



# Financial Stability Report

November 2022

BOARD OF GOVERNORS OF THE FEDERAL RESERVE SYSTEM



The Federal Reserve System is the central bank of the United States. It performs five key functions to promote the effective operation of the U.S. economy and, more generally, the public interest.

The Federal Reserve

- **conducts the nation's monetary policy** to promote maximum employment and stable prices in the U.S. economy;
- **promotes the stability of the financial system** and seeks to minimize and contain systemic risks through active monitoring and engagement in the U.S. and abroad;
- **promotes the safety and soundness of individual financial institutions** and monitors their impact on the financial system as a whole;
- **fosters payment and settlement system safety and efficiency** through services to the banking industry and the U.S. government that facilitate U.S.-dollar transactions and payments; and
- **promotes consumer protection and community development** through consumer-focused supervision and examination, research and analysis of emerging consumer issues and trends, community economic development activities, and administration of consumer laws and regulations.

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# Purpose and Framework

This report presents the Federal Reserve Board’s current assessment of the stability of the U.S. financial system. By publishing this report, the Board intends to promote public understanding by increasing transparency around, and creating accountability for, the Federal Reserve’s views on this topic. Financial stability supports the objectives assigned to the Federal Reserve, including full employment and stable prices, a safe and sound banking system, and an efficient payments system.

A financial system is considered stable when banks, other lenders, and financial markets are able to provide households, communities, and businesses with the financing they need to invest, grow, and participate in a well-functioning economy—and can do so even when hit by adverse events, or “shocks.”

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 are inherently difficult to predict, while vulnerabilities, which are the aspects of the financial system that would exacerbate stress, can be monitored as they build up or recede over time. As a result, the framework focuses primarily on assessing vulnerabilities, with an emphasis on four broad categories and how those categories might interact to amplify stress in the financial system.<sup>1</sup>

## More on the Federal Reserve’s Monitoring Efforts

See the [Financial Stability](#) section of the Federal Reserve Board’s website for more information on how the Federal Reserve monitors the stability of the U.S. and world financial systems.

The website includes:

- a more detailed look at our [monitoring framework](#) for assessing risk in each category;
- more data and research on related topics;
- information on how we coordinate, cooperate, and otherwise take action on financial system issues; and
- [public education resources](#) describing the importance of our efforts.

1. **Valuation pressures** arise when asset prices are high relative to economic fundamentals or historical norms. These developments are often driven by an increased willingness of investors to take on risk. As such, elevated valuation pressures may increase the possibility of outsized drops in asset prices (see Section 1, [Asset Valuations](#)).

<sup>1</sup> For a review of the research literature in this area, see Tobias Adrian, Daniel Covitz, and Nellie Liang (2015), “Financial Stability Monitoring,” *Annual Review of Financial Economics*, vol. 7 (December), pp. 357–95.

2. Excessive **borrowing by businesses and households** exposes the borrowers to distress if their incomes decline or the assets they own fall in value. In these cases, businesses and households with high debt burdens may need to cut back spending, affecting economic activity and causing losses for investors (see Section 2, [Borrowing by Businesses and Households](#)).
3. Excessive **leverage within the financial sector** increases the risk that financial institutions will not have the ability to absorb losses without disruptions to their normal business operations when hit by adverse shocks. In those situations, institutions will be forced to cut back lending, sell their assets, or even shut down. Such responses can impair credit access for households and businesses, further weakening economic activity (see Section 3, [Leverage in the Financial Sector](#)).
4. **Funding risks** expose the financial system to the possibility that investors will rapidly withdraw their funds from a particular institution or sector, creating strains across markets or institutions. 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 those funds in assets that are hard to sell quickly or have a long maturity. This liquidity and maturity transformation can create an incentive for investors to withdraw funds quickly in adverse situations. Facing such withdrawals, financial institutions may need to sell assets quickly at "fire sale" prices, thereby incurring losses and potentially becoming insolvent, as well as causing additional price declines that can create stress across markets and at other institutions (see Section 4, [Funding Risks](#)).

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 spread through the U.S. financial system, given our current assessment of vulnerabilities.

While this framework provides a systematic way to assess financial stability, some potential risks may be novel or difficult to quantify and therefore are not captured by the current approach. Given these complications, we 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 Financial Stability Oversight Council (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 the aftermath of the 2007–09 financial crisis, these actions have included requirements for more and higher-quality capital, an innovative stress-testing regime, and new liquidity regulations applied to the largest banks in the United States. In addition, the Federal Reserve’s assessment of financial vulnerabilities informs decisions regarding the countercyclical capital buffer (CCyB). 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

This report reviews conditions affecting the stability of the U.S. financial system by analyzing vulnerabilities related to valuation pressures, borrowing by businesses and households, financial-sector leverage, and funding risks. It also highlights several near-term risks that, if realized, could interact with these vulnerabilities.

Since the May 2022 *Financial Stability Report* was released, the economic outlook has weakened, and uncertainty about the outlook has remained elevated. Inflation remains unacceptably high in the United States and is also elevated in many other countries. Central banks around the world, including the Federal Reserve, have tightened monetary policy in response. A weaker outlook, higher interest rates, and elevated uncertainty have contributed to a substantial tightening in financial conditions. Economic, financial, and geopolitical risks also have risen across advanced

Overview of financial system vulnerabilities			
 <p><b>Asset valuations</b></p>	 <p><b>Borrowing by businesses and households</b></p>	 <p><b>Leverage in the financial sector</b></p>	 <p><b>Funding risks</b></p>
<ul style="list-style-type: none"> <li>• Prices of risky assets generally fell amid a less favorable outlook and rising interest rates.</li> <li>• Risk premiums in equity and corporate bond markets were near the middle of their historical distributions.</li> <li>• Real estate valuations remained very elevated even though activity weakened and price increases slowed markedly.</li> </ul>	<ul style="list-style-type: none"> <li>• Although debt of nonfinancial businesses and households grew in the first half of 2022, the ratio of debt to gross domestic product (GDP) was little changed and remained at a moderate level.</li> <li>• Interest coverage ratios for large businesses reached historically high levels, and debt issuance by the riskiest companies slowed. The business debt-to-GDP ratio remained high.</li> <li>• Household debt was at modest levels relative to GDP and concentrated among prime-rated borrowers.</li> </ul>	<ul style="list-style-type: none"> <li>• Banks' risk-based capital ratios have remained in the middle of the range that has prevailed since 2010, and stress tests show the system remains resilient to a severe recession.</li> <li>• Leverage was somewhat elevated at hedge funds, and bank lending to the broader set of nonbank financial institutions continued to grow.</li> <li>• Monitoring some parts of the nonbank financial sector, where hidden pockets of leverage could amplify adverse shocks, could be enhanced with more comprehensive and timely data.</li> </ul>	<ul style="list-style-type: none"> <li>• Domestic banks maintained high levels of liquid assets and stable funding.</li> <li>• Structural vulnerabilities persist at money market funds, some other mutual funds, and stablecoins.</li> <li>• Central counterparties maintain elevated margin requirements amid high market volatility, which clearing members have continued to meet.</li> </ul>

and emerging market economies (EMEs), further contributing to asset price declines and periods of significant market volatility. These developments, and future shocks, have the potential to be amplified by vulnerabilities associated with asset valuations, borrowing by households and businesses, financial-sector leverage, and funding risks.

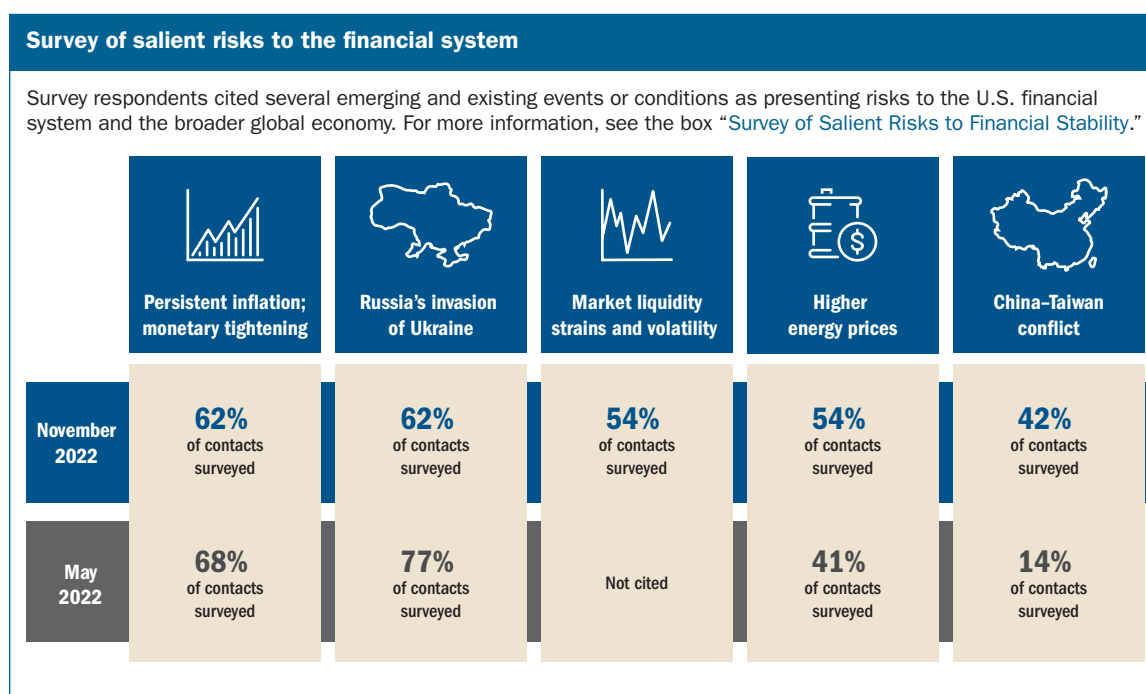
Against this backdrop, our view of the current level of vulnerabilities is as follows:

- 1. Asset valuations.** Higher interest rates and a weaker outlook for the economy led prices of financial assets to fall amid heightened volatility, but real estate prices remained elevated. Measures of equity prices relative to expected earnings declined. Risk premiums in equity and corporate bond markets were near the middle of their historical distributions. In contrast, property markets still show elevated valuations. Although housing activity weakened and national average price increases slowed sharply year over year, home prices remained historically high relative to rents. Valuations of commercial real estate (CRE) were also elevated (see Section 1, [Asset Valuations](#)).
- 2. Borrowing by businesses and households.** On balance, vulnerabilities arising from borrowing by nonfinancial businesses and households were little changed over the first half of 2022 and remained at moderate levels. Borrowing by businesses remained at high levels relative to gross domestic product (GDP) in the first half of 2022, but some measures of their ability to service that debt improved as the effects of rising interest rates were offset by higher business earnings. Household debt remained at modest levels relative to GDP, and most of that debt is owed by households with strong credit histories or considerable home equity. Nonetheless, borrowing costs continue to rise and inflation is reducing real incomes, a combination that may pose risks to the ability of some businesses and households to service their debts, especially in the event of further adverse shocks to income or inflation (see Section 2, [Borrowing by Businesses and Households](#)).
- 3. Leverage in the financial sector.** Banks maintained risk-based capital ratios near their post-2010 averages, and broker-dealer leverage remained historically low. Leverage at life insurance companies declined to about the middle of its historical range. In contrast, hedge fund leverage likely remained somewhat above its historical average, though comprehensive data are available only with a lag. Bank lending to nonbank financial institutions (NBFIs), an indicator of NBFI leverage, reached new highs. More generally, monitoring some parts of the nonbank financial sector, where hidden pockets of leverage could amplify adverse shocks, could be enhanced with more comprehensive and timely data (see Section 3, [Leverage in the Financial Sector](#)).
- 4. Funding risks.** Short-term funding markets continue to have structural vulnerabilities, as some markets and institutions remain vulnerable to large and unexpected withdrawals, especially considering the highly uncertain outlook. Funding risks at domestic banks are low, given their large holdings of liquid assets and limited reliance on short-term wholesale funding. Prime

and tax-exempt money market funds (MMFs), as well as other cash-investment vehicles, remain vulnerable to runs. Many bond and bank-loan mutual funds continue to be susceptible to large redemptions, because they hold assets that can become illiquid amid stress. The market capitalization of stablecoins—which have a set of structural vulnerabilities, including weaknesses in regulatory oversight, opacity, and consumer protection issues—continued to decline after falling sharply earlier in the year. Central counterparties (CCPs) have maintained a high level of financial resources to cover potential credit exposures in case of default by one or more clearing members, and participants have continued to meet their margin calls to date (see Section 4, [Funding Risks](#)).

In addition, market liquidity—the ability to trade assets without a large effect on market prices—remained low in several key asset markets since the May report, as discussed in the box “[Liquidity Conditions in Treasury and Other Core Financial Markets](#).” Low liquidity amplifies the volatility of asset prices and may ultimately impair market functioning. It could also increase funding risks to financial intermediaries that rely on marketable securities as collateral. These potential amplification channels may interact with leverage in the financial system.

This report also discusses potential near-term risks based in part on the most frequently cited risks to U.S. financial stability as gathered from outreach to a wide range of researchers, academics, and market contacts (discussed in the box “[Survey of Salient Risks to Financial Stability](#)”). Contacts expressed increased concern about market functioning, including the possibility of disorderly markets and extreme volatility. In addition, persistently and unexpectedly



high inflation, combined with further rate increases in the United States, could negatively affect domestic economic activity and financial conditions, which would affect the ability of businesses and households to service their debts and, as a result, the credit risk faced by financial intermediaries. As described in the box “[International Risks and U.S. Financial Stability](#),” consequences of Russia’s invasion of Ukraine, stresses in China, the strength of the dollar, and other developments abroad could lead to adverse developments in some economies, which could affect U.S. financial stability. Moreover, shocks caused by cyber events, especially cyberattacks, could impair the U.S. financial system. If any of these near-term risks were realized, and especially should such events precipitate a marked worsening of the economic outlook, their effects could be amplified through the financial vulnerabilities identified in this report.

The report also contains additional boxes that analyze salient topics related to financial stability: “[Climate Scenario Analysis: An Explainer](#)” and “[Digital Assets and Financial Stability](#).”

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# 1 | Asset Valuations

## **A deteriorating economic outlook and higher interest rates lowered corporate valuations, while real estate valuations remained elevated**

Since the May 2022 *Financial Stability Report*, the economic outlook deteriorated amid growing downside risks and heightened uncertainty. Central banks around the world tightened monetary policy in response to persistently high inflation. Against this backdrop, yields on long-term Treasury securities rose notably, which, along with diminished risk appetite, contributed to a decline in broad equity indexes and a widening of corporate credit spreads. The valuation measures tracked for most corporate financial assets are now near or below their historical averages.

In contrast, valuation pressures in real estate remained high. National average house prices continued to rise year over year, although recent data show a significant slowdown in growth and falling prices in some geographic locations. With valuations at high levels, house prices could be particularly sensitive to shocks. CRE prices continued to increase since the previous report, albeit at a slower pace in recent months. With both capitalization rates and capitalization spreads—the difference between capitalization rates and real Treasury yields—at low levels, CRE valuation pressures moved higher from already stretched levels. Farmland prices were also elevated relative to rents, driven by rising crop prices and limited inventories of land.

Table 1.1 shows the sizes of the asset markets discussed in this section. The largest asset markets are those for equities, residential real estate, CRE, and Treasury securities.

## **Treasury yields increased amid high volatility**

Reflecting a tighter monetary policy stance associated with a very tight labor market and inflation far above the Federal Open Market Committee's 2 percent inflation objective, yields on Treasury securities further increased since the May report to near or above their median levels over the past quarter-century (figure 1.1). In contrast, a model estimate of nominal Treasury term premiums—a measure of the compensation investors require to hold longer-term Treasury securities rather than shorter-term ones—was little changed and low relative to its long-run history (figure 1.2).<sup>2</sup> Consistent with heightened uncertainty about the economic outlook, a forward-looking measure of interest rate volatility derived from options prices increased from previously elevated

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<sup>2</sup> Treasury term premiums capture the difference between the yield that investors require for holding longer-term Treasury securities and the expected yield from rolling over shorter-dated ones.

**Table 1.1. Size of selected asset markets**

Item	Outstanding (billions of dollars)	Growth, 2021:Q2-2022:Q2 (percent)	Average annual growth, 1997-2022:Q2 (percent)
Residential real estate	53,004	16.8	6.3
Equities	46,511	-15.0	8.4
Commercial real estate	23,465	8.7	6.9
Treasury securities	23,253	7.2	8.1
Investment-grade corporate bonds	6,973	3.9	8.1
Farmland	2,707	1.5	5.1
High-yield and unrated corporate bonds	1,773	2.8	6.8
Leveraged loans*	1,414	12.4	14.0
Price growth (real)			
Commercial real estate**		3.9	2.9
Residential real estate***		4.8	2.7

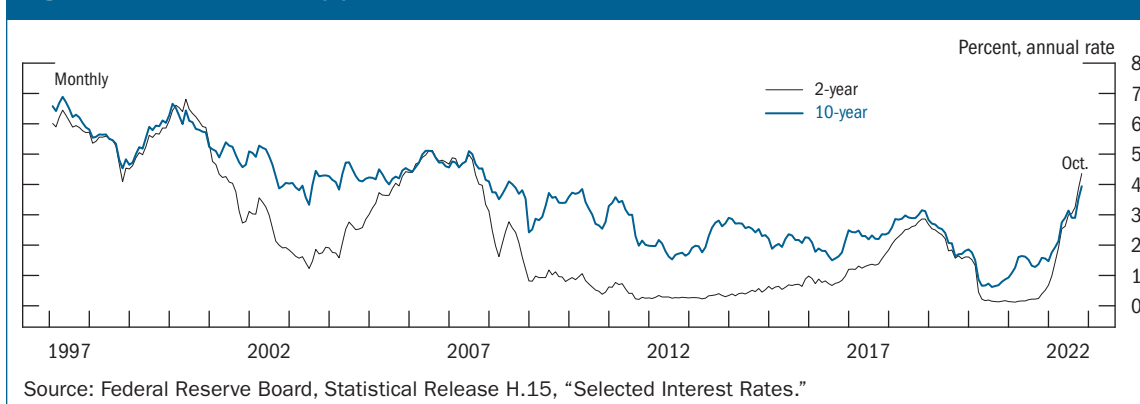
Note: The data extend through 2022:Q2. Growth rates are measured from Q2 of the year immediately preceding the period through Q2 of the final year of the period. Equities, real estate, and farmland are at nominal market value; bonds and loans are at nominal book value.

\* 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 2022:Q2, as this market was fairly small before then.

\*\* One-year growth of commercial real estate prices is from August 2021 to August 2022, and average annual growth is from 1998:Q4 to 2022:Q2. Both growth rates are calculated from value-weighted nominal prices deflated using the consumer price index (CPI).

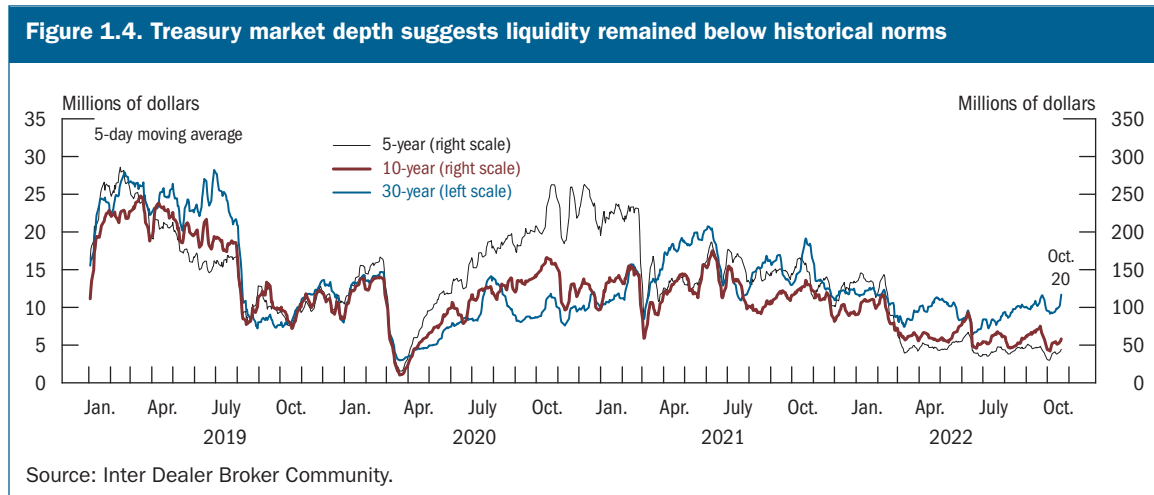
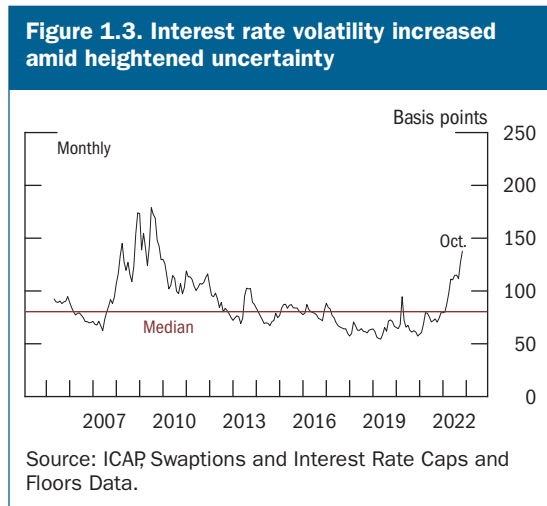
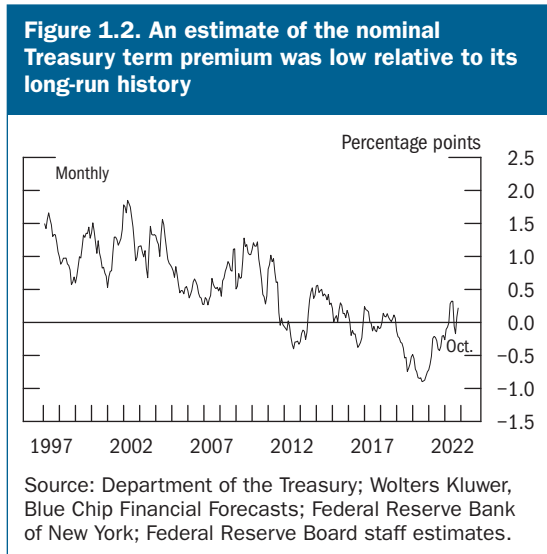
\*\*\* One-year growth of residential real estate prices is from August 2021 to August 2022, and average annual growth is from 1997:Q4 to 2022:Q2. Nominal prices are deflated using the CPI.

Source: For leveraged loans, PitchBook Data, 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, Inc.; 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."

**Figure 1.1. Nominal Treasury yields increased to levels seen before 2008**



levels (figure 1.3). Liquidity metrics, such as market depth, suggest that Treasury market liquidity has remained below historical norms (figure 1.4).<sup>3</sup> Market liquidity strains could amplify price shocks and increase costs for investors when they adjust their holdings. Moreover, persistent liquidity strains could result in higher liquidity premiums and, as a result, lower valuations. For more information on market liquidity developments, see the box “Liquidity Conditions in Treasury and Other Core Financial Markets.”



<sup>3</sup> Market depth reflects the quantity of an asset available to buy or sell at the posted bid and ask prices.

## Box 1.1. Liquidity Conditions in Treasury and Other Core Financial Markets

Market liquidity—the ease of buying and selling an asset—is a key indicator of how well markets are functioning. Low liquidity can amplify the volatility of asset prices and result in larger price moves in response to shocks. In extreme cases, low liquidity can threaten market functioning, leading to a situation in which participants are unable to trade without incurring a significant cost. Liquidity conditions in the markets for Treasury securities are particularly important due to the key role those securities play in the financial system. This discussion updates the assessment of liquidity conditions in Treasury and other core financial markets from the May report. The Treasury market has continued to function smoothly over the period from the May report, but measures of trading costs have remained moderately elevated and liquidity appears to be less resilient than is typical. These liquidity strains appear to be primarily a consequence of the elevated interest rate volatility associated with uncertainty about the economic outlook. While measures of trading costs such as bid-ask spreads are only moderately elevated, the fact that intermediaries are posting historically low volumes of quotes may mean that the risk of a sharp further increase in trading costs could be higher than usual. Liquidity conditions in various other major markets remain moderately strained. Looking ahead, the Inter-Agency Working Group on Treasury Market Surveillance is expected to provide an update on its progress toward enhancing the resilience of the U.S. Treasury market.<sup>1</sup> These enhancements include proposals intended to improve data quality and public transparency and enhance the resilience of market intermediation and market oversight.

### Measuring liquidity depends on how trading takes place

The most liquid component of the Treasury market is the interdealer broker market in on-the-run Treasury securities, where trading takes place predominantly on platforms employing central limit order books (CLOBs).<sup>2</sup> On a CLOB, market participants can either provide liquidity by posting quotes to buy and sell securities or consume liquidity by submitting an order to buy or sell at the best available quoted price. In contrast, dealer-to-client trading in off-the-run securities largely takes place using the “request for quote” (RFQ) protocol, whereby clients of Treasury securities dealers can obtain quotes for buying or selling a certain amount. Measures that capture different dimensions of liquidity include market depth, which is relevant only for CLOB-based markets, and the bid-ask spread, which can be observed for both CLOB- and RFQ-based markets. Market depth at the top of the book is the average of quantities available to buy or sell at the best quoted prices; greater market depth indicates a greater ability to instantaneously trade larger amounts without moving the price and, hence, a more liquid market.<sup>3</sup> The bid-ask spread is the difference between the best “bid” quote to buy an asset and the best “ask” quote to sell that asset; smaller bid-ask spreads indicate lower trading costs and, hence, more liquid markets.<sup>4</sup>

*(continued)*

<sup>1</sup> The Inter-Agency Working Group on Treasury Market Surveillance is composed of staff from the U.S. Department of the Treasury, the Board of Governors of the Federal Reserve System, the Federal Reserve Bank of New York, the U.S. Securities and Exchange Commission, and the U.S. Commodity Futures Trading Commission.

<sup>2</sup> On-the-run Treasury securities are the most recently auctioned securities of a given maturity, while off-the-run securities are those that were auctioned earlier.

<sup>3</sup> In practice, market depth is an imperfect measure of the ability to trade without moving the price, because quotes can be both rapidly canceled or rapidly replenished in response to incoming order flow.

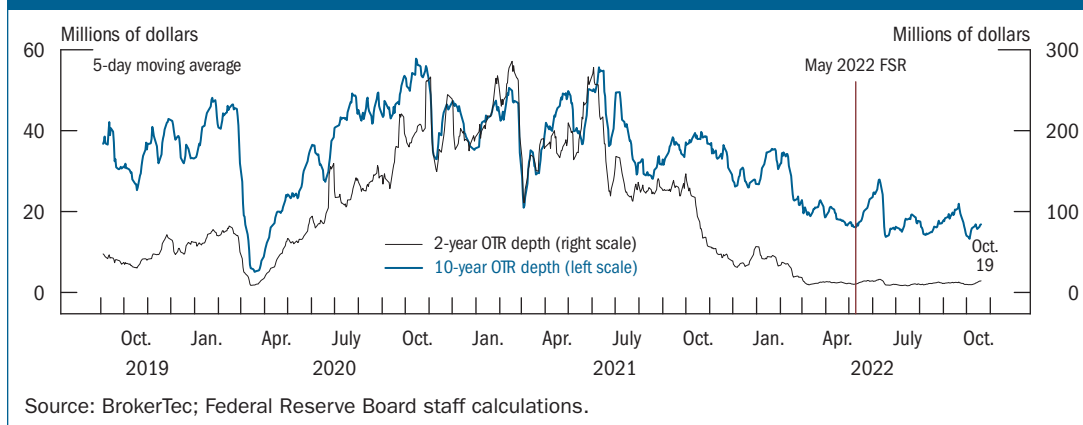
<sup>4</sup> In liquid CLOB-based markets, the bid-ask spread is often close to or at the minimum tick size, the smallest allowed difference between bid and ask prices, and widens only for short periods during the day in response to incoming orders. However, average bid-ask spreads over the course of a day may still be informative about the variation in liquidity conditions over time.

**Box 1.1—continued**

**Liquidity remained low in the U.S. Treasury market**

Figure A shows average top-of-book market depth for 2- and 10-year on-the-run Treasury securities. Between about October 2021 and the end of April 2022, market depth fell notably, which primarily reflected growing caution on the part of liquidity providers about posting quotes in large volumes in the face of heightened price volatility. That heightened volatility in turn reflected substantial uncertainty about the economic outlook and the appropriate monetary policy response. The reduction in market depth for shorter-maturity securities was relatively large—to levels around the low point seen during the onset of the COVID-19 pandemic—because the prices of those securities are more sensitive to news about the near-term economic outlook. Since the May report, market depth has remained low, reflecting the continued uncertainty about the economic outlook.

**Figure A. Top-of-book average market depth for 2- and 10-year on-the-run Treasury notes**

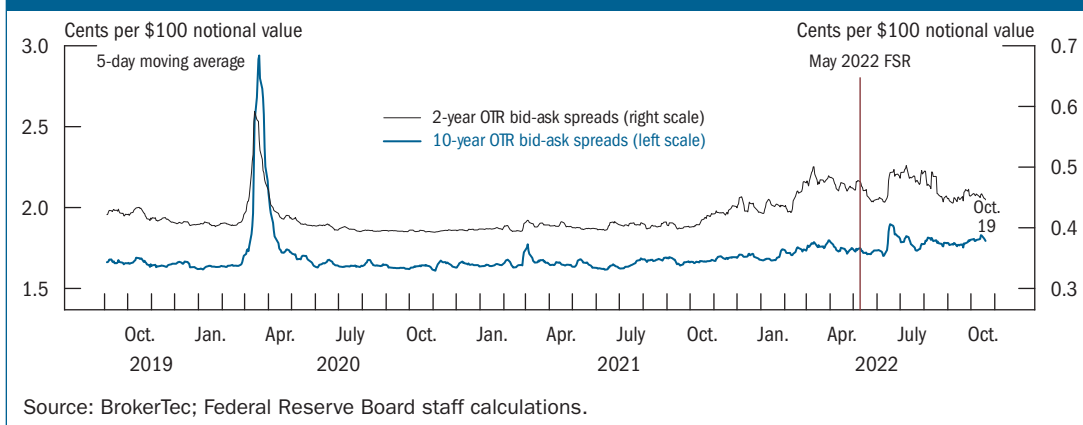


Source: BrokerTec; Federal Reserve Board staff calculations.

Figure B shows average bid-ask spreads. Spreads rose between October 2021 and mid-March 2022 and remain moderately wide. While spreads are moderately wider than was typical during the years before the pandemic, the fact that they have remained well below the pandemic-related peak in

(continued)

**Figure B. Average bid-ask spreads for 2- and 10-year on-the-run Treasury notes**



Source: BrokerTec; Federal Reserve Board staff calculations.

### Box 1.1—continued

March 2020 contrasts with market depth remaining close to its pandemic-related troughs, particularly for shorter-maturity securities. This pattern of exceptionally low market depth but only moderately high spreads suggests that liquidity providers have continued to replenish the limited volume of quotes on the CLOB sufficiently rapidly in response to incoming order flow to prevent outsized moves in the best quoted prices over short periods. At the same time, the average size of trades (not shown) trended downward in the first quarter of 2022 and remained stable since the May report, suggesting that market participants have adapted to low market depth by splitting trades into smaller chunks to minimize the effect on prices. That said, splitting trades into smaller chunks may entail increased trading costs for some market participants—for example, because it may lengthen the time taken to execute trades. Moreover, the continued low level of market depth means that liquidity remains more sensitive to the actions of liquidity providers that use high-frequency trading strategies to replenish the order book rapidly. Greater concentration of liquidity provision among firms that may follow similar strategies can be a source of fragility, making it more likely that liquidity could further deteriorate sharply in response to future shocks.

The likely predominant driver of recent low liquidity appears to be elevated uncertainty about the economic situation and the outlook for monetary policy. In general, volatility and liquidity tend to move in opposite directions because higher volatility increases the riskiness of providing liquidity, and intermediaries therefore tend to either reduce the amount they quote as a way of managing the risk or charge more compensation for the risk of providing liquidity, in the form of a wider bid-ask spread. Current levels of liquidity appear broadly in line with the historical relationship between liquidity and volatility. This situation is in contrast to that at the height of the COVID-19 pandemic crisis, when liquidity deteriorated by more than the historical relationship with volatility would suggest, as intermediaries became less willing to provide liquidity in response to heavy selling pressures, as discussed in the November 2020 report.

Liquidity conditions in other parts of the Treasury market generally have also remained low in recent months, albeit to varying degrees. Treasury futures liquidity is low relative to its typical levels; however, it has been less strained than in the cash market over the past year. In contrast, for the off-the-run nominal securities and Treasury Inflation-Protected Securities, liquidity strains are more acute.<sup>5</sup> That said, market participants are not reporting major problems obtaining quotes or executing trades.

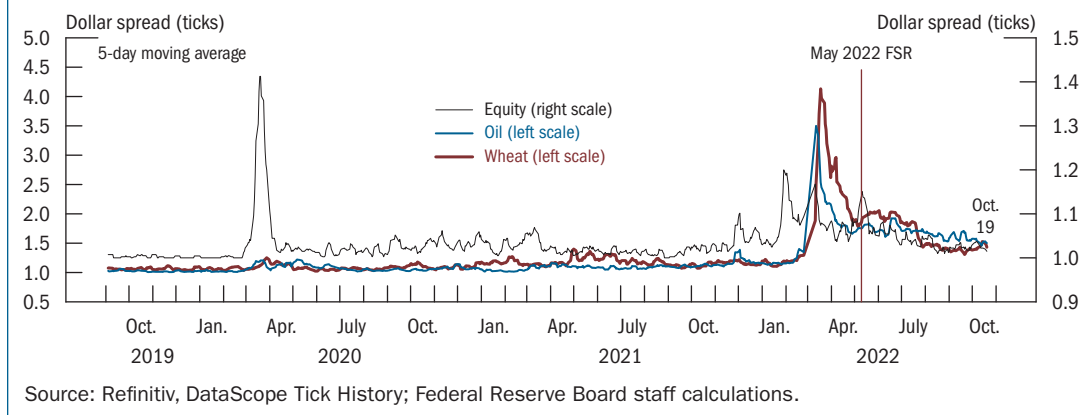
### Liquidity in other financial markets has also remained low

Liquidity conditions in some other crucial financial markets have remained strained since the May report. Figure C shows bid-ask spreads in the S&P 500 equity index, the West Texas Intermediate crude oil, and wheat futures markets. While equity futures' bid-ask spreads have narrowed since the May report, they remain elevated compared with historical levels.<sup>6</sup> Bid-ask spreads in the oil futures market briefly widened significantly following Russia's invasion of Ukraine, to levels substantially higher than observed during the pandemic-related strains, but subsequently narrowed and have remained relatively stable since the May report. In contrast, bid-ask spreads in the wheat futures market have continued to narrow since the May report. Similar to the market for on-the-run Treasury securities, market depth in all of these other markets remains historically low, suggesting that in these

(continued)

<sup>5</sup> The hierarchy of liquidity conditions being least strained in the futures market and most strained in the off-the-run cash market is consistent with typical patterns; for example, as discussed by Dobrev and Meldrum (2020), the futures Treasury market was notably more liquid than the cash market during the height of the COVID-19 pandemic crisis. See Dobrislav Dobrev and Andrew Meldrum (2020), "What Do Quoted Spreads Tell Us about Machine Trading at Times of Market Stress? Evidence from Treasury and FX Markets during the COVID-19-Related Market Turmoil in March 2020," FEDS Notes (Washington: Board of Governors of the Federal Reserve System, September 25), <https://www.federalreserve.gov/econres/notes/feds-notes/what-do-quoted-spreads-tell-us-about-machine-trading-market-stress-march-2020-20200925.html>.

<sup>6</sup> The bid-ask spreads for the E-mini S&P 500 futures are currently around the 75th percentile of their distribution since 2018.

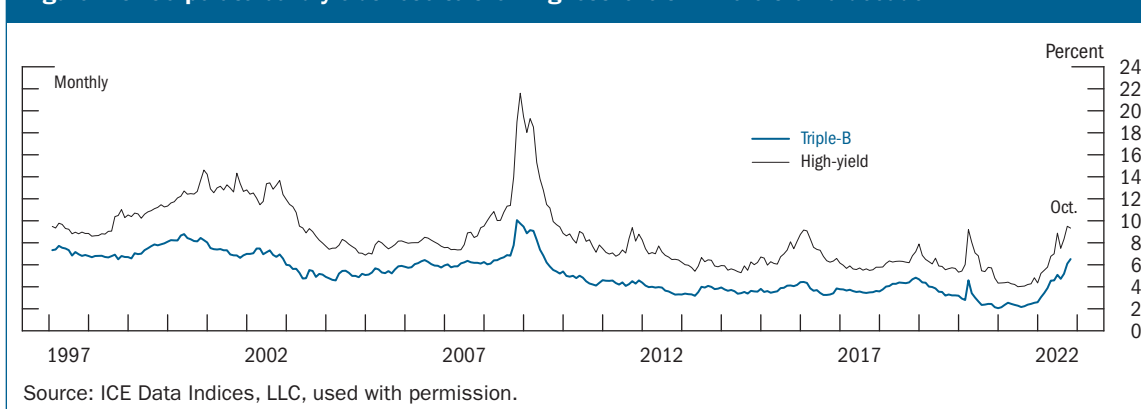
**Box 1.1**—continued**Figure C. Bid-ask spreads for E-mini S&P 500, crude oil, and wheat futures**

markets, too, liquidity providers have replenished limited volumes of quotes sufficiently rapidly to prevent outsized moves in the best quoted prices over short periods. Nonetheless, these conditions suggest a higher-than-normal risk that bid-ask spreads may widen in the face of further shocks, making prices even more volatile. Also broadly similar to the Treasury market, bid-ask spreads in the corporate bond market widened slightly since the May report but remain well below their peaks at the onset of the pandemic.

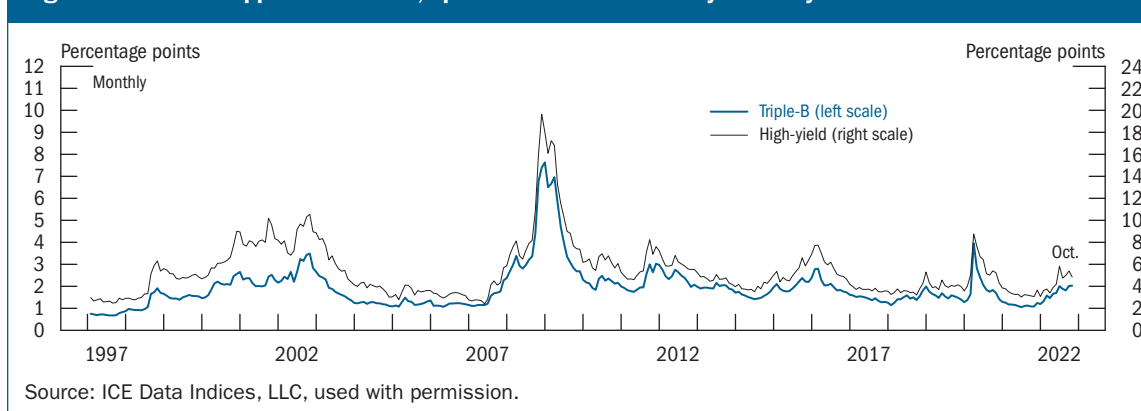
## Corporate debt market valuations fell just below historical medians

Since the May report, corporate bond yields increased more than those on comparable-maturity Treasury securities (figure 1.5). Consequently, corresponding corporate-to-Treasury spreads widened to somewhat above their historical medians, easing valuation pressures (figure 1.6).

**Figure 1.5. Corporate bond yields rose to their highest levels in more than a decade**



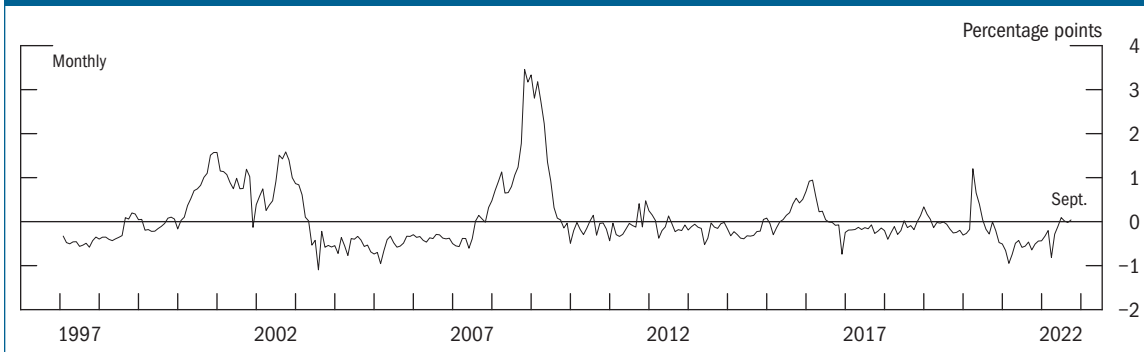
**Figure 1.6. As risk appetite declined, spreads to similar-maturity Treasury securities widened**



The excess bond premium, a measure that captures the gap between corporate bond spreads and expected credit losses, was slightly above its historical median, indicating moderate risk appetite (figure 1.7). Reflecting higher interest rates and elevated market volatility, corporate bond issuance declined in recent months.

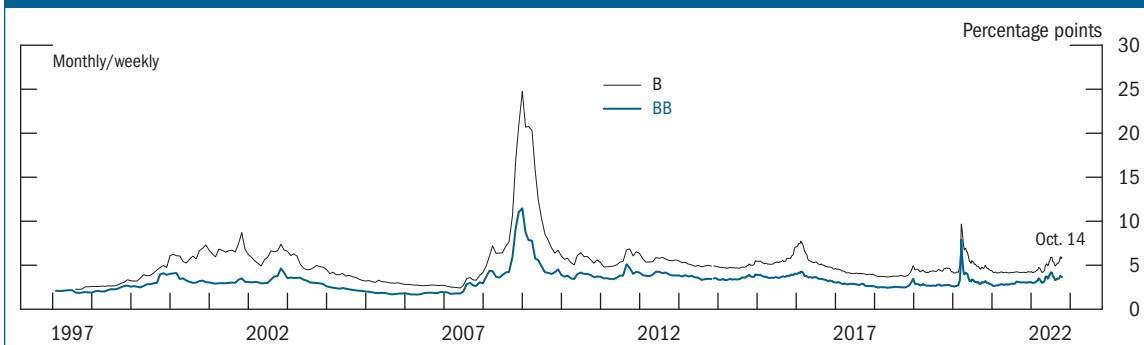
Risk appetite in the leveraged loan market declined to low levels since the May report. Demand from both retail and institutional investors fell amid concerns that higher interest rates will weigh on profitability and credit quality. Spreads on leveraged loans in the secondary market widened and stood well above their respective averages since the 2007–09 financial crisis (figure 1.8). Furthermore, amid market volatility and fewer refinancing opportunities, leveraged loan issuance slowed considerably in the third quarter to its lowest quarterly level since 2009.

**Figure 1.7. The excess bond premium returned to a level consistent with its historical norm**



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; S&P Global, Compustat.

**Figure 1.8. Spreads in the leveraged loan market also increased**



Source: PitchBook Data, Leveraged Commentary & Data.

## Equity market valuation pressures declined to near historical medians

Broad equity prices declined amid continued volatility over the period since the May report. Prices relative to earnings forecasts fell from previously elevated levels to be modestly above median levels, suggesting that valuations were moderate (figure 1.9). Meanwhile, the difference between the forward earnings-to-price ratio and the expected real yield on 10-year Treasury securities—a rough measure of the extra compensation that investors require for holding stocks relative to risk-free bonds, known as the equity premium—declined a bit to its historical median (figure 1.10). Reflecting the considerable

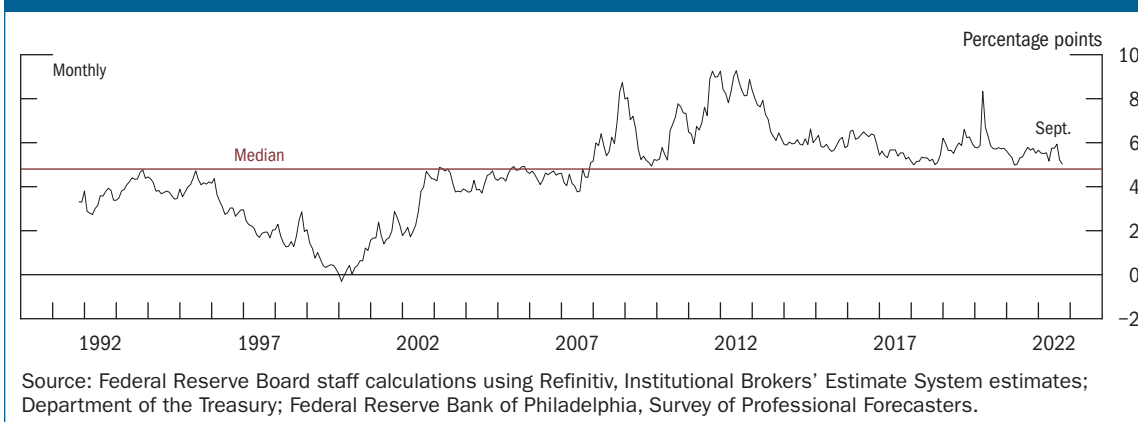
**Figure 1.9. The price-to-earnings ratio of S&P 500 firms declined but remained a bit above its historical median**



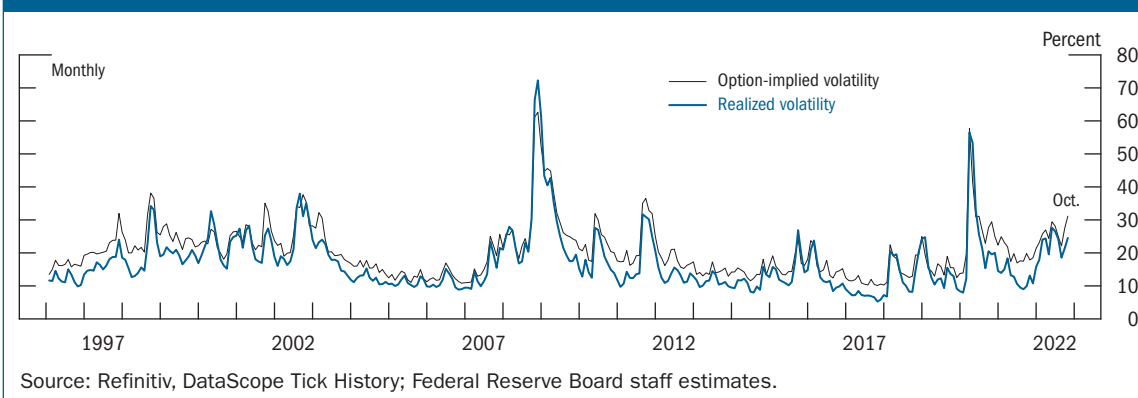
Source: Federal Reserve Board staff calculations using Refinitiv, Institutional Brokers' Estimate System estimates.

uncertainty in the markets, option-implied volatility continued to be elevated (figure 1.11). At the same time, the pace of initial public offerings was low compared with historical standards, following the exceptionally high issuance in 2021 and due to the recent volatility in prices.

**Figure 1.10. An estimate of the equity premium declined to about its historical median**



**Figure 1.11. Volatility in equity markets remained elevated**

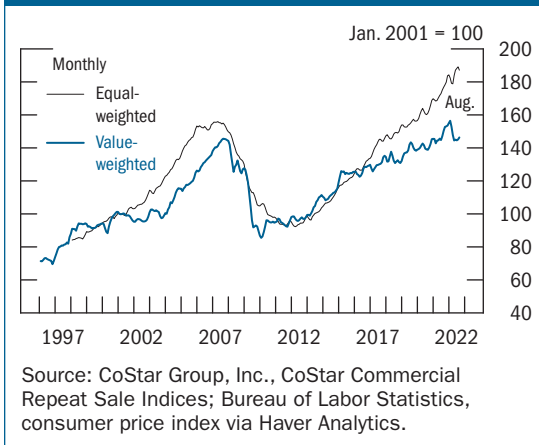


## Commercial real estate valuations remained high

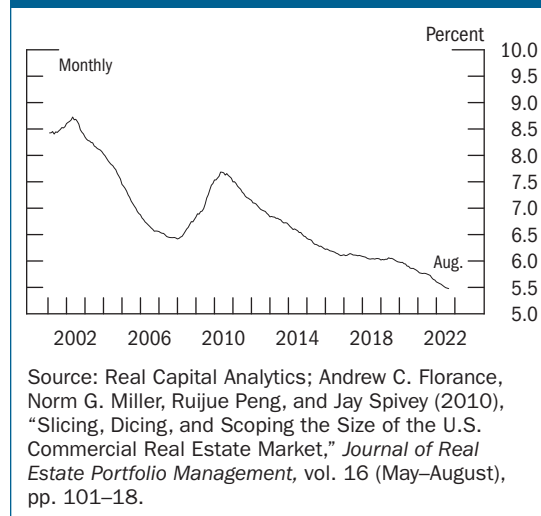
Since the May report, valuation pressures for commercial properties increased further from already considerable levels. Aggregate CRE price indexes moved to record-high levels, although price increases have slowed sharply, partially in response to higher borrowing costs. Furthermore, some inflation-adjusted price measures began showing declines (figure 1.12). Capitalization rates at the time of property purchase, which measure the annual income of commercial properties relative to their prices, continued to decline and were at historical lows (figure 1.13). Moreover, the spreads of capitalization rates to real Treasury yields—which provide a measure of risk appetite in this market—remained at the bottom third of their historical distributions through August. Although the levels of valuations across property types all remained high, some differences in valuations



**Figure 1.12. Commercial real estate prices, adjusted for inflation, remained at high levels**

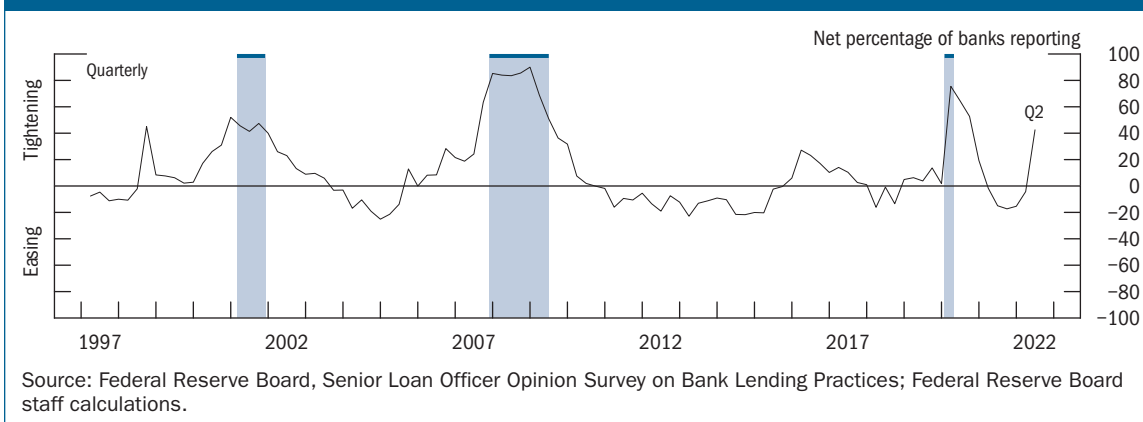


**Figure 1.13. Income of commercial properties relative to prices continued declining to historically low levels**



across segments of the CRE market reflected comparably weaker fundamentals. For example, vacancy rates and increases in asking rents were weaker in the retail and office sectors, and capitalization rates for those property types remained higher than for other property types. Meanwhile, in the July Senior Loan Officer Opinion Survey on Bank Lending Practices (SLOOS), banks reported weaker demand for most CRE loan categories and tighter lending standards for the second quarter of 2022 (figure 1.14).<sup>4</sup>

**Figure 1.14. Banks reported tightening lending standards in commercial real estate loans**

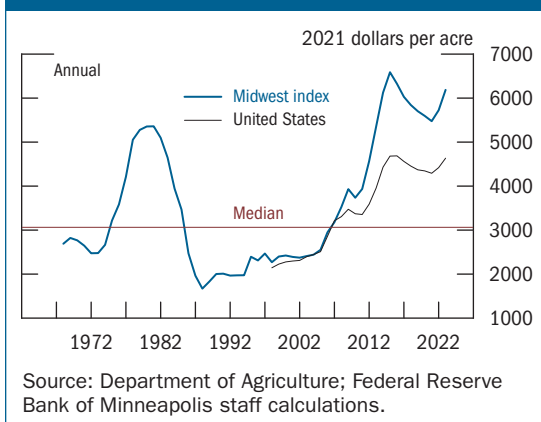


<sup>4</sup> The SLOOS is available on the Federal Reserve’s website at <https://www.federalreserve.gov/data/sloos.htm>.

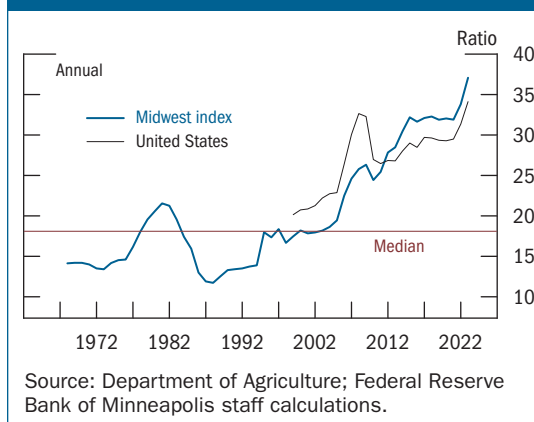
## Farmland valuations increased further from already high levels

Farmland prices continued to increase since the May report and remained at high levels (figure 1.15). The ratios of farmland prices to rents increased to new historical highs (figure 1.16). Farmland valuations were supported by high and rising commodity prices, as the positive effects of a substantial rise in prices of agricultural commodities, such as wheat and corn, appeared to outweigh the negative effects of higher prices for inputs, like fuel and fertilizers. Moreover, the inventory of farmland was limited.

**Figure 1.15. Farmland prices were at high levels**



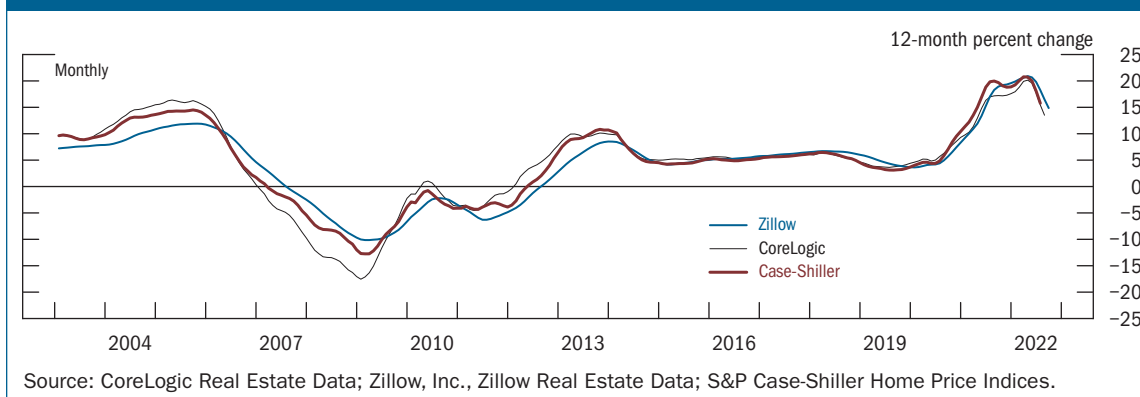
**Figure 1.16. Farmland prices rose more than rents**



## House prices have decelerated sharply, but valuations remained high

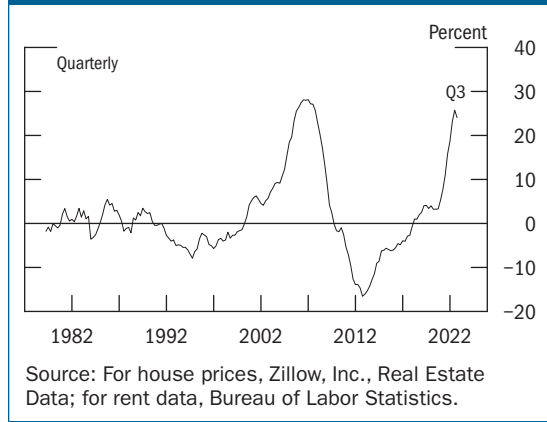
Year-over-year house price increases have slowed significantly, with some measures pointing to outright declines in recent months, likely owing in part to rising borrowing costs (figure 1.17).

**Figure 1.17. After rising rapidly in recent years, house prices decelerated**

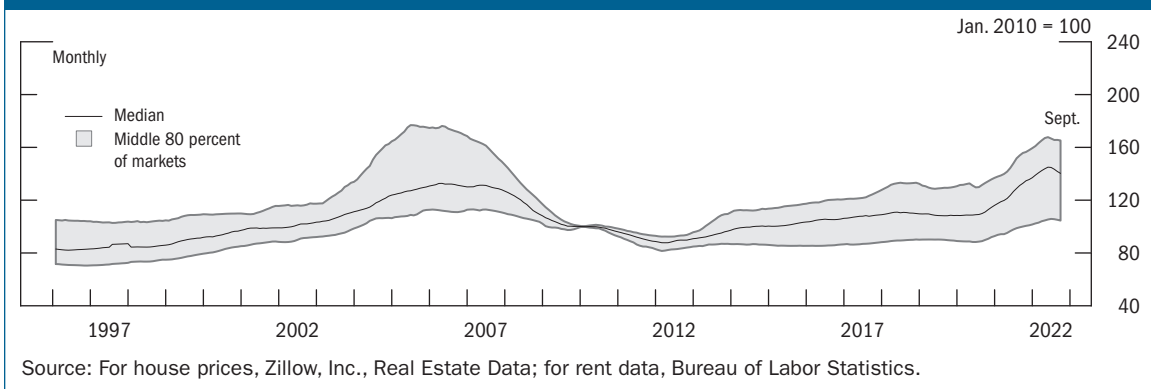


Nationwide, house price-to-rent ratios leveled off but still stood above their mid-2000s peak even as prices in some locations began falling. A model of house price valuation based on prices relative to owners' equivalent rent and interest rates points to stretched valuations (figure 1.18). However, a measure of house valuations that incorporates market-based measures of rents (based on the rent for a new lease by a new tenant) is somewhat less elevated. As house price increases slowed across regions and property types, price-to-rent ratios also flattened out across regional markets (figure 1.19).

**Figure 1.18. A model-based measure pointed to stretched house price valuations**



**Figure 1.19. House price-to-rent ratios remained elevated across geographic areas**





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## 2 | Borrowing by Businesses and Households

### **Vulnerabilities from business and household debt remained moderate**

On balance, vulnerabilities arising from borrowing by businesses and households were little changed over the first half of 2022 and remained at moderate levels. The business debt-to-GDP ratio and gross leverage stood at high levels (although significantly lower than the record highs reached at the onset of the pandemic). In contrast, median interest coverage ratios continued to improve, bolstered by strong earnings, and have reached record highs. Taken together, vulnerabilities from business leverage appeared moderate. Indicators of household vulnerabilities, including the household debt-to-GDP ratio and the aggregate household debt service ratio, remained at modest levels, but nominal household debt continued to rise. Going forward, we expect that inflation and rising borrowing costs may pose risks to the ability of some businesses and households to service their debts, especially for those holding adjustable-rate products. An economic downturn or a correction in real estate prices would also put pressure on business and household balance sheets.

Table 2.1 shows the amounts outstanding and recent historical growth rates of forms of debt owed by nonfinancial businesses and households as of the second quarter of 2022. Total outstanding private credit was split about evenly between businesses and households, with businesses owing \$19.5 trillion and households owing \$18.5 trillion.

### **The ratio of business and household debt to gross domestic product was stable and remained at a moderate level**

The combined total debt of nonfinancial businesses and households grew roughly in line with nominal GDP in the first half of 2022, leaving the debt-to-GDP ratio essentially flat and close to its pre-pandemic level (figure 2.1). Regarding the individual sectors, the ratio of business debt to GDP edged up and stood at high levels, while the ratio of household debt to GDP inched down and stood at levels similar to those that existed before the buildup preceding the 2007–09 financial crisis (figure 2.2).

### **Key indicators point to little change in business debt vulnerabilities, which remained moderate relative to historical levels**

Overall vulnerabilities from nonfinancial business debt remained moderate in the first half of 2022, as measures of leverage were little changed and solid earnings bolstered interest coverage

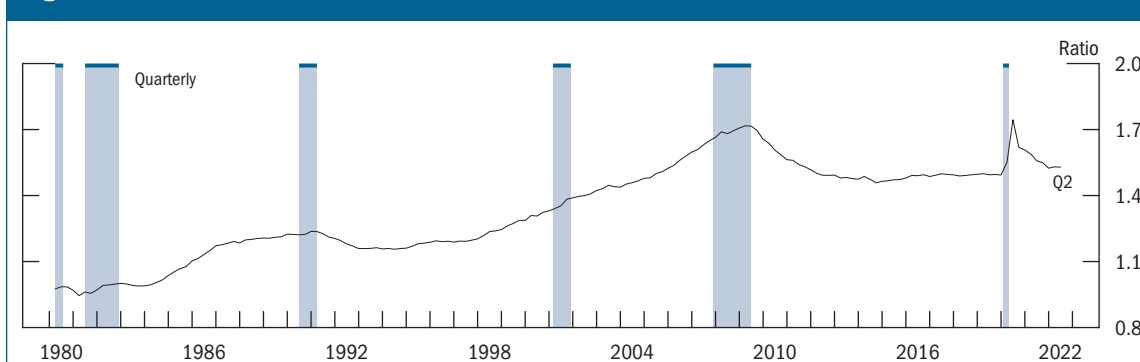
**Table 2.1. Outstanding amounts of nonfinancial business and household credit**

Item	Outstanding (billions of dollars)	Growth, 2021:Q2-2022:Q2 (percent)	Average annual growth, 1997-2022:Q2 (percent)
Total private nonfinancial credit	37,955	7.3	5.6
Total nonfinancial business credit	19,457	6.8	5.8
Corporate business credit	12,560	7.3	5.3
Bonds and commercial paper	7,542	1.3	5.5
Bank lending	2,021	19.1	4.0
Leveraged loans*	1,317	12.2	13.9
Noncorporate business credit	6,897	6.0	7.0
Commercial real estate credit	2,968	9.8	6.2
Total household credit	18,498	7.8	5.4
Mortgages	12,159	8.7	5.5
Consumer credit	4,582	7.6	5.0
Student loans	1,748	1.7	8.0
Auto loans	1,364	7.0	5.0
Credit cards	1,087	14.4	3.2
Nominal GDP	24,883	9.1	4.4

Note: The data extend through 2022:Q2. Outstanding amounts are in nominal terms. Growth rates are measured from Q2 of the year immediately preceding the period through Q2 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.

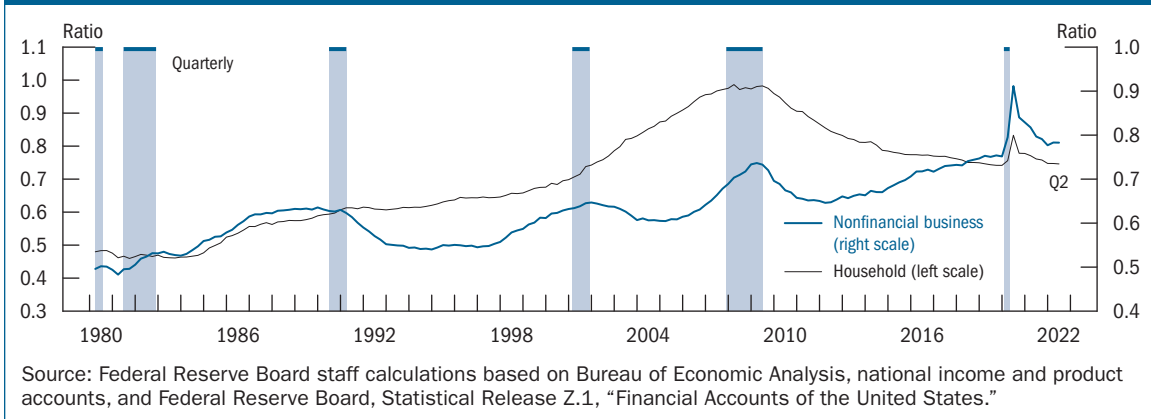
\* Leveraged loans included in this table are an estimate of the leveraged loans that are made to nonfinancial businesses only and do not include the small amount of leveraged loans outstanding for financial businesses. The amount outstanding shows institutional leveraged loans and generally excludes 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 2022:Q2, as this market was fairly small before 2000.

Source: For leveraged loans, PitchBook Data, 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."

**Figure 2.1. The debt of households and businesses relative to GDP was flat in the first half of 2022**

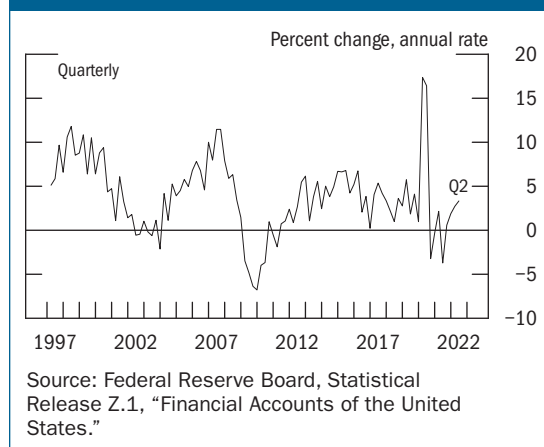
Source: Federal Reserve Board staff calculations based on Bureau of Economic Analysis, national income and product accounts, and Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States."

**Figure 2.2. Both business and household debt-to-GDP ratios moved sideways in the first half of 2022**

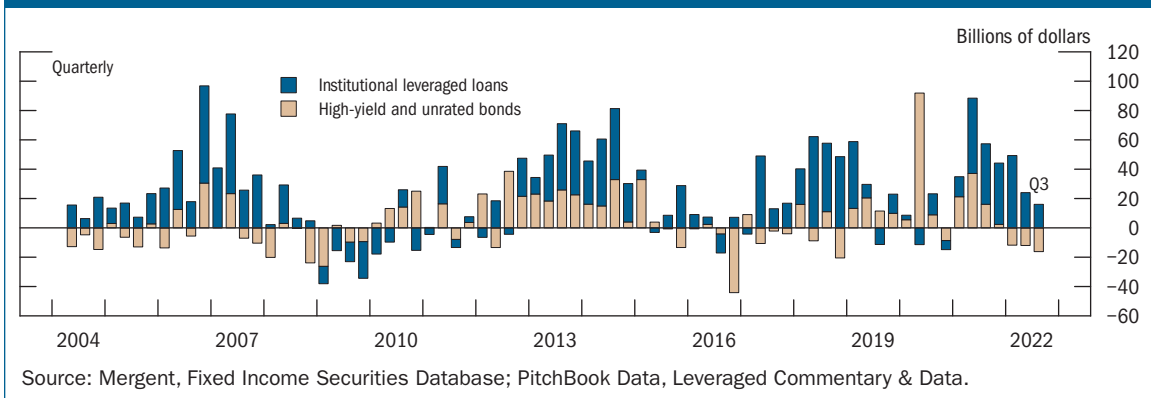


ratios, while risky debt growth slowed. Non-financial business debt adjusted for inflation grew modestly in the same period (figure 2.3). However, net issuance of risky debt was subdued over the same period (figure 2.4). In particular, institutional leveraged loan issuance slowed notably in recent months—falling back to its historical average—as investor demand weakened amid market volatility. In addition, the net issuance of high-yield and unrated bonds remained negative so far this year.

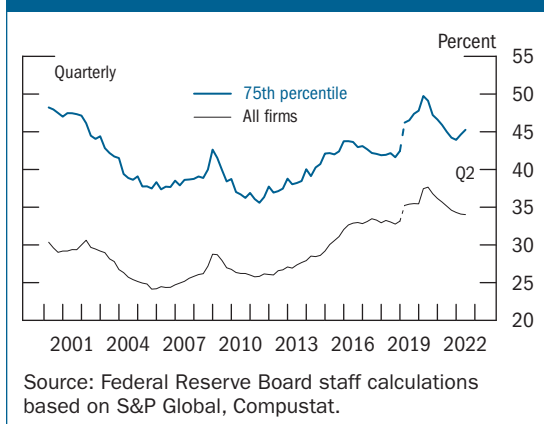
**Figure 2.3. Business debt adjusted for inflation grew modestly in the first half of 2022**



**Figure 2.4. Net issuance of risky debt has been subdued so far this year**

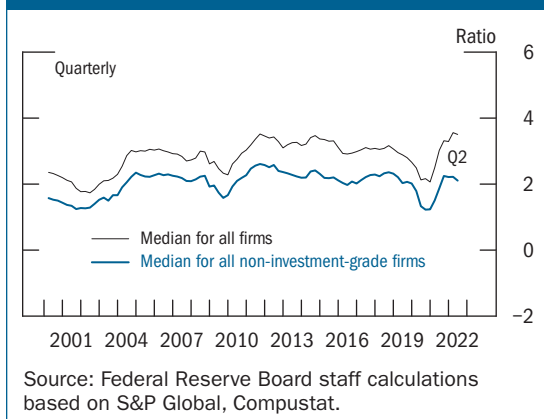


**Figure 2.5. Gross leverage of large businesses remained at high levels**



Gross leverage—the ratio of debt to assets—of all publicly traded nonfinancial firms inched down in the first half of 2022, continuing the decline from its historical peak in mid-2020. That said, it remained elevated by historical standards (figure 2.5). Net leverage—the ratio of debt less cash to total assets—was also high relative to its history and edged up among all large businesses as they ran down some of their cash reserves.

**Figure 2.6. Firms' ability to service their debt, as measured by the interest coverage ratio, remained high**



The ability of large businesses to service their debt, as measured by the median ratio of earnings to interest expenses (the interest coverage ratio), continued to improve in the first half of 2022, on net, and reached its highest level in the past two decades in the first quarter of the year (figure 2.6). This development was due to solid earnings in the first half of 2022. In addition, the effect of rising interest rates was muted, as corporate bonds—which account for the majority of the debt of public firms—generally have fixed interest rates and longer-term maturities. In particular, only about 5 percent of outstanding bonds rated triple-B and 3 percent of outstanding speculative-grade bonds are

due within a year. Nevertheless, further increases in interest expenses, combined with possible declines in profitability stemming from high inflation, supply chain disruptions, or an economic downturn, could curtail the ability of highly indebted firms to service their debt. Meanwhile, the median interest coverage ratio for the subset of all publicly traded non-investment-grade firms edged down in the first half of 2022 but remained at relatively high levels. While these firms represent a large share of the number of publicly traded firms (85 percent), their debt constitutes only 35 percent of the total debt in the sector.

The available data for smaller middle-market firms that are privately held—which have less access to capital markets and primarily borrow from banks, private credit and equity funds, and sophisticated investors—also indicate that leverage continued to decline over the first half of 2022 and

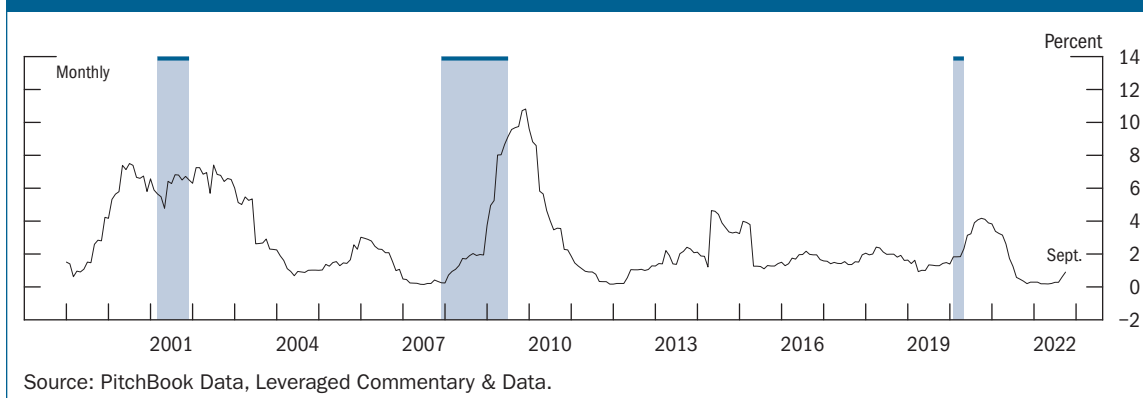


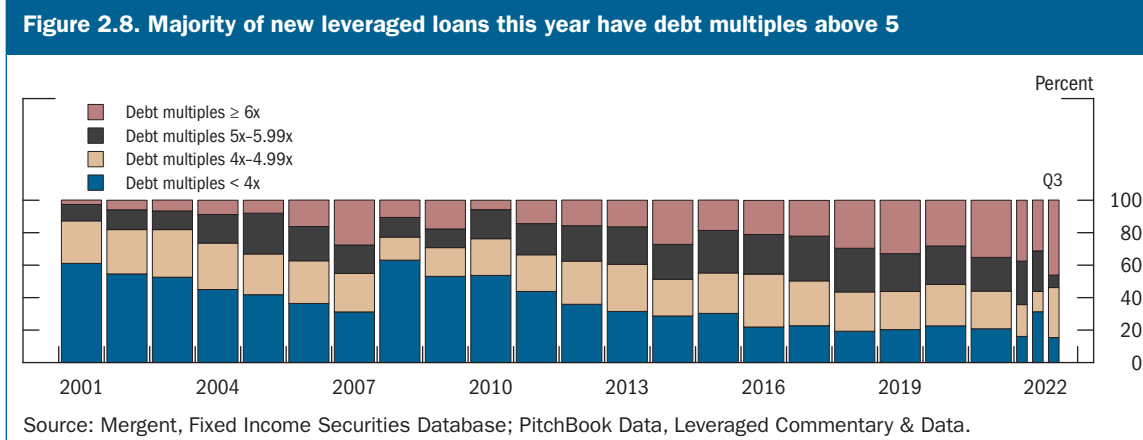
was at levels similar to those at publicly traded firms. The interest coverage ratio for the median firm in this category also improved during the same period and is above the level at publicly traded firms. However, an important caveat is that the data on smaller middle-market firms are not as comprehensive as those on large firms.

The credit performance of outstanding corporate bonds remained generally solid since the May report. The volume of downgrades and defaults remained low, but market expectations of defaults over the next year rose somewhat, as investor perceptions of the macroeconomic outlook worsened. More than half of investment-grade debt outstanding continues to be rated in the lowest category of the investment-grade range (triple-B). In an economic downturn, widespread downgrades of bonds to speculative-grade ratings could lead investors to sell the downgraded bonds rapidly, as some are constrained in their ability to hold speculative-grade debt, potentially increasing market illiquidity and downward price pressures.

The credit quality of leveraged loans remained solid through the second quarter, but it has worsened lately. Over the summer, the volume of credit rating downgrades exceeded the volume of upgrades, and default rates inched up, although from historically low levels (figure 2.7). In addition, leveraged loans feature floating interest rates, so rising interest rates, in combination with a potential slowdown in earnings growth posed by the less favorable economic outlook, could put pressure on the credit quality of outstanding debt going forward. Amid low volumes, the distribution of loans by one measure of leverage was little changed, on balance, this year. For instance, the share of newly issued loans to large corporations with debt multiples—defined as the ratio of debt to earnings before interest, taxes, depreciation, and amortization—greater than 5 decreased slightly in the second and third quarters, indicating lower tolerance for additional leverage among investors in this market, although it remained around historical highs (figure 2.8).

**Figure 2.7. Default rates on leveraged loans inched up from historically low levels**





## Delinquencies at small businesses edged up, but credit quality remained solid

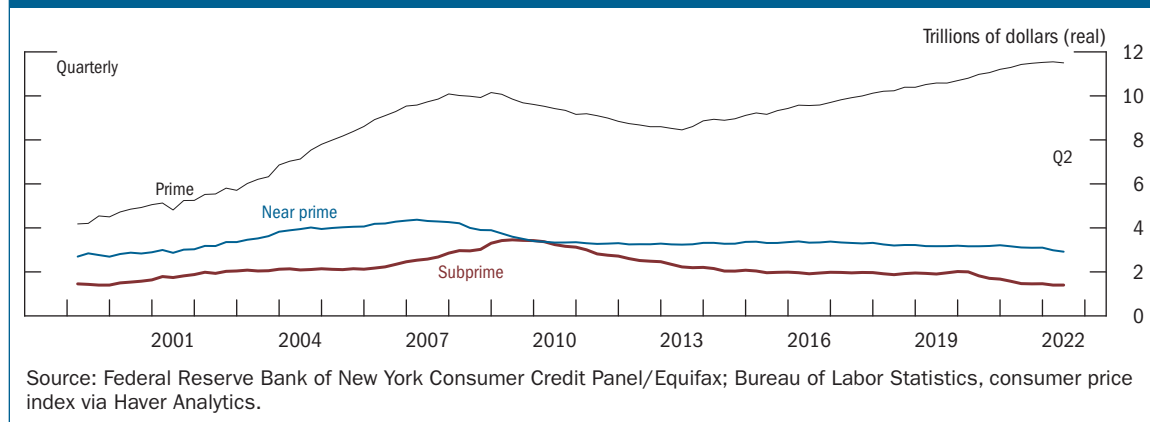
Credit quality for small businesses remained solid even as delinquency rates edged up lately from relatively low levels. Borrowing costs increased in the first half of 2022, but they remained lower than the prevailing pre-pandemic rates. In addition, the share of small businesses that borrow regularly is rising, according to the National Federation of Independent Business Small Business Economic Trends Survey, but it is still low relative to historical levels; the share of firms with unmet financing needs remained quite low.

## Vulnerabilities from household debt remained moderate

Despite a sharp decline in equity prices in the first half of 2022, household balance sheets remained strong, with elevated levels of liquid assets and large home equity cushions. In addition, prime-rated consumers continued to account for most of the increases in nominal total household debt. That said, many households started to draw down the buffers of savings that had accumulated during the pandemic. Some households remain financially strained and more vulnerable to future shocks, especially with persistently high inflation and the accompanying declines in real income and increases in borrowing costs.

## Borrowing by households continued to rise in line with income and is mostly concentrated among borrowers with low credit risk

Outstanding household debt adjusted for inflation edged down across the credit score distribution, remaining about flat for prime borrowers and decreasing for near-prime and subprime borrowers (figure 2.9). Nominal household debt, however, continued to grow in the first half of 2022, except for student loan debt. Borrowers with prime credit scores, which accounted for more than half of

**Figure 2.9. Real household debt shrank in the first half of 2022**

the total number of borrowers, continued to drive most of the growth. A note of caution, however, is that this trend reflects both increased borrowing by prime-rated borrowers and a significant increase in the share of households rated as prime after the distribution of pandemic-related relief payments.<sup>5</sup>

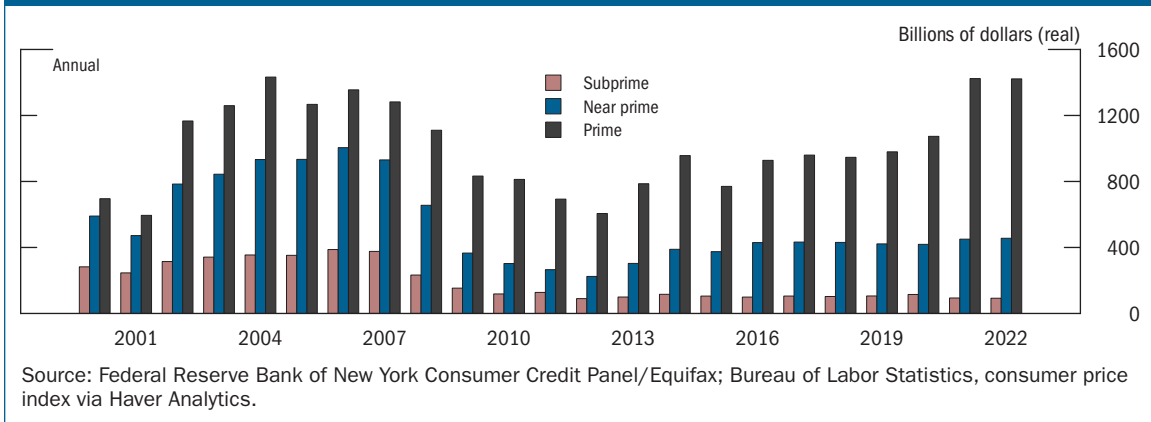
### Credit risk of outstanding household debt remained generally low

The ratio of total required household debt payments to total disposable income (the household debt service ratio) increased somewhat in the first half of 2022, suggesting that some households have become more vulnerable to shocks. However, the ratio remained at modest levels after reaching a historical low in the first quarter of 2021 amid extensive fiscal stimulus, credit card paydowns, and low interest rates. With interest rates rising, the ratio could increase further. Only a small share of household debt has a floating rate, mostly in the form of credit card debt, which should limit the effect of increased interest rates in the near term. For most other types of household debt, rising interest rates increase borrowing cost only for new loan originations.

Mortgage debt accounted for roughly two-thirds of total household debt. New mortgage extensions skewed heavily toward prime borrowers in recent years, with originations of subprime loans adjusted for inflation running at 25 percent of the peak level in 2006 (figure 2.10). The share of mortgage balances in a loss-mitigation program continued to decline and stood at low levels. However, the early payment delinquency rate—the share of balances becoming delinquent within one year of mortgage origination—started to rise. This rise resulted in an uptick in the overall

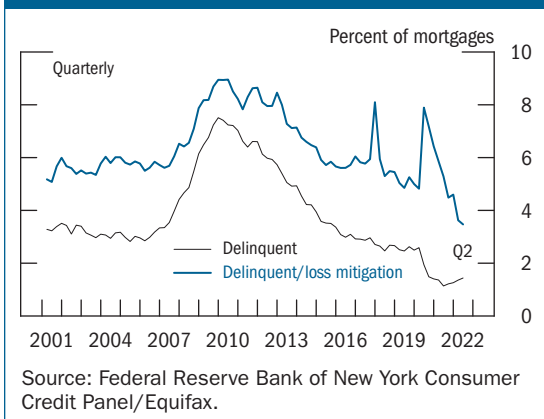
<sup>5</sup> Analysis suggests that the marked decline in the share of subprime-rated borrowers during the pandemic was in part driven by the Coronavirus Aid, Relief, and Economic Security Act forbearance provisions and thus might not reflect an improvement in the overall credit quality of households. Other contributing factors to this acceleration included income support programs. See Sarena Goodman, Geng Li, Alvaro Mezza, and Lucas Nathe (2021), “Developments in the Credit Score Distribution over 2020,” FEDS Notes (Washington: Board of Governors of the Federal Reserve System, April 30), <https://www.federalreserve.gov/econres/notes/feds-notes/developments-in-the-credit-score-distribution-over-2020-20210430.html>.

**Figure 2.10. New mortgage extensions in real terms to near-prime and subprime borrowers have been subdued**

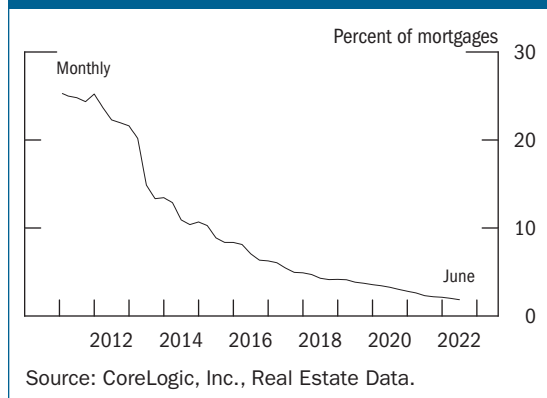


delinquency rate from a historically low level (figure 2.11). Amid continued house price growth, just 1.9 percent of mortgage borrowers had negative equity in the second quarter of 2022 (figure 2.12). However, mortgages recently originated with low down payments are subject to entering negative equity quickly if house prices decline significantly. About half of recently originated purchase mortgages have loan-to-value ratios above 90 percent, a share that has been about unchanged for the past decade. In addition, these highly leveraged mortgage originations tend to be associated with somewhat lower average borrower credit scores. Other measures of riskiness remained modest. Estimates of housing leverage when measuring home values as a function of rents and other market fundamentals increased in the first half of 2022, yet they remained significantly lower than their peak levels before 2008 (figure 2.13, black line). In addition, interest rate risk for mortgage borrowers is currently limited. The share of adjustable-rate mortgages in new home purchases rose to 10 percent in recent months but has been at or below that fraction since

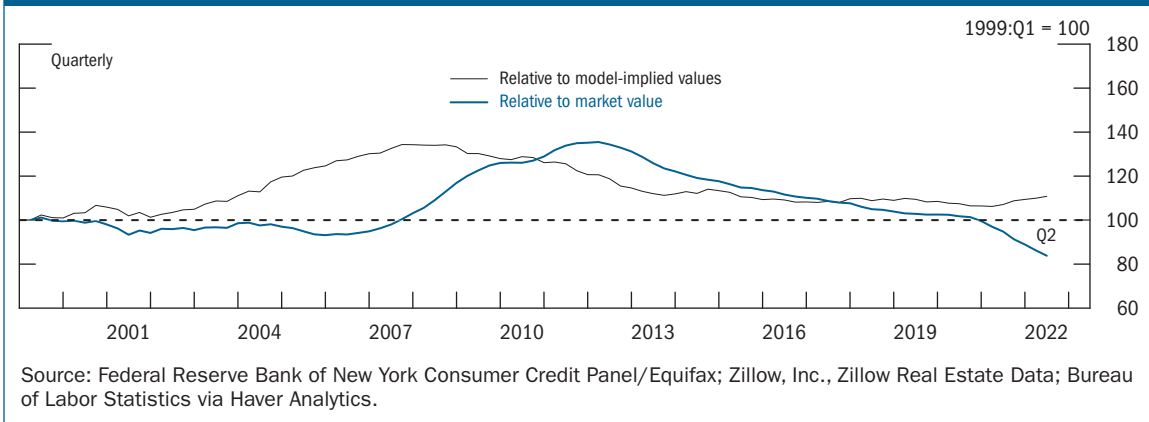
**Figure 2.11. Mortgage delinquency rates remained at historically low levels**



**Figure 2.12. Very few homeowners had negative equity in their homes**



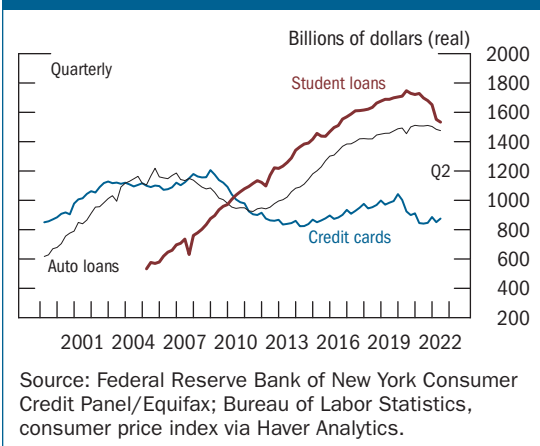
**Figure 2.13. A model-based estimate of housing leverage has remained fairly steady over the past 10 years**



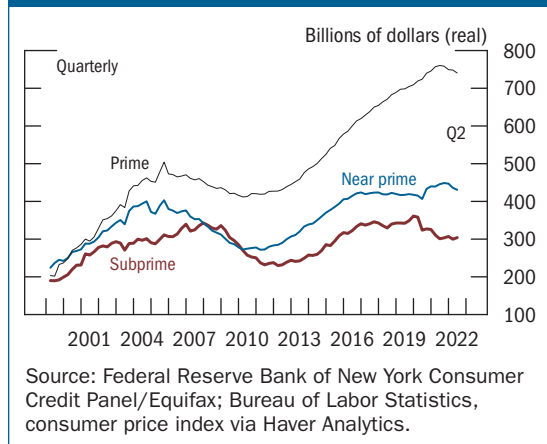
2009. Moreover, available data suggest that the nonqualified mortgage share of purchase originations edged up, albeit from extremely low levels.<sup>6</sup>

The remaining one-third of household debt was consumer credit, which consisted primarily of student loans, auto loans, and credit card debt (as shown in table 2.1). Inflation-adjusted consumer credit edged down with respect to the same time last year, as the increase in credit card debt was more than compensated for by the declines in student loan debt and auto debt (figure 2.14). The contraction in real auto loan balances was driven by declines among near-prime and prime borrowers, while balances for subprime borrowers remained about unchanged on net (figure 2.15). The

**Figure 2.14. Real consumer credit edged down on lower student loan balances**

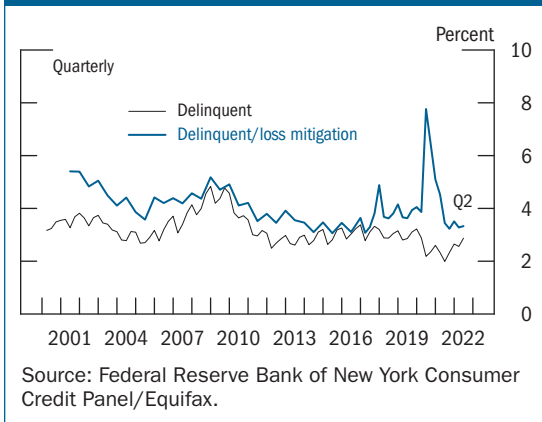


**Figure 2.15. Real auto loans outstanding fell**



<sup>6</sup> Nonqualified mortgages are mortgages that do not satisfy the Ability-to-Repay/Qualified Mortgage Rule, which requires a creditor to make a reasonable, good faith determination of a consumer’s ability to repay a residential mortgage according to its terms. For more details, see Consumer Financial Protection Bureau (2022), “What Is a Qualified Mortgage?” webpage, <https://www.consumerfinance.gov/ask-cfpb/what-is-a-qualified-mortgage-en-1789>.

**Figure 2.16. Auto loan delinquencies moved up but remained at modest levels**

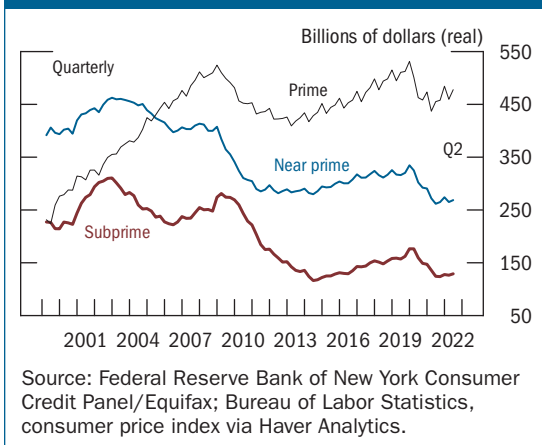


share of auto loan balances in loss mitigation continued to decline and stood at a low level, but those in delinquent status have increased significantly in the past several quarters. Still, those increases were to levels similar to the modest rates observed during most of the previous decade (figure 2.16).

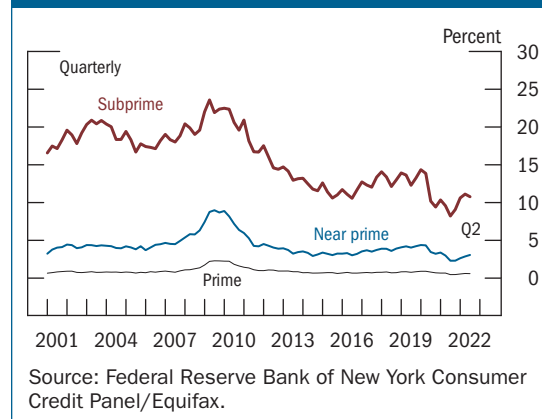
Aggregate real credit card balances increased across the credit score distribution from a year earlier, driven by double-digit nominal credit card debt growth (figure 2.17). This rapid increase was driven not only by a higher level of credit card spending among con-

sumers who pay their balances in full each month, but also by an increase in revolving balances, especially during the first half of the year. Revolving balances remained about 10 percent below pre-pandemic levels. With the rise in balances, delinquency rates started to increase from a year earlier, especially among subprime borrowers, although from historically low levels (figure 2.18).<sup>7</sup>

**Figure 2.17. Real credit card balances have increased this year, partially reversing earlier declines**



**Figure 2.18. Credit card delinquencies increased but remained at low levels**



<sup>7</sup> Securitized credit card outstanding balances amounted to \$50 billion in the second quarter of 2022, compared with \$330 billion reached during the 2007–09 financial crisis, which likely limits the effects of consumer credit delinquencies on financial stability. In addition, delinquency rates in securitized credit card pools remained lower than in the aggregate. For auto loans, securitized outstanding balances stood around \$250 billion in the second quarter of 2022, above the \$200 billion peak reached right before the 2007–09 financial crisis. That said, the current amount represents less than 20 percent of total outstanding balances, whereas it represented 25 percent before the 2007–09 financial crisis. Additionally, only \$70 billion are classified as subprime auto asset-backed securities.

After rising rapidly for over a decade, nominal student loan debt edged down in the first half of 2022 and declined significantly in inflation-adjusted terms over the same period. The decline was driven by a combination of factors, including lower loan originations; a pause on interest accumulation for most student loans; repayment; and loan discharges due to disability, school closure or misconduct, and other factors.





## 3 | Leverage in the Financial Sector

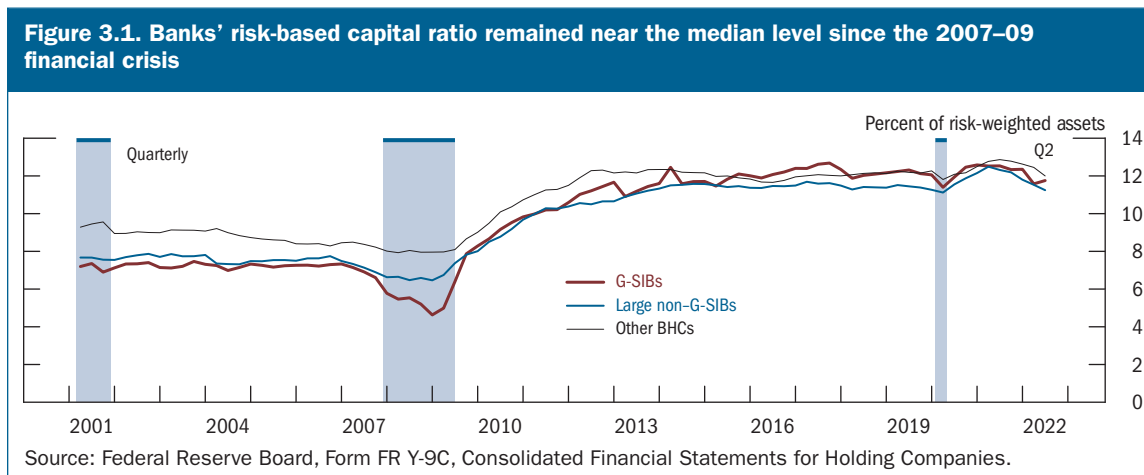
### Leverage at banks and broker-dealers remained relatively low, while leverage at some types of nonbank financial firms appeared elevated

Overall, vulnerabilities related to financial sector leverage appeared to remain moderate. Some types of nonbank financial firms operate with high leverage, and their exposures can be difficult to monitor because of limitations in existing data; these challenges raise the risk that hidden pockets of leverage could amplify adverse shocks. At the same time, the higher levels of loss-absorbing capacity in the banking sector and among broker-dealers that have prevailed since the structural reforms introduced following the 2007–09 financial crisis signal resilience in those institutions. Table 3.1 shows the sizes and growth rates of the types of financial institutions discussed in this section.

<b>Table 3.1. Size of selected sectors of the financial system, by types of institutions and vehicles</b>			
<b>Item</b>	<b>Total assets (billions of dollars)</b>	<b>Growth, 2021:Q2–2022:Q2 (percent)</b>	<b>Average annual growth, 1997–2022:Q2 (percent)</b>
Banks and credit unions	25,486	4.5	6.1
Mutual funds	17,760	–17.2	8.7
Insurance companies	11,772	–7.2	5.4
Life	8,846	–8.4	5.4
Property and casualty	2,926	–3.2	5.3
Hedge funds*	9,966	16.5	9.9
Broker-dealers**	5,066	2.5	4.9
<b>Outstanding (billions of dollars)</b>			
Securitization	12,614	8.4	5.5
Agency	11,176	7.6	6.0
Non-agency***	1,438	14.9	3.6
<p>Note: The data extend through 2022:Q2. Outstanding amounts are in nominal terms. Growth rates are measured from Q2 of the year immediately preceding the period through Q2 of the final year of the period. Life insurance companies' assets include both general and separate account assets.</p> <p>* Hedge fund data start in 2012:Q4 and are updated through 2022:Q1. Growth rates for the hedge fund data are measured from Q1 of the year immediately preceding the period through Q1 of 2022.</p> <p>** Broker-dealer assets are calculated as unnetted values.</p> <p>*** Non-agency securitization excludes securitized credit held on balance sheets of banks and finance companies.</p> <p>Source: Federal Reserve Board, Statistical Release Z.1, "Financial Accounts of the United States"; Federal Reserve Board, "Enhanced Financial Accounts of the United States."</p>			

## Bank capital remained within the range established over the past decade

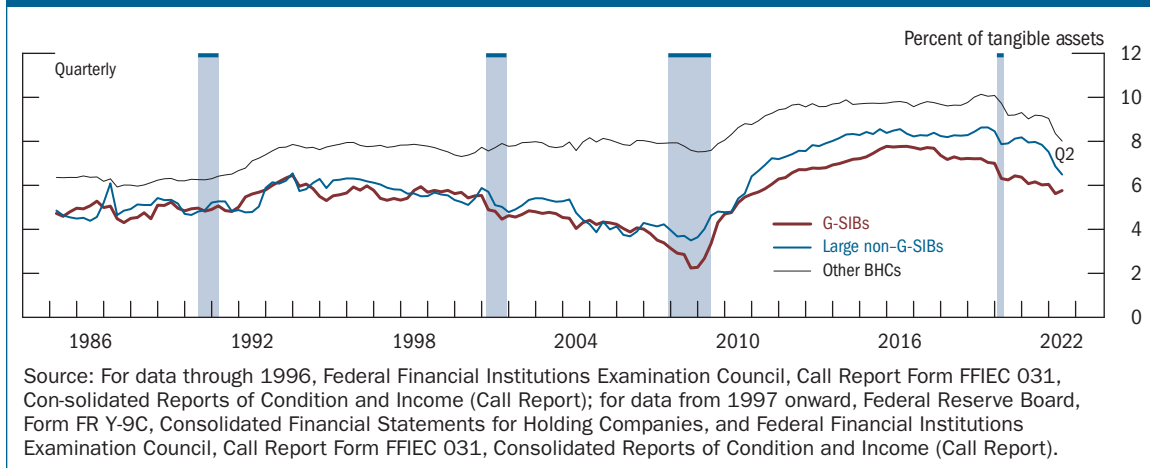
The aggregate common equity tier 1 ratio (CET1)—a regulatory risk-based measure of bank capital adequacy—declined slightly in the second quarter of 2022 and stood close to the average that has prevailed since the end of the 2007–09 financial crisis. Regarding the largest banks, global systemically important banks’ (G-SIBs) risk-based capital measures slightly reversed earlier declines in the second quarter of 2022 (figure 3.1). The results of the 2022 stress test indicate that large banks would maintain capital ratios well above the minimum risk-based requirements even during a substantial economic downturn. Moreover, the features of this year’s severely adverse scenario resulted in larger required capital buffers for several large U.S. banks that took effect at the start of the fourth quarter of 2022. Three G-SIBs have seen an increase in their G-SIB surcharges for 2023—that is, the amount of capital G-SIBs must hold in excess of their minimum capital requirements and stress capital buffers. To meet these higher regulatory capital requirements, G-SIBs have started to reduce their risk-weighted assets, and some have also announced pauses in their respective stock repurchase programs to bolster retained earnings. Relatedly, bank profitability continued to be healthy in the second quarter of 2022, in line with pre-pandemic levels and broadly unchanged from the previous quarter. Strong profitability bolsters banks’ resiliency, as retained earnings are the most straightforward way for banks to boost their capital position.



The ratio of tangible common equity to tangible assets—a measure of bank capital adequacy that treats all assets as equally risky and excludes intangible items such as goodwill from both capital and total assets—is lower compared with the beginning of the year, and the industry-wide average now stands just below the median of its historical distribution (figure 3.2). This decline was driven in part by a mix of robust balance sheet expansion earlier in the year and a substantial drop in tangible equity from unrealized losses on securities in the available-for-sale (AFS) portfolio as a

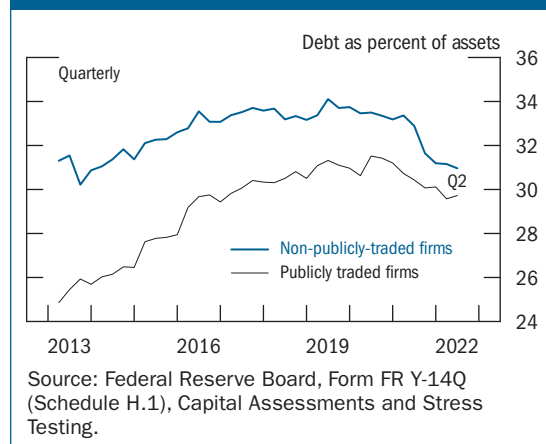
result of increases in interest rates.<sup>8</sup> Some large banks, including all G-SIBs, also must reflect the decline in market value on their AFS portfolio in their CET1 regulatory capital ratio, however smaller banks are not obligated to do so.<sup>9</sup>

**Figure 3.2. The ratio of common equity to tangible assets has decreased this year**



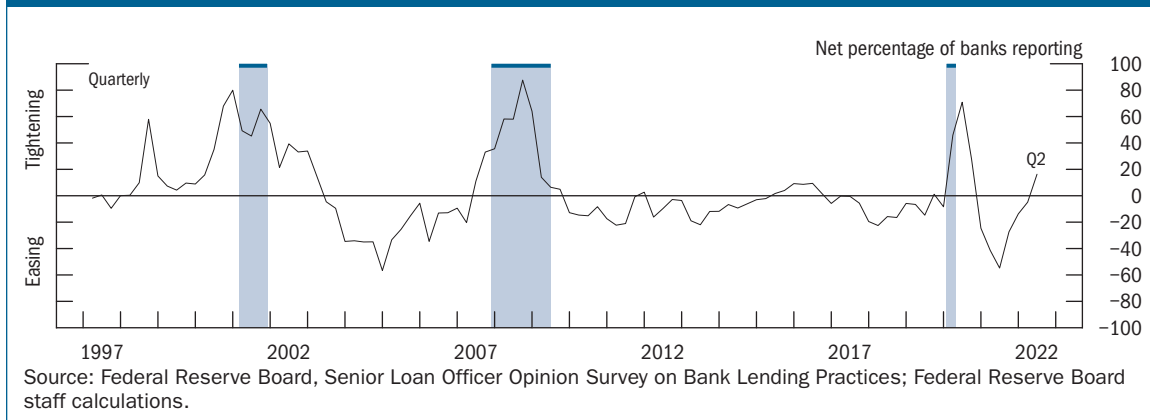
Banks' vulnerability to future credit losses appears to be moderate. As noted in Section 2, aggregate credit quality in the nonfinancial sector remained strong. Borrower leverage for bank commercial and industrial (C&I) loans continued to trend downward relative to the start of the year (figure 3.3). Moreover, according to data from the July 2022 SLOOS, banks indicated a recent tightening of lending standards for C&I (figure 3.4) and CRE (as shown in figure 1.14) loans.

**Figure 3.3. Borrower leverage for bank commercial and industrial loans continued to trend down**



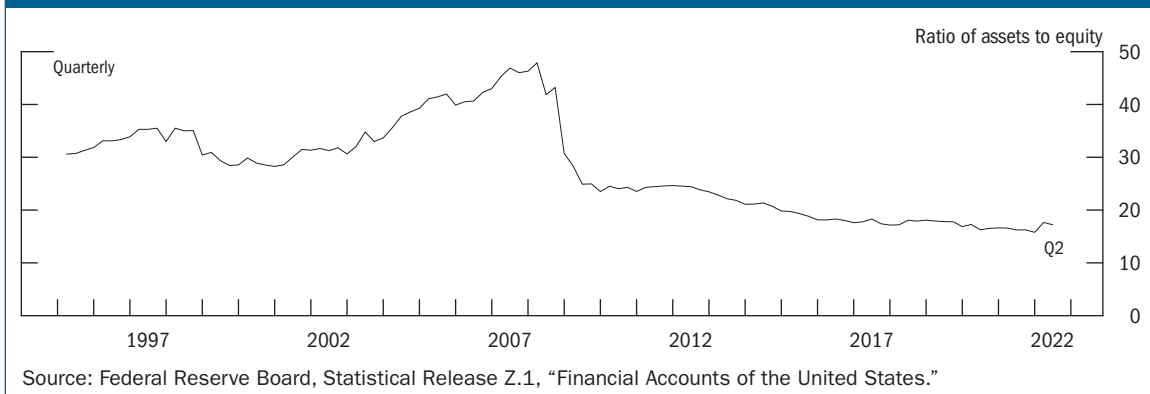
<sup>8</sup> In contrast to securities held in AFS portfolios, banks have the option to book securities that they intend to own until their maturity in hold-to-maturity portfolios. These portfolio holdings do not get marked to market, and thus changes in their valuations do not alter their capital ratios. However, in a rising rate environment, the value of banks' deposit franchise increases and provides a buffer against these unrealized losses that is also not captured by Generally Accepted Accounting Principles.

<sup>9</sup> Category 1 and category 2 banks are not allowed to opt out of including accumulated other comprehensive income for capital calculation and therefore have to include changes in value of AFS securities in CET1. In contrast, category 3 and category 4 banks are not obligated to include changes in the value of their securities portfolio in CET1; as such, changes in securities prices do not affect their CET1 capital ratios. See a visual representation of the Federal Reserve's tailoring rules at <https://www.federalreserve.gov/aboutthefed/boardmeetings/files/tailoring-rule-visual-20191010.pdf>.

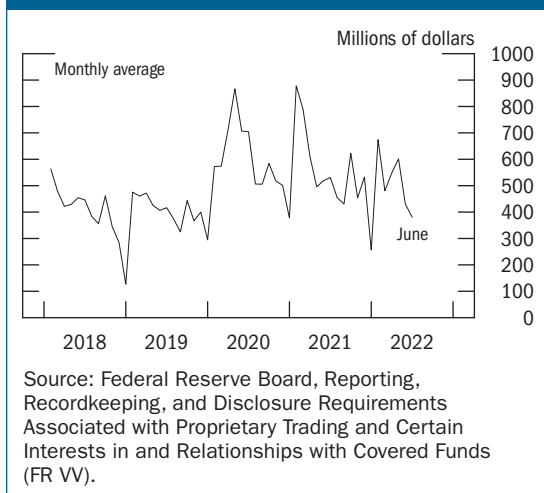
**Figure 3.4. Lending standards for bank commercial and industrial loans have tightened**

### Leverage at broker-dealers stayed at historically low levels

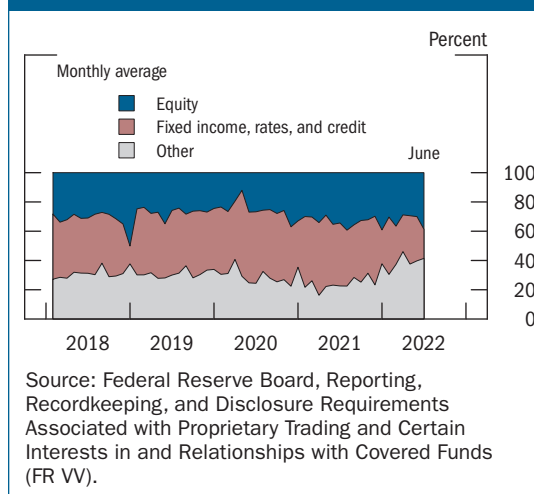
Broker-dealer leverage ratios remained near their recent historically low levels (figure 3.5). Dealers' equity growth has generally kept up with the growth of their assets, boosted in part by strong trading profits since March 2020 amid heightened market volatility (figures 3.6 and 3.7). Net secured borrowing of primary dealers edged higher since the May 2022 *Financial Stability Report* but remained near the bottom of its range, while gross financing and borrowing has changed little. Primary dealer Treasury market activities, including market making and repo, remained largely flat over the year, even as the amount of outstanding Treasury securities available to investors continued to increase. As the gap between dealer market activity and the total amount of Treasury securities held by investors continues to grow, there may be increased vulnerabilities associated with dealers' reduced willingness or ability to accommodate a surge in intermediation demand during market stress.

**Figure 3.5. Leverage at broker-dealers remained historically low**

**Figure 3.6. Profitability of trading operations has been elevated amid post-pandemic volatility**



**Figure 3.7. Share of trading profits by trading desks**



Dealer respondents from the June and September Senior Credit Officer Opinion Survey on Dealer Financing Terms (SCOOS) indicated that they had, on net, tightened the terms associated with securities financing and over-the-counter derivatives transactions, particularly for hedge funds and trading real estate investment trusts.<sup>10</sup> In response to a set of special questions about client trading activity and terms offered to their clients for cleared and uncleared commodity derivatives, respondents indicated that price and nonprice terms have tightened since the beginning of the year for both financial and nonfinancial clients that engage in commodity derivatives trading, consistent with heightened commodity price volatility.

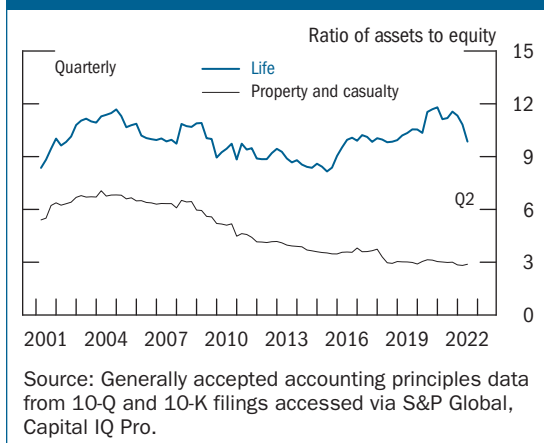
## Leverage in parts of the nonbank financial sector appears to be above average and can be difficult to assess

Vulnerability to leverage among the various categories of nonbank financial firms varies considerably. Leverage at property and casualty (P&C) insurers remained at historically low levels but declined to near the middle of its historical distribution at life insurance companies. While comprehensive measures of hedge fund leverage remained somewhat above their historical averages, these measures are only available with a considerable lag. More generally, leverage at many types of NBFIs can be difficult to measure or monitor in a timely way with available data. These gaps raise the risk that such firms are using leveraged positions, which could amplify adverse shocks, especially if they are financed with short-term funding.

<sup>10</sup> The SCOOS is available on the Federal Reserve's website at <https://www.federalreserve.gov/data/scoos.htm>.

## Leverage at life insurance companies decreased this year to the middle of its historical distribution

**Figure 3.8. Leverage at life insurance companies decreased this year to the middle of its historical distribution**

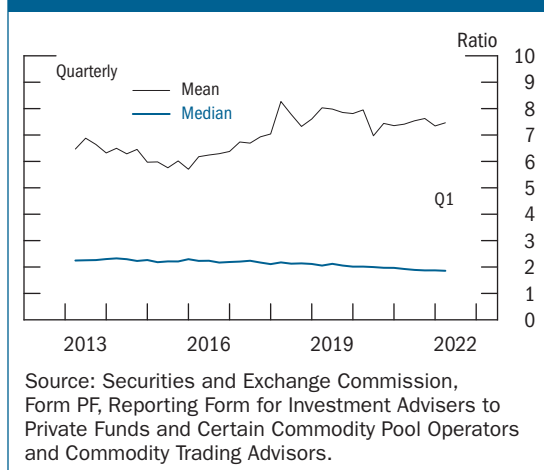


Leverage at life insurers has decreased since the previous *Financial Stability Report* to the middle of its historical distribution (figure 3.8). However, these insurers continued to increase the share of assets allocated to risky instruments—in particular, to high-yield corporate bonds, investment-grade privately placed corporate bonds, and alternative investments—which leaves insurers’ capital positions vulnerable to sudden increases in default risk. The upward trend in the proportion of risky assets became steeper after the beginning of the pandemic. Rising interest rates likely have a positive effect on the profitability of life insurers, as their liabilities

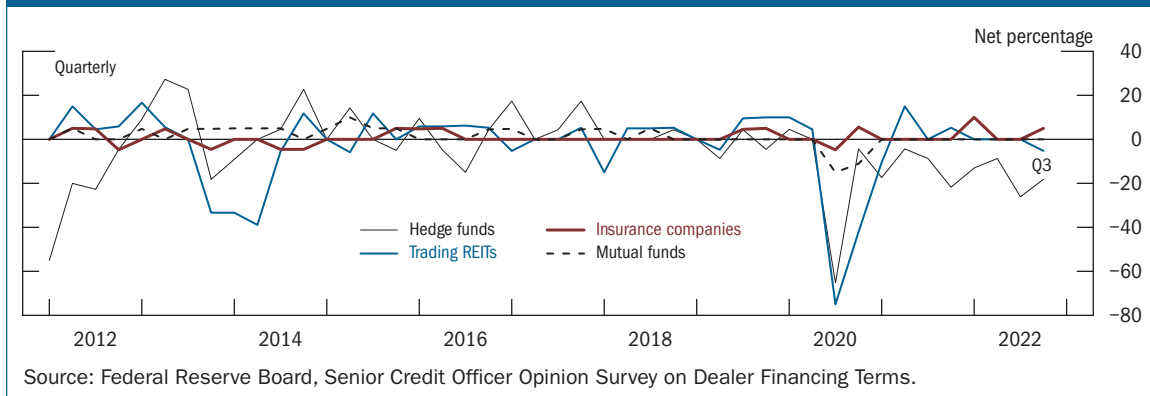
generally have had longer effective durations than their assets. However, an unexpected and sharp surge in interest rates may induce policyholders to surrender their contracts at a higher-than-expected rate, potentially causing some funding strains. Meanwhile, leverage at P&C insurers remained low relative to historical levels.

## Hedge fund leverage continued to be somewhat elevated

**Figure 3.9. Leverage at hedge funds remained elevated**

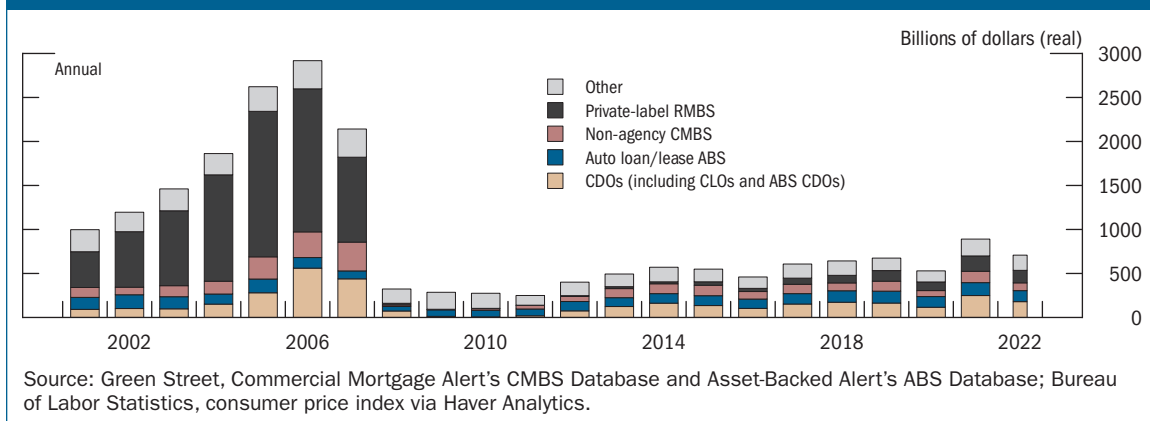


Comprehensive measures of hedge fund leverage, based on confidential data collected by the Securities and Exchange Commission, suggest that, in the first quarter of 2022, both on-balance-sheet leverage and gross leverage, which includes off-balance-sheet derivatives exposures, remained above their historical averages (figure 3.9). However, moderate net fractions of primary dealer survey respondents in the June and September 2022 SCOOS indicated that the use of hedge fund leverage had decreased between mid-February and mid-August amid tighter price and nonprice borrowing terms (figure 3.10).

**Figure 3.10. But leverage at some hedge funds reportedly decreased recently**

## Issuance of non-agency securities by securitization vehicles has slowed

After robust issuance in 2021 and in the first few months of 2022, non-agency securitization issuance—which contributes to the amount of leverage in the financial system—slowed significantly (figure 3.11).<sup>11</sup> Reportedly, overall investor demand for non-agency securitized products has declined somewhat this year, driven in part by a pullback by U.S. banks and open-end bond funds

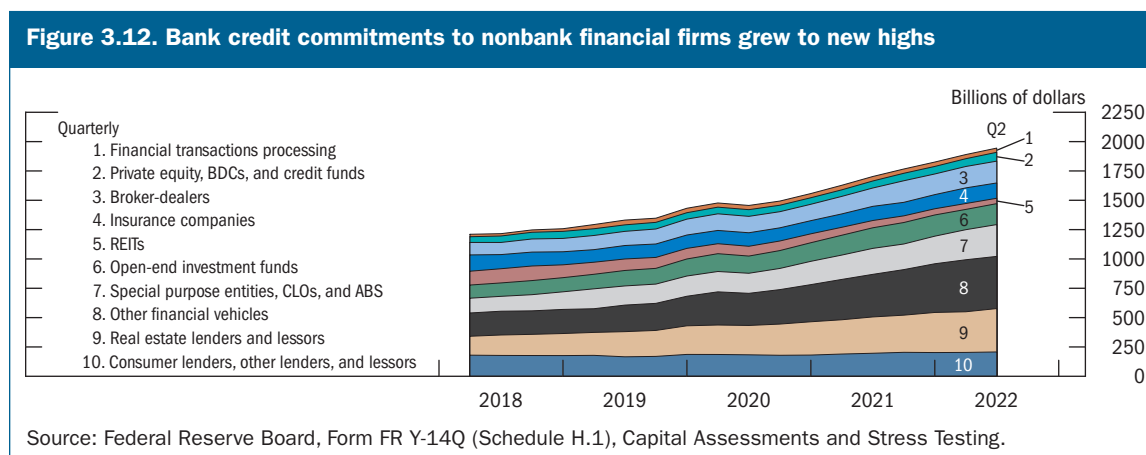
**Figure 3.11. Issuance of non-agency securitized products slowed significantly this year**

<sup>11</sup> Securitization allows financial institutions to bundle loans or other financial assets and sell claims on the cash flows generated by these assets as tradable securities, much like bonds. By funding assets with debt issued by investment funds known as special purpose entities (SPEs), securitization can add leverage to the financial system, in part because SPEs are generally subject to regulatory regimes, such as risk retention rules, that are less stringent than banks' regulatory capital requirements. Examples of the resulting securities include collateralized loan obligations (CLOs) (predominantly backed by leveraged loans), asset-backed securities (often backed by credit card and auto debt), commercial mortgage-backed securities, and residential mortgage-backed securities.

as well as regulatory capital considerations affecting demand from insurance companies.<sup>12</sup> Most securitization sectors exhibit relatively stable credit performance, indicated by low loan delinquency or default rates compared with historical long-term averages.

## Bank lending to nonbank financial institutions continued to grow rapidly

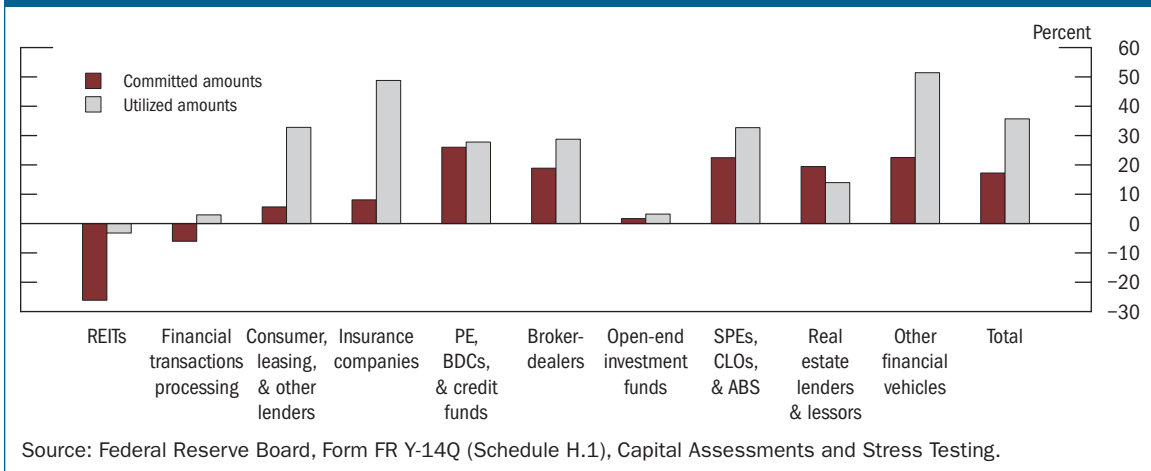
Bank lending to NBFIs, which can be informative about the amount of leverage used by NBFIs and shed light on their interconnectedness with the rest of the financial system, continued to increase notably. Banks' credit commitments to NBFIs have grown rapidly in recent years, having reached a new high of almost \$2 trillion in the second quarter of 2022 (figure 3.12). This increase was broad based and most pronounced in the category of private equity, business development companies, and credit funds. The size of unused credit lines provided by banks has proven manageable even as utilized amounts of revolving credit lines have grown notably over the past year (figure 3.13). Delinquency rates on banks' exposure to NBFIs have been lower than rates for the nonfinancial business sector since the data became available in 2013. However, the limited information we have on NBFIs' alternative funding sources, and the extent to which these sources may be fragile, could contribute to increased vulnerabilities in the financial sector.



<sup>12</sup> In 2021, a regulatory capital rule change implemented in the National Association of Insurance Commissioners (NAIC) capital treatment for insurance company investments divides the existing capital treatment framework into more granular categories. The new capital rules changed requirements minimally for triple-A-rated tranches but increased capital requirements notably for more junior tranches.



**Figure 3.13. Loan commitments grew and utilization rates increased in many sectors over the past year**





## 4 | Funding Risks

### Funding risks at domestic banks are low, but structural vulnerabilities persist in other sectors that engage in liquidity transformation

Over the past year, the total dollar amount of aggregate financial system liabilities that are vulnerable to runs increased 2.9 percent to \$19.1 trillion, equivalent to about 77 percent of nominal GDP (table 4.1 and figure 4.1).<sup>13</sup> The large banks that are subject to the liquidity coverage ratio (LCR) continued to maintain levels of high-quality liquid assets (HQLA) that suggest that their liquid resources would be sufficient to meet redemptions during periods of stress, and their reliance on short-term wholesale funding remains low.

Item	Outstanding/total assets (billions of dollars)	Growth, 2021:Q2-2022:Q2 (percent)	Average annual growth, 1997-2022:Q2 (percent)
Total runnable money-like liabilities*	19,080	2.9	4.9
Uninsured deposits	7,887	7.0	12.3
Domestic money market funds**	4,522	-3	5.5
Government	4,007	1.5	15.9
Prime	419	-15.6	-1.2
Tax exempt	97	2.3	-2.8
Repurchase agreements	3,525	-9	5.0
Commercial paper	1,091	.1	2.4
Securities lending***	800	16.6	7.1
Bond mutual funds	4,565	-12.9	9.0

Note: The data extend through 2022:Q2. Outstanding amounts are in nominal terms. Growth rates are measured from Q2 of the year immediately preceding the period through Q2 of the final year of the period. Total runnable money-like liabilities exceed the sum of listed components. Items not included in the table are variable-rate demand obligations, federal funds, funding-agreement-backed securities, private liquidity funds, offshore money market funds, short-term investment funds, local government investment pools, and stablecoins.

\* Average annual growth is from 2003:Q1 to 2022:Q2.

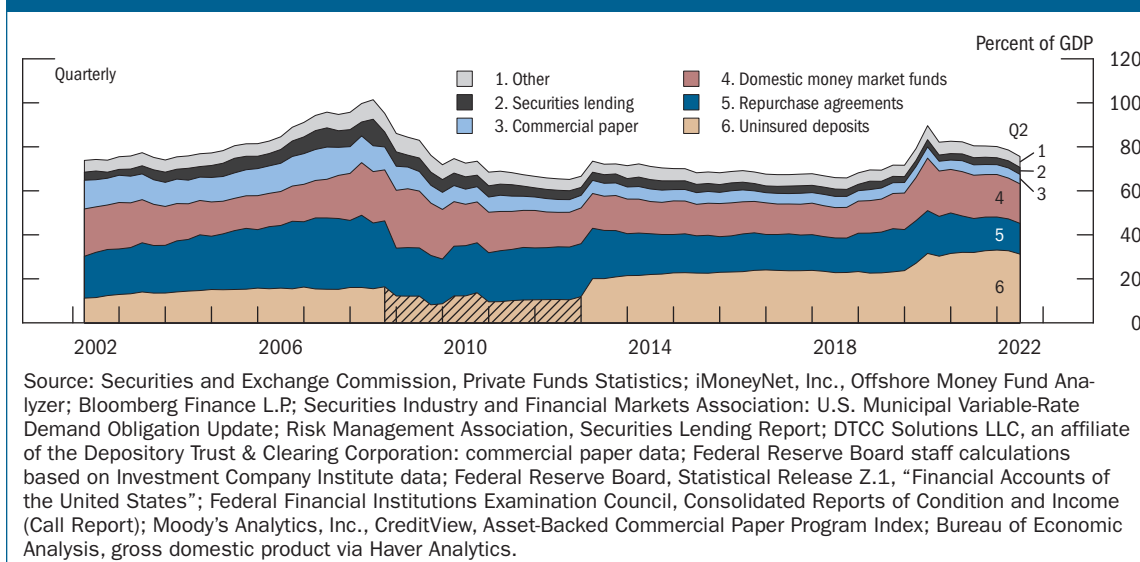
\*\* Average annual growth is from 2001:Q1 to 2022:Q2.

\*\*\* Data through 2022:Q1. Average annual growth is from 2000:Q1 to 2022:Q1.

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 Measures" (M3 monetary aggregate, 1997-2001); 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.

<sup>13</sup> Table 4.1 and figure 4.1 do not include stablecoins.

**Figure 4.1. Runnable money-like liabilities as a share of GDP edged down a touch but remained above its historical median**

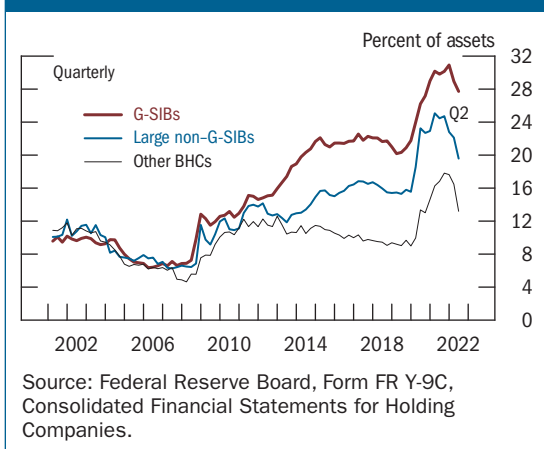


Prime and tax-exempt MMFs as well as other cash-investment vehicles remain vulnerable to runs, and some of these vehicles maintain stable net asset values (NAVs) that make them particularly susceptible to sharp increases in interest rates. Some open-end bond mutual funds continued to be susceptible to large redemptions because they hold assets that can become illiquid amid stress while promising shareholders the right to redeem their shares every day. The market capitalization of the stablecoin sector continued to decline after falling sharply earlier in the year, and the sector remains vulnerable to liquidity risks similar to those of cash-like vehicles. As market volatility persists, CCPs have maintained prefunded resources at high levels. Although CCPs' variation margin requirements have remained elevated, particularly for interest rate swaps, to date participants have continued to meet their margin calls.

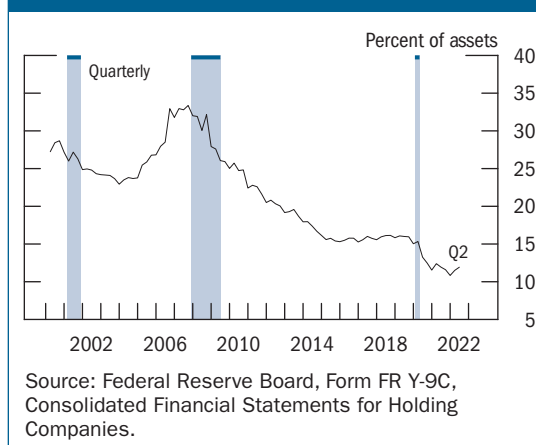
### **Banks maintained high levels of liquid assets and stable funding**

The amount of HQLA held by banks has declined, and its composition has shifted away from central bank reserves (figure 4.2). However, banks' LCRs—the requirement whereby large banks must hold an amount of HQLA to fund cash outflows for 30 days—continue to suggest that banks have the liquidity resources to meet potential redemptions during periods of stress. These LCRs have been stable despite the declines in HQLA, in part because larger banks have seen a slight decline in institutional deposits, which are part of the denominator of the ratio and may be more sensitive to the significant widening in the spread between deposit rates and short-term market rates in recent months. Banks' reliance on short-term wholesale funding, another factor in the LCR denominator, also has remained low (figure 4.3).

**Figure 4.2. The amount of high-quality liquid assets held by banks has declined but remained high**



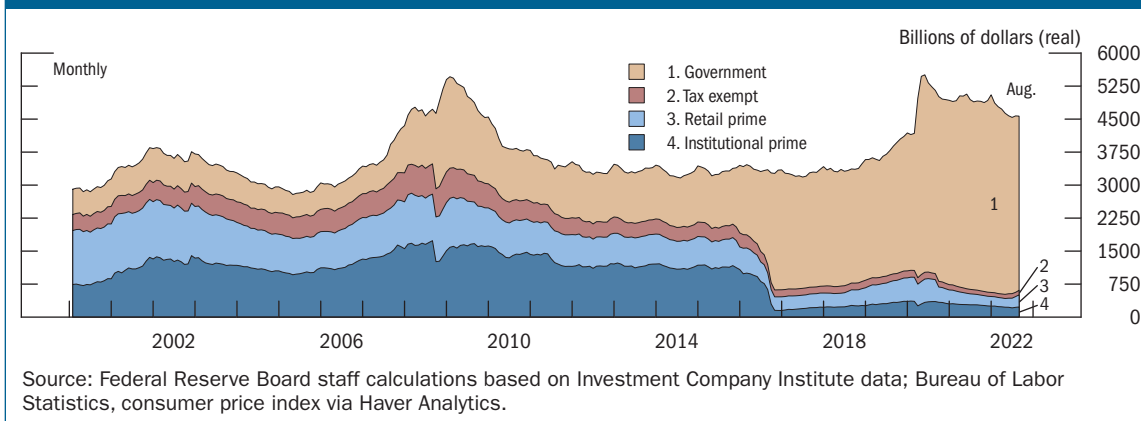
**Figure 4.3. Reliance on short-term wholesale funding remained low**



### Structural vulnerabilities remained at some money market funds and other cash-management vehicles

Prime and tax-exempt MMFs remain a prominent systemic vulnerability because of their susceptibility to runs and the significant role they continue to play in short-term funding markets. Since the May report, prime MMF assets under management (AUM) have grown 23 percent to approximately \$510 billion, with growth concentrated in retail prime funds, which offer investors a stable NAV (figure 4.4). Growth in prime MMFs likely reflects faster increases in their yields relative to the yields of other MMFs and deposit rates, as short-term interest rates have risen. However, the AUM in this category remained well below its pre-pandemic level. Government MMFs’ AUM were little changed over the period.

**Figure 4.4. Growth in money market funds was concentrated in retail prime funds**



Other cash-management vehicles, including dollar-denominated offshore funds and short-term investment funds, also invest in money market instruments and are vulnerable to runs. Since the May report, the aggregate AUM of these cash-management vehicles has held steady at about \$1.3 trillion. Currently, between \$500 billion and \$1.3 trillion of these vehicles' AUM are in portfolios similar to those of U.S. prime MMFs, and large redemptions from these vehicles also have the potential to destabilize short-term funding markets.

In addition, many cash-management vehicles—including retail and government MMFs, offshore MMFs, and short-term investment funds—seek to maintain stable NAVs that are typically rounded to \$1.00. When short-term interest rates rise sharply or portfolio assets lose value for other reasons, the market values of these funds may fall below their rounded share prices, which can put the funds under strain, particularly if they also have large redemptions.

### **Stablecoins remained vulnerable to runs**

The market capitalization of stablecoins—digital assets that are designed to maintain a stable value relative to a national currency or other reference assets—has fallen 7 percent to \$143 billion since the previous *Financial Stability Report*, after exhibiting a much larger decline earlier in the year following the collapse of TerraUSD, which led to investor outflows and declines in coin value (see the box “[Digital Assets and Financial Stability](#)”).

Although the market capitalization of stablecoins is still relatively small and stablecoins are currently not widely used as a cash-management vehicle by institutional or retail investors, they are an important vehicle for digital assets investors. Some stablecoins have structural vulnerabilities that mirror those of cash-like vehicles that engage in liquidity transformation and hold risky assets, like certain MMFs. Specifically, stablecoins are susceptible to runs if there are widespread redemption demands by coin holders, and are vulnerable to risks from liquidity and maturity transformation due to holdings of reserve assets that may become illiquid or lose value amid stress or increases in interest rates. Stablecoins' holdings of riskier reserve assets, such as commercial paper and other short-term instruments, have reportedly diminished. Notably, however, the lack of transparency regarding their asset holdings could exacerbate the effects of their vulnerabilities on financial stability through spillovers to other cash-management vehicles that participate in these markets.

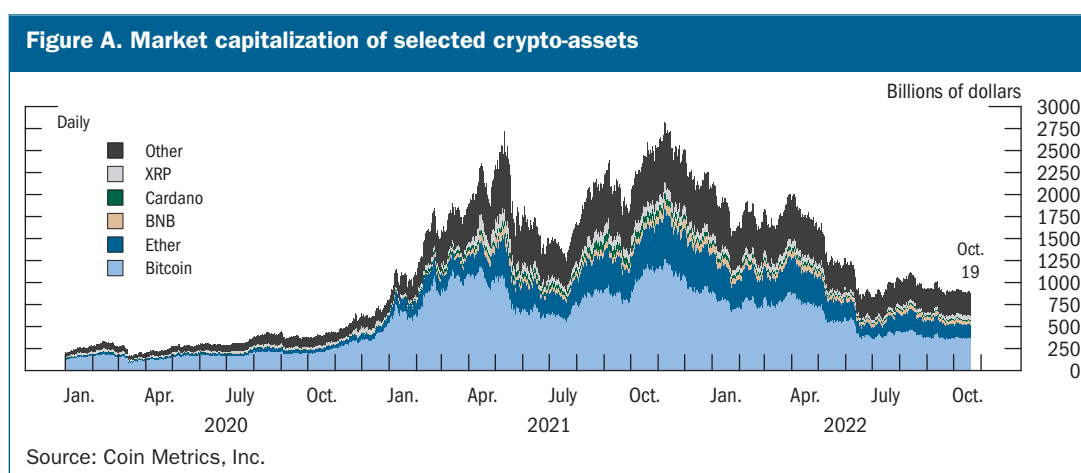
### **Bond mutual funds experienced outflows and remained exposed to liquidity and interest rate risks**

Mutual funds that invest substantially in corporate bonds, municipal bonds, and bank loans may be particularly exposed to liquidity transformation risks, given the relative illiquidity of their assets and the requirement that these funds offer redemptions daily.

## Box 4.1. Digital Assets and Financial Stability

Activities in the digital assets ecosystem can pose challenges to financial stability.<sup>1</sup> Digital assets may offer a host of useful innovations and products. The events of the past few months, however, suggest that the ecosystem faces similar vulnerabilities and risks to those that can occur in traditional finance, including runs, excessive leverage, operational risk, opacity, and fraud. Acting now to promote an appropriate regulatory environment for the digital assets ecosystem will help support responsible innovation while preserving financial stability.

Speculation and risk appetite appear to be the primary driving forces of crypto-asset prices, which have recorded big swings in recent years. Figure A shows the market capitalization of selected crypto-assets (excluding stablecoins), which is currently about 69 percent below its November 2021 peak.



Stablecoins have also experienced significant volatility over the past year, including, in certain cases, runs. TerraUSD was a stablecoin with market capitalization of about \$18 billion before its collapse in May 2022. TerraUSD largely lacked assets to back its value, and, as with many other stablecoins, its demand was mainly driven by the return that investors could earn. Amid a reduction in lending rates earned by TerraUSD holders in the months before May and temporary liquidity shortages, concerns about the stability of TerraUSD precipitated a run and a complete collapse within days. Both the market capitalization of TerraUSD and of the whole Terra blockchain, including its governance token Luna, were wiped out.<sup>2</sup> The collapse of the Terra blockchain was followed by strains throughout the digital assets ecosystem, highlighting vulnerabilities and interconnections in the space. Several entities that had direct exposures to TerraUSD or were engaged in speculative bets on other crypto-assets found themselves in financial distress, sometimes leading to bankruptcy. The events surrounding TerraUSD may

(continued)

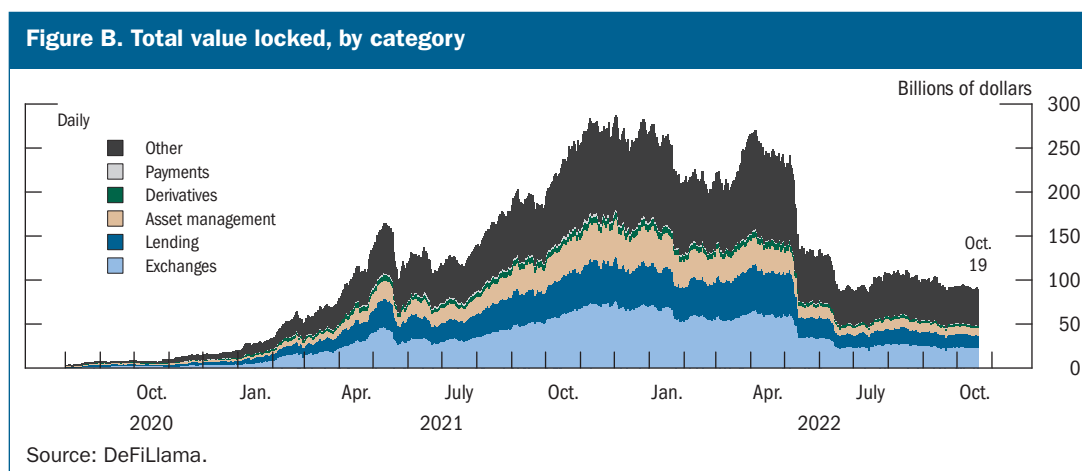
<sup>1</sup> Digital assets, such as crypto-assets and stablecoins, are an electronic representation of value and operate as part of a complex and interconnected digital ecosystem. Crypto-assets are digital assets that use cryptographic techniques to prove ownership. The crypto-assets with the largest market capitalization, like Bitcoin or Ether, are not designed to maintain a stable value. Stablecoins are digital assets that also aim to maintain a stable value relative to a reference asset—typically the U.S. dollar. For a thorough review, see Pablo D. Azar, Garth Baughman, Francesca Carapella, Jacob Gerszten, Arazi Lubis, JP Perez-Sangimino, David E. Rapoport, Chiara Scotti, Nathan Swem, Alexandros Vardoulakis, and Aurite Werman (2022), “The Financial Stability Implications of Digital Assets,” Finance and Economics Discussion Series 2022-058 (Washington: Board of Governors of the Federal Reserve System, August), <https://doi.org/10.17016/FEDS.2022.058>.

<sup>2</sup> A governance token acts as a decentralized governance body to vote on the direction of a blockchain project or for resetting specific parameters.

### Box 4.1—continued

have also triggered a temporary loss of confidence in another stablecoin, Tether, which briefly traded significantly below its peg. The market capitalization of stablecoins has declined about 22 percent since its peak in April 2022, with almost half of the decline corresponding to the collapse of TerraUSD.

The aftermath of the turmoil that started in May has also severely curtailed the activity in decentralized finance (DeFi) protocols.<sup>3</sup> As shown in figure B, the total value locked in various DeFi protocols has substantially declined, having dropped about 72 percent from its November 2021 peak.<sup>4</sup>



The turmoil in the digital assets ecosystem did not have notable effects on the traditional financial system because the digital assets ecosystem does not provide significant financial services and its interconnections with the broader financial system are limited. The digital assets ecosystem, however, could grow rapidly and increase its connections to the traditional financial system. Spillovers from runs on stablecoins represent the most salient financial stability risk, particularly for those stablecoins backed by traditional money market instruments. Enforcing existing regulation, expanding the regulatory perimeter, and addressing regulatory gaps are essential. The FSOC's *Report on Digital Asset Financial Stability Risks and Regulation*, published in October 2022, has several recommendations along these lines.<sup>5</sup>

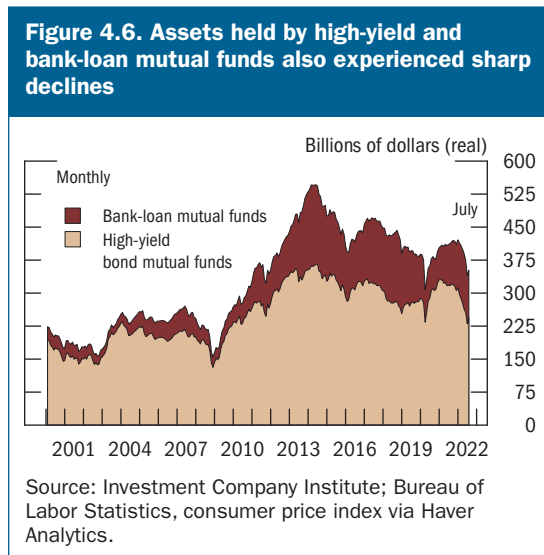
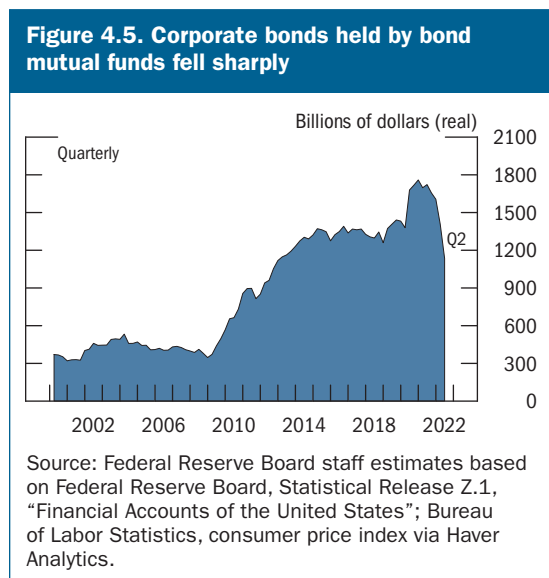
<sup>3</sup> DeFi protocols generally refers to open-source code running on open-access blockchains that aim to provide financial products without traditional financial intermediaries.

<sup>4</sup> Total value locked is the overall value of assets committed to a DeFi protocol. This metric includes governance tokens staked in the protocol, staked tokens where one of the coins in the pair is the governance token, and borrowed coins in lending protocols. Certain tokens are double counted across protocols.

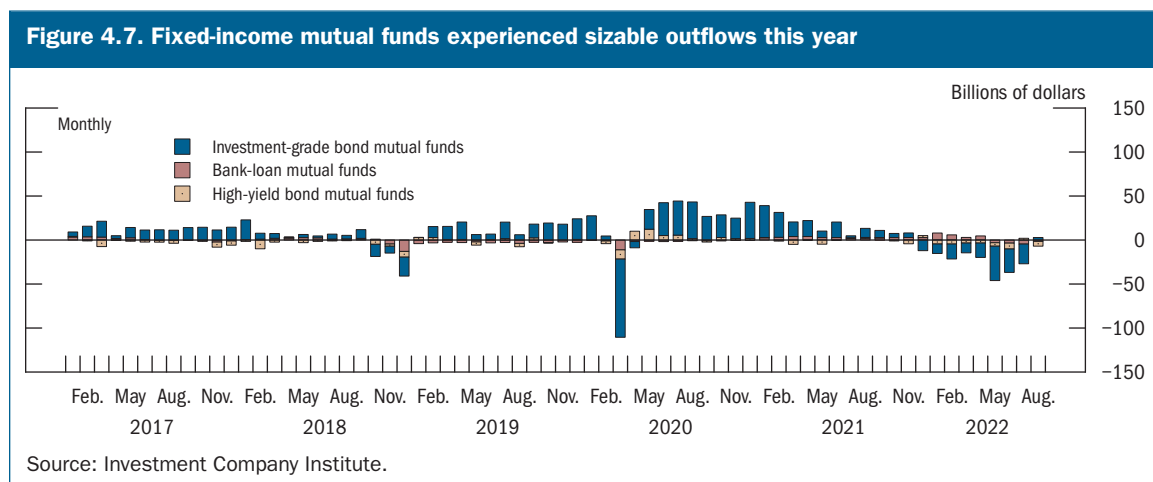
<sup>5</sup> See Financial Stability Oversight Council (2022), *Report on Digital Asset Financial Stability Risks and Regulation* (Washington: FSOC, October), <https://home.treasury.gov/system/files/261/FSOC-Digital-Assets-Report-2022.pdf>.



Total outstanding amounts of U.S. corporate bonds held by mutual funds fell to its lowest level since 2013 on an inflation-adjusted basis, primarily driven by a drop in valuations (figure 4.5). The fraction of mutual fund holdings of corporate bonds was approximately 13 percent of all U.S. corporate bonds outstanding. Total AUM at high-yield and bank-loan mutual funds, which primarily hold riskier and less liquid assets, also has decreased sharply in real terms so far in 2022 (figure 4.6).



In general, fixed-income mutual funds typically sustain losses when interest rates rise, and they have experienced negative returns and sizable outflows most of this year (figure 4.7). These funds remain susceptible to sharp increases in rates because their interest rate risk, as measured by the duration of their bond holdings, has reached its highest level since at least 2005.

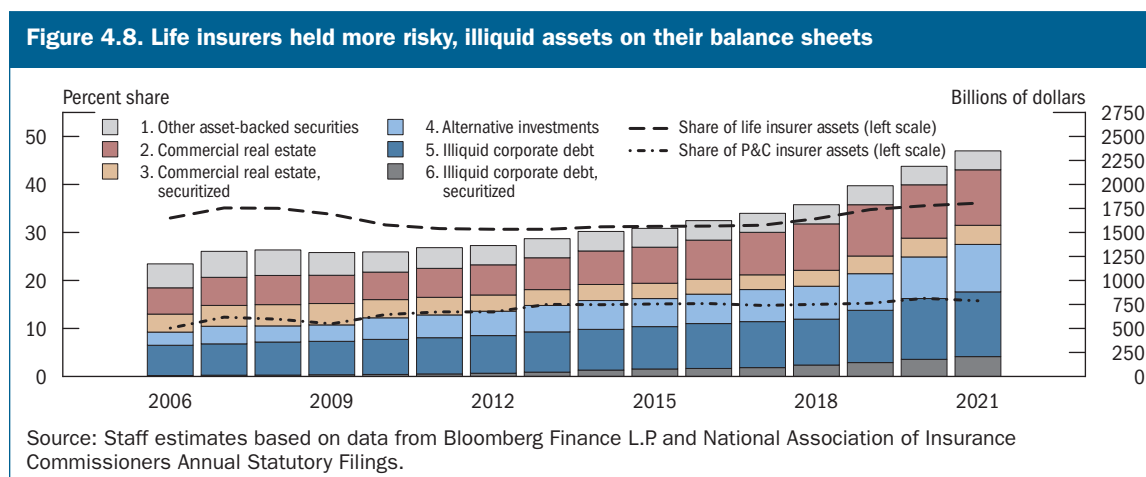


## Central counterparties' prefunded resources remained elevated amid high market volatility

CCPs continue to effectively manage increased risks and have maintained prefunded resources at elevated levels after increasing their resource requirements in the first quarter of 2022, following the general increase in market volatility.<sup>14</sup> Variation margin calls on clearing members have remained high amid persistent broad market volatility, but the driver of the largest liquidity needs has shifted toward rate-related exposures and away from commodity-related ones. Clearing members have been able to meet their margin calls; however, looking ahead, some clients—particularly clients with directional exposure to rates—may need to increase their access to liquidity resources to avoid having to unwind positions. In addition, concerns remain around the concentration of clients at the largest clearing members even as some clients reduce their hedging activity because of increased funding costs.

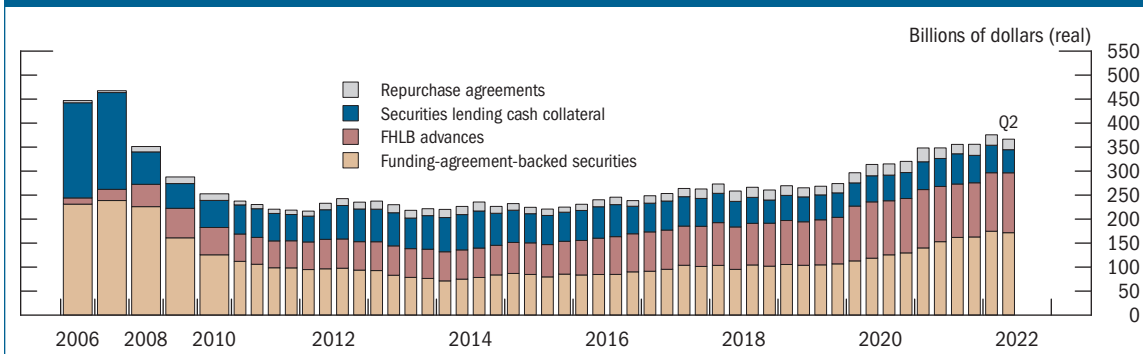
## Liquidity risks at life insurers continued to increase

Over the past decade, the liquidity of life insurers' assets declined, and the liquidity of their liabilities increased, potentially making it more difficult for life insurers to meet a sudden rise in withdrawals and other claims. Life insurers increased the share of illiquid assets—including CRE loans, less liquid corporate debt, and alternative investments—on their balance sheets (figure 4.8). In addition, they continued to rely on nontraditional liabilities, such as funding-agreement-backed securities, Federal Home Loan Bank advances, and cash received through repurchase agreements and securities lending transactions (figure 4.9).



<sup>14</sup> Prefunded resources represent financial assets, including cash and securities, transferred by the clearing members to the CCP to cover that CCP's potential credit exposure in case of default by one or more clearing members. These prefunded resources are held as initial margin and prefunded mutualized resources.

**Figure 4.9. Life insurers' reliance on nontraditional liabilities trended higher**



Source: Bureau of Labor Statistics, consumer price index via Haver Analytics; Moody's Analytics, Inc., CreditView, Asset-Backed Commercial Paper Program Index; Securities and Exchange Commission, Forms 10-Q and 10-K; National Association of Insurance Commissioners, quarterly and annual statutory filings accessed via S&P Global, Capital IQ Pro; Bloomberg Finance L.P.



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## 5 | Near-Term Risks to the Financial System

The Federal Reserve routinely engages in discussions with domestic and international policy-makers, academics, community groups, and others to gauge the set of risks of greatest concern to these groups. As noted in the box “[Survey of Salient Risks to Financial Stability](#),” in one recent outreach, contacts were particularly focused on persistent inflation and monetary tightening by central banks around the world, energy prices, and geopolitical tensions.

The following discussion considers possible interactions of existing vulnerabilities with several potential near-term risks. The box “[International Risks and U.S. Financial Stability](#)” describes several international risks that could spill over to the U.S. financial system.

### **Unexpectedly and persistently high inflation and higher interest rates could pose risks to the economy and the financial system**

Rising inflation and higher interest rates worldwide have been a significant drag on the global economy this year. In the United States, interest rates could increase beyond levels currently expected and U.S. economic activity could slow substantially if inflationary pressures prove to be more stubborn than anticipated. These developments would weaken the debt service capacity of households and businesses and lead to an increase in delinquencies, bankruptcies, and other forms of financial distress. Household purchasing power would be eroded by higher prices, and a steep rise in rates would also increase businesses’ borrowing costs. Moreover, higher-than-expected interest rates could lead to increased volatility in financial markets, stresses to market liquidity, and declines in asset prices, including prices of both commercial and residential real estate properties. Such effects could cause losses at a range of financial intermediaries, reducing their access to capital and raising their funding costs, with further adverse consequences for asset prices, credit availability, and the economy.

### **Shocks caused by cyber events, especially cyberattacks, could impair the U.S. financial system**

Cyber risk in the financial system, defined as the risk of loss or operational disruptions relating to dependence on computer systems and digital technologies, has increased over time. Some market commentators have suggested that a disruptive cyberattack on the United States and its allies could come as retaliation for sanctions imposed on Russia. In addition to cyberattacks, cyber shocks can also arise from nonmalicious events, such as when hardware malfunctions. Shocks caused by cyber events, especially cyberattacks, may spread through the financial system through

complex and potentially unrecognized interdependencies across financial firms and market participants, including a lack of substitutes for critical services. When these channels are sufficiently systemic, cyber shocks—particularly if transmission is amplified by vulnerabilities discussed elsewhere in this report—can disrupt payments or other operational features of the financial system, obstruct access to funding, trigger funding runs or asset fire sales, and impair price discovery.<sup>15</sup> Traditional mitigants such as capital and liquidity may need to be supplemented by other interventions to limit the systemic effects of cyber shocks. Various U.S. government agencies, including financial regulators, are taking steps to further protect the financial system and financial infrastructures from cyber risks and their effects.

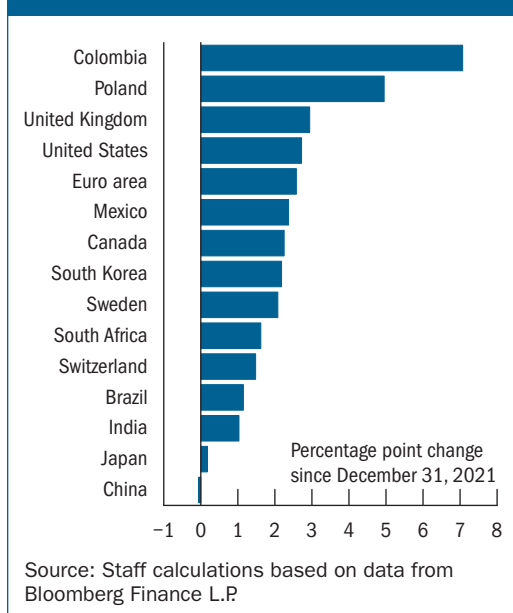
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<sup>15</sup> See Danny Brando, Antonis Kotidis, Anna Kovner, Michael Lee, and Stacey L. Schreft (2022). “Implications of Cyber Risk for Financial Stability,” FEDS Notes. (Washington: Board of Governors of the Federal Reserve System, May 12), <https://doi.org/10.17016/2380-7172.3077>.

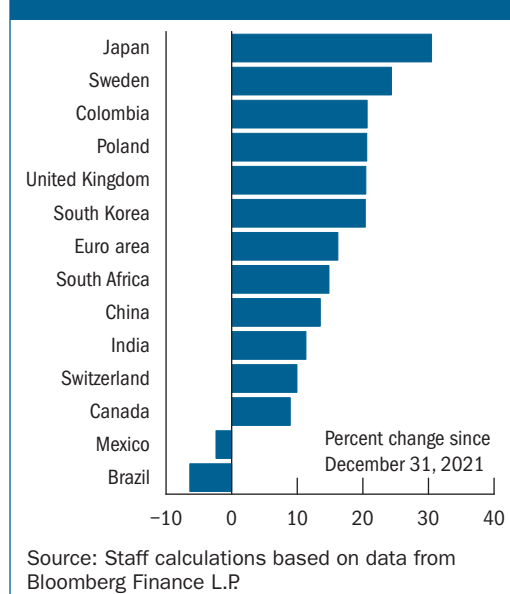
## Box 5.1. International Risks and U.S. Financial Stability

Global growth has slowed and financial conditions abroad have generally tightened since the May *Financial Stability Report*, as economies continue to wrestle with the consequences of Russia's invasion of Ukraine, spillovers from China's containment of COVID-19 and its struggling property market, and stubbornly high inflation. Lower growth trajectories and rapidly rising interest rates as central banks respond to inflation have led to bouts of market volatility, and the dollar has appreciated significantly against most foreign currencies (figures A and B). This discussion describes several foreign risks that, if realized, could spill over into the United States, potentially affecting U.S. financial stability.

**Figure A. 10-year government bond yields**



**Figure B. U.S. dollar versus currencies of selected economies**



Continued or more extreme market volatility could contribute to liquidity strains that play out in unexpected ways.<sup>1</sup> Some financial institutions increased their use of leverage and derivatives during the long period of low and stable interest rates. With the recent sharp rise in the level and volatility of rates, these institutions can face strains. For example, beginning in late September, a sharp rise in U.K. government yields forced pension funds that had taken on leveraged interest-rate positions to liquidate assets to meet margin calls, pushing yields up further. This adverse feedback loop prompted the Bank of England to introduce a temporary bond purchase program to improve market functioning. More broadly, periods of market volatility may raise concerns about funding pressures for some financial institutions.

Russia's invasion of Ukraine continues to deliver a large adverse supply shock to the European economy that may pose challenges to the financial resilience of households, businesses, financial institutions, and governments across the region.<sup>2</sup> In late summer, Russia sharply reduced the flow of natural

(continued)

<sup>1</sup> A recent study documents that when the dollar appreciated sharply in the context of volatile market conditions and a liquidity crunch in March 2020, insurance companies and pension funds based in the United Kingdom sold their most liquid assets (mostly U.K. government bonds) to meet collateral calls on unrelated currency hedging positions. See Robert Czech, Shiyang Huang, Dong Lou, and Tianyu Wang (2021), "An Unintended Consequence of Holding Dollar Assets," Staff Working Paper 953 (London: Bank of England, December), <https://www.bankofengland.co.uk/working-paper/2021/an-unintended-consequence-of-holding-dollar-assets>.

<sup>2</sup> In addition, the volatility in commodity markets has strained such markets, as discussed in the previous report. See the box "Commodity Market Stresses following Russia's Invasion of Ukraine" in the May 2022 *Financial Stability Report* for a summary of the effect of the first months of the invasion. Russia's invasion of Ukraine has affected U.S. commodity markets to a lesser

### Box 5.1—continued

gas to Europe, further straining European energy markets and raising the possibility of some form of energy rationing to manage the supply shock. Higher energy costs could squeeze household budgets and could lead energy-intensive firms to cut production significantly. Additionally, many borrowers face rising interest payments. Taken together, these stresses could adversely affect European financial institutions.<sup>3</sup> In addition, some European governments' fiscal positions could be stretched by a combination of weak revenues, higher refinancing rates, and the cost of support measures.

As U.S. monetary policy has tightened and concerns about global growth have risen, the broad real U.S. dollar index has strengthened to its highest level in over 30 years. Sharp movements in exchange rates may pose risks for institutions that are hedging dollar positions and to market functioning. The higher value of the dollar can increase stresses for any EMEs that have significant amounts of U.S. dollar debt that is neither hedged nor offset by dollar assets or revenues. This is because dollar appreciation increases the home-currency value of dollar debt, and the consequent increase in leverage may complicate the refinancing of maturing debt.

Global growth concerns amid rising interest rates in advanced economies have also led to significant portfolio outflows from EMEs. Additionally, trade disruptions and higher commodity prices have caused stress in some EMEs that are commodity importers. In some countries, droughts or floods have limited food supplies or hydroelectric production this year. Combined with higher commodity prices, this has increased concerns about food and energy security, creating new social and political tensions. These strains could further weaken the global outlook, and the financial transmission of these effects could be amplified by existing vulnerabilities in emerging markets, including levels of private-sector and government debt that have increased for many EMEs since the onset of the pandemic.

In China, stresses have persisted in the real estate sector, where activity and prices have been softening since last year.<sup>4</sup> Along with disruptions to activity from the ongoing containment of COVID-19, the slowdown in property markets has contributed to exceptionally weak growth in China this year, prompting increased unemployment, capital outflows, and depreciation of the renminbi against the dollar. Very high levels of corporate debt, particularly in the real estate sector, may further amplify the strains that these developments could place on the Chinese economy and financial sector. Given China's size and its extensive trade linkages, a worsening of the current stresses in China could further depress activity and trade worldwide. Reduced Chinese import demand has already weighed on some other EMEs.

Disruptions to economic activity or financial markets abroad can affect the United States through several channels. A pullback in risk-taking worldwide may cause further declines in asset prices and tighter credit conditions abroad and in the United States. Some U.S. investors would incur losses on foreign exposures, and foreign financial institutions would likely reduce lending to U.S. businesses. Foreign investors could sell Treasury securities and other safe U.S. assets, potentially adversely affecting financial-market functioning and the transmission of monetary policy. Foreign official holders might sell reserves to defend home currencies, and private holders might sell Treasury securities in the context of a widespread surge in demand for dollar cash buffers.<sup>5</sup> Broader pressure on large internationally active foreign banks could—if sufficiently severe—result in material spillover to U.S. financial stability through strains on dollar funding markets (in which foreign banks are large participants) and interconnectedness with U.S. banks, although the effects would be mitigated by the resilience and sound capitalization of the U.S. banking system.<sup>6</sup> More generally, modern financial markets are interconnected, so stresses abroad could lead to strains in U.S. markets and challenges for U.S. financial institutions.

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extent. Bid-ask spreads—a measure of market liquidity—remain above their historical-average levels for a number of commodities, although they have narrowed in recent months (see the box “[Liquidity Conditions in Treasury and Other Core Financial Markets](#)”).

<sup>3</sup> This possibility was noted in the most recent Financial Stability Reports by the Bank of England (July 2022) and the European Central Bank (ECB) (May 2022). The ECB's report also noted the possibility of a house price correction.

<sup>4</sup> See the box “Stresses in China's Real Estate Sector” in the May 2022 *Financial Stability Report*.

<sup>5</sup> See the box “The Role of Foreign Investors in the March 2020 Turmoil in the U.S. Treasury Market” in the November 2021 *Financial Stability Report*.

<sup>6</sup> See the box “Vulnerabilities in Global U.S. Dollar Funding Markets” in the May 2021 *Financial Stability Report*.



## Box 5.2. Climate Scenario Analysis: An Explainer

As highlighted in the November 2020 *Financial Stability Report*, the Federal Reserve is developing ways to monitor and assess financial risks that may arise from climate change. The Federal Reserve's responsibilities with respect to climate change are important but narrow. The Federal Reserve is committed to working within its existing mandates and authorities to promote a safe and stable financial system. The primary responsibility for addressing climate change itself rests with elected officials.

The unprecedented nature of climate change means that anticipating its potential effects on the safety and soundness of financial institutions and on financial stability requires forward-looking analyses. One such approach is climate scenario analysis. A climate scenario posits a potential future path of important climate-related factors, allowing analysts to explore the resulting effects on the economy and financial system. Different climate scenarios can embody different assumptions about how the future unfolds, thus helping illustrate how different risks may evolve and allowing an exploration of their potential implications. For example, in 2021, the European Central Bank conducted an exercise that assessed risks for companies and banks under three scenarios that varied in their levels of climate damages and in their transition paths to an economy that produces fewer greenhouse gas emissions.

To construct scenarios, analysts sometimes use economic models that can generate projected values for variables of interest—such as output, prices, and employment—that, in turn, affect the financial sector. Analysts can use climate scenarios to explore a wide range of implications in the financial sector for individual assets, companies, or industries, as well as for the overall macroeconomy. Some scenario analyses explore longer-run outcomes, such as how sea level rise might affect coastal property values over the life of a mortgage. Other analyses focus on shorter-run effects, such as the immediate effect of a change in climate policy on affected assets. Importantly, climate scenarios, as they are often used by financial regulators, are neither forecasts nor policy prescriptions in that they do not necessarily represent the most likely or desirable futures. Indeed, climate scenarios that are useful for risk analyses include ones that are relatively unlikely but could reveal potentially extreme downside outcomes that warrant thoughtful risk management.

For some risks, scenario analysis can offer advantages over simple risk metrics. For example, the economic and financial outcomes of greenhouse gas emissions abatement policies depend critically on the cost of reducing those emissions, which varies widely across different fuels, sectors, and sources and across different degrees of abatement. Policy outcomes also depend on how costs to regulated firms propagate through the economy to affect other firms, households, and the macroeconomy. Economic projections that incorporate these factors can highlight potential effects that might not otherwise be evident.

The Federal Reserve's climate scenario work includes assessing risks both to individual financial institutions and to the financial system more broadly. Next year, the Federal Reserve plans to engage with a small set of the largest bank holding companies to conduct a pilot supervisory climate scenario analysis exercise. This is distinct and separate from the Board's bank stress tests, which are designed to assess whether large banks have enough capital to continue lending to households and businesses during a severe recession. The Board's climate scenario analysis exercise is exploratory in nature and does not have capital consequences.

As part of its efforts to understand climate-related financial risks, the Federal Reserve is engaging with other central banks and authorities bilaterally and through participation in multilateral forums such as the Financial Stability Board and the Network of Central Banks and Supervisors for Greening the Financial System. The Federal Reserve is also learning from its counterparts around the world as they undertake exploratory climate-related supervisory exercises. The Federal Reserve is working closely with other U.S. financial regulators through the FSOC's Climate-related Financial Risk Committee. As its understanding about how to monitor and manage climate-related risks to the financial sector advances, the Federal Reserve will incorporate new findings into its financial stability work.

### **Box 5.3. Survey of Salient Risks to Financial Stability**

As part of its market intelligence gathering, staff from the Federal Reserve Bank of New York solicited views from a wide range of contacts on risks to U.S. financial stability. From late August to mid-October, the staff surveyed 26 contacts, including professionals at broker-dealers, investment funds, research and advisory organizations, and universities (figure A). Risks related to persistent inflation and tighter monetary policy, which were frequently cited in both the spring 2022 and fall 2021 surveys, remained top of mind (figure B). Respondents also continued to focus on a potential further escalation of Russia's invasion of Ukraine, especially as it relates to higher energy and other commodity prices and the economic outlook in Europe. A number of risks that ranked highly last spring fell in prominence, including concerns over risk asset valuations and the effects of COVID-19. This discussion summarizes the most cited risks in this round of outreach.

#### **Persistent inflation and monetary tightening**

Respondents remained concerned about the prospect of inflationary pressures being more persistent than anticipated, requiring a more restrictive monetary policy stance than reflected in market prices. Several contacts highlighted the global nature of monetary policy tightening and the potential for larger-than-anticipated effects on financial conditions as central banks adjust policy synchronously, especially given long and variable policy lags. Some contacts noted the risk that shrinking central bank balance sheets could prompt disruptions in funding markets or strains in market functioning. Meanwhile, a number of contacts expressed concern that central banks could pause tightening cycles or ease policy before inflation pressures are fully attenuated, leading to subsequent rounds of tightening that create volatile market conditions.

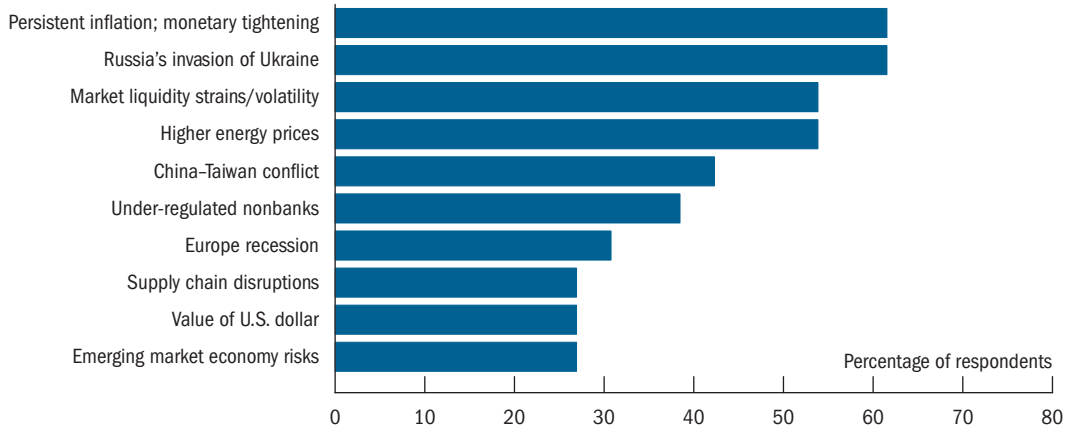
#### **Geopolitical risks**

Market participants continued to call attention to geopolitical risks, especially the possibility of a further escalation in Russia's invasion of Ukraine. In particular, many were attentive to the negative effects of the energy supply shock on net importers of natural gas—including higher inflation, lower growth, and weaker public finances. Some highlighted the deteriorating economic outlook in Europe as a result of the ongoing conflict, which could exacerbate fiscal deficits, create political instability, and spill over to the U.S. through trade, institutional, and financial market channels. Respondents also noted the risk of military or political conflict between China and Taiwan as well as any subsequent intervention by the United States, which would further disrupt global supply chains and weigh heavily on investor sentiment.

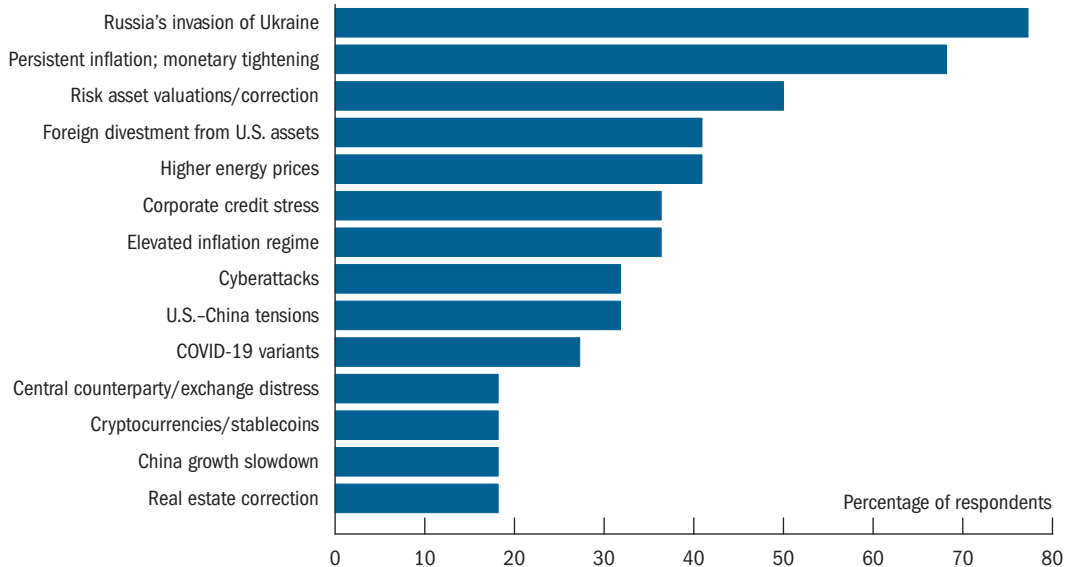
#### **Market fragilities**

Respondents highlighted a number of financial market developments that could pose risks to financial stability. Some pointed out that market liquidity, particularly in sovereign bond markets, remains challenged, noting that increases in net supply of debt securities from larger fiscal deficits and shrinking central bank balance sheets could lead to greater volatility. Several contacts saw potential spillovers from the scale and speed of the strengthening in the U.S. dollar, including the prospect of disorderly moves and potential actions by foreign authorities to manage exchange rates, either through intervention or unanticipated shifts in monetary policy.

*(continued)*

**Box 5.3—continued****Figure A. Fall 2022: Most-cited potential risks over the next 12 to 18 months**

Source: Federal Reserve Bank of New York survey of 26 market contacts from August to October.

**Figure B. Spring 2022: Most-cited potential risks over the next 12 to 18 months**

Source: Federal Reserve Bank of New York survey of 22 market contacts from January to April.



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## Appendix | Figure Notes

### Figure 1.1. Nominal Treasury yields increased to levels seen before 2008

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

### Figure 1.2. An estimate of the nominal Treasury term premium was low relative to its long-run history

The data extend through October 21, 2022. Term premiums are estimated from a 3-factor term structure model using Treasury yields and Blue Chip interest rate forecasts.

### Figure 1.3. Interest rate volatility increased amid heightened uncertainty

The data extend through October 20, 2022. Implied volatility on the 10-year swap rate, 1 month ahead, is derived from swaptions. The median value is 80.37 basis points.

### Figure 1.4. Treasury market depth suggests liquidity remained below historical norms

Market depth is defined as the average top 3 bid and ask quote sizes for on-the-run Treasury securities.

### Figure 1.5. Corporate bond yields rose to their highest levels in more than a decade

The data extend through October 20, 2022. The triple-B series reflects the effective yield of the ICE Bank of America Merrill Lynch (BofAML) triple-B U.S. Corporate Index (COA4), and the high-yield series reflects the effective yield of the ICE BofAML U.S. High Yield Index (HOA0).

### Figure 1.6. As risk appetite declined, spreads to similar-maturity Treasury securities widened

The data extend through October 20, 2022. The triple-B series reflects the option-adjusted spread of the ICE Bank of America Merrill Lynch (BofAML) triple-B U.S. Corporate Index (COA4), and the high-yield series reflects the option-adjusted spread of the ICE BofAML U.S. High Yield Index (HOA0).

### Figure 1.7. The excess bond premium returned to a level consistent with its historical norm

The excess bond premium (EBP) is a measure of bond market investors' risk sentiment. It is derived as the residual of a regression that models corporate bond spreads after controlling for expected default losses. By construction, its historical mean is zero. Positive (negative) EBP values indicate that investors' risk appetite is below (above) its historical mean.

### Figure 1.8. Spreads in the leveraged loan market also increased

The data show secondary-market discounted spreads to maturity. Spreads are the constant spread used to equate discounted loan cash flows to the current market price. B-rated spreads begin in July 1997. The line break represents the data transitioning from monthly to weekly in November 2013.

**Figure 1.9. The price-to-earnings ratio of S&P 500 firms declined but remained a bit above its historical median**

The figure shows the aggregate forward price-to-earnings ratio of S&P 500 firms, based on expected earnings for 12 months ahead. The median value is 15.45.

**Figure 1.10. An estimate of the equity premium declined to about its historical median**

The figure shows the difference between the aggregate forward earnings-to-price ratio of S&P 500 firms and the expected real Treasury yields, based on expected earnings for 12 months ahead. Expected real Treasury yields are calculated from the 10-year consumer price index inflation forecast, and the smoothed nominal yield curve is estimated from off-the-run securities. The median value is 4.8 percentage points.

**Figure 1.11. Volatility in equity markets remained elevated**

The data extend through October 20, 2022. Realized volatility is computed from an exponentially weighted moving average of 5-minute daily realized variances with 75 percent of weight distributed over the past 20 business days.

**Figure 1.12. Commercial real estate prices, adjusted for inflation, remained at high levels**

Series are deflated using the consumer price index and seasonally adjusted by Federal Reserve Board staff. The data begin in 1998 for the equal-weighted curve and 1996 for the value-weighted curve.

**Figure 1.13. Income of commercial properties relative to prices continued declining to historically low levels**

The data are a 12-month moving average of weighted capitalization rates in the industrial, retail, office, and multifamily sectors, based on national square footage in 2009.

**Figure 1.14. Banks reported tightening lending standards in commercial real estate loans**

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, December 2007–June 2009, and February 2020–April 2020. Survey respondents to the Senior Loan Officer Opinion Survey on Bank Lending Practices are asked about the changes over the quarter.

**Figure 1.15. Farmland prices were at high levels**

The data for the United States start in 1997 and extend through 2022. Midwest index is a weighted average of Corn Belt and Great Plains states derived from staff calculations. Values are given in real terms. The data are annual as of July. The median value is \$3,063.58.

**Figure 1.16. Farmland prices rose more than rents**

The data for the United States start in 1998 and extend through 2022. Midwest index is the weighted average of Corn Belt and Great Plains states derived from staff calculations. The data are annual as of July. The median value is 18.1.

**Figure 1.17. After rising rapidly in recent years, house prices decelerated**

The Zillow data extends through September 2022, the CoreLogic data extends through August 2022, and the Case-Shiller data extends through July 2022.

**Figure 1.18. A model-based measure pointed to stretched house price valuations**

Valuation is measured as the deviation from the long-run relationship between the price-to-rent ratio and the real 10-year Treasury yield.

**Figure 1.19. House price-to-rent ratios remained elevated across geographic areas**

The data are seasonally adjusted. Percentiles are based on 19 large metropolitan statistical areas.

**Box 1.1. Liquidity Conditions in Treasury and Other Core Financial Markets****Figure A. Top-of-book average market depth for 2- and 10-year on-the-run Treasury notes**

The data show the 5-day moving average of time-weighted average market depth at the best quoted prices to buy and sell, for 2- and 10-year Treasury notes. OTR is on-the-run; FSR is *Financial Stability Report*.

**Figure B. Average bid-ask spreads for 2- and 10-year on-the-run Treasury notes**

The data show the 5-day moving average of time-weighted average bid-ask spreads, for 2- and 10-year Treasury notes. OTR is on-the-run; FSR is *Financial Stability Report*.

**Figure C. Bid-ask spreads for E-mini S&P 500, crude oil, and wheat futures**

The 5-day moving average of bid-ask spreads is defined as (best ask price – best bid price)/minimum tick size. Days with limit hits are excluded. FSR is *Financial Stability Report*.

**Figure 2.1. The debt of households and businesses relative to GDP was flat in the first half of 2022**

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, December 2007–June 2009, and February 2020–April 2020. GDP is gross domestic product.

**Figure 2.2. Both business and household debt-to-GDP ratios moved sideways in the first half of 2022**

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, December 2007–June 2009, and February 2020–April 2020. GDP is gross domestic product.

**Figure 2.3. Business debt adjusted for inflation grew modestly in the first half of 2022**

Nominal debt growth is seasonally adjusted and is translated into real terms after subtracting the growth rate of the price deflator for the core personal consumption expenditures price.

#### Figure 2.4. Net issuance of risky debt was subdued so far this year

Institutional leveraged loans generally exclude loan commitments held by banks. The key identifies bars in order from top to bottom (except for some bars with at least one negative value).

#### Figure 2.5. Gross leverage of large businesses remained at high levels

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 sections of the lines in the first quarter of 2019 reflect the structural break in the series due to the 2019 compliance deadline for Financial Accounting Standards Board rule Accounting Standards Update 2016-02. The new accounting standard requires operating leases, previously considered off-balance-sheet activities, to be included in measures of debt and assets.

#### Figure 2.6. Firms' ability to service their debt, as measured by the interest coverage ratio, remained high

The interest coverage ratio is earnings before interest and taxes divided by interest payments. Firms with leverage less than 5 percent and interest payments less than \$500,000 are excluded.

#### Figure 2.7. Default rates on leveraged loans inched up from historically low levels

The data begin in December 1998. 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, December 2007–June 2009, and February 2020–April 2020.

#### Figure 2.8. Majority of new leveraged loans this year have debt multiples above 5

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

#### Figure 2.9. Real household debt shrank in the first half of 2022

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 2022 dollars using the consumer price index.

#### Figure 2.10. New mortgage extensions in real terms to near-prime and subprime borrowers have been subdued

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 1 year ago. The data are converted to constant 2022 dollars using the consumer price index. The key identifies bars in order from left to right.



#### Figure 2.11. Mortgage delinquency rates remained at historically low levels

Loss mitigation includes tradelines that have a narrative code of forbearance, natural disaster, payment deferral (including partial), loan modification (including federal government plans), or loans with no scheduled payment and a nonzero balance. Delinquent includes loans reported to the credit bureau at least 30 days past due.

#### Figure 2.13. A model-based estimate of housing leverage has remained fairly steady over the past 10 years

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 Zillow 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 2.14. Real consumer credit edged down on lower student loan balances

The data are converted to constant 2022 dollars using the consumer price index. Student loan data begin in 2005.

#### Figure 2.15. Real auto loans outstanding fell

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 2022 dollars using the consumer price index.

#### Figure 2.16. Auto loan delinquencies moved up but remained at modest levels

Loss mitigation includes tradelines that have a narrative code of forbearance, natural disaster, payment deferral (including partial), loan modification (including federal government plans), or loans with no scheduled payment and a nonzero balance. Delinquent includes loans reported to the credit bureau as at least 30 days past due. The data for auto loans are reported semiannually by RADAR until 2017, after which they are reported quarterly. The data for delinquent/loss mitigation begin in the first quarter of 2001.

#### Figure 2.17. Real credit card balances have increased this year, partially reversing earlier declines

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 2022 dollars using the consumer price index.

#### Figure 2.18. Credit card delinquencies increased but remained at low levels

Delinquency is at least 30 days past due, excluding severe derogatory loans. 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 4 quarters.

#### Figure 3.1. Banks' risk-based capital ratio remained near the median level since the 2007–09 financial crisis

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 economic recession as defined by the National Bureau of Economic Research: March 2001–November 2001, December 2007–June 2009, and February 2020–April 2020.

**Figure 3.2. The ratio of common equity to tangible assets has decreased this year**

The data are seasonally adjusted by Federal Reserve Board staff. Sample consists of domestic bank holding companies (BHCs), intermediate holding companies (IHCs) with a substantial U.S. commercial banking presence, and commercial banks. 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. Bank equity is total equity capital net of preferred equity and intangible assets. Bank assets are total assets net of intangible assets. 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, December 2007–June 2009, and February 2020–April 2020.

**Figure 3.3. Borrower leverage for bank commercial and industrial loans continued to trend down**

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 3.4. Lending standards for bank commercial and industrial loans have tightened**

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, December 2007–June 2009, and February 2020–April 2020.

**Figure 3.5. Leverage at broker-dealers remained historically low**

Leverage is calculated by dividing total assets by equity.

**Figure 3.6. Profitability of trading operations has been elevated amid post-pandemic volatility**

The sample includes all trading desks of bank holding companies subject to the Volcker rule reporting requirement.

### Figure 3.7. Share of trading profits by trading desks

The sample includes all trading desks of bank holding companies subject to the Volcker rule reporting requirement. The “other” category comprises desks trading in municipal securities, foreign exchange, and commodities, as well as any unclassified desks. The key identifies bars in order from top to bottom.

### Figure 3.8. Leverage at life insurance companies decreased this year to the middle of its historical distribution

Ratio is calculated as (total assets – separate account assets)/(total capital – accumulated other comprehensive income) using generally accepted accounting principles. The largest 10 publicly traded life and property and casualty insurers are represented.

### Figure 3.9. Leverage at hedge funds remained elevated

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 both on-balance-sheet and off-balance-sheet derivative notional exposures. Options are delta adjusted, and interest rate derivatives are reported at 10-year bond equivalents. The mean is weighted by net asset value. The data are reported on a 2-quarter lag starting in the first quarter of 2013.

### Figure 3.10. But leverage at some hedge funds reportedly decreased recently

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

### Figure 3.11. Issuance of non-agency securitized products slowed significantly this year

The data from the first, second, and third quarters of 2022 are annualized to create the 2022 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 2022 dollars using the consumer price index. The key identifies bars in order from top to bottom.

### Figure 3.12. Bank credit commitments to nonbank financial firms grew to new highs

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 2018: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). BDC is busi-

ness development company. 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.

**Figure 3.13. Loan commitments grew and utilization rates increased in many sectors over the past year**

2022:Q2-over-2021:Q2 growth rates as of the end of the second quarter of 2022. REIT is real estate investment trust; PE is private equity; BDC is business development company; SPE is special purpose entity; CLO is collateralized loan obligation; ABS is asset-backed securities. The key identifies bars in order from left to right.

**Figure 4.1. Runnable money-like liabilities as a share of GDP edged down a touch but remained above its historical median**

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 (VRDOs), 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 VRDOs 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://www.federalreserve.gov/econresdata/notes/feds-notes/2015/the-runnables-20150903.html>.

**Figure 4.2. The amount of high-quality liquid assets held by banks has declined but remained high**

Sample consists of domestic bank holding companies (BHCs), intermediate holding companies (IHCs) with a substantial U.S. commercial banking presence, and commercial banks. 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. 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.

**Figure 4.3. Reliance on short-term wholesale funding remained low**

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 1 year, trading liabilities (excluding revaluation losses on derivatives), and other borrowed money with maturity less than 1 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, December 2007–June 2009, and February 2020–April 2020.

**Figure 4.4. Growth in money market funds was concentrated in retail prime funds**

The data are converted to constant 2022 dollars using the consumer price index.

#### Figure 4.5. Corporate bonds held by bond mutual funds fell sharply

The data show holdings of all U.S. corporate bonds by all U.S.-domiciled mutual funds (holdings of foreign bonds are excluded). The data are converted to constant 2022 dollars using the consumer price index.

#### Figure 4.6. Assets held by high-yield and bank-loan mutual funds also experienced sharp declines

The data are converted to constant 2022 dollars using the consumer price index. The key identifies series in order from top to bottom.

#### Figure 4.7. Fixed-income mutual funds experienced sizable outflows this year

Mutual fund assets under management as of August 2022 included \$2,249 billion in investment-grade bond mutual funds, \$234 billion in high-yield bond mutual funds, and \$107 billion in bank-loan mutual funds. Bank-loan mutual funds, also known as floating-rate bond funds, are excluded from high-yield bond mutual funds.

#### Figure 4.8 Life insurers held more risky, illiquid assets on their balance sheets

Securitized products include collateralized loan obligations for corporate debt, private-label commercial mortgage-backed securities for commercial real estate (CRE), and private-label residential mortgage-backed securities and asset-backed securities (ABS) backed by autos, credit cards, consumer loans, and student loans for other ABS. Illiquid corporate debt includes private placements, bank and syndicated loans, and high-yield bonds. Alternative investments include assets filed under Schedule BA. P&C is property and casualty. The key identifies bars in order from top to bottom.

#### Figure 4.9. Life insurers' reliance on nontraditional liabilities trended higher

The data are converted to constant 2022 dollars using the consumer price index. FHLB is Federal Home Loan Bank. Data are annual from 2006 to 2010 and quarterly thereafter. The key identifies series in order from top to bottom.

### Box 4.1. Digital Assets and Financial Stability

#### Figure A. Market capitalization of selected crypto-assets

The "other" category consists of 345 additional tokens. The key identifies bars in order from top to bottom.

#### Figure B. Total value locked, by category

The "other" category consists of Algo-Stables, Bridge, CDP, Cross Chain, Farm, Gaming, Launchpad, Liquid Staking, Oracle, Prediction Market, Privacy, Reserve Currency, RWA, Services, and Staking. The key identifies bars in order from top to bottom.

### Box 5.1. International Risks and U.S. Financial Stability

#### Figure A. 10-year government bond yields

The German yield is used for the euro area. The data extend through market close on October 20, 2022.

Figure B. U.S. dollar versus currencies of selected economies

The data extend through market close on October 20, 2022.

**Box 5.3. Survey of Salient Risks to Financial Stability**

Figure A. Fall 2022: Most-cited potential risks over the next 12 to 18 months

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?”

Figure B. Spring 2022: Most-cited potential risks over the next 12 to 18 months

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?”



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