

M A Y
2020

OPEN MARKET OPERATIONS

DURING 2019

A REPORT PREPARED
FOR THE FEDERAL OPEN
MARKET COMMITTEE BY
THE MARKETS GROUP
OF THE FEDERAL RESERVE
BANK OF NEW YORK

CONTENTS

This report, presented to the Federal Open Market Committee by Lorie Logan, Executive Vice President, Federal Reserve Bank of New York, and Manager of the System Open Market Account, describes open market operations of the Federal Reserve System for the calendar year 2019. Fabiola Ravazzolo, Julie Remache, Kathryn Chen, Lisa Stowe, Radhika Mithal, Karen Brifu, and Timothy Chu were primarily responsible for preparation of the report.

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OVERVIEW

HIGHLIGHTS FROM 2019

During 2019, the Federal Reserve continued to control the level of the federal funds rate and other short-term interest rates primarily through the use of its administered rates, which include the rate of interest paid on excess reserves (IOER) supplemented by the offering rate for overnight reverse repurchase agreements (ON RRP). The Federal Open Market Committee (FOMC) issued important announcements about how it would implement monetary policy in the longer run, and made significant progress in transitioning toward a level of reserves that would be consistent with efficient and effective policy implementation. This report begins with a summary of these matters and then provides a detailed discussion of money market developments, the use of open market operations, and changes in the size and composition of the Federal Reserve's balance sheet over the course of the year.

The FOMC reduced the target range for the federal funds rate from a range of 2¼ to 2½ percent at the start of the year to a range of 1½ to 1¾ percent at year-end, in increments of ¼ percentage point at each of the July, September, and October FOMC meetings in 2019. In conjunction with these changes, the Board of Governors made corresponding adjustments to the IOER rate and the Committee also adjusted the offering rate on ON RRP. On several occasions, technical adjustments were made to lower the level of the Federal Reserve's administered rates relative to the target range, in order to foster trading in the federal funds market at rates well within the target range.

In January 2019, after careful study and consideration, the FOMC announced its intention to continue to operate in a regime with an ample supply of reserves. In line with this decision, the FOMC over the course of the year took steps to

adjust its balance sheet normalization plans to continue the transition toward its intended longer-run level of reserves. Specifically, the FOMC directed the Open Market Trading Desk at the Federal Reserve Bank of New York (the Desk) to first slow, from May and July, and then stop, from August, the reduction in the size of domestic securities holdings in the System Open Market Account (SOMA). In March, the Committee also reaffirmed its intent to hold primarily Treasury securities in the long run. Also in March, the Committee acknowledged that when it did cease the reduction of the Federal Reserve's domestic securities holdings, the average level of reserves might be somewhat above the level necessary to efficiently and effectively implement monetary policy. From that point, the Committee continued to monitor conditions in reserve markets amid ongoing declines in the level of reserves resulting from increases in currency and other non-reserve liabilities on the Federal Reserve's balance sheet.

In mid-September, significant upward pressure emerged in funding markets as sizable settlements of Treasury issuance increased the demand for securities financing. Outflows related to these settlements as well as to quarterly corporate tax payments created strains in repo markets, and these strains—against the backdrop of a decline in reserve balances to their lowest weekly level since 2012—spilled over to affect the federal funds rate. On September 16, the effective federal funds rate (EFFR) printed at the top of the target range, and on the following day it printed 5 basis points above the top of the range. Consistent with the FOMC directive in place at that time, the Desk conducted overnight and term repurchase agreement (repo) operations to maintain the federal funds rate in the FOMC's target range.

In light of observed and expected increases in the Federal Reserve's non-reserve liabilities, in the middle of October the FOMC directed the Desk to conduct purchases of Treasury bills in order to maintain, over time, reserve levels at or above the level that prevailed in early September 2019, a level that the Committee judged as more supportive of effective control over the federal funds rate. The FOMC also directed the Desk to continue to conduct repo operations to ensure that the supply of reserves remained ample, even against the backdrop of further increases in non-reserve liabilities, and to mitigate the risk of money market pressures that could adversely affect policy implementation. Over the remainder of the year, Treasury bill purchases together with overnight and term repos directed by the FOMC helped keep the federal funds rate within the target range.

Overall, the use of IOER, supplemented by the offering rate on ON RRP, and with the support of repos and Treasury bill purchases, helped keep the EFR within the target range on all but one day in 2019. The operational framework, through management of the federal funds rate, successfully enabled transmission of the stance of monetary policy to a broad set of market interest rates and financial conditions during the year.

Over the course of 2019, the size and composition of the Federal Reserve's balance sheet evolved as a result of FOMC directives as well as growth in non-reserve liabilities. The size of the balance sheet declined until July as a consequence of redemptions of SOMA domestic securities holdings, bringing the total size to roughly 18 percent of U.S. nominal GDP from 20 percent at the start of the year. After holding steady for a period during which redemptions were ceased, the balance sheet increased again starting in the middle of September as a result of repo operations and Treasury bill purchases, ending the year about \$120 billion larger than at the end of 2018, but unchanged as a share of U.S. nominal GDP, at around 20 percent. The SOMA domestic portfolio increased on net by about \$137 billion over the year, reflecting the FOMC's series of balance sheet decisions.¹ Treasury securities holdings increased by around \$106.4 billion, while agency mortgage-backed securities (MBS) holdings declined by roughly \$224.6 billion. The share of SOMA domestic securities holdings held in agency MBS securities declined because

only paydowns in excess of \$20 billion per month were reinvested back into agency MBS securities. Treasury bill securities were added to the SOMA portfolio for the first time since 2012 and repos were added for the first time since 2008.

Against the backdrop of the runoff of SOMA domestic securities holdings, reserve balances declined until the middle of September to roughly half the peak level reached in 2014. From that point, the level of reserves increased again because of repo operations and Treasury bill purchases in the fourth quarter of the year, with the increase from those factors partially offset by ongoing aggregate growth in Federal Reserve liabilities other than reserves, and ended the year nearly unchanged at about \$1.6 trillion. On net, aggregate non-reserve liabilities ended the year \$126.7 billion higher, mainly owing to the growth of currency in circulation, although certain other liabilities experienced significant swings during the year.

To support market functioning and ensure the effective conduct of open market operations, the Desk continued to execute securities lending operations in 2019, with a daily average volume of \$26 billion. These volumes were higher than those of the prior year and reached a record high since 1999 in the second half of the year as a result of increased volatility in the repo market.

The SOMA portfolio continued to contribute to substantial Federal Reserve income and remittances to the U.S. Treasury. In 2019, the Federal Reserve remitted a total of \$54.9 billion to the Treasury, less than the \$65.3 billion remitted in 2018, owing primarily to a decline in net income resulting from a decrease in average SOMA domestic securities holdings. The domestic portfolio moved to an unrealized gain position as a result of declines in interest rates; at year-end, the unrealized gain position totaled \$161 billion, compared to a loss position of \$6 billion at the end of 2018. Absent actual sales of assets from the Federal Reserve's portfolio, unrealized gains and losses have no effect on the portfolio's income or the Federal Reserve's remittances to the U.S. Treasury.

The size of the foreign currency reserve portfolio was largely unchanged over the year. The Desk did not conduct any foreign

OPEN MARKET OPERATIONS DURING 2019

exchange intervention activity that would alter the size of these reserve holdings, which at the end of the year totaled \$20.7 billion, compared with \$20.9 billion at the end of 2018. Meanwhile, the Desk continued to manage the foreign currency reserve holdings to conform to the portfolio's investment objectives of liquidity, safety, and return. The FOMC also continued to maintain U.S. dollar and foreign currency liquidity swap arrangements with five foreign central banks. The aggregate volume of U.S. dollar swap transactions declined roughly 38 percent from 2018, reflecting an environment of continuing decline in demand for U.S. dollar funding and hedging in the foreign exchange swap market.

Over the course of 2019, the Desk also continued to strengthen its operational flexibility and resiliency, including cyber and geographic resilience. The Desk undertook twenty-one types of small-value exercises, two more than in 2018, in order to strengthen its readiness to implement a range of potential FOMC directives.

As is customary, this report offers a forward-looking view into the SOMA portfolio in the form of staff projections of the domestic securities portfolio and its associated net income. At this time, however, the outlook for the balance sheet remains highly uncertain: the significant deterioration in the economic outlook as a result of the coronavirus outbreak in March 2020 has led to the introduction of a number of balance sheet tools, including asset purchases and lending and credit programs, to support market functioning and the flow of credit to households and businesses. Therefore, the projections presented in this report are based on the balance sheet outlook prior to the shift in policy, and they illustrate how the balance sheet would evolve over time in a “steady state” ample reserves regime.

A GUIDE TO THIS REPORT

The report is divided into four key sections:

1. Domestic Open Market Operations: The opening section reviews money market developments and the steps taken by the Desk in money markets and securities markets

to implement the FOMC's specific operating objectives for short-term interest rates and the balance sheet. It also describes securities lending operations that supported market functioning. (pp. 5-21)

2. Foreign Open Market Operations: This section focuses on the Desk's operations to maintain the Federal Reserve's portfolio of foreign currency-denominated assets and to provide U.S. dollar liquidity to foreign central banks. (pp. 23-24)

3. Operational Flexibility and Resiliency: This section reviews the network of counterparties maintained by the New York Fed to ensure that it can conduct open market operations in various scenarios. It highlights actions implemented to enhance cyber resilience and operational readiness exercises undertaken during the year. (pp. 25-29)

4. Selected Balance Sheet Developments: The final section examines the composition of the Federal Reserve's balance sheet, reviews financial developments related to the domestic SOMA portfolio, and discusses the purposes and recent trends in the Federal Reserve's liabilities. It also presents an illustrative projection of the balance sheet under a set of simplifying assumptions about growth in Federal Reserve liabilities over time. (pp. 31-51)

Appendix 1 provides references to the governing documents for Desk operations. Appendix 2 summarizes the Desk's public disclosures about its operations. Appendix 3 presents assumptions underlying the scenarios for the SOMA portfolio and the SOMA net income projections. Appendix 4 provides links to web pages where source material for Federal Reserve-related content can be found.

Underlying data for the charts shown in this report are provided on the New York Fed's website to the extent that their release is allowed by data suppliers.² Additional questions regarding this report and the underlying data can be addressed to ny.mkt.soma.annualreport@ny.frb.org.



DOMESTIC OPEN MARKET OPERATIONS

In 2019, the Desk continued to conduct open market operations in U.S. money markets and securities markets at the direction of the FOMC to support the implementation of monetary policy. The Desk also maintained a securities lending program, ancillary to monetary policy implementation, to support the smooth functioning of some of the markets in which the Federal Reserve operates.

THE FEDERAL RESERVE'S FRAMEWORK FOR MONETARY POLICY IMPLEMENTATION

To promote the goals prescribed for it by Congress, namely maximum employment and price stability, the Federal Reserve employs a monetary policy implementation framework that includes a short-term interest rate target to communicate the FOMC's policy stance, a set of administered rates set by the Federal Reserve, and market operations directed by the FOMC and conducted by the Desk to promote money market rate conditions consistent with the policy rate target. The FOMC can also alter the size and composition of its balance sheet as a mechanism for achieving its objectives.

The money market tools used by the Federal Reserve for policy implementation were developed to maintain short-term interest rate control in an environment of ample reserve balances in the banking system.³ The FOMC's key policy rate is a target range for the federal funds rate. (The federal funds rate is the rate at which depository institutions and other eligible entities conduct overnight unsecured transactions in central bank balances.) During 2019, the width of the target range for the federal funds rate continued to be $\frac{1}{4}$ percent, or 25 basis points.⁴

Administered rates are the primary tool in the Federal Reserve's monetary policy implementation toolkit. The Federal Reserve sets administered rates—the interest rate paid on excess reserves that a bank holds at the Federal Reserve, supplemented by the interest rate at which ON RRP are offered to a wide range of active nonbank lenders in addition to banks—as a means to maintain the federal funds rate within the range without actively adjusting the supply of reserve balances.⁵ The IOER rate is the main tool used to influence overnight interest rates. If a bank can earn interest on the reserve balances it holds at the central bank, then given the safety and convenience of this investment, little incentive exists for the bank to lend to private sector counterparties at a rate lower than that offered by the central bank. Further, if the bank can acquire funds in the wholesale market at rates below the rate paid on reserves, competition for these funds to earn an arbitrage profit would suggest that banks will bid up these rates to a level close to the interest rate on reserves. The ON RRP facility supports IOER by offering a rate that can be earned by a range of bank and nonbank entities.⁶

In implementing monetary policy in an ample reserves regime, the Federal Reserve also periodically needs to use open market operations to adjust the quantity of reserves in the banking system and maintain an ample supply over time. Indeed, in the last few months of 2019, the Federal Reserve employed a program of Treasury bill purchases and repo operations directed at maintaining ample reserve balances at or above the level prevailing in early September 2019 and restoring normal conditions in money markets.

OPEN MARKET OPERATIONS DURING 2019

Table 1

Key Policy Rates Effective in 2019

FOMC Meetings Announcing Policy Rate Changes	Effective Date Range for Policy Rates during 2019	Federal Funds Target Range		Interest Rate on Required and Excess Reserve Balances		Overnight Reverse Repo Offering Rate		Spread between IOER and ON RRP Rates
		Rate (Percent)	Change (Basis Points)	Rate (Percent)	Change (Basis Points)	Rate (Percent)	Change (Basis Points)	Level (Basis Points)
December 2018	January 1 to May 1	2¼ to 2½	0	2.40	0	2.25	0	15
May 2019	May 2 to July 31	2¼ to 2½	0	2.35	-5	2.25	0	10
July 2019	August 1 to September 18	2 to 2¼	-25	2.10	-25	2.00	-25	10
September 2019	September 19 to October 30	1¾ to 2	-25	1.80	-30	1.70	-30	10
October 2019	October 30 to December 31	1½ to 1¾	-25	1.55	-25	1.45	-25	10

Sources: Federal Open Market Committee; Board of Governors of the Federal Reserve System.

MONEY MARKET DEVELOPMENTS AND RELATED POLICY MEASURES

During 2019, the FOMC lowered the target for the federal funds rate a total of three times, from a range of 2¼ to 2½ percent at the start of the year to a range of 1½ to 1¾ percent at year-end. The reductions were made in increments of ¼ percentage point at each of the July, September, and October 2019 FOMC meetings (Table 1). At these meetings, the Board of Governors lowered the interest rate on excess and required reserve balances and the FOMC also adjusted the offering rate on ON RRP.

After the May and September FOMC meetings, the Board of Governors moved the IOER rate closer to the bottom of the target range. On these occasions, the FOMC also adjusted the ON RRP rate, including, at its September meeting, by moving the ON RRP rate 5 basis points below the bottom of the target range to maintain a 10 basis point spread between the IOER rate and the ON RRP rate. These actions were intended to foster trading in the federal funds market at rates well within the target range, in an environment of declining levels of reserves and significant changes in money market trading dynamics. With the IOER rate serving as a magnet for money market rates, setting the IOER

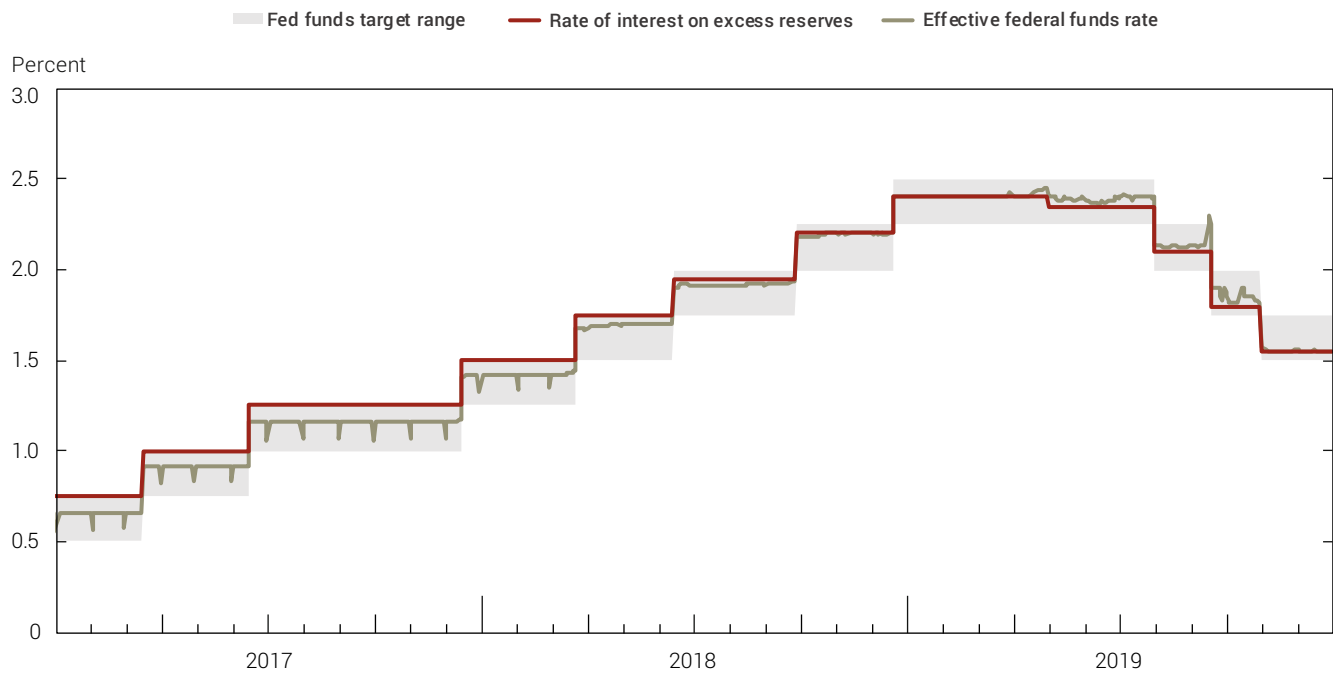
rate closer to the bottom of the federal funds target range was aimed at maintaining the EFFR within the target range. (For more information on similar adjustments in 2018, see the “Short-Term Interest Rate Management” section of the report, *Open Market Operations during 2018*.)

As a result of changes in the policy stance and technical adjustments, the IOER rate decreased from 2.40 percent to 1.55 percent and the ON RRP offering rate decreased from 2.25 percent to 1.45 percent over the year.

Over the course of 2019, in an environment of declining levels of reserves and against a backdrop of increased need for financing higher Treasury issuance, a constellation of overnight interest rates traded higher relative to the IOER rate. The EFFR became more sensitive to movements in secured rates and traded most of the year above the IOER rate (Chart 1). Use of the Federal Reserve’s principal tool, IOER, supplemented by the rate on ON RRPs, and with support of other open market operations, helped keep the EFFR within the target range on all but one day in 2019. The operational framework successfully enabled the transmission of the policy stance to a broad set of market interest rates and financial conditions.

OPEN MARKET OPERATIONS DURING 2019

Chart 1

Federal Funds Target Range, Interest on Excess Reserves, and Effective Federal Funds Rate

Source: Federal Reserve Bank of New York.

Note: Figures are daily.

Overnight secured rates traded above IOER

During 2019, rates on repurchase agreements secured by a general basket of Treasury securities continued to move higher relative to the IOER rate, extending a trend observed in 2018. Repo rates moved above the IOER rate early in the year as dealers sought to finance elevated inventories of Treasury securities in an environment characterized by a significant increase in net Treasury issuance and declining levels of reserves (Chart 2). In particular, repo rates moved significantly higher around dates with sizable Treasury securities settlements and corporate tax payments, as well as at month- and quarter-ends, compared to prior years. On Treasury settlement dates, dealers and some other market participants temporarily increased funding demand to finance received auction awards before distributing these securities more broadly.⁷ Around tax payment dates, major lenders of cash in the repo market, such as commercial banks and U.S. money market funds, reduced their repo market investments, effectively decreasing the supply of funds to the repo

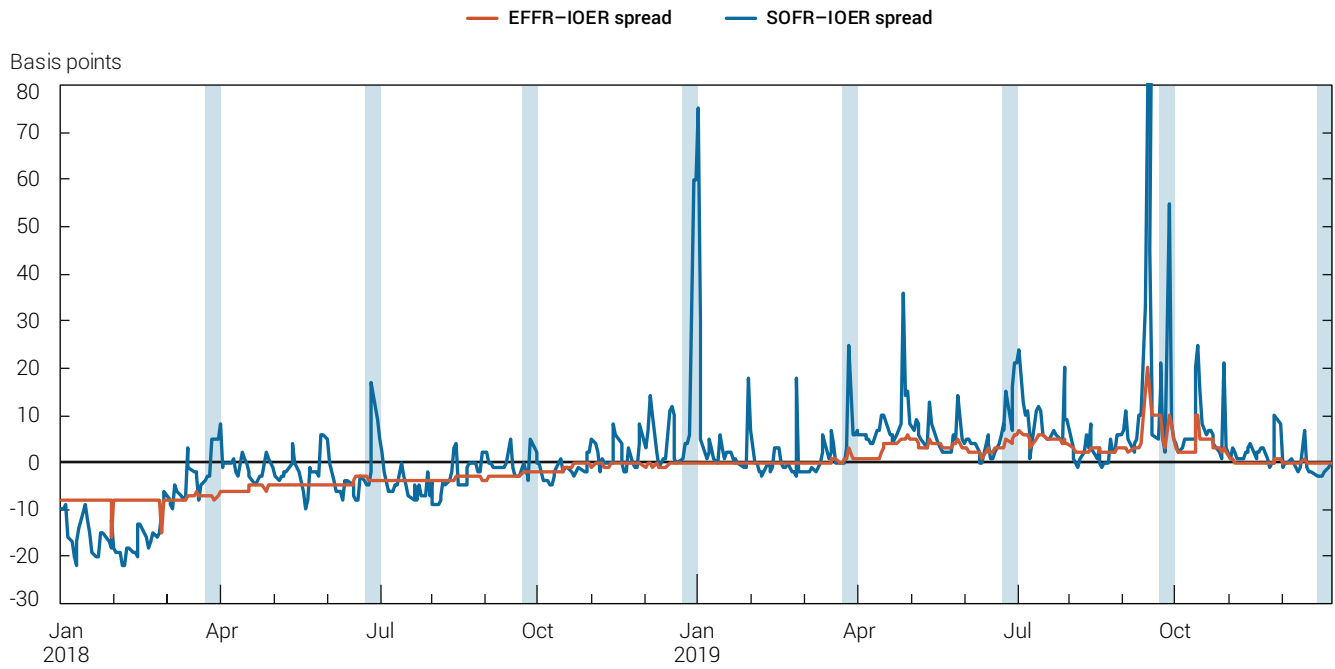
market, as a result of actual and expected cash outflows stemming from their clients' payments to the Treasury. Additionally, at period ends, some dealers reduced intermediation in the repo market in order to comply with certain regulatory ratios on reporting dates. As more borrowers with sizable financing needs chased a reduced supply of funding, repo rates notably increased around these calendar days.

The federal funds rate also traded higher relative to IOER and became more sensitive to persistent upward pressure in secured money market rates

Trading dynamics in the federal funds market changed during 2019, with the EFFF printing above the IOER rate for most of the year in an environment of declining reserves and persistent upward pressure in repo rates. The EFFF, which previously had been very stable day to day, became more volatile from the end of March, and the intraday dispersion of traded federal funds rates widened significantly (Chart 3).

OPEN MARKET OPERATIONS DURING 2019

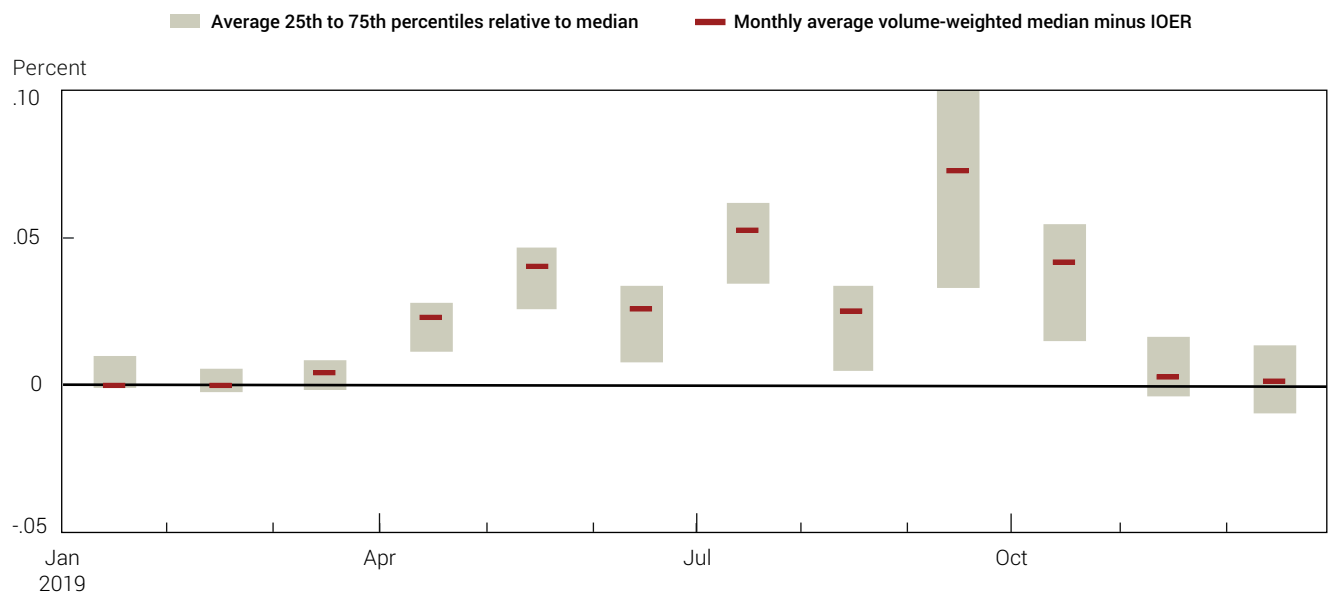
Chart 2
Effective Federal Funds Rate and Secured Overnight Financing Rate Spreads to IOER



Source: Federal Reserve Bank of New York.

Note: Shading highlights quarter-end dates.

Chart 3
Monthly Average of Intraday Dispersion of Federal Funds Rates



Source: Federal Reserve Bank of New York.

OPEN MARKET OPERATIONS DURING 2019

With the level of reserves declining over most of the first three quarters of the year, a variety of trading dynamics led borrowers to compete for federal funds. As was the case in 2018, some borrowers competed for federal funds to improve their liquidity coverage ratios (LCRs) by borrowing at higher rates from lenders that are treated more favorably in the LCR. Moreover, some smaller domestic banks that generally have limited access to other short-term funding sources also competed for federal funds to replenish their reserve balances by borrowing at higher rates. In addition, given the shift in the constellation of rates above those on federal funds transactions, some entities began to borrow in the federal funds market to lend in other money market transactions with higher rates, such as the repo market. At the same time, some entities that borrow in the federal funds market primarily to earn a spread between the interest paid on excess reserves and the rate they pay to borrow these funds significantly reduced their arbitrage activity as the EFFR moved above the IOER rate.

In addition, over the course of the year, in the environment of declining levels of reserves, unsecured rates became more sensitive to the persistent upward pressure in repo rates. The typical lenders in the unsecured markets had the option to pursue the higher returns available in the repo market. Indeed, some lenders in the federal funds market reallocated funds to reverse repo transactions, drawing some supply of cash away from the market. This shift contributed to upward pressure on rates on federal funds transactions relative to the IOER rate. Some banks also reduced their supply of cash in the federal funds market when they experienced a decrease in their reserve balances at the Federal Reserve associated with outflows related to tax payments and the settlement of Treasury issuance, putting additional pressure on rates on these dates. Overall, as more borrowers competed for a reduced supply of federal funds, the bulk of federal funds transactions occurred at higher rates relative to the IOER rate.

Overnight interest rates became more volatile in September

In mid-September 2019, money markets became volatile, with the overnight repo rate rising markedly and the federal funds

rate increasing above the top of the target range for the federal funds rate.⁸ In an environment of declining reserve balances, two factors contributed to significant upward pressure in overnight funding rates: quarterly corporate tax payments and the settlement of Treasury debt. A sizable net Treasury issuance caused financial institutions to increase demand for securities financing in the repo market. Around that time, inflows related both to the settlement of Treasury issuance and to corporate tax payments led to a substantial increase in the Treasury General Account (TGA) balance and a corresponding sharp decline in reserves in the banking system. Lenders of cash in the repo market that had been reducing repo investments for several weeks in favor of more attractive returns on alternative term investments, such as Treasury bills, sharply decreased cash lending in repos in the middle of September in anticipation of potential outflows related to the tax payments and settlement of the sizable Treasury securities issuance.

Meanwhile, some money market mutual funds that were experiencing outflows because of corporate tax payments pulled back from lending in repo markets. As a result, repo rates shifted markedly higher and repo market volatility increased notably.⁹ This upward pressure spilled into unsecured markets, including into the federal funds market. Some lenders reduced their supply in the federal funds market because they had the option to receive the high returns available in the repo market. At the same time, as reserves reached their lowest weekly level since 2012, some banks borrowed at higher rates to replenish their reserve balances, with some experiencing balances close to or below their individual lowest comfortable level of reserves.¹⁰ A few banks with excess reserves increased their lending in the federal funds market, but did so only in modest amounts despite the elevated rates; they may have preferred to keep larger cushions of reserves against unexpected outflows because of the high volatility in money markets. As more banks pursued a reduced supply of funding, the federal funds rate increased.

On September 16, the EFFR printed at the top of the federal funds target range, and on the following day, it printed above the top of the range, at 2.30 percent. Consistent with the FOMC's

directive to maintain the federal funds rate within the target range, the Desk conducted an overnight repo operation on the morning of September 17, the first such operation since 2008. The repo operation, a monetary policy implementation tool commonly used by the Desk in the past, helped reduce the pressure in money markets, with rates immediately moving much closer to the federal funds target range. In subsequent days, the Desk continued to conduct repo operations as a technical measure to maintain the federal funds rate in the target range and to ensure that the supply of reserves remained ample.

In the middle of October, in light of observed and expected increases in the Federal Reserve's non-reserve liabilities, the FOMC initiated a program of reserve management purchases to maintain, over time, reserves at or above the level that prevailed in early September 2019—a level the Committee judged as more supportive of effective control over the federal funds rate. In addition to initiating the reserve management purchases, which were in the form of purchases of Treasury bills, the FOMC directed the Desk to continue to conduct repo operations to raise the level of reserves and to address money market pressures that could adversely affect monetary policy implementation.

At year-end, a reduction of funding market activity by dealers owing to regulatory factors often creates upward pressure on money market rates. With these potential pressures in mind, in late November, the Desk began to offer repo operations with terms spanning year-end. These operations aimed to maintain ample levels of reserves at the end of 2019 and encouraged market participants to fund themselves in advance of year-end. On the last day of the year, the Desk also increased the offering amount of overnight repos in both same-day and forward-settling operations to \$225 billion, up from \$120 billion in overnight offerings in previous days. Together with term offerings, these repo operations contributed to keeping secured and unsecured rates well-contained over year-end. Overall, repo operations and purchases of Treasury bills helped control the federal funds rate and mitigate upward pressures in short-term rates over year-end.

The operational framework succeeded in maintaining the transmission of the policy stance

Overall, data from a range of money markets demonstrate that the monetary policy implementation framework succeeded in ensuring that the monetary policy stance was transmitted to a broad constellation of short-term rates during 2019.

Overnight rates declined in conjunction with the Federal Reserve's reductions in the target range and lowering of the IOER rate within the range throughout 2019. Additionally, although some short-term interest rates showed upward movements in summer and early fall, the dispersion between various unsecured and secured overnight rates narrowed in late 2019. The decline in overnight rates broadly passed through into rates on term money market instruments. The significant volatility in money markets during the second half of September had little impact on this pass-through. On net, term money markets continued to act as an important source of wholesale funding to firms in the United States and abroad.

OPEN MARKET OPERATIONS

To implement monetary policy, the FOMC authorizes and directs the Desk to undertake domestic open market operations, as necessary. Domestic open market operations comprise outright or temporary purchases of Treasury securities and certain agency or agency-backed securities from a set of pre-established counterparties. These operations are executed to achieve specific objectives, such as to provide administered rates consistent with the stance for monetary policy or to manage the size or composition of SOMA securities holdings and the level of reserves in the banking system.

In 2019, the FOMC continued to direct the Desk to use the ON RRP facility to support policy implementation, with its offering rate being a complement to the IOER rate to control short-term interest rates.

In addition, in the first half of the year, the FOMC directed the Desk to reinvest principal payments from Treasury and

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agency securities holdings in accordance with its balance sheet normalization principles and plans, in which the Committee set monthly caps on redemptions to ensure a gradual and predictable runoff in SOMA securities holdings. After remaining at their maximum levels for the first several months of the year (Table 2), the monthly caps were subsequently lowered, starting in May 2019, in order to slow the pace of the decline in the portfolio and smooth the transition to the long-run level of reserves consistent with efficient and effective monetary policy implementation. From August, the Desk was directed to reinvest all principal payments on SOMA securities holdings.

In mid-September, the Desk undertook repo operations as a technical measure to maintain the federal funds rate within the target range in accordance with the most recent FOMC directive. The Desk received a new directive from the FOMC in mid-October to conduct purchases of Treasury bills to maintain, over time, reserves at or above the level that prevailed in early September, and to continue to conduct term and overnight repos to mitigate the risk of money market pressures that could adversely affect policy implementation.

REVERSE REPURCHASE AGREEMENTS

To maintain the federal funds rate within the FOMC's target range, the FOMC directed the Desk to conduct ON RRP operations at an offering rate that was decreased twice by 0.25 percentage point and once by 0.30 percentage point, ultimately reaching 1.45 percent, as shown in Table 1.

Operational approach. In its daily ON RRP operations, the Desk offered reverse repos to a broad set of money market participants, including primary dealers and an expanded set of counterparties that includes money market funds (MMFs), government-sponsored enterprises (GSEs), and banks. These operations were limited by the value of Treasury securities held outright in the SOMA that was available for such operations.¹¹ In addition, a daily limit of \$30 billion per counterparty continued to be imposed in ON RRP operations. The Desk's reverse repo operations were conducted over FedTrade, a proprietary trading

Table 2

Monthly Caps on SOMA Securities Reductions

Billions of U.S. Dollars per Month

	October 2018– April 2019	May–July 2019	August– December 2019
U.S. Treasury securities	30	15	0
Agency securities ^a	20	20	20 ^b

Sources: Federal Open Market Committee, Addendum to the Policy Normalization Principles and Plans, June 2017; Balance Sheet Normalization, March 2019; Balance Sheet Normalization, July 2019.

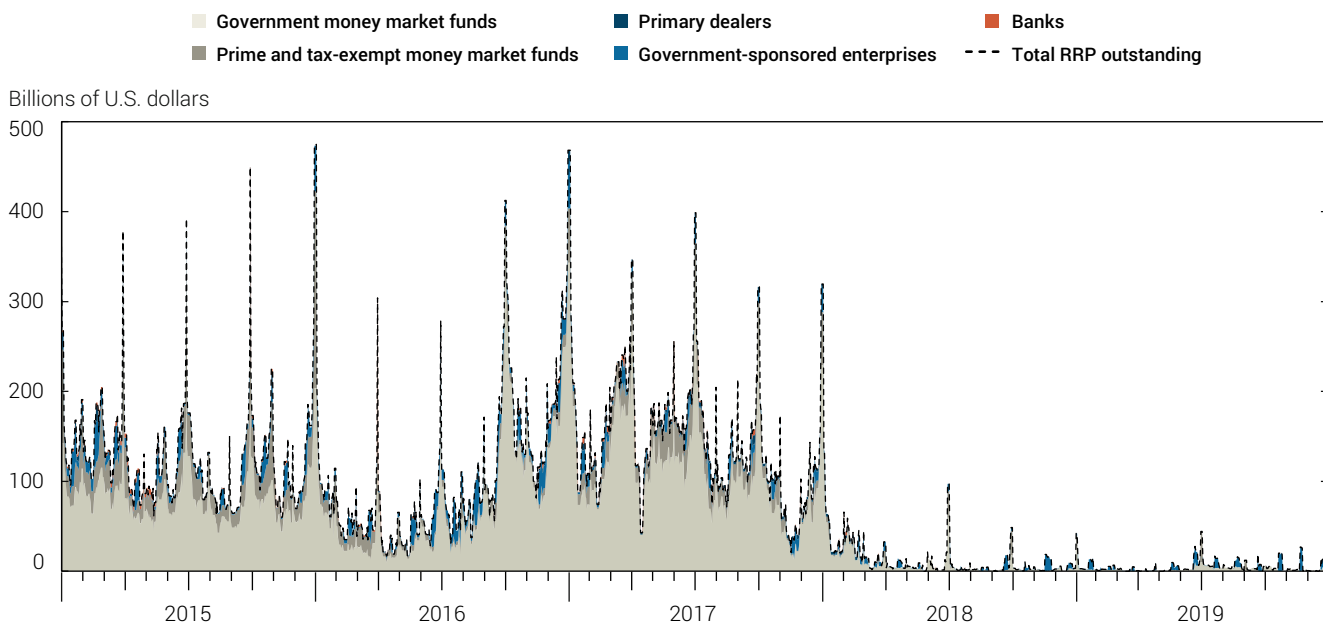
^aApplies to combined principal payments of agency debt and agency MBS.

^bThe first \$20 billion of any agency principal payments received were reinvested in Treasury securities. Any additional agency principal payments were reinvested in agency MBS.

platform, with each counterparty permitted to submit one bid at a rate not exceeding the specified offering rate for each operation. Awards were made based on the offering rate and total demand at each operation.

Operational results. Average daily take-up in the ON RRP operations decreased to \$5 billion in 2019 from \$12 billion in 2018, representing the lowest annual average of daily take-up since the introduction of the operation in 2013 (Chart 4). Although take-up at June 2019 quarter-end, at year-end, and around monthly float periods—when the GSEs invest part of mortgage principal and interest payments in the ON RRP—increased in a similar pattern to that seen in 2018, daily take-up in the ON RRP was muted and in the fourth quarter fell to zero for the first time since the introduction of the facility.¹² The decline in take-up was observed across all types of counterparties. However, while MMFs continued to account for most ON RRP demand, with 74 percent of total take-up on average in 2019, GSEs increased their share from approximately 15 percent in 2018 to around 25 percent in 2019, on average. The generally muted take-up was consistent with the availability of alternative investment options at more attractive rates, including rates on Treasury securities as well as rates on repos with securities dealers. On the last day of the year, take-up increased somewhat and was higher than on the last day of 2018 as securities dealers significantly reduced their

Chart 4

Reverse Repo Amounts Outstanding by Counterparty Type

Source: Federal Reserve Bank of New York.

Notes: Figures are daily and include overnight and term operations. Money market fund categorizations through October 14, 2016, reflect staff estimates.

demand for cash in the overnight repo market at year-end, leaving MMFs with fewer attractive alternative investment opportunities at the end of 2019. Since total demand at every operation in 2019 was significantly lower than the value of Treasury securities available for the operation, awards were always made at the specified offering rate to all counterparties.¹³

TREASURY SECURITIES OPERATIONS

For the first few months of 2019, the Desk continued to reduce the size of Treasury securities holdings in accordance with the normalization strategy initiated in October 2017. In accordance with FOMC directives, the Desk reinvested principal payments from the Federal Reserve's Treasury securities holdings to the extent that they exceeded the \$30 billion monthly cap the FOMC had set on redemptions. In May, the Desk slowed the pace of the reduction as the FOMC lowered the monthly cap on redemptions to \$15 billion. Starting in August, the Desk began to reinvest all principal payments of Treasury securities holdings and up to \$20 billion of monthly principal payments of agency debt and agency MBS holdings,

maintaining the SOMA's securities holdings at a steady size, consistent with the FOMC's balance sheet normalization principles and plans announced in March 2019 and revised in July 2019.

Beginning in mid-October, the Desk began to conduct a program of \$60 billion of monthly purchases of Treasury bills in order to maintain, over time, ample reserve balances at or above the level that prevailed in early September 2019. The program comprised purchases of Treasury bills only, because the short-term maturities of these instruments minimally affects financial conditions.

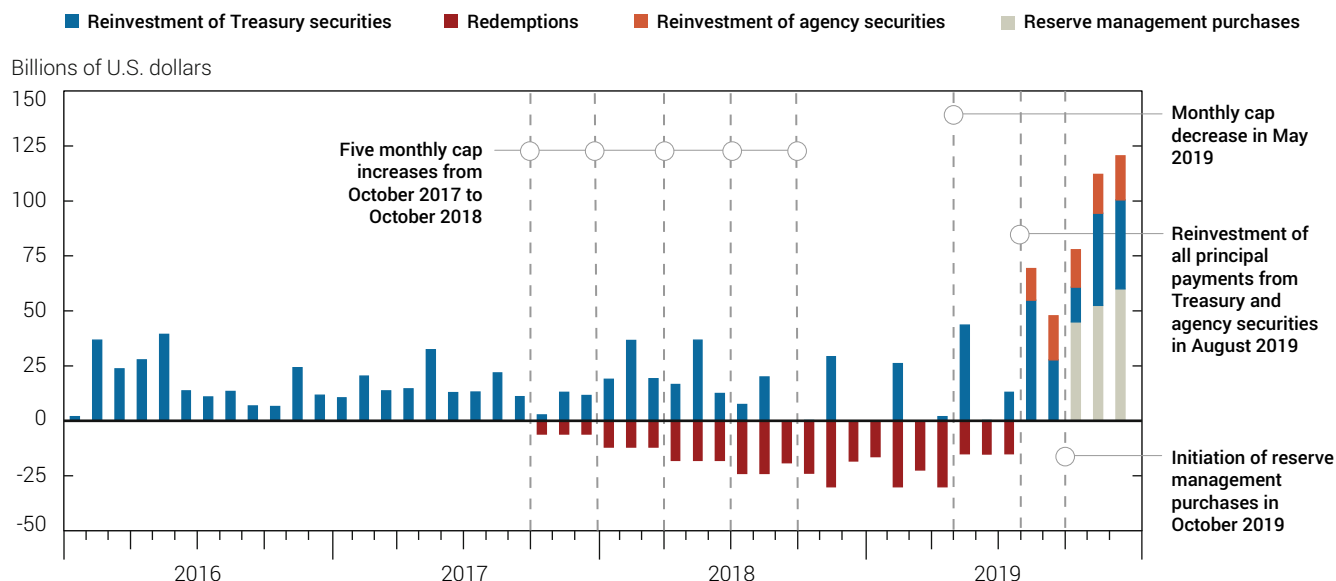
REINVESTMENTS

Reinvestments of Treasury Securities

Operational approach. In line with long-standing practice, the Desk conducted Treasury reinvestments by placing noncompetitive bids for the SOMA portfolio at Treasury auctions; these bids were treated as add-ons to announced auction sizes. Until July 2019, the Desk reinvested the portion of monthly principal payments from maturing Treasury securities in the SOMA that exceeded the cap for

OPEN MARKET OPERATIONS DURING 2019

Chart 5
SOMA Treasury Transactions and Redemptions



Source: Federal Reserve Bank of New York.

that month; from August 2019, the value of all maturing Treasury securities was rolled over at auction. When redemption caps were in place, the Desk allocated reinvestment amounts across the month's maturity dates in proportion to the amount of SOMA Treasury holdings scheduled to mature on each of those dates. Bids for SOMA securities at Treasury auctions were allocated across the securities being auctioned in proportion to their announced offering amounts. Maturing Treasury coupon securities, including Treasury notes and bonds, Treasury Inflation-Protected Securities (TIPS), and Floating Rate Notes (FRNs), were only reinvested into newly issued Treasury coupon securities. Maturing Treasury bill securities were only reinvested into newly issued Treasury bill securities.

Operational results. The Desk reinvested \$265 billion of maturing Treasury securities holdings at auction in 2019, up from \$197 billion in the prior year as a result of FOMC policy decisions during the year regarding Treasury holdings in the SOMA (**Chart 5**).

The profile of Treasury securities acquired at auction was driven both by the distribution of SOMA maturities across issuance dates and the Treasury's auction calendar. Specifically, on mid-month maturity dates the Desk reinvests in newly issued three-, ten-,

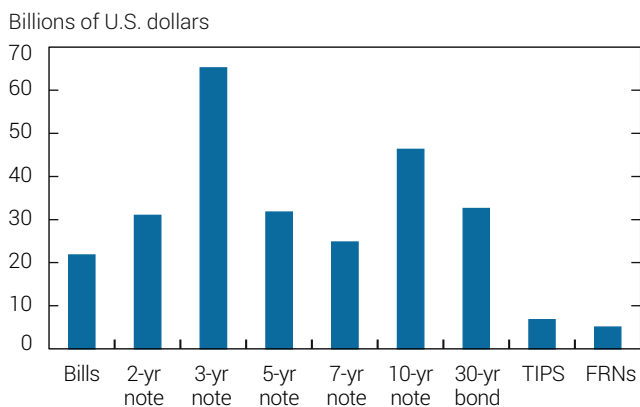
and thirty-year Treasury securities, while at the end of the month, reinvestments can occur in newly issued two-, five-, and seven-year Treasury securities, and floating rate and inflation-linked Treasury securities. In 2019, there were more mid-month maturities than end-of-month maturities; therefore, a larger proportion of the SOMA's maturing Treasury securities were reinvested in three-, ten-, and thirty-year Treasury securities (**Chart 6**). After the start of reinvestment purchases in August, and reserve management purchases of Treasury bills in the middle of October, reinvestments also included Treasury bills, typically issued on Tuesdays (four- and eight-week tenors) and Thursdays (thirteen, twenty-six, and fifty-two week tenors). As a result of the shorter tenors of Tuesday holdings, rollovers into four- and eight-week bills exceeded that of rollovers into thirteen, twenty-six, and fifty-two week bills, with \$18.2 billion and \$3.5 billion, respectively.

Reinvestments of Agency Securities

Operational approach. Beginning in August 2019, the Desk reinvested principal payments from agency debt and agency MBS holdings in Treasury securities, subject to a maximum amount of \$20 billion per month. These reinvestment purchases were conducted in the secondary market across a range of

OPEN MARKET OPERATIONS DURING 2019

Chart 6
Distribution of SOMA Reinvestments at Treasury Auctions in 2019



Source: Federal Reserve Bank of New York.

Note: Bars show the cumulative amount of Treasury securities acquired at each maturity point through rollovers in 2019.

maturities—including Treasury bills, nominal coupons, TIPS, and FRNs—to roughly match the maturity composition of Treasury securities outstanding. Specifically, purchases were allocated across eleven different sectors based on the proportional par amount of Treasury securities outstanding in each sector, using the twelve-month average as of the end of July 2019 (Chart 7.)

To support smooth market functioning and operational efficiency, the Desk refrained from purchasing securities that were trading with heightened scarcity value in the repo market for specific collateral, newly issued nominal coupon securities, securities that were cheapest to deliver (CTD) into active Treasury futures contracts, and securities with four weeks or less to maturity. Also, the Desk limited SOMA holdings to a maximum of 70 percent of the total outstanding amount of any individual Treasury security.

The Desk published a tentative schedule of operations each month, which included the maturity range and planned purchase amount for each operation, along with operation dates and times.

Transactions were conducted over FedTrade with primary dealer counterparties. Counterparties were allowed to submit offers across the range of eligible securities in a multiple-price auction, in which securities were awarded at the price corresponding to the participant's offer in the operation. Offers

were evaluated based on their proximity to prevailing market prices at the close of the auction, as well as measures of relative value. Relative value measures were calculated using the Federal Reserve Bank of New York's proprietary model.

Operational results. From August, the Desk reinvested \$89 billion of principal payments from agency debt and agency MBS holdings into Treasury securities via secondary market purchases conducted across a range of maturities, as shown in Chart 7. Offer-to-cover ratios, which measure total offering amounts relative to purchase amounts, were robust.¹⁴ Specifically, the ratio averaged 5.7 during the period of reinvestment purchases, meaning that for every dollar of securities the Desk purchased, \$5.70 of securities were offered for sale.

Operations generated pricing that was, in general, cheaper relative to market and theoretical prices. Operations also generated broad participation and awards from primary dealers.

Reserve Management Purchases

Operational approach. In mid-October, the FOMC instructed the Desk to purchase Treasury bills as part of a temporary program to maintain, over time, ample reserve balances at or above the level that prevailed in early September 2019. The operational procedures and rules regarding eligible securities were largely the same as those for the reinvestment of agency securities in Treasury securities, although reserve management purchases were limited to Treasury bills. The Desk published the planned amount of reserve management purchases, along with operation dates and times, in a tentative schedule of purchase operations over a one-month period, together with the schedule of the reinvestment of agency debt and agency MBS securities. The operation platform, counterparties, and bid submission and evaluation process were the same for reserve management purchases as they were for purchases conducted to reinvest principal payments on agency securities.

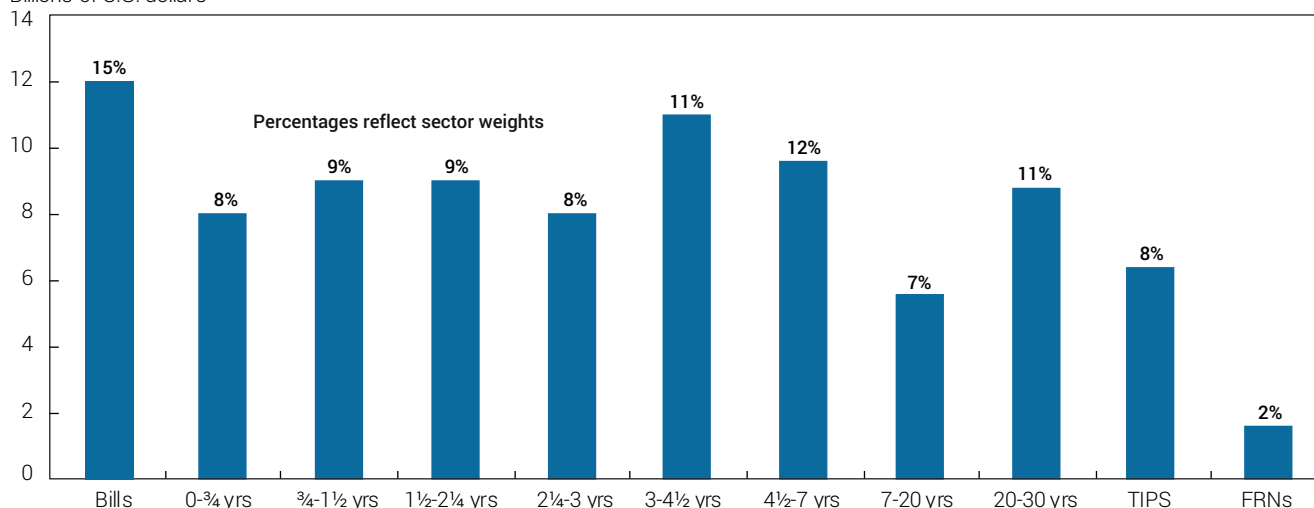
Operational results. The Desk purchased \$158 billion of Treasury bills from October to the end of 2019. Reserve management operations proceeded smoothly during the quarter, with robust offer-to-cover ratios. Specifically, the ratio averaged

OPEN MARKET OPERATIONS DURING 2019

Chart 7

Distribution of SOMA Treasury Reinvestment Purchases across Sectors in 2019

Billions of U.S. dollars



Source: Federal Reserve Bank of New York.

Notes: Sector weights are the proportional par amount of Treasury securities outstanding in each sector used to allocate Treasury purchases. For determining sector weights, the on-the-run 3-year note is considered part of the 2¼ to 3-year sector and the on-the-run 7-year note is considered part of the 4½ to 7-year sector. The chart reflects purchases made until December 31, 2019, and not the full mid-month to mid-month schedule of purchases from December 2019 to January 2020.

4.0 over the period from the start of purchases to the end of the year. Operations generated cheaper pricing relative to market and theoretical prices. Operations also generated broad participation and awards from primary dealers. A larger share of purchases occurred in longer-dated Treasury bills compared with the universe of outstanding Treasury bills, given the relative value of offers submitted by dealers for these securities.

AGENCY DEBT AND AGENCY MBS OPERATIONS

Throughout 2019, the FOMC continued to direct the Desk to reinvest agency debt and agency MBS principal payments in excess of the monthly cap into agency MBS. The reinvestment cap remained at \$20 billion throughout 2019. The FOMC also directed the Desk to conduct dollar rolls and coupon swaps as necessary to facilitate settlement of the Federal Reserve's agency MBS transactions. In addition, in 2019 the Desk began purchasing Uniform MBS (UMBS) for the first time and made meaningful changes to the Desk's CUSIP aggregation program.

REINVESTMENTS

Operational approach. As has been the case since the inception of the agency MBS purchase program, the Desk purchased MBS guaranteed by the two government-sponsored enterprises—Fannie Mae and Freddie Mac—and by the government corporation Ginnie Mae. Purchases were concentrated in the most frequently produced coupons in thirty- and fifteen-year securities in the “to-be-announced” (TBA) market, because these securities have the greatest liquidity and are closely linked to new primary issuance and, accordingly, are tied to primary mortgage rates.¹⁵

The Desk determined the amount to purchase during each reinvestment period and conducted purchases between the middle of one month and the middle of the following month. The Desk calculated this amount by subtracting the \$20 billion cap amount from the amount of principal payments on agency debt and agency MBS expected to be received during each calendar month.¹⁶ For months in which principal payments did not exceed the cap, the Desk instead conducted small-value exercises to maintain

OPEN MARKET OPERATIONS DURING 2019

operational readiness (for a description and summary of small-value exercises, see the “Operational Readiness” section of this report). From January through April, paydowns fell below the reinvestment cap, so no reinvestment operations were conducted and the Desk instead conducted small-value exercises to maintain its readiness to conduct MBS operations. From May 2019 to the end of the year, principal paydowns exceeded the monthly reinvestment cap and the Desk reinvested the amount of paydowns in excess of the cap in agency MBS.

The Desk published a tentative amount of reinvestments for the upcoming purchase period on or around the ninth business day of each month. The Desk also published a tentative schedule of planned agency MBS operations approximately every two weeks, detailing operation dates and times, the type of securities to be purchased (including agency, term, and coupon), and the maximum purchase amounts for each security.

The Desk conducted operations over FedTrade with primary dealer counterparties that transact in the agency MBS market. Counterparties were allowed to submit multiple offers across the range of eligible securities in a multiple-price auction, meaning that each offer at or below the stop-out rate was transacted at the offer rate. Offers were evaluated based on their proximity to prevailing market prices at the auction close.

The Desk can settle—that is, take delivery of purchased securities—up to three months after trade date. Given the forward exposure, the Desk required counterparties to post margin on their unsettled trade amounts. The margin was calculated daily and served to protect the Federal Reserve from financial risk exposure to counterparties obligated to deliver securities in the future.

Operational results. The Desk received \$261.9 billion in principal payments from agency debt and agency MBS in 2019 (**Chart 8**), an increase of \$13.6 billion from levels in 2018.¹⁷ Declines in thirty-year primary mortgage rates over 2019 led to increased incentive for homeowners to prepay

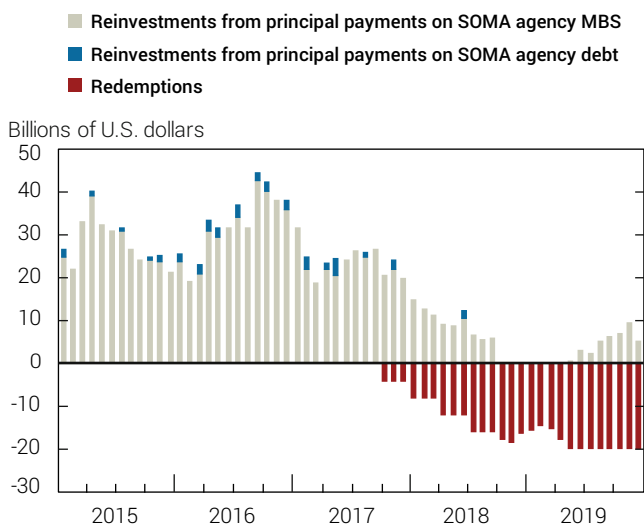
their loans by refinancing their mortgages, which in turn led to an increase in paydowns to MBS held in the SOMA. Of the principal payments received, \$38.9 billion was reinvested in agency MBS and \$222.9 billion was redeemed. This marked a material decrease in the amount of reinvestments and a material increase in the amount of redemptions of MBS holdings relative to 2018, when a total of \$87.5 billion was reinvested and \$160.8 billion was redeemed.

The decline in longer-term Treasury yields throughout much of 2019, which resulted, on average, in lower primary mortgage rates than in 2018, drove a notable increase in the market’s production of lower-coupon agency MBS. This development prompted the Desk to shift the bulk of its thirty-year securities purchases from 4.0 percent coupons in 2018 to 3.0 percent coupons in 2019. Similarly, fifteen-year securities purchases largely shifted from 3.5 percent coupons in 2018 to 2.5 percent coupons in 2019 (**Charts 9 and 10**).

Desk purchases of separate Fannie Mae and Freddie Mac TBA contracts were replaced with purchases of UMBS following implementation of the Federal Housing Finance Agency’s Single Security Initiative in June. Since UMBS allow for the delivery of either Fannie Mae- or Freddie Mac-backed MBS into the TBA contract, Desk purchases of UMBS were equivalent to combined purchases of Fannie Mae and Freddie Mac securities conducted in prior years. As such, the transition to UMBS purchases did not have a meaningful impact on the composition of the SOMA portfolio. Outside of Desk operations, market participants viewed the initial transition toward the Single Security Initiative as widely successful, with no reported issues surrounding market functioning or valuation following implementation.

Over 93 percent of the Desk’s purchases in 2019 were of thirty-year Fannie Mae, Freddie Mac, and Ginnie Mae securities, which make up the majority of issuance among the three agencies in the TBA market. The remainder of the purchases consisted of fifteen-year Fannie Mae and Freddie Mac securities.

Chart 8
SOMA Reinvestments and Redemptions of Agency MBS and Debt



Source: Federal Reserve Bank of New York.

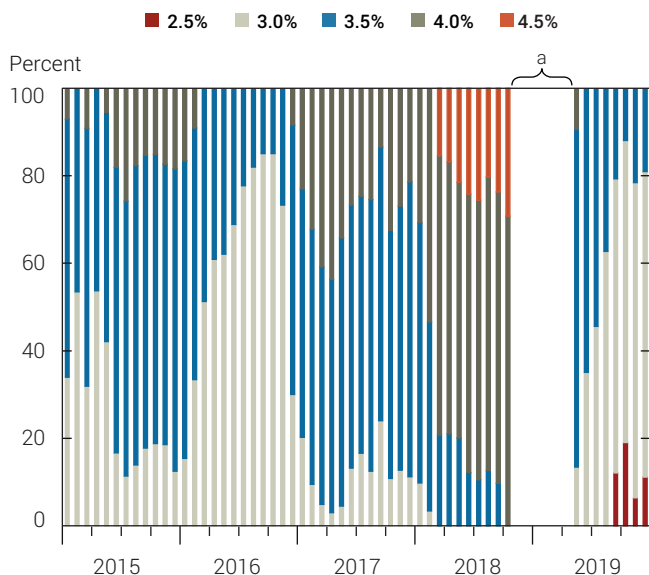
Note: Reinvestment purchases of agency MBS occur from mid-month to the following mid-month.

Desk purchases averaged approximately 2 percent of issuance of fixed-rate agency MBS over the course of 2019 (Table 3), a decline from last year’s average of 9 percent of issuance owing to the decrease in Desk reinvestment purchases.

Dollar Rolls and Agency MBS Market Functioning

Given the forward-settling nature of the Desk’s agency MBS transactions in the TBA market, MBS could potentially become scarce in the market during the time between a transaction’s trade date and its settlement date. In these instances, the Desk may conduct dollar roll sales to facilitate settlement.¹⁸ Dollar roll sales allow dealers more time to obtain securities required to settle transactions, in exchange for a market price that compensates the Federal Reserve for the delay in settlement. The Desk’s dollar roll transactions are conducted over TradeWeb, a commercial trading platform.

Chart 9
SOMA Purchases of Thirty-Year Agency MBS by Coupon

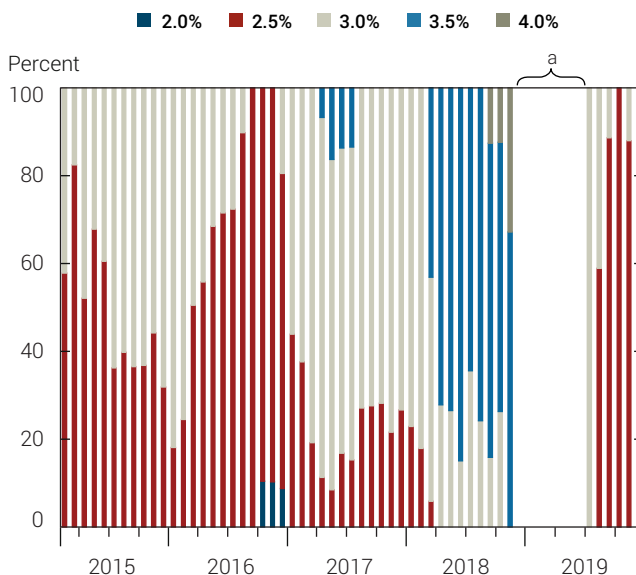


Source: Federal Reserve Bank of New York.

Note: Figures are monthly and exclude purchases conducted for the purpose of testing operational readiness.

^a The Desk did not conduct reinvestment purchases of 30-year agency MBS from November 2018 through April 2019, as monthly principal payments of agency MBS were below the \$20 billion reinvestment cap.

Chart 10
SOMA Purchases of Fifteen-Year Agency MBS by Coupon



Source: Federal Reserve Bank of New York.

Note: Figures are monthly and exclude purchases conducted for the purpose of testing operational readiness.

^a The Desk did not conduct reinvestment purchases of 15-year agency MBS from November 2018 through May 2019, as monthly principal payments of agency MBS were below the \$20 billion reinvestment cap.

OPEN MARKET OPERATIONS DURING 2019

Settlement of the Desk's agency MBS reinvestment transactions was smooth throughout 2019 as the amount of purchases compared to new market trading and issuance volumes was small. As a consequence, the volume of dollar roll sales was small, although larger than in 2018, representing an average of 3.6 percent of the Desk's expected agency MBS settlements during the year (**Chart 11**). This figure, consistent with the small shares seen in recent years, suggests that limited settlement stress was present in the agency MBS sectors in which the Desk concentrated its purchases.¹⁹ Indeed, daily and intraday indicators of market functioning and liquidity conditions in the agency MBS market were little changed year-over-year and remained healthy overall in 2019. For example, measures of aggregate trading activity, such as transaction volume and average trade size, increased slightly over the year. Measures of transaction costs and the price impact of trades were stable throughout most of 2019, though on average, slightly higher year-over-year.

CUSIP Aggregation

In 2019, the Desk continued an effort initiated in 2015 to consolidate many small, individual agency MBS into fewer and larger-value securities. Through this process, known as CUSIP aggregation, a number of existing agency MBS with similar characteristics—including issuing agency, coupon, and original term to maturity—are consolidated into one larger security.²⁰ The cash flows from each of the underlying agency MBS then provide the cash flows for the aggregated CUSIP.

By reducing the number of individual securities held in the SOMA portfolio, CUSIP aggregation can lower operational risk, simplify back-office portfolio administration, and trim custodial costs, which are assessed on a per-CUSIP basis. The Desk expanded its CUSIP aggregation program in 2019 to include, for the first time, certain Ginnie Mae securities excluded in prior programs as well as expand certain CUSIP groupings in order to better meet the stated goals of the program and aggregate a larger portion of the SOMA portfolio than had been previously considered. As a result of these efforts, in 2019 nearly 18,301 CUSIPs were aggregated into forty new agency MBS; the

Table 3
Distribution of Agency MBS Operations in 2019

Agency	Coupon (Percent)	SOMA Purchases (Billions of U.S. Dollars)	SOMA Purchases as a Share of Gross Issuance (Percent)
30-year			
Uniform MBS	2.5	3.1	7
	3.0	15.3	8
	3.5	4.6	3
Ginnie Mae	2.5	–	–
	3.0	6.7	4
	3.5	4.2	3
Subtotal		33.8	2
15-year			
Uniform MBS	2.5	1.8	8
	3.0	0.6	4
	3.5	–	–
Subtotal		2.4	2
Total		36.2	2

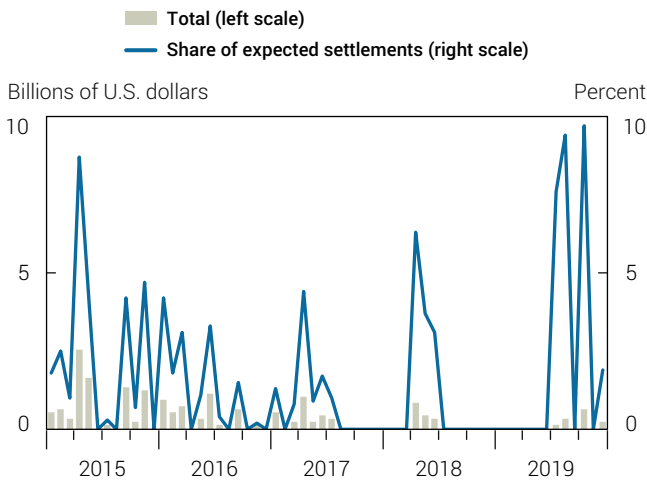
Sources: Federal Reserve Bank of New York; Knowledge Decision Services, LLC.

Notes: Figures may be rounded. Gross issuance represents all fixed-rate agency MBS issued in 2019, including non-TBA-eligible securities. Subtotal issuance comprises all coupons, including those not purchased for the SOMA, with original terms to maturity of fifteen or thirty years. Total issuance comprises all coupons and all original terms to maturity. For TBA outright purchases conducted after May 1, 2019, both Fannie Mae and Freddie Mac securities are deliverable into Uniform MBS contracts.

newly aggregated securities had a face value of approximately \$105 billion at the time of issuance. The aggregation of 8,003 Ginnie Mae CUSIPs into eight new agency MBS was executed over the course of four months. Since the beginning of the 2015 CUSIP aggregation initiative, nearly 87,332 CUSIPs have been consolidated into 314 new agency MBS, with a face value of more than \$1.57 trillion at the time of issuance. Taking these aggregations into account, the SOMA agency MBS portfolio held 19,402 CUSIPs at the end of 2019, roughly half the number held at the end of 2018.

OPEN MARKET OPERATIONS DURING 2019

Chart 11
SOMA Dollar Roll Sales



Source: Federal Reserve Bank of New York.

Notes: Figures are monthly by settlement month. Share of expected settlements is calculated excluding purchases conducted for the purpose of testing operational readiness.

REPURCHASE AGREEMENTS

In mid-September 2019, in accordance with the FOMC directive in place at that time, the Desk began to conduct temporary repo operations as a technical measure to ensure that the supply of reserves remained supportive of maintaining the federal funds rate within the target range. Subsequently, the FOMC directive in October instructed the Desk to continue to conduct temporary overnight and term repo operations through January 2020 to ensure an ample supply of reserves and mitigate the risk of money market pressures that could adversely affect policy implementation.

Operational approach. In its overnight and term repo operations, the Desk offered secured funding to primary dealers against Treasury, agency debt, and agency MBS collateral, conducted as competitive auctions.

The offering size for overnight repo operations was initially set at \$75 billion, but with elevated take-up around high payment flow dates such as month- and quarter-ends when overnight funding rates rose, the offering amounts were increased to \$120 billion by the end of October, and remained at that level for the remainder of the year.

Additionally, the Desk offered term repo operations with one- to six-week tenors to secure a supply of reserves, allowing market participants to fund themselves in advance of year-end in light of expected Treasury issuance and high payment flow days. The offering size of term repos varied between \$25 billion and \$50 billion, depending on the tenor and timing of the operation. The Desk published the planned schedule and amount of overnight and term repo operations over a one-month period. Desk repo operations were conducted over FedTrade with primary dealer counterparties, and settled on the Bank of New York Mellon's tri-party system. Offerings of all repo operations were in a fixed-quantity, multiple-price format in which the Desk offered a fixed amount and bidders paid the rate submitted on accepted bids. Each counterparty was permitted to submit two propositions per collateral type at rates no lower than the minimum bid rates, and each operation had proposition size limits such that no single counterparty could be awarded the entire operation.

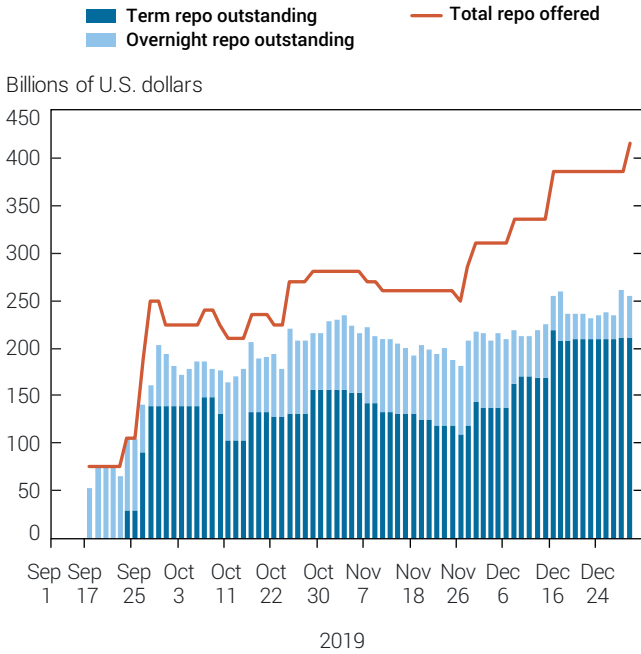
The minimum bid rate on overnight repo operations was set equal to the IOER rate at the time of the offering. The minimum rate on term operations was based on prevailing market rates that reflected market expectations for the path of the federal funds rate over a tenor similar to that of the repo operation.

Awards were made based on the volume and rate bid in each operation. If the total volume bid in an individual operation was less than the maximum operation size, all bids were accepted. If the aggregate amount bid exceeded the maximum operation size, bids were accepted starting with the highest-rate bid and working down until the maximum was awarded.

Operational results. The Desk conducted both overnight and term repo operations from the middle of September to the end of the year, in aggregate average daily amounts outstanding of approximately \$200 billion. Outstanding aggregate term repos covering the turn of the year reached a peak of \$211 billion just prior to year-end, reducing some of the demand in overnight operations. Overnight repos outstanding at year-end totaled \$44 billion.

OPEN MARKET OPERATIONS DURING 2019

Chart 12
SOMA Repo Amounts by Tenor

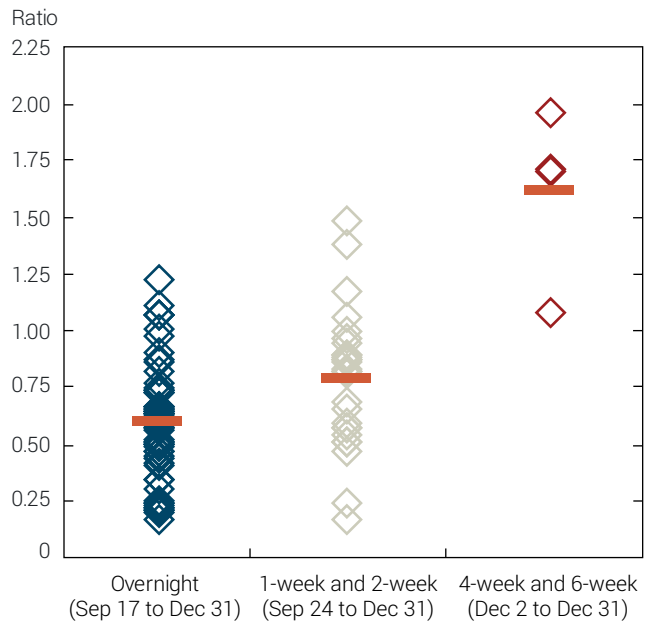


Source: Federal Reserve Bank of New York.

Except for some of the initial operations conducted in mid-September and an operation in mid-October, aggregate bids in overnight repo operations were lower than their offering amount. That is, overnight operations were generally undersubscribed (**Chart 12**). In overnight operations, the average ratio of total bids to the maximum amount offered was 0.60, though this ratio varied from operation to operation. Weighted average award rates for overnight operations were generally quite close to the minimum bid rate—the IOER rate—throughout the fourth quarter. Treasury and agency MBS collateral accounted for 76 percent and 23 percent of awards, respectively, on average for overnight operations, while agency debt was minimally used as collateral.

Most term repo operations were oversubscribed, with aggregate bids greater than or very close to the offering amount, as dealers preferred to arrange longer-tenor funding following the notable interest rate volatility in mid-September. The average bid-to-cover ratio for term repo operations was 0.89. The ratio was volatile from operation to operation, but in general it was lower for

Chart 13
Bid-to-Cover Ratio by Repo Operation Tenor



Source: Federal Reserve Bank of New York.

Notes: Diamonds represent bid-to-cover ratio for each operation. Bars represent averages for each operation tenor.

one- and two-week operations than for longer-tenor operations, which generally spanned year-end (**Chart 13**). Volume-weighted average award rates on term repo auctions were comparable to rates of relevant market repo transactions.

Volume-weighted average award rates for each collateral type in term operations were also generally close to the minimum bid rate. Treasury and agency MBS collateral accounted for 68 percent and 32 percent of awards, respectively, on average for term operations.

SECURITIES LENDING AND TREASURY MARKET FUNCTIONING

To support the effective conduct of open market operations, the FOMC has authorized the Desk to lend eligible Treasury and agency debt securities held in the SOMA to dealers on an overnight basis. These operations provide a secondary and temporary source of securities to the financing market to promote

the smooth clearing of Treasury and agency securities. Lending Treasury securities, especially those in which the SOMA holds a significant market share, may help mitigate periods of scarcity or elevated fails.

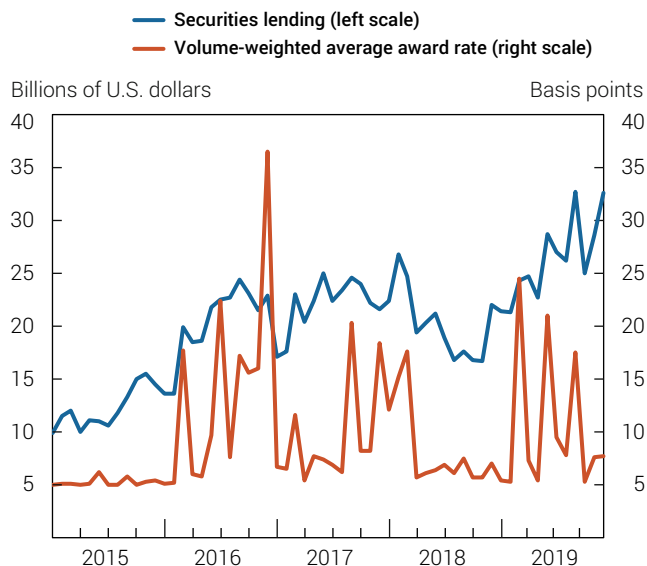
Operational Approach

In 2019, the Desk continued to lend Treasury and agency debt securities held in the SOMA portfolio to primary dealers based on competitive bidding in a multiple-price auction held at noon each business day. Primary dealers bid a fee to borrow the security; the fee is economically equivalent to a spread between the general collateral repo rate and the overnight rate at which the dealers would be willing to borrow the security. As has been the case since 2009, the minimum bid fee was 5 basis points and loans were for an overnight term. Dealers borrowing securities were required to pledge other Treasury securities to the New York Fed, plus margin, as collateral for the securities loan.

Operational Results

During 2019, SOMA securities lending volumes in Treasury securities averaged \$26 billion per day, higher than in 2018 (**Chart 14**). In September, volume reached the highest level since data collection began in 1999, as volatile general collateral repo rates made pricing specials more uncertain, leading dealers to source more securities from the New York Fed. Subsequently, securities lending volumes returned to levels observed in the first part of the year, as volatility in general collateral repo rates declined. Volumes picked up again in late December, which is typical around year-end, reaching a new historical high of \$41 billion on the last day of the year. The new high occurred against the backdrop of already elevated volumes in 2019, driven in part by increased borrowing of benchmark securities. Moreover, borrowing of Treasury bills, which were added to the SOMA's holdings for the first time since 2012, also contributed to the increase in securities lending volume in late 2019. The volume-weighted

Chart 14
SOMA Securities Lending in Treasuries



Source: Federal Reserve Bank of New York.

Note: Figures are monthly averages of daily lending results.

average bid fee on Treasury securities averaged 10 basis points for the year, slightly higher than in 2018.

Trading in the secondary Treasury market was generally orderly in 2019. Bid-ask spreads, trading volumes, and quote sizes remained within recent ranges. In early August, amid a spike in volatility in U.S. Treasury yields, the Treasury market experienced a deterioration in liquidity conditions. In particular, order book depth, which measures the quantity of securities available for sale or purchase at the best bid and offer prices, declined and remained low for the remainder of the year. Liquidity of Treasury bills and Treasury securities used for futures contract delivery temporarily deteriorated in mid-September amid elevated volatility of repo rates. Nevertheless, conditions stabilized in the fourth quarter and the market experienced minimal settlement strains.

OPEN MARKET OPERATIONS DURING 2019



FOREIGN OPEN MARKET OPERATIONS

Consistent with activity in recent years, the Desk conducted two types of foreign currency operations for the SOMA in 2019—the investment of SOMA foreign reserves and the execution of draw requests on standing U.S. dollar swap arrangements with a network of five other central banks.

FOREIGN RESERVES MANAGEMENT

The Federal Reserve holds euro- and yen-denominated assets, which are invested to ensure sufficient liquidity during a potential foreign exchange intervention.²¹ The size of foreign reserve holdings is largely a result of past intervention activity in foreign exchange markets. The FOMC and U.S. Treasury make decisions on foreign exchange intervention activity; in 2019, the Desk was not directed to undertake any such activity.

INVESTMENT APPROACH

The Desk is directed by the FOMC to manage the SOMA's foreign currency holdings in a manner that ensures sufficient liquidity, maintains a high degree of safety, and, once these objectives have been met, provides the highest rate of return possible in each currency. The Desk passively manages its foreign currency reserve holdings against an internal asset allocation target, which is determined based on the FOMC's stated objectives and updated on an annual basis. The SOMA's foreign currency reserves may be invested on an outright basis in German, French, Dutch, and Japanese government securities, as well as in deposits at the Bank for International Settlements and at foreign central banks such as the Deutsche Bundesbank, Banque de France, and Bank of Japan.

OPERATIONAL APPROACH

The Desk typically conducts foreign sovereign debt transactions in the secondary market with commercial counterparties over TradeWeb, a commercial trading platform, or by phone. To ensure execution at competitive prices, the Desk solicits offers for individual securities from multiple counterparties simultaneously.

INVESTMENT ACTIVITY

In 2019, foreign sovereign debt purchases were not required to meet the portfolio's target asset allocation. As a result, new investment activity was limited to deposits at the Bank for International Settlements and at foreign central banks such as the Deutsche Bundesbank, Banque de France, and Bank of Japan. As of year-end 2019, the SOMA foreign currency portfolio, on an amortized cost basis, totaled \$20.7 billion, compared with \$20.9 billion at the end of 2018. Since no transactions associated with foreign exchange intervention were undertaken and the interest income was limited given the interest rate environment in the euro area and Japan, changes in the portfolio's U.S. dollar market value largely reflected the change in the foreign exchange value of the dollar against the euro and Japanese yen over the year.²² (Foreign currency-denominated holdings are described further in the "Selected Balance Sheet Developments" section of this report.)

CENTRAL BANK LIQUIDITY SWAPS

The FOMC continued to authorize and direct the Desk to maintain standing U.S. dollar and foreign currency liquidity swap lines with a network of five other major central banks—the Bank of Canada, Bank of England, Bank of Japan, European

Central Bank, and Swiss National Bank.²³ The U.S. dollar liquidity swap lines, which involve a temporary exchange of currencies between two central banks, are designed to improve liquidity conditions in dollar funding markets in the United States and abroad by providing foreign central banks with the capacity to deliver U.S. dollar funding to institutions in their jurisdictions during times of market stress. Likewise, the foreign currency liquidity swap lines provide the Federal Reserve with the capacity to offer liquidity in foreign currencies to U.S. financial institutions should the FOMC judge that such actions are appropriate. These arrangements help to ease strains in financial markets and mitigate their effects on economic conditions. The swap lines support financial stability and serve as a prudent liquidity backstop.

OPERATIONAL APPROACH

In a U.S. dollar liquidity swap, a foreign central bank (FCB) transfers a specified amount of its currency to the New York Fed in exchange for U.S. dollars at the prevailing market exchange rate. At the same time, the New York Fed and the FCB agree that the transfer will unwind on a specified future date at the same exchange rate as the initial transaction. At the conclusion of the second transaction, the FCB compensates the New York Fed at a market-based interest rate.²⁴ In 2019, liquidity swaps were priced at the relevant U.S. dollar overnight indexed swap rate plus 50 basis points.

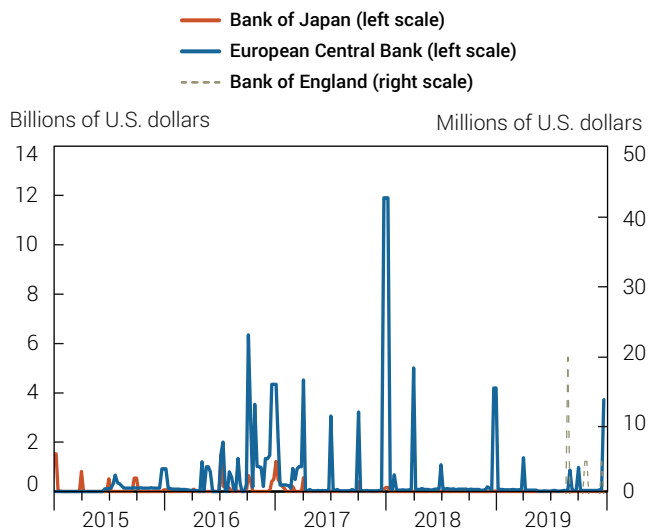
The Bank of England, Bank of Japan, European Central Bank, and Swiss National Bank currently hold weekly U.S. dollar liquidity-providing operations according to a schedule pre-approved by the Chair of the FOMC. When these operations are utilized, the FCB requests a draw on the U.S. dollar liquidity swap arrangements.

OPERATIONAL RESULTS

Total dollar volume of U.S. dollar liquidity swap transactions decreased 38 percent from 2018 to 2019. Weekly draws by the European Central Bank averaged \$179 million, with the largest draw of \$3.7 billion occurring at year-end (**Chart 15**). Weekly draws by the Bank of Japan averaged roughly \$1 million, with

Chart 15

U.S. Dollar Liquidity Swaps Outstanding



Source: Federal Reserve Bank of New York.

Note: Figures are weekly. Swaps outstanding for the Bank of England are given in millions of U.S. dollars and are scaled for the purposes of legibility.

the largest draw of \$6 million occurring in February. For the first time since 2009, the Bank of England drew on its U.S. dollar liquidity swap line, with four draws during the year totaling \$35 million in aggregate.

Lower usage of U.S. dollar liquidity swap lines in 2019 reflected an environment of more balanced demand and supply conditions in the foreign exchange swap market, as illustrated by relatively narrower foreign exchange swap-implied basis spreads. A flatter U.S. Treasury yield curve reduced the relative foreign exchange-hedged return on U.S. dollar assets, resulting in lower demand for dollar funding and hedging in the foreign exchange swap market. At the same time, banks continued to adjust to changes in the regulatory environment. These adjustments, along with a corresponding improvement in their balance sheet management, helped alleviate constraints on banks' supply of U.S. dollars in the foreign exchange swap market.

The Bank of Canada and Swiss National Bank did not utilize their U.S. dollar liquidity swap lines. Similarly, the Federal Reserve did not draw on its foreign currency liquidity swap lines with FCBs in 2019.

OPEN MARKET OPERATIONS DURING 2019

OPERATIONAL FLEXIBILITY AND RESILIENCY

To ensure readiness to implement directives from the FOMC, the New York Fed continued to enhance its operational flexibility and resiliency by maintaining a robust and geographically dispersed network of counterparties and Desk operations, and by undertaking operational readiness exercises and a variety of initiatives to enhance cyber resiliency.

COUNTERPARTIES

The New York Fed relies on a robust network of trading counterparties to supply the necessary operational capacity to execute domestic and foreign open market operations. This network is diverse and geographically dispersed to ensure that the New York Fed can continue to conduct open market operations in a range of scenarios.²⁵

PRIMARY DEALERS

Primary dealers are trading counterparties of the New York Fed in its implementation of monetary policy, and are expected to participate consistently and competitively in open market operations. They are also expected to make markets for the New York Fed on behalf of its official account holders as needed, and to bid on a pro rata basis in all Treasury auctions at reasonably competitive prices.²⁶ The New York Fed also expects primary dealers to provide ongoing insight into market developments in the daily market monitoring activities that the Desk conducts to support the formulation and implementation of monetary policy. As of December 31, 2019, there were twenty-four primary dealers.

REVERSE REPURCHASE AGREEMENT COUNTERPARTIES

To enhance its ability to support the monetary policy objectives of the FOMC, the Desk has arrangements with an expanded set of counterparties with whom it can conduct reverse repo transactions. These reverse repo counterparties—which include money market funds, government-sponsored enterprises, and banks—augment the existing set of primary dealer counterparties with which the New York Fed can conduct reverse repos. As of December 31, 2019, there were 130 expanded reverse repo counterparties, comprising 100 money market funds from twenty-nine investment management firms, fourteen government-sponsored enterprises, and sixteen banks.

FOREIGN EXCHANGE COUNTERPARTIES

Foreign exchange counterparties are trading counterparties of the New York Fed in its foreign exchange operations on behalf of the Federal Reserve and the U.S. Treasury. They are also expected to make reasonable markets for Desk transactions that relate to the currency needs of the New York Fed's official account holders and agencies of the U.S. government. The New York Fed also relies on its foreign exchange counterparties for ongoing insight into global financial market developments as it conducts daily market monitoring activities to support the formulation and implementation of policy by U.S. monetary authorities. Foreign exchange counterparties are expected to provide competitive two-way pricing, as needed, to support the Desk's periodic foreign exchange operations. As of December 31, 2019, there were twenty-one foreign exchange counterparties.

FOREIGN RESERVES MANAGEMENT COUNTERPARTIES

The New York Fed transacts with foreign reserves management counterparties to invest the foreign currency reserves of the Federal Reserve and the U.S. Treasury. These counterparties are expected to participate consistently and competitively in the Desk's periodic investment operations. As of December 31, 2019, there were twenty-four foreign reserve management counterparties, representing sixteen parent financial firms.

OPERATIONAL READINESS

Over the course of 2019, the Desk conducted small-value exercises in both domestic and foreign financial markets for the purpose of ensuring operational readiness. During these exercises, transactions are conducted end-to-end, from trading execution through settlement, and are modest in size. The purpose of these exercises is to maintain the operational capability to execute a range of operation types that may be required to implement future policy directives. Events this year highlighted the benefit of conducting regular small-value exercises. For instance, the Desk was able to expeditiously implement several policy decisions—Treasury bill purchases, repurchase transactions, agency MBS purchases—in part because of its practice of regularly conducting small-value tests for these operations. The selection of an operation for testing should not be interpreted as a signal about the future timing or direction of changes in policy, as small-value exercises are solely conducted to test operational preparedness across the Desk.

Consistent with the limits in the Authorization for Domestic Open Market Operations approved by the FOMC, the aggregate par value of domestic outright operations conducted for the purpose of testing operational readiness did not exceed the limit of \$5 billion per calendar year, and the outstanding amount of repo and reverse repo transactions conducted for this purpose did not exceed \$5 billion at any given time. Domestic small-value exercises were announced in advance and the operation results were posted on the New York Fed's website (**Table 4**).

Consistent with the limit in the Authorization for Foreign Currency Operations approved by the FOMC, the aggregate amount of foreign currency operations conducted for the purpose of testing operational readiness did not exceed \$2.5 billion per calendar year (**Table 5**). The results of small-value liquidity swap transactions were posted on the New York Fed's website, and information about small-value foreign currency operations was included in the *Treasury and Federal Reserve Foreign Exchange Operations* quarterly reports.

In addition, the Federal Reserve Board periodically tested the Term Deposit Facility (TDF), through which it offers interest-bearing term deposits to depository institutions (**Table 6**). Periodic testing helps to maintain operational readiness and provides eligible institutions with an opportunity to keep up their familiarity with term deposit procedures. Tests are announced in advance and results are published on the website of the Federal Reserve Board.²⁷

OPERATIONAL AND CYBER RESILIENCY

The Federal Reserve, its counterparties, and its customers operate in an increasingly complex environment in which trading and payment systems and an information infrastructure of growing sophistication open up new opportunities to obtain and manage information, conduct business, and communicate. At the same time, the increase in interconnectedness, the complexity of the information technology infrastructure, and the increase in the threat landscape put the topic of cyber resiliency at the forefront of risk management.

As part of a long-standing commitment to proactively manage security risks, the Federal Reserve has continually invested in initiatives to improve physical and information security while also enhancing operational resilience, including collecting and analyzing threat intelligence, implementing defensive measures, and augmenting its detective and reactive capabilities. In recent years, the New York Fed has enhanced the resiliency of its operational infrastructure through a number of initiatives that have added protections for key transactional systems to address

Table 4

Small-Value Exercise Results in 2019: Domestic Operations

Operation Type	Operation Date	Operation Amount (Millions of U.S. Dollars)	Additional Information
Repurchase agreements	May 8	65	Term tenor; multi-tranche (Treasury, agency, agency MBS)
	May 13	65	Overnight tenor; multi-tranche (Treasury, agency, agency MBS)
	November 5	68	Term tenor; multi-tranche (Treasury, agency, agency MBS); conducted as a forward settling operation
	December 18	62	Overnight tenor; multi-tranche (Treasury, agency, agency MBS); conducted utilizing a backup tool
Reverse repurchase agreements	May 15	102	Term tenor; Treasury collateral
	May 21	73	Overnight tenor; agency MBS collateral
	November 19	71	Term tenor; agency MBS collateral
Treasury outright purchases	April 24	100	Bills maturing between May 28, 2019, and June 18, 2019
	July 25	50	Floating Rate Notes with maturities between 1 and 23 months
Treasury outright sales	May 15	50	Bills with maturities between 3 and 5 weeks
	December 5	50	Floating Rate Notes with maturities between 1 and 24 months
Treasury bill maturity	June 18	45	
	July 9	3	
	August 6	2	
Treasury bill rollovers	June 6	5	Rollover of June 11, 2019, bill into 4- and 8-week bills
Securities lending	March 7	75	Conducted utilizing a backup tool
	November 7	75	Conducted utilizing a backup tool
Agency MBS TBA purchases	December 14–January 14	290	
	January 15–February 13	288	
	February 14–March 13	270	
	March 14–April 11	292	
	April 12–May 13	275	
Agency MBS outright sales	June 25 and June 27	143	4 specified pools
	December 3 and December 5	167	4 specified pools
Agency MBS dollar roll sales	April 2 and April 3	20	Four dollar roll sales of \$5 million each
Agency MBS coupon swaps	May 7 and May 8	20	Four coupon swaps of \$5 million each
	November 19 and November 21	20	Four coupon swaps of \$5 million each

Source: Federal Reserve Bank of New York.

Notes: Figures may be rounded. Reinvestment purchases of agency MBS occur from mid-month to the following mid-month.

^aFurther details for each small-value exercise are available on the Federal Reserve Bank of New York's website.

OPEN MARKET OPERATIONS DURING 2019

Table 5

Small-Value Exercise Results in 2019: Foreign Operations

Operation Type	Operation Date	Operation Amount	Additional Information
Repurchase agreements	February 5	€1 million	Euro-denominated sovereign debt obligations
	August 14	€1 million	Euro-denominated sovereign debt obligations
Term deposits	November 8	€1 million	Early partial liquidation of a euro-denominated callable term deposit
Sovereign debt sales	April 9	€1 million	Euro-denominated sovereign debt obligations
	August 7	€1 million	Euro-denominated sovereign debt obligations
	April 16	¥100 million	Yen-denominated sovereign debt obligations
	September 26	¥100 million	Yen-denominated sovereign debt obligations
Sovereign debt purchases	November 19	¥100 million	Yen-denominated sovereign debt obligations
Liquidity swaps	February 14	€ 51,000	Liquidity swap with the European Central Bank
	May 22	CAD 51,000	Liquidity swap with the Bank of Canada
	October 10	CHF 51,000	Liquidity swap with the Swiss National Bank
	October 10	\$51,000 each	Liquidity swaps with the Bank of Canada, Bank of England, European Central Bank, and Swiss National Bank
	November 5	£51,000	Liquidity swap with the Bank of England
	November 18	¥51,000	Liquidity swap with the Bank of Japan

Source: Federal Reserve Bank of New York.

Note: Figures may be rounded.

Table 6

Term Deposit Facility Operation Results in 2019

Operation Date	Maturity Date	Term (Days)	Rate (Basis Points)	Maximum Award Amount (Millions of U.S. Dollars)	Total Amount Awarded (Billions of U.S. Dollars)	Number of Participants
May 30	June 06	7	IOER + 1 (236)	250.0	2.7	21
August 22	August 29	7	IOER + 1 (211)	250.0	1.7	18

Source: Board of Governors of the Federal Reserve System.

Note: Awarded amount figures may be rounded.

OPEN MARKET OPERATIONS DURING 2019

risks posed by cyber threats. Relatedly, the New York Fed continues to annually attest to the SWIFT Customer Security Programme (CSP) rolled out in 2017.²⁸

GEOGRAPHIC RESILIENCY

In the event of wide-scale disruptions in large metropolitan areas (in particular, the New York region, where many market participants are located), the Federal Reserve must continue to conduct open market operations and settlement activities. In 2019, the Desk continued to reinforce its operational flexibility and resiliency with a robust, geographically dispersed network of counterparties and Desk operations.

To maintain the resiliency of the Desk's operations, the New York Fed continued to operate alternative sites for trading and settlement of open market operations in other Reserve Bank locations across the Federal Reserve System. These arrangements ensure that the Desk would have the resources needed to carry out critical operational and analytical activities should a contingency scenario affect the greater New York area. During the year, the Desk seamlessly executed numerous open market operations under this arrangement. Similarly, all primary dealers have established and regularly tested geographically dispersed primary and secondary locations to ensure that robust end-to-end participation in open market operations would occur amid any wide-scale disruption.



SELECTED BALANCE SHEET DEVELOPMENTS

During 2019, the size and composition of the Federal Reserve's balance sheet fluctuated as a result of the FOMC's policy decisions related to the transition to a longer-run level of reserves as well as the growth and variability of non-reserve liabilities. Despite significant variation throughout the year, the year-end size of the balance sheet was, on net, largely unchanged as a share of U.S. nominal GDP.

The size of the balance sheet declined from the start of the year until July because of the redemptions of the SOMA's Treasury and agency securities. In the middle of September, the size of the balance sheet began to increase again as a result of repo operations and reserve management purchases of Treasury bill securities. The balance sheet at year-end, on net, was around \$120 billion higher than its level in 2018, at \$4.18 trillion (**Table 7**), although in terms of the share of U.S. nominal GDP it was unchanged at about 20 percent. There was a net \$137.3 billion increase in the size of the SOMA holdings of domestic securities and repos, leaving reserve balances on net unchanged while accommodating growth in the aggregate size of non-reserve liabilities.²⁹ Reserve balances decreased in the first half of the year, reaching a low of \$1.39 trillion in the middle of September, the lowest weekly level since 2012, primarily owing to runoff in the SOMA portfolio. Subsequently, reserve balances rose as a result of repos and reserve management purchases. These operations also offset the reserve-draining impact of ongoing growth in non-reserve liabilities, primarily Federal Reserve notes.

The portfolio continued to contribute to substantial levels of Federal Reserve income in 2019, although net income was slightly lower than in 2018 because of lower interest income due to lower average SOMA domestic securities holdings in 2019 than in the prior year. Remittances to the Treasury

Department decreased during the year because of the decline in net income. The domestic portfolio returned to an unrealized gain position in 2019 because of the decrease in interest rates.

SELECTED ASSETS

The SOMA comprises the Federal Reserve's domestic securities holdings, repos, and foreign portfolios, as well as the short-term credit that the Federal Reserve extends to foreign central banks through U.S. dollar liquidity swaps. The Federal Reserve also provides short-term credit to depository institutions through the primary credit facility, which is not part of the SOMA. In 2019, the SOMA domestic portfolio included Treasury bills for the first time since 2012 and repos for the first time since 2008.

All else equal, an increase (decrease) in holdings of a particular asset leads to a corresponding increase (decrease) in reserve balances or other liability categories.

SOMA DOMESTIC SECURITIES HOLDINGS PORTFOLIO SIZE AND COMPOSITION

The vast majority of the SOMA is composed of domestic securities holdings. The size of the domestic securities portfolio, which consists of Treasury and agency securities held on an outright basis, decreased through July 2019 as securities holdings were allowed to mature without reinvestment, subject to the monthly redemption caps. After reaching \$3.58 trillion in the first part of September, the lowest level of the year, securities holdings began to increase again in October as a result of the commencement of reserve management purchases, ending the year at \$3.74 trillion.

OPEN MARKET OPERATIONS DURING 2019

Table 7

Changes in Selected Federal Reserve Assets and Liabilities

Billions of U.S. Dollars

	Assets ^a						Total Assets
	Total Domestic Securities Holdings	U.S. Treasury Securities ^b	Agency MBS ^c	Agency Debt	Repo Outstanding	Other Assets	
Outstanding as of:							
December 31, 2018	3,862.37	2,222.55	1,637.41	2.41	0.00	195.79	4,058.16
September 18, 2019	3,597.17	2,105.83	1,489.00	2.35	75.00	177.09	3,849.26
December 31, 2019	3,744.09	2,328.93	1,412.81	2.35	255.62	178.04	4,177.76
Changes in the period:							
Dec 31, 2018, to Sept 18, 2019	-265.20	-116.72	-148.42	-0.06	75.00	-18.70	-208.90
Sept 18, 2019, to Dec 31, 2019	146.92	223.11	-76.19	0.00	180.62	0.96	328.50
Dec 31, 2018, to Dec 31, 2019	-118.28	106.38	-224.60	-0.06	255.62	-17.75	119.60

	Liabilities and Capital							Total Liabilities
	Reserve Balances	Federal Reserve Notes	Treasury General Account	ON RRP	Foreign Repo Pool	Other Liabilities and Capital	Total Other Than Reserve Balances	
Outstanding as of:								
December 31, 2018	1,555.95	1,671.44	402.14	41.85	262.16	124.62	2,502.21	4,058.16
September 18, 2019	1,385.43	1,714.57	303.06	18.91	306.21	121.08	2,463.83	3,849.26
December 31, 2019	1,548.85	1,759.43	403.85	64.09	272.56	128.97	2,628.91	4,177.76
Changes in the period:								
Dec 31, 2018, to Sept 18, 2019	-170.52	43.13	-99.08	-22.94	44.05	-3.54	-38.38	-208.90
Sept 18, 2019, to Dec 31, 2019	163.42	44.86	100.79	45.18	-33.65	7.90	165.08	328.50
Dec 31, 2018, to Dec 31, 2019	-7.10	87.99	1.71	22.24	10.40	4.35	126.70	119.60

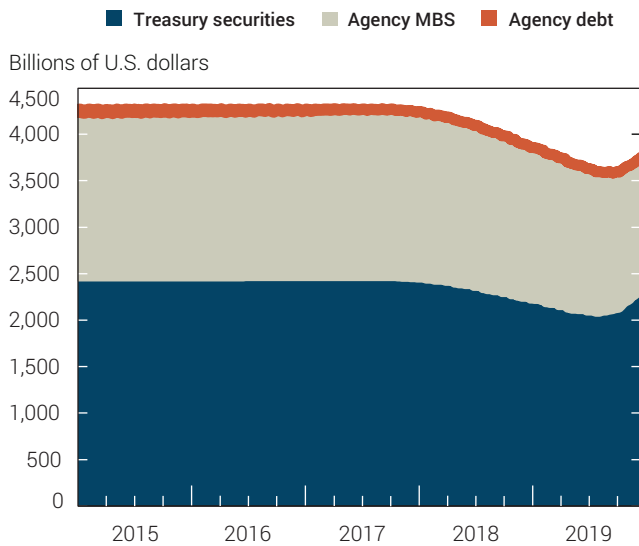
Source: Federal Reserve, H.4.1, Factors Affecting Reserve Balances.

Note: The level of reserve balances on September 18 represents the lowest level in 2019 in the weekly H.4.1 series.

^aHoldings of U.S. Treasury, agency MBS, and agency debt securities are par values.^bHoldings of U.S. Treasury securities include Treasury bills, Treasury coupon securities, Treasury Inflation-Protected Securities, and Floating Rate Notes.^cIncludes commitments to buy mortgage-backed securities.

OPEN MARKET OPERATIONS DURING 2019

Chart 16
Composition of SOMA Domestic Securities Holdings



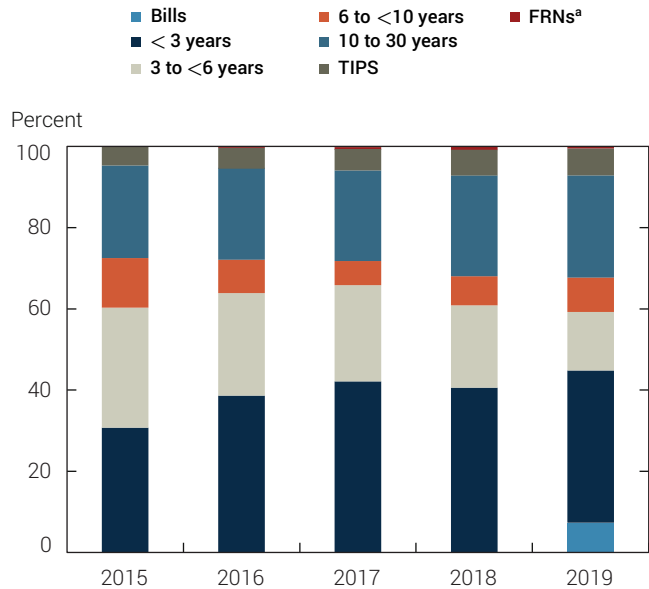
Source: Board of Governors of the Federal Reserve System.
 Note: Figures are weekly and include unsettled holdings.

As of year-end 2019, the domestic securities portfolio was composed of Treasury securities totaling \$2.33 trillion (62 percent), agency MBS totaling \$1.41 trillion (38 percent), and agency debt totaling \$2 billion (less than 1 percent) (**Chart 16**).³⁰ Starting in August 2019, the share of the portfolio held in Treasury securities began to increase because of the reinvestment of principal payments on agency securities into Treasury securities, consistent with the FOMC's intent to hold primarily Treasury securities in the long run. The subsequent commencement of reserve management purchases of Treasury securities also contributed to the shift, resulting in an aggregate increase of 4 percentage points in the proportion of the portfolio held in Treasury securities over the year.

Treasury Holdings

In 2019, the par size of the Treasury portfolio increased from approximately \$2.22 trillion to approximately \$2.33 trillion. Over the year, the par size of the Treasury portfolio declined until the end of July to approximately \$2.08 trillion as principal payments from some maturing Treasury securities were allowed to mature without reinvestment. The Treasury portfolio increased in the remaining months of the year as the Desk began

Chart 17
Distribution of SOMA Treasury Holdings



Source: Federal Reserve Bank of New York.
 Note: Figures are as of year-end.

^aLess than 1 percent of holdings in 2015-2019 are Floating Rate Notes (FRNs).

to roll over maturing Treasury securities at auction, reinvest some principal payments from agency securities into Treasury securities, and conduct reserve management purchases of Treasury bills.

The weighted average maturity of the portfolio was 8.0 years at the end of 2019, compared with 8.1 years at the end of 2018. During the first half of the year, the weighted average maturity of Treasury securities holdings increased as redemptions left a larger proportion of longer-maturity securities in the portfolio; however, most of this rise in the maturity of Treasury securities holdings was offset later in the year as Treasury bills were added to the portfolio. Specifically, the share held in longer-term securities and Treasury bills increased moderately, while the share of the Treasury portfolio held in nominal coupon securities with less than six years to maturity declined slightly over the period (**Chart 17**). Nominal coupon securities with less than three years to maturity continued to make up the largest share of the Treasury securities portfolio, followed by the share of nominal securities with ten to thirty years to maturity and the

OPEN MARKET OPERATIONS DURING 2019

share with three to six years to maturity. The percentages of the portfolio held in TIPS and Treasury bills remained small, and the share held in FRNs was minimal.

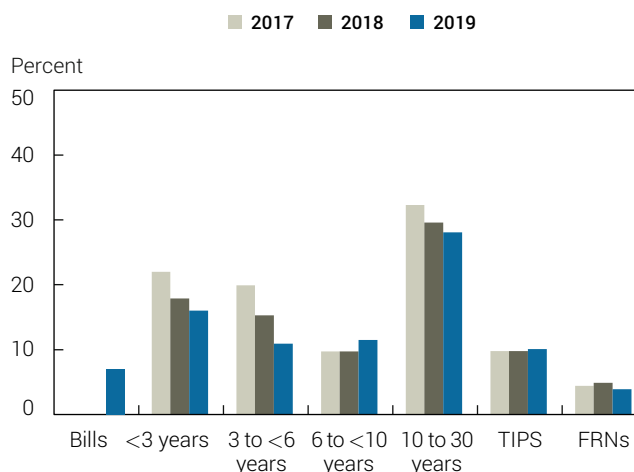
SOMA holdings of Treasury securities as a share of the outstanding Treasury market were minimally changed at 14.0 percent at the end of 2019, compared with 14.2 percent at the end of 2018. Although the size of Treasury marketable debt held by the public increased by roughly \$1.07 trillion during the year, the size of SOMA Treasury securities holdings also increased in 2019.³¹ The SOMA continued to hold a sizable share of securities with ten to thirty years to maturity as a result of the Federal Reserve's large-scale asset purchase programs. Roughly 28.1 percent of outstanding Treasury coupon securities with ten to thirty years remaining until maturity was held in the SOMA as of year-end, compared with 16.0 percent of outstanding Treasury coupon securities with up to three years remaining until maturity (**Chart 18**). Meanwhile, mainly as a result of the reserve management purchases initiated in October, the SOMA expanded its share of Treasury bills to roughly 7.0 percent of outstanding Treasury bills by the end of the year. Consistent with the SOMA's concentrated holdings in longer-term securities, at the end of 2019, the weighted average maturity of the SOMA Treasury portfolio was greater than that of the outstanding stock of Treasury debt—8.0 years, as compared with 5.8 years.

Agency MBS Holdings

The SOMA's holdings of agency MBS decreased by \$224.6 billion during the 2019 calendar year, as principal payments on agency MBS and agency debt securities were only reinvested in agency MBS to the extent that they exceeded the redemption caps. (For more information on agency MBS reinvestments, see the "Agency Debt and Agency MBS Operations" section of this report.)

Given the Desk's operational approach of making reinvestment purchases in agency MBS in the to-be-announced (TBA) market, specifically in TBA contracts with coupon rates consistent with current agency MBS origination, agency MBS delivered to the SOMA were generally concentrated in more recently issued securities. Although these more recently

Chart 18
SOMA Treasury Holdings as a Share of Outstanding Treasury Supply

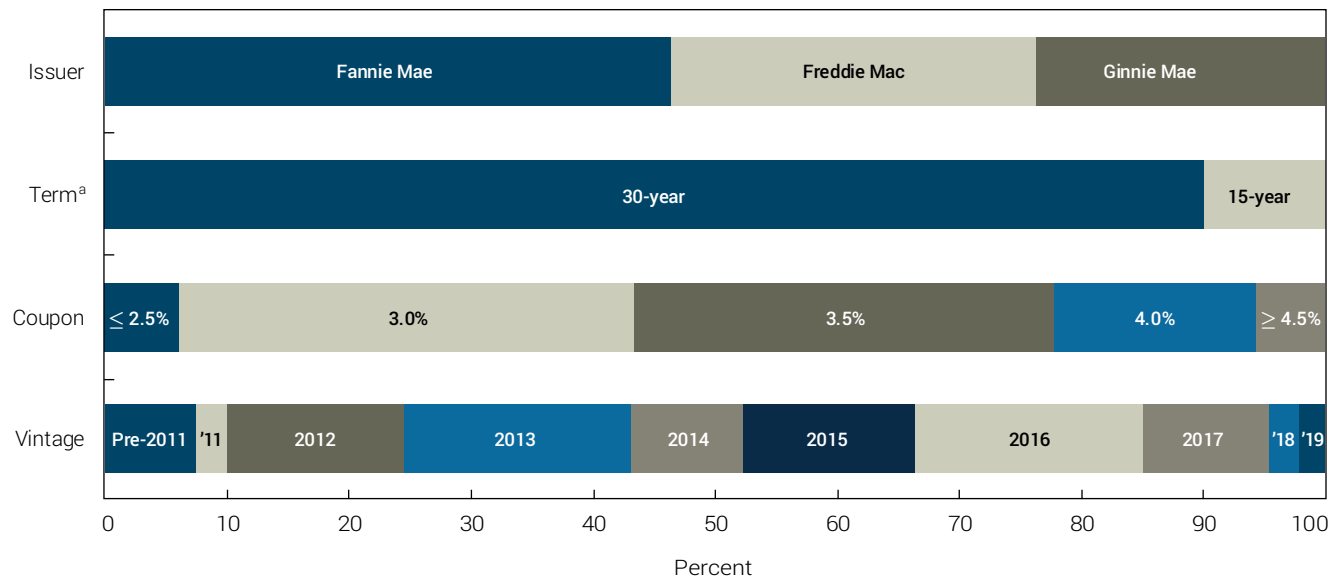


Sources: Federal Reserve Bank of New York; U.S. Treasury Department.

Note: Figures are as of year-end.

issued securities were generally originated at lower mortgage rates than the securities that paid down over the course of the year, the small amount of purchases relative to the total agency MBS portfolio meant there was minimal effect on the overall composition of the portfolio. More generally, the composition of the portfolio across various dimensions—including the agencies, terms, coupons, and vintages of the securities held—evolved as a result of the replacement of securities refinanced or repaid over the years with newer securities. As of year-end, 15 percent of the securities held in the portfolio were originated within the past three years. Forty-six percent of the settled agency MBS portfolio was held in MBS guaranteed by Fannie Mae, 30 percent in MBS guaranteed by Freddie Mac, and 24 percent in MBS guaranteed by Ginnie Mae (**Chart 19**).³² Almost 90 percent of the portfolio was held in thirty-year MBS, with most of the remainder in fifteen-year MBS. As of the end of 2019, the weighted average life of the settled agency MBS held in the SOMA was 5.33 years.³³ The share of the settled agency MBS portfolio held in securities with 3.0 and 3.5 percent coupons remained steady at roughly 70 percent. The weighted average coupon of the agency MBS held in the SOMA portfolio was steady as well, remaining at 3.4 percent at the end of 2019.

Chart 19
Distribution of SOMA Agency MBS Holdings



Source: Federal Reserve Bank of New York.

Notes: Figures are as of December 31, 2019. Holdings total \$1.41 trillion and consist of settled holdings only.

^aLess than 1 percent of holdings are ten- and twenty-year agency MBS, which may be delivered into fifteen- and thirty-year TBA contracts, respectively.

SOMA holdings of agency MBS as a share of the outstanding stock of fixed-rate agency MBS declined during 2019, from 25 percent to 21 percent, as the size of agency MBS holdings decreased while the outstanding stock of agency MBS increased by roughly \$220 billion. The characteristics of agency MBS holdings in the SOMA are broadly consistent with those of the outstanding agency MBS market, although the portfolio is slightly more concentrated in lower-coupon securities. The weighted average coupon rate of underlying mortgage loans in the agency MBS held in the SOMA was 3.95 percent, slightly below the broader market's weighted average coupon rate of 4.15 percent. Similarly, the weighted average age of loans held by the SOMA was sixty-nine months, while the weighted average age of loans in the broader market was forty-eight months.

Agency Debt Holdings

SOMA agency debt holdings stayed approximately constant at roughly \$2 billion in face value during 2019 as maturities during the year were less than \$100 million. These holdings consist of the remainder of the \$172 billion of agency debt acquired by the Federal Reserve between 2008 and 2010 as

part of its first asset purchase program. Remaining agency debt securities will mature sporadically between 2029 and 2032 in small increments.

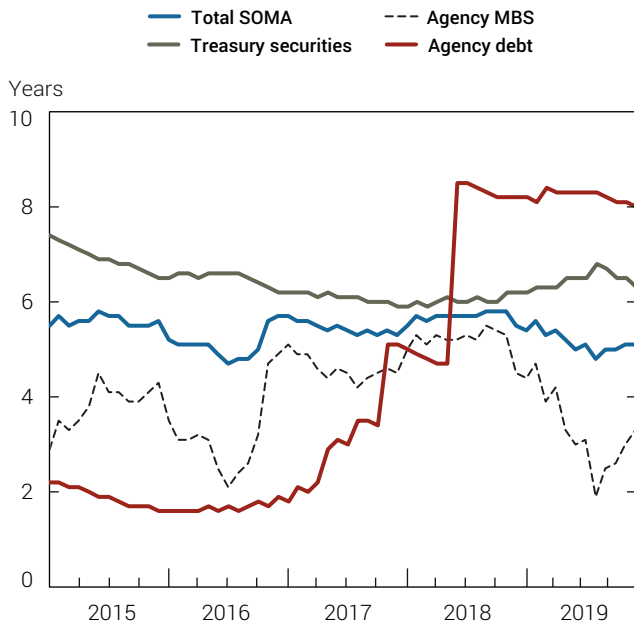
PORTFOLIO RISK METRICS

Duration measures the sensitivity of a security's price to changes in interest rates, and may be thought of as the weighted average time to maturity of cash flows from the portfolio. The longer the duration of a security, the more sensitive it will be to changes in interest rates. Duration is generally greater for longer-maturity and lower-coupon securities.

During 2019, the duration of the total SOMA domestic securities portfolio decreased by 0.4 year to approximately 5.1 years. A decrease of 1.2 years in the effective duration of the agency MBS portfolio and a 0.2 year decrease in the agency debt portfolio fully offset a 0.1 year increase in the duration of the Treasury portfolio, resulting in an overall decrease in the par-weighted average duration of the domestic securities holdings. (Chart 20).³⁴

OPEN MARKET OPERATIONS DURING 2019

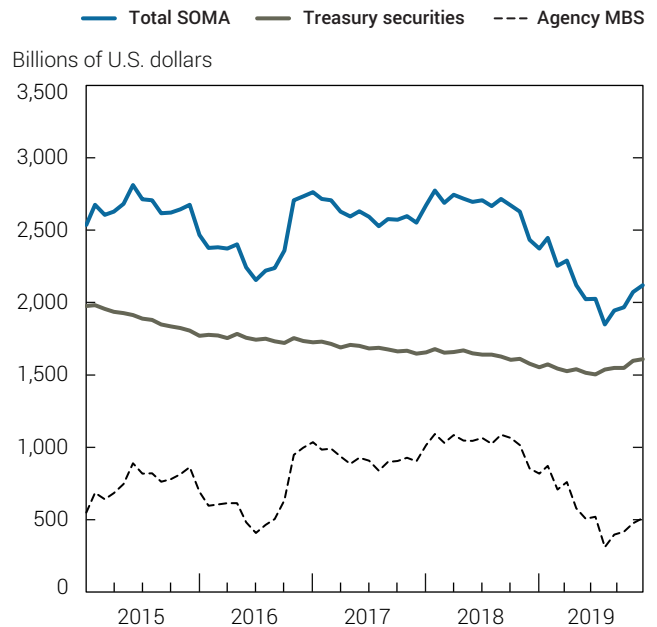
Chart 20
Average Duration of SOMA Domestic Securities Holdings



Source: Federal Reserve Bank of New York.

Notes: Figures are as of month-end. Calculations are par-weighted. The rise in agency debt duration during 2018 is due to a maturity that left a small number of agency debt securities with longer tenors in the portfolio.

Chart 21
SOMA Domestic Securities Holdings in Ten-Year Equivalents



Source: Federal Reserve Bank of New York.

Notes: Figures are as of month-end. Calculations are par-weighted. Agency debt is not shown owing to its minimal value.

The duration of Treasury securities held in the SOMA increased very slightly, from 6.2 years to 6.3 years. While the year-over-year change was minimal, the duration increased substantially during the first part of the year, peaking at 6.8 years in August, because redemptions of Treasury securities holdings resulted in securities with longer maturities making up a larger share of the portfolio. After August, purchases of Treasury bills drove the duration of the portfolio lower. The effective duration of the SOMA's holdings of agency MBS decreased by 1.2 years in 2019, prompted by a decline in primary mortgage rates. The sensitivity of MBS duration to changes in interest rates highlights the prepayment risk absorbed by the SOMA portfolio—a risk arising from the prepayment option embedded in agency MBS. (For more information, see Box 3, “Agency MBS Prepayment Uncertainty,” in *Open Market Operations during 2017*).³⁵

Measures of the dollar value of duration risk held in the SOMA portfolio declined in 2019. One method of measuring dollar duration

is in terms of ten-year equivalents—that is, the amount of ten-year Treasury securities that would be needed to match the duration risk of the portfolio. The SOMA portfolio's ten-year equivalent measure declined from \$2.43 trillion at the end of 2018 to \$2.12 trillion at the end of 2019 (Chart 21), driven primarily by the decline in the duration of agency MBS holdings and also by the decline in the overall size of the domestic securities holdings.

SOMA REPURCHASE AGREEMENTS

For the first time since 2008, the Desk conducted overnight and term repurchase agreements—from mid-September 2019 through the end of the year—to influence the level of supply of reserves and mitigate upward pressure in rates observed after a sharp decline in reserve balances. During this period, the aggregate average daily amount outstanding was approximately \$200 billion, with the proportion shifting to predominantly term repos around the middle of December when these operations began to cover the end

OPEN MARKET OPERATIONS DURING 2019

of the year. (For more information on these operations and their results, see the “Open Market Operations” section of this report.)

SOMA FOREIGN CURRENCY-DENOMINATED HOLDINGS

The Federal Reserve holds foreign currency-denominated assets, which are invested to ensure adequate liquidity to meet anticipated foreign exchange intervention needs. (For more details, see the “Foreign Open Market Operations” section of this report.)

As of year-end 2019, the SOMA foreign currency portfolio totaled \$20.7 billion, composed of \$12.1 billion of euro-denominated assets and \$8.6 billion of yen-denominated assets. The portfolio decreased \$0.2 billion in U.S. dollar terms from 2018, primarily owing to a 2 percent depreciation of the euro against the dollar over the year, which was partly offset by a 1 percent appreciation of the yen against the dollar. In both the euro- and yen-denominated portfolios, the share of government debt obligations decreased, while the share of cash held on deposit at official institutions increased (**Chart 22**).

The increased share of cash in the portfolio contributed to a reduction in the Macaulay duration of foreign SOMA holdings, which declined from 24.9 months at year-end 2018 to 19.8 months at year-end 2019 for euro-denominated assets, and from 2.4 months at year-end 2018 to 0.8 month at year-end 2019 for yen-denominated assets.

SHORT-TERM LIQUIDITY PROVISION

PRIMARY CREDIT FACILITY

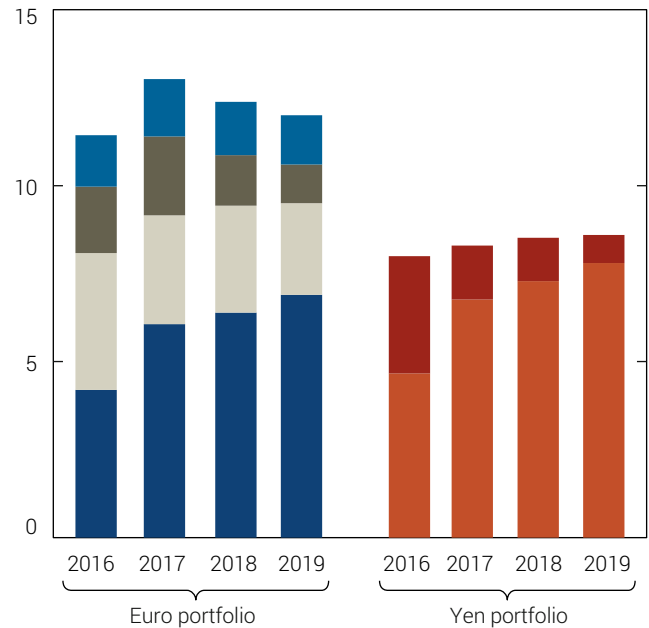
The primary credit facility, the discount window’s main lending program, serves as a backup source of liquidity for depository institutions that are in generally sound financial condition and have appropriate collateral pledged to a Reserve Bank.³⁶ Loans are generally limited to overnight maturities and are initiated by depository institutions and approved by Reserve Banks. In 2019, the interest rate on primary credit loans began the year at

Chart 22

Distribution of SOMA Foreign Currency Portfolio Holdings



Billions of U.S. dollars



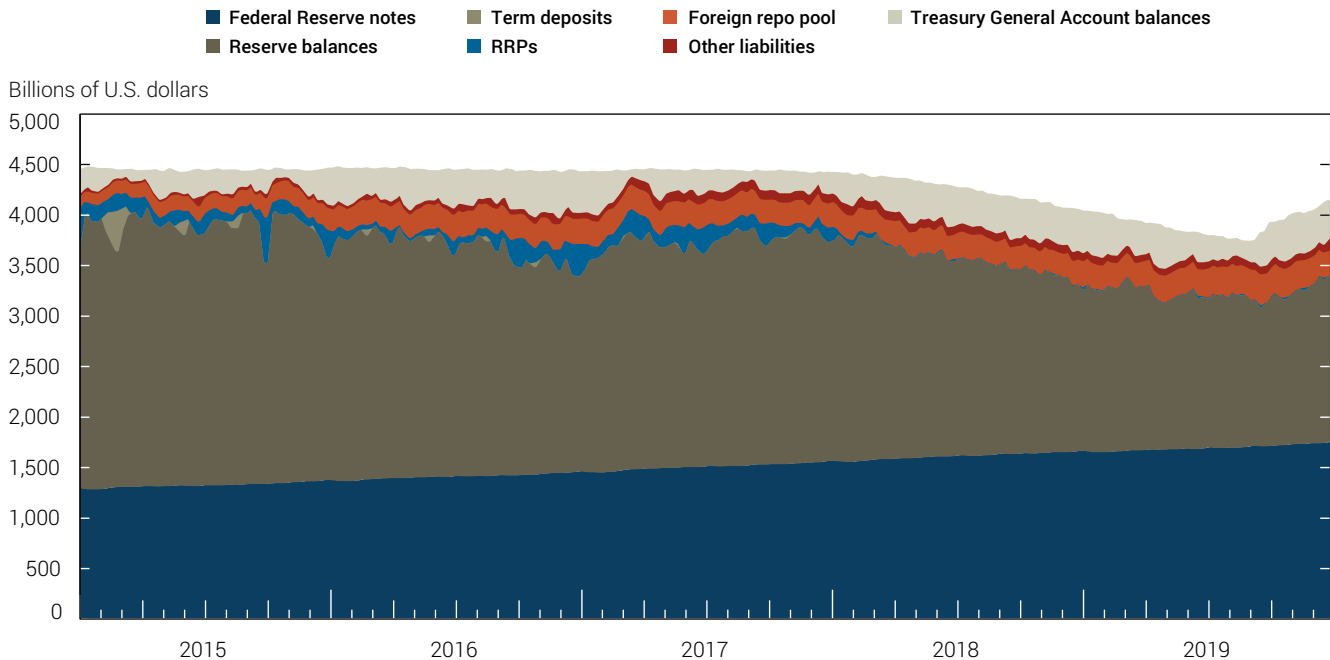
Source: Federal Reserve Bank of New York.

Note: Figures reflect amortized cost.

3 percent but was later lowered in conjunction with the FOMC’s decisions to lower the federal funds target range: the Board of Governors approved 25 basis point decreases in August, September, and October, resulting in a primary credit rate of 2.25 percent by the end of the year.³⁷ The spread between the primary credit rate and the top of the federal funds target range remained constant at 50 basis points.

Primary credit borrowings declined in 2019, reaching the low end of the range seen in the post-crisis period. The average daily loan balance under primary credit declined from \$20.7 million in 2018 to \$11.9 million in 2019. The number of primary credit loans decreased from a total of 2,810 loans originated in 2018 to a total of 2,397 loans in 2019, as non-test loan activity declined from that seen in 2018.³⁸ Nearly three-quarters of the loans in

Chart 23
Federal Reserve Liabilities



2019 were test loans, up modestly from the proportion of test loans in 2018.

CENTRAL BANK LIQUIDITY SWAPS

The Federal Reserve maintains standing dollar and foreign-currency swap lines with a network of five other major central banks: the Bank of Canada, Bank of England, Bank of Japan, European Central Bank, and Swiss National Bank. As in years past, U.S. dollar swap line usage in 2019 reached its highest level in the quarter- and year-end periods, with draws of around \$4.2 billion outstanding over the 2018 year-end and around \$3.7 billion outstanding over the 2019 year-end. Including these year-end periods, the average daily outstanding value of swaps in 2019 totaled about \$273 million, \$404 million lower than in 2018. (For more information, see the “Foreign Open Market Operations” section of this report.)

SELECTED LIABILITIES

The Federal Reserve’s assets are funded by a variety of liabilities and capital; these liabilities provide safe and liquid assets for the public, the Treasury, and the banking system.³⁹

In 2019, the total level of liabilities and capital increased about \$126.7 billion from the level at the end of 2018, due to an aggregate increase in non-reserve liabilities primarily resulting from steady growth in Federal Reserve notes (**Chart 23**). The foreign repo pool also rose, on net, and reached a record level in August. Treasury General Account balances were broadly unchanged year over year at around \$400 billion, but experienced significant swings during the year, reaching a low of about \$126 billion in September before rising to more typical levels following the resolution of the debt ceiling impasse. Take-up in the ON RRP facility for most of the year was generally lower than was seen in 2018, although at year-end it reached a level slightly above that at the end of 2018. The variability of some non-reserve

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liabilities increased from the levels seen in 2018, including that of TGA balances and the size of the foreign repo pool.

The level of reserves of \$1.6 trillion was largely unchanged on net over the year despite the runoff of domestic securities holdings in the first half of the year. In fact, increases on the asset side of the balance sheet in the fourth quarter added to reserves, offsetting the impact of growth in liabilities other than reserves (Chart 24). Over the last several years, increases in non-reserve liabilities have tended to reduce reserves on net, except in 2017 when debt ceiling-related events led to a decline in the TGA over the year. Some non-reserve liabilities, such as Federal Reserve notes, had a steady reserves-draining impact during these years. In 2018 and 2019, changes in the size of the SOMA portfolio were an additional factor driving the level of reserves.

Other than reserves and ON RRP, the level of liabilities as well as the flows affecting their variability are separate from monetary policy decisions.

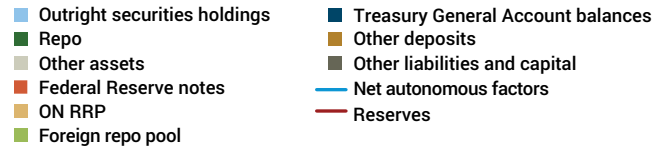
RESERVE BALANCES

Reserve balances, which are deposits held by depository institutions at the Federal Reserve, represent one of the largest liabilities of the Federal Reserve.⁴⁰ Reserve balances are composed of balances held by banks to fulfill reserve requirements as well as reserves held in excess of these requirements to meet intraday payments, to manage liquidity risk and meet associated regulatory ratios, and to earn interest on their balances.⁴¹

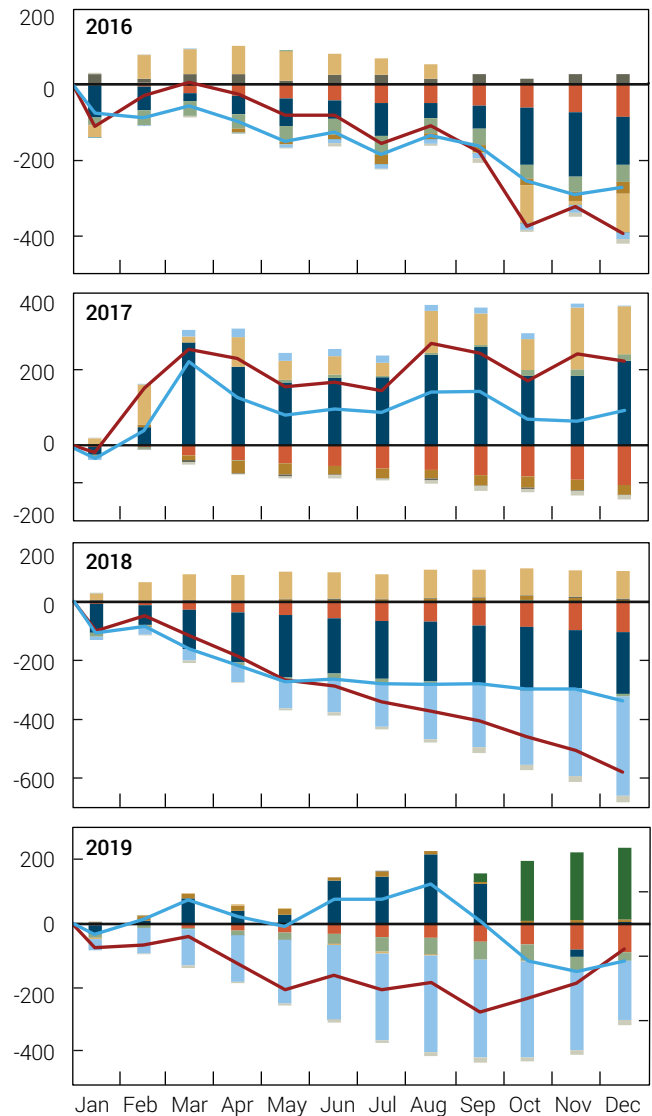
Banks may maintain a precautionary balance of excess reserves to absorb daily payment flows without borrowing funds or selling assets. Bank demand for reserves has increased in recent years as a result of heightened focus on liquidity risk management and new regulatory ratios adopted after the financial crisis.⁴²

In recent years, reserve balances have declined as a result of the runoff of domestic securities holdings and ongoing growth in non-reserve liabilities. The level of reserves declined

Chart 24
Source of Changes in Reserve Balances



Billions of U.S. dollars



Source: Federal Reserve Bank of New York.

Notes: Figures are the monthly averages of the weekly average levels. Net autonomous factors include other assets plus non-reserve liabilities other than ON RRP (Federal Reserve notes, Treasury General Account, foreign repo pool, other deposits, other liabilities and capital). Bars above the axis reflect changes supplying reserves, while bars below the axis represent changes reducing reserves.

from a peak of roughly \$2.8 trillion in October 2014 to about \$2.2 trillion in late September 2017, reflecting the growth of non-reserve liabilities. Subsequently, reserves declined further, due to the FOMC's decision to allow gradual runoff of maturing securities holdings in addition to growth in non-reserve liabilities. By the time the FOMC decided to conclude the reduction of the SOMA's aggregate size of securities holdings in August 2019, reserves had fallen to about \$1.5 trillion. Reserve balances reached \$1.39 trillion in mid-September 2019, the lowest weekly level since 2012 and roughly 50 percent lower than their peak in 2014. Reserve balances rose after mid-September, to \$1.6 trillion in December, as a result of repos and reserve management purchases conducted from mid-October through year-end, partially offset by increases in non-reserve liabilities.

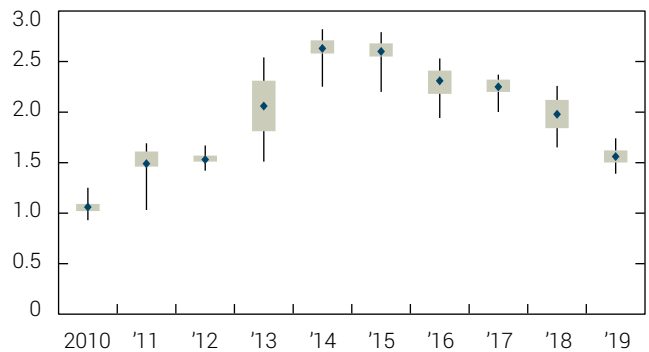
Reserves continued to be highly variable on a daily basis, with changes in TGA balances primarily driving that variability. Nevertheless, reserves in 2019 moved in a somewhat smaller range than in 2018, when a larger reduction in the size of the SOMA securities holdings resulted in the level of reserves moving in a wider range. (**Chart 25**).

FEDERAL RESERVE NOTES

Federal Reserve notes, commonly known as currency in circulation (currency), was the largest liability in 2019, totaling \$1.76 trillion at the end of the year.⁴³ Currency is an asset that households and firms hold because they can exchange it for goods and services and because it provides a store of value. When the U.S. economy grows, households and firms tend to conduct more transactions and hence demand more currency. U.S. currency tends to exhibit steady growth month to month, picking up slightly toward the end of the year as demand for cash increases during the holiday season, and slowing somewhat at the beginning of the year. The rate of growth of currency outstanding has generally reflected the pace of expansion of economic activity in nominal terms, though it has also fluctuated somewhat with factors other than economic growth, such as the demand for U.S. currency abroad, particularly during periods of heightened financial and political uncertainty.⁴⁴

Chart 25
Reserve Balances

Trillions of U.S. dollars



Source: Board of Governors of the Federal Reserve System.

Notes: Boxes indicate interquartile ranges, diamonds indicate annual averages, and whiskers indicate minimum and maximum outcomes. Data show the distribution of weekly figures for reserve balances.

In 2019, Federal Reserve notes outstanding grew about 5.2 percent, a pace slightly below the 6.3 percent increase registered in 2018, although the growth rate remained within the range observed during the last decade (**Chart 26**). Since the global financial crisis, currency has, on average, grown at an annual rate higher than the annual rate of growth of U.S. nominal GDP.

REVERSE REPURCHASE AGREEMENTS

OPEN MARKET OPERATIONS

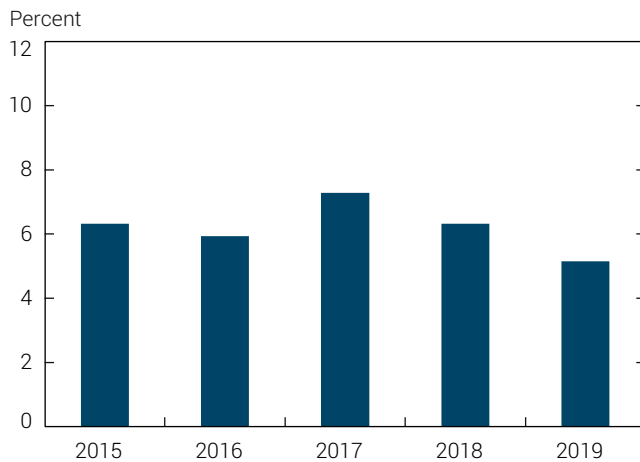
Throughout 2019, the Federal Reserve conducted overnight reverse repurchase agreements to support the implementation of monetary policy. In 2019, average daily amounts outstanding totaled \$5 billion, down from \$12 billion in 2018, with the decline due to the availability of alternative investment opportunities. (For more information on these operations and their results, see the "Open Market Operations" section of this report, page 10.)

FOREIGN REPO POOL

The New York Fed has long offered its foreign official and international account holders an overnight repo investment service, known as the foreign repo pool. At the end of each business day, account holders' cash balances are swept into an overnight reverse repo secured by the Federal Reserve's securities

OPEN MARKET OPERATIONS DURING 2019

Chart 26
Federal Reserve Notes



Source: Board of Governors of the Federal Reserve System.

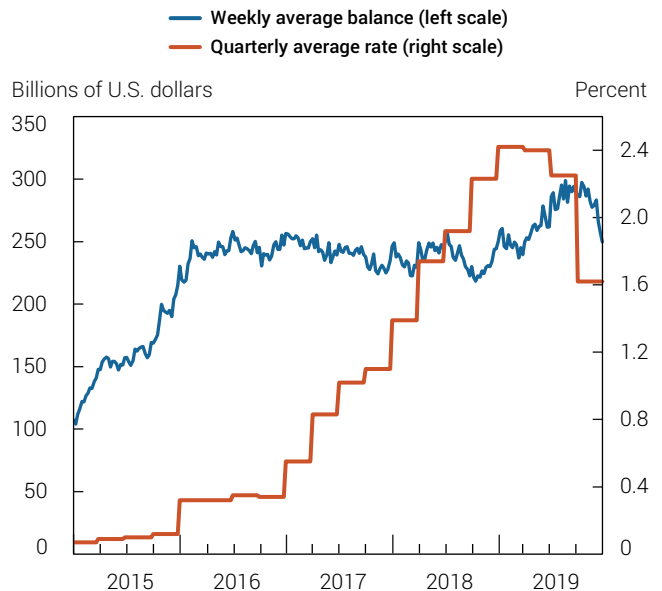
Note: Figures for Federal Reserve notes reflect annual growth rates based on year-end Wednesday levels.

holdings.⁴⁵ Upon maturity on the following business day, the securities are repurchased by the SOMA at a repurchase price that includes a return calculated at a rate generally equivalent to the New York Fed's overnight reverse repurchase operations (ON RRP), although the New York Fed may vary the rate of return at any time without prior notice. In December 2019, the rate was changed from the previous rate that was tied to comparable market-based Treasury repo rates.

This service addresses a strong preference by many central banks to hold significant dollar liquidity buffers at the Federal Reserve for policy purposes, and supports operational liquidity needs to clear and settle securities in these accounts. Like other reserve currency central banks, the Federal Reserve offers this service as part of a suite of banking and custody services to central banks, governments, and international official institutions. The size of the facility increased in 2015 when the Federal Reserve removed constraints on account holders' ability to vary the size of their investments in the middle of 2015 and as foreign accounts sought to maintain more robust dollar liquidity buffers.

Over the course of 2019, the weekly average size of the foreign repo pool fluctuated within a wider range relative to prior years (**Chart 27**). After moving around \$250 billion in the

Chart 27
Foreign Repo Pool



Sources: Board of Governors of the Federal Reserve System; Federal Reserve Bank of New York.

first quarter of the year, the size of the pool increased between April and August to \$300 billion, the highest level on record. Approximately three-quarters of this increase was driven by a small subset of customers who appeared to increase their pool balances following foreign exchange reserve accumulation and a reallocation out of Treasury notes. Approximately one-quarter of the increase was driven by a broader set of customers shifting out of Treasury bills and other money market investments given dynamics of the rate earned on the pool relative to other short-term investments. After remaining around \$290 billion from August to October, the level of the pool generally declined during the remainder of the year.

DEPOSITS

TREASURY GENERAL ACCOUNT

By statute, the Federal Reserve acts as fiscal agent for the federal government. Consequently, the U.S. Treasury maintains a cash balance at the Federal Reserve—the Treasury General Account—to deposit corporate and individual taxes paid to the U.S. government and to disburse payments, pay interest on

OPEN MARKET OPERATIONS DURING 2019

federal debt, and settle Treasury security transactions.⁴⁶ In 2015, the Treasury announced that it would generally strive to maintain a TGA balance that was large enough to ensure that it could cover one week of payments and maturing debt, subject to a minimum of \$150 billion.⁴⁷

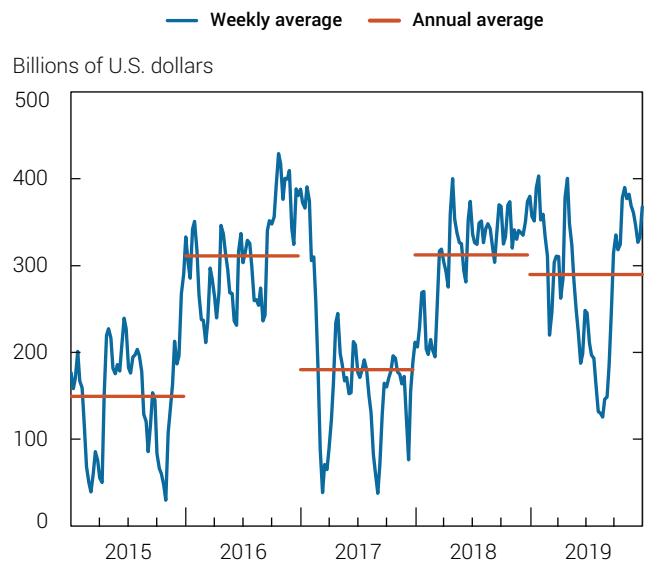
TGA balances typically exhibit significant variation around Treasury auction settlement dates and debt limit–related deadlines, and when tax payments take place.⁴⁸ For example, in September 2019, the TGA balance increased by \$115 billion over the course of two days due to tax payments and Treasury settlement-related flows. This type of variation has important implications in an ample reserves regime, since the level of reserves needs to be high enough that the change in TGA balances does not decrease reserves below the level demanded by banks at interest rates set at IOER.

The average weekly TGA balance during 2019 was \$290 billion, slightly lower than the roughly \$315 billion weekly average in 2018. However, the average weekly TGA balance fluctuated within a wider range in 2019 than it did in 2018— from a low of \$126 billion to a high of \$403 billion. The average weekly TGA balance exceeded the Treasury’s minimum balance of \$150 billion throughout 2019, except for in early September when the TGA balance temporarily fell below the minimum level as the Treasury faced constraints on marketable borrowing. After legislation was approved to suspend the debt limit through July 2021, the TGA balance returned above the \$150 billion level (**Chart 28**).

FOREIGN OFFICIAL AND OTHER DEPOSITS

The Federal Reserve has long offered deposit services to international and multilateral organizations and to government-sponsored enterprises. More recently, it has offered deposit accounts to designated financial market utilities (DFMUs).⁴⁹ GSEs are financial intermediaries chartered by the federal government that primarily facilitate the flow of credit to housing and agriculture. DFMUs provide the infrastructure for transferring, clearing, and settling payments, securities, and

Chart 28
Treasury General Account Balances



Source: Board of Governors of the Federal Reserve System.

Note: Figures are averages of daily balances.

other financial transactions among financial institutions. Access to deposit accounts at the Federal Reserve enables these entities to store their cash in a safe and liquid facility. Deposits held by DFMUs may be remunerated at the rate paid on balances maintained by depository institutions or another rate determined by the Board from time to time, not to exceed the general level of short-term interest rates. Aggregate balances of these accounts more than doubled after all eight DFMUs were able to open an account at the Federal Reserve in 2013.

In 2019, aggregate balances of foreign official and other deposits fell to around \$60 billion from the historically high levels of around \$80 billion observed in the prior two years, which had been reached as more DFMUs opened accounts in 2016 and 2017.

TERM DEPOSITS

The Federal Reserve periodically conducted small-value exercises to test the Term Deposit Facility, through which it offers interest-bearing term deposits to depository institutions. TDF

amounts outstanding ranged from \$1.7 billion to \$2.7 billion across two seven-day periods over the course of 2019. (For more details, see the “Operational Flexibility and Resiliency” section of this report.)

FINANCIAL RESULTS

The SOMA portfolio continued to contribute to substantial levels of Federal Reserve income and remittances to the U.S. Treasury in 2019, although these levels declined slightly from the prior year. Since peaking in 2014, SOMA net income and remittances to the U.S. Treasury have declined because of lower interest income—driven primarily by higher funding costs associated with rising short-term interest rates—and, more recently, because of lower average SOMA domestic securities holdings.

SOMA INCOME

In 2019, total SOMA income was \$96.6 billion, primarily derived from interest income on domestic securities holdings.⁵⁰ SOMA net income, which takes into account the costs of funding the portfolio, was \$61.6 billion in 2019, down from \$68.8 billion in 2018 (Table 8).⁵¹ The \$7.2 billion decline stemmed primarily from the decrease in interest income. However, the portfolio continued to generate substantial income in 2019 as a result of its large size and its concentration in longer-term securities.

FEDERAL RESERVE REMITTANCES

The Federal Reserve remits excess earnings to the U.S. Treasury Department on a weekly basis, after providing for the cost of operations, payment of dividends, and reservation of any amount necessary to maintain aggregate Reserve Bank capital surplus up to a specified limit. The Federal Reserve remitted a total of \$54.9 billion to the Treasury during 2019, down from the \$65.3 billion remitted in 2018. The \$10.4 billion decrease in remittances stemmed primarily from the decline in net income (Chart 29).

Table 8

SOMA Net Income

Billions of U.S. Dollars

	2019	2018
Interest income		
Repurchase agreements	1.0	–
Treasury securities	58.5	62.8
Agency debt	0.1	0.2
Agency MBS	43.1	49.3
Other	–	–
	102.7	112.3
Interest expense		
Reverse repurchase agreements		
Overnight and term RRP	(0.1)	(0.2)
Foreign repo pool	(5.9)	(4.4)
Other	0.0	0.0
	(6.0)	(4.6)
Non-interest income (loss)		
Foreign currency translation gains (losses)	(0.1)	(0.4)
Other	–	–
	(0.1)	(0.4)
SOMA income	96.6	107.3
Assumed funding cost	(35.0)	(38.5)
SOMA net income	61.6	68.8

Sources: Federal Reserve Bank of New York; Board of Governors of the Federal Reserve System.

Notes: The assumed funding cost represents the interest expense on interest-bearing liabilities assumed to be associated with SOMA net assets in excess of Federal Reserve notes outstanding and the Treasury General Account balance held at the Federal Reserve Bank of New York. Actual interest expense on all non-SOMA interest-bearing liabilities of the Federal Reserve (including reserves and term deposits) totaled \$35.0 billion for 2019 and \$38.5 billion for 2018. These liabilities fund non-SOMA assets of the Federal Reserve in addition to SOMA net assets.

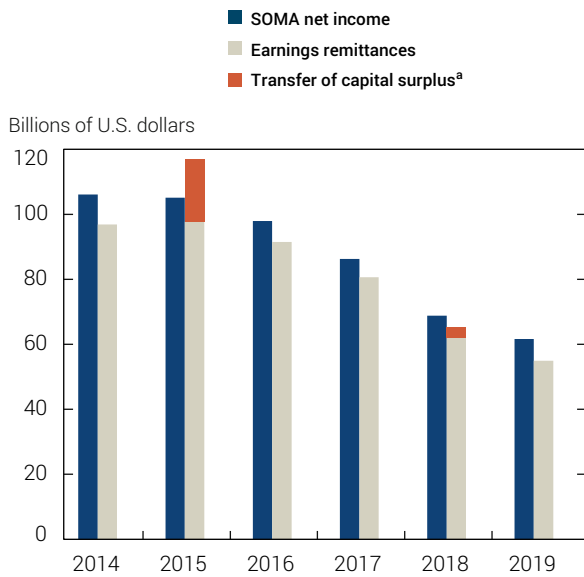
SOMA UNREALIZED GAINS AND LOSSES

The market value of the SOMA’s securities portfolio fluctuates with changes in the prevailing level of interest rates. During 2019, a decrease in longer-term interest rates resulted in the SOMA domestic portfolio moving from an unrealized loss

OPEN MARKET OPERATIONS DURING 2019

Chart 29

SOMA Net Income and Federal Reserve Remittances to the U.S. Treasury

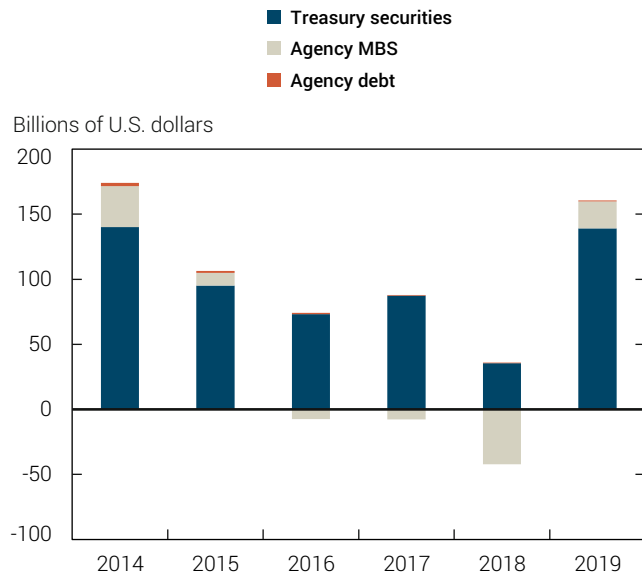


Sources: Federal Reserve Bank of New York; Board of Governors of the Federal Reserve System.

^aRepresents the transfer of capital to reduce the aggregate Reserve Bank surplus to the \$10 billion limit required by the Fixing America's Surface Transportation Act (FAST Act), which amended the Federal Reserve Act.

Chart 30

SOMA Domestic Portfolio Unrealized Gains and Losses



Source: Board of Governors of the Federal Reserve System.

Note: Figures are as of year-end.

position of \$6 billion at the end of 2018 to an unrealized gain position of \$161 billion at the end of the year (**Chart 30**). The Treasury portfolio's unrealized gain position increased to roughly \$139 billion from \$36 billion at the end of 2018, and the agency MBS portfolio moved to a gain of roughly \$21 billion at the end of 2019 from a loss of \$42 billion at the end of 2018. Unrealized gains on the foreign portfolio increased to \$118 million at the end of 2019 from \$51 million at the end of 2018. Unrealized gains and losses are calculated as the difference between the market value of the portfolio and its book value (which reflects amortized cost).⁵²

The SOMA's unrealized gain or loss position has no effect on net income or Federal Reserve remittances to the Treasury unless assets are actually sold and those gains or losses are realized. When securities are held to maturity, their unrealized gains or losses fall to zero over time as their price reverts to par at maturity. Unrealized gains and losses have no effect on the conduct of monetary policy.

PROJECTIONS

The SOMA portfolio increased significantly in the last four months of 2019 as a result of the actions taken to maintain reserve balances and offset growth in non-reserve liabilities. In the fourth quarter, repo operations and purchases of Treasury bills helped maintain reserves above the level that prevailed in early September and mitigated the risk of money market pressures that could adversely affect monetary policy implementation. Since that time, a significant deterioration in the outlook for the economy related to the coronavirus outbreak has led to a dramatic shift in the stance of monetary policy, including the introduction of a number of balance sheet tools to support market functioning and the flow of credit to the economy. Under these circumstances, the outlook for the balance sheet remains highly uncertain. The projections presented here are based on the balance sheet outlook prior to the shift in policy to illustrate how the balance would evolve over time in a "steady state" ample reserves regime.

OPEN MARKET OPERATIONS DURING 2019

In such a regime, the size of the SOMA portfolio—and the balance sheet as a whole—would primarily be determined by the evolution of Federal Reserve liabilities. Certain liabilities, such as currency, tend to experience steady and persistent growth over time. Other liabilities experience daily variation due to changes in balances. For example, the TGA experiences large changes associated with tax payment dates and Treasury debt financing. The Desk conducts purchases of Treasury securities to accommodate growth and variability in liabilities on the Federal Reserve’s balance sheet, and the size of purchases depends on the outlook for growth in Federal Reserve liabilities over a medium-term horizon.

In light of the inherent uncertainty about the future path of such liabilities, the projections presented here consider several illustrative scenarios for how the size and composition of the Federal Reserve’s balance sheet could evolve. Assumptions underlying the projections are based on publicly available, survey-based interest rate and macroeconomic forecasts available at the end of 2019, as well as simple rules that proxy typical growth in the Federal Reserve’s liabilities. The assumptions are presented in the section below, and the remainder of this report presents the range of outcomes for portfolio balances, income, and reserves associated with these assumptions.

These projections represent a simplified exercise—employing fixed growth rates and monthly figures—aimed at illustrating the balance sheet mechanics. This exercise does not illustrate the day-to-day evolution of non-reserve liabilities, which in practice are highly variable and influenced by seasonal factors and calendar-related dynamics. In addition, the exercise does not show how the balance sheet would evolve if the FOMC were to decide to adjust the size or composition of its balance sheet in response to changing economic conditions.

Under this range of scenarios, the exercise suggests that the SOMA portfolio would grow to a size of between \$5.3 and \$6.8 trillion by 2030, which is projected to range between 16 and 21 percent of GDP, compared to 17 percent as of

December 2019. Scenarios involving slower or negligible growth in one or more Federal Reserve liabilities would result in a smaller portfolio and balance sheet, and scenarios with faster growth would result in a larger portfolio and balance sheet. In these scenarios, the portfolio is projected to be increasingly composed of Treasury securities.

The projections indicate that the portfolio’s net income would remain firmly positive across a range of scenarios that consider differences in both interest rates as well as the size and composition of Federal Reserve liabilities. Across scenarios that consider variation in the size of Federal Reserve liabilities and a baseline path of interest rates, the portfolio is estimated to be held at a gain for the majority of the forecast horizon. Under a lower interest rate scenario, the portfolio would be in an unrealized gain position for the majority of the forecast horizon, while the portfolio is estimated to be in an unrealized loss position in a higher interest rate scenario.

ASSUMPTIONS

This section reviews the assumptions about liabilities and interest rates that are used for the projections; a complete list of key assumptions can be found in Appendix 3. The exercise employs illustrative simple rules and does not attempt to isolate drivers for individual liabilities, or how growth rates could vary over time.

BALANCE SHEET Liabilities and Capital

In the baseline scenario, all Federal Reserve liabilities and capital—including reserve balances—are assumed to begin at their average December 2019 level and grow over the projection horizon in line with nominal GDP. This growth rate assumption is based on responses to the December 2019 Survey of Primary Dealers. The median expected growth rates of real GDP and headline personal consumption expenditures in the long run were 1.9 percent and 2.0 percent, respectively, implying a long-run level of nominal GDP growth of 3.9 percent.⁵³

Table 9

Assumed Levels of Federal Reserve Balance Sheet in 2030 and Recent Averages

Billions of U.S. Dollars

	December 2019	Slower Currency Scenario	Baseline Scenario	Faster Currency Scenario	Constant Reserves Scenario
Federal Reserve notes	1,749	2,174	2,664	3,319	2,664
Reserve balances	1,635	2,490	2,490	2,490	1,635
Deposits in Treasury General Account (TGA)	353	538	538	538	538
Reverse repos with private counterparties	6	9	9	9	9
Reverse repos with foreign official accounts	262	399	399	399	399
Other deposits	74	113	113	113	113
All other liabilities and capital	45	69	69	69	69
Total	4,124	5,792	6,282	6,937	5,427

Sources: Board of Governors of the Federal Reserve System; Federal Reserve Bank of New York.

Notes: The Baseline scenario assumes that all liabilities grow in line with nominal GDP; the 3.9 percent rate of long run growth of nominal GDP is inferred from the December 2019 Desk survey, which asked respondents to provide expectations for the long run growth of real GDP and long run inflation. Relative to the Baseline, the Slower Currency scenario assumes currency grows at 2 percent, the Faster Currency scenario assumes currency grows at 6 percent, and the Constant Reserves scenario assumes reserves stay constant at the December 2019 level of \$1.6 trillion.

In order to demonstrate the effect of the composition and growth rate of liabilities on the size and income of the SOMA portfolio, three alternate liabilities scenarios were considered. In addition to a baseline scenario, these projections consider scenarios with slower and faster currency growth, as well as an alternative path for reserve balances. These scenarios focus on the uncertainty associated with the largest liabilities: currency and reserves. First, as discussed in earlier sections of this report, currency has typically been the largest liability on the Federal Reserve's balance sheet and has demonstrated secular growth over time. Since 2002, annual growth rates have ranged from 1.2 percent to 9.6 percent, with a median growth rate of 6.1 percent. Currency is assumed to grow at 2 percent, 3.9 percent, and 6 percent in the slower, baseline, and faster currency growth scenarios, respectively. Second, while reserve demand has increased substantially in recent years, banks' demand for reserves in the future is uncertain; to illustrate this uncertainty, while the baseline scenario assumes that reserves grow in line with nominal GDP (assumed to be 3.9 percent annually), a separate scenario assumes that reserve balances remain fixed at the average December 2019 level of \$1.6 trillion throughout the projection horizon.

Table 9 summarizes the projected average levels in 2030 for Federal Reserve liabilities and capital corresponding to the baseline and the three alternate liabilities scenarios; December 2019 average values, the starting point for each of the scenarios, are shown for reference.

In all scenarios except the slower currency growth scenario, currency continues to be the largest liability on the Federal Reserve's balance sheet, reaching a level as high as \$3.3 trillion in the faster currency growth scenario in 2030. In these scenarios, the size of the longer-run balance sheet reaches between \$5.4 trillion and \$6.9 trillion, corresponding to 18 and 21 percent of nominal GDP, respectively, compared to 20 percent as of December 2019.⁵⁴

These assumptions involve smooth growth for all liabilities. In practice, these liabilities may exhibit day-to-day fluctuations as well as varying growth rates. For example, Federal Reserve notes tend to grow at a faster rate during the fourth quarter than in other quarters, possibly owing to holiday-related demand for cash. The TGA balance is often driven by date-specific patterns, such as tax payment deadlines and the Treasury auction calendar.

OPEN MARKET OPERATIONS DURING 2019

Assets

The projections assume that the portfolio is increased through reserve management purchases (RMPs) of Treasury securities in order to keep pace with growth in the Federal Reserve's liabilities. For simplicity, the projections assume that assets are increased through RMPs alone, and no repurchase operations are included in this exercise.⁵⁵ All other assets, including foreign currency reserves, are assumed to remain at December 2019 levels throughout the projection horizon.⁵⁶

The projections do not take into account any balance sheet actions that the FOMC may contemplate in order to address economic or financial shocks. Instead, assumptions about the composition of the SOMA portfolio are drawn from the FOMC's communications in 2019. In particular, principal pay-downs on agency MBS are assumed to be reinvested in Treasury securities up to a maximum amount of \$20 billion per month. Above \$20 billion, agency MBS principal pay-downs are assumed to be reinvested in agency MBS.

INTEREST RATES

The baseline paths for the federal funds rate and longer-term interest rates are drawn from the combined set of responses to the December 2019 Survey of Primary Dealers and the December 2019 Survey of Market Participants. In addition, the projections consider a lower and higher interest rate scenario relative to this baseline. In the baseline scenario, the median expected level of the effective federal funds rate remains at 1.6 percent through 2022 and rises to 2.4 percent in the longer-term. The ten-year Treasury yield and thirty-year fixed primary mortgage rate are assumed to rise to 2.5 percent and 4.25 percent in the longer run, respectively. Additionally, the IOER rate is assumed to be set 10 basis points above the bottom of the target range and the ON RRP offering rate assumed to be set at the bottom of the target range. These assumptions are consistent with the FOMC's January 2020 Implementation Note.

PROJECTION RESULTS

PATH OF PORTFOLIO HOLDINGS AND RESERVE BALANCES

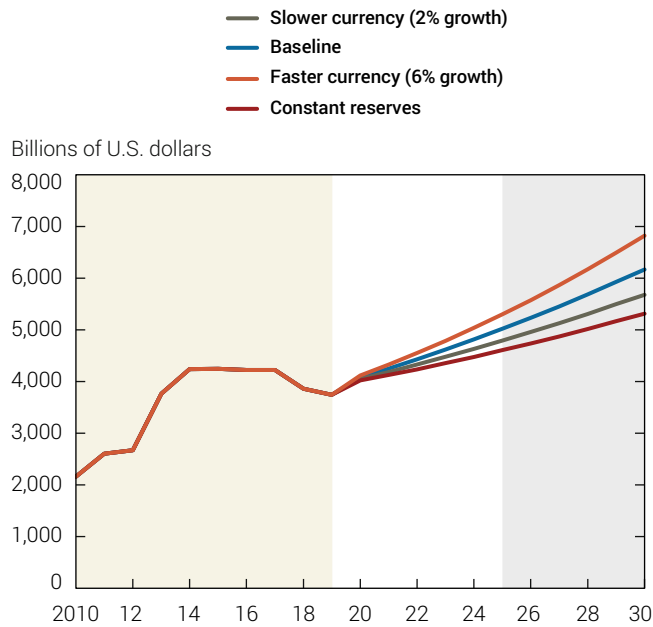
The projections start with the SOMA domestic securities portfolio as of December 31, 2019, and then incorporate the previously described assumptions. In all scenarios, the paths of liabilities are assumed to be smooth over the forecast horizon for illustrative purposes; in practice, these factors exhibit considerable daily and seasonal volatility that may influence the pace of reserve management purchases and pace of growth of the balance sheet within a year.

The projected path of the total SOMA portfolio balance under various scenarios is illustrated in **Chart 31**. In the baseline scenario, the portfolio grows to \$6.2 trillion by the end of 2030. The portfolio remains smaller in scenarios that consider slower overall growth in liabilities, reaching a level of \$5.3 trillion and \$5.7 trillion in the constant reserves and slower currency growth scenarios, respectively. In contrast, the portfolio grows to \$6.8 trillion in the faster currency growth scenario, as increases in currency drive increases in the portfolio. In all scenarios except the constant reserves scenario, the assumed level of reserve balances grows to \$2.5 trillion in 2030 (**Chart 32**).

PORTFOLIO COMPOSITION

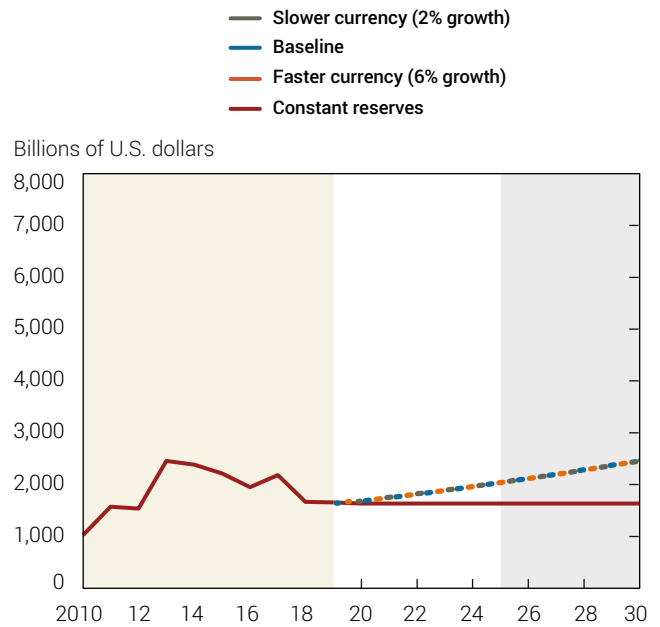
As the portfolio grows to accommodate growth in liabilities, its composition also shifts significantly. The compositional shift occurs as a result of both the reinvestment of principal payments on SOMA securities holdings as well as RMPs of Treasury securities. As discussed above, reinvestments occur through three different methods: (1) proceeds from MBS pay-downs below the \$20 billion monthly cap are reinvested into Treasury securities through secondary market purchases; (2) pay-downs above the \$20 billion cap are reinvested into MBS; and (3) maturing Treasury securities are rolled over at auction. Over time, growth in the portfolio occurs through RMPs conducted in the Treasury market. These assumptions are consistent with the FOMC's Balance Sheet Normalization Principles and Plans, in which the Committee stated that it intends to hold primarily Treasury securities in the longer run.

Chart 31
**Projected SOMA Domestic Securities Holdings:
 Alternative Liabilities Scenarios**



Source: Federal Reserve Bank of New York.
 Notes: Figures are as of year-end. Figures for 2010-19 are shaded gold and represent historical settled holdings. Figures for 2025-30 are shaded gray and represent an extension of the projection horizon beyond that of previous reports. Projected figures are rounded.

Chart 32
**Projected Reserve Balances:
 Alternative Liabilities Scenarios**



Sources: Board of Governors of the Federal Reserve System; Federal Reserve Bank of New York.
 Notes: Projected figures are as of year-end. Historical figures are as of the last Wednesday in December. Figures for 2010-19 are shaded gold and represent historical reserve balances. Figures for 2025-30 are shaded gray and represent an extension of the projection horizon beyond that of previous reports. Projected figures are rounded.

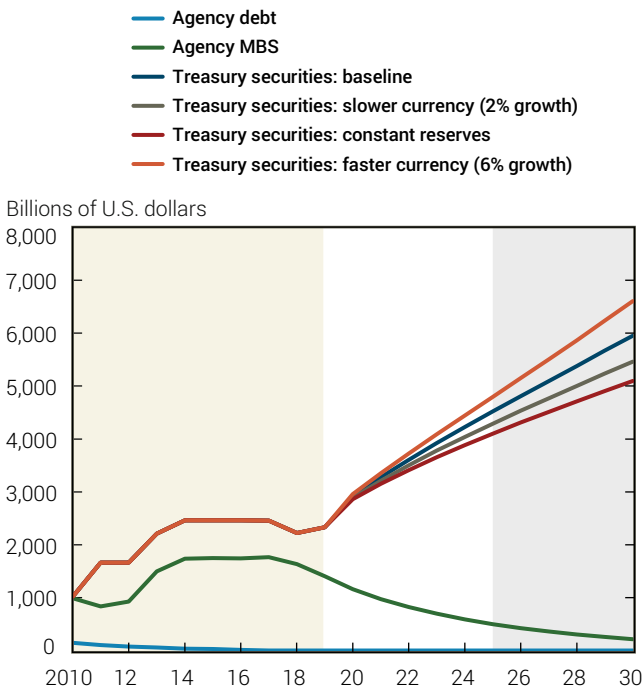
Chart 33 shows projections of portfolio holdings of Treasury securities, agency MBS, and agency debt across the four scenarios given the timing of Treasury maturities and model-based estimates for MBS principal pay-downs.⁵⁷ Because interest rates are unchanged across the four scenarios, the evolution of the agency MBS portfolio is identical in all scenarios, with roughly \$18 billion of agency MBS pay-downs reinvested into agency MBS until late 2020, at which point pay-downs are projected to fall below the \$20 billion run-off cap. Over the entire forecast horizon, roughly \$1.2 trillion in Treasury securities will be purchased to reinvest principal payments on agency MBS. By contrast, differences in the evolution of the Treasury portfolio across the scenarios are driven by the pace of RMPs, and therefore track the difference in the growth of Federal Reserve liabilities across the three scenarios.

In the baseline scenario, roughly \$340 billion and \$170 billion of Treasury securities are projected to be purchased to support growth in Federal Reserve liabilities in 2020 and 2021, respectively. The relatively elevated amount of purchases in 2020 is due to the replacement of outstanding repurchase agreements with RMPs as a means of providing reserves.⁵⁸ Over the forecast horizon from 2021 through 2030, RMPs total an average of \$209 billion per year, with the annual level being relatively small earlier in the forecast horizon and relatively large later in the forecast horizon, in line with the overall evolution of the size of the balance sheet over time. Taken together with reinvestments of agency MBS pay-downs into Treasury securities, these purchases bring the share of the SOMA portfolio composed of Treasury securities from 62 percent at the end of 2019 to 96 percent at the end of 2030.

OPEN MARKET OPERATIONS DURING 2019

Chart 33

Projected SOMA Domestic Securities Holdings: Alternative Liabilities Scenarios by Asset Class



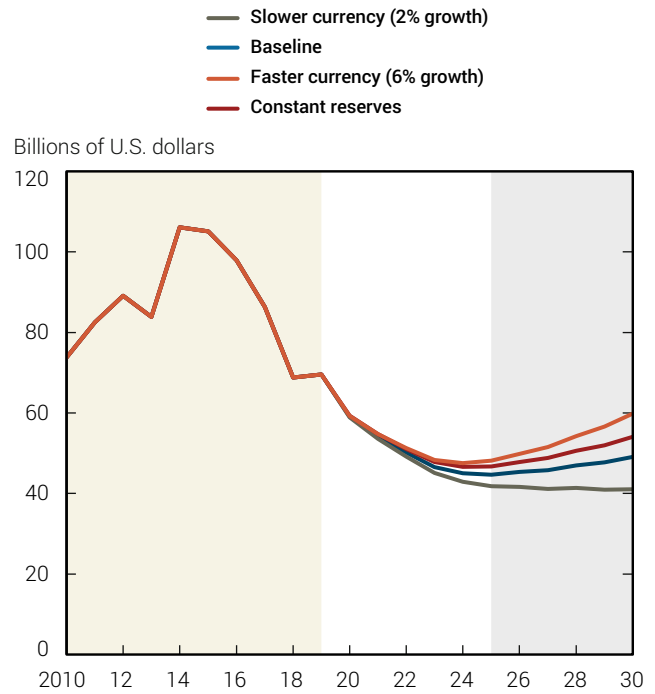
Source: Federal Reserve Bank of New York.

Notes: Figures are as of year-end. Figures for 2010-19 are shaded gold and represent historical settled holdings. Figures for 2025-30 are shaded gray and represent an extension of the projection horizon beyond that of previous reports. Projected figures are rounded.

In the faster currency growth scenario, additional RMPs are necessary to keep pace with growth in Federal Reserve liabilities. Under this projection, average annual RMPs total \$270 billion, bringing the SOMA portfolio to \$6.8 trillion by 2030. In contrast, in both the slower currency growth and constant reserves scenarios, a slower pace of growth in liabilities results in a smaller amount of RMPs and a smaller SOMA portfolio over time. Under these scenarios, average RMPs are \$163 billion and \$129 billion, respectively, leading to a SOMA portfolio that totals \$5.6 trillion and \$5.3 trillion in 2030. Across all scenarios, due to the ongoing reinvestment of most principal payments on MBS holdings into Treasury securities, in 2030 the SOMA portfolio is composed of more than 95 percent Treasury securities.

Chart 34

Projected SOMA Net Income: Alternative Liabilities Scenarios



Source: Federal Reserve Bank of New York.

Notes: Figures are as of year-end 2019. Figures for 2010-19 are shaded gold and represent historical net income. Figures for 2025-30 are shaded gray and represent an extension of the projection horizon beyond that of previous reports. Projected figures are rounded.

SOMA NET INCOME AND REMITTANCES

The Federal Reserve remits excess earnings to the U.S. Treasury after providing for the cost of operations, the payment of dividends, and any amount necessary to maintain aggregate Reserve Bank capital surplus up to a specified limit. SOMA net income—a measure that reflects income and expenses associated with the SOMA portfolio, including its assumed funding costs—is the primary driver of Federal Reserve remittances.⁵⁹

Across all liability scenarios, SOMA net income is projected to fall through 2023 before rebounding slightly before the end of the forecast horizon (Chart 34). A key driver of this result is the fact that both the federal funds rate and, by extension, the IOER rate, are assumed to increase gradually through the forecast horizon. Both portfolio income and interest expense therefore increase in tandem

OPEN MARKET OPERATIONS DURING 2019

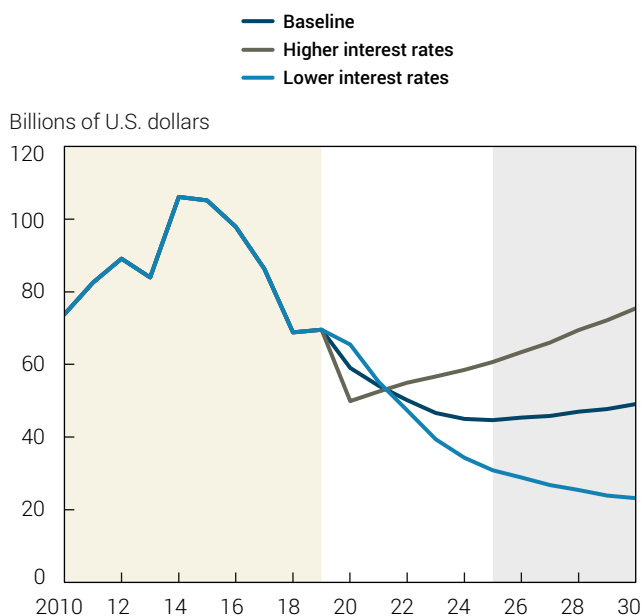
with higher long-term rates and short-term rates, respectively. In addition, the future size and composition of Federal Reserve liabilities also affect the path of SOMA net income, owing to the impacts on the size of the portfolio as well as the weighting of the balance sheet toward interest-bearing and away from non-interest bearing liabilities. Federal Reserve notes, currently the Federal Reserve's largest liability, incurs no interest expense, while reserve balances are remunerated at IOER.

In the baseline scenario, annual net income is projected to steadily decline, reaching a trough of \$45 billion in 2025. The alternative scenarios illustrate how the size and composition of the Federal Reserve's liabilities could affect net income. A larger portfolio suggests higher coupon income and a smaller portfolio suggests lower coupon income. On the other hand, all else equal, a larger proportion of the Federal Reserve's liabilities being made up of non-interest-bearing currency implies lower interest expense and higher net income, while a larger proportion made up of reserves has the opposite effect. Accordingly, relative to the baseline scenario, net income is smaller in the slower currency growth scenario, due to both the smaller size of the portfolio and the larger share of interest-bearing reserves. Net income is larger in the constant reserves scenario, due to the larger share of currency and despite a smaller portfolio, and even larger in the faster currency growth scenario, due to both the larger share of currency and the larger portfolio.

To illustrate the sensitivity of SOMA net income to alternative interest rate paths, we consider two variations relative to the baseline path in **Chart 35**.⁶⁰ First, in a higher interest rate shock scenario, where interest rates are assumed to be 100 basis points higher than in the baseline path, net income decreases sharply relative to the baseline path in the short term before recovering and reaching a higher level in the long run. This is the result of interest expense rapidly outpacing income in the short term as funding costs increase; in the longer run, these effects are offset by higher coupon income as securities are purchased at higher yields. Second, in a lower interest rate shock scenario, where interest rates are assumed to be 100 basis points lower than in the baseline scenario, net income monotonically decreases through the

Chart 35

Projected SOMA Net Income: Alternative Interest Rate Paths



Source: Federal Reserve Bank of New York.

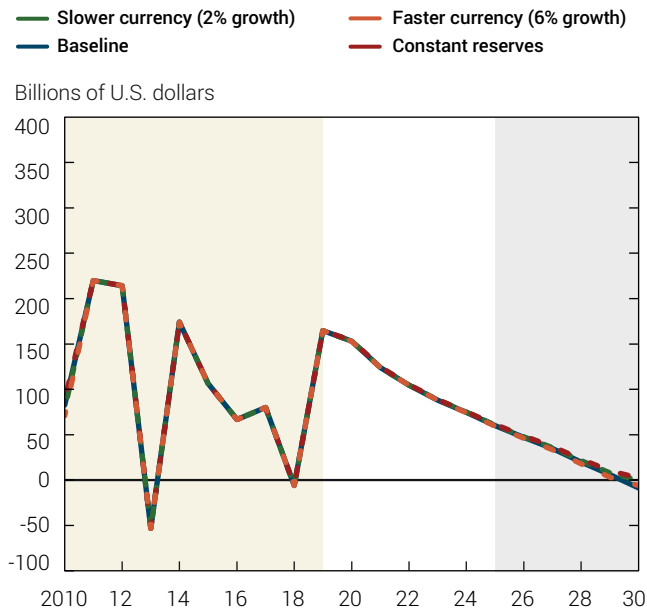
Notes: Figures are as of year-end. Figures for 2010-19 are shaded gold and represent historical net income. Figures for 2025-30 are shaded gray and represent an extension of the projection horizon beyond that of previous reports. Projected figures are rounded.

projection horizon, as the reduced income associated with the replacement of maturing securities in the portfolio with securities at lower yields is not offset by lower funding costs.

SOMA UNREALIZED GAINS AND LOSSES

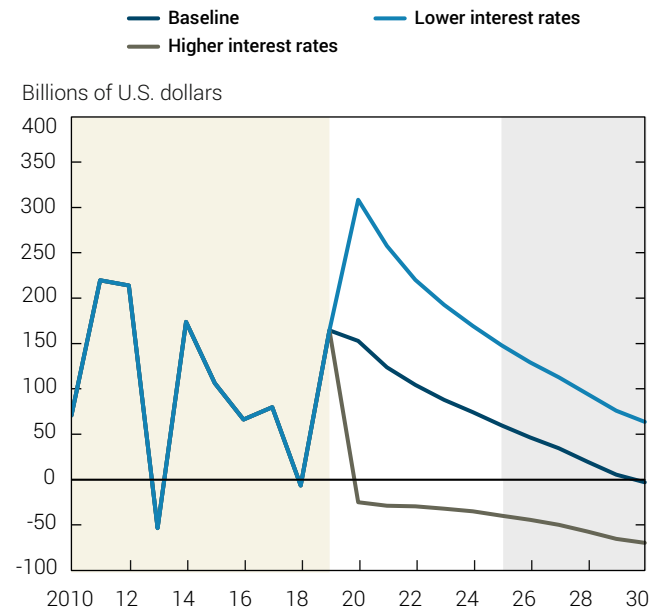
The market value of securities holdings fluctuates with changes in the prevailing level of interest rates. The unrealized gain on the portfolio, shown in **Chart 36**, calculated as the difference between the market value of the portfolio and its book value (which reflects amortized cost), varies over the projection horizon but is mostly positive throughout, declining to around zero at the end of 2030. These projections are largely similar across all liabilities scenarios considered. To measure the sensitivity of this outcome to interest rate assumptions, **Chart 37** compares unrealized gains and losses assuming the baseline path of interest rates and applying the

Chart 36
**Projected SOMA Unrealized Gains and Losses:
 Alternative Liabilities Scenarios**



Source: Federal Reserve Bank of New York.
 Notes: Figures are as of year-end 2019. Figures for 2010-19 are shaded gold and represent historical unrealized gains and losses. Figures for 2025-30 are shaded gray and represent an extension of the projection horizon beyond that of previous reports. Projected figures are rounded.

Chart 37
**Projected SOMA Unrealized Gains and Losses:
 Alternative Interest Rate Paths**



Source: Federal Reserve Bank of New York.
 Notes: Figures are as of year-end 2019. Figures for 2010-19 are shaded gold and represent historical unrealized gains and losses. Figures for 2025-30 are shaded gray and represent an extension of the projection horizon beyond that of previous reports. Projected figures are rounded.

higher and lower interest rate shocks considered earlier. At the end of 2030, in the higher interest rate scenario, the portfolio is projected to be held at an unrealized loss of \$70 billion, whereas it is projected to be held at an unrealized gain of \$64 billion in the lower interest rates scenario. Importantly, the portfolio’s unrealized gain or loss position has no effect

on net income or Federal Reserve remittances to the Treasury, unless assets are actually sold and those gains or losses are realized and therefore reported in the non-interest income portion of the Federal Reserve’s income statement. Similarly, unrealized gains and losses have no effect on the conduct of monetary policy.⁶¹

OPEN MARKET OPERATIONS DURING 2019



APPENDIX 1:

Governing Documents

AUTHORIZATION FOR DOMESTIC OPEN MARKET OPERATIONS

On January 29, 2019, by unanimous vote, the FOMC voted to reaffirm the Authorization for Domestic Open Market Operations.

https://www.federalreserve.gov/monetarypolicy/files/FOMC_RulesAuthPamphlet_201901.pdf

See page 46: Authorization for Domestic Open Market Operations

GUIDELINES FOR THE CONDUCT OF SYSTEM OPEN MARKET OPERATIONS IN FEDERAL-AGENCY ISSUES

The Guidelines for the Conduct of System Open Market Operations in Federal-Agency Issues, which were temporarily suspended on January 27, 2009, remained suspended throughout 2019.

DOMESTIC POLICY DIRECTIVES ISSUED TO THE FEDERAL RESERVE BANK OF NEW YORK

In 2019, the FOMC authorized and directed the Open Market Desk at the Federal Reserve Bank of New York to execute transactions in the SOMA in accordance with domestic policy directives. The following is a list of links to the domestic policy directives issued by the FOMC from January 1 to December 31.

Open Market Operations from January 1 to January 30

The FOMC issued the following domestic policy directive on December 19, 2018.

<https://www.federalreserve.gov/newsevents/pressreleases/monetary20181219a1.htm>

Open Market Operations from January 31 to March 20

The FOMC issued the following domestic policy directive on January 30, 2019.

<https://www.federalreserve.gov/newsevents/pressreleases/monetary20190130a1.htm>

Open Market Operations from March 21 to May 1

The FOMC issued the following domestic policy directive on March 20, 2019.

<https://www.federalreserve.gov/newsevents/pressreleases/monetary20190320a1.htm>

Open Market Operations from May 2 to June 19

The FOMC issued the following domestic policy directive on May 1, 2019.

<https://www.federalreserve.gov/newsevents/pressreleases/monetary20190501a1.htm>

Open Market Operations from June 20 to July 31

The FOMC issued the following domestic policy directive on June 19, 2019.

<https://www.federalreserve.gov/newsevents/pressreleases/monetary20190619a1.htm>

Open Market Operations from August 1 to September 18

The FOMC issued the following domestic policy directive on July 31, 2019.

<https://www.federalreserve.gov/newsevents/pressreleases/monetary20190731a1.htm>

OPEN MARKET OPERATIONS DURING 2019

Open Market Operations from September 19 to October 30

The FOMC issued the following domestic policy directive on September 18, 2019.

<https://www.federalreserve.gov/newsevents/pressreleases/monetary20190918a1.htm>

Open Market Operations from October 31 to December 11

The FOMC issued the following domestic policy directive on October 30, 2019.

<https://www.federalreserve.gov/newsevents/pressreleases/monetary20191030a1.htm>

Open Market Operations from December 12 to December 31

The FOMC issued the following domestic policy directive on December 11, 2019.

<https://www.federalreserve.gov/newsevents/pressreleases/monetary20191211a1.htm>

AUTHORIZATION FOR FOREIGN CURRENCY OPERATIONS AND FOREIGN CURRENCY DIRECTIVE

On January 29, 2019, by unanimous vote, the FOMC voted to reaffirm without change the Authorization for Foreign Currency Operations and the Foreign Currency Directive.

https://www.federalreserve.gov/monetarypolicy/files/FOMC_RulesAuthPamphlet_201901.pdf

See:

Page 48: Authorization for Foreign Currency Operations

Page 52: Foreign Currency Directive

APPENDIX 2:

Operations Disclosures

The following table summarizes the types of information disclosed by the Desk about various SOMA operations. To access the data listed in the table, visit the Markets Data Dashboard on the New York Fed's website, at

<https://www.newyorkfed.org/markets/data-hub>. For U.S. Treasury data, see https://www.treasurydirect.gov/instit/annceresult/annceresult_query.htm.

Operations Disclosures

Operation Type	Operation Schedule	Operation Results	Additional Operations Data ^a	Transaction Data ^b
Domestic open market operations				
Overnight repo	✓	✓	✓	✓
Term repo	✓	✓	✓	✓
Overnight RRP	^c	✓	✓	✓
Treasury outright purchases	✓	✓	✓	✓
Treasury rollovers		✓ ^d		
Treasury rollovers with bills		✓ ^d		
Agency MBS outright purchases	✓	✓	✓	✓
Agency MBS dollar rolls			✓	✓
Treasury securities lending	^c	✓	✓	✓
Foreign open market operations				
Foreign sovereign debt purchases				✓
Central bank liquidity swaps			✓ ^e	
Small-value exercises				
Repurchase agreements	✓	✓	✓	✓
Reverse repurchase agreements	✓	✓	✓	✓
Treasury outright purchases	✓	✓	✓	✓
Treasury outright sales	✓	✓	✓	✓
Treasury bill maturity				
Treasury rollovers with bills	✓	✓ ^d		
Securities lending	✓	✓		✓
Agency MBS TBA purchases	✓	✓	✓	✓
Agency MBS outright sales	✓	✓	✓	✓
Agency MBS dollar rolls			✓	✓
Agency MBS coupon swaps	✓	✓	✓	✓
Foreign sovereign debt sales				✓
Foreign sovereign debt purchases				✓
Foreign currency repos ^f				✓
Foreign currency term deposits				
Central bank liquidity swaps		✓	✓ ^g	

Source: Federal Reserve Bank of New York.

^aAdditional data could include details about types of counterparties, pricing, and higher-frequency transaction data.

^bThe New York Fed discloses transaction data with market counterparties on a quarterly basis with a two-year lag, in accordance with the Dodd-Frank Act. Details include: the date and amount of the transaction; the counterparty to the transaction; the price, interest rate, or exchange rate at which the transaction was conducted; other relevant terms; and for certain types of transactions, information about the collateral.

^cSince overnight RRP and Treasury securities lending are daily facilities, a regular calendar is not released; schedule changes are typically announced at least one business day prior to the operation.

^dSOMA awards are released by the U.S. Treasury after each auction.

^eTransactions between the New York Fed and foreign central bank counterparties are reported weekly by the New York Fed; foreign central banks' operation results are reported immediately after the completion of their respective auctions.

^fIn the Dodd-Frank Act transaction data disclosures for foreign currency repos and foreign currency reverse repos, the transaction category is reclassified to match the perspective of the New York Fed's counterparty.

^gTransactions between the New York Fed and foreign central bank counterparties are reported weekly by the New York Fed.

OPEN MARKET OPERATIONS DURING 2019

APPENDIX 3:

Summary of Projection Assumptions

The assumptions underlying the scenarios for the SOMA portfolio and the SOMA net income projection exercise are presented below. Sources for these assumptions include the December 2019 Survey of Primary Dealers and the December 2019 Survey of Market Participants.

INTEREST RATE ASSUMPTIONS:

- ◆ A combined set of responses to the December 2019 Survey of Primary Dealers and December 2019 Survey of Market Participants, for
 - the effective federal funds rate,
 - the ten-year Treasury yield, and
 - the thirty-year fixed primary mortgage rate.
- ◆ The MBS current coupon rate is assumed to be a constant 100 basis points over the primary mortgage rate.
- ◆ The IOER rate is assumed to be set 10 basis points above the bottom of the target range.
- ◆ The ON RRP offering rate is assumed to be set at the bottom of the target range.

BALANCE SHEET ASSUMPTIONS:

- ◆ Projections start with the Federal Reserve balance sheet as of December 31, 2019.
- ◆ Asset-related assumptions:
 - No repo, starting in January 2020

- No assumed RMP sizes. RMPs are conducted to keep up with the organic growth in liabilities and capital.
- Reinvestment of principal payments on MBS into Treasury securities continues indefinitely.
- ◆ Liability-related assumptions:
 - Longer-run levels of liabilities and capital are based on their average December 2019 level and grow over the projection horizon in line with nominal GDP, where the nominal GDP growth is based on responses to the December 2019 Survey of Primary Dealers.
 - Currency grows to \$2.7 trillion in 2030.
 - Reserve balances grow to \$2.5 trillion in 2030.
 - TGA balance grows to \$538 billion in 2030.
 - Foreign repo pool grows to \$399 billion in 2030.
- ◆ Constant reserves scenario:
 - Reserves remain fixed at the average December 2019 level of \$1.6 trillion throughout the projection horizon.
- ◆ Slower currency growth scenario:
 - Currency grows at 2 percent (approximately 2 percent slower than the baseline), reaching \$2.2 trillion in 2030.
- ◆ Faster currency growth scenario:
 - Currency grows at 6 percent (approximately 2 percent faster than the baseline), reaching \$3.3 trillion in 2030.

APPENDIX 4:

Reference Web Pages

Policies, communications, and data discussed in this document can be found online at the websites for the Board of Governors of the Federal Reserve System and the Federal Reserve Bank of New York. Below, we provide the primary web pages where this source material can be found.

FEDERAL RESERVE BOARD

FOMC Rules and Authorizations

https://www.federalreserve.gov/monetarypolicy/rules_authorizations.htm

FOMC statements, implementation notes, minutes, and information about policy normalization

<http://www.federalreserve.gov/monetarypolicy/fomccalendars.htm>

<https://www.federalreserve.gov/monetarypolicy/policy-normalization.htm>

Background on reserve requirements, interest on reserves, and IOER

<https://www.federalreserve.gov/monetarypolicy/reservereq.htm>

<http://www.federalreserve.gov/monetarypolicy/resbalances.htm>

Detailed transaction information about discount window lending to depository institutions and historical open market operations

<https://www.federalreserve.gov/regreform/discount-window.htm>

https://www.newyorkfed.org/markets/OMO_transaction_data.html

Federal Reserve System financial reports

<https://www.federalreserve.gov/monetarypolicy/bst-fedfinancials.htm>

Operational results, announcements, and other details regarding the Term Deposit Facility

<https://www.federalreserve.gov/monetarypolicy/tdf.htm>

FEDERAL RESERVE BANK OF NEW YORK

Markets and Policy Implementation

<https://www.newyorkfed.org/markets/index.html>

Electronic version of this report and the underlying data for the charts and tables

https://www.newyorkfed.org/markets/annual_reports.html

Operational policies, FAQs, operation results, and other detail regarding:

Domestic market operations

<https://www.newyorkfed.org/markets/domestic-market-operations>

Repurchase and reverse repurchase agreements

https://www.newyorkfed.org/markets/rrp_op_policies.html

<https://apps.newyorkfed.org/markets/autorates/temp>

Treasury open market and securities lending operations

<https://www.newyorkfed.org/markets/domestic-market-operations/monetary-policy-implementation/treasury-securities>

<http://nyapps.newyorkfed.org/markets/pomo/operations/index.html>

<https://www.newyorkfed.org/markets/domestic-market-operations/monetary-policy-implementation/securities-lending>

Agency MBS open market operations

<https://www.newyorkfed.org/markets/domestic-market-operations/monetary-policy-implementation/agency-mortgage-backed-securities>

<https://www.newyorkfed.org/markets/ambs/operations/results>

International market operations

<https://www.newyorkfed.org/markets/international-market-operations>

Foreign currency operations, including foreign reserves management, central bank liquidity swaps, and foreign exchange quarterly reports

<https://www.newyorkfed.org/markets/international-market-operations/foreign-reserves-management>

<https://www.newyorkfed.org/markets/international-market-operations/central-bank-swap-arrangements>

https://www.newyorkfed.org/markets/quar_reports.html

New York Fed counterparties for market operations

<https://www.newyorkfed.org/markets/counterparties>

System Open Market Account holdings

https://www.newyorkfed.org/markets/soma/sysopen_accholdings.html

Consolidated list of statements and operating policies across all

Desk open market operations

https://www.newyorkfed.org/markets/op_policies.html

Desk statement regarding small-value exercises

<https://www.newyorkfed.org/markets/operational-readiness>

Desk surveys of primary dealers and market participants

https://www.newyorkfed.org/markets/primarydealer_survey_questions.html

https://www.newyorkfed.org/markets/survey_market_participants

FR 2420 Report of Selected Money Rates

<https://www.newyorkfed.org/markets/reference-rates>

<https://apps.newyorkfed.org/markets/autorates/obfr>

<https://www.newyorkfed.org/markets/obfrinfo>

<https://www.newyorkfed.org/medialibrary/media/markets/EFER-technical-note-070815.pdf>

Services for central banks and international institutions

<https://www.newyorkfed.org/markets/central-bank-and-international-account-services>

ENDNOTES

¹ Unless otherwise stated, all dollar values of securities held in the domestic SOMA portfolio refer to inflation-adjusted par (face) values and reflect both settled and unsettled amounts, including commitments to buy agency MBS. Values of agency MBS refer to the remaining principal balance of the securities. The Federal Reserve reports SOMA securities holdings at par (face) value, inflation compensation, and any unamortized premiums or discounts separately in its weekly statistical release on the balance sheet. For purposes of financial accounting, SOMA securities holdings are reported at amortized cost, and gains and losses resulting from sales of securities are determined based on average cost of each purchased and sold security. Unless otherwise noted, the dollar values of securities held in the foreign SOMA portfolio refer to amortized cost basis.

² Annual reports on open market operations and accompanying data can be found at https://www.newyorkfed.org/markets/annual_reports.html. In preparing the material presented in this report, the Federal Reserve Bank of New York used data and other information from various third-party sources. The New York Fed's information suppliers are not responsible for the content of this report, and they do not warrant or guarantee the accuracy, timeliness, or completeness of information presented in the report.

³ For a description of the Federal Reserve's approach to implementing monetary policy in an ample reserves regime, see Jane Ihrig, Zeynep Senyuz, and Gretchen C. Weinbach, "The Fed's 'Ample-Reserves' Approach to Implementing Monetary Policy," FEDS Working Papers, February 2020, <https://www.federalreserve.gov/econres/feds/the-feds-ample-reserves-approach-to-implementing-monetary-policy.htm>.

⁴ This approach to policy implementation was outlined in the FOMC's September 2014 statement of Policy Normalization Principles and Plans, which sets forth the Committee's strategy for normalizing the stance of monetary policy. The Committee provided additional details about its intended operational

approach in its March 2015 meeting minutes and in its January 2019 meeting communication.

⁵ The Federal Reserve also sets the rate of interest paid on required reserves (IORR), which at this time is the same as the IOER rate.

⁶ Since the introduction of IOER in late 2008, and especially in recent years, which have featured very elevated levels of excess reserves, IOER has served only as a soft rather than firm floor on overnight interest rates as a result of certain institutional features of the U.S. money market. These features include bank-only access to IOER, which makes key cash lenders in U.S. money markets, such as government-sponsored enterprises and money market mutual funds, ineligible to earn the IOER rate. To support a firmer floor under overnight interest rates, the Federal Reserve uses an ON RRP facility through which it offers a daily risk-free overnight investment with same-day settlement to a wide range of active nonbank lenders in addition to banks. The FOMC sets the rate and other key terms, including the per counterparty limit and the aggregate cap, and the Desk conducts the open market operations. In this way, the ON RRP facility supports policy implementation as a complement to the IOER rate to help maintain the federal funds rate within the target range.

⁷ A substantial share of newly issued Treasury debt is typically purchased by securities dealers, who then gradually sell the bonds to their customers. Dealers finance their bond inventories by using the securities as collateral for generally overnight loans in the repo market.

⁸ For detailed descriptions of fluctuations in money market rates in September 2019, see Sam Schulhofer-Wohl, "Understanding Recent Fluctuations in Short-Term Interest Rates," *Chicago Fed Letter*, No. 423, 2019, <https://www.chicagofed.org/publications/chicago-fed-letter/2019/423>, and Sriya Anbil, Alyssa Anderson, and Zeynep Senyuz, "What Happened in Money Markets in September 2019?," *FEDS Notes*,

February 2020, <https://www.federalreserve.gov/econres/notes/feds-notes/what-happened-in-money-markets-in-september-2019-20200227.htm>.

⁹ During this period of significant volatility in repo markets, the issuance of products linked to the Secured Overnight Financing Rate (SOFR), a reference rate used in the pricing of financial instruments, remained steady. For more information about the production and publication of a set of overnight Treasury repo reference rates—the effective federal funds rate and the overnight bank funding rate—see Box 1, “Money Market Reference Rates,” in the report *Open Market Operations during 2018*.

¹⁰ The Federal Reserve’s Senior Financial Officer Survey defines the “lowest comfortable level of reserves” (LCLoR) as the approximate lowest level of reserves an institution would feel comfortable holding before taking actions to maintain or increase its reserve balance level. If the actual level of reserve balances of a bank declines below its LCLoR, the bank would seek to replenish its reserve balances to its stated LCLoR by borrowing funds or otherwise adjusting its balance sheet. For details about the survey, including qualitative and quantitative information on the LCLoRs of respondents, see <https://www.federalreserve.gov/data/sfos/sfos.htm>.

¹¹ In determining the value of Treasury securities available for ON RRP operations, the Desk takes several factors into account, such as the need to reserve some of the Treasury securities held outright in the SOMA to conduct reverse repurchase agreements with foreign official and international accounts, to support the Desk’s securities lending operations.

¹² The temporary increase in ON RRP use over quarter-ends observed in recent years reflected reduced availability of other investments on dates when some financial institutions—most notably, some foreign institutions that play a major role in U.S. money markets—recorded financial results and regulatory ratios to report to investors and regulators. For further discussion of the impact of regulatory implementation on rates and quantities borrowed in the U.S. repo market, see James Egelhof, Antoine Martin, and Noah Zinsmeister, “Regulatory Incentives and Quarter-End Dynamics in the Repo Market,” *Liberty Street Economics* (blog), August 7, 2017, <http://libertystreeteconomics.newyorkfed.org/2017/08/regulatory-incentives-and-quarter-end-dynamics-in-the-repo-market.html>.

¹³ In the event that the value of propositions received exceeded the amount of available securities, awards would be made at the stop-out rate. The stop-out rate is the rate at which the total quantity of propositions, ranked in ascending order by submitted rate, equals the overall size limit. All propositions at rates below the stop-out rate would be awarded in full and all propositions at the rate equal to this rate would be awarded on a pro rata basis.

¹⁴ Other measures of competitiveness include the price on counterparties’ offers relative to the observed market price prior to the close of the operation and, for accepted offers, the aggregate premium or discount relative to the market price. Therefore, the offer-to-cover ratio by itself provides only a partial picture of competitiveness.

¹⁵ The to-be-announced market is a forward market built on a trading convention that enables market participants to efficiently trade agency MBS backed by millions of individual mortgages. The market uses only a few standardized contracts, which are grouped by key characteristics such as the agency, term, coupon, and settlement date of the security that will be delivered. The standardized nature of TBA contracts helps make a large segment of the agency MBS market effectively homogeneous and thus highly liquid. Under a TBA contract, the buyer is notified by the seller of the specific securities that will be delivered (that is, the securities are “announced”) two days prior to settlement.

¹⁶ For example, consider that a given month’s cap is \$20 billion and that the principal payments to be received from agency debt are \$2 billion and the anticipated principal payments to be received from agency MBS are \$22 billion. To determine the amount of reinvestment purchases of agency MBS, the Desk would subtract the \$20 billion cap from the total principal payments of \$24 billion. An announcement would be made on or around the ninth business day of that month indicating that the Desk would purchase \$4 billion of agency MBS, with operations taking place between the following business day and the ninth business day of the following month.

¹⁷ While the principal received is based on agency debt and agency MBS payments received during each calendar month, the reinvestment and redemption figures are based on reinvestment cycle periods, which occur on a mid-month to mid-month basis.

¹⁸ A dollar roll sale is a transaction that involves the sale of agency MBS for delivery in one month with the simultaneous agreement to purchase substantially similar securities in a later month. The FOMC directive in place in 2019 allows the Desk to conduct dollar rolls and coupon swaps to facilitate settlement, although the Desk has not conducted a coupon swap since 2010.

¹⁹ The Desk was also directed to conduct coupon swaps as necessary to facilitate settlement of the Federal Reserve's agency MBS transactions, but it did not execute any in 2019 aside from the small-value coupon swap operations conducted to ensure operational readiness. A coupon swap is a transaction that involves the sale of one agency MBS and the simultaneous purchase of another agency MBS, which may have a different coupon, issuer, or both.

²⁰ CUSIPs are codes that identify financial securities, enabling the efficient clearing and settlement in capital markets. For details, see <http://www.cusip.com>.

²¹ The New York Fed is authorized by the FOMC to intervene in the foreign exchange market by executing foreign exchange transactions for the SOMA as directed by the FOMC and, in its capacity as fiscal agency of the United States, for the Treasury's Exchange Stabilization Fund (ESF). This report covers the SOMA's foreign currency holdings.

²² Further details can be found in the New York Fed's *Treasury and Federal Reserve Foreign Exchange Operations* quarterly reports. See https://www.newyorkfed.org/markets/quar_reports.html.

²³ The Desk also maintains reciprocal currency arrangements of \$2 billion with the Bank of Canada and \$3 billion with Banco de México. These arrangements were established in 1994 under the North American Framework Agreement to promote orderly currency exchange markets.

²⁴ For a more detailed discussion of the mechanics of a U.S. dollar liquidity swap, see https://www.federalreserve.gov/monetarypolicy/bst_liquidityswaps.htm and <https://www.newyorkfed.org/markets/international-market-operations/central-bank-swap-arrangements>.

²⁵ For details about the New York Fed policy on counterparties for market operations, see <https://www.newyorkfed.org/markets/counterparties/policy-on-counterparties-for-market-operations>.

²⁶ The Treasury promulgates rules and provides guidelines for Treasury auctions that are applicable to primary dealers and other bidders. Primary dealers are expected to bid their pro rata share of each auction, an amount that is determined as the total amount auctioned divided by the number of primary dealers at the time of the auction.

²⁷ For more details on the term deposit facility and announcements of TDF operations and their results, see <https://www.federalreserve.gov/monetarypolicy/tdf.htm>.

²⁸ The CSP is a SWIFT program announced in 2016 and rolled out in 2017 that consists of a set of security standards that includes both mandatory and advisory controls. SWIFT users must comply with the mandatory controls by announced deadlines and submit a self-attestation against those controls on an annual basis. For more information, see <https://www.swift.com/insights/press-releases/swift-introduces-mandatory-customer-security-requirements-and-an-associated-assurance-framework>.

²⁹ Changes in the size of the Federal Reserve's balance sheet also reflect a decline in other assets, which was primarily driven by a \$15 billion decrease in net unamortized premiums and discounts on SOMA domestic securities holdings in 2019.

³⁰ Because agency MBS purchases are conducted in the TBA market, a gap exists between the purchase date and the settlement date. Figures for portfolio size include unsettled purchase amounts, unless otherwise stated. As of the end of 2019, net unsettled commitments totaled \$4.129 billion.

³¹ As of December 31, 2019, the U.S. Treasury had approximately \$16.66 trillion in marketable debt held by the public (inclusive of SOMA holdings) outstanding. Further information can be found at <https://www.treasurydirect.gov/govt/reports/pd/mspd/2019/opds122019.pdf>.

³² As a result of the new UMBS program, 47 percent of securities held in the SOMA consisted of mortgages guaranteed by both agencies; however, for the purposes here, such mortgages are counted as being guaranteed by their most recent guarantor.

³³ The weighted average life of an MBS refers to the expected time outstanding until the mortgage principal is repaid. This calculation is dependent on a model of future prepayments and is therefore subject to some uncertainty and model sensitivity.

³⁴ “Modified duration” is used to calculate the duration of Treasury and agency debt securities, while “effective duration” is employed to measure the duration of MBS. Modified duration approximates the percentage change in the price of a fixed-income security given a 100 basis point parallel shift in the yield curve and is most applicable to securities with fixed cash flows, such as Treasury and agency debt securities. Effective duration, which accounts for the potential alterations in cash flows as interest rates change, is suitable for capturing the duration of MBS because it is affected by mortgage borrowers’ decisions to exercise or forgo their prepayment option. Duration measures of the portfolio throughout this report are calculated on a par-weighted average basis.

³⁵ Homeowners’ option to prepay their mortgage at any time without penalty adds uncertainty to the agency MBS holder’s expected cash flows. In general, lower mortgage rates encourage homeowners to refinance their loans, thereby shortening the duration of the MBS securitizing these loans, while higher mortgage rates discourage homeowners from refinancing, thereby lengthening the duration of MBS.

³⁶ Depository institutions also have access to secondary credit and seasonal credit through the discount window.

³⁷ The Board of Governors approved requests submitted in August, September, and October by the Boards of Directors of the Federal Reserve Banks for 25 basis point decreases in the primary credit rate.

³⁸ Test loans are actual loans requested by institutions to ensure readiness to borrow from the Federal Reserve should a true funding need arise. The number of test loans is estimated and includes any loan that the borrowing institution indicated was a test as well as any loan for an amount less than or equal to \$10,000.

³⁹ For a detailed discussion about the liabilities of the Federal Reserve, see the box titled “The Role of Liabilities in Determining the Size of the Federal Reserve’s Balance Sheet” in the Federal Reserve’s February 2019 Monetary Policy Report, <https://www.federalreserve.gov/monetarypolicy/2019-02-mp-part2.htm>. Additionally, see Thomas Haasl, Sam Schulhofer-Wohl, and Anna Paulson, “The Structure of Federal Reserve Liabilities,” *Chicago Fed Letter* 395, 2018, <https://www.chicagofed.org/publications/chicago-fed-letter/2018/395>.

⁴⁰ Reserves may also be held as vault cash.

⁴¹ The definition of reserve balances changed on June 27, 2013, as a consequence of revisions to Federal Reserve Regulation D, which governs the administration of reserve requirements. Before this date, excess reserves were defined as the difference between actual reserve balances held by depository institutions and the institutions’ reserve balance requirements. Effective June 27, 2013, however, changes to Regulation D introduced penalty-free bands around reserve requirements, and the Board of Governors of the Federal Reserve System started to report the sum of balances exceeding the top of depository institutions’ penalty-free bands rather than excess balances.

⁴² For a detailed discussion of banks’ demand for reserves and the impact of liquidity regulations, see Jane Ihrig, “Banks’ Demand for Reserves in the Face of Liquidity Regulations,” Federal Reserve of St. Louis *On the Economy* blog, March 5, 2019, <https://www.stlouisfed.org/on-the-economy/2019/march/banks-demand-reserves-face-liquidity-regulations>.

⁴³ In this discussion, Federal Reserve notes outstanding are net of the holdings of Federal Reserve Banks. The Federal Reserve pays no interest on notes; however, Reserve Banks pay expenses incidental to the issuance and retirement of currency (such as costs related to manufacturing, shipping, educational services, and research and development). These expenses do not vary with the level of interest rates, unlike those associated with some other liabilities. Currency costs were \$837 million in 2019.

⁴⁴ For a detailed discussion of factors affecting the amount of currency outstanding, see Thomas Haasl, Sam Schulhofer-Wohl, and Anna Paulson, “Understanding the Demand for Currency at Home and Abroad,” *Chicago Fed Letter* 396, 2018, <https://www.chicagofed.org/publications/chicago-fed-letter/2018/396>.

⁴⁵ Upon initiation of the transaction, each participant has an undivided interest, proportional to its investment, in a pool of securities from the SOMA that has been allocated toward this purpose.

⁴⁶ For a detailed discussion of the evolution of Treasury cash management, see Paul J. Santoro, “The Evolution of Treasury Cash Management during the Financial Crisis,” Federal Reserve Bank of New York *Current Issues in Economics and Finance* 18, no. 3, 2012, https://www.newyorkfed.org/research/current_issues/ci18-3.html. Additionally, for more details on historical patterns in the Treasury General Account, see “Treasury General Account” in the report *Open Market Operations during 2018*.

⁴⁷ For details, see U.S. Department of the Treasury, “Quarterly Refunding Statement of Acting Assistant Secretary for Financial Markets Seth B. Carpenter,” May 6, 2015, <https://www.treasury.gov/press-center/press-releases/pages/jl10045.aspx>.

⁴⁸ For details on volatility in the TGA and its impact on reserve balances, see Jeffrey Huther, Luke Pettit, and Mark Wilkinson, “Fiscal Flow Volatility and Reserves,” Federal Reserve Board of Governors *FEDS Notes*, December 16, 2019, <https://www.federalreserve.gov/econres/notes/feds-notes/fiscal-flow-volatility-and-reserves-20191216.htm>

⁴⁹ A financial market utility may be designated as systemically important by the Financial Stability Oversight Council under Title VIII of the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd-Frank Act). Title VIII of the Dodd-Frank Act also allows these designated financial market utilities to establish and maintain Reserve Bank accounts.

⁵⁰ Interest income on foreign currency–denominated holdings was negative \$33 million in 2019.

⁵¹ SOMA net income reflects (1) interest income on SOMA assets, including interest on domestic and foreign currency–denominated investments; (2) interest expense on SOMA liabilities, which comprise interest on reverse repurchase agreements, interest on reserve balances, and remuneration of DFMUs’ deposits; and (3) non-interest income or loss associated with SOMA assets, which is principally composed of foreign currency translation gains and losses and any realized capital gains or losses, as reported in the Federal Reserve System’s annual audited financial statements. SOMA net income, which includes the assumed cost of funding the SOMA portfolio, is calculated as SOMA income associated with SOMA assets less the interest expense on interest-bearing liabilities.

⁵² For an explanation of the accounting principles regarding unrealized and realized positions, as well as their potential implications for the Federal Reserve’s ability to meet its obligations, see Brian Bonis, Lauren Fiesthumel, and Jamie Noonan, “SOMA’s Unrealized Loss: What Does It Mean?” Federal Reserve Board of Governors *FEDS Notes*, August 13, 2018, <https://www.federalreserve.gov/econres/notes/feds-notes/somas-unrealized-loss-what-does-it-mean-20180813.htm>.

⁵³ The December 2019 Survey of Primary Dealers is available at https://www.newyorkfed.org/markets/primarydealer_survey_questions.

⁵⁴ As a simplifying assumption, liabilities are assumed to grow at the survey-derived growth rate for nominal GDP each year. In practice, growth rates from year to year will likely vary from this long-run trajectory. Nevertheless, the assumed evolution of liabilities shown in this projection illustrates the degree to which the size and composition of the Federal Reserve’s balance sheet evolves due to trend growth in key components.

⁵⁵ While this approach ignores that repos have remained in the portfolio in 2020 thus far, results of the projection exercise are largely similar to those that would result if some level of repo holdings were assumed. As discussed later in this section, RMPs are projected to be relatively elevated in 2020 as security holdings increase to offset the assumed unwind of repos, resulting in a portfolio that is largely similar with regard to size and income if repos had been included.

⁵⁶ In reality, changes in both assets and liabilities on the Federal Reserve’s balance sheet impact the level of reserves. However, given the larger size and variability of certain liabilities and secular growth in these factors, we focus primarily on the impact of liabilities and capital to simplify this discussion.

⁵⁷ The timing of principal payments from maturing Treasury securities and agency debt securities is known with certainty since maturity dates are fixed. In contrast, projected principal pay-downs associated with agency MBS are subject to considerable uncertainty owing to the embedded prepayment option in the underlying mortgages. This uncertainty necessitates the use of model-based estimates for MBS principal pay-downs that are sensitive to changes in interest rates, home prices, and other factors. For a more detailed description, see Box 3, “Agency MBS Prepayment Uncertainty,” in *Open Market Operations during 2017*.

⁵⁸ Of the total RMPs projected for 2020, roughly \$250 billion are to replace repos not reflected in the assumptions for this exercise, while the remainder is due to growth in liabilities.

⁵⁹ It is important to bear in mind that the Federal Reserve’s policy decisions are intended to advance its dual mandate of maximum employment and price stability, and that the implications of such decisions for government finances extend well beyond their direct influence on the Federal Reserve’s earnings.

⁶⁰ The higher and lower interest rate scenarios examined in Chart 35 assume that all interest rates are 1 percentage point

(100 basis points) higher or lower, respectively, than the rates used in the baseline scenario. In each case, the shocks are phased in over two quarters. This analysis is done using the median liabilities scenario as the baseline case. All other assumptions are held constant. Although not shown here, if a shock were to result in a steeper (flatter) implied yield curve, income would increase (decrease) as funding costs decreased (increased) relative to the income associated with security holdings.

⁶¹ For securities that are held to maturity, at which point the Federal Reserve will receive the par values, the market valuation of the securities and their amortized cost converge to the par value so that the unrealized position gradually reduces to zero as the securities approach maturity. For an explanation of the accounting principles regarding unrealized and realized positions, as well as the potential implications for the Federal Reserve's ability to meet its obligations, see the *FEDS Note* article cited in endnote 52 of this report.

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The background is a dark, abstract composition. It features a faint grid of white lines. Overlaid on this are several glowing, semi-transparent elements: a bar chart with vertical bars of varying heights, a wavy line that oscillates across the chart, and a diagonal line that passes through the chart. The colors are primarily shades of blue, cyan, and magenta, with some yellow and white highlights. The overall effect is that of a digital or data visualization environment.

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