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Report to the Congress

December 2019

# FEDERAL DEBT MANAGEMENT

# Treasury Should Strengthen Policies for Market Outreach and Analysis to Maintain Broad-Based Demand for Securities

Accessible Version

GAO-20-131

# GAO Highlights

Highlights of GAO-20-131, a report to Congress

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December 2019

# FEDERAL DEBT MANAGEMENT

## Treasury Should Strengthen Policies for Market Outreach and Analysis to Maintain Broad-Based Demand for Securities

## Why GAO Did This Study

The Congressional Budget Office projects that federal deficits will reach $1 trillion in 2020 and average $1.2 trillion per year through 2029, further adding to the more than $16 trillion in current debt held by the public. As a result, Treasury will need to issue a substantial amount of debt to finance government operations and refinance maturing debt. To support its goal to borrow at the lowest cost over time, Treasury must maintain strong demand from a diverse group of investors for Treasury securities.

GAO prepared this report as part of continuing efforts to assist Congress in identifying and addressing debt management challenges. This report (1) identifies factors that affect demand for Treasury securities and (2) examines how Treasury monitors and analyzes information about the Treasury market to inform its debt issuance strategy.

GAO analyzed data on investor holdings of Treasury securities; surveyed a non-generalizable sample of 109 large domestic institutional investors across 10 sectors (67 responded); reviewed Treasury analysis and market research; and interviewed market participants across sectors, experts on foreign investors, and Treasury officials.

## What GAO Recommends

GAO recommends that Treasury (1) finalize its policy for conducting bilateral market outreach and (2) establish a policy for the documentation and quality assurance of analytical models.

Treasury agreed with these recommendations.

## What GAO Found

The large institutional investors GAO surveyed across multiple sectors identified liquidity, depth, and safety as the most important characteristics of Treasury securities. This combination supports reliable demand from different types of investors through changing market conditions. Many investors accept low yields because of these characteristics, keeping the Department of the Treasury's (Treasury) borrowing costs low.

**Key Characteristics of the Treasury Market That Support Broad-Based Demand**


Source: GAO. | GAO-20-131

Market participants GAO interviewed and surveyed identified risks that could degrade these key characteristics and reduce future demand:

- **Debt limit impasses** could force Treasury to delay payments on maturing securities and interest, until sufficient funds are available, compromising the safety of Treasury securities.
- **Unsustainable levels of federal debt** could cause investors to demand a risk premium and seek out alternatives to Treasury securities.
- **A reduced role for the U.S. dollar as the dominant reserve currency** could diminish the advantages of holding Treasury securities for foreign investors, particularly foreign government investors who hold large amounts of dollar-denominated assets to assist in managing their exchange rates.
- **Changes in the Treasury secondary market** where securities are traded—including high-frequency trading and a reduced role for broker-dealers who buy and sell for customers—could increase volatility and reduce liquidity.

Treasury regularly makes important issuance decisions—such as what types of securities to issue and in what quantities—to maintain broad-based demand and support its goal of borrowing at the lowest cost over time. Treasury officials said three key inputs support these decisions: market outreach; auction and market metrics (e.g., trading volumes); and analytical models.

However, Treasury has not finalized its policy for systematically conducting bilateral market outreach to ensure a thorough understanding of market demand. Treasury also does not have a policy governing important aspects of its analytical modeling, including following and documenting quality assurance steps to ensure that analytical methods are appropriate and available to future model developers and users. Codifying policies governing key information sources would help ensure that Treasury's decisions are based on the best possible information.

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**Abbreviations**

| | |
|---|---|
| Fannie Mae | Federal National Mortgage Association |
| Federal Reserve | The Federal Reserve System |
| FINRA | Financial Industry Regulatory Authority, Inc. |
| FOMC | Federal Open Market Committee |
| Freddie Mac | Federal Home Loan Mortgage Corporation |
| FRBNY | Federal Reserve Bank of New York |
| Ginnie Mae | Government National Mortgage Association |
| IMF | International Monetary Fund |
| SEC | Securities and Exchange Commission |
| SOFR | Secured Overnight Financing Rate |
| TBAC | Treasury Borrowing Advisory Committee |
| TIPS | Treasury Inflation-Protected Security |
| TRACE | Trade Reporting and Compliance Engine |
| Treasury | Department of the Treasury |

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Report to the Congress

In 2018, the Department of the Treasury (Treasury) held more than 280 auctions where it sold Treasury securities (e.g., Treasury bills, notes, and bonds) to investors, totaling more than $10 trillion in total borrowing. The Congressional Budget Office projects that federal deficits will reach $1 trillion in 2020 and average $1.2 trillion per year through 2029; further adding to the more than $16 trillion in current debt held by the public.[1] As a result, Treasury will need to issue a substantial amount of debt in the coming decades to finance government operations and refinance maturing debt held by the public.[2]

To achieve its goal of financing the government's borrowing needs at the lowest cost over time, Treasury must maintain strong demand from a diverse group of investors for the debt that it issues. Given the size of the Treasury market, even a marginal reduction in the amount of interest paid would significantly reduce the government's borrowing costs. A decrease in the total cost of borrowing of just one one-hundredth of a percent—or one basis point—would save the government tens of millions of dollars annually.

We prepared this report under the Comptroller General's authority as part of continuing efforts to assist Congress in identifying and addressing debt management challenges. This report: (1) identifies factors that affect demand for Treasury securities; and (2) examines how Treasury monitors and analyzes information about the Treasury market to inform its debt issuance strategy.

To identify the factors that affect demand for Treasury securities we analyzed Treasury and the Federal Reserve System (Federal Reserve) data, including Treasury holdings by type of investor and sector.[3] We also

[1]Congressional Budget Office, An *Update to the Budget and Economic Outlook: 2019 to 2029* (Washington, D.C.: Aug. 21, 2019).

[2]Federal debt held by the public is the value of all federal securities sold to investors outside of the federal government.

[3]The Federal Reserve's Financial Accounts of the United States, Table Z1 reports Treasury holdings by sector. The Treasury International Capital data report foreign holdings of Treasury securities by country.

reviewed economic literature about the demand for Treasury debt. We administered an online survey to 109 of the largest institutions by total assets or other equivalent financial indicator in 10 sectors: money market funds, mutual and exchange-traded funds, state and local government retirement funds, private pension plans, commercial banks, life insurance providers, casualty insurance providers, broker-dealers, nonfinancial corporations, and state and local governments. Sixty-seven market participants (62 percent) completed the survey with between five and 11 respondents per sector. The survey results are not generalizable to all investors in Treasury securities, but provide views on demand for Treasury securities from some of the largest investors and risks they see to the market. For more information on our survey methodology, see appendix I.

We interviewed 11 market participants representing broker-dealers, commercial banks, mutual funds, and public pension funds. We selected market participants to ensure a diversity of viewpoints, taking into consideration market sector, share of the Treasury market, and recommendations by market experts. We also interviewed three associations representing major sectors participating in the Treasury market, such as asset managers and insurance companies, and a widely recognized expert and commentator on the Treasury market. The views expressed in these interviews are not generalizable to all market participants.

To better understand recent trends in foreign holdings of Treasury securities, we analyzed data from the Treasury International Capital system and the Federal Reserve's Financial Accounts of the United States.[4] We interviewed officials from the International Monetary Fund (IMF), Bank for International Settlements, the Federal Reserve Board of Governors, and the Federal Reserve Bank of New York.[5] We also coordinated with representatives of five audit institutions from selected

[4]The Treasury International Capital reporting system maintains data on capital flows into and out of the United States, excluding direct investment, and the resulting levels of cross-border claims and liabilities. The Federal Reserve's Financial Accounts of the United States track sources and uses of funds by sector, and include flow of funds, balance sheet, and integrated macroeconomic account data.

[5]The Bank for International Settlements carries out research and policy analysis on monetary and financial stability and provides financial services to, and is owned by, central banks representing countries from around the world.

countries or regions that hold Treasury securities and we reviewed relevant audit reports.[6]

To examine how Treasury monitors and analyzes information about the Treasury market to inform its debt issuance strategy, we assessed Treasury's approach against IMF and World Bank guidance for public debt management and Federal Standards for Internal Control.[7] The control activities component of internal control—the actions management establishes to achieve objectives and respond to risks—was significant to this objective, along with the related principle that management should implement control activities through policies. We assessed Treasury's policies and procedures for conducting market outreach and analytical modeling.

We also assessed the documentation of Treasury's analytical models against our Assessment Methodology for Economic Analysis, supplemented by Federal Reserve guidance.[8] We reviewed analysis and market research Treasury conducted to make recent issuance and product decisions. We interviewed Treasury officials about how they make debt-issuance decisions.

To assess the reliability of the data used in this study, including Treasury auction data and information on the largest holders of Treasury securities, we reviewed related documentation and traced data from source documents, where possible and appropriate. In some cases, we corroborated the results of our data analyses and interviews with other sources. We used data sets that are commonly used by Treasury and researchers to monitor changes in federal debt and related transactions. Based on our assessment we believe that the data are reliable for reporting on broad trends in Treasury security holdings.

[6]We selected countries or regions whose audit institutions are current or former members of the International Organization of Supreme Audit Institutions working group on financial modernization and, as of July 2018, held more than $95 billion in Treasury securities as reported by the Treasury International Capital system.

[7]World Bank-International Monetary Fund, *Revised Guidelines for Public Debt Management* (April 2014) and GAO, *Standards for Internal Control in the Federal Government,* GAO-14-704G (Washington D.C.: September 2014).

[8]GAO, *Assessment Methodology for Economic Analysis*, GAO-18-151SP (Washington D.C.: Apr. 10, 2018), and Board of Governors of the Federal Reserve System, *SR Letter 11-7: Supervisory Guidance on Model Risk Management* (Washington, D.C.: Apr. 4, 2011).

We conducted this performance audit from June 2018 to December 2019 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

# Background

Treasury borrows money by issuing Treasury securities to finance the federal deficit (i.e., the difference between current spending and revenues), which includes paying interest on outstanding debt, and refinancing maturing debt. According to Treasury's Strategic Plan, the primary objective of its debt management strategy is to finance the government's borrowing needs at the lowest cost over time.[9] Treasury reports that it achieves this objective by

- issuing marketable debt with a regular and predictable framework—meaning Treasury debt managers provide the market clear and transparent information about planned issuance, and set a standard calendar of auctions of each security type.[10]
- managing its debt portfolio to mitigate "rollover risk"—the risk that it may have to refinance its debt at higher interest rates;
- fostering a healthy and liquid secondary market—the marketplace in which Treasury securities are traded; and
- promoting a broad and diverse investor base.

To this end, Treasury issues securities in a wide range of maturities to appeal to a broad range of investors, and in sufficient amounts to promote liquid markets so investors can easily buy and sell Treasury securities. Treasury's regular and predictable auction framework also provides investors greater certainty and better information to plan their investments.

[9]Department of the Treasury, *2018-2022 Strategic Plan*, Washington, D.C.

[10]Marketable securities constitute most debt held by the public and can be resold by whoever owns them. Treasury also issues a smaller amount of nonmarketable securities, such as savings securities and State and Local Government Series securities.

Treasury regularly issues nominal securities that range in maturity from 4 weeks to 30 years, inflation protected securities with 5-, 10-, and 30-year maturities, and floating rate notes (see table 1). A nominal security returns the face value of the security at maturity; an inflation-indexed security repays the principal adjusted for inflation. Floating rate notes pay interest quarterly at a rate that varies with changes in the indexed rate, such as the discount rate on the 13-week Treasury bill.

**Table 1: Description of Treasury Securities as of September 2019**

| Security type | Maturity | Auction frequency |
|---|---|---|
| **Treasury bills**<br>Typically sold at a discount from their face value. A $1,000 bill might sell at auction for $980. At maturity, the investor receives the face value—in this case $1,000. The difference ($20) equals the interest earned. | 4-week, 8-week,13-week, 26-week | Weekly |
| | 52-week | Every 4 weeks |
| **Treasury notes**<br>Sold below, at, or above face value. Notes pay interest every 6 months until they mature, at which time the investor is paid the face value. | 2-year, 3-year, 5-year, 7-year | Monthly |
| | 10-year | February, May, August, November with reopenings in the other 8 months[a] |
| **Treasury bonds**<br>Sold below, at, or above face value. They pay interest every 6 months until they mature, at which time the investor is paid at the face value. | 30-year | February, May, August, November with reopenings in the other 8 months |
| **Floating rate notes**<br>Sold below, at, or above face value. They pay interest quarterly at a rate that varies with changes in the 13-week Treasury bill discount rate. At maturity, the investor is paid the face value. | 2-year | January, April, July, October with reopenings in the other 8 months |
| **Treasury Inflation Protected Securities (TIPS)**<br>Principal increases with inflation and interest is applied to the adjusted principal, so interest payments rise with inflation. When TIPS mature, an investor is paid the inflation-adjusted principal. Should there be deflation, the principal decreases but not below the original face amount. | 5-year | April, October and reopenings in June and December |
| | 10-year | January and July; reopenings in March, May, September, and November |
| | 30-year | February; reopening in August |

Source: GAO summary of Department of the Treasury information. | GAO-20-131

Note: Outside of the regular auction schedule, Treasury issues cash management bills of varying maturities—usually a matter of days—as financing needs require.

[a]Reopened securities have the same maturity date, coupon interest rate, and interest payment dates as the original security, but have a different issue date and usually a different price.

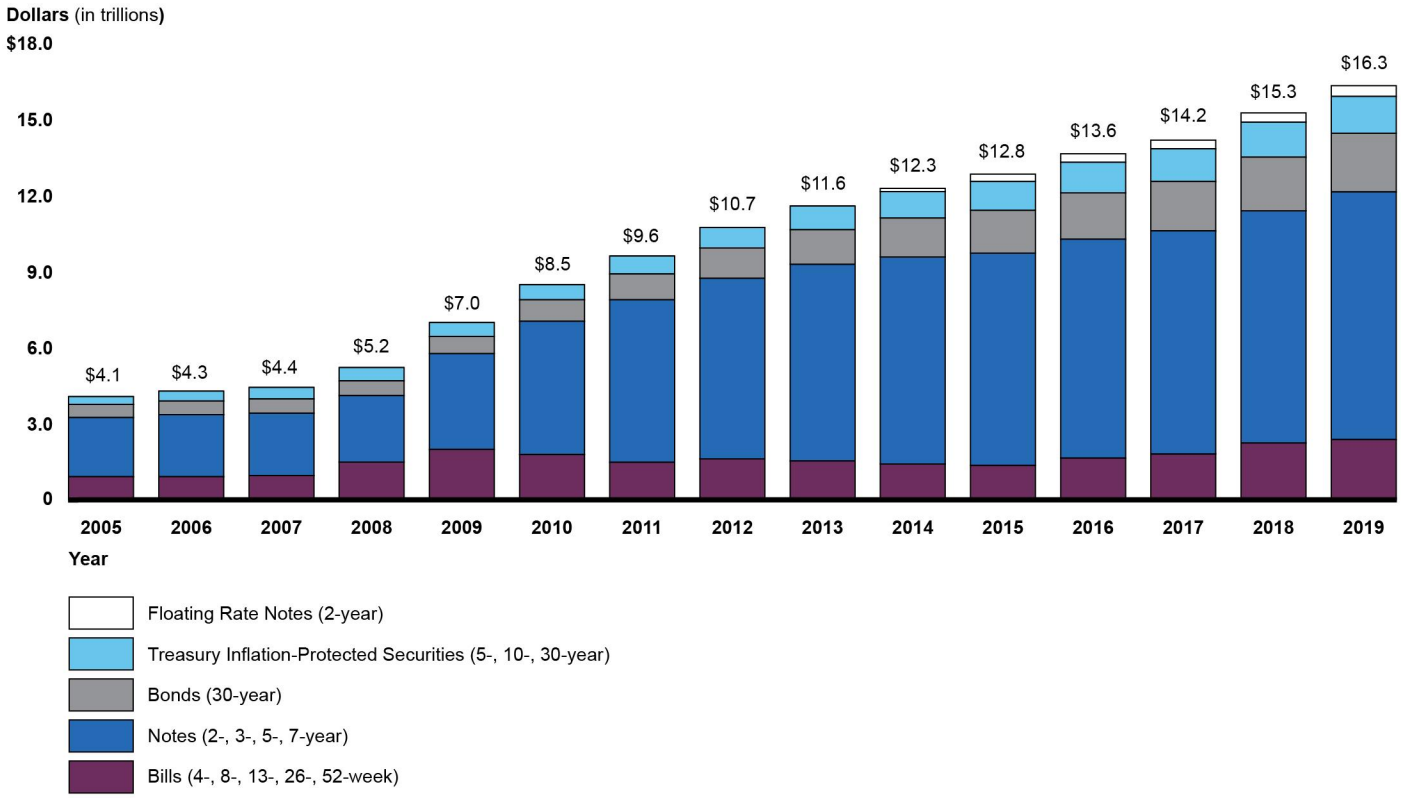
The interest rates associated with the range of maturities of the nominal securities issued by Treasury creates a “yield curve” which represents the relationship between the maturity of an asset and its yield (the interest rate paid by Treasury or cost of borrowing). Each security has different cost and risk features for Treasury. Generally, Treasury must pay a

higher interest rate for longer-dated securities to compensate buyers for waiting longer for principal to be repaid and accepting increased risk due to uncertainty about future market conditions.[11] But longer-dated securities offer more certainty for budget planning because they lock in interest rates for the duration of the security. Similarly, as Treasury offers more of any given security, it may have to pay more interest to attract investors. However, if Treasury offers too little of a specific security given changing market demand, it could reduce the security's liquidity in the secondary market, which would increase the interest cost Treasury must pay to compensate investors for less liquidity.

The mix of securities changes regularly as Treasury issues new debt and funding needs change. Figure 1 shows the outstanding marketable debt held by the public by security type between 2005 and 2019.

[11]In rare instances, the yield curve "inverts," often because investors are concerned about the future, and the interest rates of certain shorter-term securities are higher than rates on some longer-term securities.

**Figure 1: Marketable Federal Debt Held by the Public, for the Fiscal Years Ended September 30, 2005, to 2019**




Source: GAO analysis of The Schedules of Federal Debt, Bureau of the Fiscal Service | GAO-20-131

**Data table for Figure 1: Marketable Federal Debt Held by the Public, for the Fiscal Years Ended September 30, 2005, to 2019**

| Year | Bills | Notes | Bonds | Treasury Inflation-Protected Securities | Floating Rate Notes | total marketable debt held by the public (trillions) |
|---|---|---|---|---|---|---|
| 2005 | 910.32 | 2328.21 | 520.51 | 307.01 | 0 | $4.1 |
| 2006 | 908.47 | 2445.31 | 534.47 | 395.55 | 0 | $4.3 |
| 2007 | 954.61 | 2456.1 | 560.92 | 456.78 | 0 | $4.4 |
| 2008 | 1484.33 | 2623.36 | 578.5 | 523.95 | 0 | $5.2 |
| 2009 | 1986.17 | 3772.96 | 677.49 | 551.31 | 0 | $7.0 |
| 2010 | 1783.68 | 5252.59 | 846.05 | 593.61 | 0 | $8.5 |
| 2011 | 1475.56 | 6406.98 | 1016.41 | 705.35 | 0 | $9.6 |
| 2012 | 1613.03 | 7114.96 | 1194.72 | 807.47 | 0 | $10.7 |
| 2013 | 1527.91 | 7750.34 | 1363.11 | 936.04 | 0 | $11.6 |
| 2014 | 1409.63 | 8160.2 | 1534.07 | 1044.68 | 122.99 | $12.3 |

| Year | Bills | Notes | Bonds | Treasury Inflation-Protected Securities | Floating Rate Notes | total marketable debt held by the public (trillions) |
|---|---|---|---|---|---|---|
| 2015 | 1355.23 | 8366.03 | 1688.21 | 1135.36 | 287.04 | $12.8 |
| 2016 | 1644.76 | 8624.25 | 1825.34 | 1209.81 | 334.14 | $13.6 |
| 2017 | 1799.57 | 8798.94 | 1948.41 | 1286.12 | 342.63 | $14.2 |
| 2018 | 2239.47 | 9150.3 | 2114.98 | 1376.18 | 369.14 | $15.3 |
| 2019 | 2376 | 9756 | 2311 | 1455 | 424.07 | $16.3 |

Notes: Treasury introduced the floating rate note in 2014.

Treasury also issues a small amount of nonmarketable securities, such as savings securities and State and Local Government Series securities. As of September 30, 2019, these totaled about $486 billion or 3 percent of total debt held by the public.

Treasury typically responds to long-term increases in borrowing needs by taking the following steps:

- **Increasing the amount of securities offered at scheduled auctions.** In 2018, Treasury increased auction sizes for securities at all maturities as borrowing needs increased. For example, Treasury increased the average size of auctions for floating rate notes by 15 percent (from about $16.2 billion in 2017 to $18.6 billion in 2018) and 3-year notes by 32 percent (from about $25.9 to $34.1 billion).
- **Increasing the frequency of scheduled auctions.** For example, in 2003 and 2008, Treasury adjusted the auction calendar to include additional reopenings of 10-year notes. More recently, Treasury added an October 5-year TIPS issue, with the first auction held on October 17, 2019.
- **Introducing new types of securities to offer at its auctions.** For example, in 2014, Treasury introduced a 2-year floating rate note.[12] In October 2018, Treasury began auctioning a 2-month bill. According to Treasury officials, the addition of the 2-month bill allowed Treasury to issue more bills without increasing auction sizes for existing bills beyond maximum sizes recommended by market participants.

In taking these steps, Treasury announces expected auction sizes each quarter and publicly discusses the changes well in advance.

[12]GAO, *Debt Management: Floating Rate Notes Can Help Treasury Meet Borrowing Goals, but Additional Actions are Needed to Help Manage Risk,* GAO-14-535 (Washington, D.C.: June 16, 2014).

## The Treasury Market Has a Diverse Investor Base

Treasury securities are held by a wide range of investors for a variety of different reasons, including cash and liquidity management, collateral, hedging, speculation, arbitrage, and as long-term "buy and hold" investments. As shown in figure 2, these investors can be grouped into three categories:

- **The Federal Reserve System (Federal Reserve),** the U.S. central bank, conducts monetary policy to promote maximum employment, stable prices, and moderate long-term interest rates.[13] As part of this role, the Federal Reserve banks may buy and sell Treasury and other securities in the secondary market and roll over holdings of Treasury securities at auction as a noncompetitive bidder.[14] The Federal Reserve is the largest individual holder of Treasury securities, and as of June 2019, held approximately $2.3 trillion in Treasury securities—or 14 percent of marketable debt held by the public.[15]
- **International investors** include both private investors and foreign official institutions, including central banks and government-owned investment funds. As of June 2019, foreign holdings represented 41 percent of marketable debt held by the public; about $6.6 trillion. Most

[13]The Federal Reserve System consists of the Board of Governors of the Federal Reserve System, 12 regional Reserve Banks, and the Federal Open Market Committee (FOMC). FOMC is responsible for directing open market operations—the purchase and sale of securities in the open market by a central bank—to influence the total amount of money and credit available in the economy. FOMC has authorized and directed the Federal Reserve Bank of New York to execute open market transactions on behalf of the System Open Market Account.

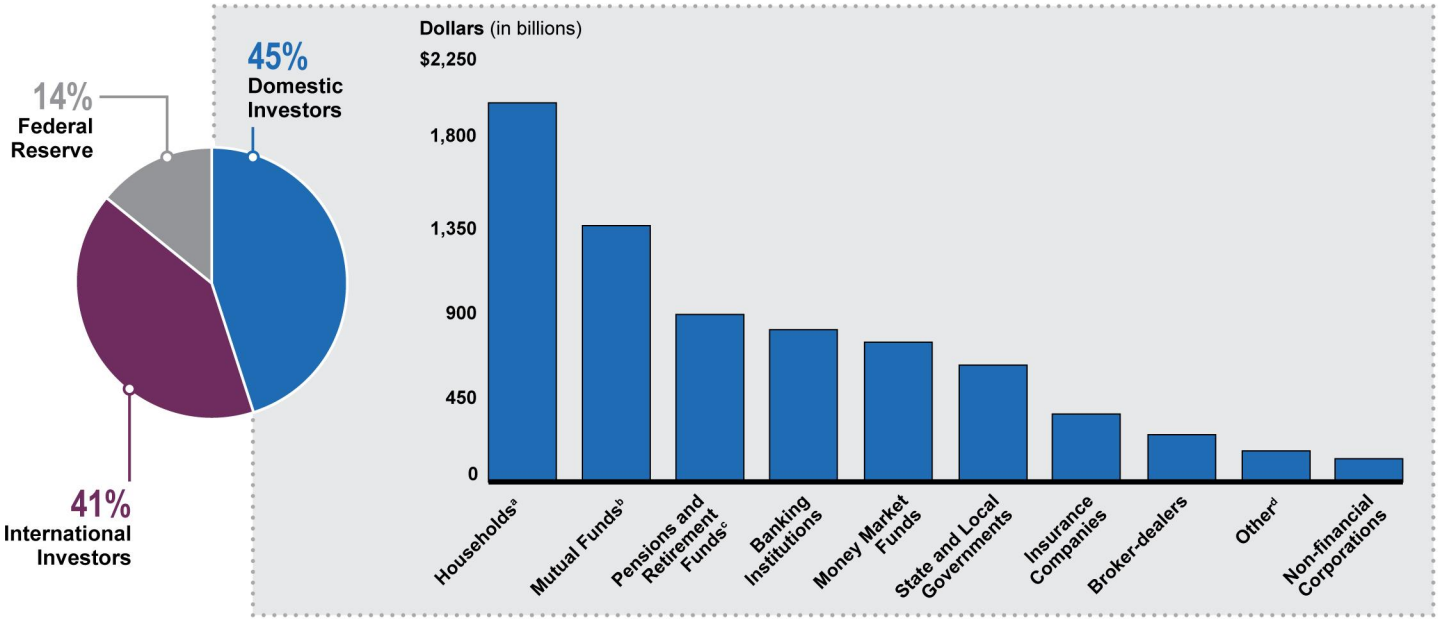
[14]Noncompetitive bidding means that the bidder agrees to accept the rate, yield, or discount margin determined at auction. To roll over maturing Treasury securities, the Federal Reserve Bank of New York places noncompetitive bids at Treasury auctions in an amount equal to all or a portion of the System Open Market Account's maturing Treasury securities. On the auction settlement date, the maturing Treasury securities are exchanged for the newly issued Treasury securities.

[15]The assets of the Federal Reserve—including Treasury securities— that have been acquired through open market operations are held in its System Open Market Account. The Federal Reserve also influences the total cost of borrowing for Treasury because it remits any profits it earns, including any profits associated with interest received on Treasury securities, back to Treasury.

foreign holdings are from official sources (63 percent according to available data), such as foreign central banks.[16]

- **Domestic investors** include banks, investment funds, pension funds, insurance companies, state and local governments, and individuals. As of June 2019, domestic investors held 45 percent of marketable debt held by the public; more than $7 trillion. Figure 2 shows the sectors that represent the domestic investor category.

**Figure 2: U.S. Treasury Security Holdings by the Federal Reserve, International Investors, and Domestic Investors (by Sector), June 2019**




Source: GAO analysis of the Federal Reserve Financial Accounts of the United States data. | GAO 20-131

**Data table for Figure 2: U.S. Treasury Security Holdings by the Federal Reserve, International Investors, and Domestic Investors (by Sector), June 2019**

| Households | Mutual Funds | Pensions and Retirement Funds | Banking Institutions | Money Market Funds | State and Local Governments | Insurance Companies | Broker-dealers | Other | Non-financial Corporations |
|---|---|---|---|---|---|---|---|---|---|
| 2016 | 1363 | 891 | 810 | 743 | 621 | 361 | 251 | 165 | 123 |

[16]The remaining 37 percent are held by foreign private investors. Data on foreign holdings come from the Treasury International Capital System.

| Domestic Investors | International Investors | Federal Reserve |
|---|---|---|
| 45% | 41% | 14% |

Notes: These sectors are defined by the Federal Reserve.

[a]The household sector is a residual sector. In addition to holdings by individual households, it reflects assets of entities for which there is no data source, such as nonprofit organizations, domestic hedge funds, private equity funds, and personal trusts.

[b]The mutual funds category includes exchange-traded funds and closed-end funds. Closed-end funds do not continuously offer shares, but instead sell a fixed number of shares at one time.

[c]Pensions and retirement funds include private pension funds and public retirement funds. We excluded federal retirement funds from this category because they primarily invest in nonmarketable Treasury securities.

[d]The other category includes holdings by issuers of asset-backed securities and government-sponsored enterprises such as the Federal National Mortgage Association (Fannie Mae) and the Federal Home Loan Mortgage Corporation (Freddie Mac), which support the housing finance market.

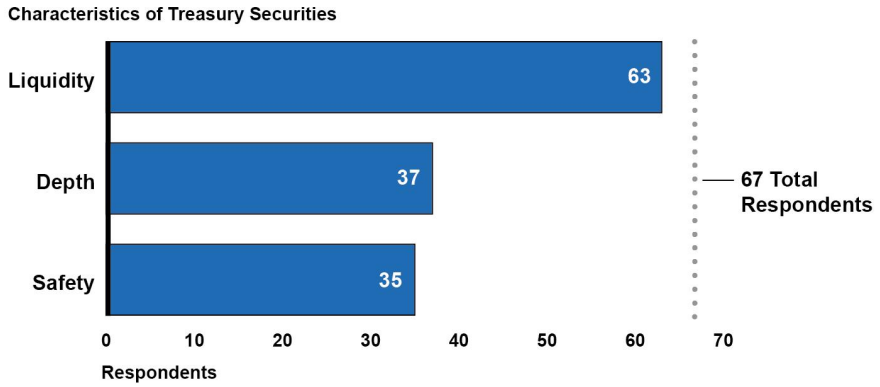
# Key Characteristics of Treasury Securities Support Reliable Demand but Changes in Policies or Market Conditions Pose Risks

## Low Risk and the Ability to Easily Buy and Sell Large Volumes of Treasury Securities Support Reliable, Broad-Based Demand

The combination of the liquidity, depth, and safety of the Treasury market is unmatched in global markets. These characteristics make Treasury securities a unique and critical asset for a broad range of investors. Market participants and subject matter experts we interviewed and surveyed identified liquidity, depth, and safety as the most important characteristics of Treasury securities. As shown in figure 3, 63 of 67 market participants we surveyed from across 10 domestic sectors reported that liquidity is one of the most important characteristics, followed by depth and safety.[17] Moreover, 55 of the 67 survey respondents cited at least two of these characteristics as the most important.

[17]The survey sample represented the following 10 sectors: commercial banks; broker-dealers; property-casualty and life insurance providers; state and local retirement funds; private pension funds; state and local governments; mutual funds and exchange-traded funds; money market funds; and nonfinancial corporations. For more information on the survey population and sample design, see appendix I.

**Figure 3: Survey Respondents Cited Liquidity, Depth, and Safety as the Top Three Characteristics of Treasury Securities**




Source: GAO. | GAO-20-131

**Data table for Figure 3: Survey Respondents Cited Liquidity, Depth, and Safety as the Top Three Characteristics of Treasury Securities**

| Characteristic | Respondents |
|---|---|
| Liquidity | 63 |
| Depth | 37 |
| Safety | 35 |

Note: Each respondent was asked to identify the top three characteristics of Treasury securities that are important to them for the assets that they oversee or manage.

Liquidity, depth, and safety are interrelated characteristics of Treasury securities (see fig. 4). For example, liquidity and depth are both related to the size of the market and the willingness of market participants to buy and sell securities at low cost. In addition, liquidity is enhanced by safety, for example by minimizing the risk that trading could be disrupted by default. Treasury securities are considered one of the safest assets in the world because they are backed by the full faith and credit of the U.S. government.

**Figure 4: Liquidity, Depth, and Safety are Key Characteristics of the Treasury Market That Support Broad-Based Demand**


Source: GAO. | GAO-20-131

*"Holdings of Treasury securities are driven primarily by the organizational need for liquidity to fund catastrophe payments. Sizable claims payments require timely access to funds. Treasury securities are a critical component of the liquidity program based upon credit quality, depth of market, and maturity profile. Treasury holdings are not significantly impacted by a view on future market conditions (such as interest rates, economic cycles, trading mindset, etc)."*

Source: GAO survey of market participants. | GAO-20-131

The importance of these characteristics was consistent across sectors, as liquidity, depth, and safety support a variety of business practices and needs. For example, Treasury securities serve as a close substitute to cash for financial institutions and corporate treasurers, are one of the cheapest and one of the most widely used forms of collateral for financial transactions, and are a benchmark for pricing many other financial products, such as corporate bonds, derivatives, and mortgages.[18]

In addition, international investors and experts we interviewed said that both foreign official sector and foreign private sector investors value the liquidity, depth, and safety of the Treasury market. For example, foreign central banks value the ability to buy and sell large quantities of securities to assist in managing their exchange rates and, in times of economic stress, provide foreign currency credit to their country's businesses that borrow or trade in U.S. dollars. Officials from a foreign central bank we spoke with told us that Treasury securities are well suited for their

[18]A derivative is a financial contract whose value is derived from the performance of underlying market factors, such as interest rates, currency exchange rates, and commodity, credit, and equity prices. For example, a Treasury futures contract is an agreement to buy or sell Treasury securities at a future date for a fixed price. The value of such a contract is derived from the value of the underlying Treasury securities.

investment needs because of the combination of the large and deep market—which accommodates high-volume transactions—and their safety and liquidity.

The combination of liquidity, depth, and safety supports reliable demand for Treasury securities through changing market conditions. A diverse investor base helps to protect Treasury from large swings in interest costs due to shifts in demand from particular sectors.

*"First and foremost, we think Treasuries are the most liquid instruments in our portfolio and we do transact in large size. Being able to buy and sell with little market impact across the yield curve is very important."*
Source: GAO survey of market participants. | GAO-20-131

After liquidity, depth, and safety, the fourth most cited characteristic of Treasury securities (25 of 67 survey respondents) was the ability to purchase across the yield curve—that is, purchasing securities of various maturities to match investment needs. In addition to issuing securities at various maturities, Treasury's strategic plan includes a goal to develop new products to increase the investor base.[19] As previously noted, Treasury began issuing 2-month bills in October 2018. Market participants we surveyed said there is potential demand for (1) a new nominal security; (2) expansion of the floating rate note offerings; and (3) a zero-coupon bond.[20] (For more information on the survey results, see appendix II.)

*"An increase in global risk (political or economic) will determine flight to quality and higher allocation to Treasuries."*
Source: GAO survey of market participants. | GAO-20-131

Many investors are willing to accept a lower yield on Treasury securities in exchange for the liquidity, depth, and safety they provide. For example, only 14 of the 67 market participants we surveyed cited the yield of Treasury securities as one of the top three characteristics. Market participants we surveyed and interviewed emphasized that there is no true substitute for Treasury securities because other assets come with additional risks or do not have the liquidity and depth of the Treasury market. As a result, in times of economic uncertainty or stress, investors often move quickly into Treasury securities—known as a "flight to quality"—which increases demand and drives down yields.

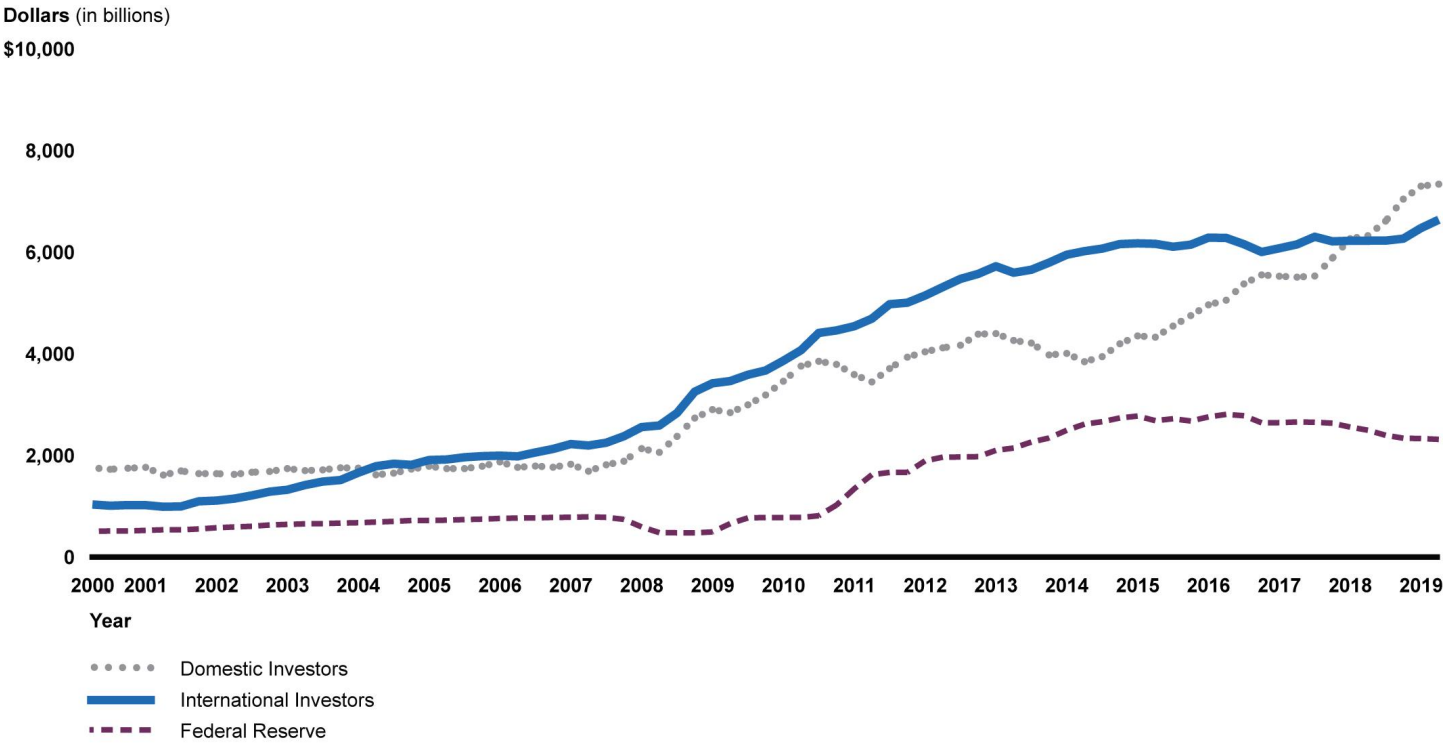
[19]Department of the Treasury, *2018-2022 Strategic Plan,* Washington, D.C.

[20]Zero coupon bonds are bonds that are sold at discount from face value and do not pay interest during the life of the bond. The investor's return is the difference between the purchase price of the bond and its face value when redeemed.

## Changes in U.S. Monetary Policy Operations, Financial Regulation, and Foreign Central Bank Needs Have Affected the Composition of Demand

While a broad and diverse investor base helps promote stability for the Treasury market as a whole, demand for Treasury securities by different types of investors fluctuates over time, reflecting changes in the investment needs of particular sectors. Since the 2007-2009 financial crisis, changes in monetary policy operations, financial regulation, and foreign central bank needs have changed the composition of demand for Treasury securities across different sectors. Figure 5 shows the overall changes in holdings of Treasury securities by the three primary investor groups—domestic investors, international investors, and the Federal Reserve.

**Figure 5: U.S. Treasury Security Holdings by Domestic Investors, International Investors, and the Federal Reserve, June 2000 to June 2019**




Source: GAO analysis of the Federal Reserve Financial Accounts of the United States data. | GAO-20-131

**Data table for Figure 5: U.S. Treasury Security Holdings by Domestic Investors, International Investors, and the Federal Reserve, June 2000 to June 2019**

| Time | Year | International Investors | Federal Reserve | Domestic Investors |
|---|---|---|---|---|
| 2000Q2 | 2000 | $1,033 | $505 | $1,754 |
| 2000Q3 | 2000 | $1,009 | $511 | $1,725 |
| 2000Q4 | 2000 | $1,021 | $512 | $1,747 |
| 2001Q1 | 2001 | $1,020 | $524 | $1,764 |
| 2001Q2 | 2001 | $988 | $535 | $1,613 |
| 2001Q3 | 2001 | $995 | $534 | $1,693 |
| 2001Q4 | 2001 | $1,095 | $552 | $1,641 |
| 2002Q1 | 2002 | $1,110 | $575 | $1,640 |
| 2002Q2 | 2002 | $1,148 | $591 | $1,625 |
| 2002Q3 | 2002 | $1,211 | $604 | $1,668 |
| 2002Q4 | 2002 | $1,285 | $629 | $1,682 |
| 2003Q1 | 2003 | $1,323 | $641 | $1,740 |
| 2003Q2 | 2003 | $1,415 | $652 | $1,700 |
| 2003Q3 | 2003 | $1,484 | $656 | $1,714 |
| 2003Q4 | 2003 | $1,514 | $667 | $1,755 |
| 2004Q1 | 2004 | $1,658 | $674 | $1,749 |
| 2004Q2 | 2004 | $1,786 | $687 | $1,617 |
| 2004Q3 | 2004 | $1,835 | $700 | $1,649 |
| 2004Q4 | 2004 | $1,814 | $718 | $1,729 |
| 2005Q1 | 2005 | $1,908 | $717 | $1,785 |
| 2005Q2 | 2005 | $1,919 | $725 | $1,739 |
| 2005Q3 | 2005 | $1,963 | $736 | $1,739 |
| 2005Q4 | 2005 | $1,984 | $744 | $1,785 |
| 2006Q1 | 2006 | $1,994 | $759 | $1,871 |
| 2006Q2 | 2006 | $1,980 | $766 | $1,764 |
| 2006Q3 | 2006 | $2,057 | $769 | $1,789 |
| 2006Q4 | 2006 | $2,126 | $779 | $1,766 |
| 2007Q1 | 2007 | $2,222 | $781 | $1,824 |
| 2007Q2 | 2007 | $2,194 | $791 | $1,688 |
| 2007Q3 | 2007 | $2,248 | $780 | $1,814 |
| 2007Q4 | 2007 | $2,376 | $741 | $1,884 |
| 2008Q1 | 2008 | $2,557 | $591 | $2,133 |
| 2008Q2 | 2008 | $2,588 | $479 | $2,058 |
| 2008Q3 | 2008 | $2,834 | $477 | $2,373 |
| 2008Q4 | 2008 | $3,253 | $476 | $2,734 |

| Time | Year | International Investors | Federal Reserve | Domestic Investors |
|---|---|---|---|---|
| 2009Q1 | 2009 | $3,418 | $492 | $2,900 |
| 2009Q2 | 2009 | $3,462 | $656 | $2,842 |
| 2009Q3 | 2009 | $3,586 | $769 | $2,994 |
| 2009Q4 | 2009 | $3,671 | $777 | $3,188 |
| 2010Q1 | 2010 | $3,862 | $777 | $3,458 |
| 2010Q2 | 2010 | $4,070 | $777 | $3,757 |
| 2010Q3 | 2010 | $4,409 | $812 | $3,851 |
| 2010Q4 | 2010 | $4,459 | $1,021 | $3,790 |
| 2011Q1 | 2011 | $4,541 | $1,340 | $3,590 |
| 2011Q2 | 2011 | $4,691 | $1,620 | $3,445 |
| 2011Q3 | 2011 | $4,974 | $1,665 | $3,708 |
| 2011Q4 | 2011 | $5,004 | $1,663 | $3,932 |
| 2012Q1 | 2012 | $5,145 | $1,892 | $4,038 |
| 2012Q2 | 2012 | $5,311 | $1,965 | $4,117 |
| 2012Q3 | 2012 | $5,473 | $1,968 | $4,167 |
| 2012Q4 | 2012 | $5,571 | $1,974 | $4,385 |
| 2013Q1 | 2013 | $5,721 | $2,098 | $4,397 |
| 2013Q2 | 2013 | $5,595 | $2,144 | $4,262 |
| 2013Q3 | 2013 | $5,653 | $2,262 | $4,210 |
| 2013Q4 | 2013 | $5,793 | $2,341 | $3,976 |
| 2014Q1 | 2014 | $5,948 | $2,494 | $4,006 |
| 2014Q2 | 2014 | $6,019 | $2,614 | $3,843 |
| 2014Q3 | 2014 | $6,069 | $2,662 | $3,942 |
| 2014Q4 | 2014 | $6,158 | $2,736 | $4,196 |

Note: We excluded federal retirement funds' holdings of Treasury securities from the Domestic Investor category because they primarily invest in nonmarketable Treasury securities. As of June 2019, federal government retirement funds had about $1.7 trillion in Treasury securities.

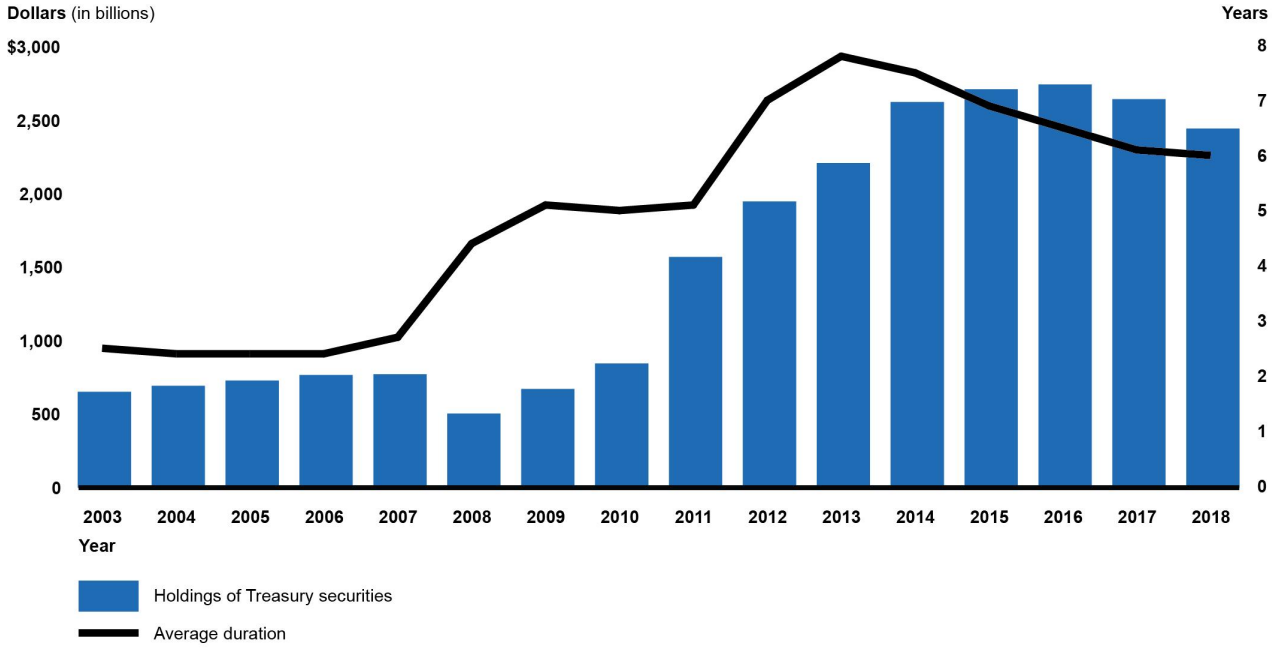
## The U.S. Federal Reserve Has Substantially Increased Its Participation in the Treasury Market

As part of its response to the 2007-2009 financial crisis, the Federal Reserve substantially increased its purchases of longer-term Treasury securities. In turn, these purchases substantially increased the overall size and duration of the Federal Reserve's holdings of Treasury securities (see fig. 6).[21] From 2008 to 2014, its holdings of Treasury securities

[21]Duration is closely related to maturity, and measures the average time taken for the security to pay back the original investment.

increased by 475 percent; from roughly $480 billion in 2008 to $2.7 trillion in 2014. The average duration of the holdings also increased from 2.7 years in 2007 to a high of 7.8 years in 2013.

**Figure 6: Average Value and Duration of Treasury Securities Held by the Federal Reserve, 2003 to 2018**




Source: GAO analysis of data from the Federal Reserve Bank of New York and the Federal Reserve Board of Governors Z.1 Financial Accounts of the United States. | GAO-20-131

**Data table for Figure 6: Average Value and Duration of Treasury Securities Held by the Federal Reserve, 2003 to 2018**

| Year | Holdings of Treasury Securities | Average Duration (Years) |
|---|---|---|
| 2003 | 654091 | 2.5 |
| 2004 | 694909 | 2.4 |
| 2005 | 730656 | 2.4 |
| 2006 | 768186 | 2.4 |
| 2007 | 772917 | 2.7 |
| 2008 | 505656 | 4.4 |
| 2009 | 673634 | 5.1 |
| 2010 | 846714 | 5.0 |
| 2011 | 1572023 | 5.1 |
| 2012 | 1949664 | 7.0 |
| 2013 | 2211395 | 7.8 |
| 2014 | 2626803 | 7.5 |
| 2015 | 2713067 | 6.9 |

| Year | Holdings of Treasury Securities | Average Duration (Years) |
|---|---|---|
| 2016 | 2746147 | 6.5 |
| 2017 | 2646199 | 6.1 |
| 2018 | 2445975 | 6.0 |

**Basis point**

A basis point is equal to one-one hundredth of a percent and is a common unit of measure in finance to describe the percentage change in the value or rate of a financial instrument.

Source: GAO. | GAO-20-131

This substantial shift in the size and composition of the Federal Reserve's holdings began in late 2008 when the Federal Reserve undertook the first of a series of large-scale asset purchase programs, often referred to as quantitative easing, to better reduce long-term interest rates and improve economic conditions. The Federal Reserve's purchases of long-dated Treasury securities, and other assets, substantially increased the size of its balance sheet and meaningfully reduced interest rates on long-term Treasury securities.[22] One study estimated that quantitative easing reduced interest rates on 10-year Treasury securities as much as 160 basis points (or 1.6 percentage points) (see sidebar).[23]

**Federal Funds Rate**

A market determined interest rate that banks charge each other to borrow reserves overnight.

Source: GAO. | GAO-20-131

The Federal Reserve needed a new approach to managing short-term interest rates while maintaining a large balance sheet. Therefore, in 2014, the Federal Reserve outlined a new framework it intended to adopt for implementing monetary policy when it began to increase interest rates for the first time since the financial crisis. The new operating framework entails setting two short-term interest rates to manage the federal funds rate (see sidebar).[24] Changes in these rates are intended to influence other short-term interest rates (including rates on Treasury securities), the availability of credit, and the economy as a whole to assist the Federal Reserve in achieving its monetary policy objectives.

In response to the improving economy the Federal Reserve, in October 2017, began a process to slowly shrink its balance sheet by limiting the reinvestment of proceeds from maturing securities, intending to return to a smaller balance sheet and lower holdings of Treasury securities. In January 2019, however, the Federal Reserve announced that it intended to continue to operate with its post-crisis framework and would therefore evaluate the appropriate time to stop shrinking its balance sheet. In

[22]The Federal Reserve balance sheet holds Treasury securities, federal agency debt, mortgage backed securities, and other items as assets and, largely, cash reserves and currency in circulation as liabilities. There are a range of estimates of the impact of quantitative easing on interest rates. These estimates have been surveyed in Joseph Gagnon, *Quantitative Easing, an Underappreciated Success,* Peterson Institute Policy Brief (April 2016).

[23]Arvind Krishnamurthy and Annette Vissing-Jorgensen, "The Effects of Quantitative Easing on Interest Rates: Channels and Implications for Policy," *Brookings Papers on Economic Activity* (2011) No. 2.

[24]The Federal Reserve has direct control over two overnight interest rates, the interest it pays banks on reserves and the interest rate available to a range of counterparties that participate in overnight reverse repurchase agreements against securities held in the System Open Market Account (the reverse repurchase agreement rate).

October 2019, the Federal Reserve announced that it would expand its balance sheet, through purchases of Treasury bills, to satisfy increases in the market's demand for cash and keep the federal funds rate in its target range.[25] As a result of these announcements, the Federal Reserve will continue to hold a much larger portfolio of Treasury securities and will therefore continue to purchase much larger quantities of Treasury securities on an ongoing basis.

If economic and financial conditions warrant, the Federal Reserve has stated that it may again buy specific maturities of Treasury securities in significant amounts to influence prevailing long-term interest rates to improve economic conditions and thereby aid in achieving its monetary policy objectives. The possibility of these purchases during future periods of economic stress could increase current demand for Treasury securities among market participants, even during normal times. This could keep interest rates on Treasury securities somewhat lower than they would be otherwise.

[25]In September 2019, volatility in overnight funding markets used by financial institutions caused a number of short-term interest rates to increase significantly, and the federal funds rate to briefly exceed the Federal Reserve's target range. In response, the Federal Reserve undertook open market operations—similar to the pre-crisis framework for implementing monetary policy—to better influence these short term interest rates.

## Some Financial Institutions Changed Their Holdings of Treasury Securities in Response to Regulations Issued after the 2007-2009 Financial Crisis

The implementation of recent financial regulations and reforms in the wake of the 2007-2009 financial crisis resulted in changes in certain domestic sectors' holdings of Treasury securities, including money market funds and banking institutions.

### Money Market Funds

**Money Market Fund**

A money market fund is a type of mutual fund that is required by law to invest in low-risk securities. Money market funds act as intermediaries between investors seeking highly liquid, safe investments and corporate and government entities that issue short-term debt to fund operations. Money market funds typically invest in short-term, highly liquid securities, such as Treasury bills, and pay dividends that generally reflect short-term interest rates.

Source: GAO. | GAO-20-131

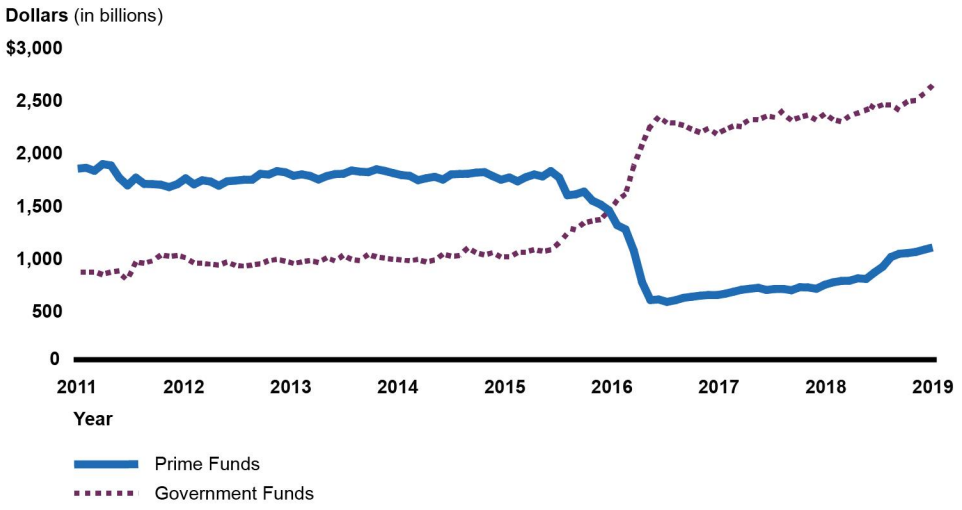
Money market fund reforms that took effect in 2016 resulted in a significant increase in this sector's holdings of Treasury securities (see sidebar). This sector experienced significant volatility during the 2007-2009 financial crisis as large numbers of investors rapidly withdrew from these funds. To address this risk, the Securities and Exchange Commission (SEC) placed a number of restrictions on prime money market funds.[26]

Prime funds invest primarily in taxable short-term corporate and bank debt. The SEC regulations exempted government money market funds—which invest only in cash and U.S. government securities, including Treasury securities—from certain requirements because these assets are less risky and more liquid than other investments.[27] Since these exemptions make government funds particularly attractive, many investors replaced prime money market fund investments with government money market fund investments (see fig. 7).

[26]For example, the rules require prime money market funds to value their portfolio securities using market-based factors and sell and redeem shares based on a floating net asset value instead of the special pricing and valuation conventions that previously allowed them to maintain a constant share price of $1.00. 79 Fed. Reg. 47736 (Aug. 14, 2014).

[27]17 C.F.R. § 270.2a-7(c)(2)(iii).

**Figure 7: U.S. Money Market Fund Total Assets by Fund Type, January 2011 to August 2019**




Source: GAO analysis of Department of the Treasury's Office of Financial Research data. | GAO-20-131

**Data table for Figure 7: U.S. Money Market Fund Total Assets by Fund Type, January 2011 to August 2019**

| Year | Prime Funds | Government Funds |
|---|---|---|
| 2011 | 1808.12 | 828.68 |
| 2012 | 1661.05 | 986.57 |
| 2013 | 1784.64 | 945.77 |
| 2014 | 1802.01 | 971.08 |
| 2015 | 1770.57 | 1011.74 |
| 2016 | 1564.55 | 1229.51 |
| 2017 | 583.66 | 2217.15 |
| 2018 | 667.91 | 2294.01 |
| 2019 | 824.01 | 2382.46 |

*"The biggest key change was 2a-7 [money market] reform and the asset migration that came from the changes to prime funds. This has most affected our demand for Treasury securities."*

Source: GAO survey of market participants. | GAO-20-131

Money market funds now represent one of the largest shares of Treasury securities holdings among domestic investors, holding approximately 8 percent (around $743 billion) of the domestic total as of June 2019 (excluding the Federal Reserve).[28] The five money market funds we

[28]That calculation is based on the value of Treasury securities held by money market funds from the "Financial Accounts of the United States" produced by the Federal Reserve.

surveyed all reported that one of the top three ways they use Treasury securities is to comply with regulations.

### Banking Institutions

Following the financial crisis, U.S. and international regulators implemented reforms intended to promote a more resilient financial sector, including reforms aimed at the banking sector.[29] Overall, these reforms increased demand from large banking institutions for Treasury securities.

The reforms strengthened global capital and liquidity standards to make banking institutions more resilient and better able to lend in the event of an economic shock. For example, through the "Liquidity Coverage Ratio," large banking institutions are now required to ensure they can cover short-term cash needs by holding a proportionate amount of high-quality liquid assets—cash reserves, Treasury securities, or Ginnie Mae securities.[30] Since Treasury securities are classified as part of the group of most liquid assets, they are attractive for banks looking to meet these requirements.

*"Changes in bank liquidity regulations steered us to use more Treasuries in recent years."*
Source: GAO survey of market participants. | GAO-20-131

Overall, bank holdings of Treasury securities increased from less than 1 percent of the sector's total assets in 2008 (just over $100 billion) to more than 3 percent (over $800 billion) as of June 2019.[31] The five banks we surveyed all reported that one of the top three ways they use Treasury securities is to comply with regulations.

[29]In 2010, the Dodd-Frank Wall Street Reform and Consumer Protection Act was signed into law in the United States. Pub. L. No. 111-203, 124 Stat. 1376 (July 21, 2010). In 2013, the Basel III framework was adopted by U.S. federal banking regulators. 78 Fed. Reg. 62018 (Oct. 11, 2013); Basel Committee on Banking Supervision, *Basel III: A Global Regulatory Framework for More Resilient Bank and Banking Systems* (Basel, Switzerland: December 2010, revised June 2011).

[30]Cash reserves, Treasury securities, and Ginnie Mae securities are designated Level 1 high-quality liquid assets. The Government National Mortgage Association (Ginnie Mae) is a government-owned corporation within the Department of Housing and Urban Development that guarantees the timely payment of principal and interest on mortgage-backed securities issued by financial institutions.

[31]That calculation is based on assets, including Treasury securities, held by private depository institutions and holding companies from the "Financial Accounts of the United States" produced by the Federal Reserve.

## Foreign Central Bank Holdings of Treasury Securities Have Changed over Time Based on the Need to Manage Their Exchange Rates

Foreign official demand for Treasury securities—which includes foreign governments and central banks as well as government-owned investment funds—has fluctuated based on economic conditions, especially the need for foreign central banks to manage their exchange rates. After the 2007-2009 financial crisis, foreign governments increased holdings of Treasury securities from $1.5 trillion in 2007 to $4.1 trillion in 2015. In recent years, foreign governments' accumulation of Treasury securities has slowed substantially. As of December 2018, they held about $4 trillion, or about 25 percent of all marketable Treasury securities.[32] According to market participants and subject matter experts we interviewed, this slowdown does not imply a change in the nature of foreign demand for Treasury securities, but rather is a consequence of foreign central banks' changing need for foreign reserves—many of which are held in the form of Treasury securities—to assist in managing their currencies.

**Reserve currency**

A reserve currency is a currency used by central banks to hold their foreign exchange reserves.

Source: GAO. | GAO 20-131

The U.S. dollar is the dominant currency used by foreign central banks in their official foreign exchange reserves, referred to as a reserve currency (see sidebar).[33] As the reserve currency, foreign central banks buy and sell U.S. dollars to influence the value of their currencies to help manage their exchange rates, among other uses. To this end, foreign central banks hold Treasury securities in part because they can be converted to U.S. dollars quickly and in great quantity.

[32]That calculation is based on data from the Treasury International Capital System, accessed on July 30, 2019.

[33]According to IMF data, about 62 percent of reported foreign reserves are denominated in U.S. dollars.

Foreign central banks often act to limit the impact of exchange rate fluctuations and maintain the stability of their own currency.[34] For example, a fall in U.S. interest rates tends to reduce the demand for dollars as private investors seek higher yielding assets abroad. In response, foreign central banks buy dollars—often investing those dollars in Treasury securities—and sell their own currency on foreign exchange markets which reduces the demand for—and hence the value of—their own currency relative to the dollar (see fig. 8).

**Figure 8: Illustrative Relationship Between U.S. Interest Rates and Exchange Rates**


Source: GAO. | GAO 20-131

Conversely, when U.S. interest rates began increasing in 2015, dollar-denominated assets became more attractive to private investors seeking higher yields, which increased the value of the dollar relative to other currencies. In response to this and other events, experts we spoke with highlighted the role of China in particular— the largest foreign official holder of Treasury securities—in selling Treasury securities during that time period to help stabilize its exchange rate. Because U.S. interest rates are cyclical, foreign central bank interventions will also be cyclical, which implies their demand for Treasury securities will continue, to some

[34]Countries that are members of the International Monetary Fund (IMF) are obligated to promote a stable system of exchange rates. In doing so, members are permitted to choose their own exchange rate arrangements and to intervene in currency markets to counter disorderly conditions, such as disruptive short-term movements in exchange rates. Members should avoid manipulating exchange rates to gain an unfair competitive advantage. The IMF assesses member exchange rate arrangements by reviewing developments such as protracted large-scale intervention in one direction in the exchange market, fundamental exchange rate misalignment, or large and prolonged current account deficits or surpluses, among other potential developments. See *Articles of Agreement of the International Monetary Fund*, International Monetary Fund (April 2016), and *Bilateral Surveillance over Members' Policies*, International Monetary Fund (June 2007).

extent, to vary over time so long as the U.S. dollar is a dominant reserve currency.

## Treasury Market Faces Risks from Debt Limit Impasses, Rising Debt, and Changing Market Conditions That Could Compromise the Safety or Liquidity of Treasury Securities

Future changes in market conditions or policies—especially to the extent those changes significantly affect the combination of liquidity, depth, and safety of Treasury securities—could raise new and important risks to the Treasury market. Market participants we interviewed and surveyed across various sectors have raised concerns about risks that could affect demand for Treasury securities: risks from a future debt limit impasse, the sustainability of the federal debt, the dollar's status as the primary reserve currency, and changes in the structure of the market which might affect liquidity, all of which could degrade the unique advantages of the Treasury market.

## Debt Limit Impasses

**Debt Limit**

The debt limit is a legal limit on the total amount of federal debt that can be outstanding at one time. (31 U.S.C. §§ 3101, 3101A.)

It is not a control on debt but rather an after-the-fact measure that restricts the Department of the Treasury's authority to borrow to finance the decisions already enacted by Congress and the President.

Source: GAO. | GAO-20-131

Many market participants from all 10 sectors we surveyed and interviewed identified delays in raising (or suspending) the debt limit as potentially undermining the perceived safety of Treasury securities (see sidebar). During these times, Treasury departs from normal cash and debt management operations and takes extraordinary actions to avoid breaching the limit.[35] Once all of the extraordinary actions are exhausted, Treasury may not issue debt without further action from Congress and could be forced to delay payments until sufficient funds become available. Treasury could eventually be forced to default on legal debt obligations.

We previously reported that delays in raising the debt limit can lead to increased borrowing costs and significant disruptions in the Treasury market.[36] For example, there were lengthy impasses over the debt limit in 2011 and 2013. During the 2013 impasse, investors reported taking the unprecedented action of systematically avoiding certain Treasury securities (i.e., those that would mature around the dates when Treasury projected it would exhaust the extraordinary actions available). Consequently, interest rates for these securities increased dramatically and liquidity declined in the secondary market where securities are traded among investors.

[35]Extraordinary actions include temporarily suspending investments to the Government Securities Investment Fund of the Federal Employees' Retirement System. See *Debt Limit: Market Response to Recent Impasses Underscores Need to Consider Alternative Approaches,* GAO-15-476 (Washington, D.C.: July 9, 2015), appendix III for more information on the extraordinary actions available to Treasury to manage debt when delays in raising the debt limit occur.

[36]For more information, see GAO, *The Nation's Fiscal Health: Actions Needed to Achieve Long-Term Fiscal Sustainability,* GAO-19-611T (Washington, D.C.: June 26, 2019), GAO-15-476, *Debt Limit: Analysis of 2011-2012 Actions Taken and Effect of Delayed Increase on Borrowing Costs*, GAO-12-701 (Washington, D.C.: July 23, 2012), and *Debt Limit: Delays Create Debt Management Challenges and Increase Uncertainty in the Treasury Market*, GAO-11-203 (Washington, D.C.: Feb. 22, 2011).

*"Treasury securities are held for liquidity management. It is critical that we have confidence in the timely payment of principal and interest on U.S. Treasury securities. Gamesmanship by political parties that impacts the confidence in timely payment on U.S. Treasury securities simply is not acceptable. We therefore are forced to invest in other forms of liquid securities, or to modify our participation in T-bills to avoid key dates around debt limits."*

Source: GAO survey of market participants. | GAO-20-131

Overall, 48 of the 67 (72 percent) investors we surveyed reported that they anticipated they would take similar action—such as avoiding purchases of securities that would mature around the affected dates and requiring higher yields for purchasing those securities—to manage potential market disruptions caused by any future debt limit impasses.

A default would have devastating effects on U.S. and global economies and the public. It is generally recognized that a default would prevent the government from honoring all of its obligations to pay for such things as program benefits; contractual services and supplies; employees' salaries and wages and retirement benefits; and principal on maturing securities. Any disruption of these payments would have cascading effects on the economy. A default would call into question the full faith and credit of the U.S. government, and therefore immediately and significantly decrease demand for Treasury securities. Those investors who did purchase Treasury securities would demand a premium in the form of higher interest rates, to compensate for this increased risk.

We have reported numerous times that the full faith and credit of the United States must be preserved. We have recommended that Congress consider alternative approaches to the current debt limit to avoid seriously disrupting the Treasury market and increasing borrowing costs.[37] Experts have suggested replacing the debt limit with a fiscal rule imposed on spending and revenue decisions. As previously reported, Congress could consider this change as part of a broader plan to put the government on a more sustainable fiscal path.[38]

## Sustainability of the Federal Debt

Some market participants we interviewed and surveyed expressed concern that continued deterioration of the federal government's fiscal position could negatively affect the safety of Treasury securities. We have reported that the federal government is on an unsustainable fiscal path.[39] Over the last 10 years, debt held by the public has more than doubled; increasing from about $7 trillion in 2009 to $16 trillion in 2019. We, the Office of Management and Budget, and the Congressional Budget Office

[37]See most recently GAO-19-611T.

[38]GAO-19-611T.

[39]GAO, *The Nation's Fiscal Health: Action Is Needed to Address the Federal Government's Fiscal Future* GAO-19-314SP (Washington, D.C.: Apr. 10, 2019).

estimate that federal debt will continue to grow, surpassing its historical high of 106 percent of gross domestic product within 13 to 20 years.[40] Congress and the administration face serious economic, security, and social challenges that require difficult policy choices in the near term in setting national priorities and charting a path forward for economic growth. We have reported that a broad plan is also needed to put the federal government on a sustainable long-term fiscal path and ensure that the United States remains in a strong economic position to meet its security and social needs, as well as to preserve the flexibility to address unforeseen events.[41]

In August 2011, one of the major credit rating agencies, Standard & Poor's, lowered its long-term sovereign credit rating on the U.S. from AAA to AA+, citing the United States' rising public debt burden and greater policymaking uncertainty.[42] The other major rating agencies have not lowered their rating of U.S. debt but continually monitor fiscal conditions and the political climate.[43]

*"If federal budgets continue to increase and $1 trillion or more deficits are the norm, clients could begin to diversify away from U.S. Treasuries as a result of the deteriorating fundamentals."*

Source: GAO survey of market participants. | GAO-20-131

If market participants perceive that the deteriorating fiscal outlook of the federal government could undermine the credit quality of Treasury securities, some investors could seek out alternative investments or demand a risk premium. This could further increase yields and therefore costs to Treasury. In general, larger deficits are likely to increase the yields on Treasury securities that are required by market participants, all else equal.[44]

[40]GAO-19-314SP.

[41]GAO-19-314SP.

[42]See Standard & Poor's *United States of America Long-Term Rating Lowered To 'AA+' Due to Political Risks, Rising Debt Burden; Outlook Negative* (Aug. 5, 2011).

[43]See Moody's Investors Service, *Government of United States—AAA Stable: Annual Credit Analysis*, (June 14, 2019) and Fitch Ratings, *Fitch Affirms the United States at 'AAA'; Outlook Stable* (New York: Apr. 2, 2019).

[44]Congressional Budget Office, *The Effect of Government Debt on Interest Rates,* Working Paper 2019-01 (Washington, D.C.: March 2019) and Arvind Krishnamurthy and Annette Vissing-Jorgensen, "The Aggregate Demand for Treasury Securities," *Journal of Political Economy*, Vol. 120, No. 2 (April 2012), pp. 233-267.

## U.S. Dollar's Status as Reserve Currency

Market participants and subject matter experts we interviewed emphasized the importance of the U.S. dollar's status as the dominant global reserve currency in supporting demand for Treasury securities. So long as the U.S. dollar remains the dominant reserve currency worldwide, Treasury securities are likely to remain in high demand by foreign central banks and other investors.[45]

*"Liquidity and credit quality is paramount. Anything that degrades either, not only endanger reserve currency status but undermines the economy in general."*
Source: GAO survey of market participants. | GAO-20-131

However, events that undermine the liquidity, safety, or depth of the Treasury market—such as debt limit impasses or concerns about fiscal sustainability—could reduce the share of U.S. dollar assets in foreign central bank reserves. Furthermore, reduced openness of the U.S. economy in global trade or financial markets would reduce the advantages of holding U.S. dollar reserves and could similarly precipitate a shift away from the U.S. dollar toward other currencies. Such a shift would likely reduce foreign official holdings of Treasury securities and could potentially reduce demand from other sectors that use U.S. dollars for global trade and other transactions. Consequently, Treasury's cost to borrow would likely increase.

## Changing Market Structure

Secondary market trading in Treasury securities is increasingly conducted on electronic platforms. The resulting changes and innovations have led to a number of benefits for market participants, but could also introduce new risks. For example, the Treasury Market Practices Group reported in 2015 that electronic trading had arguably improved overall liquidity through enhanced order flow and competition, reducing trading costs and allowing market participants to more effectively manage risk.[46]
Many market participants we surveyed agreed. For example, a market participant we surveyed reported that increased electronification of the Treasury market made it easier to price, trade, and settle holdings.

[45]The use of a particular country's currency as a reserve currency is influenced by a number of factors, including the scale of the country's involvement in international trade, the country's macroeconomic stability, and the size and openness of the country's financial system (including the prevalence of liquid and safe investment options, such as Treasury securities).

[46]Treasury Market Practices Group, *Automated Trading in Treasury Market*s, June 2015. The Treasury Market Practices Group is sponsored by the Federal Reserve Bank of New York.

However, market participants we surveyed and interviewed also told us that there is a potential risk of reduced liquidity and increased volatility in the Treasury secondary market. Market participants attributed these potential risks to a number of different factors related to the changing structure of the market: (1) increased use of automated trading; (2) increased role of principal trading firms; and (3) post-crisis financial reforms.

## Increased Use of Automated Trading

**Automated Trading**

A subset of electronic trading that relies on computer algorithms—advanced mathematical models—to make decisions about the timing, price, and quantity of the market order.

**High-frequency Trading**

A subset of automated or algorithmic trading in which the trading opportunities are identified and acted upon algorithmically and executed through technology at high speeds.

Source: GAO. | GAO-20-131

Market participants we surveyed and interviewed said that automated trading—particularly high-frequency algorithmic trading (see sidebar)—may introduce operational risks that could interfere with market functioning. Automated trading relies on speeds that are beyond manual detection and intervention. Consequently, the Treasury Market Practices Group pointed out that internal controls may not be sufficient to counteract malfunctioning algorithms or algorithms reacting to inaccurate or unexpected data. For example, a malfunctioning algorithm could interfere with market functioning by creating sharp, short-lived spikes in prices as a result of other algorithms responding to an initial incorrect order.[47]

*"Our Treasury trading desk is about 50 percent smaller than it was a decade ago, and we now have nearly as many traders devoted to algorithmic and electronic market-making as traditional market-making activity."*

Source: GAO survey of market participants. | GAO 20 131

Market participants also noted that this type of trading may lead to more frequent episodes of volatility, making it more difficult to buy or sell Treasury securities at predictable or stable prices, particularly during periods of market stress. In one notable example, on October 15, 2014—in what has been referred to as a "flash rally"—the Treasury secondary market experienced record-high trading volumes and significant intraday volatility that could not be explained by external policy announcements or other factors. A 2015 interagency report examining the events of that day observed that as the speed of market activity increases, the Treasury market could continue to experience more frequent variations in market liquidity than in the past.[48]

**Market-Maker**

A firm that continuously provides prices to both buyers and sellers in the market, and stands ready to transact at those prices in various market environments.

Source: GAO. | GAO-20-131

## Increased Role of Principal Trading Firms

Advancements in technology, and the associated growth in high-speed electronic trading, have contributed to a shift in the composition of the types of firms actively trading and making markets in Treasury securities. Market-makers serve a crucial role in financial markets by providing liquidity to facilitate market efficiency and functioning (see sidebar). The 2015 interagency report examining the "flash rally" found that principal trading firms—proprietary trading firms that almost exclusively use

[47]Treasury Market Practices Group, *Automated Trading in Treasury Market*s, June 2015.

[48]U.S. Department of the Treasury, Board of Governors of the Federal Reserve System, Federal Reserve Bank of New York, U.S. Securities and Exchange Commission, U.S. Commodity Futures Trading Commission; *Joint Staff Report: The U.S. Treasury Market on October 15, 2014* , July 13, 2015.

automated trading strategies—conducted more than half of the trading activity on certain electronic platforms on the days reviewed.[49]

*"Algorithmic trading has adversely affected liquidity in the U.S. Treasury space. During volatile periods, the lack of true liquidity is noticeable."*

Source: GAO survey of market participants. | GAO 20 131

Market participants we spoke with expressed concern that some of the principal trading firms might not continue to provide liquidity in times of stress. According to the 2015 interagency report, principal trading firms tend to buy and sell frequently in small amounts, rarely holding Treasury securities beyond a day, and generally not trading on behalf of clients.[50]

Additionally, the extent of these firms' presence in the Treasury market and the role they play is less well understood in part because they are not required to report their Treasury holdings and other financial information to the SEC that other financial institutions, such as broker-dealers and investment companies, are required to report.[51] These firms' holdings of Treasury securities are reflected in the Federal Reserve's "household" category; the largest category of Treasury securities holdings among all domestic investors (excluding the Federal Reserve).[52] As of June 2019, "households" held roughly $2 trillion in Treasury securities, up from $565 billion at the beginning of 2009—a 249 percent increase.

According to Treasury, its 2018 market outreach revealed that data on the size of trades (market volume) are not transparent, which may hinder liquidity for certain securities.[53] In September 2019, Treasury announced that the Financial Industry Regulatory Authority, Inc. (FINRA) expects to publicly release aggregate trading volume data for the Treasury secondary market in 2020.[54]

[49]*Joint Staff Report: The U.S. Treasury Market on October 15, 2014*.

[50]*Joint Staff Report: The U.S. Treasury Market on October 15, 2014*.

[51]Certain hedge funds and principal trading firms qualify for exemptions from certain securities laws and regulations, including the requirement to register as a broker-dealer or an investment company, as applicable. See, 15 U.S.C. §§ 77d, 78*l*(g), 80b-3(b).

[52]In the Financial Accounts of the United States, the Federal Reserve calculates the "household" category as a residual sector meaning that it is the balance of holdings after all other sectors have been accounted.

[53]Department of the Treasury, *Remarks of Deputy Secretary Justin Muzinich at the 2019 U.S. Treasury Market Structure Conference*, Sept. 23, 2019.

[54]FINRA is a privately funded nongovernmental entity, referred to as a self-regulatory organization. FINRA is the largest independent regulator of securities firms doing business with the public in the United States. SEC oversees FINRA's operations and programs.

*"Balance sheet costs and regulatory rule changes have reduced the amount of inventory that the average primary dealer is able to accommodate."*

Source: GAO survey of market participants. | GAO-20-131

## Post-Crisis Financial Reforms

At the same time that the number of principal trading firms increased, market participants we surveyed and interviewed told us that broker-dealers are holding a smaller inventory of Treasury securities, which they attributed to certain post-crisis financial reforms that increased the cost of holding a large inventory of securities, including Treasury securities, for broker-dealers that are part of the larger banking institutions.

As discussed above, these reforms were introduced to promote a more resilient financial sector. One set of reforms requires that large banking institutions hold a certain amount of high-quality liquid assets, including Treasury securities, to cover short-term cash needs. Another bank capital regulation—the supplementary leverage ratio—requires an institution to hold a supply of capital proportionate to total assets, which includes both low-risk assets (e.g., Treasury securities) and higher-risk assets.[55] Because there are costs for holding capital, these institutions may prefer to reduce the size of their Treasury securities portfolio for the purpose of making markets and instead expand other lines of business that offer higher returns for the same amount of capital under the supplementary leverage ratio.

*"The role of the primary dealer has shifted from providing market depth and liquidity to managing liquidity and optimizing their balance sheet size despite the fact that the marketable debt outstanding has tripled."*

Source: GAO survey of market participants. | GAO-20-131

Broker-dealers have traditionally been the predominant market makers for customers, including foreign central banks, mutual funds, hedge funds, pension funds, and insurance companies; buying and selling Treasury securities to meet customer trading needs, which could involve maintaining a large balance sheet to be able to buy and sell in large amounts and across days.

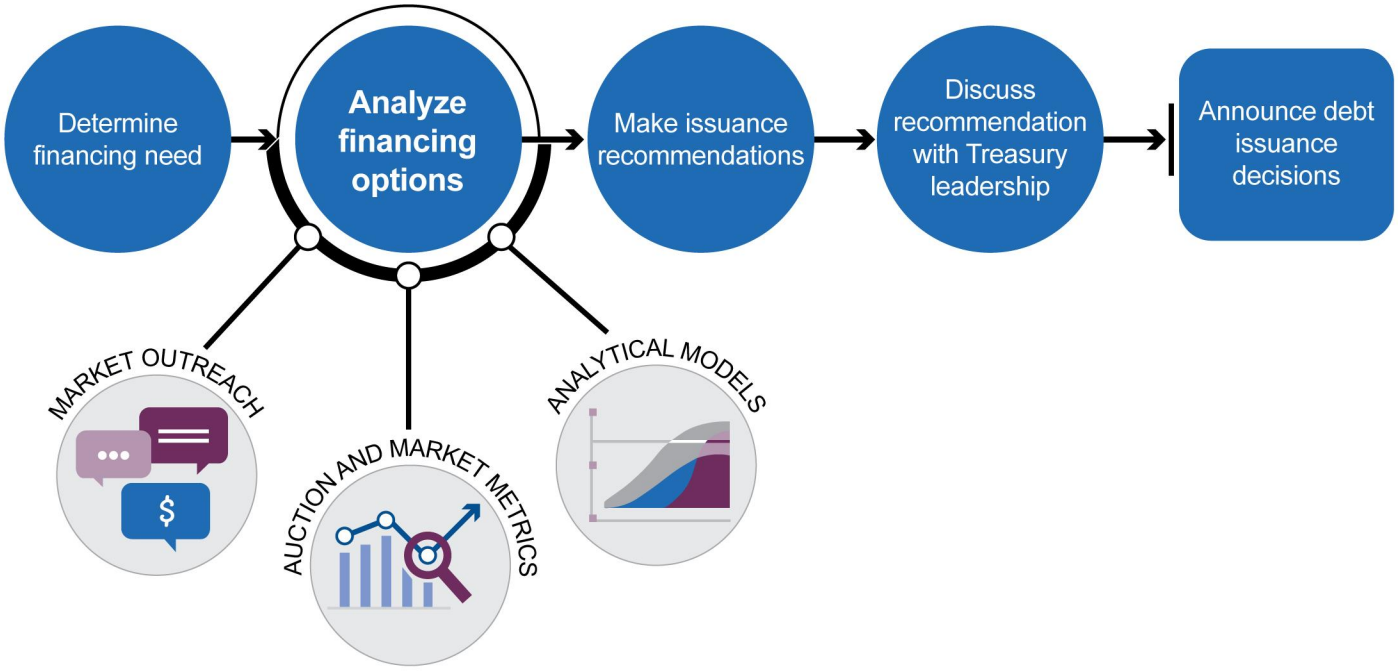
According to market participants, broker-dealers' smaller balance sheets have resulted in reduced liquidity for certain securities and could lead to additional risks during periods of secondary market stress or volatility. A well-functioning secondary market is important to Treasury in part because rates in the secondary market ultimately affect Treasury's borrowing costs, as investors generally demand similar rates at auction to those in the secondary market.

[55]For more information on capital ratio requirements, see GAO, *Bank Capital Reforms: Initial Effects of Basel III on Capital, Credit, and International Competitiveness*, GAO-15-67 (Washington, D.C.: Nov. 20, 2014).

## Market Outreach and Analysis Inform Treasury Debt Issuance Decisions but Policies Governing Key Inputs Could Be Strengthened

Treasury must regularly make important debt issuance decisions—such as what type of Treasury security to issue and in what quantities—to maintain broad-based demand and support its goal of borrowing at the lowest cost over time. Treasury officials described the steps the Office of Debt Management takes to make decisions about Treasury's debt issuance strategy (see fig. 9). Treasury officials told us that they rely on three key inputs to help analyze financing options and inform these decisions: (1) market outreach, (2) auction and market metrics, and (3) analytical models.

**Figure 9: Treasury's Process for Making Debt Issuance Decisions**




Source: GAO analysis of Department of the Treasury information. | GAO-20-131

This is consistent with World Bank-IMF guidelines for public debt management. These guidelines highlight the importance of communicating regularly with investors, monitoring market activity, and

having a strong analytical framework to inform decisions about the timing and amount of each type of security to issue.[56]

However, we found Treasury lacks policies governing some of these key inputs. Specifically, Treasury's draft policy for bilateral market outreach does not include guidance on systematically selecting and documenting these interactions. Furthermore, Treasury does not have a policy governing important aspects of its analytical modeling, including requiring that analyses are documented and that Treasury staff follow and document appropriate quality assurance steps.

## Treasury Conducts Market Outreach but Does Not Have a Policy for Bilateral Outreach

Treasury conducts market outreach to obtain information and analysis of market expectations and reinforce its public communication, according to Treasury officials. Treasury also conducts market outreach to explore longer term questions about subjects such as offering new products.[57] Treasury has three primary channels for conducting market outreach:


Source: GAO. | GAO-20-131

[56]World Bank-International Monetary Fund, *Revised Guidelines for Public Debt Management* (April 2014). Debt managers should promote a close and continuing dialogue with investors to keep them informed of the country's debt portfolio characteristics and to obtain information about investors' preferences. Section 2.29. A framework should be developed to enable debt managers to identify and manage the trade-offs between expected cost and risk in the government debt portfolio. Section 5.

[57]For certain significant changes in Treasury policy or issuance, Treasury has published Federal Register notices inviting further public comment. For example, in 2016, Treasury published a request for information on structural changes in the Treasury market, including data collection efforts. In 2012 and 2013, Treasury published a series of Federal Register notices regarding issuance of a floating rate note.

**Primary Dealers**

A group of banks and broker-dealers designated by the Federal Reserve Bank of New York (FRBNY) to serve as trading counterparties to the FRBNY in the implementation of monetary policy. They are also required to participate in all Treasury auctions.

Source: GAO. | GAO-20-131

**Treasury Borrowing Advisory Committee**

An advisory committee composed of 15 senior officials from broker-dealers, asset managers, banks, and hedge funds.

Source: GAO. | GAO-20-131

- **Primary dealers.** Treasury surveys all primary dealers quarterly and meets with half of them in person on a rotating basis to obtain estimates on borrowing, issuance, and the federal budget deficit (see sidebar).[58]

  Treasury also uses the survey and meetings to obtain input on a variety of debt management discussion topics, posed in advance. For example, in April 2018 Treasury officials asked the primary dealers to comment on foreign private and official demand for Treasury securities over the short to intermediate term.

- **Treasury Borrowing Advisory Committee (TBAC).** Treasury and TBAC meet quarterly as part of Treasury's quarterly refunding process (see sidebar).[59] At these meetings, Treasury officials and the committee members discuss economic forecasts, federal borrowing needs, debt management issues, and market dynamics. For example, in January 2019, Treasury asked TBAC to examine any products or debt management practices that might expand the investor base for Treasury securities, among other things.[60]

  TBAC also provides Treasury with technical assistance intended to complement Treasury's internal analyses. For example, in 2016, TBAC members began work to develop a debt issuance model to help guide the committee's recommendations to Treasury about how to finance the government's borrowing needs. In November 2017, based on the modeling framework as well as other factors, TBAC recommended that Treasury increase issuance of 2-, 3-, and 5-year notes to meet higher funding needs.[61]

- **Bilateral market outreach.** To reach a broader range of investors, Treasury officials and staff also communicate directly—via email,

[58]For a list of current primary dealers, see https://www.newyorkfed.org/marketsprimarydealers.html.

[59]While TBAC meetings are closed due to the sensitivity of the matters under discussion, Treasury releases TBAC meeting minutes along with other quarterly refunding documents on its website.

[60]Treasury Borrowing Advisory Committee, "2019 2nd Quarter" in *Treasury Borrowing Advisory Committee Discussion Charts by Calendar Year*," (Washington, D.C.: January 2019).

[61]The authors of the TBAC model published it as a working paper with the Brookings Institution. See, Terry Belton et. al., *Optimizing the Maturity Structure of U.S. Treasury Debt: A Model-Based Framework* (Washington, D.C.: Hutchins Center on Fiscal & Monetary Policy at Brookings, October 2018).

telephone, conferences, and in-person meetings—with other market participants, such as foreign central banks, asset managers, investment banks, life insurance companies, pension funds, hedge funds, principal trading firms, and trading platforms. According to Treasury, staff use this bilateral outreach to discuss new products or distribution channels; assess investor needs; determine the drivers of market demand; and guide market perception about Treasury policy. Treasury officials said they select individuals for bilateral outreach using a combination of qualitative and quantitative information, such as data on specific investors' participation in the Treasury market. According to Treasury, the bilateral market outreach helps mitigate an over-reliance on a subset of market participants that might not represent the full spectrum of views of Treasury market investors.

However, we found that Treasury does not have an official policy to ensure that its bilateral market outreach is conducted or documented in a systematic manner. This is consistent with our reporting from 2010.[62]

In May 2010, Treasury officials told us that one of Treasury's priorities was to improve investor outreach and collect information more systematically. Treasury acquired a customer relationship management tool, but Treasury officials said they only use it to store contact information. Treasury also drafted a policy document in November 2017 for Office of Debt Management staff that specifies the nature, restrictions on, and expectations for bilateral discussions with market contacts, but the policy is not final. While Treasury's 2017 draft policy includes some guidance on documenting the bilateral outreach, Treasury officials told us they did not systematically produce formal documentation of these meetings.

Treasury officials said that one reason Treasury did not have formal documentation of market outreach is because the staff who conduct the outreach also make the policy recommendations. Treasury officials also said direct outreach can sometimes cover market-sensitive information and that confidentiality is important to ensure candid exchange of information. However, the discreet nature of the outreach does not preclude Treasury staff from taking steps to document summary level

[62]At the time, we recommended that Treasury consider conducting a systematic and periodic survey of the largest holders of Treasury securities in all sectors. Treasury agreed with the recommendation and in 2016 published a notice requesting industry feedback about the government bond market. See GAO-10-498.

information that would meet their needs and still maintain confidentiality. For example, Treasury officials and staff are experienced at managing market sensitive information for TBAC and primary dealers and communicating appropriate information to the public.

While the level and nature of documentation can vary based on the materiality to decision-making, documentation is a necessary part of an effective internal control system. Documentation provides a means to retain organizational knowledge and mitigate the risk of having that knowledge limited to a few personnel.[63] In 2017, Treasury conducted market outreach—through the primary dealers, TBAC, and bilateral discussions with market participants—about demand for a potential Treasury ultra-long bond (50- or 100-year bonds). At that time, Treasury decided not to proceed with introducing ultra-long bonds in part because its analysis indicated that the bond would be too costly to issue relative to other Treasury securities, such as the 30-year bond. In August 2019, Treasury announced that it was conducting broad market outreach to update its understanding of market demand for an ultra-long bond.

Federal standards for internal control direct agencies to design and implement control activities—policies, procedures, and mechanisms—to achieve program objectives and respond to risks.[64] A policy governing the selection of individuals for bilateral outreach could help Treasury ensure it is systematically obtaining market views from investors across various sectors. A policy for documenting bilateral outreach would also ensure that the information that Treasury staff obtains is available to help inform future deliberations. Treasury officials said that they are considering updating and finalizing the 2017 draft outreach guidance based on our review.

[63]GAO-14-704G.

[64]GAO-14-704G.

## Treasury Uses Auction and Market Metrics to Analyze Issuance Decisions and Is Working to Develop Improved Data on the Secondary Market

In addition to market outreach, Treasury calculates and monitors metrics that summarize important aspects of the debt portfolio, Treasury auctions, and the secondary market. Treasury officials stated they monitor metrics to understand changing market dynamics and highlighted some of the key metrics they use to inform decisions (see table 2).


Source: GAO. | GAO-20-131

**Table 2: Key Debt Portfolio Metrics**

| Metric | Description |
|---|---|
| Percent of debt maturing | The percent of debt that will mature and require payment or refinancing in various time frames, such as the next 12-36 months; 1-5 years; 5-10 years; 10-20 years; and 20 years and over. |
| Weighted average maturity of debt outstanding | Average of the maturity of debt outstanding weighted by the current face amount of that debt. |
| Composition of debt outstanding by security type | The breakdown of the outstanding debt portfolio by type of security. |
| Composition of debt outstanding by investor type | The breakdown of the outstanding debt portfolio by type of investor. For example, holdings by official foreign investors versus domestic investors. |

Source: GAO summary of Department of the Treasury information. | GAO-20-131

**Rollover risk**

Rollover risk includes two types of risk:

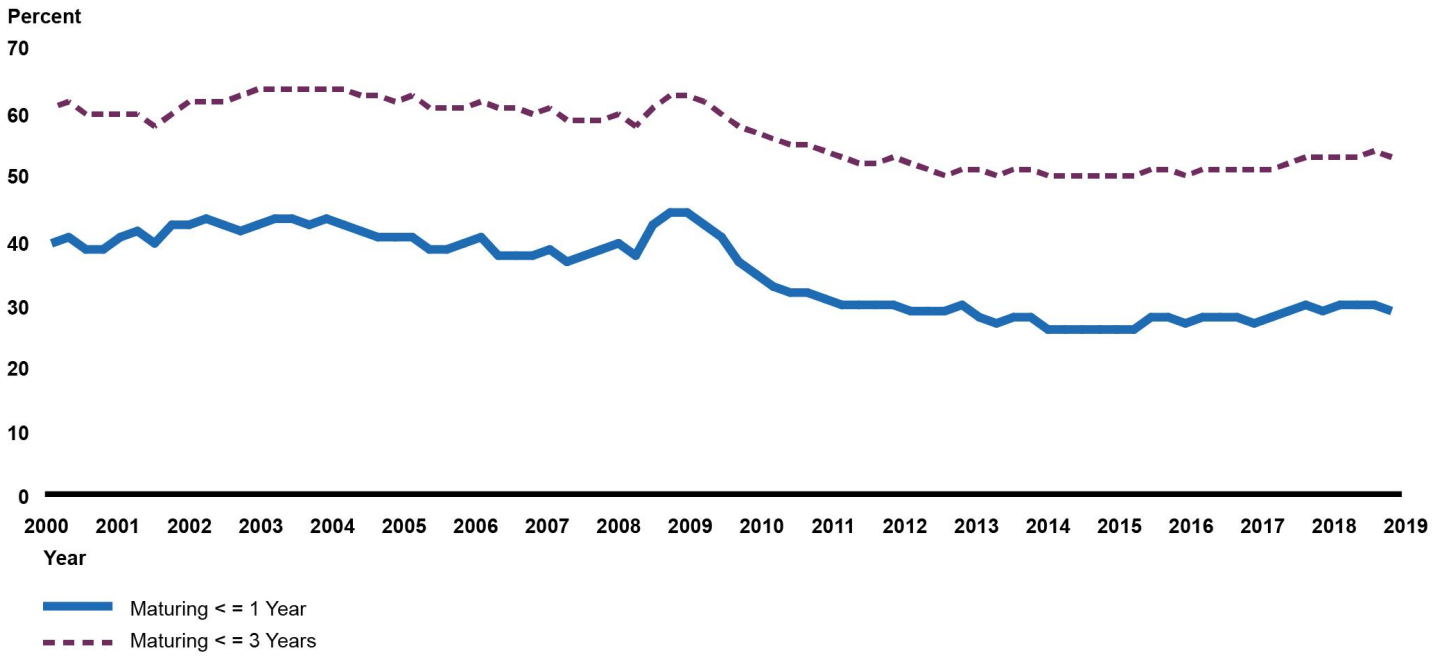
1. interest rate risk—the risk that Treasury will have to refinance its debt at less favorable interest rates, and
2. market access risk—the operational risks inherent in coming back to the market to refinance the debt.

Source: GAO. | GAO-20-131

According to Treasury officials, the percent of debt maturing in a given period is among the better indicators of rollover risk (see sidebar).

As of September 2019, more than half of the $16.3 trillion marketable debt held by the public will mature in the next 3 years; about 27 percent will mature in the next 12 months (see fig. 10). A significant share of that maturing debt will need to be refinanced at prevailing interest rates.

**Figure 10: Maturity Profile of Debt Held by the Public, for the Fiscal Years Ended September 30, 2000 to 2019**




Source: GAO analysis of data from the Department of the Treasury. | GAO-20-131

**Data table for Figure 10: Maturity Profile of Debt Held by the Public, for the Fiscal Years Ended September 30, 2000 to 2019**

| Year | Maturing < = 1 Year | Maturing < = 3 Years |
|---|---|---|
| 2000 | 0.38 | 0.6 |
| 2nd quarter | 0.39 | 0.61 |
| 3rd quarter | 0.37 | 0.59 |
| 4th quarter | 0.37 | 0.59 |
| 2001 | 0.39 | 0.59 |
| 2nd quarter | 0.4 | 0.59 |
| 3rd quarter | 0.38 | 0.57 |
| 4th quarter | 0.41 | 0.59 |
| 2002 | 0.41 | 0.61 |
| 2nd quarter | 0.42 | 0.61 |
| 3rd quarter | 0.41 | 0.61 |

| Year | Maturing < = 1 Year | Maturing < = 3 Years |
|---|---|---|
| 4th quarter | 0.4 | 0.62 |
| 2003 | 0.41 | 0.63 |
| 2nd quarter | 0.42 | 0.63 |
| 3rd quarter | 0.42 | 0.63 |
| 4th quarter | 0.41 | 0.63 |
| 2004 | 0.42 | 0.63 |
| 2nd quarter | 0.41 | 0.63 |
| 3rd quarter | 0.4 | 0.62 |
| 4th quarter | 0.39 | 0.62 |
| 2005 | 0.39 | 0.61 |
| 2nd quarter | 0.39 | 0.62 |
| 3rd quarter | 0.37 | 0.6 |
| 4th quarter | 0.37 | 0.6 |
| 2006 | 0.38 | 0.6 |
| 2nd quarter | 0.39 | 0.61 |
| 3rd quarter | 0.36 | 0.6 |
| 4th quarter | 0.36 | 0.6 |
| 2007 | 0.36 | 0.59 |
| 2nd quarter | 0.37 | 0.6 |
| 3rd quarter | 0.35 | 0.58 |
| 4th quarter | 0.36 | 0.58 |
| 2008 | 0.37 | 0.58 |
| 2nd quarter | 0.38 | 0.59 |
| 3rd quarter | 0.36 | 0.57 |
| 4th quarter | 0.41 | 0.6 |
| 2009 | 0.43 | 0.62 |
| 2nd quarter | 0.43 | 0.62 |
| 3rd quarter | 0.41 | 0.61 |
| 4th quarter | 0.39 | 0.59 |
| 2010 | 0.35 | 0.57 |
| 2nd quarter | 0.33 | 0.56 |
| 3rd quarter | 0.31 | 0.55 |
| 4th quarter | 0.3 | 0.54 |
| 2011 | 0.3 | 0.54 |
| 2nd quarter | 0.29 | 0.53 |
| 3rd quarter | 0.28 | 0.52 |
| 4th quarter | 0.28 | 0.51 |

| Year | Maturing < = 1 Year | Maturing < = 3 Years |
|---|---|---|
| 2012 | 0.28 | 0.51 |
| 2nd quarter | 0.28 | 0.52 |
| 3rd quarter | 0.27 | 0.51 |
| 4th quarter | 0.27 | 0.5 |
| 2013 | 0.27 | 0.49 |
| 2nd quarter | 0.28 | 0.5 |
| 3rd quarter | 0.26 | 0.5 |
| 4th quarter | 0.25 | 0.49 |
| 2014 | 0.26 | 0.5 |
| 2nd quarter | 0.26 | 0.5 |
| 3rd quarter | 0.24 | 0.49 |
| 4th quarter | 0.24 | 0.49 |
| 2015 | 0.24 | 0.49 |
| 2nd quarter | 0.24 | 0.49 |
| 3rd quarter | 0.24 | 0.49 |
| 4th quarter | 0.24 | 0.49 |
| 2016 | 0.26 | 0.5 |
| 2nd quarter | 0.26 | 0.5 |
| 3rd quarter | 0.25 | 0.49 |
| 4th quarter | 0.26 | 0.5 |
| 2017 | 0.26 | 0.5 |
| 2nd quarter | 0.26 | 0.5 |
| 3rd quarter | 0.25 | 0.5 |
| 4th quarter | 0.26 | 0.5 |
| 2018 | 0.27 | 0.51 |
| 2nd quarter | 0.28 | 0.52 |
| 3rd quarter | 0.27 | 0.52 |
| 4th quarter | 0.28 | 0.52 |
| 2019 | 0.28 | 0.52 |
| 2nd quarter | 0.28 | 0.53 |
| 3rd quarter | 0.27 | 0.52 |

Treasury publishes a number of key auction metrics that provide insight into auction demand for Treasury securities as well as which sectors purchase securities at auction (see table 3). Treasury also analyzes more granular data on bidders that are not publicly available.

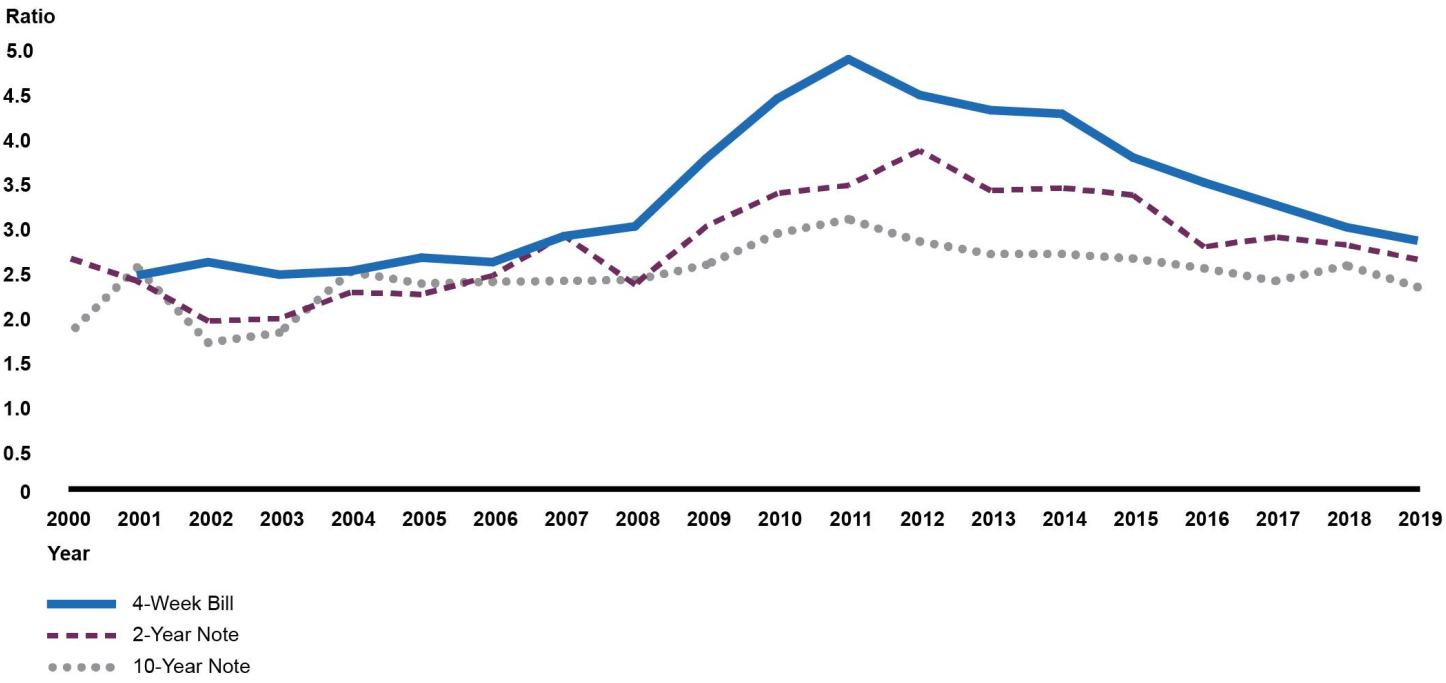
**Table 3: Publicly Available Auction Metrics**

| Metric | Description |
|---|---|
| Bid-to-cover ratio | The face amount of all bids received in the auction, divided by the face amount of the securities issued at auction. A higher ratio indicates stronger demand. |
| Yields | The interest rate paid on Treasury securities. Lower yields could indicate stronger demand. |
| Investor class data | The sectors involved in purchasing Treasury securities at auction. There are eight investor class categories: The Federal Reserve system, depository institutions, individuals, dealers and brokers, pension and retirement funds and insurance companies, investment funds, foreign and international, and other. |

Source: GAO summary of Department of the Treasury information. | GAO-20-131

According to Treasury officials, one indicator of demand for Treasury securities at auction is the bid-to-cover ratio. When the ratio is greater than one, buyers submitted bids for more securities than were offered. Figure 11 shows weighted average bid-to-cover ratios for the 4-week bill, 2-year note, and 10-year note from 2000 to 2019.

**Figure 11: Average Bid-to-Cover Ratios for Treasury Securities, January 2000 to July 2019**




Source: GAO analysis of Department of the Treasury auction data. | GAO-20-131

**Data table for Figure 11: Average Bid-to-Cover Ratios for Treasury Securities, January 2000 to July 2019**

| Year | 4-Week Bill | 2-Year Note | 10-Year Note |
|---|---|---|---|
| 2000 | - | 2.6 | 1.70 |
| 2001 | 2.39 | 2.33 | 2.48 |
| 2002 | 2.54 | 1.88 | 1.64 |
| 2003 | 2.4 | 1.91 | 1.75 |
| 2004 | 2.44 | 2.2 | 2.43 |
| 2005 | 2.59 | 2.18 | 2.30 |
| 2006 | 2.54 | 2.39 | 2.32 |
| 2007 | 2.83 | 2.84 | 2.33 |
| 2008 | 2.94 | 2.29 | 2.34 |
| 2009 | 3.7 | 2.94 | 2.51 |
| 2010 | 4.37 | 3.31 | 2.86 |
| 2011 | 4.81 | 3.4 | 3.02 |
| 2012 | 4.41 | 3.79 | 2.77 |
| 2013 | 4.24 | 3.34 | 2.63 |
| 2014 | 4.2 | 3.37 | 2.63 |
| 2015 | 3.71 | 3.29 | 2.58 |
| 2016 | 3.43 | 2.71 | 2.47 |
| 2017 | 3.18 | 2.82 | 2.33 |
| 2018 | 2.93 | 2.73 | 2.50 |
| 2019 | 2.78 | 2.57 | 2.26 |

Treasury regularly engages with the Federal Reserve, SEC, and the U.S. Commodity Futures Trading Commission regarding secondary market activity, including significant price movements and their causes, trends in market structure (such as changes in venues, participants, and trade protocols), liquidity conditions, and market functioning. Treasury officials reported that they routinely review data relevant to secondary market activity (see table 4).

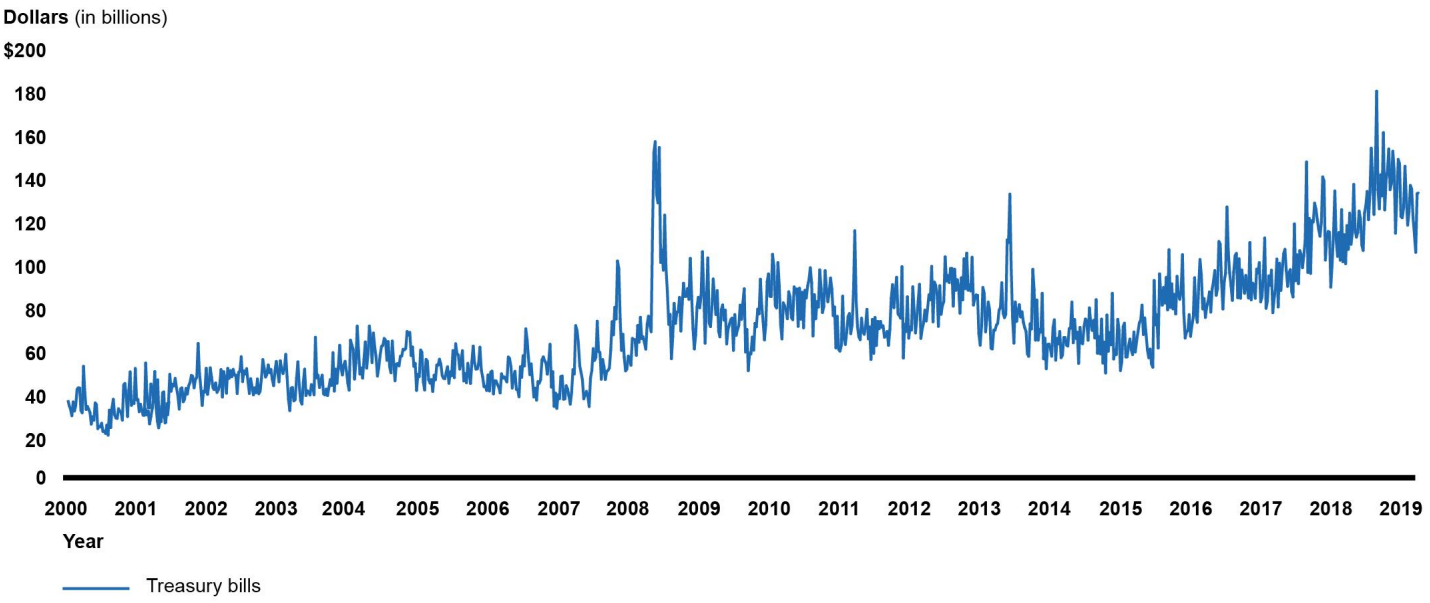
**Table 4: Key Secondary Market Metrics**

| Metric | Description |
|---|---|
| Average daily trading volumes | Trading volumes are often viewed as a proxy for liquidity because high volumes suggest that buyers and sellers are able to regularly meet and transact. |
| Bid-ask spread | The spread between the best bid and offer prices for Treasury securities. This metric is used to illustrate the cost of transacting in a typical size. |
| Average trade size | The average size of trades by type and maturity of Treasury security. |

Source: GAO summary of Department of the Treasury information. | GAO-20-131

Figure 12 shows the average daily trading volumes between primary dealers for Treasury bills; this is a measure of liquidity of the market.

**Figure 12: Average Daily Trading Volume for Treasury Bills, January 2000 to August 2019**




Source: GAO analysis of Federal Reserve Bank of New York Primary Dealer data. | GAO-20-131

**Data table for Figure 12: Average Daily Trading Volume for Treasury Bills, January 2000 to August 2019**

| Date | Treasury bills (trillions) |
|---|---|
| 1/5/2000 | 30,830 |
| 1/12/2000 | 28,132 |
| 1/19/2000 | 26,516 |
| 1/26/2000 | 23,388 |
| 2/2/2000 | 29,997 |
| 2/9/2000 | 25,658 |

| Date | Treasury bills (trillions) |
|---|---|
| 2/16/2000 | 28,301 |
| 2/23/2000 | 36,030 |
| 3/1/2000 | 36,848 |
| 3/8/2000 | 36,679 |
| 3/15/2000 | 25,896 |
| 3/22/2000 | 24,758 |
| 3/29/2000 | 47,120 |
| 4/5/2000 | 34,575 |
| 4/12/2000 | 26,377 |
| 4/19/2000 | 27,818 |
| 4/26/2000 | 26,445 |
| 5/3/2000 | 24,872 |
| 5/10/2000 | 19,335 |
| 5/17/2000 | 22,827 |
| 5/24/2000 | 21,223 |
| 5/31/2000 | 29,554 |
| 6/7/2000 | 28,693 |
| 6/14/2000 | 17,118 |
| 6/21/2000 | 18,428 |
| 6/28/2000 | 17,957 |
| 7/5/2000 | 19,729 |
| 7/12/2000 | 15,829 |
| 7/19/2000 | 15,986 |
| 7/26/2000 | 14,835 |
| 8/2/2000 | 18,878 |
| 8/9/2000 | 14,037 |
| 8/16/2000 | 26,057 |
| 8/23/2000 | 17,685 |
| 8/30/2000 | 27,255 |
| 9/6/2000 | 31,270 |
| 9/13/2000 | 23,896 |
| 9/20/2000 | 22,297 |
| 9/27/2000 | 22,099 |
| 10/4/2000 | 26,749 |
| 10/11/2000 | 25,644 |
| 10/18/2000 | 24,964 |
| 10/25/2000 | 21,269 |

| Date | Treasury bills (trillions) |
|---|---|
| 11/1/2000 | 38,246 |
| 11/8/2000 | 38,933 |
| 11/15/2000 | 32,325 |
| 11/22/2000 | 22,990 |
| 11/29/2000 | 35,664 |
| 12/6/2000 | 44,451 |
| 12/13/2000 | 28,399 |
| 12/20/2000 | 30,087 |
| 12/27/2000 | 29,272 |
| 1/3/2001 | 46,086 |
| 1/10/2001 | 31,026 |
| 1/17/2001 | 31,191 |
| 1/24/2001 | 25,294 |
| 1/31/2001 | 28,901 |
| 2/7/2001 | 26,236 |
| 2/14/2001 | 23,666 |
| 2/21/2001 | 23,634 |
| 2/28/2001 | 48,699 |
| 3/7/2001 | 33,360 |
| 3/14/2001 | 27,243 |
| 3/21/2001 | 27,238 |
| 3/28/2001 | 38,628 |
| 4/4/2001 | 36,299 |
| 4/11/2001 | 31,998 |
| 4/18/2001 | 44,646 |
| 4/25/2001 | 27,625 |
| 5/2/2001 | 20,894 |
| 5/9/2001 | 17,560 |
| 5/16/2001 | 20,596 |
| 5/23/2001 | 20,583 |
| 5/30/2001 | 34,425 |
| 6/6/2001 | 34,861 |
| 6/13/2001 | 19,936 |
| 6/20/2001 | 26,042 |
| 6/27/2001 | 23,775 |
| 7/4/2001 | 30,375 |
| 7/11/2001 | 27,764 |

| Date | Treasury bills (trillions) |
|---|---|
| 7/18/2001 | 29,581 |
| 7/25/2001 | 23,612 |
| 8/1/2001 | 26,988 |
| 8/8/2001 | 30,840 |
| 8/15/2001 | 35,563 |
| 8/22/2001 | 35,368 |
| 8/29/2001 | 37,919 |
| 9/5/2001 | 43,936 |
| 9/12/2001 | 25,766 |
| 9/19/2001 | 25,630 |
| 9/26/2001 | 32,052 |
| 10/3/2001 | 27,408 |
| 10/10/2001 | 26,555 |
| 10/17/2001 | 24,338 |
| 10/24/2001 | 32,937 |
| 10/31/2001 | 33,279 |
| 11/7/2001 | 46,489 |
| 11/14/2001 | 38,720 |
| 11/21/2001 | 41,919 |
| 11/28/2001 | 41,113 |
| 12/5/2001 | 44,621 |
| 12/12/2001 | 40,085 |
| 12/19/2001 | 36,596 |
| 12/26/2001 | 30,462 |
| 1/2/2002 | 39,811 |
| 1/9/2002 | 40,275 |
| 1/16/2002 | 33,810 |
| 1/23/2002 | 35,079 |
| 1/30/2002 | 40,004 |
| 2/6/2002 | 37,395 |
| 2/13/2002 | 41,228 |
| 2/20/2002 | 42,734 |
| 2/27/2002 | 46,041 |
| 3/6/2002 | 45,570 |
| 3/13/2002 | 40,283 |
| 3/20/2002 | 44,145 |
| 3/27/2002 | 45,143 |

| Date | Treasury bills (trillions) |
|---|---|
| 4/3/2002 | 60,775 |
| 4/10/2002 | 46,932 |
| 4/17/2002 | 40,435 |
| 4/24/2002 | 32,157 |
| 5/1/2002 | 38,777 |
| 5/8/2002 | 38,256 |
| 5/15/2002 | 49,294 |
| 5/22/2002 | 37,240 |
| 5/29/2002 | 42,001 |
| 6/5/2002 | 49,480 |
| 6/12/2002 | 45,065 |
| 6/19/2002 | 40,313 |
| 6/26/2002 | 39,400 |
| 7/3/2002 | 42,524 |
| 7/10/2002 | 38,117 |
| 7/17/2002 | 39,389 |
| 7/24/2002 | 41,500 |
| 7/31/2002 | 48,688 |
| 8/7/2002 | 36,025 |
| 8/14/2002 | 47,719 |
| 8/21/2002 | 44,464 |
| 8/28/2002 | 37,804 |
| 9/4/2002 | 49,242 |
| 9/11/2002 | 44,674 |
| 9/18/2002 | 48,206 |
| 9/25/2002 | 45,376 |
| 10/2/2002 | 48,782 |
| 10/9/2002 | 46,133 |
| 10/16/2002 | 46,096 |
| 10/23/2002 | 37,637 |
| 10/30/2002 | 47,376 |
| 11/6/2002 | 48,003 |
| 11/13/2002 | 54,630 |
| 11/20/2002 | 43,156 |
| 11/27/2002 | 48,074 |
| 12/4/2002 | 46,650 |
| 12/11/2002 | 49,102 |

| Date | Treasury bills (trillions) |
|---|---|
| 12/18/2002 | 43,060 |
| 12/25/2002 | 37,679 |
| 1/1/2003 | 44,452 |
| 1/8/2003 | 40,845 |
| 1/15/2003 | 37,031 |
| 1/22/2003 | 40,224 |
| 1/29/2003 | 38,052 |
| 2/5/2003 | 44,310 |
| 2/12/2003 | 37,510 |
| 2/19/2003 | 38,707 |
| 2/26/2003 | 44,677 |
| 3/5/2003 | 53,289 |
| 3/12/2003 | 49,336 |
| 3/19/2003 | 45,219 |
| 3/26/2003 | 46,463 |
| 4/2/2003 | 50,824 |
| 4/9/2003 | 47,273 |
| 4/16/2003 | 48,767 |
| 4/23/2003 | 44,202 |
| 4/30/2003 | 41,294 |
| 5/7/2003 | 48,151 |
| 5/14/2003 | 52,457 |
| 5/21/2003 | 47,436 |
| 5/28/2003 | 43,061 |
| 6/4/2003 | 52,765 |
| 6/11/2003 | 48,760 |
| 6/18/2003 | 46,850 |
| 6/25/2003 | 49,540 |
| 7/2/2003 | 55,708 |
| 7/9/2003 | 45,239 |
| 7/16/2003 | 34,925 |
| 7/23/2003 | 29,761 |
| 7/30/2003 | 40,126 |
| 8/6/2003 | 40,435 |
| 8/13/2003 | 34,249 |
| 8/20/2003 | 34,815 |
| 8/27/2003 | 44,759 |

| Date | Treasury bills (trillions) |
|---|---|
| 9/3/2003 | 52,242 |
| 9/10/2003 | 41,609 |
| 9/17/2003 | 34,290 |
| 9/24/2003 | 32,770 |
| 10/1/2003 | 42,706 |
| 10/8/2003 | 48,858 |
| 10/15/2003 | 36,715 |
| 10/22/2003 | 38,934 |
| 10/29/2003 | 38,365 |
| 11/5/2003 | 36,986 |
| 11/12/2003 | 41,788 |
| 11/19/2003 | 41,115 |
| 11/26/2003 | 37,073 |
| 12/3/2003 | 63,621 |
| 12/10/2003 | 44,883 |
| 12/17/2003 | 46,096 |
| 12/24/2003 | 40,426 |
| 12/31/2003 | 43,511 |
| 1/7/2004 | 46,096 |
| 1/14/2004 | 37,576 |
| 1/21/2004 | 36,992 |
| 1/28/2004 | 39,658 |
| 2/4/2004 | 36,707 |
| 2/11/2004 | 40,426 |
| 2/18/2004 | 44,050 |
| 2/25/2004 | 41,364 |
| 3/3/2004 | 56,500 |
| 3/10/2004 | 38,765 |
| 3/17/2004 | 48,890 |
| 3/24/2004 | 42,404 |
| 3/31/2004 | 49,994 |
| 4/7/2004 | 59,903 |
| 4/14/2004 | 49,292 |
| 4/21/2004 | 46,241 |
| 4/28/2004 | 50,764 |
| 5/5/2004 | 52,523 |
| 5/12/2004 | 48,028 |

| Date | Treasury bills (trillions) |
|---|---|
| 5/19/2004 | 42,453 |
| 5/26/2004 | 39,199 |
| 6/2/2004 | 62,294 |
| 6/9/2004 | 60,008 |
| 6/16/2004 | 57,922 |
| 6/23/2004 | 44,327 |
| 6/30/2004 | 51,853 |
| 7/7/2004 | 68,745 |
| 7/14/2004 | 57,184 |
| 7/21/2004 | 46,634 |
| 7/28/2004 | 49,401 |
| 8/4/2004 | 44,777 |
| 8/11/2004 | 53,321 |
| 8/18/2004 | 61,443 |
| 8/25/2004 | 49,378 |
| 9/1/2004 | 55,731 |
| 9/8/2004 | 68,815 |
| 9/15/2004 | 63,145 |
| 9/22/2004 | 51,941 |
| 9/29/2004 | 65,586 |
| 10/6/2004 | 59,007 |
| 10/13/2004 | 54,487 |
| 10/20/2004 | 45,711 |
| 10/27/2004 | 49,783 |
| 11/3/2004 | 55,520 |
| 11/10/2004 | 59,458 |
| 11/17/2004 | 59,798 |
| 11/24/2004 | 63,107 |
| 12/1/2004 | 62,219 |
| 12/8/2004 | 53,009 |
| 12/15/2004 | 61,605 |
| 12/22/2004 | 50,008 |
| 12/29/2004 | 47,213 |
| 1/5/2005 | 61,880 |
| 1/12/2005 | 52,179 |
| 1/19/2005 | 43,557 |
| 1/26/2005 | 51,158 |

| Date | Treasury bills (trillions) |
|---|---|
| 2/2/2005 | 51,602 |
| 2/9/2005 | 50,392 |
| 2/16/2005 | 54,820 |
| 2/23/2005 | 54,967 |
| 3/2/2005 | 58,076 |
| 3/9/2005 | 57,825 |
| 3/16/2005 | 58,495 |
| 3/23/2005 | 66,266 |
| 3/30/2005 | 64,572 |
| 4/6/2005 | 65,896 |
| 4/13/2005 | 55,195 |
| 4/20/2005 | 59,110 |
| 4/27/2005 | 50,202 |
| 5/4/2005 | 51,538 |
| 5/11/2005 | 39,075 |
| 5/18/2005 | 46,552 |
| 5/25/2005 | 45,421 |
| 6/1/2005 | 57,775 |
| 6/8/2005 | 56,613 |
| 6/15/2005 | 42,931 |
| 6/22/2005 | 39,263 |
| 6/29/2005 | 53,446 |
| 7/6/2005 | 52,616 |
| 7/13/2005 | 43,947 |
| 7/20/2005 | 42,476 |
| 7/27/2005 | 44,054 |
| 8/3/2005 | 38,576 |
| 8/10/2005 | 46,069 |
| 8/17/2005 | 44,000 |
| 8/24/2005 | 50,785 |
| 8/31/2005 | 50,782 |
| 9/7/2005 | 53,459 |
| 9/14/2005 | 51,247 |
| 9/21/2005 | 46,025 |
| 9/28/2005 | 44,683 |
| 10/5/2005 | 44,525 |
| 10/12/2005 | 47,504 |

| Date | Treasury bills (trillions) |
|---|---|
| 10/19/2005 | 49,990 |
| 10/26/2005 | 42,377 |
| 11/2/2005 | 47,622 |
| 11/9/2005 | 45,865 |
| 11/16/2005 | 57,476 |
| 11/23/2005 | 44,988 |
| 11/30/2005 | 60,596 |
| 12/7/2005 | 55,964 |
| 12/14/2005 | 55,485 |
| 12/21/2005 | 48,957 |
| 12/28/2005 | 52,762 |
| 1/4/2006 | 57,416 |
| 1/11/2006 | 43,472 |
| 1/18/2006 | 46,841 |
| 1/25/2006 | 42,628 |
| 2/1/2006 | 51,578 |
| 2/8/2006 | 47,325 |
| 2/15/2006 | 42,298 |
| 2/22/2006 | 52,318 |
| 3/1/2006 | 59,561 |
| 3/8/2006 | 51,879 |
| 3/15/2006 | 48,960 |
| 3/22/2006 | 49,016 |
| 3/29/2006 | 51,268 |
| 4/5/2006 | 59,030 |
| 4/12/2006 | 48,447 |
| 4/19/2006 | 45,362 |
| 4/26/2006 | 40,843 |
| 5/3/2006 | 40,884 |
| 5/10/2006 | 39,075 |
| 5/17/2006 | 46,214 |
| 5/24/2006 | 38,809 |
| 5/31/2006 | 47,512 |
| 6/7/2006 | 48,005 |
| 6/14/2006 | 37,493 |
| 6/21/2006 | 43,508 |
| 6/28/2006 | 43,369 |

| Date | Treasury bills (trillions) |
|---|---|
| 7/5/2006 | 41,757 |
| 7/12/2006 | 40,620 |
| 7/19/2006 | 37,926 |
| 7/26/2006 | 46,714 |
| 8/2/2006 | 44,734 |
| 8/9/2006 | 45,429 |
| 8/16/2006 | 44,181 |
| 8/23/2006 | 42,981 |
| 8/30/2006 | 54,528 |
| 9/6/2006 | 53,823 |
| 9/13/2006 | 50,044 |
| 9/20/2006 | 40,175 |
| 9/27/2006 | 45,573 |
| 10/4/2006 | 47,891 |
| 10/11/2006 | 39,618 |
| 10/18/2006 | 39,342 |
| 10/25/2006 | 36,105 |
| 11/1/2006 | 50,019 |
| 11/8/2006 | 45,165 |
| 11/15/2006 | 55,065 |
| 11/22/2006 | 50,394 |
| 11/29/2006 | 67,528 |
| 12/6/2006 | 62,367 |
| 12/13/2006 | 54,129 |
| 12/20/2006 | 46,389 |
| 12/27/2006 | 51,295 |
| 1/3/2007 | 43,751 |
| 1/10/2007 | 36,036 |
| 1/17/2007 | 40,108 |
| 1/24/2007 | 34,611 |
| 1/31/2007 | 43,177 |
| 2/7/2007 | 42,389 |
| 2/14/2007 | 44,043 |
| 2/21/2007 | 53,153 |
| 2/28/2007 | 54,552 |
| 3/7/2007 | 52,792 |
| 3/14/2007 | 51,614 |

| Date | Treasury bills (trillions) |
|---|---|
| 3/21/2007 | 46,584 |
| 3/28/2007 | 52,407 |
| 4/4/2007 | 60,357 |
| 4/11/2007 | 40,616 |
| 4/18/2007 | 47,724 |
| 4/25/2007 | 31,685 |
| 5/2/2007 | 37,848 |
| 5/9/2007 | 30,771 |
| 5/16/2007 | 37,071 |
| 5/23/2007 | 35,292 |
| 5/30/2007 | 45,447 |
| 6/6/2007 | 45,702 |
| 6/13/2007 | 35,021 |
| 6/20/2007 | 35,148 |
| 6/27/2007 | 41,209 |
| 7/4/2007 | 39,616 |
| 7/11/2007 | 36,459 |
| 7/18/2007 | 32,711 |
| 7/25/2007 | 38,300 |
| 8/1/2007 | 48,715 |
| 8/8/2007 | 46,693 |
| 8/15/2007 | 68,988 |
| 8/22/2007 | 66,787 |
| 8/29/2007 | 61,059 |
| 9/5/2007 | 50,469 |
| 9/12/2007 | 47,383 |
| 9/19/2007 | 43,968 |
| 9/26/2007 | 35,198 |
| 10/3/2007 | 36,973 |
| 10/10/2007 | 38,600 |
| 10/17/2007 | 36,417 |
| 10/24/2007 | 31,639 |
| 10/31/2007 | 44,881 |
| 11/7/2007 | 48,309 |
| 11/14/2007 | 58,339 |
| 11/21/2007 | 52,974 |
| 11/28/2007 | 54,405 |

| Date | Treasury bills (trillions) |
|---|---|
| 12/5/2007 | 71,042 |
| 12/12/2007 | 57,002 |
| 12/19/2007 | 56,595 |
| 12/26/2007 | 44,253 |
| 1/2/2008 | 53,322 |
| 1/9/2008 | 50,024 |
| 1/16/2008 | 44,111 |
| 1/23/2008 | 47,869 |
| 1/30/2008 | 48,279 |
| 2/6/2008 | 49,431 |
| 2/13/2008 | 57,674 |
| 2/20/2008 | 70,802 |
| 2/27/2008 | 64,757 |
| 3/5/2008 | 77,487 |
| 3/12/2008 | 72,076 |
| 3/19/2008 | 98,865 |
| 3/26/2008 | 95,453 |
| 4/2/2008 | 72,068 |
| 4/9/2008 | 57,578 |
| 4/16/2008 | 65,018 |
| 4/23/2008 | 54,464 |
| 4/30/2008 | 48,071 |
| 5/7/2008 | 48,973 |
| 5/14/2008 | 54,967 |
| 5/21/2008 | 53,883 |
| 5/28/2008 | 50,730 |
| 6/4/2008 | 63,134 |
| 6/11/2008 | 62,618 |
| 6/18/2008 | 62,450 |
| 6/25/2008 | 55,300 |
| 7/2/2008 | 69,044 |
| 7/9/2008 | 61,352 |
| 7/16/2008 | 72,854 |
| 7/23/2008 | 62,979 |
| 7/30/2008 | 63,849 |
| 8/6/2008 | 61,090 |
| 8/13/2008 | 58,155 |

| Date | Treasury bills (trillions) |
|---|---|
| 8/20/2008 | 69,550 |
| 8/27/2008 | 73,358 |
| 9/3/2008 | 69,188 |
| 9/10/2008 | 66,199 |
| 9/17/2008 | 113,615 |
| 9/24/2008 | 149,069 |
| 10/1/2008 | 154,013 |
| 10/8/2008 | 129,681 |
| 10/15/2008 | 125,729 |
| 10/22/2008 | 151,306 |
| 10/29/2008 | 98,237 |
| 11/5/2008 | 103,959 |
| 11/12/2008 | 94,652 |
| 11/19/2008 | 120,066 |
| 11/26/2008 | 95,326 |
| 12/3/2008 | 84,657 |
| 12/10/2008 | 69,656 |
| 12/17/2008 | 74,179 |
| 12/24/2008 | 53,737 |
| 12/31/2008 | 63,910 |
| 1/7/2009 | 79,272 |
| 1/14/2009 | 70,012 |
| 1/21/2009 | 75,212 |
| 1/28/2009 | 75,399 |
| 2/4/2009 | 82,006 |
| 2/11/2009 | 66,510 |
| 2/18/2009 | 79,090 |
| 2/25/2009 | 88,602 |
| 3/4/2009 | 82,478 |
| 3/11/2009 | 82,611 |
| 3/18/2009 | 86,160 |
| 3/25/2009 | 81,132 |
| 4/1/2009 | 100,076 |
| 4/8/2009 | 82,700 |
| 4/15/2009 | 67,461 |
| 4/22/2009 | 58,231 |
| 4/29/2009 | 64,761 |

| Date | Treasury bills (trillions) |
|---|---|
| 5/6/2009 | 77,649 |
| 5/13/2009 | 82,107 |
| 5/20/2009 | 77,246 |
| 5/27/2009 | 82,971 |
| 6/3/2009 | 103,143 |
| 6/10/2009 | 84,482 |
| 6/17/2009 | 60,889 |
| 6/24/2009 | 79,628 |
| 7/1/2009 | 100,266 |
| 7/8/2009 | 70,208 |
| 7/15/2009 | 68,567 |
| 7/22/2009 | 77,096 |
| 7/29/2009 | 90,559 |
| 8/5/2009 | 81,970 |
| 8/12/2009 | 74,156 |
| 8/19/2009 | 85,168 |
| 8/26/2009 | 66,379 |
| 9/2/2009 | 63,844 |
| 9/9/2009 | 76,279 |
| 9/16/2009 | 78,562 |
| 9/23/2009 | 71,576 |
| 9/30/2009 | 76,166 |
| 10/7/2009 | 60,567 |
| 10/14/2009 | 67,371 |
| 10/21/2009 | 69,593 |
| 10/28/2009 | 71,759 |
| 11/4/2009 | 72,505 |
| 11/11/2009 | 57,599 |
| 11/18/2009 | 74,093 |
| 11/25/2009 | 64,512 |
| 12/2/2009 | 67,096 |
| 12/9/2009 | 69,175 |
| 12/16/2009 | 78,473 |
| 12/23/2009 | 71,905 |
| 12/30/2009 | 79,674 |
| 1/6/2010 | 86,034 |
| 1/13/2010 | 56,810 |

| Date | Treasury bills (trillions) |
|---|---|
| 1/20/2010 | 67,206 |
| 1/27/2010 | 48,240 |
| 2/3/2010 | 56,373 |
| 2/10/2010 | 55,876 |
| 2/17/2010 | 63,704 |
| 2/24/2010 | 57,634 |
| 3/3/2010 | 70,041 |
| 3/10/2010 | 68,500 |
| 3/17/2010 | 76,611 |
| 3/24/2010 | 74,440 |
| 3/31/2010 | 90,451 |
| 4/7/2010 | 78,131 |
| 4/14/2010 | 70,779 |
| 4/21/2010 | 62,447 |
| 4/28/2010 | 69,464 |
| 5/5/2010 | 89,206 |
| 5/12/2010 | 92,915 |
| 5/19/2010 | 82,616 |
| 5/26/2010 | 82,445 |
| 6/2/2010 | 101,955 |
| 6/9/2010 | 96,499 |
| 6/16/2010 | 78,222 |
| 6/23/2010 | 77,152 |
| 6/30/2010 | 98,136 |
| 7/7/2010 | 87,406 |
| 7/14/2010 | 69,385 |
| 7/21/2010 | 62,881 |
| 7/28/2010 | 79,515 |
| 8/4/2010 | 78,040 |
| 8/11/2010 | 76,042 |
| 8/18/2010 | 72,211 |
| 8/25/2010 | 84,650 |
| 9/1/2010 | 82,290 |
| 9/8/2010 | 72,698 |
| 9/15/2010 | 71,712 |
| 9/22/2010 | 86,887 |
| 9/29/2010 | 84,242 |

| Date | Treasury bills (trillions) |
|---|---|
| 10/6/2010 | 85,958 |
| 10/13/2010 | 68,699 |
| 10/20/2010 | 86,263 |
| 10/27/2010 | 71,953 |
| 11/3/2010 | 84,408 |
| 11/10/2010 | 68,023 |
| 11/17/2010 | 85,314 |
| 11/24/2010 | 81,777 |
| 12/1/2010 | 87,205 |
| 12/8/2010 | 90,231 |
| 12/15/2010 | 95,732 |
| 12/22/2010 | 88,820 |
| 12/29/2010 | 64,250 |
| 1/5/2011 | 83,321 |
| 1/12/2011 | 72,173 |
| 1/19/2011 | 80,070 |
| 1/26/2011 | 77,592 |
| 2/2/2011 | 94,778 |
| 2/9/2011 | 86,300 |
| 2/16/2011 | 75,066 |
| 2/23/2011 | 77,697 |
| 3/2/2011 | 94,400 |
| 3/9/2011 | 85,993 |
| 3/16/2011 | 80,066 |
| 3/23/2011 | 84,313 |
| 3/30/2011 | 90,973 |
| 4/6/2011 | 85,899 |
| 4/13/2011 | 73,638 |
| 4/20/2011 | 77,628 |
| 4/27/2011 | 58,730 |
| 5/4/2011 | 73,271 |
| 5/11/2011 | 58,109 |
| 5/18/2011 | 57,183 |
| 5/25/2011 | 59,933 |
| 6/1/2011 | 82,607 |
| 6/8/2011 | 63,130 |
| 6/15/2011 | 60,326 |

| Date | Treasury bills (trillions) |
|---|---|
| 6/22/2011 | 66,067 |
| 6/29/2011 | 73,182 |
| 7/6/2011 | 74,559 |
| 7/13/2011 | 65,317 |
| 7/20/2011 | 69,247 |
| 7/27/2011 | 84,500 |
| 8/3/2011 | 112,840 |
| 8/10/2011 | 80,660 |
| 8/17/2011 | 68,435 |
| 8/24/2011 | 63,860 |
| 8/31/2011 | 62,496 |
| 9/7/2011 | 72,410 |
| 9/14/2011 | 66,300 |
| 9/21/2011 | 64,988 |
| 9/28/2011 | 68,779 |
| 10/5/2011 | 76,523 |
| 10/12/2011 | 62,906 |
| 10/19/2011 | 68,405 |
| 10/26/2011 | 53,375 |
| 11/2/2011 | 71,854 |
| 11/9/2011 | 56,209 |
| 11/16/2011 | 72,764 |
| 11/23/2011 | 59,852 |
| 11/30/2011 | 70,929 |
| 12/7/2011 | 67,583 |
| 12/14/2011 | 70,990 |
| 12/21/2011 | 68,261 |
| 12/28/2011 | 68,930 |
| 1/4/2012 | 63,584 |
| 1/11/2012 | 64,571 |
| 1/18/2012 | 66,261 |
| 1/25/2012 | 59,881 |
| 2/1/2012 | 67,145 |
| 2/8/2012 | 81,697 |
| 2/15/2012 | 87,934 |
| 2/22/2012 | 77,318 |
| 2/29/2012 | 84,271 |

| Date | Treasury bills (trillions) |
|---|---|
| 3/7/2012 | 91,316 |
| 3/14/2012 | 74,498 |
| 3/21/2012 | 73,616 |
| 3/28/2012 | 72,440 |
| 4/4/2012 | 96,217 |
| 4/11/2012 | 54,049 |
| 4/18/2012 | 69,597 |
| 4/25/2012 | 66,285 |
| 5/2/2012 | 82,332 |
| 5/9/2012 | 63,220 |
| 5/16/2012 | 68,367 |
| 5/23/2012 | 66,962 |
| 5/30/2012 | 86,945 |
| 6/6/2012 | 76,104 |
| 6/13/2012 | 65,641 |
| 6/20/2012 | 72,258 |
| 6/27/2012 | 80,474 |
| 7/4/2012 | 88,075 |
| 7/11/2012 | 63,155 |
| 7/18/2012 | 67,397 |
| 7/25/2012 | 70,317 |
| 8/1/2012 | 76,157 |
| 8/8/2012 | 71,171 |
| 8/15/2012 | 77,110 |
| 8/22/2012 | 83,227 |
| 8/29/2012 | 80,924 |
| 9/5/2012 | 96,387 |
| 9/12/2012 | 70,774 |
| 9/19/2012 | 89,107 |
| 9/26/2012 | 87,590 |
| 10/3/2012 | 83,651 |
| 10/10/2012 | 68,707 |
| 10/17/2012 | 87,434 |
| 10/24/2012 | 74,268 |
| 10/31/2012 | 78,397 |
| 11/7/2012 | 80,154 |
| 11/14/2012 | 100,783 |

| Date | Treasury bills (trillions) |
|---|---|
| 11/21/2012 | 89,642 |
| 11/28/2012 | 92,144 |
| 12/5/2012 | 88,915 |
| 12/12/2012 | 95,429 |
| 12/19/2012 | 95,432 |
| 12/26/2012 | 78,025 |
| 1/2/2013 | 95,072 |
| 1/9/2013 | 85,363 |
| 1/16/2013 | 90,210 |
| 1/23/2013 | 86,668 |
| 1/30/2013 | 74,725 |
| 2/6/2013 | 91,126 |
| 2/13/2013 | 80,895 |
| 2/20/2013 | 99,896 |
| 2/27/2013 | 86,102 |
| 3/6/2013 | 102,496 |
| 3/13/2013 | 85,405 |
| 3/20/2013 | 87,879 |
| 3/27/2013 | 85,054 |
| 4/3/2013 | 100,582 |
| 4/10/2013 | 78,525 |
| 4/17/2013 | 81,475 |
| 4/24/2013 | 83,202 |
| 5/1/2013 | 83,005 |
| 5/8/2013 | 65,260 |
| 5/15/2013 | 59,960 |
| 5/22/2013 | 68,840 |
| 5/29/2013 | 86,605 |
| 6/5/2013 | 83,880 |
| 6/12/2013 | 66,138 |
| 6/19/2013 | 72,553 |
| 6/26/2013 | 79,879 |
| 7/3/2013 | 76,122 |
| 7/10/2013 | 58,565 |
| 7/17/2013 | 58,189 |
| 7/24/2013 | 66,926 |
| 7/31/2013 | 66,904 |

| Date | Treasury bills (trillions) |
|---|---|
| 8/7/2013 | 69,196 |
| 8/14/2013 | 70,105 |
| 8/21/2013 | 76,163 |
| 8/28/2013 | 77,328 |
| 9/4/2013 | 88,817 |
| 9/11/2013 | 74,706 |
| 9/18/2013 | 72,709 |
| 9/25/2013 | 74,254 |
| 10/2/2013 | 108,641 |
| 10/9/2013 | 107,352 |
| 10/16/2013 | 129,735 |
| 10/23/2013 | 94,901 |
| 10/30/2013 | 72,750 |
| 11/6/2013 | 60,938 |
| 11/13/2013 | 79,884 |
| 11/20/2013 | 70,984 |
| 11/27/2013 | 75,420 |
| 12/4/2013 | 78,674 |
| 12/11/2013 | 72,995 |
| 12/18/2013 | 75,380 |
| 12/25/2013 | 70,635 |
| 1/1/2014 | 68,100 |
| 1/8/2014 | 66,308 |
| 1/15/2014 | 55,954 |
| 1/22/2014 | 54,777 |
| 1/29/2014 | 69,846 |
| 2/5/2014 | 67,493 |
| 2/12/2014 | 94,997 |
| 2/19/2014 | 85,520 |
| 2/26/2014 | 62,292 |
| 3/5/2014 | 80,829 |
| 3/12/2014 | 62,325 |
| 3/19/2014 | 67,214 |
| 3/26/2014 | 66,011 |
| 4/2/2014 | 83,912 |
| 4/9/2014 | 53,668 |
| 4/16/2014 | 63,121 |

| Date | Treasury bills (trillions) |
|---|---|
| 4/23/2014 | 49,085 |
| 4/30/2014 | 60,261 |
| 5/7/2014 | 60,483 |
| 5/14/2014 | 58,598 |
| 5/21/2014 | 54,898 |
| 5/28/2014 | 67,995 |
| 6/4/2014 | 71,682 |
| 6/11/2014 | 53,050 |
| 6/18/2014 | 63,104 |
| 6/25/2014 | 60,608 |
| 7/2/2014 | 66,271 |
| 7/9/2014 | 54,156 |
| 7/16/2014 | 55,359 |
| 7/23/2014 | 63,486 |
| 7/30/2014 | 63,472 |
| 8/6/2014 | 59,999 |
| 8/13/2014 | 59,560 |
| 8/20/2014 | 67,638 |
| 8/27/2014 | 67,844 |
| 9/3/2014 | 79,885 |
| 9/10/2014 | 61,081 |
| 9/17/2014 | 71,839 |
| 9/24/2014 | 63,118 |
| 10/1/2014 | 65,979 |
| 10/8/2014 | 51,586 |
| 10/15/2014 | 68,167 |
| 10/22/2014 | 61,317 |
| 10/29/2014 | 60,608 |
| 11/5/2014 | 68,543 |
| 11/12/2014 | 72,092 |
| 11/19/2014 | 71,256 |
| 11/26/2014 | 62,282 |
| 12/3/2014 | 77,198 |
| 12/10/2014 | 70,173 |
| 12/17/2014 | 66,858 |
| 12/24/2014 | 71,415 |
| 12/31/2014 | 63,290 |

| Date | Treasury bills (trillions) |
|---|---|
| 1/7/2015 | 80,974 |
| 1/14/2015 | 56,198 |
| 1/21/2015 | 63,919 |
| 1/28/2015 | 55,991 |
| 2/4/2015 | 72,013 |
| 2/11/2015 | 51,697 |
| 2/18/2015 | 61,376 |
| 2/25/2015 | 47,119 |
| 3/4/2015 | 73,906 |
| 3/11/2015 | 57,155 |
| 3/18/2015 | 65,759 |
| 3/25/2015 | 60,156 |
| 4/1/2015 | 83,916 |
| 4/8/2015 | 53,598 |
| 4/15/2015 | 57,792 |
| 4/22/2015 | 55,663 |
| 4/29/2015 | 71,895 |
| 5/6/2015 | 66,798 |
| 5/13/2015 | 48,263 |
| 5/20/2015 | 52,366 |
| 5/27/2015 | 68,570 |
| 6/3/2015 | 70,137 |
| 6/10/2015 | 54,513 |
| 6/17/2015 | 54,557 |
| 6/24/2015 | 59,574 |
| 7/1/2015 | 62,773 |
| 7/8/2015 | 57,945 |
| 7/15/2015 | 55,631 |
| 7/22/2015 | 66,057 |
| 7/29/2015 | 56,833 |
| 8/5/2015 | 61,807 |
| 8/12/2015 | 66,049 |
| 8/19/2015 | 70,251 |
| 8/26/2015 | 71,581 |
| 9/2/2015 | 78,479 |
| 9/9/2015 | 64,928 |
| 9/16/2015 | 72,561 |

| Date | Treasury bills (trillions) |
|---|---|
| 9/23/2015 | 65,064 |
| 9/30/2015 | 57,900 |
| 10/7/2015 | 54,196 |
| 10/14/2015 | 58,168 |
| 10/21/2015 | 51,377 |
| 10/28/2015 | 49,814 |
| 11/4/2015 | 89,867 |
| 11/11/2015 | 69,428 |
| 11/18/2015 | 74,041 |
| 11/25/2015 | 58,674 |
| 12/2/2015 | 92,897 |
| 12/9/2015 | 82,328 |
| 12/16/2015 | 78,439 |
| 12/23/2015 | 86,627 |
| 12/30/2015 | 79,488 |
| 1/6/2016 | 91,283 |
| 1/13/2016 | 76,311 |
| 1/20/2016 | 104,084 |
| 1/27/2016 | 77,440 |
| 2/3/2016 | 88,320 |
| 2/10/2016 | 76,757 |
| 2/17/2016 | 83,441 |
| 2/24/2016 | 74,412 |
| 3/2/2016 | 91,783 |
| 3/9/2016 | 83,414 |
| 3/16/2016 | 81,165 |
| 3/23/2016 | 85,115 |
| 3/30/2016 | 101,784 |
| 4/6/2016 | 74,641 |
| 4/13/2016 | 63,277 |
| 4/20/2016 | 66,100 |
| 4/27/2016 | 66,791 |
| 5/4/2016 | 74,093 |
| 5/11/2016 | 64,108 |
| 5/18/2016 | 69,121 |
| 5/25/2016 | 72,685 |
| 6/1/2016 | 91,117 |

| Date | Treasury bills (trillions) |
|---|---|
| 6/8/2016 | 74,173 |
| 6/15/2016 | 70,597 |
| 6/22/2016 | 87,291 |
| 6/29/2016 | 99,538 |
| 7/6/2016 | 92,346 |
| 7/13/2016 | 76,724 |
| 7/20/2016 | 81,511 |
| 7/27/2016 | 72,804 |
| 8/3/2016 | 77,931 |
| 8/10/2016 | 80,336 |
| 8/17/2016 | 84,567 |
| 8/24/2016 | 75,267 |
| 8/31/2016 | 85,828 |
| 9/7/2016 | 89,559 |
| 9/14/2016 | 94,423 |
| 9/21/2016 | 83,011 |
| 9/28/2016 | 85,956 |
| 10/5/2016 | 107,923 |
| 10/12/2016 | 106,672 |
| 10/19/2016 | 89,247 |
| 10/26/2016 | 76,709 |
| 11/2/2016 | 89,600 |
| 11/9/2016 | 93,274 |
| 11/16/2016 | 123,840 |
| 11/23/2016 | 103,001 |
| 11/30/2016 | 93,467 |
| 12/7/2016 | 87,468 |
| 12/14/2016 | 80,694 |
| 12/21/2016 | 93,702 |
| 12/28/2016 | 101,305 |
| 1/4/2017 | 102,418 |
| 1/11/2017 | 81,877 |
| 1/18/2017 | 99,856 |
| 1/25/2017 | 81,689 |
| 2/1/2017 | 94,667 |
| 2/8/2017 | 89,154 |
| 2/15/2017 | 83,963 |

| Date | Treasury bills (trillions) |
|---|---|
| 2/22/2017 | 92,172 |
| 3/1/2017 | 86,588 |
| 3/8/2017 | 81,766 |
| 3/15/2017 | 107,395 |
| 3/22/2017 | 80,912 |
| 3/29/2017 | 88,655 |
| 4/5/2017 | 87,929 |
| 4/12/2017 | 81,669 |
| 4/19/2017 | 95,106 |
| 4/26/2017 | 93,299 |
| 5/3/2017 | 98,106 |
| 5/10/2017 | 80,008 |
| 5/17/2017 | 82,294 |
| 5/24/2017 | 92,487 |
| 5/31/2017 | 109,488 |
| 6/7/2017 | 77,021 |
| 6/14/2017 | 80,296 |
| 6/21/2017 | 91,990 |
| 6/28/2017 | 87,642 |
| 7/5/2017 | 94,624 |
| 7/12/2017 | 74,984 |
| 7/19/2017 | 81,750 |
| 7/26/2017 | 85,994 |
| 8/2/2017 | 99,761 |
| 8/9/2017 | 77,639 |
| 8/16/2017 | 97,808 |
| 8/23/2017 | 85,308 |
| 8/30/2017 | 94,783 |
| 9/6/2017 | 102,144 |
| 9/13/2017 | 104,234 |
| 9/20/2017 | 94,390 |
| 9/27/2017 | 87,185 |
| 10/4/2017 | 93,424 |
| 10/11/2017 | 94,870 |
| 10/18/2017 | 84,754 |
| 10/25/2017 | 82,264 |
| 11/1/2017 | 115,979 |

| Date | Treasury bills (trillions) |
|---|---|
| 11/8/2017 | 89,762 |
| 11/15/2017 | 101,741 |
| 11/22/2017 | 88,414 |
| 11/29/2017 | 103,647 |
| 12/6/2017 | 101,851 |
| 12/13/2017 | 95,779 |
| 12/20/2017 | 101,246 |
| 12/27/2017 | 108,299 |
| 1/3/2018 | 144,625 |
| 1/10/2018 | 93,588 |
| 1/17/2018 | 118,520 |
| 1/24/2018 | 93,148 |
| 1/31/2018 | 117,569 |
| 2/7/2018 | 116,842 |
| 2/14/2018 | 125,589 |
| 2/21/2018 | 122,860 |
| 2/28/2018 | 117,834 |
| 3/7/2018 | 113,536 |
| 3/14/2018 | 110,348 |
| 3/21/2018 | 116,770 |
| 3/28/2018 | 137,734 |
| 4/4/2018 | 135,847 |
| 4/11/2018 | 99,337 |
| 4/18/2018 | 109,656 |
| 4/25/2018 | 112,529 |
| 5/2/2018 | 112,188 |
| 5/9/2018 | 86,792 |
| 5/16/2018 | 97,609 |
| 5/23/2018 | 111,797 |
| 5/30/2018 | 131,224 |
| 6/6/2018 | 108,586 |
| 6/13/2018 | 101,025 |
| 6/20/2018 | 112,006 |
| 6/27/2018 | 99,269 |
| 7/4/2018 | 122,611 |
| 7/11/2018 | 98,524 |
| 7/18/2018 | 110,974 |

| Date | Treasury bills (trillions) |
|---|---|
| 7/25/2018 | 97,636 |
| 8/1/2018 | 115,258 |
| 8/8/2018 | 104,283 |
| 8/15/2018 | 120,960 |
| 8/22/2018 | 106,629 |
| 8/29/2018 | 111,836 |
| 9/5/2018 | 134,242 |
| 9/12/2018 | 113,360 |
| 9/19/2018 | 109,894 |
| 9/26/2018 | 112,134 |
| 10/3/2018 | 121,921 |
| 10/10/2018 | 118,340 |
| 10/17/2018 | 106,269 |
| 10/24/2018 | 103,744 |
| 10/31/2018 | 120,987 |
| 11/7/2018 | 124,505 |
| 11/14/2018 | 131,022 |
| 11/21/2018 | 117,953 |
| 11/28/2018 | 130,490 |
| 12/5/2018 | 150,985 |
| 12/12/2018 | 136,920 |
| 12/19/2018 | 120,372 |
| 12/26/2018 | 139,515 |
| 1/2/2019 | 177,327 |
| 1/9/2019 | 131,766 |
| 1/16/2019 | 122,956 |
| 1/23/2019 | 138,688 |
| 1/30/2019 | 128,972 |
| 2/6/2019 | 158,181 |
| 2/13/2019 | 122,495 |
| 2/20/2019 | 136,196 |
| 2/27/2019 | 140,659 |
| 3/6/2019 | 150,619 |
| 3/13/2019 | 131,831 |
| 3/20/2019 | 134,737 |
| 3/27/2019 | 149,580 |
| 4/3/2019 | 140,932 |

| Date | Treasury bills (trillions) |
|---|---|
| 4/10/2019 | 111,719 |
| 4/17/2019 | 129,550 |
| 4/24/2019 | 145,805 |
| 5/1/2019 | 143,753 |
| 5/8/2019 | 119,466 |
| 5/15/2019 | 118,820 |
| 5/22/2019 | 123,580 |
| 5/29/2019 | 142,616 |
| 6/5/2019 | 127,863 |
| 6/12/2019 | 115,447 |
| 6/19/2019 | 121,500 |
| 6/26/2019 | 133,802 |
| 7/3/2019 | 132,071 |
| 7/10/2019 | 118,855 |
| 7/17/2019 | 111,054 |
| 7/24/2019 | 102,901 |
| 7/31/2019 | 130,036 |
| 8/7/2019 | 130,351 |

In the past, Treasury has had limited data on transactions in the secondary market. As a result, it has had limited real-time information on secondary market trading activity, which, as discussed earlier, has changed significantly in recent years, and has experienced abrupt changes in liquidity conditions, such as the October 2014 “flash rally” event.

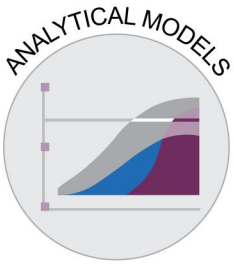
In July 2017, Treasury and other agencies gained access to more granular data on secondary market transactions as reported to the Financial Industry Regulatory Authority, Inc. (FINRA) by its broker-dealer members through the Trade Reporting and Compliance Engine (TRACE). Currently, the TRACE data are available to Treasury, the SEC, the Federal Reserve, and other official entities.[65] According to Treasury officials, analyzing the raw TRACE data can provide insight into pricing in

[65]As mentioned earlier, in September 2019, a Treasury official stated that FINRA plans to publicly release aggregated data on Treasury trade volumes weekly. Department of the Treasury, *Remarks of Deputy Secretary Justin Muzinich at the 2019 U.S. Treasury Market Structure Conference*, Sept. 23, 2019.

the market, patterns of trading activity, and the timing of trades. Treasury officials stated no other data source offered such detailed and reasonably comprehensive information on secondary market transactions in Treasury securities.

However, there are limitations to the TRACE data, and Treasury is continuing to work with FINRA and the SEC to improve the quality of the data. Treasury has made policy recommendations supportive of expanding the scope of TRACE data reporting. Treasury reported that in April 2019, FINRA made enhancements to the Treasury transaction data that are reported through TRACE. For example, FINRA now requires more detailed transaction reporting to better understand the firms that are trading with each other. These identifying data will be available only to Treasury and regulators, such as the SEC and the Federal Reserve. According to Treasury, this will provide them with a better understanding of principal trading firm activity in the Treasury secondary market.

## Treasury Uses Analytical Models to Illustrate Costs and Risks of Issuance Strategies, but Does Not Have a Quality Assurance Policy




Source: GAO. | GAO-20-131

Treasury's analytical models are another source of information for the department's financing decisions, but Treasury lacks a policy governing important aspects of these activities. According to Treasury officials, they use a number of analytical approaches, from fully specified models to simple illustrative analyses. Some models are more complex, combining information on the debt portfolio along with assumptions about future financing needs, economic conditions, and interest rates. Other models perform relatively simple calculations based on market data.[66] Treasury officials told us they use these analyses to illustrate trade-offs, test potential financing options, and understand long-term dynamics of the Treasury market. These kinds of analytical tools can play an important role in good debt management decisions.[67]

According to Treasury officials, the bulk of modeling is completed by the Office of Debt Management's Quantitative Strategies Group. Treasury officials told us that the group, which was formed in 2011, has two full-time-equivalent employees. Treasury officials provided examples of some internal analysis and modeling they have used in the last few years.

- **Portfolio simulation models of the Treasury debt portfolio.** These simulations produce estimates of future costs and risks—among other potential outputs—arising from the debt portfolio and potential issuance strategies. For example, the simulation can produce a cost metric that represents Treasury's interest cost for a particular issuance strategy.[68] In addition, the simulation can produce a risk metric that represents the amount of debt maturing over various periods (e.g., in 1 year, 3 years, 5 years) given a specific issuance

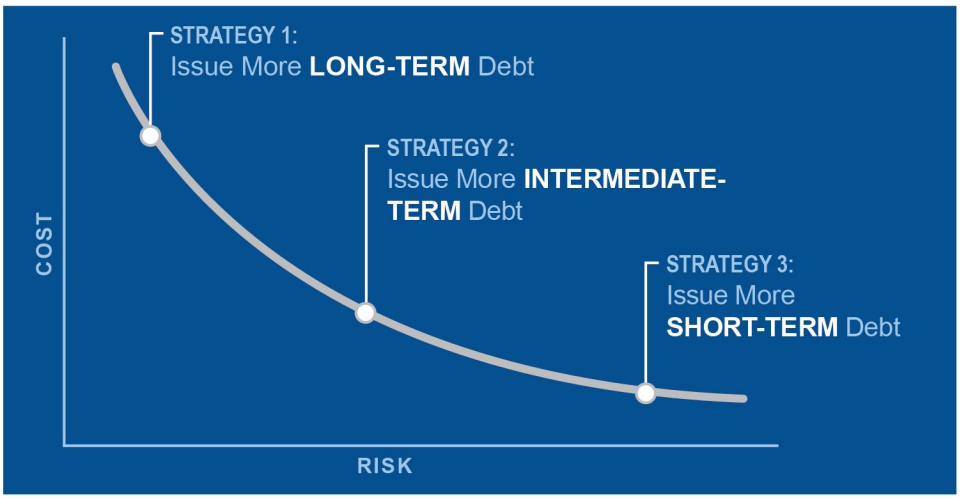
[66]For our purposes, and consistent with a definition used by the Federal Reserve, models can refer to, for example, complex, formal models as well as simple quantitative analyses. See Board of Governors of the Federal Reserve System, *SR Letter 11-7: Supervisory Guidance on Model Risk Management* (Washington, D.C.: Apr. 4, 2011).

[67]World Bank-International Monetary Fund, *Revised Guidelines for Public Debt Management* (April 2014).

[68]For more information on this type of modeling, see the following public working paper authored by an Office of Debt Management employee: V*isualizing Treasury Issuance Strate*gy (SSRN, Feb. 15, 2018). This is not an official Treasury document.

strategy. One use of such a model is to represent an issuance strategy as one cost-risk choice among a range of options associated with alternative issuance strategies (see fig. 13). As assumptions about the economy or financial markets change, or as issue sizes or maturities are adjusted, the cost and risk outcomes change.

**Figure 13: Illustration of Cost-Risk Trade-off for Different Issuance Strategies**




Source: GAO. | GAO-20-131

In August 2018, Treasury officials stated that model output, along with market outreach and analysis of historical auction data, supported Treasury's decision to increase issuance at all maturities with a focus on the intermediate range of 2, 3, and 5years.

- **Stress testing to examine how the debt portfolio might perform in challenging environments.** For example, Treasury staff examined projections of future borrowing needs and interest rates and analyzed how a strategy might perform under different interest-rate assumptions.
- **Calculations to estimate the yields on potential new securities.** For example, in 2017, Treasury used several analytical approaches to create a range of potential prices for an ultra-long bond. One approach estimated the additional yield for an ultra-long bond, assuming it would be proportionate to the difference between 30-year and 10-year bond yields.

Analytical models can improve decisions, but they also come with risks, including possible adverse consequences of decisions based on models

that are incorrect or misused. These risks can be managed through appropriate documentation and quality assurance. In our previous work, we identified the elements of economic analyses that are relevant for federal agency decision-making, including transparency and documentation of the analyses for internal stakeholders.[69]

Analyses should be transparent by describing and justifying the analytical choices, assumptions, and data used. Transparency allows internal stakeholders to understand the implications of these analytical choices and their associated risks. Sufficient documentation ensures that analytical choices, data, assumptions, limitations, and uncertainties are clear and available to future model developers and users.[70] Documentation also provides a means to retain organizational knowledge and mitigate the risk of having that knowledge limited to a few personnel.[71]

Documentation of quantitative analyses and models should be clearly written, with a plain language summary and clearly labeled tables that describe the data used and results, and a conclusion that is consistent with these results. Documentation should also indicate that analyses comply with a robust quality assurance process.[72] The Federal Reserve outlines a quality assurance process intended to verify that models are performing in line with their design objectives and business uses and also identifies potential limitations and assesses their possible impact.[73]

The degree of quality assurance required should be commensurate with the level of complexity, risk, and materiality to decision-making. Federal

[69]GAO, *Assessment Methodology for Economic Analysis*, GAO-18-151SP (Washington D.C.: Apr. 10, 2018).

[70]GAO-18-151SP.

[71]GAO-14-704G.

[72]Quality assurance activities can also, commensurate with risk, benefit from some degree of independence from model development such that individuals may be better positioned to undertake quality assurance activities if they do not have a stake in whether a model is determined to be valid. Board of Governors of the Federal Reserve System, *SR Letter 11-7: Supervisory Guidance on Model Risk Management* (Washington, D.C.: Apr. 4, 2011).

[73]The Federal Reserve guidance is directed to bank holding companies, which it supervises. We believe this guidance reflects quality assurance practices for models that can be more broadly applicable. *SR Letter 11-7: Supervisory Guidance on Model Risk Management* (Washington, D.C.: Apr. 4, 2011).

standards for internal control also direct agencies to design and implement control activities—such as documentation and quality assurance—through policies to achieve program objectives and respond to risks.[74]

Treasury provided information on its analytical models which included some key elements relevant to the documentation and transparency of Treasury's analyses, including:

- Internal Treasury presentations that described the purpose, rationale, and certain analytical choices and results for a portfolio simulation model.
- Internal presentations detailing results and some analytical choices related to pricing estimates for an ultra-long bond.
- A code repository that can facilitate replication of some models and examples of code used to operate models.

While Treasury's documentation of its analytical models contained useful information for internal stakeholders, the documentation did not fully characterize the analytical choices, data, assumptions, limitations, and uncertainties associated with the analyses. For example:

- Treasury's internal presentations on its portfolio simulation models did not fully justify analytical choices or describe the limitations of the models.
- Treasury's internal presentations on pricing estimates for an ultra-long bond contain estimates from six different analytical approaches developed by Treasury but only detail a subset of the assumptions needed to arrive at the estimates. For example, there is no description of the precise structure of the approaches or the necessary sources of uncertainty that would lead to the range of estimates that Treasury presents for each approach.

Treasury officials did not have documentation indicating that analytical models had been subject to quality assurance or that quality assurance activities had been commensurate with the level of complexity, risk, and materiality to decision-making.

[74]See GAO-14-704G, principles 10 and 12.

These issues arise in part because Treasury does not have a policy governing important aspects of the Office of Debt Management's analytical modeling activities, including requiring that analyses are documented and that Treasury staff follow and document appropriate quality assurance steps. Treasury officials told us that they take steps to ensure that analytical work is appropriately reviewed. They stated that the review process is based on the nature of the work, and according to Treasury officials, quality assurance generally entails cross checks among staff and review by office leadership. One model was also shared with external contacts for feedback.

Treasury officials emphasized that models are only one input of many into Treasury's decision-making and explained that their practices are sufficient for the more straightforward analyses that typically inform decisions. However, the analyses that Treasury relies on—both relatively straightforward and more complex—to inform important decisions should be documented and subject to quality assurance to ensure that decision makers receive quality information based on appropriate analytical approaches. Treasury relies on a range of analytical methods, all of which require some degree of technical expertise to develop, implement, and evaluate, despite varying degrees of complexity.

A policy requiring appropriate documentation and quality assurance would help Treasury ensure that analytical methods, data, assumptions, limitations, and uncertainties are transparent, appropriate, and available to future model developers and users.

# Conclusions

U.S. Treasury securities play a vital role in U.S. and global financial markets because of their deep and liquid market and because investors are confident that debt backed by the full faith and credit of the U.S. government will be honored. This combination of characteristics has helped support reliable demand for Treasury securities through ever changing market conditions, which, in turn, has helped minimize Treasury's borrowing costs. Changing investment needs across different sectors and fluctuations in demand for Treasury securities are a normal part of economic cycles.

Treasury and Congress need to be alert to risks that could compromise these key characteristics to preserve Treasury securities' unique advantages. These risks include changing dynamics of the secondary

market, including new participants using high-frequency trading strategies that could reduce liquidity, particularly in times of market stress. Treasury's recent efforts to coordinate with the SEC and FINRA to obtain detailed information on the secondary Treasury market are an important step.

In addition, as we have previously reported, Congress needs to consider taking action to address the unsustainable long-term fiscal path as well as alternative approaches to managing the debt limit that would ensure the continued safety of U.S. Treasury securities.

Treasury has a critical role to play through its management of the federal debt portfolio to support its goal to borrow at the lowest cost over time. Treasury must promote strong demand for its securities from a diverse group of investors while making debt issuance decisions that appropriately balance risks and interest costs. Therefore, it is important that Treasury make these decisions based on the best information possible.

Consistent with good debt management practices, Treasury uses a range of qualitative and quantitative inputs to inform its decision-making. It does not, however, have policies governing important aspects of two of these inputs: bilateral market outreach and analytical modeling. Until Treasury has designed and implemented policies around these key activities, it cannot be certain that needed information for debt issuance decisions is available, complete, and appropriately reviewed. Moreover, without appropriate documentation of important market outreach or analytical models, Treasury risks losing critical organizational information as staff leave the agency. Given the size and importance of the Treasury market, ensuring the quality of information available to decision-makers is essential to Treasury's efforts to reduce risk and cost to taxpayers.

## Recommendations for Executive Action

We are making the following two recommendations to Treasury.

The Secretary of the Treasury should finalize the Office of Debt Management's policy for conducting bilateral market outreach and ensure it includes guidance on selecting market participants and documenting and sharing relevant information throughout the office while safeguarding the confidentiality of discussions. (Recommendation 1)

The Secretary of the Treasury should establish a policy for the documentation and quality assurance of the Office of Debt Management's analytical models. At a minimum, this policy should require (1) appropriate and sufficient documentation of analytical models, and (2) documented quality assurance of analytical models commensurate with the level of complexity, risk, and materiality to decision-making. (Recommendation 2)

# Agency Comments

We provided a draft of this report to Treasury and the Federal Reserve for review and comment. In its comments, reproduced in appendix III, Treasury agreed with our recommendations and said it would work to implement them over the coming months. Treasury and the Federal Reserve also provided technical comments, which we incorporated as appropriate.

We are sending copies of this report to the appropriate congressional committees, the Secretary of the Treasury, the Federal Reserve, and other interested parties. In addition, the report will be available at no charge on the GAO website at http://www.gao.gov.

For questions about this report, please contact Tranchau (Kris) T. Nguyen at (202) 512-6806 or nguyentt@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this report. GAO staff who made key contributions to this report are listed in appendix IV.

Tranchau (Kris) T. Nguyen
Director, Strategic Issues

# Appendix I: Survey Population and Sample Design

To address both of our objectives, we surveyed market participants regarding (1) factors that affect demand for Treasury securities, (2) experiences interacting with the Department of the Treasury (Treasury), and (3) evolution of the Treasury market.

In March 2019, we administered an online survey to 109 institutions. We selected the 10 largest institutions by total assets (or other equivalent financial indicator) in nine sectors that hold Treasury securities and the 15 largest mutual funds and exchange-traded funds by total assets under management (see table 5). We also sent the survey to four market participants we interviewed in September that did not meet our top 10 criterion for its sector. The survey results are not generalizable to all investors in Treasury securities.

**Table 5: Survey Responses by Recipient Type**

| Sector | Total recipients of survey | Total completed surveys |
|---|---|---|
| Broker-dealers | 13 | 10 |
| Commercial banks | 11 | 5 |
| Life insurance | 10 | 5 |
| Money market funds | 10 | 5 |
| Mutual funds and exchange-traded funds | 15 | 11 |
| Nonfinancial corporations | 10 | 6 |
| Private pension funds | 10 | 8 |
| Property and casualty insurance | 10 | 6 |
| State and local governments | 10 | 5 |
| State and local retirement funds | 10 | 6 |
| **Total** | **109** | **67** |

Source: GAO | GAO-20-131

To define the sectors for our sample, we reviewed data from the Federal Reserve's *Financial Accounts of the United States*, (table L.100 to L. 133, first quarter 2018) to identify sectors holding Treasury securities. We excluded some sectors due to challenges in contacting certain entities, such as foreign monetary authorities, other foreign investors, and the household sector. According to the Federal Reserve, the household sector is a residual category and includes individuals holding Treasury securities, hedge funds, and other institutions not required to report to regulatory bodies. We excluded this sector due to the difficulty of identifying, ranking, and contacting individual household investors and other entities. We excluded Government Sponsored Enterprises because these entities are unlikely to provide additional insights into the Treasury market beyond our sample, which includes commercial banks. We excluded federal government retirement funds because the Thrift Savings Plan does not invest in marketable Treasury securities.

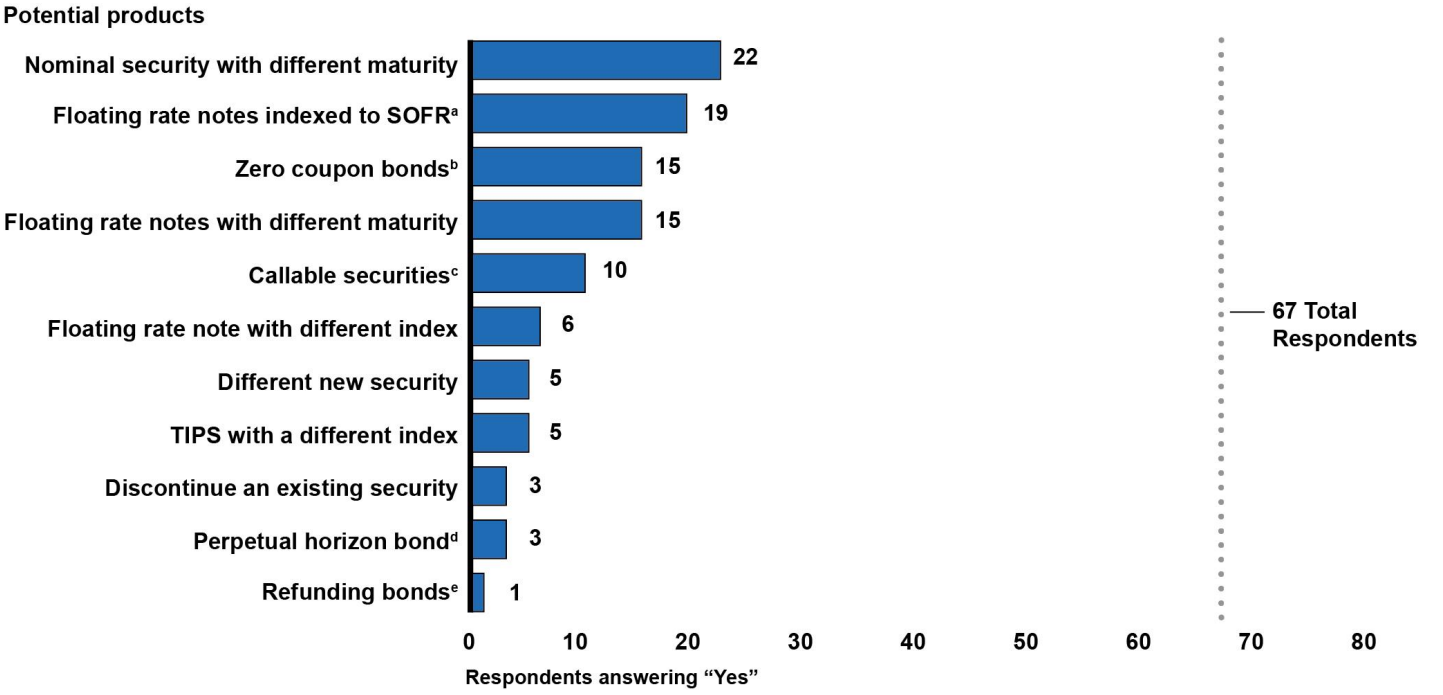
To identify the organizations within each sector that would receive our web-based survey, we used rankings of the largest organizations in each sector based on total assets or an equivalent financial indicator, such as assets under management or direct premiums written, and selected the 10 largest in each sector. In the case of mutual funds and exchange traded funds, we used information from the Investment Company Institute on total assets under management in Treasury- and government-focused funds to identify the largest 15 in that sector. For the broker-dealer sector, we selected the 10 largest primary dealers.

# Appendix II: Selected Results from Survey of Market Participants

As part of our survey of market participants, we asked respondents to identify products or debt management practices that, if the Department of the Treasury (Treasury) introduced, would increase the respondent's overall demand for Treasury securities. Results from our related survey questions are presented below.

**Survey Question:** *If Treasury were to make the following changes to its offerings, would your overall demand for Treasury securities increase?* (see fig. 14).

**Figure 14: New Treasury Products That Would Increase Respondent's Overall Demand for Treasury Securities, According to Survey Respondents**




Source: GAO survey of market participants. | GAO-20-131

**Data table for Figure 14: New Treasury Products That Would Increase Respondent's Overall Demand for Treasury Securities, According to Survey Respondents**

| Potential products | Respondents answering "Yes" |
|---|---|
| Nominal security with different maturity | 22 |
| Floating rate notes indexed to SOFR | 19 |
| Zero coupon bonds | 15 |
| Floating rate notes with different maturity | 15 |
| Callable securities | 10 |
| Floating rate note with different index | 6 |
| Different new security | 5 |
| TIPS with a different index | 5 |
| Discontinue an existing security | 3 |
| Perpetual horizon bond | 3 |
| Refunding bonds | 1 |
| Total | 67 |

[a]The Secured Overnight Financing Rate (SOFR) is a broad measure of the cost of borrowing cash overnight collateralized by Treasury securities.

[b]Zero coupon bonds are bonds that are sold at discount from face value and do not pay interest during the life of the bond. The investor's return is the difference between the purchase price of the bond and its face value when redeemed.

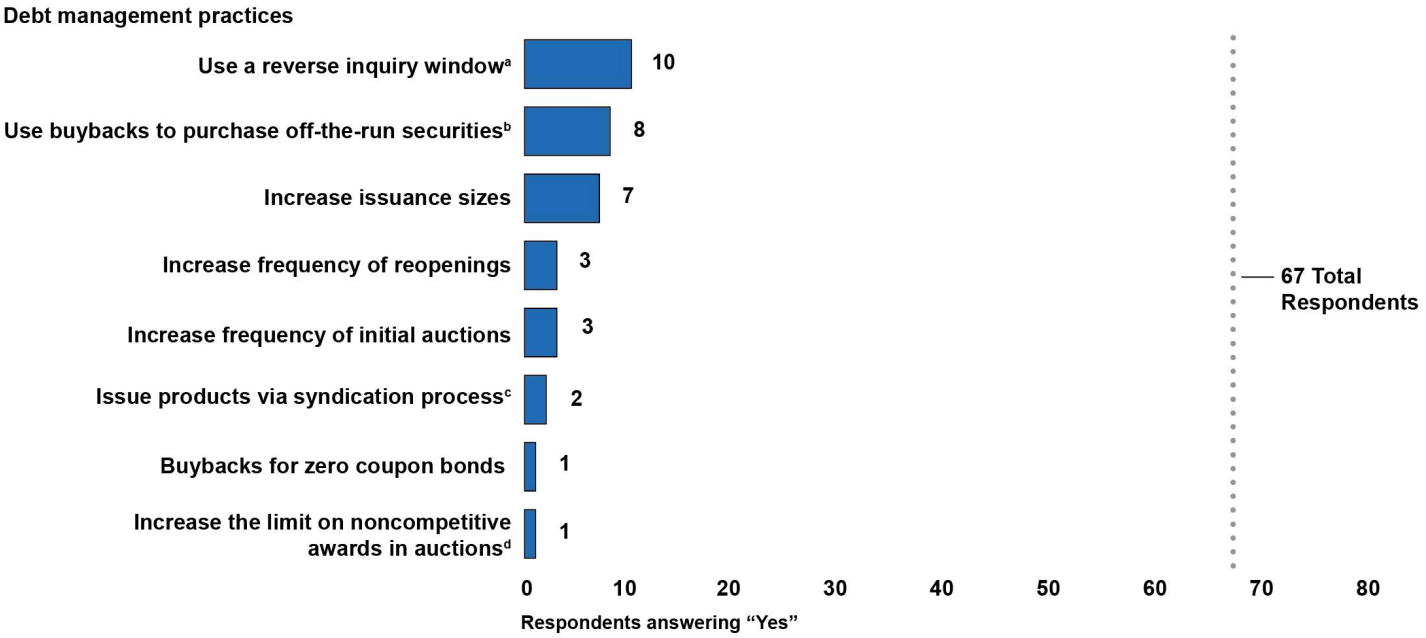
[c]Callable bonds are bonds that can be redeemed or paid off by the issuer prior to the bond's maturity date.

[d]Perpetual horizon bonds are bonds with no maturity date and pay interest on the bond forever.

[e]Refunding bonds are bonds that are issued to retire or redeem previously issued bonds before their maturity date.

**Survey Question:** *If Treasury were to change its debt management practices in the following ways, would your overall demand for Treasury securities increase?* (see fig. 15).

**Figure 15: Debt Management Practices That Would Increase Respondent's Overall Demand for Treasury Securities, According to Survey Respondents**




Source: GAO survey of market participants. | GAO-20-131

**Data table for Figure 15: Debt Management Practices That Would Increase Respondent's Overall Demand for Treasury Securities, According to Survey Respondents**

| Debt management Practices | Respondents answering "Yes" |
|---|---|
| Use a reverse inquiry window | 10 |
| Use buybacks to purchase off-the-run securities | 8 |
| Increase issuance sizes | 7 |
| Increase frequency of reopenings | 3 |
| Increase frequency of initial auctions | 3 |
| Issue products via syndication process | 2 |
| Buybacks for zero coupon bonds | 1 |
| Increase the limit on noncompetitive awards in auctions | 1 |
| Total | 67 |

[a]A reverse inquiry window would allow investors to request and purchase specific securities from Treasury.

[b]Buybacks of off-the-run securities would involve Treasury purchasing older debt, which is less liquid than on-the-run debt, or the most recently issued securities.

[c]The syndication process involves investors underwriting bond issuance and guaranteeing their purchase.

# Appendix III: Comments from the Department of the Treasury

**DEPARTMENT OF THE TREASURY**
**WASHINGTON, D.C.**

November 15, 2019

Tranchau (Kris) T. Nguyen
Director, Strategic Issues
U.S. Government Accountability Office
441 G Street, NW
Washington, DC 20548

Dear Ms. Nguyen:

Thank you for the opportunity to review the Government Accountability Office's (GAO) draft report entitled *Federal Debt Management: Treasury Should Strengthen Policies for Market Outreach and Analysis to Maintain Broad-Based Demand for Securities* (GAO-20-131) (the Draft Report). The Draft Report discusses factors that affect demand for Treasury securities and examines how Treasury analyzes information about the market to inform its debt issuance strategy.

As the Draft Report notes, the Treasury market is the deepest and most liquid market in the world, with a broad and diverse investor base. These hallmarks of the Treasury market help to reduce the cost of financing the U.S. government and provide important benefits for financial markets and the U.S. economy more broadly.

To support Treasury's goal of borrowing at the lowest cost over time, Treasury employs a robust, multifaceted approach to analyzing potential debt issuance strategies within a regular and predictable issuance framework. As noted in the Draft Report, this process includes market outreach (such as primary dealer surveys, work with the Treasury Borrowing Advisory Committee, and bilateral meetings with market participants), analysis of auction and market metrics, and analytical models. These activities help Treasury to understand demand, liquidity, and other important market dynamics for existing and potential Treasury products. We are pleased that the Draft Report found that, consistent with good debt management practices, Treasury uses a range of qualitative and quantitative inputs to inform its debt issuance decision-making. Treasury's actions have been successful in continuing to support a strong and healthy Treasury market, despite challenges (such as debt limit impasses) noted in the Draft Report.

GAO recommends that Treasury adopt two additional policies related to its bilateral market outreach and its analytical models. Though Treasury's market outreach is carefully considered and its analytical work is rigorous, we accept the Draft Report's recommendations and will work to implement them over the coming months.

Thank you again for the opportunity to review and comment on the Draft Report. We appreciate your suggestions for enhancing Treasury's policies and procedures related to debt management.

Sincerely,

Brian Smith
Deputy Assistant Secretary for Federal Finance

# Text of Appendix III: Comments from the Department of the Treasury

November 15, 2019

Tranchau (Kris) T. Nguyen Director, Strategic Issues

U.S. Government Accountability Office 441 G Street, NW

Washington, DC 20548 Dear Ms. Nguyen:

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Brian Smith

Deputy Assistant Secretary for Federal Finance

# Appendix IV: GAO Contacts and Staff Acknowledgments

## GAO Contact

Tranchau (Kris) T. Nguyen at (202) 512-6806 or nguyentt@gao.gov

## Staff Acknowledgments

In addition to the contact named above, Thomas J. McCabe (Assistant Director), Margaret M. Adams (Analyst-in-Charge), Abigail Brown, Michael Hoffman, Loren Lipsey, Daniel Mahoney, Anna Beth Smith, Andrew J. Stephens, Farrah Stone, and Wade Tanner made significant contributions to this report. Robert Gebhart, Jerome Sandau, Peter Verchinski, and Alicia White also contributed to this report.

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