Financial Stability Report

May 2020

Board of Governors of the Federal Reserve System

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Note: This report generally reflects information that was available as of May 1, 2020.

Purpose

This report presents the Federal Reserve Board's current assessment of the resilience of the U.S. financial system. By publishing this report, the Board intends to promote public understanding and increase transparency and accountability for the Federal Reserve's views on this topic.

Promoting financial stability is a key element in meeting the Federal Reserve's dual mandate for monetary policy regarding full employment and stable prices. In an unstable financial system, adverse events are more likely to result in severe financial stress and disrupt the flow of credit, leading to high unemployment and great financial hardship. Monitoring and assessing financial stability also support the Federal Reserve's regulatory and supervisory activities, which promote the safety and soundness of our nation's banks and other important financial institutions. Information gathered while monitoring the stability of the financial system helps the Federal Reserve develop its view of the salient risks to be included in the scenarios of the stress tests and its setting of the countercyclical capital buffer (CCyB).[1]

The Board's *Financial Stability Report* is similar to those published by other central banks and complements the annual report of the Financial Stability Oversight Council (FSOC), which is chaired by the Secretary of the Treasury and includes the Federal Reserve Board Chair and other financial regulators.

[1] More information on the Federal Reserve's supervisory and regulatory activities is available on the Board's website; see Board of Governors of the Federal Reserve System (2020), *Supervision and Regulation Report* (Washington: Board of Governors, May), available at https://www.federalreserve.gov/publications/supervision-and-regulation-report.htm as well as the webpages for Supervision and Regulation (https://www.federalreserve.gov/supervisionreg.htm) and Payment Systems (https://www.federalreserve.gov/paymentsystems.htm). Moreover, additional details about the conduct of monetary policy are also on the Board's website; see the *Monetary Policy Report* (https://www.federalreserve.gov/monetarypolicy/mpr_default.htm) and the webpage for Monetary Policy (https://www.federalreserve.gov/monetarypolicy.htm).

Framework

A stable financial system, when hit by adverse events, or "shocks," continues to meet the demands of households and businesses for financial services, such as credit provision and payment services. In contrast, in an unstable system, these same shocks are likely to have much larger effects, disrupting the flow of credit and leading to declines in employment and economic activity.

Consistent with this view of financial stability, the Federal Reserve Board's monitoring framework distinguishes between shocks to and vulnerabilities of the financial system. Shocks, such as sudden changes to financial or economic conditions, are typically surprises and are inherently difficult to predict. Vulnerabilities tend to build up over time and are the aspects of the financial system that are most expected to cause widespread problems in times of stress. As a result, the framework focuses primarily on monitoring vulnerabilities and emphasizes four broad categories based on research.[2]

1. Elevated **valuation pressures** are signaled by asset prices that are high relative to economic fundamentals or historical norms and are often driven by an increased willingness of investors to take on risk. As such, elevated valuation pressures imply a greater possibility of outsized drops in asset prices.

2. Excessive **borrowing by businesses and households** leaves them vulnerable to distress if their incomes decline or the assets they own fall in value. In the event of such shocks, businesses and households with high debt burdens may need to cut back spending sharply, affecting the overall level of economic activity. Moreover, when businesses and households cannot make payments on their loans, financial institutions and investors incur losses.

3. Excessive **leverage within the financial sector** increases the risk that financial institutions will not have the ability to absorb even modest losses when hit by adverse shocks. In those situations, institutions will be forced to cut back lending, sell their assets, or, in extreme cases, shut down. Such responses can substantially impair credit access for households and businesses.

4. **Funding risks** expose the financial system to the possibility that investors will "run" by withdrawing their funds from a particular institution or sector. Many financial institutions raise funds from the public with a commitment to return their investors' money on short notice, but those institutions then invest much of the funds in illiquid assets that

[2] For a review of the research literature in this area and further discussion, see Tobias Adrian, Daniel Covitz, and Nellie Liang (2015), "Financial Stability Monitoring," *Annual Review of Financial Economics,* vol. 7 (December), pp. 357–95.

are hard to sell quickly or in assets that have a long maturity. This liquidity and maturity transformation can create an incentive for investors to withdraw funds quickly in adverse situations. Facing a run, financial institutions may need to sell assets quickly at "fire sale" prices, thereby incurring substantial losses and potentially even becoming insolvent. Historians and economists often refer to widespread investor runs as "financial panics."

These vulnerabilities often interact with each other. For example, elevated valuation pressures tend to be associated with excessive borrowing by businesses and households because both borrowers and lenders are more willing to accept higher degrees of risk and leverage when asset prices are appreciating rapidly. The associated debt and leverage, in turn, make the risk of outsized declines in asset prices more likely and more damaging. Similarly, the risk of a run on a financial institution and the consequent fire sales of assets are greatly amplified when significant leverage is involved.

It is important to note that liquidity and maturity transformation and lending to households, businesses, and financial firms are key aspects of how the financial system supports the economy. For example, banks provide safe, liquid assets to depositors and long-term loans to households and businesses; businesses rely on loans or bonds to fund investment projects; and households benefit from a well-functioning mortgage market when buying a home.

The Federal Reserve's monitoring framework also tracks domestic and international developments to identify near-term risks—that is, plausible adverse developments or shocks that could stress the U.S. financial system. The analysis of these risks focuses on assessing how such potential shocks may play out through the U.S. financial system, given our current assessment of the four areas of vulnerabilities.

While this framework provides a systematic way to assess financial stability, some potential risks do not fit neatly into it because they are novel or difficult to quantify. In addition, some vulnerabilities are difficult to measure with currently available data, and the set of vulnerabilities may evolve over time. Given these limitations, we continually rely on ongoing research by the Federal Reserve staff, academics, and other experts to improve our measurement of existing vulnerabilities and to keep pace with changes in the financial system that could create new forms of vulnerabilities or add to existing ones.

Federal Reserve actions to promote the resilience of the financial system

The assessment of financial vulnerabilities informs Federal Reserve actions to promote the resilience of the financial system. The Federal Reserve works with other domestic agencies directly and through the FSOC to monitor risks to financial stability and to undertake supervisory and regulatory efforts to mitigate the risks and consequences of financial instability.

Actions taken by the Federal Reserve to promote the resilience of the financial system include its supervision and regulation of financial institutions—in particular, large bank holding companies (BHCs), the U.S. operations of certain foreign banking organizations, and financial market utilities. Specifically, in the post-crisis period, for the largest, most systemically important BHCs, these actions have included requirements for more and higher-quality capital, an innovative stress-testing regime, new liquidity regulation, and improvements in the resolvability of such BHCs.

In addition, the Federal Reserve's assessment of financial vulnerabilities informs the design of stress-test scenarios and decisions regarding the CCyB. The stress scenarios incorporate some systematic elements to make the tests more stringent when financial imbalances are rising, and the assessment of vulnerabilities also helps identify salient risks that can be included in the scenarios. The CCyB is designed to increase the resilience of large banking organizations when there is an elevated risk of above-normal losses and to promote a more sustainable supply of credit over the economic cycle.

Overview

The coronavirus (COVID-19) pandemic has caused tremendous human and economic hardship across the United States and around the world. The pandemic and the measures taken to contain it have effectively closed some sectors of the economy since mid-March. Economic activity in the United States has contracted at an unprecedented pace, and the unemployment rate surged to 14.7 percent in April.

The disruptions to economic activity here and abroad have significantly affected financial conditions and have impaired the flow of credit. Policymakers in the United States and worldwide have taken extraordinary measures to strengthen the recovery once the health crisis passes. The Federal Reserve quickly lowered its policy rate to close to zero to support economic activity and took extraordinary measures to stabilize markets and bolster the flow of credit to households, businesses, and communities. In addition, the U.S. Congress and Administration rapidly enacted fiscal measures to support households and businesses. Taken together, these steps contributed to improved conditions that should boost the economic recovery when social distancing and other public health measures are able to subside.

Against this backdrop, this *Financial Stability Report* reviews the effect of the economic and market shocks associated with COVID-19 on U.S. financial stability to date and discusses the Federal Reserve's response. While the financial regulatory reforms adopted since 2008 have substantially increased the resilience of the financial sector, the financial system nonetheless amplified the shock, and financial sector vulnerabilities are likely to be significant in the near term. The strains on household and business balance sheets from the economic and financial shocks since March will likely create fragilities that last for some time. Financial institutions—including the banking sector, which had large capital and liquidity buffers before the shock—may experience strains as a result.

Our view on the current level of vulnerabilities is as follows:

1. **Asset valuations.** Asset prices have been volatile across many markets. Since their lows in late March and early April, risky asset prices have risen and spreads have narrowed in key markets. Asset prices remain vulnerable to significant price declines should the pandemic take an unexpected course, the economic fallout prove more adverse, or financial system strains reemerge.

2. **Borrowing by businesses and households.** Debt owed by businesses had been historically high relative to gross domestic product (GDP) through the beginning of 2020, with the most rapid increases concentrated among the riskiest firms amid weak credit standards. The general decline in revenues associated with the severe reduction in economic activity has weakened the ability of businesses to repay these (and other) obligations. Partly as a

result, there has been a widespread repricing of credit risk, and the issuance of high-yield corporate bonds and the origination of leveraged loans appear to have slowed appreciably. While household debt was at a moderate level relative to income before the shock, a deterioration in the ability of some households to repay obligations may result in material losses to lenders.

3. **Leverage in the financial sector.** Before the pandemic, the largest U.S. banks were strongly capitalized, and leverage at broker-dealers was low; by contrast, measures of leverage at life insurance companies and hedge funds were at the higher ends of their ranges over the past decade. To date, banks have been able to meet surging demand for draws on credit lines while also building loan loss reserves to absorb higher expected defaults. Broker-dealers struggled to provide intermediation services during the acute period of financial stress. At least some hedge funds appear to have been severely affected by the large asset price declines and increased volatility in February and March, reportedly contributing to market dislocations. All told, the prospect for losses at financial institutions to create pressures over the medium term appears elevated.

4. **Funding risk**. In the face of the COVID-19 outbreak and associated financial market turmoil, funding markets proved less fragile than during the 2007–09 financial crisis. Nonetheless, significant strains emerged, and emergency Federal Reserve actions were required to stabilize short-term funding markets.

The outlook for the pandemic and economic activity is uncertain. In the near term, risks associated with the course of COVID-19 and its effect on the U.S. and global economies remain high. In addition, there is potential for stresses to interact with preexisting vulnerabilities stemming from financial system or fiscal weaknesses in Europe, China, and emerging market economies (EMEs). These risks have the potential to interact with the vulnerabilities identified in this report and pose additional risks to the U.S. financial system.

The Federal Reserve's Monetary Policy Actions and Facilities to Support the Economy since the COVID-19 Outbreak

The Federal Reserve has acted with unprecedented speed and force to mitigate the economic and financial impacts of the pandemic. These actions can be generally grouped into three categories: (1) monetary policy measures, to bolster economic activity over the medium term and to support more immediate market functioning concerns, thereby fostering effective monetary policy transmission; (2) steps to stabilize short-term funding markets; and (3) actions to support more directly credit flows to households, businesses, and communities.[1]

Monetary policy

On March 3, 2020, the Federal Open Market Committee (FOMC) reduced the target range of the federal funds rate and on March 15 reduced it further to near zero. The FOMC stated at its mid-March and late April meetings that it expects to maintain this target range until it is confident that the economy has weathered recent events and is on track to achieve its maximum employment and price stability goals. These measures will support a recovery in employment and a return of inflation to its 2 percent objective. The FOMC further emphasized it would use its tools to support the economy and assess the timing and size of adjustments to its policy stance in light of incoming information.

As a more adverse outlook for the economy associated with the COVID-19 pandemic prompted investors to move rapidly toward cash and shorter-term government securities, trading conditions in the markets for Treasury securities and agency mortgage-backed securities (MBS) started to experience strains. These markets are critical to the overall functioning of the financial system and to the transmission of monetary policy to the broader economy. In response, the FOMC undertook purchases of Treasury securities and agency MBS in the amounts needed to support smooth market functioning, and with these purchases market conditions improved substantially (figure A).[2]

Stabilizing short-term funding markets

Investors' rapid move into cash and the most liquid assets also caused strains in many other financial markets, reducing the flow of credit to businesses needed to fund critical operations. This liquidity squeeze—with short-term funding drying up even for companies in good financial standing—was particularly acute in mid-March and threatened to amplify the initial economic shock. Businesses and state and local governments with strong finances rely on short-term debt, or "commercial paper" (CP), to raise cash to pay for health care, employee salaries, and suppliers' invoices. These businesses and governments are generally able to roll over their CP every few weeks. As market strains rose, many

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[1] In the area of supervision and regulation, the Federal Reserve's responses to the pandemic have focused on steps to ensure the ability of banks to deploy existing liquidity and capital stores to serve their household, business, and municipal customers. See the *Federal Reserve Supervision and Regulation Report* at https://www.federalreserve.gov/publications/supervision-and-regulation-report.htm.

[2] Around the same time, the Federal Reserve took a number of other actions to address market functioning strains and provide more direct credit support to the economy. For example, the Federal Reserve Bank of New York further expanded its repurchase agreement operations to stabilize money market conditions and support smooth market functioning in dollar funding markets. In addition, the Federal Reserve lowered the primary credit rate and allowed banks to borrow from the discount window for periods as long as 90 days. Also, the Federal Reserve encouraged depository institutions to utilize intraday credit extended by Reserve Banks, on both a collateralized and uncollateralized basis, to support the provision of liquidity to households and businesses and the general smooth functioning of payment systems.

Federal Reserve's Monetary Policy Actions and Facilities *(continued)*

investors were unwilling to advance funds for longer than a few days, so businesses were forced to issue CP on a near-daily basis, with no guarantee that investors would accept it.

At the same time—and contributing to the stress—investors started to pull away from some prime institutional money market mutual funds (MMF). These funds typically hold CP and other short-term debt instruments. However, the scale of investor redemptions threatened to exhaust these funds' holdings of their most liquid assets. Concerns that the funds would restrict or suspend daily redemptions grew, prompting even heavier outflows. The consequences of a failure in the CP market or of restricted redemptions from money funds could have been dire: Households and businesses might have missed payments to counterparties, forcing technical defaults by creditworthy entities, with potential consequences for the broader economy.

In response, the Federal Reserve, together with the Department of the Treasury, set up the Commercial Paper Funding Facility (CPFF) and Money Market Mutual Fund Liquidity Facility (MMLF). These emergency lending facilities were established under section 13(3) of the Federal Reserve Act. Each facility has $10 billion of equity (CPFF) or credit protection (MMLF) provided by the Treasury Department to protect the Federal Reserve from losses. The CPFF and MMLF function as backstops for these critical short-term funding markets by providing investors confidence that they can access their cash when they need it, relieving the pressure to sell amid fear that other investors are doing likewise. In turn, these backstops are critical to businesses, and thereby support employment and the broader economy.

A companion facility, the Primary Dealer Credit Facility (PDCF), was established to provide loans against good collateral to the primary dealers that are critical intermediaries in short-term funding markets. In March, constraints on dealers' intermediation capacity contributed to deteriorating liquidity in even usually liquid markets. The PDCF improves the ability of primary dealers to contribute to smooth market functioning and thereby supports the financial needs of businesses, households, and communities.

Indicators of market functioning improved after the announcement of the CPFF, the MMLF, and the PDCF (figures B, C, and D). Issuance of overnight CP dropped, and redemptions from money funds slowed and then reversed. In addition, after an initial wave of borrowing, market strains eased, and market participants have largely ceased initiating new draws at these facilities (figure E).

More direct support for credit across the economy

As it became clear that the pandemic would significantly disrupt economies around the world, markets for longer-term debt also faced severe strains, as the cost of borrowing rose sharply for those issuing corporate bonds, longer-term municipal debt, and asset-backed securities (ABS). Borrowing costs in these markets comprise the yield on a comparable-maturity risk-free bond and an additional difference, or "spread." These spreads widened notably, in some cases to post-crisis highs, and issuance of new debt in these markets slowed substantially or stopped altogether. Effectively, the ability of creditworthy households, businesses, and state and local governments to borrow, even at elevated rates, was threatened. In addition, small and medium-sized businesses that traditionally rely on bank lending

(continued)

faced large increases in their funding needs as COVID-19 and health policies implemented to minimize the spread of the virus forced them to close or substantially curtailed their revenues.

In light of these unusual and exigent circumstances, the Federal Reserve, with approval of the Secretary of the Treasury and associated equity to absorb potential losses from the Treasury Department, took a series of steps to support the flow of credit to households, businesses, and communities using authorities under section 13(3) of the Federal Reserve Act. Ultimately, a set of 13(3) facilities were announced to support the flow of up to $2.6 trillion of credit to large employers, small and medium-sized businesses, households, and state and local governments. The Treasury's equity investments in many of these facilities were authorized by the Cares Act (Coronavirus Aid, Recovery, and Economic Security Act).

The Term Asset-Backed Securities Loan Facility (TALF) was established on March 23 (and revised on April 9) to facilitate the issuance of auto loans, equipment leases, credit card loans, and other lending that is bundled into securities that are sold to investors. By facilitating issuance and instilling confidence that these markets will function effectively, the TALF contributes to the flow of credit to consumers and businesses. A TALF program was also operated in 2009–10 and was effective in supporting consumers and businesses.

The Paycheck Protection Program Liquidity Facility (PPPLF) was established on April 9 (and revised on April 30) to extend credit to lenders that participate in the Small Business Administration's Paycheck Protection Program (PPP), which provides forgivable loans to small businesses so that they can keep their workers on the payroll. The PPPLF bolsters the effectiveness of the PPP by supplying liquidity to lenders focused on servicing small businesses.

The Primary Market Corporate Credit Facility (PMCCF) and the Secondary Market Corporate Credit Facility (SMCCF) were established on March 23, with revised terms issued on April 9. These facilities are designed to work together to support the flow of credit to large investment-grade U.S. corporations so that they can maintain business operations and capacity during the period of dislocation related to COVID-19. The PMCCF will stand ready to purchase new bonds and loans issued by such corporations, while the SMCCF will support trading in bonds that these corporations had previously issued. High secondary market yields increase borrowing costs for businesses because seasoned bonds compete with newly issued bonds for investors' funds. In addition to purchasing individual bonds, the SMCCF will also purchase shares in exchange-traded funds (ETFs), which are commonly used vehicles that allow investors to purchase a share in all of the bonds forming an index, as a way to quickly and broadly support the functioning of bond markets and thus credit access by investment-grade firms. The PMCCF and SMCCF are open to firms that were investment grade but downgraded to the upper end of the speculative-grade range following the pandemic shock. In order to prevent an unusually large gap from opening up between borrowing costs faced by investment-grade and high-yield businesses, the SMCCF may also purchase a limited amount of shares in ETFs that target high-yield bonds. Since the announcement of the PMCCF and the SMCCF, spreads of both investment-grade and speculative-grade corporate bonds declined notably (figure F). In addition, issuance of investment-grade corporate bonds strengthened.

The Municipal Liquidity Facility (MLF) was established on April 9 (and revised on April 27) to help state and local governments better manage cash flow pressures in order to continue to serve households and businesses in their communities. The facility will purchase short-term debt from U.S. states, counties, and cities. These purchases directly improve access to credit and indirectly buoy access

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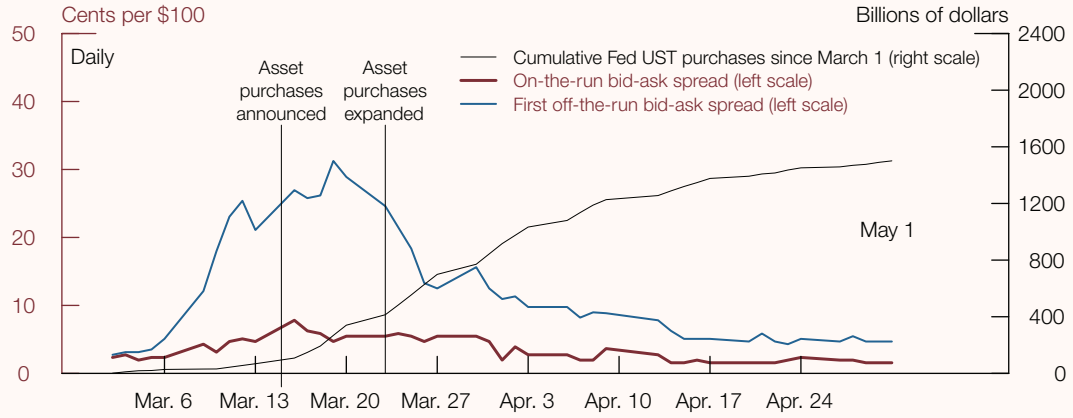
Federal Reserve's Monetary Policy Actions and Facilities *(continued)*

to market finance through improved market conditions and investor sentiment. Conditions in municipal bond markets improved after the announcement that the CPFF and the MMLF would be broadened to accept securities issued by state and local governments, and they improved further after the subsequent announcement of the MLF. In April, spreads on municipal securities continued to decline, and primary-market issuance continued to pick up (figure G).

The Main Street Lending Program was established on April 9 (and revised on April 30) to support the flow of credit to small and medium-sized businesses. The program includes three facilities, each of which will purchase participations in loans originated by insured depository institutions to borrowers with 15,000 or fewer employees or $5 billion or less in annual revenue. The Main Street program complements the PMCCF and SMCCF by supporting lending to businesses that are too small to benefit directly from those facilities. Purchases of loan participations both directly enhance access to credit for small and medium-sized businesses and indirectly support lending outside the program by expanding the lending capacity of depository institutions.

Figure A shows an example of how bid-ask spreads, a measure of transaction costs, jumped in the first half of March for U.S. Treasury securities, particularly for seasoned off-the-run vintages.[3] As Federal Reserve purchases gradually increased, market functioning improved, though bid-ask spreads for off-the-run vintages remain somewhat elevated.

Figure A. Indicative U.S. Treasury Bid-Ask Spreads



Source: Federal Reserve Bank of New York.

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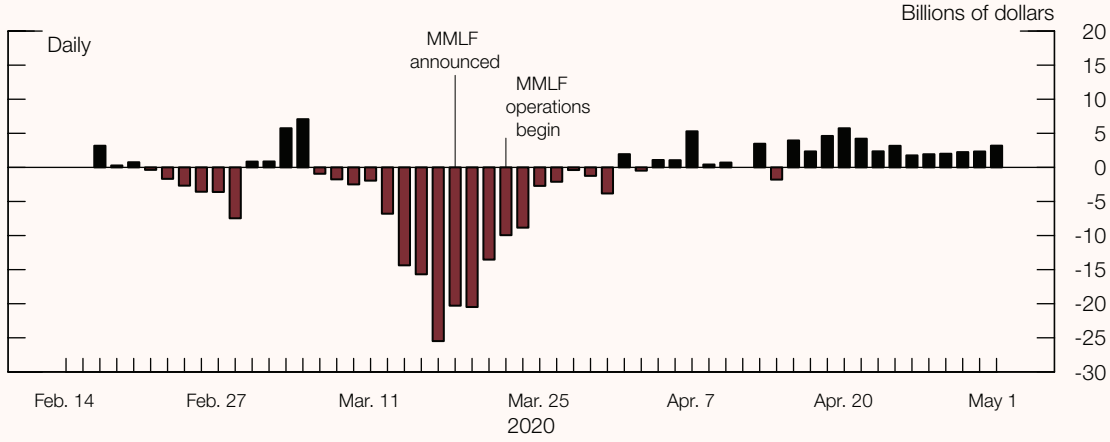
[3] The bid-ask spread for a security is the difference between the bid price and the ask price, where the "bid" is the price to buy a security and the "ask" is the price to sell. In general, the most recently issued Treasury securities are the most frequently traded and thus the most liquid. These securities are known as "on the run" securities, while less recent issues are called "off the run" securities.

Figure B shows that during the COVID-19 outbreak, institutional prime MMFs experienced heavy redemptions. The announcement and implementation of the MMLF helped stem such outflows.

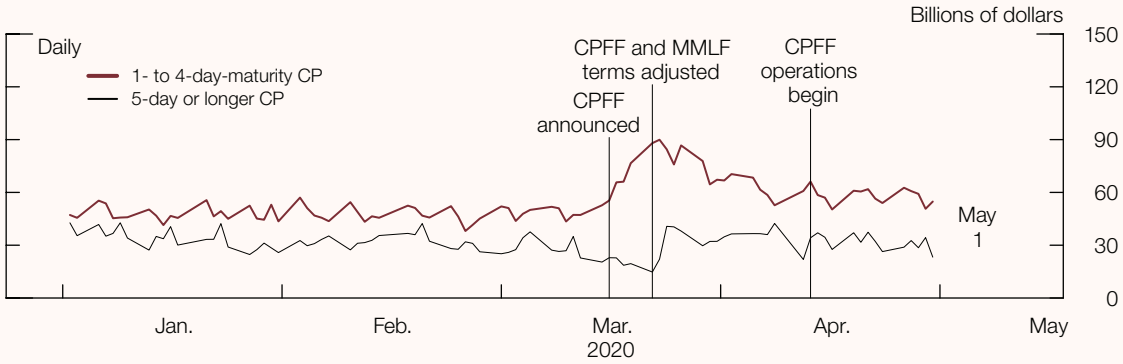
Figure B. Prime Money Market Mutual Fund Net Flows



Source: iMoneyNet, Money Fund Analyzer-Gold.

Figure C illustrates the transmission of strains to the CP market during the COVID-19 outbreak. Issuance of CP with overnight maturities rose sharply as investors pulled back to only the shortest-maturity assets. The announcement by the Federal Reserve and the Treasury Department of an emergency facility to backstop CP issuance (the CPFF), a liquidity facility for primary dealers (the PDCF), and a facility for MMFs (the MMLF) greatly eased pressures in funding markets.

Figure C. Total Commercial Paper Issuance, by Maturity



Source: DTCC Solutions LLC, an affiliate of the Depository Trust & Clearing Corporation.

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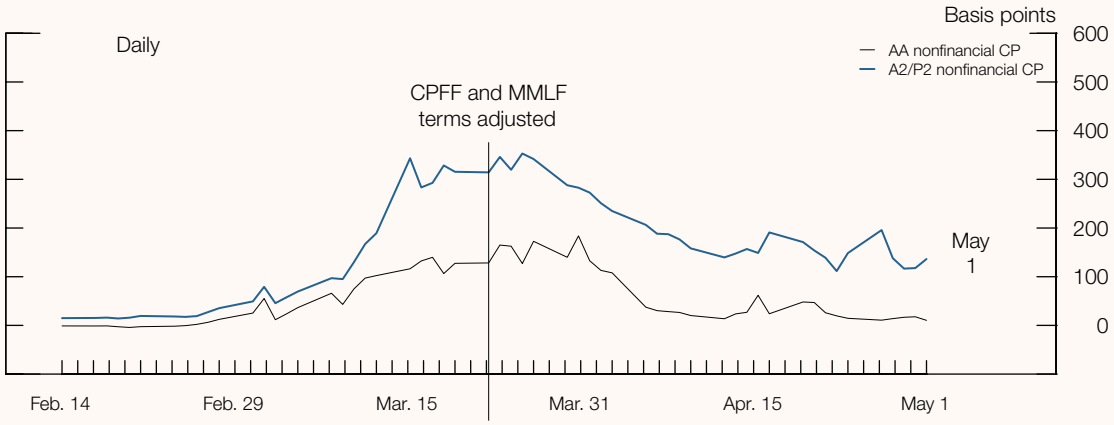
Federal Reserve's Monetary Policy Actions and Facilities *(continued)*

Figure D depicts the sharp increase in short-term funding costs for investment-grade nonfinancial firms with double-A ratings and for such firms with A2/P2 ratings prior to the announcements of the CPFF and the MMLF. Funding costs decreased markedly shortly after these announcements, though costs also remain somewhat elevated.

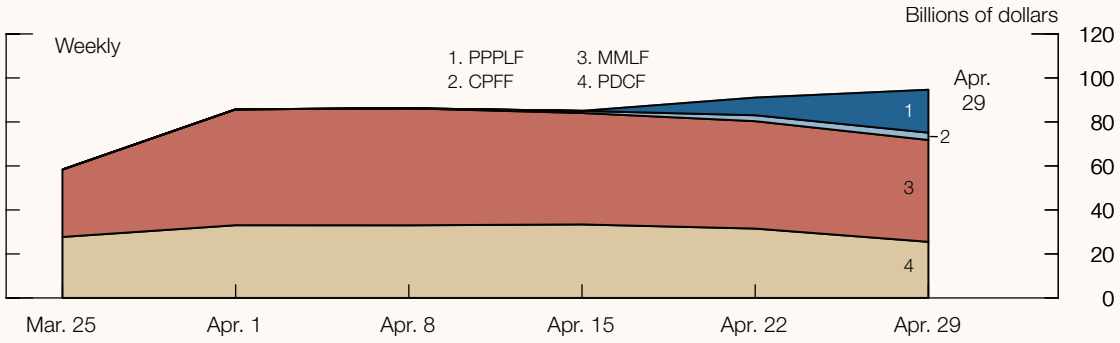
Figure D. 1-Month Funding Market Spreads for Investment-Grade Nonfinancial Firms



Source: Bloomberg Finance L.P.; DTCC Solutions LLC, an affiliate of the Depository Trust & Clearing Corporation.

Figure E shows the evolution of balances outstanding in selected Federal Reserve facilities. In general, balances grew rapidly during the first few weeks after a facility was established; balances subsequently declined as market strains eased.

Figure E. Emergency Lending Facilities



Source: Federal Reserve Board, Statistical Release H.4.1, "Factors Affecting Reserve Balances of Depository Institutions and Condition Statement of Federal Reserve Banks."

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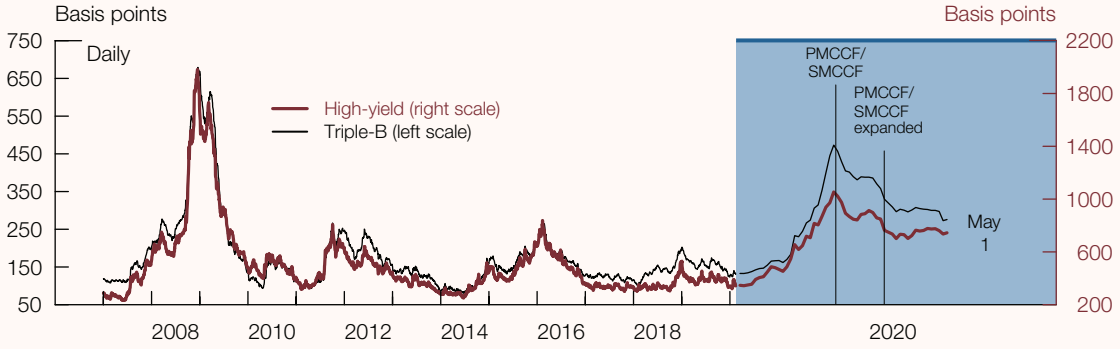
Figure F shows a COVID-19-induced spike in the cost of credit for firms in both the investment- and speculative-grade portions of the corporate bond market. Following the initial announcements of the PMCCF and the SMCCF, and the subsequent expansions of the size and scope of the facilities, spreads of both investment-grade and speculative-grade corporate bonds declined notably, and issuance of investment-grade corporate bonds strengthened.

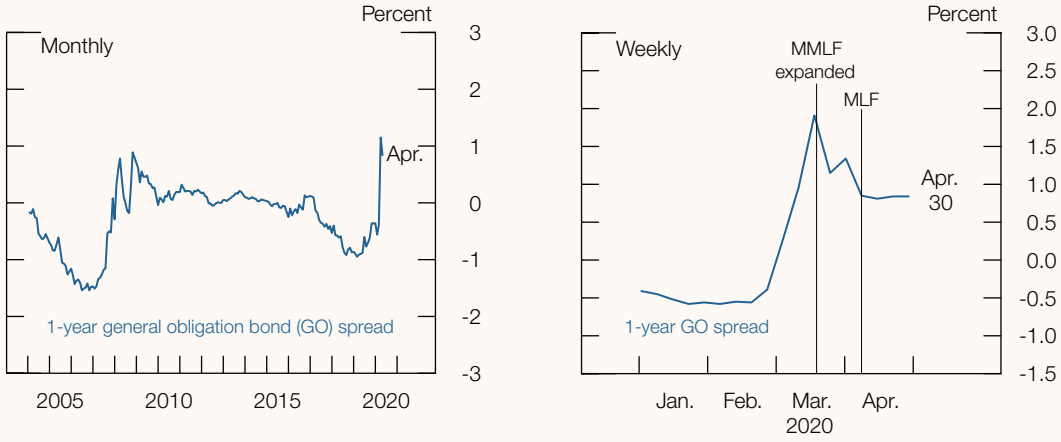
Figure F. Corporate Bond Spreads to 10-Year Treasury



Source: ICE Data Indices, LLC, used with permission.

Figure G shows a similar pattern for general obligation (GO) municipal bond spreads, with borrowing costs shooting up due to the pandemic but coming down by more than 1 percentage point following both the expansion of the MMLF to include some municipal bonds and the subsequent announcement of the MLF. The GO spread still remains fairly elevated relative to earlier in the year.

Figure G. Spreads to Treasuries

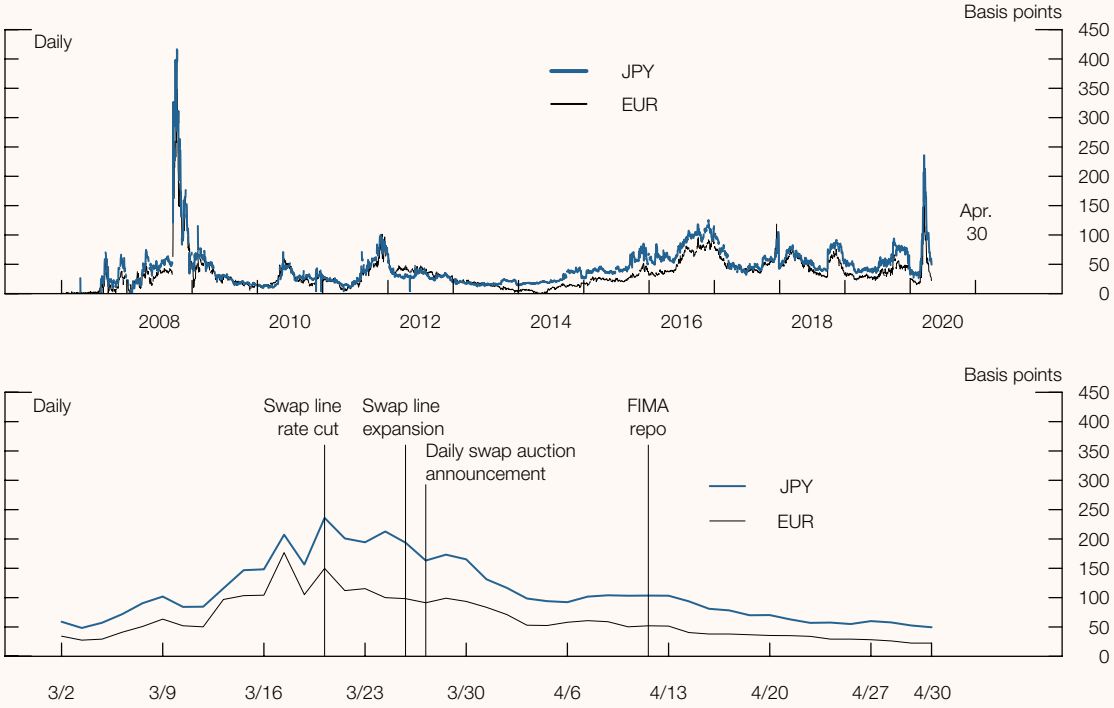


Source: Bond Buyer via Bloomberg L.P.; Municipal Market Analytics, Inc.

Federal Reserve Tools to Lessen Strains in Global Dollar Funding Markets

In mid-March, offshore dollar funding markets came under stress, as manifested by sharp increases in foreign exchange (FX) swap basis spreads, which widened to levels last seen in the Global Financial Crisis (GFC) (top panel of figure A).[1] In response, the Federal Reserve and several other central banks announced the expansion and enhancement of dollar liquidity swap lines. In addition, the Federal Reserve introduced a new temporary repurchase agreement (repo) facility for foreign monetary authorities. The expanded swap lines were met with strong demand (figure B). Subsequently, swap basis spreads have moved back down toward their levels before the COVID-19 shock (bottom panel of figure A).

Figure A. Three-Month FX Swap Basis Spreads



Source: Federal Reserve Bank of New York calculations based on data from Bloomberg Finance L.P.

The U.S. dollar is the leading currency for trade and other international transactions and is used extensively as a funding and investment currency worldwide. In general, foreign financial institutions lack ready access to U.S. retail deposits or other stable sources of dollar funding and thus rely more heavily on wholesale funding markets than do U.S. institutions. As a result, when dollar funding markets seize up, as occurred during the GFC and recently as COVID-19 emerged, foreign financial institutions may be disproportionately affected. They not only may cut back on lending to foreign borrowers, thereby exacerbating disruptions in global markets, but also may reduce lending to U.S. residents and liquidate holdings of U.S. assets in order to obtain dollars, harming U.S. households and businesses. The

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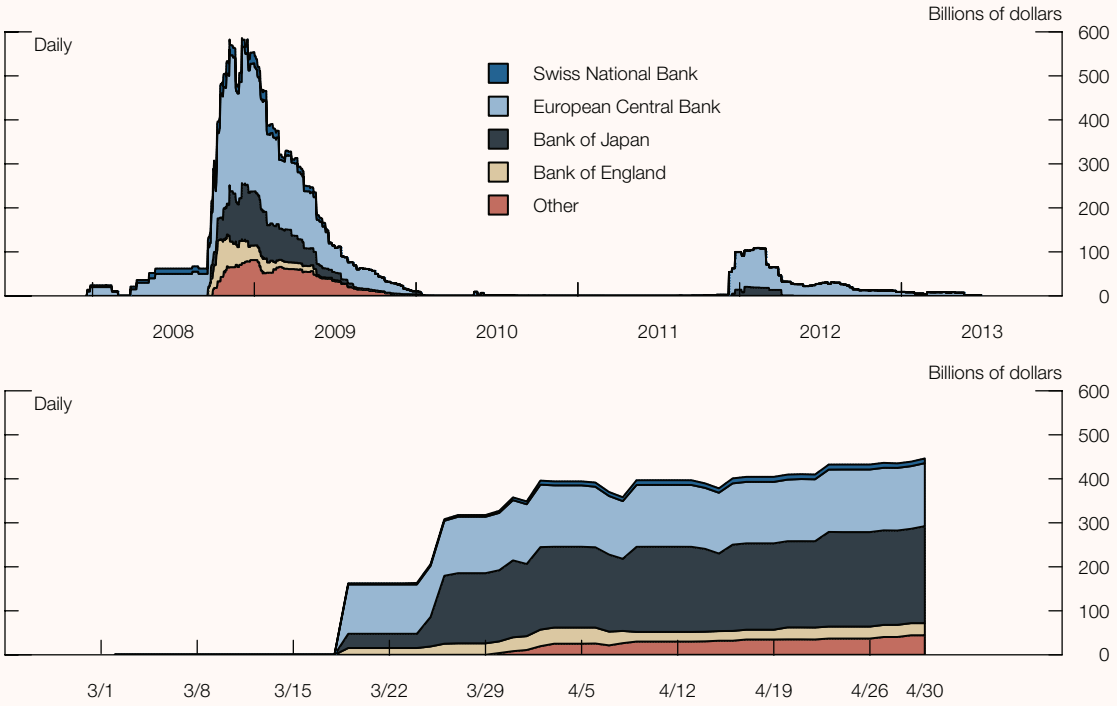
[1] The FX swap basis spread is a measure of the additional cost of obtaining U.S. dollar funding in the FX swap market compared with directly borrowing dollars using overnight index swaps.

Figure B. Central Bank Dollar Liquidity Swaps Outstanding



Source: Bank of England; European Central Bank; Bank of Japan; Swiss National Bank; Federal Reserve Board, Statistical Release H.4.1, "Factors Affecting Reserve Balances."

Federal Reserve's dollar liquidity programs aim to mitigate these strains, supporting the flow of credit to U.S. households and businesses.

Recent usage of the Federal Reserve dollar swap lines

In response to the COVID-19 pandemic and accompanying stresses in dollar funding markets, the Federal Reserve coordinated with several other central banks to expand and enhance its central bank liquidity swap lines during the week of March 15, 2020.[2] The swap fee was reduced from 50 basis points to 25 basis points over the U.S. dollar overnight index swap rate. To better target stresses in funding markets for longer-term dollar borrowing, swap operations with a maturity of 84 days were added to the usual 7-day operations by the four central banks that traditionally hold regular auctions—the Bank of England (BOE), the Bank of Japan (BOJ), the European Central Bank (ECB), and the Swiss National Bank (SNB). In addition, temporary swap lines were reopened with the nine central banks that had temporary agreements during the GFC. Finally, the four foreign central banks with standing swap agreements announced that they would begin daily auctions.

(continued on next page)

[2] The swap lines were first established during the GFC in December 2007 and were expanded in October 2008. They were allowed to lapse in February 2010, but when funding strains reemerged in May 2010, the swap lines were reestablished with five central banks: the Bank of Canada, the Bank of England, the Bank of Japan, the European Central Bank, and the Swiss National Bank. These temporary swap lines were converted in October 2013 to standing lines with no preset expiration date. These lines are bilateral and provide the Federal Reserve with the capacity to obtain foreign currencies from foreign central banks.

Federal Reserve Tools to Lessen Strains *(continued)*

The auctions initially conducted by the BOE, BOJ, ECB, and SNB were met with strong demand. Swaps outstanding as of April 30 stood at $446 billion, the highest level recorded since the GFC, with participation dominated by the BOJ ($220 billion) and the ECB ($143 billion); participation by central banks with temporary arrangements was lower but still sizable at $44 billion (figure B).

The Federal Reserve's temporary FIMA Repo Facility

In addition to the swap line enhancements, on March 31, the Federal Reserve announced a new program to support dollar funding markets, the temporary FIMA (Foreign and International Monetary Authorities) Repo Facility. This facility is designed to provide a reliable source of dollar liquidity to a broad range of countries, many of which do not have swap line arrangements with the Federal Reserve. Under this facility, FIMA account holders (which include central banks and other monetary authorities) can enter into overnight repos with the Federal Reserve, temporarily exchanging U.S. Treasury securities they hold with the Federal Reserve for U.S. dollars, which can then be provided to institutions in their respective jurisdictions. This facility is intended as a backstop, with the rate set at the primary credit rate plus 25 basis points.

The FIMA Repo Facility allows central banks to obtain dollars for liquidity purposes without selling their Treasury securities outright, which should help prevent Treasury market disruptions. Usage of this facility has been minimal thus far.

1. Asset Valuations

The severe deterioration in the economic outlook, with its associated increase in uncertainty and risk aversion, depressed valuations, increased volatility, and impaired market functioning

Beginning in late February, expectations for global economic growth plummeted and uncertainty increased sharply, driving down risky asset prices and putting downward pressure on Treasury yields. These movements were amplified by a decrease in investor appetite for risk amid deteriorating market conditions. For a time, markets were severely dislocated, with volatilities historically high and liquidity conditions severely strained.

During the most severe period of stress, equity prices fell sharply, outpacing the downward revisions to earnings forecasts; spreads on corporate bonds over comparable-maturity Treasury securities widened to record the highest daily levels since 2009; and leveraged loan spreads also widened, especially for lower-rated loans. Since late March, however, investor risk sentiment has improved, and risky asset prices have partially retraced earlier declines. Some of this improvement is likely due to strong and rapid fiscal and monetary policy responses as well as the measures taken by the Federal Reserve and Treasury described in the boxes (see the boxes "The Federal Reserve's Monetary Policy Actions and Facilities to Support the Economy since the COVID-19 Outbreak" and "Federal Reserve Tools to Lessen Strains in Global Dollar Funding Markets").

Property prices—including on commercial real estate (CRE), farmland, and residential real estate (RRE)—generally take more time to respond to sudden changes in economic activity but appear likely to come under pressure.

Asset prices remain vulnerable to significant declines should the pandemic worsen, the economic fallout prove more adverse, or financial system strains reemerge

The improvement in asset markets since their troughs reflects expectations for a rebound in economic activity as well as the extraordinary policy actions taken. Uncertainty remains high and markets remain volatile relative to historical norms, suggesting the possibility of further price declines should developments prove more adverse than expected. Price declines could be especially pronounced in areas where valuations have remained high and where asset values are sensitive to the pace of economic activity. CRE markets are an example, as prices were high relative to fundamentals before the pandemic, and disruptions in the hospitality and retail sectors have been severe.

Table 1 shows the size of the asset markets discussed in this section. The largest asset markets are those for corporate equities, RRE, CRE, and Treasury securities.

Yields in Treasury markets experienced elevated volatility, and market functioning was strained

Yields on longer-dated Treasury securities declined to very low levels (figure 1-1). Consistent with the safety role of longer-term Treasury securities, estimates of Treasury term premiums

Table 1. Size of Selected Asset Markets

Item	Outstanding (billions of dollars)	Growth, 2018:Q4–2019:Q4 (percent)	Average annual growth, 1997–2019:Q4 (percent)
Equities	38,491	26.4	8.6
Residential real estate	37,768	3.8	5.5
Commercial real estate	20,007	8.0	7.1
Treasury securities	16,629	6.8	7.5
Investment-grade corporate bonds	5,949	4.1	8.4
Farmland	2,555	1.8	5.5
High-yield and unrated corporate bonds	1,341	4.9	6.6
Leveraged loans*	1,193	5.0	15.1
Price growth (real)			
Commercial real estate**		4.6	2.6
Residential real estate***		1.4	2.0

Note: The data extend through 2019:Q4. Growth rates are measured from Q4 of the year immediately preceding the period through Q4 of the final year of the period. Equities, real estate, and farmland are at market value; bonds and loans are at book value.

* The amount outstanding shows institutional leveraged loans and generally excludes loan commitments held by banks. For example, lines of credit are generally excluded from this measure. Average annual growth of leveraged loans is from 2000 to 2019:Q4, as this market was fairly small before then.

** One-year growth of commercial real estate prices is from September 2018 to December 2019, and average annual growth is from 1998:Q4 to 2019:Q4. Both growth rates are calculated from value-weighted nominal prices deflated using the consumer price index.

*** One-year growth of residential real estate is from September 2018 to December 2019, and average annual growth is from 1997:Q4 to 2019:Q4. Nominal prices are deflated using the consumer price index.

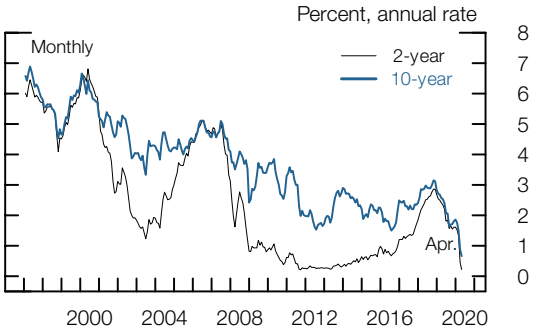
Source: For leveraged loans, S&P Global Market Intelligence, Leveraged Commentary & Data; for corporate bonds, Mergent, Inc., Corporate Fixed Income Securities Database; for farmland, Department of Agriculture; for residential real estate price growth, CoreLogic; for commercial real estate price growth, CoStar Group, Inc., CoStar Commercial Repeat Sale Indices; for all other items, Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States."

are at record lows (figure 1-2).[3] Reflecting heightened uncertainty and realized volatility, a forward-looking measure of Treasury market volatility derived from options prices shot up from the subdued levels seen in the fall. The March average was at its highest level since 2008-09, but volatility has since come down considerably (figure 1-3).

As the effects of the COVID-19 pandemic on financial markets intensified, Treasury market functioning became unusually strained, and by mid-March there were indications of severe market dislocations. Even though overall trading volumes rose significantly, market depth for longer-dated securities in both Treasury cash and futures markets dropped to record-low levels, and average bid-ask spreads widened dramatically. One factor contributing to the severe distress may have been constraints on dealers' ability to expand their balance sheets to

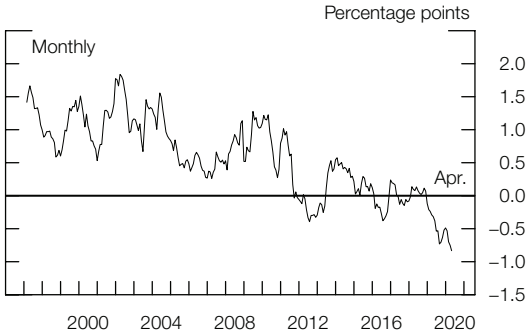
[3] Treasury term premiums capture the difference between the yield that investors require for holding longer-term Treasury securities—for which realized returns are more sensitive to risks from future inflation or volatility in interest rates than the realized returns of shorter-term securities—and the expected yield from rolling over shorter-dated ones.

1-1. Yields on Nominal Treasury Securities



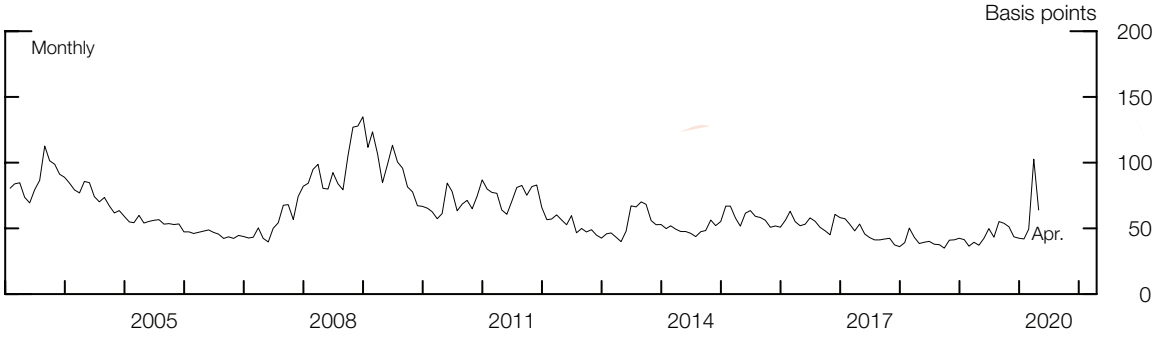
Source: Federal Reserve Board, Statistical Release H.15, "Selected Interest Rates."

1-2. Term Premium on 10-Year Nominal Treasury Securities



Source: Department of the Treasury; Wolters Kluwer, Blue Chip Financial Forecasts; Federal Reserve Bank of New York; Federal Reserve Board staff estimates.

1-3. Option-Implied Volatility on the 10-Year Swap Rate



Source: Cboe Volatility Index (TYVIX), accessed via Bloomberg.

hold higher quantities of assets amid a wave of Treasury securities sales (see the box "Institutional Activities and Market Liquidity" for further discussion).[4] Federal Reserve open market operations and regulatory actions reportedly helped offset some pressure on the balance sheets of dealers.[5] Subsequently, market functioning difficulties receded, with bid-ask spreads in relatively liquid segments of the Treasury market returning to more typical levels. However, some measures, such as market depth, have shown only modest signs of improvement; this is particularly true for longer-dated tenors (figure 1-4).[6]

[4] As market makers, dealers absorbed large amounts of less-liquid off-the-run Treasury securities from investors who sought to secure liquidity by selling assets or had to unwind positions, which reportedly expanded dealers' balance sheets against the constraints imposed by regulatory or risk-management considerations.

[5] In addition to its increased asset purchases and funding facilities, the Federal Reserve announced a temporary change to its supplementary leverage ratio rule to ease strains in the Treasury market. The change excludes U.S. Treasury securities and deposits at Federal Reserve Banks from the calculation of the supplementary leverage ratio rule for holding companies until March 31, 2021. See Board of Governors of the Federal Reserve System (2020), "Federal Reserve Board Announces Temporary Change to Its Supplementary Leverage Ratio Rule to Ease Strains on the Treasury Market Resulting from the Coronavirus and Increase Banking Organizations' Ability to Provide Credit to Households and Businesses," press release, April 1, https://www.federalreserve.gov/newsevents/pressreleases/bcreg20200401a.htm.

[6] Market depth indicates the quantity of an asset available to buy or sell at the best posted bid and ask prices.

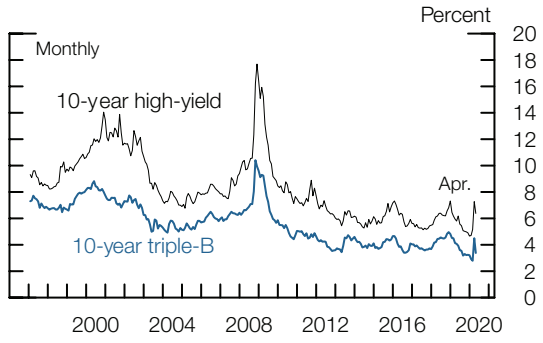
1-4. Treasury Market Depth

Source: Repo interdealer broker community.

Corporate bond spreads widened substantially amid a deteriorating corporate earnings outlook and illiquidity

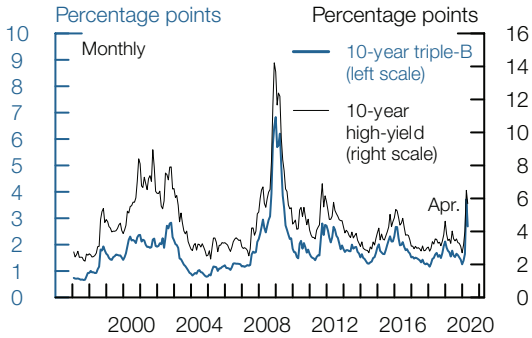
Yields on corporate bonds, although supported by very low Treasury yields, still increased in March from historically low levels (figure 1-5). Consequently, spreads of yields on corporate bonds over comparable-maturity Treasury yields widened substantially as investor risk appetite deteriorated (figure 1-6).[7] Spreads widened particularly for firms in the energy, airline, and leisure industries, as the outlook for those industries deteriorated with the intensification of the COVID-19 pandemic.[8] Other indicators also suggest a reduction in investor risk appetite. For example, the excess bond premium, measured as the gap between corporate bond spreads and expected credit losses and inversely related to investor risk appetite, rose well above its historical median (figure 1-7).[9] Corporate bond market functioning was adversely affected as liquidity conditions deteriorated: Bid-ask spreads widened considerably

1-5. Corporate Bond Yields



Source: ICE Data Indices, LLC, used with permission.

1-6. Corporate Bond Spreads to Similar-Maturity Treasury Securities



Source: ICE Data Indices, LLC, used with permission; Department of the Treasury.

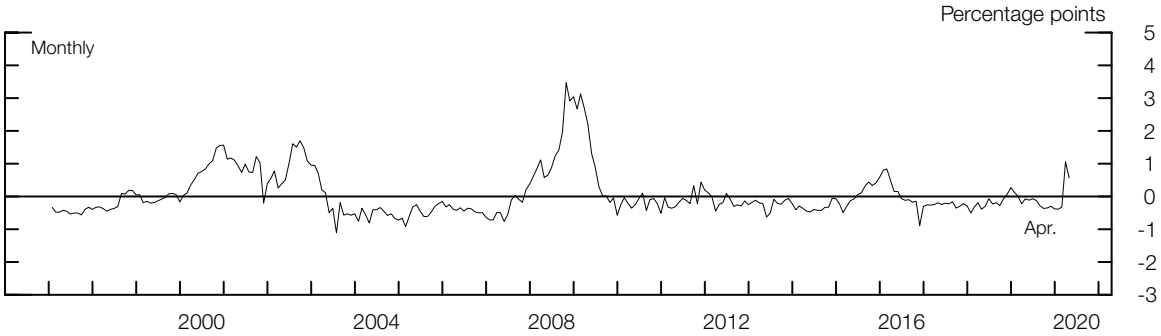
[7] Spreads between yields on corporate bonds and comparable-maturity Treasury securities reflect the extra compensation investors require to hold debt that is subject to corporate default or liquidity risks.

[8] An oil supply dispute between Saudi Arabia and Russia also contributed to widening spreads for energy companies.

[9] For a description of the excess bond premium, see Simon Gilchrist and Egon Zakrajšek (2012), "Credit Spreads and Business Cycle Fluctuations," *American Economic Review*, vol. 102 (June), pp. 1692–720.

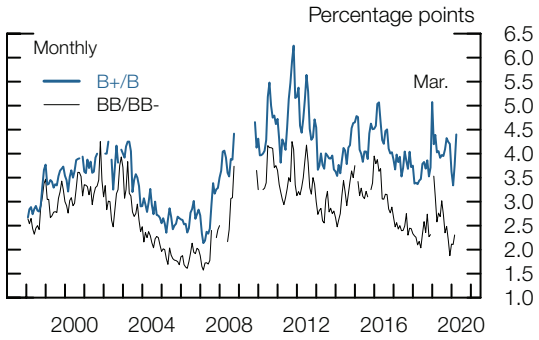
for both investment-grade and high-yield bonds, and bond mutual funds and ETFs experienced large outflows. Liquidity conditions in those markets as well as investor risk appetite improved following the Federal Reserve's announcement of corporate credit facilities.

1-7. Corporate Bond Premium over Expected Losses



Source: Federal Reserve Board staff calculations based on Lehman Brothers Fixed Income Database (Warga); Intercontinental Exchange, Inc., ICE Data Services; Center for Research in Security Prices, CRSP/Compustat Merged Database, Wharton Research Data Services; Bank of America Merrill Lynch Bond Indices; Moody's; S&P Global Market Intelligence, Compustat.

1-8. Spreads on Newly Issued Institutional Leveraged Loans



Source: S&P Global, Leveraged Commentary & Data.

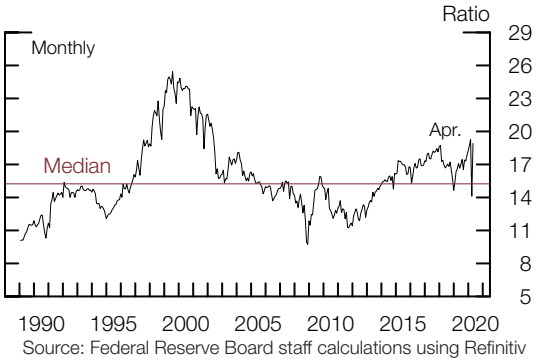
Investor demand for leveraged loans has also fallen since late February, leading to a notable widening of interest rate spreads at issuance for lower-rated leveraged loans (figure 1-8). Interest rate spreads for higher-rated leveraged loans also widened. However, the observed widening of spreads at issuance likely understates the deterioration in market conditions, as new issuance activity nearly came to a halt in March. Issuance of collateralized loan obligations (CLOs)—the largest investors in leveraged loans—slowed considerably, and loan mutual funds experienced sharp outflows on net. Liquidity conditions in the secondary market also deteriorated, with bid-ask spreads widening to their highest levels in a decade. Conditions have improved somewhat since late March.

Equity prices swung widely, and liquidity conditions deteriorated

Equity prices plunged as concern over the COVID-19 outbreak grew, reflecting declines in both investor appetite for risk and expected income. Equity prices relative to forecasts of corporate earnings also declined below the historical median (figure 1-9). However, prices relative to earnings forecasts have risen since late March to levels seen before the outbreak: Prices have increased a fair bit from their trough, and analysts' firm-level earnings forecasts have fallen in response to the economic deterioration. Other measures of investor risk appetite in domestic equity markets exhibited a similar pattern. The gap between the forward earnings-to-price ratio and the expected real yield on 10-year Treasury securities—a rough

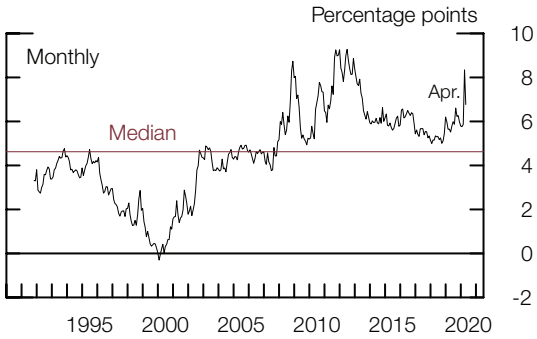
measure of the premium investors require for holding risky corporate equities—jumped close to historical highs in March, but it has since retraced about half of the increase (figure 1-10).

1-9. Forward Price-to-Earnings Ratio of S&P 500 Firms



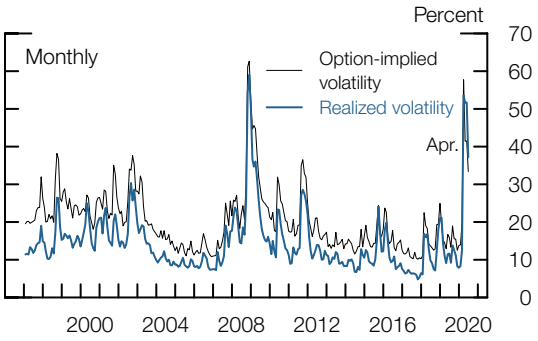
Source: Federal Reserve Board staff calculations using Refinitiv (formerly Thomson Reuters), Institutional Brokers Estimate System Estimates.

1-10. Spread of Forward Earnings-to-Price Ratio of S&P 500 Firms to 10-Year Real Treasury Yield



Source: Federal Reserve Board staff calculations using Refinitiv (formerly Thomson Reuters), Institutional Brokers Estimate System Estimates; Department of the Treasury; Federal Reserve Bank of Philadelphia, Survey of Professional Forecasters.

1-11. S&P 500 Return Volatility



Source: Bloomberg Finance L.P.

A measure of expected equity return volatility over the next 30 days implied by option prices surged to a record daily reading in mid-March, sending the March average to the highest level in more than a decade (figure 1-11). Liquidity conditions in equity cash and futures markets deteriorated significantly in late February amid heightened price volatility. Large price movements triggered circuit breakers several times in both equity spot and equity futures markets in March.[10] Since late March, volatility has come down, but remains elevated relative to historical norms, and liquidity remains poor.

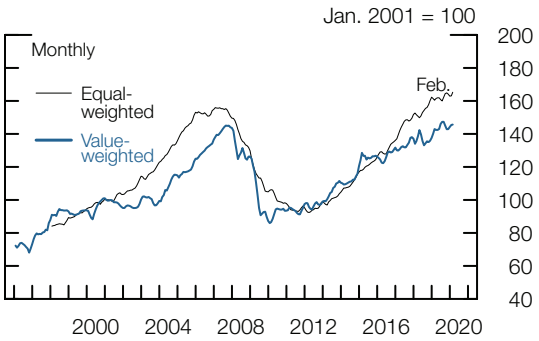
Prices of commercial properties and farmland were highly elevated relative to their income streams on the eve of the pandemic, suggesting that their prices could fall notably

CRE prices were elevated through February 2020, the most recent data point (figure 1-12). Commercial property rents have generally risen more slowly than prices over the past several years. As a result, capitalization rates, which measure annual rental income relative to prices for recently transacted commercial properties, have ranged around historically low levels (figure 1-13). The spread of capitalization rates over yields on 10-year Treasury securities,

[10] Large price movements and poor liquidity conditions also posed serious challenges for some firms trading on a strategy that is based on an assumption that the differences in the implied volatilities across various derivatives should converge to zero.

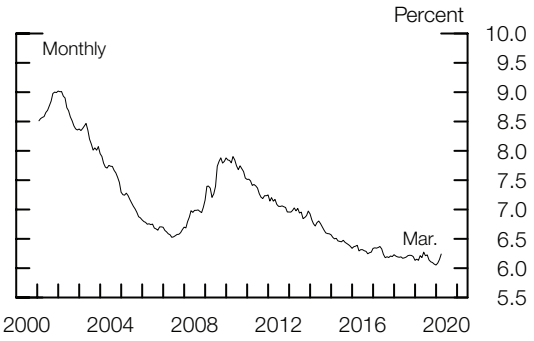
which is a rough measure of the premium that investors require for holding CRE over safe alternative investments, increased somewhat as Treasury yields declined (figure 1-14).

1-12. Commercial Real Estate Prices (Real)



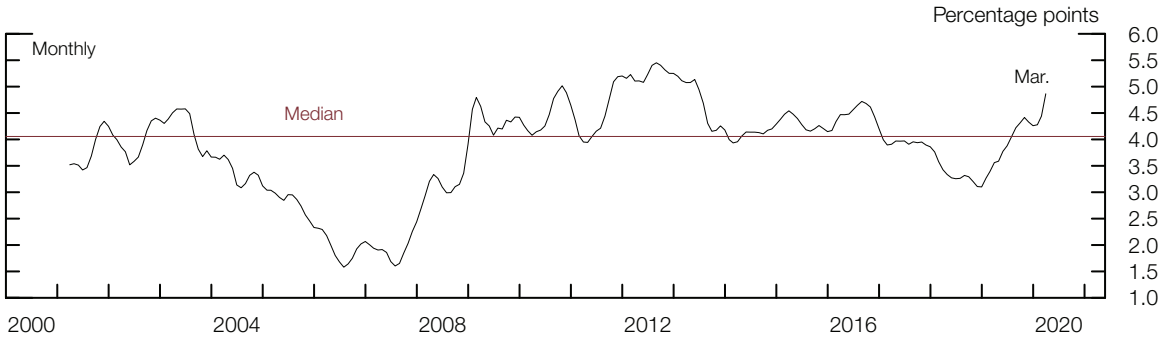
Source: CoStar Group, Inc., CoStar Commercial Repeat Sale Indices; Bureau of Labor Statistics, consumer price index via Haver Analytics.

1-13. Capitalization Rate at Property Purchase



Source: Real Capital Analytics; Andrew C. Florance, Norm G. Miller, Ruijue Peng, and Jay Spivey (2010), "Slicing, Dicing, and Scoping the Size of the U.S. Commercial Real Estate Market," *Journal of Real Estate Portfolio Management*, vol. 16 (May–August), pp. 101–18.

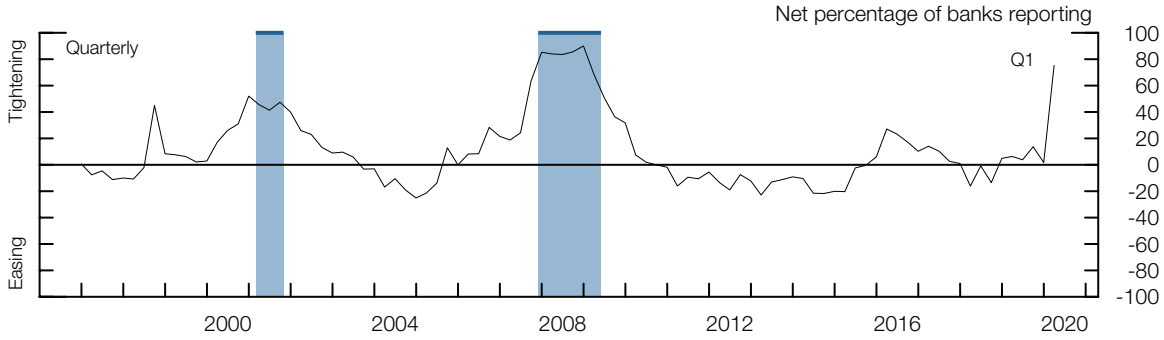
1-14. Spread of Capitalization Rate at Property Purchase to 10-Year Treasury Yield



Source: Real Capital Analytics; Department of the Treasury; Andrew C. Florance, Norm G. Miller, Ruijue Peng, and Jay Spivey (2010), "Slicing, Dicing, and Scoping the Size of the U.S. Commercial Real Estate Market," *Journal of Real Estate Portfolio Management*, vol. 16 (May–August), pp. 101–18.

The vulnerability stemming from elevated CRE valuation pressures, coupled with a dim outlook for the sector as indicated by recent declines in equity real estate investment trust (REIT) prices, suggests that CRE may undergo a substantial repricing in response to disruptions generated by the COVID-19 pandemic. For instance, since late February, the hospitality and retail sectors have experienced precipitous declines in demand because of social distancing, putting the ability of these sectors to make timely mortgage and rental payments into question. The non-agency commercial mortgage-backed securities (CMBS) market, which had previously been funding about one-fifth of CRE mortgage debt, stopped new securitizations toward the end of March. CRE loans that would normally be securitized have been accumulating on bank balance sheets. In addition, data from the April 2020 Senior Loan Officer Opinion Survey on Bank Lending Practices (SLOOS) indicated that a major fraction of banks reported weaker demand for CRE loans and tighter lending standards, on net, in the first quarter of 2020 (figure 1-15).

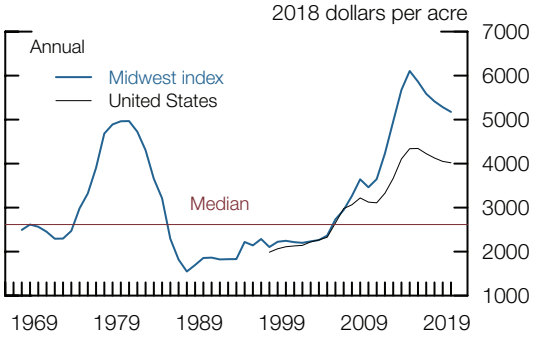
1-15. Change in Bank Standards for Commercial Real Estate Loans



Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices; Federal Reserve Board staff calculations.

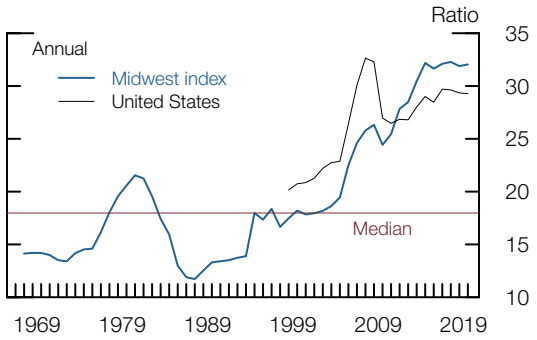
According to data through 2019, farmland prices, both nationally and in several midwestern states, had remained high by historical standards, although they moved down from earlier peaks (figure 1-16). Farmland prices also remain high relative to rents (figure 1-17). Net farm income is forecast to have increased in 2019 but to be well below the high levels seen in the early years of the past decade, reflecting low agricultural commodity prices and trade tensions. While the available data predate the COVID-19 outbreak, the effect of COVID-19 on the agricultural supply chain has placed further downward pressure on already-stressed farm income.

1-16. Farmland Prices



Source: Department of Agriculture; Federal Reserve Board staff calculations.

1-17. Farmland Price-to-Rent Ratio

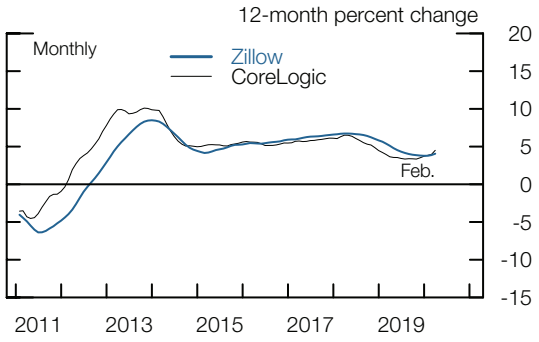


Source: Department of Agriculture; Federal Reserve Board staff calculations.

House prices were somewhat elevated relative to rents before the COVID-19 outbreak

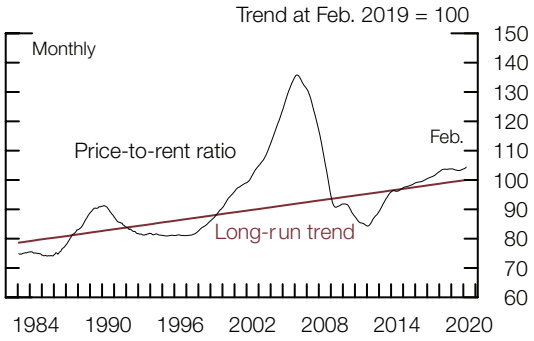
House prices have grown at a moderate pace for the past several quarters, and, nationwide, prices appear only a little above their long-run average relationship with property rents (figures 1-18 and 1-19). However, housing price-to-rent ratios vary significantly across regional markets, and price-to-rent ratios for some cities that have seen rapid price increases are elevated (figure 1-20).

1-18. Growth of Nominal Prices of Existing Homes



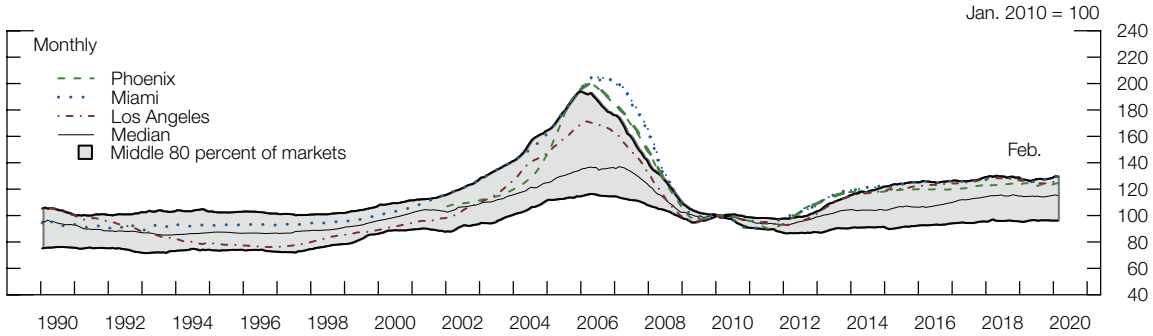
Source: CoreLogic Real Estate Data; Zillow, Inc., Zillow Real Estate Data.

1-19. Housing Price-to-Rent Ratio



Source: For house prices, CoreLogic; for rent data, Bureau of Labor Statistics.

1-20. Selected Local Housing Price-to-Rent Ratio Indexes



Source: For house prices, CoreLogic Real Estate Data; for rent data, Bureau of Labor Statistics.

The severe disruptions in economic activity following the outbreak could reduce house prices by bringing down household incomes and restricting access to mortgage credit. However, weakened demand may be partially offset by lower supply arising from slowdowns in the construction of new houses, and mortgage forbearance may help prevent an increase in distressed transactions that could otherwise put considerable downward pressure on house prices. It will take some time for house prices to show the effects, as these prices generally reflect contractual agreements made 30 to 45 days earlier.

Institutional Activities and Market Liquidity

Market liquidity is the ability to transact in financial markets quickly and at desired quantities without exerting an outsized effect on market prices.[1] In March and April, even the deepest and most liquid financial markets experienced poor liquidity and extreme price volatility. Against this backdrop, we take a longer-range view and highlight a few trends in the activities of securities dealers, leveraged funds such as hedge funds and principal trading firms (PTFs), and mutual funds and ETFs that could have implications for market liquidity.

Channels of liquidity provision

This analysis focuses on the following three ways in which market liquidity is supported by institutions:

1. *direct liquidity* provision through market making—that is, cases in which a firm buys and sells securities from market participants at posted bid and ask prices for which the market maker is compensated through the difference between the buying and selling prices, or the bid-ask spread
2. *funding liquidity* provision through secured credit—that is, cases in which one firm provides secured credit that allows other financial institutions to undertake business models that directly or indirectly provide market liquidity
3. *indirect liquidity* provision through arbitrage and trading—that is, cases in which firms' business models require them to buy and sell securities on a regular basis for purposes other than making markets that nonetheless create buying and selling opportunities for other investors

The flow chart in figure A depicts these three distinct channels of liquidity provision. Securities dealers—or, simply, dealers—are institutions that market, underwrite, and transact in a range of securities, including government debt, corporate bonds, and MBS. Many large dealers are subsidiaries of bank holding companies. As market makers, dealers are direct liquidity providers in the sense that they typically stand ready to buy and sell securities from their own holdings and are effectively compensated for providing market liquidity through the difference between the prices at which they buy and sell a particular security. Dealers also provide funding liquidity by offering secured credit to leveraged funds (shown by the line connecting the two types of institutions). In turn, although not market makers per se, leveraged funds regularly buy and sell securities at scale, often to take advantage of arbitrage opportunities. By doing so, leveraged funds provide selling and buying opportunities to other investors, bolstering market liquidity indirectly. The bottom row describes indirect liquidity provision by other asset managers such as mutual funds and ETFs. Like leveraged funds, these institutions buy and sell securities frequently and so can have material effects on liquidity. Unlike leveraged funds, some of these asset managers, such as MMFs, also provide funding liquidity to dealers in the repo market.[2]

Dealers' market making and liquidity provision

Dealer market making activities have evolved significantly since the 2007–09 crisis, with dealer inventory holdings of Treasury securities having increased since the crisis and inventories of corporate securities having decreased (figure B). While dealers generally continue to stand ready to buy and sell

(continued)

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[1] For a detailed discussion of market liquidity, see Board of Governors of the Federal Reserve System (2019), *Financial Stability Report* (Washington: Board of Governors, November), https://www.federalreserve.gov/publications/files/financial-stability-report-20191115.pdf.

[2] Dealers may also procure funding from banks and other dealers, while leveraged funds may source funding directly from MMFs through sponsored repos.

securities from their own holdings in the Treasury market, they no longer do so at scale in the corporate bond market and some other securities markets. Increasingly, dealers attempt to match clients who want to buy and sell particular securities in those markets.

Figure A. Dealers' and Institutions' Liquidity Provisions

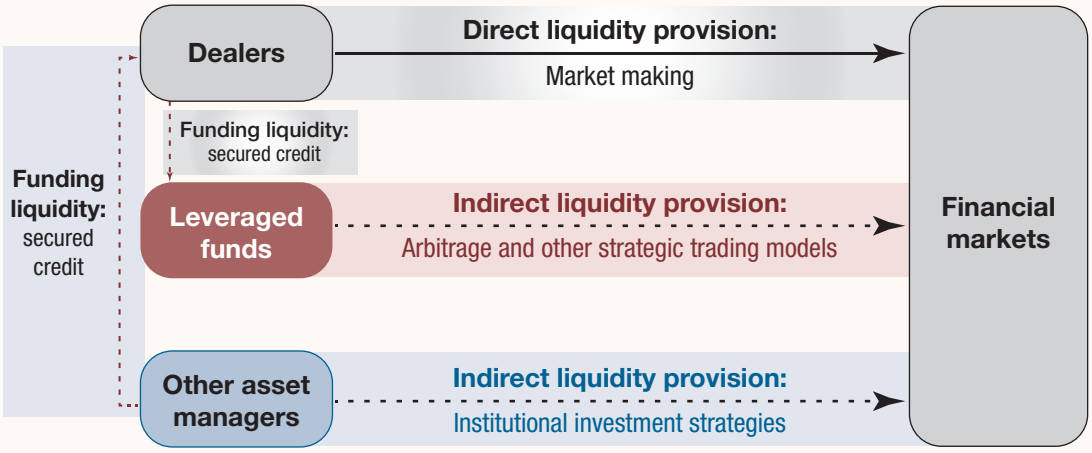
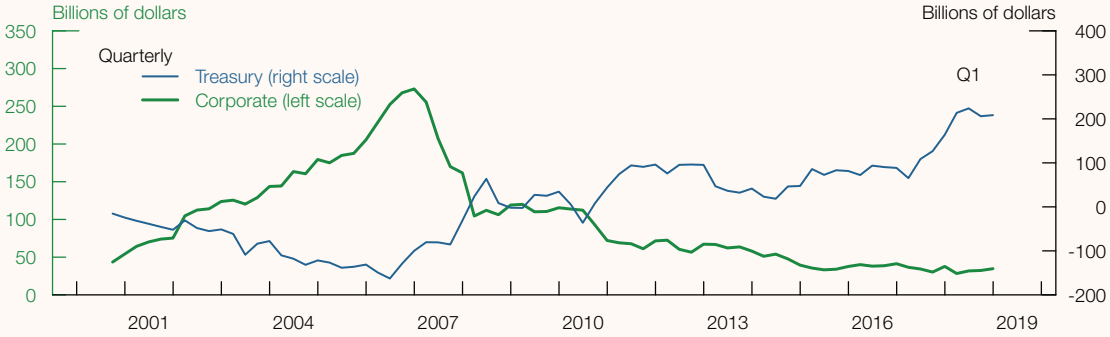


Figure B. Net Positions in Treasury and Corporate Securities



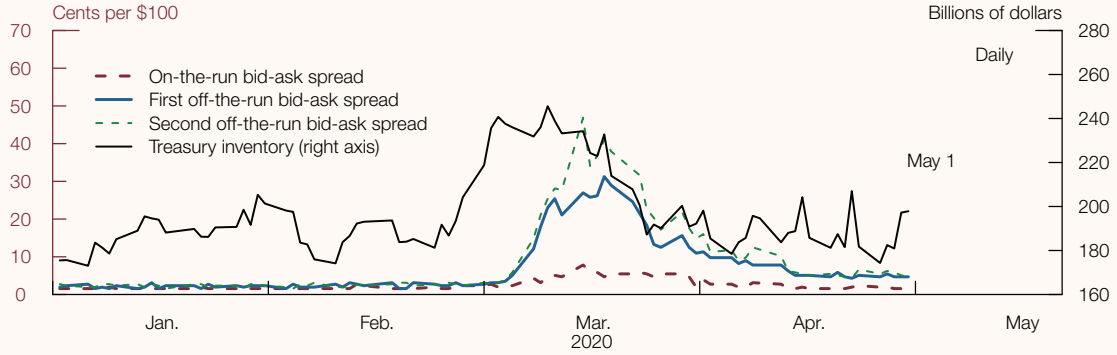
Source: Federal Reserve Board, Form FR 2004A, Weekly Report of Dealer Positions.

Dealers intermediate in the Treasury market by buying and selling securities from clients while funding their inventory holdings in short-term secured funding markets. Dealer intermediation in the Treasury market received considerable attention during the intense market volatility in March. As investors sold less-liquid Treasury securities to obtain cash, dealers absorbed large amounts of these Treasury securities onto their balance sheets. It is possible that some dealers reached their capacity to absorb these sales, leading to a deterioration in Treasury market functioning. Actions taken by the Federal Reserve—including expanded repo operations, temporary regulatory relief, and expanded purchases of Treasury securities—were designed to alleviate the constraints on dealers and to improve Treasury market functioning (see the box "The Federal Reserve's Monetary Policy Actions and Facilities to Support the Economy since the COVID-19 Outbreak"). In the wake of these actions, dislocations in the Treasury market have subsided, and measures of market functioning, such as market depth and bid-ask spreads, have improved (figure C).

(continued on next page)

Institutional Activities and Market Liquidity *(continued)*

Figure C. U.S. Treasury Dealer Inventory and Indicative Bid-Ask Spreads



Source: Federal Reserve Bank of New York, Federal Reserve Board, Form FR 2052a, Complex Institution Liquidity Monitoring Report.

Although there is little indication that changes in corporate bond market intermediation by dealers have had a noticeable effect on market liquidity in normal times, there is evidence suggesting liquidity has become somewhat more fragile—that is, more likely to disappear—in times of stress.[3] Specifically, during periods of market strain, corporate bond liquidity tends to decline, and the cost of transacting tends to rise substantially. Although this trend suggests that dealers may be less willing to engage in market making in the corporate bond market during times of stress, other changes in market structure, such as the increased prevalence of electronic trading, may also affect market liquidity.[4] Against this backdrop, measures of corporate bond market liquidity deteriorated sharply in March 2020, although they have subsequently improved.

Besides market making, dealers also contribute to market liquidity by providing credit to leveraged funds such as hedge funds and other firms that engage in significant trading activity, including those that engage in high-frequency trading (HFT). This funding liquidity is provided in several ways, including repos.[5] Leveraged funds, in turn, depend on the credit provided by dealers to finance their trading activities in a number of markets, including bond and equity markets.

Implications of leveraged funds' indirect liquidity provision

Leveraged funds, such as hedge funds, buy and sell securities frequently to exploit arbitrage opportunities and thereby are indirect providers of market liquidity. At the same time, most leveraged funds require a minimum level of preexisting market liquidity in order to execute their trading strategies, and

(continued)

[3] For additional information, see the discussion of liquidity fragility in Board of Governors of the Federal Reserve System (2019), *Financial Stability Report* (Washington: Board of Governors, November), pp. 14–16, https://www.federalreserve.gov/publications/files/financial-stability-report-20191115.pdf.

[4] See Jack Bao, Maureen O'Hara, and Xing (Alex) Zhou (2018), "The Volcker Rule and Corporate Bond Market Making in Times of Stress," *Journal of Financial Economics*, vol. 130 (October), pp. 95–113; Hendrik Bessembinder, Stacey Jacobsen, William Maxwell, and Kumar Venkataraman (2018), "Capital Commitment and Illiquidity in Corporate Bonds," *Journal of Finance*, vol. 73 (August), pp. 1615–61; Jens Dick-Nielsen and Marco Rossi (2019), "The Cost of Immediacy for Corporate Bonds," *Review of Financial Studies*, vol. 32 (January) pp. 1–41.

[5] Other ways to provide credit include margin loans under prime brokerage agreements and derivatives.

leveraged funds that are not actively trading in a market because of poor liquidity may be required to deleverage by selling assets into the same market. This combination can lead to a rapid unraveling of market liquidity under certain circumstances. Seen in this light, a few hedge fund industry trends have important implications for understanding recent strains in market liquidity.

First, the concentration of hedge fund leverage has increased markedly. The top 25 hedge funds accounted for 50 percent of the industry's borrowing as of 2019:Q2, although they accounted for less than 14 percent of its net assets.[6] The increase in leverage concentration has occurred over the past several years as dealers have reportedly given preferential terms to their most-favored hedge fund clients. Market participants have raised concerns over this concentration because distress at a few large hedge funds with disproportionately high leverage can have outsized effects, as they may have to sell large amounts of assets to meet margin calls or reduce portfolio risk during periods of market stress. Such deleveraging may have contributed to the poor liquidity conditions in financial markets in March.

Second, many hedge funds have increasingly relied on model-driven trading strategies, which has increased the potential for "crowding" in trading strategies. For example, the growing popularity of certain momentum- and volatility-sensitive strategies implies that many hedge funds may need to buy and sell the same types of securities at the same time. Common types of these strategies include those of "risk parity" and "commodity trading advisors" funds. Such strategies typically require selling when equity prices fall, which can amplify market moves in stress events.

A subset of leveraged firms that can be particularly problematic during stressful periods consists of PTFs.[7] In normal times, PTFs provide a large amount of liquidity for different markets, particularly those that operate on electronic trading platforms. PTFs use proprietary, automated HFT strategies, particularly in equities, Treasury securities, and FX. Their high-frequency automated trading on electronic trading platforms is characterized by very short-term investment horizons. Some PTFs also arbitrage prices across market segments (for example, cash, futures, and options) and across markets (particularly among equities, Treasury securities, and FX). During periods of extreme market stress, some PTFs may abruptly reduce their trading, which can contribute to poor market liquidity and transmit stress quickly from one market to another.

Other asset managers' effects on market liquidity

In addition to dealers and leveraged funds, other asset managers can also have material effects on market liquidity. Some mutual funds offer daily redemptions to investors but invest in less-liquid assets, such as high-yield bonds and bank loans. These types of mutual funds have grown rapidly over the past decade or so. This pronounced form of liquidity transformation can make these funds particularly

(continued on next page)

[6] See Securities and Exchange Commission Form PF, "Reporting Form for Investment Advisers to Private Funds and Certain Commodity Pool Operators and Commodity Trading Advisors," https://www.sec.gov/files/formpf.pdf.

[7] A PTF is defined as a principal investor who deploys proprietary low-latency automated trading strategies and who may be registered as a broker-dealer but does not have clients as in a typical broker-dealer business model; see U.S. Department of the Treasury, Board of Governors of the Federal Reserve System, Federal Reserve Bank of New York, U.S. Securities and Exchange Commission, and U.S. Commodity Futures Trading Commission (2015), *Joint Staff Report: The U.S. Treasury Market on October 15, 2014* (Washington: Treasury, Board of Governors, FRBNY, SEC, and CFTC, July), https://www.treasury.gov/press-center/press-releases/Documents/Joint_Staff_report_Treasury_10-15-2015.pdf.

Institutional Activities and Market Liquidity *(continued)*

vulnerable to large redemptions during stressed conditions.[8] If investors believe redemptions would negatively affect the ability of funds to meet future redemptions, they may have an incentive to redeem ahead of others. Such self-reinforcing dynamics could lead to waves of redemptions at the funds in market downturns, which may force funds to sell less-liquid assets at fire sale prices and result in further strains on market liquidity. Both high-yield funds and bank loan funds experienced heightened outflows in March, reaching 4 percent and 14 percent of assets under management, respectively.

One notable trend in the asset management industry over the past couple of decades is the shift from actively managed assets to passively managed mutual funds and ETFs. As investors in passive mutual funds tend to be less responsive to performance than those in active funds, this shift to passive investing might help reduce large redemptions arising from poor performance and, therefore, damp fire sale risks.[9]

At the same time, some types of exchange-traded products (ETPs)—leveraged and inverse ETPs—have features that could cause strains in market liquidity.[10] Those two types of ETPs must rebalance their portfolios near the end of the day in order to meet fund objectives. By construction, the rebalancing is in the same direction as market movements earlier in the day. Because this pattern is well known by other market participants, there is the potential for "front running," or executing trades in anticipation of the rebalancing, leading to further liquidity strains.

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[8] There is some evidence that the largest bank loan mutual funds have increased their shares of holdings of most illiquid assets in recent years. Moreover, bank loans typically have lengthy settlement periods (usually longer than seven days), which could further constrain the funds' ability to convert loans into cash to meet large redemptions. See Kenechukwu Anadu and Fang Cai (2019), "Liquidity Transformation Risks in U.S. Bank Loan and High-Yield Mutual Funds," FEDS Notes (Washington: Board of Governors of the Federal Reserve System, August 9), https://www.federalreserve.gov/econres/notes/feds-notes/liquidity-transformation-risks-in-US-bank-loan-and-high-yield-mutual-funds-20190809.htm.

[9] See Kenechukwu Anadu, Mathias Kruttli, Patrick McCabe, Emilio Osambela, and Chae Hee Shin (2018), "The Shift from Active to Passive Investing: Potential Risks to Financial Stability?" Finance and Economics Discussion Series 2018-060 (Washington: Board of Governors of the Federal Reserve System, August), https://dx.doi.org/10.17016/FEDS.2018.060.

[10] Leveraged ETPs attempt to offer multiples of a daily index return, while their inverse counterparts attempt to deliver multiples of daily inverse returns of an index. Both must rebalance their portfolios towards the end of the trading session to maintain their target exposures relative to their assets.

2. Borrowing by Businesses and Households

The high level of business-sector debt is likely to amplify the adverse effects of the COVID-19 outbreak

Vulnerabilities arising from business debt were elevated at the end of 2019, while vulnerabilities arising from household debt were at more modest levels. Business debt levels were high relative to either business assets or GDP, with the riskiest firms accounting for most of the increase in debt in recent years. By contrast, household borrowing has advanced more slowly than overall economic activity in recent years and remained heavily concentrated among borrowers with high credit scores.

Against this backdrop, the COVID-19 outbreak poses severe risks to businesses of all sizes and millions of households. Economic activity is contracting sharply, and the associated reduction in earnings and increase in credit needed to bridge the downturn will expand the debt burden and default risk of a highly leveraged business sector. While household debt vulnerabilities were generally modest before the pandemic, the severity of the shock and the associated sudden increase in unemployment and sharp decline in incomes may lead to a significant rise in delinquencies and defaults on household debt.

Table 2 shows the volume and recent historical growth rates of forms of debt owed by nonfinancial businesses and households as of the end of 2019. Total outstanding private credit was split almost equally between businesses and households, with each owing close to $16 trillion.

In the years before the pandemic shock, total private credit advanced roughly in line with economic activity . . .

Over the past several years, the combined total debt owed by businesses and households expanded at a pace similar to that of nominal GDP. As a result, the nonfinancial-sector credit-to-GDP ratio was broadly stable through the end of 2019, similar to its level in mid-2005, the period preceding the episode of rapid credit growth from 2006 to 2007 (figure 2-1). Going forward, the credit-to-GDP ratio will likely rise dramatically in 2020, as GDP is expected to fall precipitously.

Figure 2-2 shows the credit-to-GDP ratio separately for the nonfinancial business and household sectors (the next section discusses leverage of financial firms). The business debt-to-GDP ratio has risen significantly over the past several years, surpassing its historical high. In contrast, the household debt-to-GDP ratio has fallen steadily over the past decade.

Table 2. Outstanding Amounts of Nonfinancial Business and Household Credit

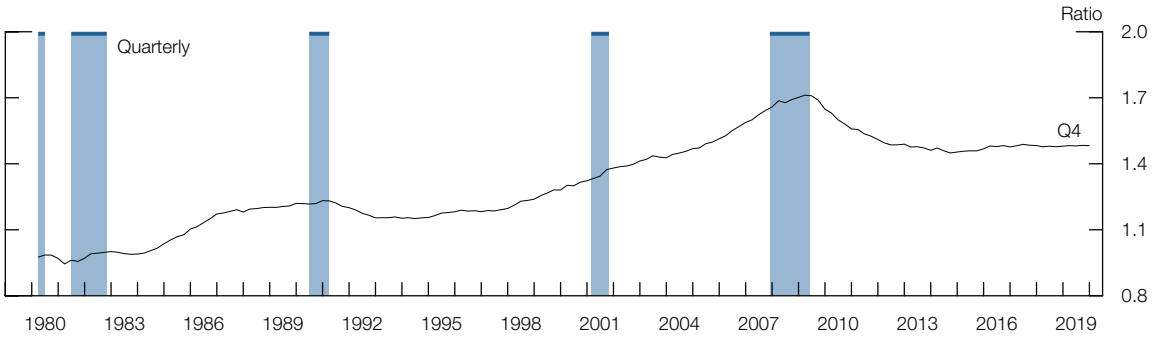
Item	Outstanding (billions of dollars)	Growth, 2018:Q4–2019:Q4 (percent)	Average annual growth, 1997–2019:Q4 (percent)
Total private nonfinancial credit	32,207	4.2	5.5
Total nonfinancial business credit	16,058	4.8	5.7
Corporate business credit	10,117	4.7	5.0
Bonds and commercial paper	6,558	4.1	5.6
Bank lending	1,425	3.5	2.8
Leveraged loans*	1,134	5.0	15.1
Noncorporate business credit	5,941	4.9	7.2
Commercial real estate	2,508	6.2	6.2
Total household credit	16,149	3.5	5.4
Mortgages	10,610	3.0	5.6
Consumer credit	4,191	4.5	5.3
Student loans	1,643	4.7	9.3
Auto loans	1,196	3.8	5.0
Credit cards	1,093	3.8	3.5
Nominal GDP	21,727	3.7	4.2

Note: The data extend through 2019:Q4. Growth rates are measured from Q4 of the year immediately preceding the period through Q4 of the final year of the period. The table reports the main components of corporate business credit, total household credit, and consumer credit. Other, smaller components are not reported. The commercial real estate (CRE) row shows CRE debt owed by both corporate and noncorporate businesses. The total household-sector credit includes debt owed by other entities, such as nonprofit organizations. GDP is gross domestic product.

* Leveraged loans included in this table are an estimate of the leveraged loans that are made to nonfinancial businesses only and do not include the small amount of leveraged loans outstanding for financial businesses. The amount outstanding shows institutional leveraged loans and generally excludes loan commitments held by banks. For example, lines of credit are generally excluded from this measure. The average annual growth rate shown for leveraged loans is computed from 2000 to 2019:Q4, as this market was fairly small before 2000.

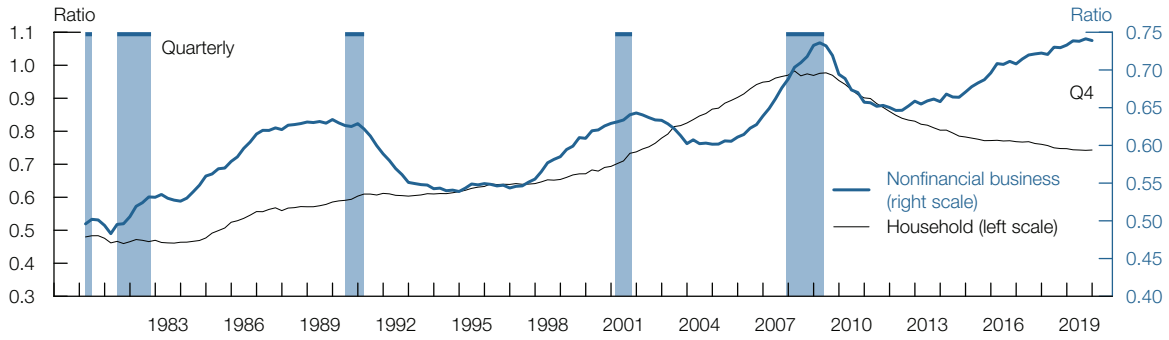
Source: For leveraged loans, S&P Global, Leveraged Commentary & Data; for GDP, Bureau of Economic Analysis, national income and product accounts; for all other items, Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States."

2-1. Private Nonfinancial-Sector Credit-to-GDP Ratio



Source: Federal Reserve Board staff calculations based on Bureau of Economic Analysis, national income and product accounts, and Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States."

2-2. Nonfinancial Business- and Household-Sector Credit-to-GDP Ratios

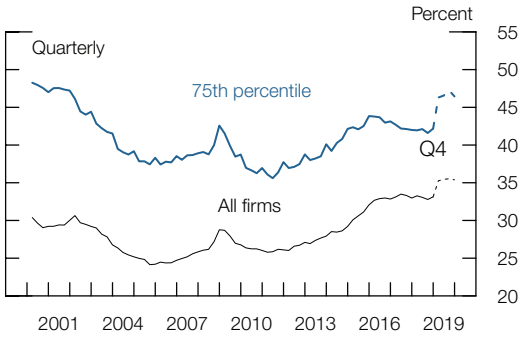


Source: Federal Reserve Board staff calculations based on Bureau of Economic Analysis, national income and product accounts, and Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States."

. . . but business leverage was near its highest level over the past two decades . . .

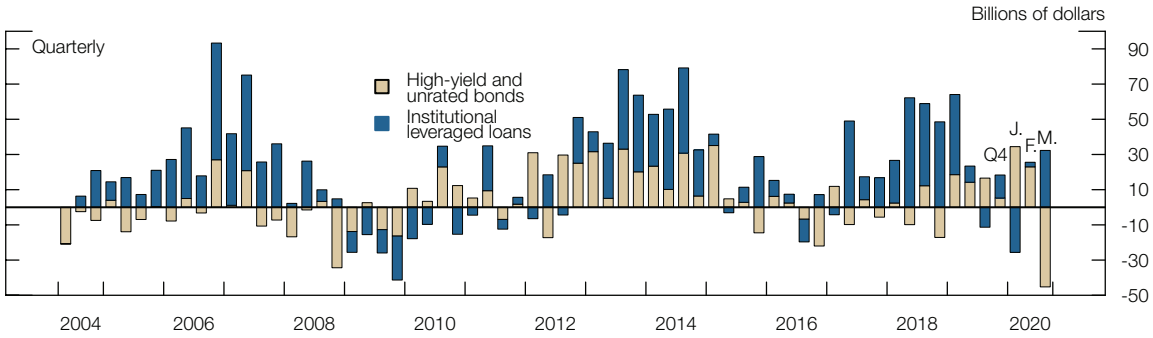
An indicator of the leverage of businesses—the ratio of debt to assets for all publicly traded nonfinancial firms—was at its highest level in 20 years at the beginning of 2020 (figure 2-3).[11] Moreover, for highly leveraged public firms—defined as firms above the 75th percentile of the leverage distribution—this indicator is close to a record high. The net issuance of riskier forms of business debt—high-yield bonds and institutional leveraged loans—showed some variation but remained high, overall, through 2019 (figure 2-4).

2-3. Gross Balance Sheet Leverage of Public Nonfinancial Businesses



Source: Federal Reserve Board staff calculations based on S&P Global, Compustat.

2-4. Net Issuance of Risky Business Debt

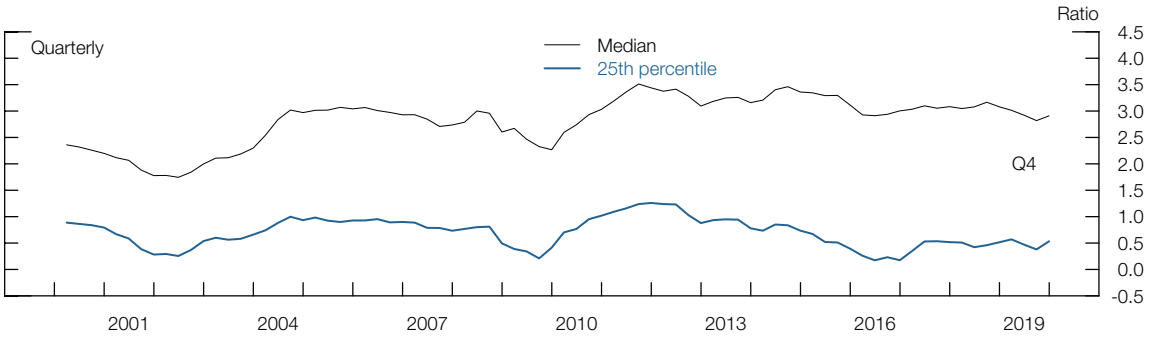


Source: Mergent, Fixed Income Securities Database; S&P Global, Leveraged Commentary & Data.

[11] The dashed line in the series beginning in the first quarter of 2019 reflects a structural break due to a new accounting standard that requires operating leases, previously considered off-balance-sheet activities, to be included in measures of debt and assets.

Historically low interest rates likely lessened investor concerns about default risks arising from higher leverage, as the ratio of earnings to interest expenses (the interest coverage ratio) had remained high for the median firm and near the historical median for riskier firms, defined as those in the bottom 25th percentile of the distribution of this ratio (figure 2-5). As the economic effects of COVID-19 continue to unfold, earnings declines will imply significantly lower interest coverage ratios, which could trigger a sizable increase in firm defaults. Policy interventions may help businesses withstand a period of weak earnings by issuing new debt and extending existing credit, but many of these businesses will emerge with even higher amounts of leverage, suggesting that vulnerabilities stemming from the business sector, including nonpublic companies and small businesses, are likely to remain elevated for some time.

2-5. Interest Coverage Ratios for Public Nonfinancial Businesses



Source: Federal Reserve Board staff calculations based on S&P Global, Compustat.

. . . and debt owed by large corporate businesses has already shown some signs of amplifying the economic effects of COVID-19

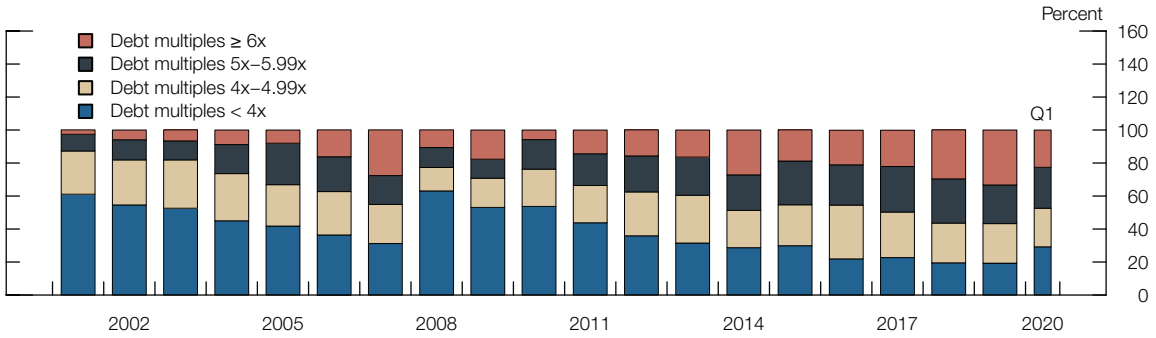
Business debt growth picked up during January and most of February. Early indicators point to a sharp slowdown in new debt since the end of February, while businesses have also started drawing on existing credit lines at banks (see the box "Risks Associated with Banks' Corporate Credit Exposures through Credit Lines"). Against this backdrop, approximately $170 billion of investment-grade corporate bonds and $29 billion of speculative-grade corporate bonds issued by nonfinancial corporations are set to mature before the end of 2020, representing 25 percent and 11 percent, respectively, of the average annual nonfinancial corporate issuance of each grade over the past five years. While bond issuance has resumed, particularly for investment-grade bonds, and policy interventions appear to be supporting lending, tight financing conditions could compromise the ability of some businesses to refinance their existing debt and, as a result, intensify the economic effects of the pandemic on these businesses' employment and investment decisions.

At the beginning of 2020, about half of investment-grade debt outstanding was rated in the lowest category of the investment-grade range (triple-B)—near an all-time high. The amount of debt downgraded from investment grade to speculative grade in 2019 was close to the historical average over the past five years. However, almost $125 billion of nonfinancial investment-grade corporate debt has been downgraded to speculative grade since late

February, and expected defaults may rise if the economic outlook and corporate earnings are revised downward. Widespread downgrades of bonds to speculative-grade ratings could lead investors to accelerate the sale of downgraded bonds, possibly generating market dislocation and downward price pressures in a segment of the corporate bond market known to exhibit relatively low liquidity.[12]

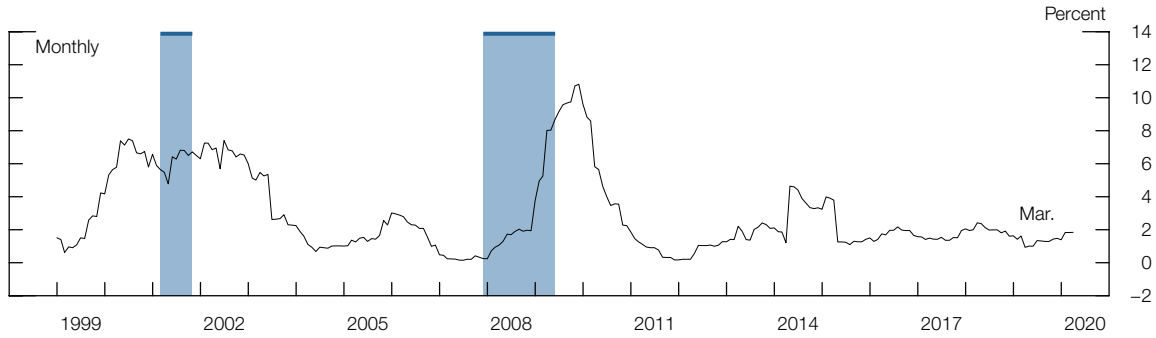
Similarly, vulnerabilities stemming from leveraged lending were increasing through mid-February 2020, as demand remained strong while credit standards stayed weak. Issuance came to a halt at the end of February, as investors became more cautious and attentive to volatility in financial markets. Reflecting this change in sentiment, the share of newly issued loans to large corporations with high leverage—defined as those with ratios of debt to earnings before interest, taxes, depreciation, and amortization greater than 6—dropped in the first quarter of 2020 after two years in which the share reached historical highs (figure 2-6). Defaults on leveraged loans ticked up in February and March and are likely to continue to increase, with the specific contour highly dependent on the path of overall economic activity (figure 2-7). Such developments would weaken the balance sheets of lenders, including CLOs that hold leveraged loans, and amplify the economic effects of COVID-19.

2-6. Distribution of Large Institutional Leveraged Loan Volumes, by Debt-to-EBITDA Ratio



Source: S&P Global, Leveraged Commentary & Data.

2-7. Default Rates of Leveraged Loans



Source: S&P Global, Leveraged Commentary & Data.

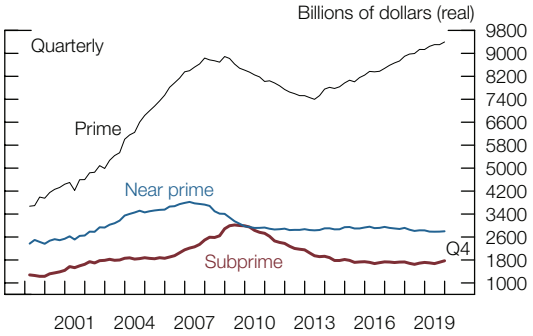
[12] The box "Vulnerabilities Associated with Elevated Business Debt" in the May 2019 report gives a fuller description of risks associated with downgrades of credit ratings; see Board of Governors of the Federal Reserve System (2019), *Financial Stability Report* (Washington: Board of Governors, May), pp. 22–25, https://www.federalreserve.gov/publications/files/financial-stability-report-201905.pdf.

On the eve of the COVID-19 outbreak, households were generally in sound financial condition; however, a substantial number of households will face increasing financial distress

The rise in unemployment in April demonstrates the severe shock to income and economic security many households face. Before this shock, households were generally in sound financial condition. Nonetheless, strains associated with the performance of household debt may worsen significantly and affect lenders throughout the financial system.

Borrowing by households had been rising in line with incomes in recent years . . .

2-8. Total Household Loan Balances



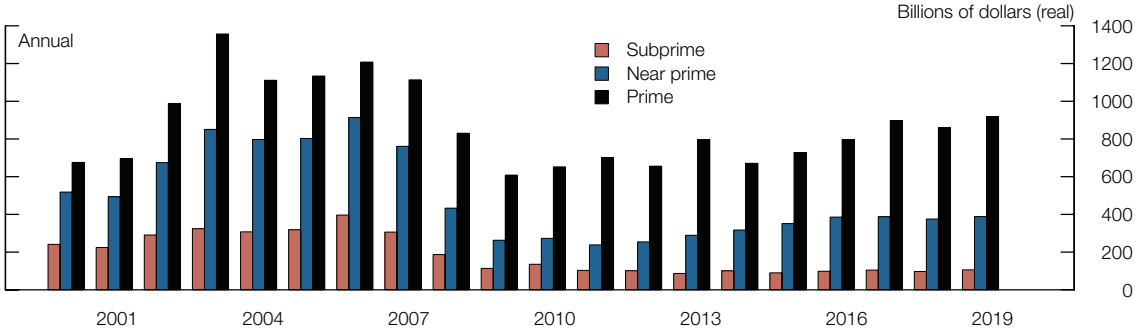
Source: FRBNY Consumer Credit Panel/Equifax; Bureau of Labor Statistics, consumer price index via Haver Analytics.

Through the end of last year, household debt grew a bit less than income, with debt owed by households with prime credit scores accounting for most of the growth. Loan balances owed by borrowers with prime credit scores, who constitute about one-half of all borrowers and about two-thirds of all balances, continued to grow in the second half of 2019, surpassing pre-crisis levels (after an adjustment for general price inflation). By contrast, inflation-adjusted loan balances for the remaining one-half of borrowers with near-prime and subprime credit scores have changed little since 2014 (figure 2-8).

. . . and mortgage borrowing poses less risk to the financial system than in the 2000s . . .

Mortgage debt accounts for roughly two-thirds of total household credit. Through the end of 2019, new mortgage extensions remained skewed toward prime borrowers, consistent with the general shift in the composition of household debt toward less-risky borrowers and in line with stronger underwriting standards relative to the mid-2000s (figure 2-9). Although many households face substantial losses in income, widespread forbearance measures should help damp the effect of COVID-19 on delinquencies, which were at low levels at the end of

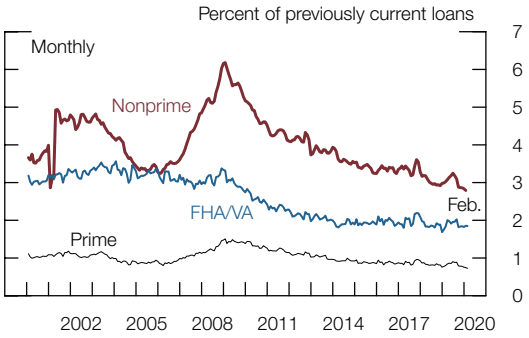
2-9. Estimate of New Mortgage Volume to Households



Source: FRBNY Consumer Credit Panel/Equifax; Bureau of Labor Statistics, consumer price index via Haver Analytics.

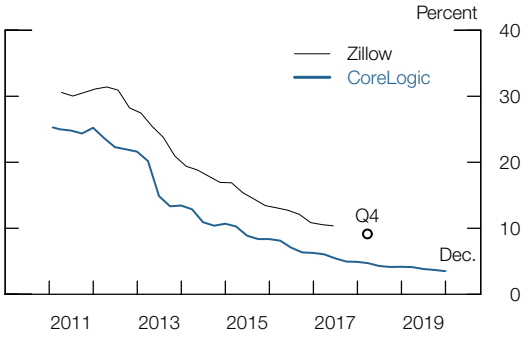
2019 (figure 2-10). Relatively few borrowers had negative equity, a factor that will also serve to limit defaults (figure 2-11). While the severe decline in economic activity and tightening of lending standards originating from the COVID-19 pandemic might put downward pressure on house prices, the ratio of outstanding mortgage debt to home values at the end of 2019 was at the level seen in the relatively calm housing market of the late 1990s. Higher levels of homeowner equity generally reduce the likelihood of borrower defaults and would also provide lenders with a degree of protection against credit losses even as borrowers take advantage of forbearance measures, lessening concerns that a deterioration in lenders' balance sheets might impede future credit issuance and further worsen the economic outlook (figure 2-12).

2-10. Transition Rates into Mortgage Delinquency



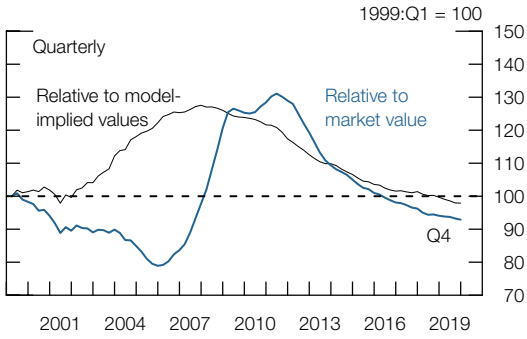
Source: For prime and FHA/VA, Black Knight McDash data; for nonprime, CoreLogic

2-11. Estimate of Mortgages with Negative Equity



Source: CoreLogic; Zillow.

2-12. Estimates of Housing Leverage



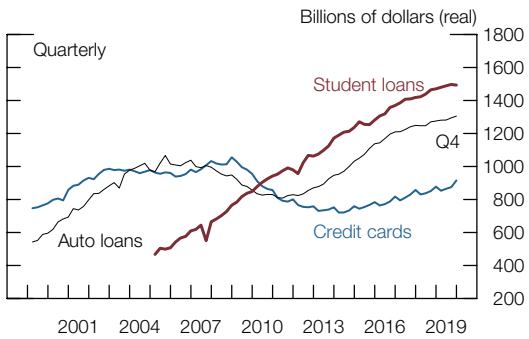
Source: FRBNY Consumer Credit Panel/Equifax; CoreLogic; Bureau of Labor Statistics.

. . . although some households are struggling to manage their debt

The remaining one-third of total debt owed by households, commonly referred to as consumer credit, consists mainly of student loans, auto loans, and credit card debt (figure 2-13). Table 2 shows that consumer credit rose 4.5 percent over 2019 and currently stands at about $4 trillion.

Borrowers with subprime credit scores accounted for about one-fourth of outstanding auto loan balances as of the end of 2019 (figure 2-14). Despite the prolonged economic expansion and low interest rates,

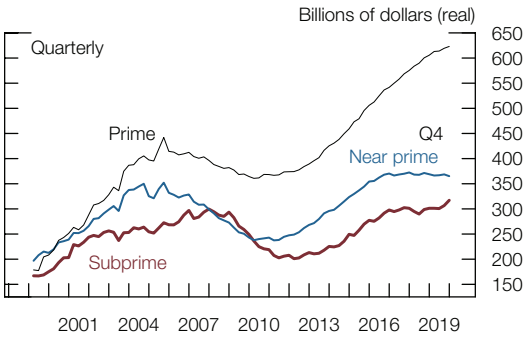
2-13. Consumer Credit Balances



Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax; Bureau of Labor Statistics, consumer price index via Haver Analytics.

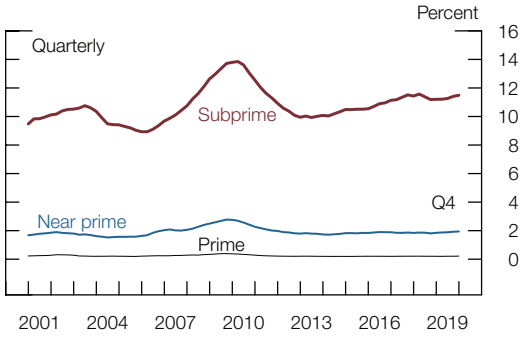
delinquency rates for auto loans to subprime borrowers have remained elevated for the past several years and are expected to increase further in response to the COVID-19 outbreak (figure 2-15).

2-14. Auto Loan Balances



Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax; Bureau of Labor Statistics, consumer price index via Haver Analytics.

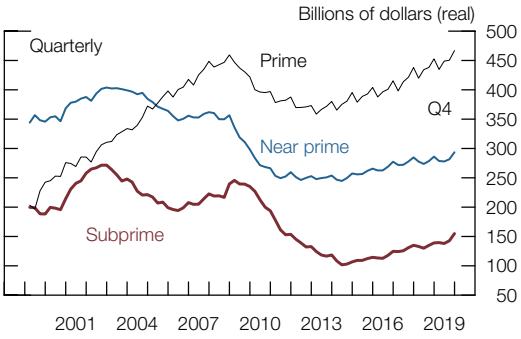
2-15. Auto Loan Delinquency Rates



Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax.

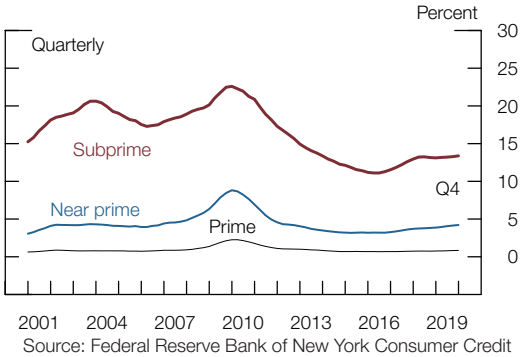
Consumer credit card balances were almost $1 trillion at the end of 2019, with subprime and near-prime borrowers, taken together, accounting for about half of that amount (figure 2-16). Delinquency rates for these two groups of borrowers could climb above the peaks of 2009 and 2010 given the sharp increase in the unemployment rate (figure 2-17).

2-16. Credit Card Balances



Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax; Bureau of Labor Statistics, consumer price index via Haver Analytics.

2-17. Credit Card Delinquency Rates



Source: Federal Reserve Bank of New York Consumer Credit Panel/Equifax.

Finally, the already elevated delinquency rates on student loans highlight the challenges associated with debt payments for a number of households going into the pandemic. While a substantial number of households are facing, and will face, additional stress as a result of the pandemic, the risk that student loan debt, per se, poses to the financial system appears limited at this time; the majority of loans were issued through government programs, and the Cares Act guarantees payment forbearance and stops interest accrual until the end of September 2020.

3. Leverage in the Financial Sector

Table 3 shows the sizes and growth of the types of financial institutions discussed in this section.

Table 3. Size of Selected Sectors of the Financial System, by Types of Institutions and Vehicles

Item	Total assets (billions of dollars)	Growth, 2018:Q4–2019:Q4 (percent)	Average annual growth, 1997–2019:Q4 (percent)
Banks and credit unions	20,049	4.5	5.7
Mutual funds	17,660	20.4	9.9
Insurance companies	11,278	13.0	6.0
Life	8,573	13.3	6.1
Property and casualty	2,704	12.1	5.7
Hedge funds*	7,593	4.8	7.2
Broker-dealers	3,469	3.3	4.9
	Outstanding (billions of dollars)		
Securitization	10,592	3.3	5.4
Agency	9,382	3.2	5.9
Non-agency**	1,210	4.3	3.2

Note: The data extend through 2019:Q4. Growth rates are measured from Q4 of the year immediately preceding the period through Q4 of the final year of the period. Life insurance companies' assets include both general and separate account assets.

* Hedge fund data start in 2013:Q4 and are updated through 2018:Q4.

** Non-agency securitization excludes securitized credit held on balance sheets of banks and finance companies.

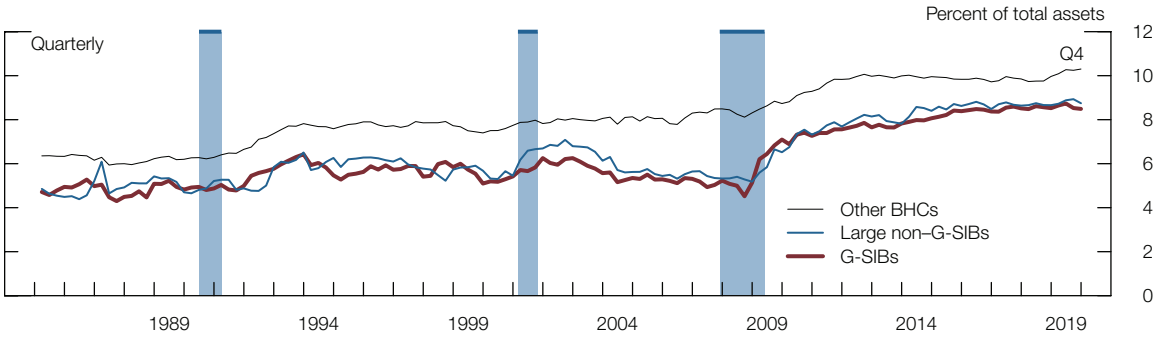
Source: Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States"; Federal Reserve Board staff calculations based on Securities and Exchange Commission, Form PF, Reporting Form for Investment Advisers to Private Funds and Certain Commodity Pool Operators and Commodity Trading Advisors.

Banks were well capitalized as of the fourth quarter of 2019

At the end of 2019, loss-absorbing capacity in the banking sector was at historically high levels. This strength permitted banks to absorb the increased credit provisions and draws on credit lines associated with the onset of the pandemic. Tangible capital at large banks—a measure of bank equity that excludes items such as goodwill—changed little in 2019, and regulatory capital ratios stayed well above their required minimum levels (figures 3-1 and 3-2). The Federal Reserve is currently conducting its 2020 stress test and conducting additional assessments of banks' resilience to the unprecedented economic shock caused by COVID-19.[13]

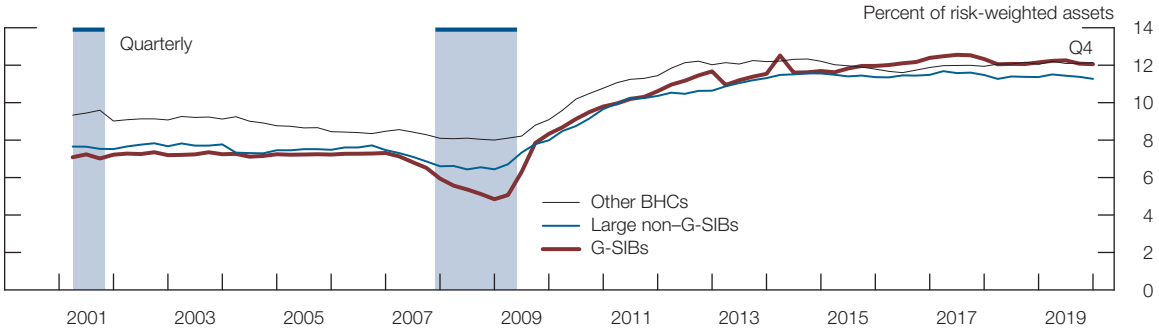
[13] In March 2020, the Board approved a final rule creating a stress capital buffer requirement for large banks. See Board of Governors of the Federal Reserve System (2020), "Federal Reserve Board Approves Rule to Simplify Its Capital Rules for Large Banks, Preserving the Strong Capital Requirements Already in Place," press release, March 4, https://www.federalreserve.gov/newsevents/pressreleases/bcreg20200304a.htm.

3-1. Ratio of Tangible Bank Equity to Assets



Source: Federal Financial Institutions Examination Council, Consolidated Reports of Condition and Income (Call Report).

3-2. Common Equity Tier 1 Ratio of Banks



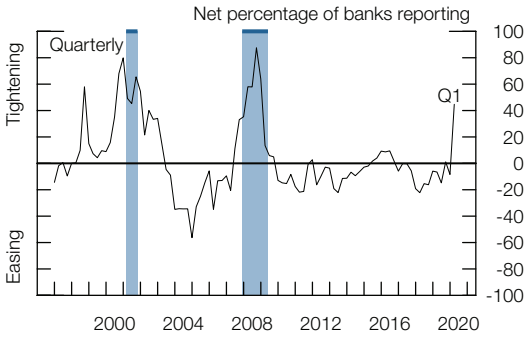
Source: Federal Reserve Board, Form FR Y-9C, Consolidated Financial Statements for Holding Companies.

To date, banks have been able to meet surging demand for draws on credit lines from businesses (see the box "Risks Associated with Banks' Corporate Credit Exposures through Credit Lines"). Banks have publicly stated their willingness to work with business and household clients to modify the terms of existing loans, including delaying payments, and have reported a substantial increase in forbearance requests across loan types. The largest banks have also announced that they have currently suspended share buybacks. Nonetheless, recent declines in interest rates and the potential for rising credit losses have weakened the outlook for bank profitability, a key factor in banks' ability to replenish capital.

As of the fourth quarter of 2019, the credit quality of most bank loans remained strong, but it is likely to deteriorate considerably. Accordingly, banks are reassessing credit risks and writing down assets as borrowers come under increasing stress. In first-quarter earnings announcements, large banks reported significant increases in loan loss reserves. These reserves absorb losses before Tier 1 capital, adding resilience to individual banks and the entire banking system. Data from the April 2020 SLOOS indicate that a significant share of banks tightened standards on commercial and industrial (C&I) loans in the first quarter

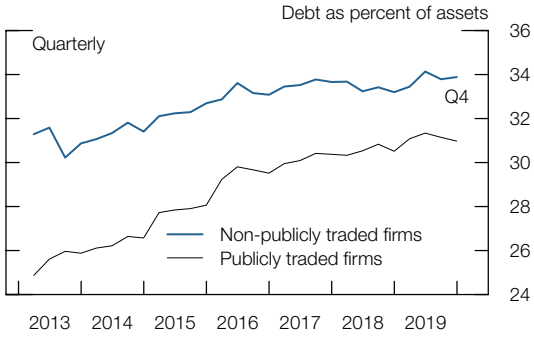
(figure 3-3). As of the fourth quarter of 2019, the leverage of firms that obtained C&I loans from the largest banks was about unchanged and stood at historically high levels (figure 3-4).

3-3. Change in Bank Lending Standards for Commercial and Industrial Loans



Source: Federal Reserve Board, Senior Loan Officer Opinion Survey on Bank Lending Practices; Federal Reserve Board staff calculations.

3-4. Borrower Leverage for Bank Commercial and Industrial Loans

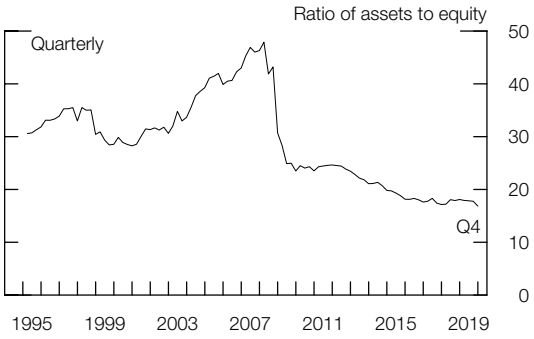


Source: Federal Reserve Board, Form FR Y-14Q (Schedule H.1), Capital Assessments and Stress Testing.

Leverage was low at broker-dealers as of the fourth quarter . . .

Leverage at broker-dealers changed little in the second half of 2019 and remained at historically low levels (figure 3-5). However, in March, constraints on dealers' intermediation capacity, including internal risk-management practices and regulatory constraints on the bank holding companies under which many dealers operate, were cited as possible reasons for deteriorating liquidity in even usually liquid markets. In response, the Federal Reserve increased repo operations, purchased Treasury securities and agency MBS, and introduced the PDCF to support smooth market functioning and facilitate the availability of credit to businesses and households (see the box "The Federal Reserve's Monetary Policy Actions and Facilities to Support the Economy since the COVID-19 Outbreak"). The Federal Reserve also announced a temporary change to the supplemental leverage ratio, removing a possible constraint for some of the largest dealers in the Treasury market.

3-5. Leverage at Broker-Dealers

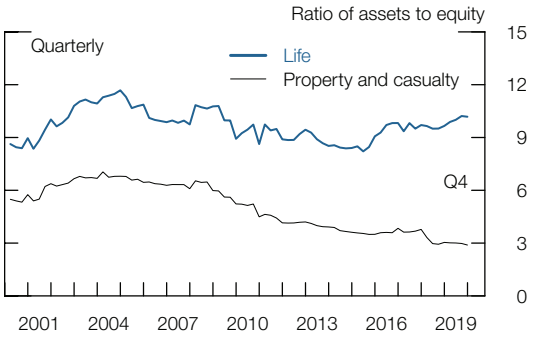


Source: Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States."

. . . but was increasing at life insurance companies . . .

Leverage measured at life insurance companies using generally accepted accounting principles rose to post-2008 highs (figure 3-6). Moreover, the capitalization of the life insurance

3-6. Leverage at Insurance Companies

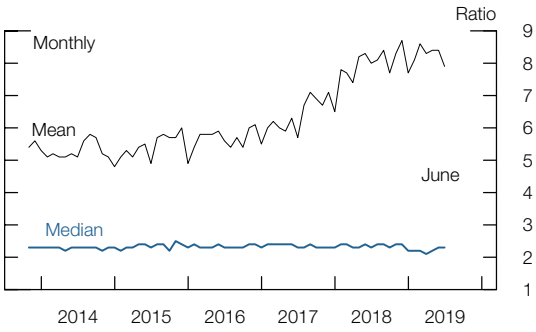


Source: S&P Global Market Intelligence.

sector is likely to deteriorate in coming quarters because of lower-than-expected asset valuations and lower long-term interest rates. Insurance companies are also important investors in CRE, corporate bonds, and CLOs, exposing them to risks stemming from sharp drops in asset prices, elevated issuer leverage, potentially rising defaults in the corporate sector, and funding illiquidity risks. Meanwhile, based on information through the fourth quarter of 2019, leverage at property and casualty insurers stayed at lower levels than in previous years.

. . . while hedge fund leverage remains elevated relative to the past five years

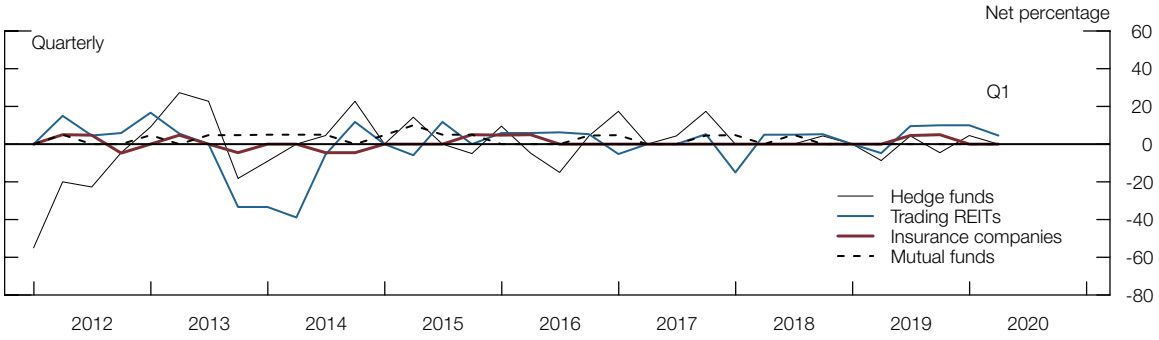
3-7. Gross Leverage at Hedge Funds



Source: Federal Reserve Board staff calculations based on Securities and Exchange Commission, Form PF, Reporting Form for Investment Advisers to Private Funds and Certain Commodity Pool Operators and Commodity Trading Advisors.

Gross leverage of hedge funds hovered around the same range in the first half of 2019 as in 2018 after having risen steadily over the previous few years (figure 3-7).[14] More recently, in the March Senior Credit Officer Opinion Survey on Dealer Financing Terms, dealers reported that the use of leverage by hedge fund clients was about unchanged in the fourth quarter of 2019 and the first quarter of 2020, though the survey closed in February before the major disruptions of COVID-19 (figure 3-8). Since then, hedge funds reportedly reduced their leverage significantly as market

3-8. Change in the Use of Financial Leverage



Source: Federal Reserve Board, Senior Credit Officer Opinion Survey on Dealer Financing Terms.

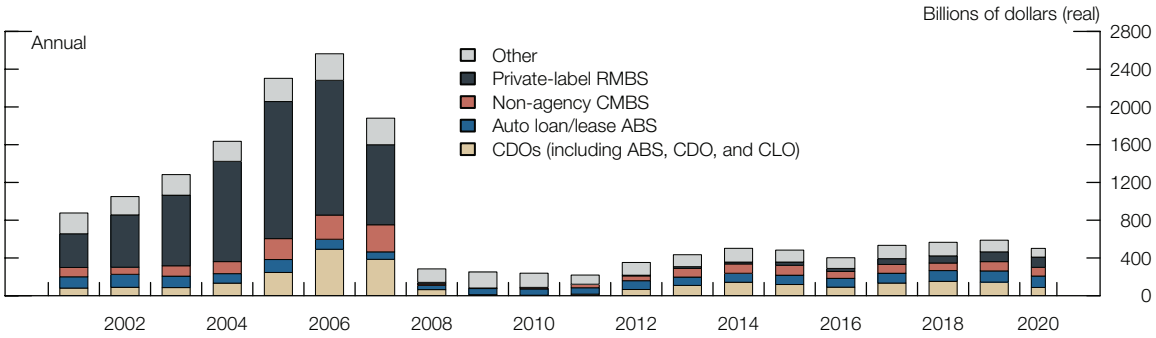
[14] Comprehensive data on hedge fund leverage are available only with a long lag. The Federal Reserve supplements these data with more timely but less comprehensive measures.

volatility rose and many hedge funds experienced margin calls. Some types of hedge funds are built around strategies that can result in rapid deleveraging when volatility spikes, which could, in turn, contribute to further market volatility. See the box "Institutional Activities and Market Liquidity" for more information on how asset managers such as hedge funds affect market liquidity.

Securitization volumes increased in the second half of 2019 but came to a halt in March before policy actions relieved strains

Securitization allows financial institutions to bundle loans or other financial assets and sell claims on the cash flows generated by these assets as securities that can be traded, much like bonds. This process often involves the creation of securities with different levels of seniority, or "tranches," and thus represents a form of credit risk transformation whereby some highly rated securities can be created from a pool of lower-rated underlying assets. Examples of the resulting securities include CLOs, ABS, and commercial and residential MBS. Issuance volumes of non-agency securities (that is, those not guaranteed by a government-sponsored enterprise or by the federal government) increased substantially in 2019 but remain well below the levels seen in the run-up to the 2007–09 financial crisis (figure 3-9). The disturbances from COVID-19 caused securitization volumes to essentially stop by the second half of March. In response, the Federal Reserve established the TALF to help meet the credit needs of consumers and small businesses by facilitating the issuance of ABS and improving the market conditions for ABS more generally.

3-9. Issuance of Non-agency Securitized Products, by Asset Class



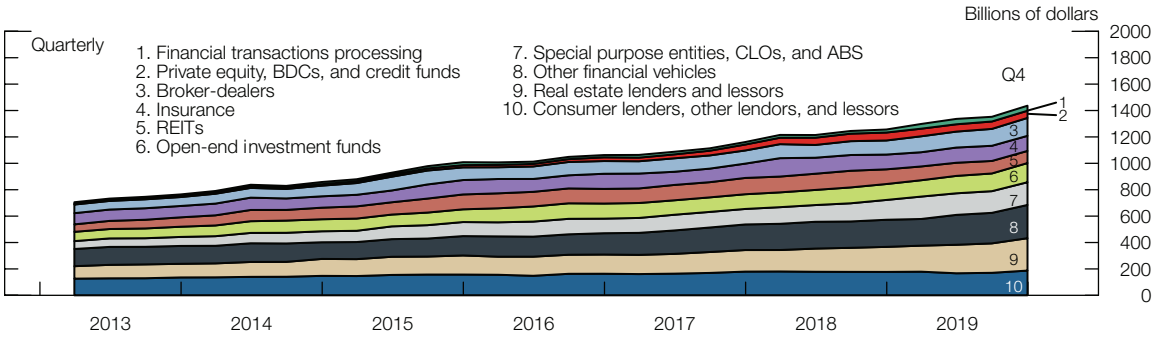
Source: Green Street Advisors, LLC, Commercial Mortgage Alert (cmalert.com) and Asset-Backed Alert (abalert.com); Bureau of Labor Statistics, consumer price index via Haver Analytics.

. . . and bank lending to nonbank financial firms continued to grow notably

Banks have substantially increased their lending to financial institutions operating outside the banking sector—such as finance companies, asset managers, securitization vehicles,

and REITs. Committed amounts of credit from large banks to nonbank financial firms have more than doubled since 2013, reaching $1.4 trillion by the fourth quarter of 2019 (figure 3-10).[15]

3-10. Large Bank Lending to Nonbank Financial Firms: Committed Amounts



Source: Federal Reserve Board, Form FR Y-14Q (Schedule H.1), Capital Assessments and Stress Testing.

[15] Data on this type of bank lending can be informative about the use of leverage by nonbanks and shed light on the credit exposures of banks to these institutions. The Federal Reserve is able to monitor the exposures of the largest U.S. banks to businesses more closely than in the past because those banks now report detailed information about their loan commitments on regulatory Form FR Y-14Q, which can be found on the Board's website at https://www.federalreserve.gov/apps/reportforms/reportdetail.aspx?sOoYJ+5BzDZGWnsSjRJKDwRxOb5Kb1hL.

Risks Associated with Banks' Corporate Credit Exposures through Credit Lines

Bank credit lines are an important source of credit and liquidity for large and small businesses. In normal times, funds drawn from firms' credit lines provide working capital and finance investment, and they serve as temporary liquidity backstops for CP or asset securitization programs. However, during times of financial stress, banks may be exposed to funding risk as businesses rapidly and suddenly draw down their existing credit lines to ensure they have access to funds to bridge the uncertainty and general concerns about capital markets. This discussion reviews current bank lending through credit lines and provides perspectives on liquidity and capital implications.

Recent evolution of bank lending through credit lines

As shown in the table, as of year-end 2019, revolving credit-line commitments extended to businesses by large banks reached $3.6 trillion. About $2.3 trillion of these credit lines remained undrawn. Banks' committed credit lines to businesses are diversified across industries. As of year-end 2019, about 28 percent of bank credit line exposures were to nonbank financial institutions (NBFIs); 24 percent to trade, transportation, and utilities; and 22 percent to manufacturing. Revolving credit lines to NBFIs stood at $996 billion as of year-end 2019, and drawdowns on those lines were $444 billion, implying an average utilization rate of 45 percent.

Reflecting heightened uncertainty and financial disruptions associated with the COVID-19 pandemic, business borrowers drew significant amounts from their committed credit lines in March and April. A little more than half of these new drawdowns were by firms with investment-grade ratings. As shown in the table, drawdowns in syndicated loan markets in March and April reached $284 billion.[1] A little more than half of these new drawdowns were by firms with investment-grade ratings.

Liquidity and capital implications of stress-related drawdowns of credit lines

At the height of the 2007–09 financial crisis, credit-line drawdowns in 2008 allowed many businesses to weather the effects of the crisis, particularly when other funding sources such as bond issuance and CP markets were scarce. While these developments had many benefits, large unexpected credit-line drawdowns put additional strain on the capital and liquidity positions of banks. In response, the Federal Reserve and other federal agencies put in place more stringent liquidity and capital requirements on undrawn credit lines. For instance, under the Liquidity Coverage Ratio requirement, banks must hold high-quality liquid assets (HQLA) equal to 40 percent and 10 percent of the amount of unused credit lines to NBFIs and nonfinancial firms, respectively. In the case of liquidity facilities used to back up market funding such as CP issuance and asset-backed CP conduits, the requirements are higher and equal to 100 percent and 30 percent for NBFIs and nonfinancial firms, respectively. Similarly, under current regulatory capital requirements, undrawn noncancelable credit lines have a 50 percent risk

(continued on next page)

[1] Preliminary estimates suggest that total drawdowns in March and April could have been twice as large as drawdowns in syndicated loan markets. Consistent with these estimates, the Federal Reserve's Statistical Release H.8, "Assets and Liabilities of Commercial Banks in the United States," shows an increase in C&I loans of about $660 billion in March and April, about $298 billion of which corresponds to loan increases at the largest U.S. banks. The H.8 data are available on the Board's website at https://www.federalreserve.gov/releases/h8/current/default.htm.

Risks Associated with Banks' Corporate Credit Exposures *(continued)*

Table A. Committed Corporate Exposures, by Industry (as of December 2019)

Sector	Credit line (billions of dollars)	Credit line as a share of total (percent)	Percent utilized (percent)	Drawdowns on syndicated credit lines March–April, 2020 (billions of dollars)
Nonbank financial institutions	996	28	45	21
Nonfinancial firms	2,558	72	31	263
Trade, transportation and utilities	839	24	39	66
Manufacturing	766	22	24	85
Mining, quarrying and oil and gas	162	5	31	15
Leisure and hospitality	87	2	38	38
Other	703	20	29	58
All industries	3,554	100	35	284

Source: Federal Reserve Board, Form FR Y-14Q (Schedule H.1), Capital Assessments and Stress Testing; S&P Global, Leveraged Commentary & Data.

weight for commitments with a maturity greater than one year and 20 percent for those with a maturity less than one year. As a result, despite the surge in demand for credit from firms with lines, banks were well positioned to accommodate these line draws and have, to date, fully met these liquidity demands.

Unlike the 2007–09 financial crisis, when some borrowers drew on credit lines because of fears about their lenders' financial conditions and a potential lack of alternative funding sources, credit-line drawdowns in March and April appear to have been motivated in many cases by the need to build cash in light of the perceived increase in the risk of a recession. For the largest banks, many of the credit draws were offset by growth in deposits.

4. Funding Risk

In the face of the COVID-19 outbreak and associated financial market turmoil, funding markets proved less fragile than during the 2007–09 financial crisis; nonetheless, significant strains emerged, and emergency Federal Reserve actions were required to stabilize short-term funding markets

As of the fourth quarter of 2019, the total amount of liabilities most vulnerable to runs, including those of nonbanks, had increased about 10 percent over the past year to $15.5 trillion (table 4). Banks rely only modestly on short-term wholesale funding and maintain large amounts of HQLA, in part because of liquidity regulations introduced after the GFC and the improved understanding and management by banks of their liquidity risks.

Table 4. Size of Selected Instruments and Institutions

Item	Outstanding/ total assets (billions of dollars)	Growth, 2018:Q4-2019:Q4 (percent)	Average, annual growth, 1997–2019:Q4 (percent)
Total runnable money-like liabilities*	15,517	9.8	4.0
Uninsured deposits	5,173	6.6	10.6
Repurchase agreements	3,998	12.5	5.9
Domestic money market funds**	3,604	18.6	4.3
Commercial paper	1,045	4.9	2.1
Securities lending***	578	-3.7	5.6
Bond mutual funds	4,440	16.7	9.0

Note: The data extend through 2019:Q3. Growth rates are measured from Q3 of the year immediately preceding the period through Q3 of the final year of the period.

* Average annual growth is from 2003:Q4 to 2019:Q3.

** Average annual growth is from 2001:Q4 to 2019:Q3.

*** Average annual growth is from 2000:Q4 to 2019:Q3.

Source: Securities and Exchange Commission, Private Funds Statistics; iMoneyNet, Inc., Offshore Money Fund Analyzer; Bloomberg Finance L.P.; Securities Industry and Financial Markets Association: U.S. Municipal Variable Rate Demand Obligation Update; Risk Management Association, Securities Lending Report; DTCC Solutions LLC, an affiliate of the Depository Trust & Clearing Corporation: Commercial Paper data; Federal Reserve Board staff calculations based on Investment Company Institute data; Federal Reserve Board, Statistical Release H.6, "Money Stock and Debt Measures" (M3 monetary aggregate); Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States"; Federal Financial Institutions Examination Council, Consolidated Reports of Condition and Income (Call Report); Morningstar, Inc., Morningstar Direct; Moody's Analytics, Inc., CreditView, Asset-Backed Commercial Paper Program Index.

Meanwhile, driven largely by increased clearing of over-the-counter derivatives, central counterparties intermediate a larger share of transactions across more markets than in the 2007–09 financial crisis. With the jump in volatility in March and resulting increase in transaction activity, central clearing, while mitigating counterparty risks, absorbed significantly higher amounts of cash and collateral; overall, market participants were well positioned and able to meet these increased liquidity demands.

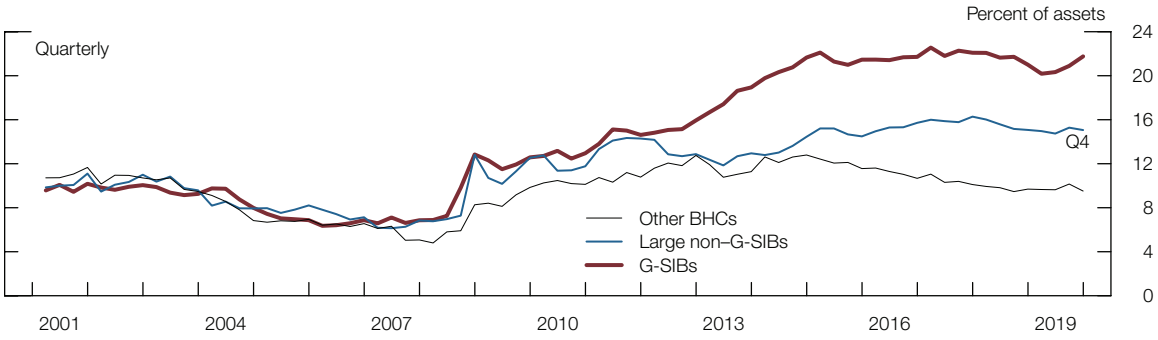
However, as noted in previous *Financial Stability Reports,* recent growth in prime MMFs had increased the vulnerability in the system, and holdings of corporate debt by mutual funds grew notably in recent years. These vulnerabilities produced considerable funding strain in March.

Given the funding pressures, the Federal Reserve undertook several actions to ensure the smooth functioning of various markets. (See the boxes "The Federal Reserve's Monetary Policy Actions and Facilities to Support the Economy since the COVID-19 Outbreak" and "Federal Reserve Tools to Lessen Strains in Global Dollar Funding Markets.") In addition, federal banking regulators provided regulatory relief to support credit availability.

Banks had high levels of liquid assets and stable funding before the shock hit

Banks had strong liquidity positions as of the fourth quarter of 2019. At most large banks, liquid asset positions exceeded regulatory requirements significantly (figure 4-1). Businesses drew heavily on their lines of credit as the pandemic shock hit, although these draws were accommodated by bank capital and liquidity buffers. The box "Risks Associated with Banks' Corporate Credit Exposures through Credit Lines" provides more information about the extent of bank exposures to affected industries and the resilience of banks to unexpected drawdowns.

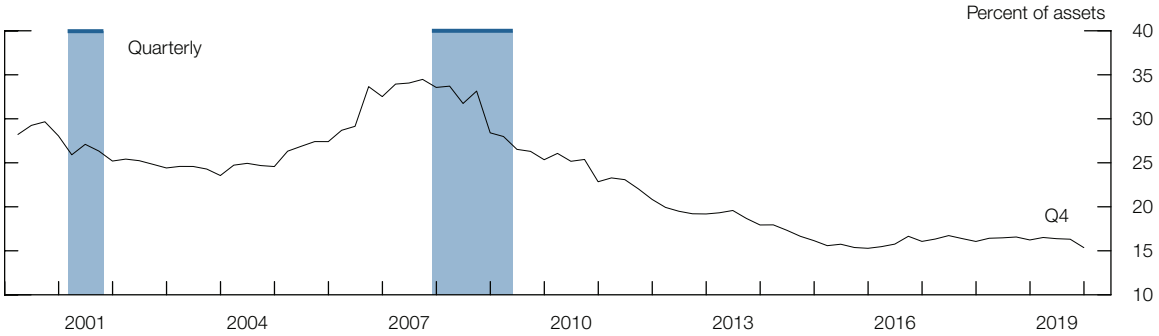
4-1. Liquid Assets Held by Banks



Source: Federal Reserve Board, Form FR Y-9C, Consolidated Financial Statements for Holding Companies; Federal Financial Institutions Examination Council, Consolidated Reports of Condition and Income (Call Report).

Moreover, bank reliance on the most unstable sources of funding stood at historically low levels (figure 4-2). As the shock hit, banks increased borrowing at the discount window and expanded Federal Home Loan Bank (FHLB) advances as part of their liquidity management. Banks also experienced heavy deposit inflows, consistent with investors becoming more risk averse and credit-line borrowers depositing the proceeds from line draws taken as precautionary measures.

4-2. Short-Term Wholesale Funding of Banks



Source: Federal Reserve Board, Form FR Y-9C, Consolidated Financial Statements for Holding Companies.

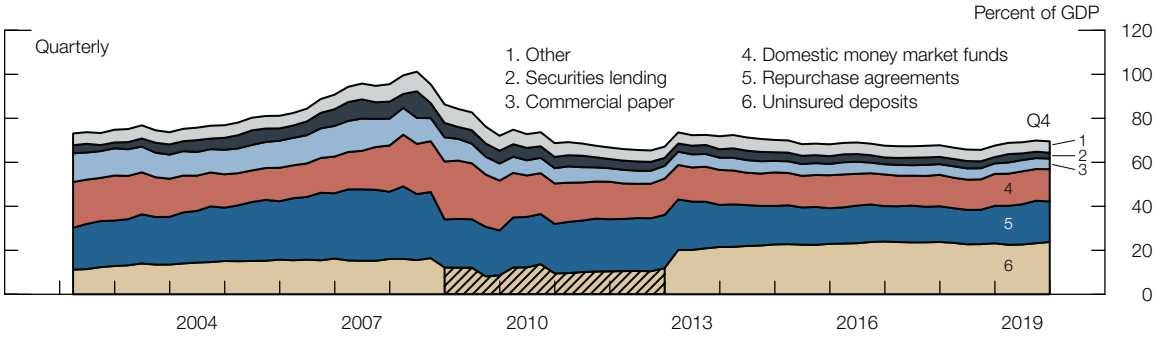
Mortgage servicers will be put under strain as mortgage forbearance expands

The Cares Act provides a right to forbearance for up to 12 months to homeowners who have mortgages in pools guaranteed by Fannie Mae, Freddie Mac, and Ginnie Mae if they are experiencing hardships associated with the COVID-19 shock. Under the servicing contracts, mortgage servicers are responsible for advancing payments on behalf of a borrower who requests forbearance. This responsibility can cause strains for nonbank mortgage servicers because they do not have access to the same sources of liquidity as banks. Instead, nonbanks have relied on their internal cash or, in some cases, fairly expensive private-market financing to fund these payments. In the short term, these strains could lead to curtailment of mortgage credit, and in the longer term, large-scale forbearance could cause some nonbank mortgage servicers to fail. Recently, Ginnie Mae established a facility to lend against advances of principal and interest (but not taxes and insurance).

Money markets came under stress during the market turmoil in March and April, prompting response by the Federal Reserve and the Treasury . . .

Money-like liabilities that are prone to runs—an aggregate measure of private short-term debt that can be rapidly withdrawn in times of stress—stood at about 70 percent of GDP in the fourth quarter of 2019 (figure 4-3). The growth in runnable liabilities over the past couple of quarters was largely attributable to a surge in repos backed by Treasury securities that, in turn, is a consequence of the high volume of Treasury issuance that has occurred over this period.

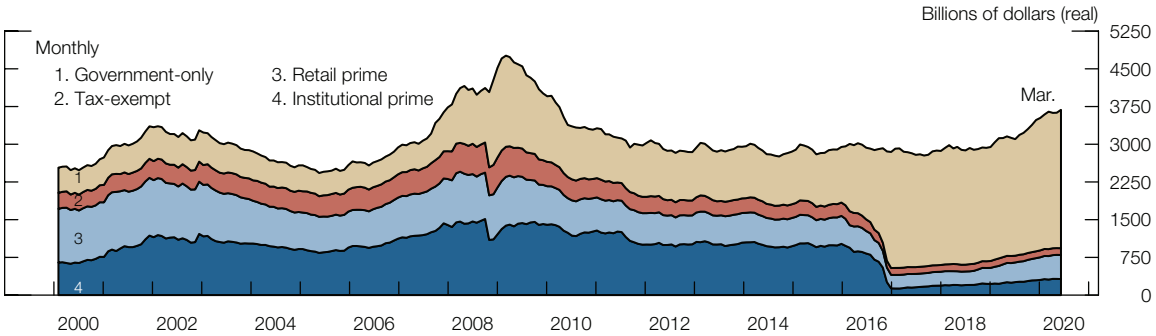
4-3. Runnable Money-Like Liabilities as a Share of GDP, by Instrument and Institution



Source: Securities and Exchange Commission, Private Funds Statistics; iMoneyNet, Inc., Offshore Money Fund Analyzer; Bloomberg Finance L.P.; Securities Industry and Financial Markets Association: U.S. Municipal VRDO Update; Risk Management Association, Securities Lending Report; DTCC Solutions LLC, an affiliate of the Depository Trust & Clearing Corporation: Commercial Paper data; Federal Reserve Board staff calculations based on Investment Company Institute data; Federal Reserve Board, Statistical Release H.6, "Money Stock and Debt Measures" (M3 monetary aggregate); Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States"; Federal Financial Institutions Examination Council, Consolidated Reports of Condition and Income (Call Report); Moody's Analytics, Inc., CreditView, ABCP Program Index; Bureau of Economic Analysis, gross domestic product via Haver Analytics.

Assets under management at domestic MMFs increased over the past year (figure 4-4). As described in greater detail in the box "The Federal Reserve's Monetary Policy Actions and Facilities to Support the Economy since the COVID-19 Outbreak," money markets came under severe stress in March, prompting a response by the Federal Reserve and the Treasury.

4-4. Domestic Money Market Fund Assets

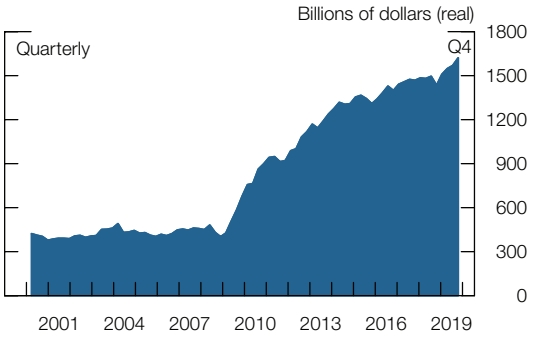


Source: Federal Reserve Board staff calculations based on Investment Company Institute data; Bureau of Labor Statistics, consumer price index via Haver Analytics.

. . . as did long-term mutual funds that hold less liquid assets

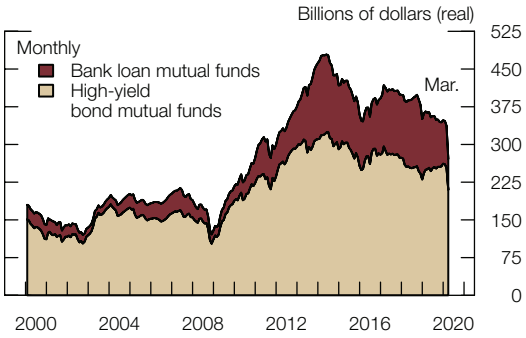
U.S. corporate bonds held by mutual funds more than tripled over the past decade, reaching more than $1.6 trillion in the fourth quarter of 2019 (figure 4-5). Mutual funds are estimated to hold about one-sixth of outstanding corporate bonds and to purchase about one-eighth of newly originated leveraged loans. Total assets under management in high-yield corporate bond mutual funds, which primarily hold riskier corporate bonds, and in bank loan funds increased notably over the past decade to about $330 billion through February 2020 (figure 4-6).

4-5. U.S. Corporate Bonds Held by Mutual Funds



Source: Federal Reserve Board staff estimates based on Federal Reserve Board Statistical Release Z.1, "Financial Accounts of the United States"; Bureau of Labor Statistics, consumer price index via Haver Analytics.

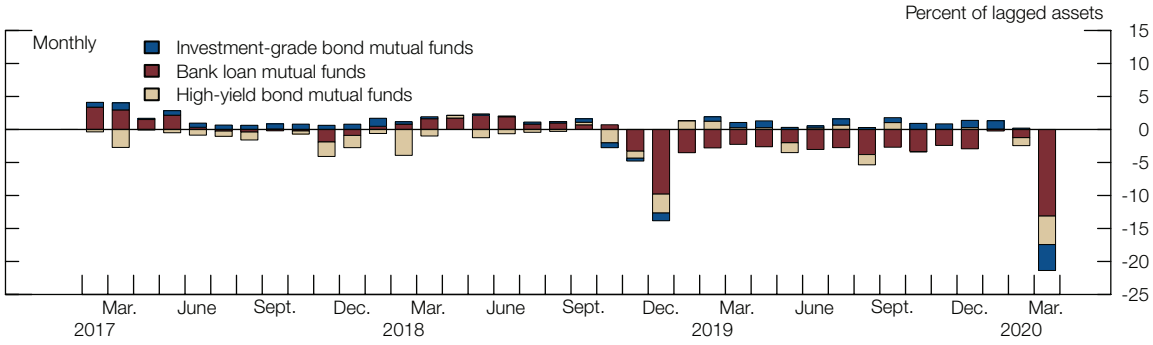
4-6. Bank Loan and High-Yield Bond Mutual Fund Assets



Source: Morningstar, Inc., Morningstar Direct; Bureau of Labor Statistics, consumer price index via Haver Analytics.

These open-end mutual funds engage in liquidity transformation by offering daily redemptions to investors, notwithstanding the liquidity profile of a fund's underlying assets. Funds investing substantially in corporate bonds and bank loans may be especially exposed to liquidity transformation risks, given the relative illiquidity of such assets. While bank loan mutual funds experienced moderate outflows in the six months ending in February, outflows increased substantially in March as investors became more risk averse (figure 4-7). Total net assets of high-yield bond mutual funds decreased 16 percent, and bank loan mutual funds decreased 26 percent.

4-7. Mutual Fund Net Flows



Source: Investment Company Institute.

Separately, bond mutual funds that invest primarily in investment-grade corporate bonds may face heightened selling pressure in the event of large-scale corporate downgrades from investment grade to below investment grade. While current regulation does not require such funds to sell "fallen angels," funds may start to divest to avoid future losses. In the midst of negative economic news, recent downgrades of large issuers were accompanied by particularly strong withdrawals from investment-grade bond funds. To support the corporate bond market that ultimately supports the credit needs of employers, the Federal Reserve created the PMCCF and the SMCCF.

While funding risk at CLOs is limited, leveraged investors may face pressure if CLOs are downgraded

CLO issuance was robust in 2019 after reaching a record level in 2018. These securities fund more than 50 percent of outstanding institutional leveraged loans—loans that have been under significant price pressures, as previously discussed. Unlike open-end mutual funds, CLOs do not generally permit early redemptions and do not rely on funding that must be rolled over before the underlying assets mature. As a result, CLOs avoid the run risk associated with a rapid reversal in investor sentiment. Still, many lower-rated CLO tranches have been put on negative watch by rating agencies, indicating that material downgrades to those tranches are likely in the future. Some CLO investors such as hedge funds purchase lower-rated tranches using leverage. Downgrades of CLO tranches could result in margin calls on leveraged investors, forcing them to reduce their exposure by selling their holdings. Such sales have the potential of putting additional pressures on leveraged investors.

Mortgage REITs came under funding pressure . . .

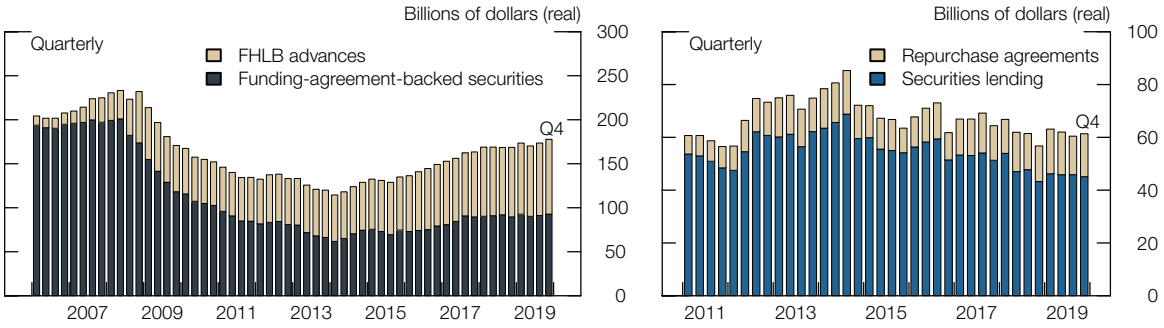
Nonbank institutions known as mortgage REITS (mREITS) invest in real-estate-backed securitized products such as MBS and CMBS. As of the fourth quarter of 2019, mREITs held about $500 billion of securities backed by property loans. Most securities held by mREITs are agency MBS—MBS issued by Fannie Mae, Freddie Mac, and Ginnie Mae—which minimizes credit risk. In addition, these securities are generally very liquid. However, because mREITs invest in long-term assets and often have high leverage that can include a significant amount of short-term debt, mREITs can have considerable funding risk. After the large decrease in interest rates in late February to early March, prices of mortgage-linked assets fell considerably, which triggered margin calls from mREIT lenders. Asset sales by mREITs, combined with already existing strains on dealer balance sheets, resulted in liquidity in MBS and CMBS markets drying up, which set up an adverse feedback loop between asset sales and margin calls at mREITs. FOMC actions announced in March, which included purchases of agency MBS and CMBS as well as U.S. Treasury securities, mitigated strains on dealers' balance sheets and gradually improved liquidity conditions and market functioning in these markets.

. . . and the liquidity risks at life insurers have been increasing

Over the past decade, life insurers have been increasing the share of risky and illiquid assets on their balance sheets. At the end of 2019, CRE loans, CLOs, corporate loans, and high-yield corporate bonds accounted for about 17 percent of general account assets, up from 13 percent in 2012. CLO issuance by U.S. insurers has been particularly strong since 2017. Across a large sample of CLOs issued by U.S. life insurers since 2010, each insurer remains

directly exposed to about 15 percent, on average, of its issuance through its general account holdings. Any losses on these CLOs would lower the insurer's surplus and could affect the life insurer's ability to access wholesale funding, which has edged up over the past few years (figure 4-8).

4-8. Nontraditional Liabilities of U.S. Life Insurers, by Liability Type



Source: Bureau of Labor Statistics, consumer price index via Haver Analytics; Moody's Analytics, Inc., CreditView, ABCP Program Index; Securities and Exchange Commission, Forms 10-Q and 10-K; National Association of Insurance Commissioners, quarterly and annual statutory filings accessed via the S&P Global Market Intelligence platform; Bloomberg Finance L.P.

Near-Term Risks to the Financial System

The course of the pandemic and the size and duration of the resulting economic fallout remain the most significant risks to the economy and financial system. The realization of these risks depends largely on the success of public health measures and other government actions to contain the spread of COVID-19. In addition, the steps households and businesses take to resume economic activity, supported by government efforts and policy actions, may ameliorate the most adverse potential outcomes.

The Federal Reserve routinely engages in discussions with domestic and international policymakers, academics, community groups, and others to gauge the set of risks of particular concern to these groups. The following analysis considers possible interactions of existing vulnerabilities with three broad categories of risk that were also raised in these discussions: a prolonged slowdown in U.S. economic growth, risks emanating from Europe, and risks originating in China and other EMEs.

The pandemic could persist for a prolonged period or reemerge, further delaying the recovery of U.S. economic activity and leading to strains on the financial system that worsen the downturn . . .

Most forecasters expect a sharp contraction in economic output in the United States, for at least the first half of 2020, and a global recession. As noted in the box "Salient Shocks to Financial Stability Cited in Market Outreach," contacts are focused on the likely effects of the COVID-19 outbreak on U.S. economic activity. The expected slowdown could affect the financial system by further weakening the balance sheets of businesses and households, especially those that are already vulnerable. Furthermore, monetary and fiscal policy tools have limited ability to moderate some dimensions of what is fundamentally a public health shock.

If the outbreak persists or if there is a second wave of the pandemic, downward pressure on the U.S. economy would be sustained, as businesses would remain shuttered and workers that have been laid off would be without normal income for a longer period. A number of the vulnerabilities identified in this report could grow, making them more likely to further amplify negative shocks to the economy. Investor risk appetite and asset prices have declined, as would be expected with such an extreme shock. With a protracted pandemic, risk aversion could increase further. Disturbances from COVID-19 have substantially weakened the outlook for profits of nonfinancial businesses. Given the generally high level of leverage in the nonfinancial business sector, financial stress and defaults could become more widespread in a more sustained economic downturn. In addition, a prolonged slowdown could further deteriorate the finances of even high-credit-score households, which could lead to defaults and place financial pressure on banks and other lenders. Broader solvency issues could impair the ability of some financial institutions to lend or induce more selling of assets and redemptions of withdrawable liabilities.

Salient Shocks to Financial Stability Cited in Market Outreach

As part of its market intelligence gathering, Federal Reserve staff gather the views of a wide range of contacts on risks to U.S. financial stability. From early February to mid-April, the staff surveyed 22 contacts at banks, investment firms, academic institutions, and political consultancies. The nature of risks highlighted by respondents evolved over the course of the outreach, though concerns regarding the scope and duration of the COVID-19 pandemic—and its economic and financial effects—featured prominently throughout, as shown in the figure. Global recession concerns remained pronounced, with respondents highlighting a number of vulnerabilities—including elevated government and corporate debt levels as well as untested market structures and investment strategies—that could amplify stress in a downturn. Respondents also expressed concerns about the threat of intensifying geopolitical tensions. In contrast to the previous report, global trade tensions were not cited as one of the most salient near-term risks, partly because of the signing of a phase-one trade deal between the United States and China in December 2019.

The effect of COVID-19 could generate a range of economic, market, and financial risks

Contacts were highly focused on the effect of the COVID-19 pandemic and lockdown efforts on the economy and financial system. With regard to the virus itself, respondents early in the outreach cited the potential spread of the virus from China to Europe and the United States. As the virus spread globally, the focus shifted toward the risk of a longer, deeper pandemic, with contacts highlighting the prospect that a premature easing of restrictions could prolong the outbreak and that effective vaccines or therapies might not be developed in time to attenuate possible second waves.

Respondents also highlighted a range of operational, financial, and policy risks related to the outbreak. Respondents noted that lockdowns were likely to amplify operational vulnerabilities at firms; they cited the potential for remote or home-based trading activity to weaken market functioning and for financial institutions' offshore back-office operations to be disrupted.

Many contacts expressed concern that a U.S. recession brought about by the pandemic could expose highly leveraged sectors of the economy. Contacts noted that corporate default rates were likely to increase sharply, with acute stress in the energy sector. Even before the outbreak spread to the United States, concerns related to nonfinancial corporate debt were cited frequently, with a focus on the growth in leveraged loans, private credit, and triple-B-rated bonds. More recently, surveyed respondents noted that a period of renewed outflows from credit-oriented mutual funds could lead to limits on redemptions and that stressed global insurers could become large sellers of U.S. corporate bonds.

A number of contacts also raised concerns over household balance sheets, especially in low-income segments, highlighting increases in credit card, student loan, and auto loan delinquencies as well as concerns over spillovers from nonpayments of rent and mortgages. Against the backdrop of corporate, consumer, and real estate stress, several respondents noted that bank asset quality could come

(continued)

under severe pressure. Smaller banks with high concentrations of lower-rated consumers, small and medium-sized businesses, and CRE were viewed as especially vulnerable.

Several policy-related risks were also identified, including the risk that funding designated to support small businesses would be either insufficient to address the scale of the need or not timely enough to avert a wave of layoffs and bankruptcies. Finally, a few contacts noted the prospect that state and local governments would face large budgetary gaps, with spillovers to the municipal bond market and local economies. In the euro area, some respondents noted that the absence of more expansive fiscal resource sharing or debt mutualization could underpin a return of redenomination risk in some of the monetary union's most indebted sovereigns.

A few respondents noted that novel investment strategies and market structures could prove vulnerable in a sustained market downturn. Specifically mentioned were the growth of short-volatility strategies, the expansion of leveraged ETFs, and the reliance in some markets on sources of liquidity that could withdraw in a shock.

Finally, geopolitical tensions were cited frequently as a medium- to long-term risk. A few contacts noted that the COVID-19 outbreak could amplify tensions and accelerate a shift away from multilateralism. Respondents also highlighted the risk of heightened trade tensions and the possibility that the virus and its fallout could accelerate global leadership changes and amplify political uncertainty.

Most Cited Potential Shocks over Next 12–18 Months

Source: Federal Reserve Bank of New York phone survey of 22 market contacts from February to mid-April.

. . . and financial institutions are at greater risk for adverse operational events in the meantime

The pandemic has had significant effects on the operations of a variety of financial firms, leading to an increase in operational risk in the financial system. Financial institutions have been operating based on their business continuity plans while often intermediating very high transaction volumes. Banks' relative success thus far demonstrates the benefits of both having those plans and actively testing them. Nonetheless, banks have been following these plans for longer than anticipated and should continue developing new longer-term plans.

Many operational challenges make it harder to operate efficiently or effectively. Absenteeism has increased because of social distancing or illness and also because of competing responsibilities such as childcare. Some large banks have selectively closed branches or opted to alternate branch operating times. Smaller banks and those that operate in rural markets may have less flexibility and could be significantly impaired if a staff member were infected. Many financial infrastructures have switched to operating completely remotely at a time when transaction volumes have often been extremely high. During periods when financial institutions operate remotely or with limited staff, the possibility of operational miscues or other mistakes may increase. For example, remote arrangements have slowed decision-making or approval channels which can result in processing delays and create backlogs due to employees who experience difficulties with internet or other infrastructure issues at home. And financial firms are also more vulnerable to security risks, as more employees work from home.

Stresses emanating from Europe pose risks to the United States because of strong transmission channels . . .

European banks play an important role in global financial intermediation and have notable financial and economic linkages with the United States. Over the past few months, many countries in Europe forced nationwide lockdowns to mitigate COVID-19's spread; many businesses were ordered to shut down, and residents were required to stay at home for prolonged periods, damping economic activity, which could lead to sizable loan losses in the banking system. In response to these developments, European governments have implemented fiscal policies that have resulted in increased government spending and tax relief. These fiscal policy actions will likely reduce financial stability risks, on balance, in the short run. However, further expansionary policies, possibly due to large-scale reinfections of COVID-19, could have the potential to result in a sizable increase in government debt and a further increase in sovereign risk in the long run. In Italy, for example, additional fiscal measures could have implications for the sustainability of Italian sovereign debt, which is already elevated as a share of output. If debt sustainability were to materially worsen in Italy and in other highly indebted countries, it also could stress European financial institutions and lead to political tensions within the euro area. Such a development could, in turn, affect the U.S. economy and the financial system through dollar funding markets, credit exposures, a further deterioration in risk appetite, and trade channels.

In addition to the COVID-19-related risks, a no-trade-deal Brexit still poses risks to the European and U.S. financial systems. Although the United Kingdom formally left the European Union (EU) in January, it remains under the EU's trade rules until the end of this year. The failure to reach a final trade agreement could lead to supply chain disruptions in Europe and also could result in losses for European financial institutions. Accordingly, although financial institutions will have had ample time to prepare for Brexit, an unsuccessful trade agreement could lead to strains in global financial markets, resulting in a tightening of U.S. financial conditions.

. . . and adverse developments in China and other emerging market economies with vulnerable financial systems and strained public finances could also spill over to the United States

Because of the size of the economy, prolonged or recurrent periods of markedly depressed economic activity in China due to reinfections of COVID-19 could spill over to U.S. and global markets through disruptions in supply chains, a further reduction of risk appetite, more U.S. dollar appreciation, and additional declines in commodity prices. In China, the spread of the virus has slowed significantly and, therefore, restrictions on domestic travel and economic activity have in large part been lifted. That said, a sluggish recovery of Chinese domestic demand, a deeper slump in demand from abroad, or renewed efforts to curtail another virus outbreak could put additional pressure on Chinese firms, which are already highly indebted, and could put stress on the vulnerable financial sector. This situation could further strain global financial markets and disrupt regional value chains and exports to China, which could ultimately affect the U.S. financial system.

Broader stresses in EMEs, in which health-care systems, political institutions, and financial infrastructures are more fragile, could also have repercussions for the United States. In particular, Latin American economies, which have had persistent current account deficits, have already seen significant capital outflows due to a drop in global risk appetite. If the spread of COVID-19 is not mitigated in these countries and authorities find they have limited fiscal capacity to deal with the macroeconomic shock and the health crisis, further deterioration in credit risk or risk appetite could lead to balance of payment crises. For oil exporters, these dynamics could be exacerbated if oil prices remain depressed or fall even further because of either weak demand or a resumption of disputes within OPEC (Organization of the Petroleum Exporting Countries). Further dollar appreciation due to widespread stresses in EMEs could potentially put additional strains on U.S. firms that rely on exports and supply chains for their business operations. Some U.S. financial institutions may be directly affected by their exposures to these U.S. firms, in addition to the stressed EME firms and sovereigns themselves.

Figure Notes

Box: The Federal Reserve's Monetary Policy Actions and Facilities to Support the Economy since the COVID-19 Outbreak

Figure A

Indicative bid-ask spreads for 10-year Treasury note. On March 15, the FOMC announced an increase of its holdings of Treasury securities by at least $500 billion and its holdings of agency mortgage-backed securities by at least $200 billion. On March 23, the Federal Reserve announced it would continue to purchase Treasury securities and agency mortgage-backed securities in the amounts needed to support smooth market functioning and effective transmission of monetary policy to broader financial conditions.

Figure B

The Money Market Mutual Fund Liquidity Facility (MMLF) was announced on March 18 and operations began on March 23. On the same day, the Federal Reserve announced that the MMLF would be expanded to include negotiable certificates of deposit and variable-rate demand notes.

Figure C

CP is commercial paper, and CPFF is the Commercial Paper Funding Facility. Neither DTCC Solutions LLC nor any of its affiliates shall be responsible for any errors or omissions in any DTCC data included in this publication, regardless of the cause and, in no event, shall DTCC or any of its affiliates be liable for any direct, indirect, special or consequential damages, costs, expenses, legal fees, or losses (including lost income or lost profit, trading loses and opportunity costs) in connection with this publication.

Figure D

All spreads are to OIS of the same tenor. CP is commercial paper, CPFF is the Commercial Paper Funding Facility, and MMLF is the Money Market Mutual Fund Liquidity Facility. MMLF operations began on March 23. On the same day, the Federal Reserve announced that the MMLF would be expanded to include negotiable certificates of deposit and variable-rate demand notes, and the lending rate for the CPFF was reduced. CPFF operations began on April 14. Neither DTCC Solutions LLC nor any of its affiliates shall be responsible for any errors or omissions in any DTCC data included in this publication, regardless of the cause and, in no event, shall DTCC or any of its affiliates be liable for any direct, indirect, special or consequential damages, costs, expenses, legal fees, or losses (including lost income or lost profit, trading loses and opportunity costs) in connection with this publication.

Figure E

The values shown are outstanding amounts. PPPLF is the Paycheck Protection Program Liquidity Facility, CPFF is the Commercial Paper Funding Facility, MMLF is the Money Market Mutual Fund Liquidity Facility, and PDCF is the Primary Dealer Credit Facility.

Figure F

The shaded area with top cap represents an expanded window focusing on the period from February 17 onward. The triple-B reflects the effective yield of the ICE Bank of America Merrill Lynch triple-B U.S. Corporate Index (C0A4), and the high-yield reflects the effective yield of the ICE BofAML U.S. High Yield Index (H0A0). Treasury yields from smoothed yield curve estimated from off-the-run securities. Spreads over 10-year Treasury yield. PMCCF is the Primary Market Corporate Credit Facility and SMCCF is the Secondary Market Corporate Credit Facility.

Figure G

MLF is the Municipal Liquidity Facility and MMLF is the Money Market Mutual Fund Liquidity Facility.

Box: Federal Reserve Tools to Lessen Strains in Global Dollar Funding Markets

Figure A

The basis spreads were calculated using the respective overnight index swap rates. JPY is Japanese yen. EUR is euro.

Figure B

Swap operations are being conducted daily. Key identifies series in order from top to bottom.

Figure 1-1

The 2- and 10-year Treasury rates are the constant-maturity yields based on the most actively traded securities.

Figure 1-2

Term premiums are estimated from a three-factor term structure model using Treasury yields and Blue Chip interest rate forecasts.

Figure 1-3

Implied volatility on the 10-year Treasury yield, 1 month ahead, derived from future prices on government bond futures.

Figure 1-4

Market depth is defined as the average top three bid and ask quote sizes for on-the-run Treasury securities.

Figure 1-5

The 10-year triple-B reflects the effective yield of the ICE Bank of America Merrill Lynch 7-to-10-year triple-B U.S. Corporate Index (C4A4), and the 10-year high-yield reflects the effective yield of the ICE Bank of America Merrill Lynch 7-to-10-year U.S. Cash Pay High Yield Index (J4A0).

Figure 1-6

The 10-year triple-B reflects the effective yield of the ICE Bank of America Merrill Lynch 7-to-10-year triple-B U.S. Corporate Index (C4A4), and the 10-year high-yield reflects the effective yield of the ICE Bank of America Merrill Lynch 7-to-10-year U.S. Cash Pay High

Yield Index (J4A0). Treasury yields from smoothed yield curve estimated from off-the-run securities.

Figure 1-7
The data are plotted in percentage points.

Figure 1-8
Breaks in the series represent periods with no issuance. Spreads are calculated against 3-month LIBOR (London interbank offered rate). The spreads do not include up-front fees.

Figure 1-9
Aggregate forward price-to-earnings ratio of S&P 500 firms. Based on expected earnings for 12 months ahead.

Figure 1-10
Aggregate forward earnings-to-price ratio of S&P 500 firms. Based on expected earnings for 12 months ahead. Real Treasury yields are calculated from the 10-year consumer price index inflation forecast and the smoothed nominal yield curve estimated from off-the-run securities.

Figure 1-11
Realized volatility estimated from 5-minute returns using an exponentially weighted moving average with 75 percent of the weight distributed over the past 20 days.

Figure 1-12
Series deflated using the consumer price index and seasonally adjusted by Board staff.

Figure 1-13
The data are 3-month moving averages of weighted capitalization rates in the industrial, retail, office, and multifamily sectors, based on national square footage in 2009.

Figure 1-14
The data are 3-month moving averages of weighted capitalization rates in the industrial, retail, office, and multifamily sectors, based on national square footage in 2009.

Figure 1-15
Banks' responses are weighted by their commercial real estate loan market shares. The shaded bars with top caps indicate periods of business recession as defined by the National Bureau of Economic Research: March 2001–November 2001 and December 2007–June 2009. Survey respondents to the Senior Loan Officer Opinion Survey on Bank Lending Practices are asked the changes over the quarter.

Figure 1-16
The data for the United States start in 1997. Midwest index is a weighted average of Corn Belt and Great Plains states that comes from staff calculations. Values are given in real terms. Data end in 2019.

Figure 1-17
The data for the United States start in 1998. Midwest index is the weighted average of Corn Belt and Great Plains states. Data end in 2019.

Figure 1-19
Figure shows the log of the price-to-rent ratio. Long-run trend is estimated using data from 1978 to 2001 and includes the effect of carrying costs on the expected price-to-rent ratio. The last value of the trend is normalized to equal 100.

Figure 1-20
Seasonally adjusted. The data for Phoenix start in 2002. Monthly rent values for Phoenix are interpolated from semiannual numbers. Percentiles are based on 19 metropolitan statistical areas.

Box: Institutional Activities and Market Liquidity

Figure B
Quarterly average positions are based on weekly reports of primary dealers. Treasury securities exclude Treasury inflation-protected security. Corporate securities include non-agency mortgage-backed securities.

Figure C
Indicative bid-ask spreads for 10-year Treasury note. Non-rehypothecated Treasury repurchase agreement serves as a proxy for dealer Treasury inventory.

Figure 2-1
The shaded bars with top caps indicate periods of business recession as defined by the National Bureau of Economic Research: January 1980–July 1980, July 1981–November 1982, July 1990–March 1991, March 2001–November 2001, and December 2007–June 2009. GDP is gross domestic product.

Figure 2-2
The shaded bars with top caps indicate periods of business recession as defined by the National Bureau of Economic Research: January 1980–July 1980, July 1981–November 1982, July 1990–March 1991, March 2001–November 2001, and December 2007–June 2009. GDP is gross domestic product.

Figure 2-3
Gross leverage is an asset-weighted average of the ratio of firms' book value of total debt to book value of total assets. The 75th percentile is calculated from a sample of the 2,500 largest firms by assets. The dashed line shows the data after the structural break in the series due to the 2019 compliance deadline for Financial Accounting Standards Board rule Accounting Standards Update 2016–02.

Figure 2-4
Institutional leveraged loans generally exclude loan commitments held by banks. Key identifies series in order from top to bottom.

Figure 2-5
The interest coverage ratio is earning before interest and taxes over interest payments. Firms with leverage less than 5 percent and interest payments less than $500,000 are excluded.

Figure 2-6
Volumes are for large corporations with earnings before interest, taxes, depreciation, and amortization (EBITDA) greater than $50 million and exclude existing tranches of add-ons and amendments as well as restatements with no new money. Key identifies bars in order from top to bottom.

Figure 2-7
The data begin 2004:Q2. The default rate is calculated as the amount in default over the past 12 months divided by the total outstanding volume at the beginning of the 12-month period. The shaded bars with top caps indicate periods of business recession as defined by the National Bureau of Economic Research: March 2001–November 2001 and December 2007–June 2009.

Figure 2-8
Subprime are those with an Equifax Risk Score below 620; near prime are from 620 to 719; prime are greater than 719. Scores are measured contemporaneously. Student loan balances before 2004 are estimated using average growth from 2004 to 2007, by risk score. The data are converted to constant 2019 dollars using the consumer price index.

Figure 2-9
Year-over-year change in balances for the second quarter of each year among those households whose balance increased over this window. Subprime are those with an Equifax Risk Score below 620; near prime are from 620 to 719; prime are greater than 719. Scores were measured a year ago. The data are converted to constant 2019 dollars using the consumer price index. Key identifies bars in order from left to right.

Figure 2-10
Percent of previously current mortgages that transition from being current to being at least 30 days delinquent each month. The data are three-month moving averages. FHA is Federal Housing Administration; VA is U.S. Department of Veterans Affairs. Prime and nonprime are defined among conventional loans.

Figure 2-11
Estimated share of mortgages with negative equity according to CoreLogic and Zillow. For CoreLogic, the data are monthly. For Zillow, the data are quarterly and, for 2017, are available only for the first and fourth quarters.

Figure 2-12
Housing leverage is estimated as the ratio of the average outstanding mortgage loan balance for owner-occupied homes with a mortgage to (1) current home values using the CoreLogic national house price index and (2) model-implied house prices estimated by a staff model based on rents, interest rates, and a time trend.

Figure 2-13
The data are converted to constant 2019 dollars using the consumer price index.

Figure 2-14
Subprime are those with an Equifax Risk Score below 620; near prime are from 620 to 719;

prime are greater than 719. Scores are measured contemporaneously. The data are converted to constant 2019 dollars using the consumer price index.

Figure 2-15

Delinquency is at least 30 days past due, excluding severe derogatory loans. The data are four-quarter moving averages. Subprime are those with an Equifax Risk Score below 620; near prime are from 620 to 719; prime are greater than 719. Credit scores are lagged four quarters.

Figure 2-16

Subprime are those with an Equifax Risk Score below 620; near prime are from 620 to 719; prime are greater than 719. Scores are measured contemporaneously. The data are converted to constant 2019 dollars using the consumer price index.

Figure 2-17

Delinquency is at least 30 days past due, excluding severe derogatory loans. The data are four-quarter moving averages. Subprime are those with an Equifax Risk Score below 620; near prime are from 620 to 719; prime are greater than 719. Credit scores are lagged four quarters.

Figure 3-1

Bank equity is total equity capital net of preferred equity and intangible assets, and assets are total assets. The data are seasonally adjusted by Board staff. G-SIBs are global systemically important U.S. banks. Large non–G-SIBs are bank holding companies (BHCs) and intermediate holding companies (IHCs) with greater than $100 billion in total assets that are not G-SIBs. The shaded bars with top caps indicate periods of business recession as defined by the National Bureau of Economic Research: July 1990–March 1991, March 2001–November 2001, and December 2007–June 2009.

Figure 3-2

The data are seasonally adjusted by Federal Reserve Board staff. Sample consists of domestic bank holding companies (BHCs) and intermediate holding companies (IHCs) with a substantial U.S. commercial banking presence. G-SIBs are global systemically important U.S. banks. Large non–G-SIBs are BHCs and IHCs with greater than $100 billion in total assets that are not G-SIBs. Before 2014:Q1 (advanced-approaches BHCs) or before 2015:Q1 (non-advanced-approaches BHCs) the numerator of the common equity Tier 1 ratio is Tier 1 common capital. Afterward, the numerator is common equity Tier 1 capital. The denominator is risk-weighted assets. The shaded bars with top caps indicate periods of business recession as defined by the National Bureau of Economic Research (NBER): March 2001–November 2001, and December 2007–June 2009.

Figure 3-3

Banks' responses are weighted by their commercial and industrial loan market shares. Survey respondents to the Senior Loan Officer Opinion Survey on Bank Lending Practices are asked about the changes over the quarter. Results are shown for loans to large and medium-sized firms. The shaded bars with top caps indicate periods of business recession as defined by the National Bureau of Economic Research: March 2001–November 2001 and December 2007–June 2009.

Figure 3-4
Weighted median leverage of nonfinancial firms that borrow using commercial and industrial loans from the 26 banks that have filed in every quarter since 2013:Q1. Leverage is measured as the ratio of the book value of total debt to the book value of total assets of the borrower, as reported by the lender, and the median is weighted by committed amounts.

Figure 3-5
Leverage is calculated by dividing total assets by equity.

Figure 3-6
Ratio is calculated as (total assets – separate account assets)/(total capital – accumulated other comprehensive income) using GAAP. Top 10 publicly traded life and property and casualty insurers.

Figure 3-7
Leverage is computed as the ratio of hedge funds' gross notional exposure to net asset value. Gross notional exposure includes the nominal value of all long and short positions and derivative notional exposures. Options are delta adjusted, and interest rate derivatives are reported at 10-year bond equivalents. Data are reported on a three-quarter lag.

Figure 3-8
Net percentage equals the percentage of institutions that reported increased use of financial leverage over the past three months minus the percentage of institutions that reported decreased use of financial leverage over the past three months. REIT is real estate investment trust.

Figure 3-9
The data from the first quarter of 2020 is annualized to create the 2020 bar. CMBS is commercial mortgage-backed securities; CDO is collateralized debt obligation; RMBS is residential mortgage-backed securities; CLO is collateralized loan obligation. The "Other" category consists of other asset-backed securities (ABS) backed by credit card debt, student loans, equipment, floor plans, and miscellaneous receivables; resecuritized real estate mortgage investment conduit (Re-REMIC) RMBS; and Re-REMIC CMBS. The data are converted to constant 2020 dollars using the consumer price index. Key identifies bars in order from top to bottom.

Figure 3-10
Committed amounts on credit lines and term loans extended to nonbank financial firms by a balanced panel of 26 bank holding companies that have filed Form FR Y-14Q in every quarter since 2013:Q1. Nonbank financial firms are identified based on reported North American Industry Classification System (NAICS) codes. In addition to NAICS codes, a name-matching algorithm is applied to identify specific entities such as real estate investment trusts (REITs), special purpose entities, collateralized loan obligations (CLOs), and asset-backed securities (ABS). REITs incorporate both mortgage (trading) REITs and equity REITs. Broker-dealers also include commodity contracts dealers and brokerages and other securities and commodity exchanges. Other financial vehicles include closed-end investment and mutual funds and financial planning and pension funds. BDC is business development company.

Figure 4-1

Liquid assets are cash plus estimates of securities that qualify as high-quality liquid assets as defined by the Liquidity Coverage Ratio requirement. Accordingly, Level 1 assets and discounts and restrictions on Level 2 assets are incorporated into the estimate. G-SIBs are global systemically important U.S. banks. Large non–G-SIBs are bank holding companies (BHCs) and intermediate holding companies with greater than $100 billion in total assets.

Figure 4-2

Short-term wholesale funding is defined as the sum of large time deposits with maturity less than one year, federal funds purchased and securities sold under agreements to repurchase, deposits in foreign offices with maturity less than one year, trading liabilities (excluding revaluation losses on derivatives), and other borrowed money with maturity less than one year. The shaded bars with top caps indicate periods of business recession as defined by the National Bureau of Economic Research: March 2001–November 2001 and December 2007–June 2009.

Figure 4-3

The black striped area denotes the period from 2008:Q4 to 2012:Q4 when insured deposits increased because of the Transaction Account Guarantee program. "Other" consists of variable-rate demand obligations, federal funds, funding-agreement-backed securities, private liquidity funds, offshore money market funds, and local government investment pools. Securities lending includes only lending collateralized by cash. GDP is gross domestic product. Values for variable-rate demand obligations come from Bloomberg beginning in 2019:Q1. See Jack Bao, Josh David, and Song Han (2015), "The Runnables," FEDS Notes (Washington: Board of Governors of the Federal Reserve System, September 3), https://dx.doi.org/10.17016/2380-7172.1595.

Figure 4-4

The data are converted to constant 2020 dollars using the consumer price index.

Figure 4-5

The data are converted to constant 2020 dollars using the consumer price index.

Figure 4-6

The data are converted to constant 2020 dollars using the consumer price index. Key identifies series in order from top to bottom.

Figure 4-8

The data are converted to constant 2019 dollars using the consumer price index. FHLB is Federal Home Loan Bank. Key identifies series in order from top to bottom.

Box: Salient Shocks to Financial Stability Cited in Market Outreach

Figure

Responses are to the following question: "Over the next 12–18 months, which shocks, if realized, do you think would have the greatest negative effect on the functioning of the U.S. financial system?"

Corrections

On November 19, 2020, the data in figure 3-9 was corrected to fix a coding error.

On November 10, 2021, the data in figure 3-2 was corrected to fix a coding error.

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