.

Key Developments since the Financial Stability Monitor in December

In December, the Federal Reserve raised its target interest rate by 25 basis points, its first rate hike since before the financial crisis. The long-awaited "liftoff" did not materially disrupt financial markets or growth.

Figure 2: U.S. equity prices (index) and corporate bonds spreads (basis points)



Note: S&P 500 indexed to 100 on Dec. 1, 2015.
Sources: Bloomberg L.P., Haver Analytics, OFR analysis

In early 2016, other concerns triggered a major sell-off in risky assets, which largely reversed by mid-March (see **Figure 2**). Analysts linked the sell-off to renewed uncertainty about growth and economic policy in China, new signs of oil oversupply, the Bank of Japan's surprise move to a negative policy interest rate, and a reassessment of capital adequacy and earnings potential at large financial firms (see our April Financial Markets Monitor). Concerns about China were reduced by short-term economic stimulus and greater currency stability there. However, the other key market concerns from early 2016 remain largely unresolved.

On June 23, the U.K. voted to leave the EU. Although the referendum is non-binding, the U.K. government is expected to respect the result and formally move to exit the EU. The referendum result was a major shock to U.K. investors and to confidence in the U.K. economy, with global effects. Risky assets sold off sharply in response to the vote, with the sharpest losses for the U.K. currency and financial stocks in the U.K. and the rest of Europe (see **Figures 3** and **4**). Although other risky assets largely recovered amid expectations of policies to mitigate fallout from the referendum result, these markets may be underpricing the considerable risks ahead, which are discussed below.

Summary Financial Stability Assessment

This section discusses the OFR's overall assessment of financial stability in the United States. The OFR's assessment is centered on vulnerabilities — weaknesses in the financial system that can originate, amplify, or transmit shocks, potentially destabilizing the system. This assessment is organized by the five risk categories noted above — macroeconomic, market, credit, funding and liquidity, and contagion.

This edition begins with a special discussion of the shock from the U.K. referendum and the channels through which it could threaten financial stability in the United States.

The OFR's assessment is that risks to financial stability have stayed in the medium range, but have risen as a result of the U.K. referendum.

Potential financial stability implications of the U.K. referendum

The financial response to the vote has been largely orderly so far. Despite heavy trading and large price moves, global markets functioned largely without disruptions. Expectations of policies to mitigate the fallout from the referendum supported markets.

However, the vote introduced an extended period of uncertainty, or bouts of it, as policymakers deliberate and negotiate if, when, and how the U.K. will exit the EU. The uncertainty and the ultimate decisions could have major legal and economic implications for the U.K.'s very large financial services industry and for the cross-border financial flows on which the U.K. is highly dependent. They could also have consequences for EU cohesion. The ultimate outcome and interim developments could introduce larger shocks to confidence, potentially threatening financial stability in the U.K. and elsewhere in the EU.

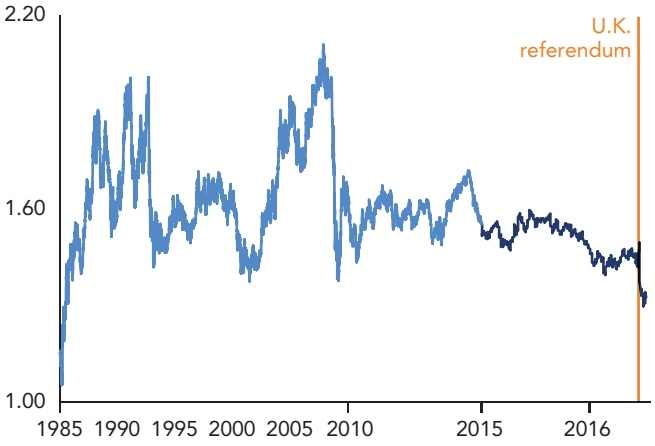
In a severe adverse scenario, shocks from the U.K. and Europe would threaten U.S. financial stability through the transmission channels discussed below. Although the euro area's very severe financial crisis in 2010-12 did not destabilize the U.S. economy or financial system, that outcome does not guarantee resilience in the future.

Trade. A recession in the U.K. or other EU economies, and depreciation of their currencies, would reduce demand for U.S. exports. U.S. exports to the EU total less than 3 percent of GDP, while exports to the U.K. are about one-quarter that. At that magnitude, a reduction in exports would be unlikely to threaten U.S. financial stability, though it could moderately slow U.S. growth.

Financial exposures. The United States has large direct financial exposures to the U.K. and broader EU (see **Figure 5**). These claims could be vulnerable to losses due to currency depreciations and volatility, declines in the market prices of the assets, and increased defaults on debt claims.

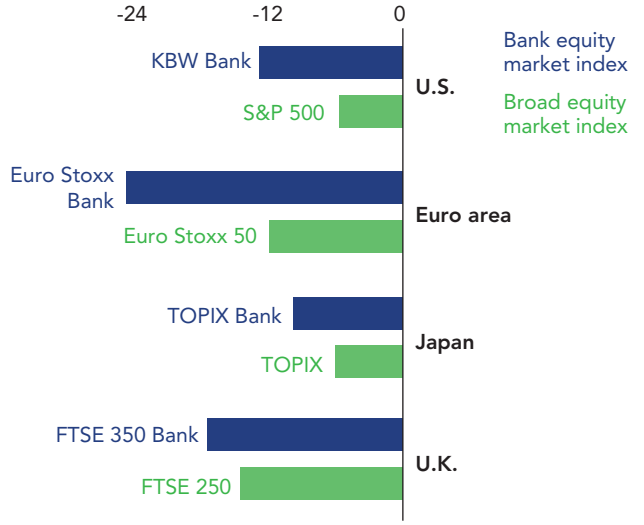
Confidence and indirect effects. Financial instability in the U.K. or the broader EU could do lasting damage to global investor confidence. The referendum result has already helped push long-term U.S. interest rates to record lows, increasing incentives for excessive

Figure 3. Price of 1 British pound in U.S. dollars



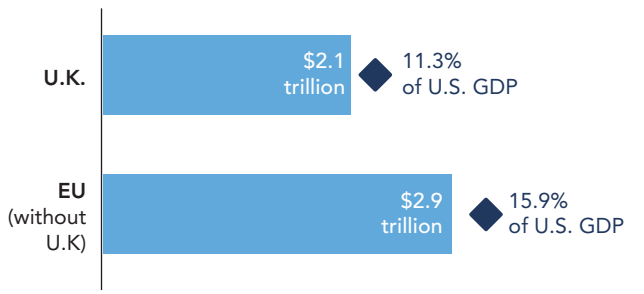
Source: Bloomberg L.P.

Figure 4: Global bank and equity index returns (percent)



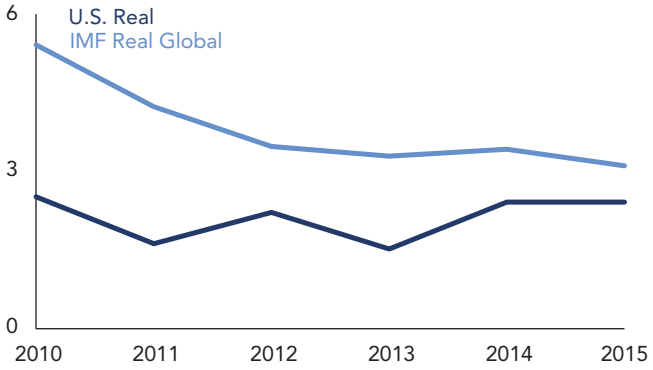
Note: Local currency returns from market close on June 23, 2016 to market close on June 25, 2016.
Source: Bloomberg L.P.

Figure 5: U.S. financial claims on U.K. and EU entities



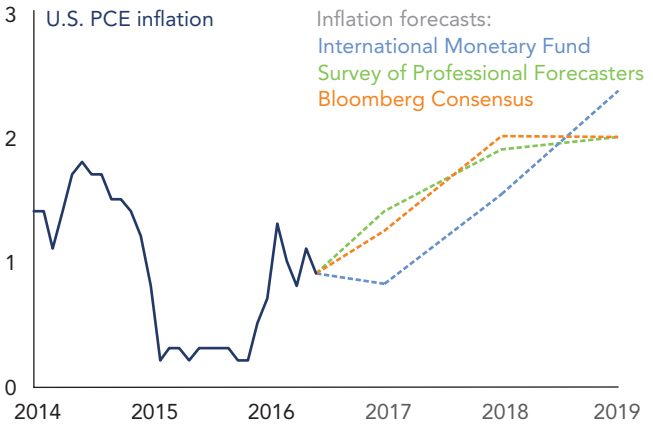
Note: U.S. financial claims from Treasury International Capital data
Source: Haver Analytics

Figure 6: Real GDP growth (annual percent change)



Source: Haver Analytics

Figure 7: U.S. inflation and expectations (year-over-year percent change)



Notes: PCE is personal consumption expenditure, which measures prices for goods and services purchased by consumers.
Sources: Bloomberg L.P., International Monetary Fund, Federal Reserve Bank of Philadelphia, OFR analysis

borrowing and investor risk-taking in the United States. Further confidence shocks could also trigger a much larger depreciation of U.S. risky assets, such as equities, which remain at high valuations (see "Market risks" below). Indirect exposures could also be important, given the interconnectedness of the financial systems of the United States and the EU. Finally, a lesson from past financial instability is that confidence and indirect effects can evolve in less predictable ways. A loss of confidence can be self-perpetuating, and indirect linkages can be invisible until revealed by stress.

Financial system vulnerabilities

Macroeconomic risks. The most important macroeconomic risks to U.S. financial stability originate outside the United States. The U.S. economy and financial system have been resilient to much weaker growth in foreign economies since 2010 (see **Figure 6**). However, severe economic and financial stress abroad could still hurt U.S. growth and potentially threaten U.S. financial stability.

U.S. economic growth has remained in the same range since 2010, but two factors have increased downside risks. First, the U.K. referendum and its aftermath could slow U.S. growth by reducing investor confidence and, to a lesser extent, through decreased trade. Second, declining U.S. corporate profits could restrain investment and hiring. U.S. job growth was very strong until falling sharply in the second quarter; it remains to be seen if this slowdown is transitory.

U.S. consumer price inflation has fallen due to low oil prices, but U.S. core inflation (which excludes food and energy prices) and key long-term inflation expectations remain near the 2 percent level the Federal Open Market Committee considers consistent with its mandate (see **Figure 7**).

In the U.K., post-referendum uncertainty is likely to lead to slower growth as consumers and businesses postpone spending and investment. After the vote, many economists lowered growth forecasts for the U.K. and broader EU. In a Bloomberg survey after the referendum, 71 percent of economists predicted that the "leave" vote will lead to a U.K. recession in 2016 or 2017.

Other advanced economies also have important macroeconomic vulnerabilities. In the euro area, growth has improved since 2012 but remains sluggish. Growth has been weaker and more volatile in Japan. Inflation expectations in both economies remain very low. Weak growth, low inflation, and high debt levels in the public and private sectors leave these economies more vulnerable to financial instability.

Macroeconomic risks remain elevated in China and other emerging markets. A five-year slowdown in growth continues. Foreign investment flows have slowed or reversed. Rapid credit growth after the financial crisis produced large private debt burdens. These factors have preceded past crises in emerging markets. Among emerging markets, China is the largest and most important to the global economy and investor

risk appetite. Its economy and financial markets have been more stable in recent months, after market stress and unprecedented financial outflows from late 2014 to early 2016. However, China's structural growth slowdown, large private-sector debt, and challenging transition to more open capital markets leave it prone to future episodes of financial stress.

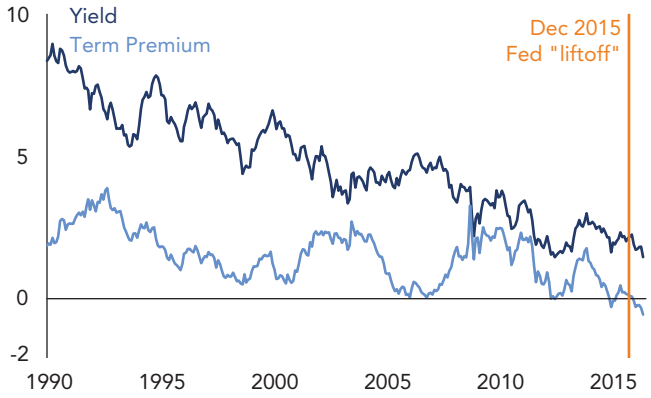
Market risks. Key market risks stem from persistently low U.S. interest rates, a situation exacerbated by the U.K. vote. Long-term U.S. interest rates have been low for years, but they have fallen markedly since 2014. This decline has occurred despite the end of the Federal Reserve's asset purchases, the first Federal Reserve interest rate hike in 10 years, and strong U.S. job growth (see **Figure 8**). As documented in the OFR's *2015 Financial Stability Report*, the low level of U.S. rates is partly due to spillover from falling and increasingly negative rates in Europe. The U.K. vote has pushed European rates even lower and is likely to prolong negative interest rate policies in the euro area and elsewhere. These factors could keep U.S. long-term rates low for years. U.S. long-term interest rates reached historic lows in the week after the referendum.

Low U.S. long-term rates underpin excesses in investor risk-taking, as well as high U.S. equity prices and commercial real estate prices. Alone, these excesses may not threaten U.S. financial stability, but they could compound other threats, including credit risk as discussed below.

Low interest rates have prompted investors to take risks to get better returns. As a result, duration risk in U.S. bond portfolios is near the top of its long-term range. This risk leaves investors open to heavy losses from large jumps in interest rates, whether from surprises in the Federal Reserve's monetary policy or other shocks.

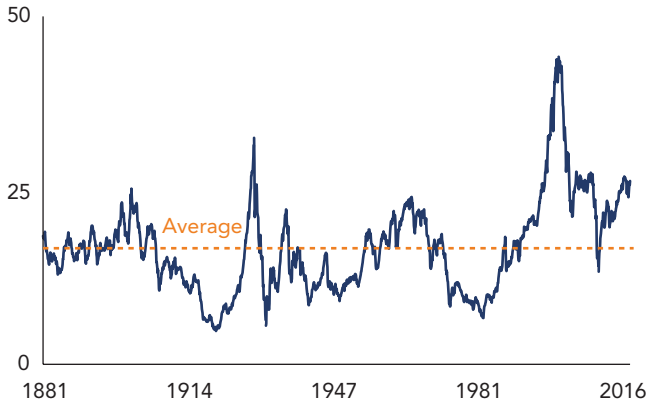
Even after the market turmoil in early 2016 and after the U.K. referendum, U.S. equity prices remain high according to several metrics discussed in a 2015 OFR brief. The cyclically adjusted price-to-earnings ratio (CAPE), the Q-ratio, and the Buffett Indicator are much higher than their long-term averages. The CAPE ratio has only reached its current level ahead of the three largest equity market declines in the last century (see **Figure 9**).

Figure 8: Ten-year U.S. Treasury yield and term premium (percent)



Sources: Federal Reserve Bank of New York; Adrian, Crump, and Moench (2013); Bloomberg L.P.

Figure 9: Cyclically adjusted price-to-earnings ratio (CAPE)

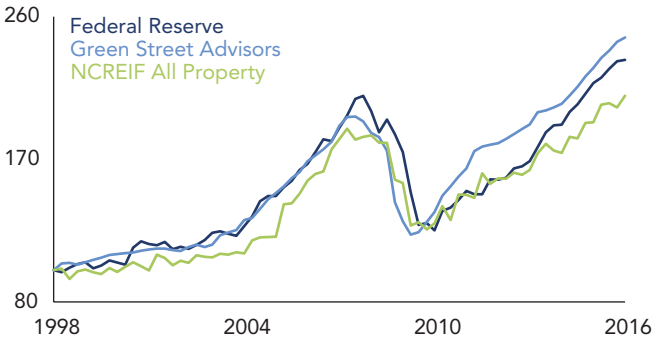


Note: Data as of June 2016. CAPE is the ratio of the monthly S&P 500 price level to trailing 10-year average earnings (inflation adjusted)
Sources: Robert Shiller, OFR analysis

Commercial real estate prices climbed rapidly from 2010 to 2015 (see **Figure 10**), with an average growth rate faster than that of the expansion before the financial crisis. The rapid increase is generally attributed to low interest rates and low vacancy rates. However, such large and rapid price increases can make an asset market more susceptible to large price declines, whether caused by a change in fundamental factors, like vacancy rates, or other shocks.

Credit risks. Credit risks remain elevated in U.S. nonfinancial businesses. They remain in a medium range in the U.S. household and financial sectors.

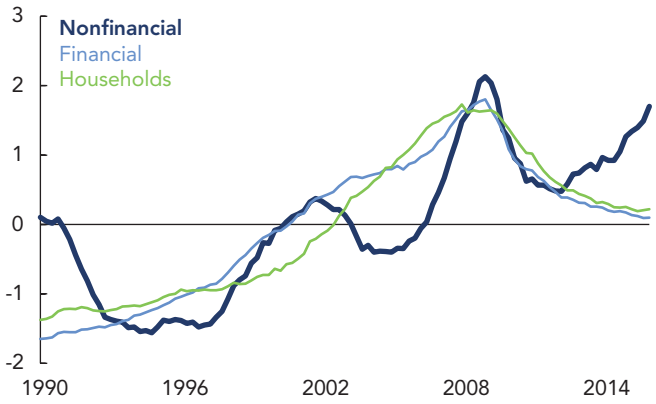
Figure 10: U.S. commercial real estate prices (index)



Notes: Index = 100 on March 31, 1998. The Federal Reserve Board index is most recently based on the CoStar Commercial Repeat Sale Index. The NCREIF All Property index is transaction-based, and the Green Street Advisors index is a value-weighted, appraisal-based index of REIT-owned properties.

Sources: Haver Analytics, OFR analysis

Figure 11: U.S. private sector debt-to-GDP ratios (z-scores)



Note: Z-score represents distance from the Q1 1990-Q1 2016 average, expressed in standard deviations.

Sources: Federal Reserve, Haver Analytics, OFR analysis

Debt among nonfinancial businesses continues to grow rapidly. The debt-to-GDP ratio is now above its 2007 level (see **Figure 11**). The ratio of debt to earnings among firms has also approached or exceeded peak levels from past credit cycles, even for borrowers with investment-grade ratings (see **Figure 12**). A severe default cycle in this $15 trillion sector could cause financial instability if investors lack the capital or liquidity to manage the losses and erosion of confidence. Losses could be magnified by correlated price declines in U.S. equities, which constitute the capital of many of the same businesses. Disruptions in nonfinancial business credit could also generate losses in commercial real estate lending, where property values reflect the level of business activity sustained by current credit availability.

In contrast, aggregate debt burdens continue to decline in the U.S. household and financial sectors (see **Figure 11**). Excessive borrowing in these sectors was a key contributor to the financial crisis and its aftermath. However, important vulnerabilities remain. Balance sheet leverage levels remain high in some important financial sectors, including broker-dealers, life insurers, government-sponsored enterprises, and a set of large hedge funds. Off-balance-sheet leverage levels remain largely unknown because of inadequate reporting standards for derivative positions.

Funding and liquidity risks. The key liquidity risks and funding risks today are structural and slow to change. They include liquidity risks in major bond markets, risks of fire sales in repo markets, and the risk of investor runs in some prime money market funds and short-term investment vehicles. Although these risks have not caused financial instability in recent years when financial stress was moderate, their amplifying properties could be destabilizing during a time of severe stress.

Key funding risks are much lower than before the financial crisis due to major changes in short-term funding markets (for more detail, see this 2015 OFR working paper). The size of these markets declined sharply during the crisis. In securities financing markets, maturity transformation has been reduced and overall collateral quality is now higher. A number of reforms in tri-party repo and other areas addressed additional vulnerabilities exposed by the crisis. However, some important vulnerabilities persist.

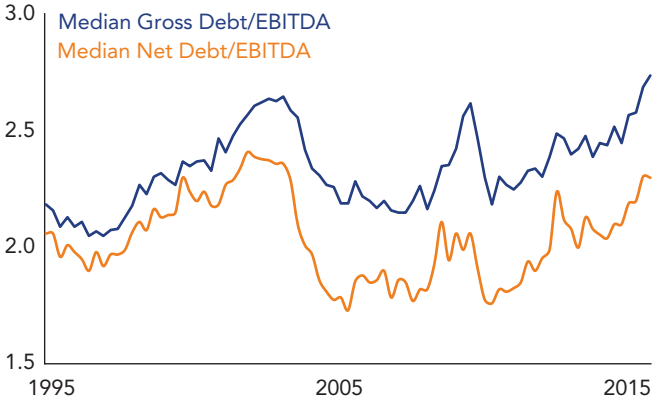
In repo markets, collateral fire sales remain a risk, as discussed in our *2015 Financial Stability Report* and other reports. For example, the default of a repo counterparty could trigger destabilizing sales of securities left as collateral.

Run risks persist in some money market funds and short-term investment vehicles, similar to those that contributed to the financial crisis in 2008. Specifically, these funds and vehicles report a stable net asset value, even though they take credit risks and have no government backstop. The Securities and Exchange Commission's 2014 reform was designed to address these risks for prime money market funds with institutional investors. The rule requires such funds to let their net asset value float with the value of the underlying assets. However, prime funds with retail investors may continue to report a stable net asset value even after the reform. Other short-term investment vehicles also report stable net asset value, including many short-term investment funds, local government investment pools, and private liquidity funds. Although data are incomplete, the combined liabilities of these funds are much greater than the $340 billion withdrawn from prime money market funds in September 2008. Those withdrawals intensified the financial crisis.

New patterns have emerged in some money market rates, but they do not seem to signal financial stability risks. Foreign exchange basis swaps have widened since early 2014, and U.S. interest rate swap spreads have turned negative since late 2015 (see **Figure 13**). These trends are widely attributed to two factors. The first is increased demand for swaps relative to cash bonds, due to lower associated financial commitments and bank capital requirements. The second is increased investor hedging of currency and interest rate risk in reaction to interest rate policy in the euro area and Japan. These trends do not indicate funding stress or perceived counterparty risk. Similarly, wider spreads for key U.S. bank funding costs have been an adjustment to the Federal Reserve's December rate increase, rather than to an increase in perceived counterparty risk.

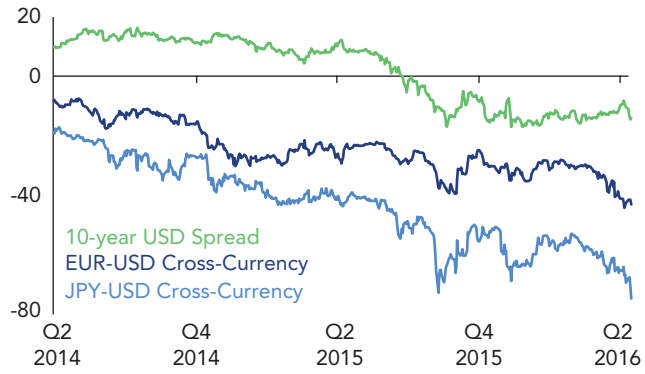
Market liquidity shows signs of fragility even in traditionally deep, liquid markets, as discussed in our *2015 Financial Stability Report*. Specifically, although market liquidity has generally been sufficient during normal market conditions, it has fallen sharply during some

Figure 12: Investment-grade U.S. nonfinancial business leverage (ratio)



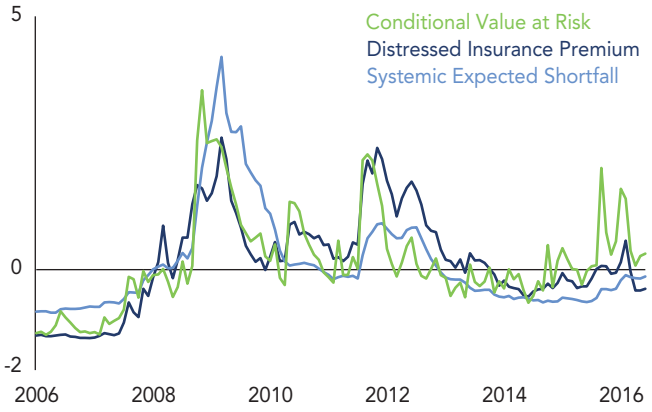
Note: Data as of first quarter of 2016. EBITDA is earnings before interest, taxes, depreciation, and amortization. Gross leverage is the ratio of total debt to EBITDA. Net leverage subtracts cash assets and short-term investments from total debt.
Sources: Standard & Poors, OFR analysis

Figure 13: U.S. interest rate swap spreads and FX basis swap rates (basis points)



Source: Bloomberg L.P.

Figure 14: Measures of joint distress for six large U.S. bank holding companies (z-scores)



Note: Six large bank holding companies are Bank of America, Citigroup, Goldman Sachs, JPMorgan Chase, Morgan Stanley and Wells Fargo. Z-score represents the distance from the average, expressed in standard deviations.

Sources: Adrian and Brunnermeier (2011), Acharya and others (2010), Huang, Zhou, and Zhu (2011), Bloomberg L.P., OFR analysis

moderate stress events, amplifying market volatility. Traditional metrics of liquidity are poor predictors of how liquidity behaves in these times of stress, so measuring and tracking this risk is difficult before the stress occurs.

Contagion risks. In our assessment, contagion risk is greater than available metrics indicate. Many of these metrics are activated by financial stress, and fail to indicate the contagion vulnerabilities that exist before the stress occurs. Recent experience illustrates the point. Key contagion metrics jumped during the market sell-offs of early 2016, then reversed to long-term average levels as markets recovered.

Measures of joint distress at large U.S. banks increased in late 2015 and early 2016 (see **Figure 14**). This increase was due to the marked fall in bank share prices during the sell-offs. The indicators quickly fell back to average levels as U.S. bank equity prices recovered. Measures of correlation across key asset prices also jumped during the early-2016 rout, then mostly ebbed as the market recovered.

It is unlikely that the contagion risks disappeared as stress receded. It is more plausible that underlying factors — such as risky assets' tendency to become more correlated during market stress — pose enduring contagion risks.