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# OPEN MARKET OPERATIONS

DURING 2018

A Report Prepared for the  
Federal Open Market Committee by the Markets Group  
of the Federal Reserve Bank of New York

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*This report, presented to the Federal Open Market Committee by Simon Potter, 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 2018. Fabiola Ravazzolo, Kathryn Chen, Karen Brifu, and Timothy Chu were primarily responsible for preparation of the report.*

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# Overview

## Highlights from 2018

During 2018, the Federal Open Market Committee (FOMC) continued to normalize the stance of monetary policy by further raising the target range of the federal funds rate and gradually reducing the size of the Federal Reserve's domestic securities portfolio according to the plan announced in 2017. The size of the domestic securities portfolio declined by roughly \$380 billion during 2018.<sup>1</sup>

The FOMC increased the target range for the federal funds rate from a range of 1¼ to 1½ percent at the start of the year to a range of 2¼ to 2½ percent at the end, in increments of ¼ percentage point at each of the March, June, September, and December FOMC meetings in 2018. The Federal Reserve controlled the level of the federal funds rate and other short-term interest rates primarily through the use of the rate of interest paid on excess reserves (IOER) held by banks at the Federal Reserve, supported by overnight reverse repurchase agreements (ON RRP) offered at a specified rate and executed by the Open Market Trading Desk at the Federal Reserve Bank of New York (the Desk). These tools continued to be successful in keeping the effective federal funds rate (EFFR) within the FOMC's target range despite substantial changes in the level of reserves in the banking system and significant changes in money markets. During the year, the Committee made two technical adjustments, each time lowering the IOER rate within the federal funds target range to help ensure that the EFFR remained within the target range. Overnight rates in both unsecured and secured money markets moved up roughly in line with the increases in the IOER rate, and the expected increases passed through into rates on term money market instruments. Average daily take-up in ON RRP operations decreased significantly in 2018 because of the availability of alternative investment options, such as Treasury bills and repos, at more attractive rates.

The FOMC continued the program initiated in October 2017 of gradually reducing the size of the Federal Reserve's domestic securities holdings, by directing the Desk to limit reinvestment of the principal payments it receives from securities held in the System Open Market Account (SOMA). Specifically, the Committee instructed the Desk to reinvest such payments only to the extent that they exceeded gradually rising redemption caps. After these caps reached their maximum levels in October 2018, the Desk did not reinvest agency mortgage-backed securities (MBS). This marked the first time since September 2011 that the Desk did not reinvest principal payments received from holdings of agency MBS. Since the commencement of gradual portfolio reductions in October 2017, the size of the SOMA domestic securities portfolio has declined from roughly \$4.3 trillion at the end of September 2017 to just below \$3.9 trillion at the end of 2018. To support market functioning and ensure the effective conduct of open market operations, the Desk continued to execute securities lending operations in 2018, at volumes of \$20 billion each day on average.

Against the backdrop of the normalization of the size of the SOMA domestic portfolio, the total level of the Federal Reserve's liabilities declined during the year. Reserve balances, which had been the largest Federal Reserve liability since October 2009, declined to a level similar to that of currency in circulation, which historically tends to be a central bank's largest liability. Specifically, in 2018 the \$380 billion decrease in SOMA domestic securities holdings and a modest aggregate increase in liabilities other than reserves led to an approximately \$398 billion decline in reserve balances to about \$1.6 trillion at the end of the year. The aggregate increase in liabilities other than reserves stemmed from growth of currency in circulation and an increase in the

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balances of the Treasury General Account (TGA); increases in non-reserve liabilities were largely offset by a decline in take-up in ON RRP operations. The level of reserve balances has declined significantly from a peak of roughly \$2.8 trillion, reached in October 2014, to about \$1.6 trillion at the end of 2018, with about a third of this decline attributable to domestic securities holdings runoff and the remainder owing to growth in liabilities other than reserves.

The SOMA portfolio continued to contribute to elevated levels of Federal Reserve income and remittances to the U.S. Treasury. In 2018, the Federal Reserve remitted a total of \$65 billion to the Treasury. Although this amount was lower than the \$81 billion paid in 2017—largely because of the increased interest expenses associated with higher short-term interest rates—the level of remittances remained historically elevated. During the first quarter of 2018, the domestic portfolio moved to an unrealized loss position; at year-end, the unrealized loss position totaled \$6 billion. The shift from an unrealized gain position of \$80 billion at the end of 2017 resulted from higher interest rates during the year that reduced the market value of Treasury and agency debt and agency MBS held in the SOMA. 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 Federal Reserve continued to develop money market reference rates to improve market transparency and support the efficient functioning of money markets. In April 2018, the Desk began publishing a set of reference rates based on overnight repo transactions secured by Treasury securities. These rates include the Secured Overnight Financing Rate (SOFR), which was selected by the Alternative Reference Rates Committee in 2017 as its recommended alternative to U.S. dollar LIBOR for new U.S. dollar derivatives and other financial contracts. In 2018, the New York Fed issued two statements of compliance of its reference rates with the Principles for Financial Benchmarks published by the International Organization of Securities Commissions (IOSCO). Separately, the Federal Reserve started to collect data on short-term, wholesale unsecured deposits that

are held at domestic branches of banks and are economically equivalent to Eurodollars, providing additional information on U.S. money markets.

The foreign currency reserve portfolio was largely unchanged over the year. The Desk did not conduct any foreign exchange intervention activity that would alter the size of these reserves, which at the end of the year totaled \$20.9 billion on an amortized cost basis. Meanwhile, the Desk continued to conduct transactions to ensure that the foreign portfolio holdings conformed to investment objectives related to portfolio 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 dollar volume of liquidity swap transactions declined roughly 57 percent relative to 2017, reflecting an environment of decreasing demand for U.S. dollar funding and hedging in the foreign exchange swap market.

Over the course of 2018, the Desk also continued to strengthen its operational flexibility and resiliency, including cyber and geographic resiliency. The Desk undertook nineteen types of small-value exercises, five more than in 2017, in order to strengthen its readiness to implement a range of potential FOMC directives.

## A GUIDE TO THIS REPORT

The report is divided into four key sections:

**1. Domestic Open Market Operations:** The opening section reviews the steps taken by the Desk in money markets and securities markets to implement the FOMC’s operating objectives for short-term interest rates and the balance sheet. It also describes securities lending operations that supported market functioning. Additionally, the section includes two sidebars, one that provides an update of efforts related to money market reference rates and another that describes evolving structural aspects and trading dynamics in the U.S. secured money market. (pp. 5-18)

**2. Foreign Open Market Operations:** This section focuses on the Desk’s operations to maintain the Federal Reserve’s portfolio of

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foreign currency–denominated assets and to provide U.S. dollar liquidity to foreign central banks. (pp. 19-20)

**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. 21-25)

**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 includes a sidebar illustrating the mechanics of the balance sheet. (pp. 27-40)

Note: Previous reports have included staff projections of the path of the domestic SOMA portfolio and SOMA net income. These projections are typically developed using a number of data sources, including results from the Surveys of Primary Dealers and Market Participants. Given recent adjustments to policy

normalization plans, staff projections are not included in this year’s report. In January 2019, the FOMC announced its plan to continue to implement monetary policy in a regime with an ample supply of reserves. In March 2019, it announced its intentions to slow the pace of the decline in reserves and to stop reducing the size of the SOMA portfolio at the end of September 2019.<sup>2</sup> The New York Fed plans to release an addendum to this report later in the year containing portfolio projections that incorporate this information, including updated survey data.

Appendixes 1 through 5 provide the complete text of the FOMC authorizations and directives guiding the Desk’s activity. Appendix 6 summarizes the Desk’s public disclosures about its operations, and Appendix 7 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 is provided on the New York Fed’s website to the extent that its release is allowed by data suppliers.<sup>3</sup> Additional questions regarding this report and the underlying data can be addressed to [ny.mkt.soma.annualreport@ny.frb.org](mailto:ny.mkt.soma.annualreport@ny.frb.org).



# Domestic Open Market Operations

In 2018, 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

Monetary policy implementation refers to the tools and practices that a central bank uses to achieve its policy objectives. The Federal Reserve uses a set of administered rates as the primary mechanism to achieve its dual mandate of maximum employment and price stability. The Federal Reserve's framework for monetary policy implementation features a short-term interest rate target to communicate the FOMC's policy stance, the use of 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 tool for achieving its objectives.

The money market tools currently used by the Federal Reserve for policy implementation were developed to maintain short-term interest rate control in the prevailing environment of abundant reserve balances in the banking system. The FOMC's key policy rate remains 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.) Throughout 2018, the width of the target range for the federal funds rate continued to be 25 basis points.<sup>4</sup>

The Federal Reserve sets administered rates—the interest rate paid on excess reserves that a bank holds at the Federal Reserve, supplemented by ON RRP's offered at a specified rate to a wide range of active nonbank lenders in addition to banks—as a means to move the federal funds rate into the target range and to maintain it in that range without actively adjusting the supply of reserve balances.<sup>5</sup> The IOER rate is the primary 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.

In recent years, with the large levels of excess reserves that prevailed in the system, certain institutional features of the U.S. money markets made IOER act more like a soft floor on overnight interest rates. These features include bank-only access to IOER, which makes key cash lenders in U.S. money markets, such as government-sponsored enterprises (GSEs) and money market mutual funds (MMFs), ineligible to earn the IOER rate. To provide a firmer floor under overnight interest rates, the Federal Reserve uses an overnight reverse repo 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.

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Table 1

**Monthly Caps on SOMA Securities Reductions**

Billions of U.S. Dollars per Month

	October–December 2017	January–March 2018	April–June 2018	July–September 2018	From October 2018
U.S. Treasury securities	6	12	18	24	30
Agency debt and MBS	4	8	12	16	20

Source: Federal Open Market Committee, Addendum to the Policy Normalization Principles and Plans, June 2017.

The Committee continued the program initiated in October 2017 to gradually reduce the size of the Federal Reserve’s securities holdings from elevated levels. As outlined in its June 2017 Addendum to the Policy Normalization Principles and Plans, the FOMC directed the Desk to reinvest principal payments on the Federal Reserve’s securities holdings to the extent that they exceeded gradually increasing caps (Table 1). The maximum caps were reached in October 2018 and remained in place so that the Federal Reserve’s securities holdings would decline in a gradual and predictable manner.

**Monetary Policy Implementation**

In 2018, the Desk continued to conduct open market operations in money markets to influence short-term interest rates—namely, reverse repo operations to support IOER. Additionally, the Desk conducted open market operations in the Treasury and agency MBS markets to achieve the FOMC’s balance sheet objectives. In April 2018, the Federal Reserve began producing and publishing a

set of overnight Treasury repo reference rates (Box 1) in addition to the ongoing publication of the EFR and the overnight bank funding rate (OBFR). The publication of these reference rates is intended to provide a better understanding of money market dynamics and aid market functioning by enhancing transparency.

**SHORT-TERM INTEREST RATE MANAGEMENT**

The FOMC raised the target for the federal funds rate a total of four times from a range of 1¼ to 1½ percent to a range of 2¼ to 2½ percent, in increments of ¼ percentage point at each of the March, June, September, and December 2018 FOMC meetings. To maintain the federal funds rate within the target range, the Board of Governors increased the interest paid on required and excess reserve balances by 25 basis points at the March and September FOMC meetings and by 20 basis points at the June and December meetings. In addition, at each of these meetings the FOMC directed the Desk to increase the offering rate on overnight RRP by 25 basis points (Table 2).

Table 2

**Key Policy Rates Effective in 2018**

FOMC Meetings Announcing Policy Rate Changes	Effective Date Range for Policy Rates during 2018	Federal Funds Target Range (Percent)	Interest Rate on Required and Excess Reserve Balances (Percent)	Overnight Reverse Repo Offering Rate (Percent)
December 2017	January 1–March 21	1¼–1½	1.50	1.25
March 2018	March 22–June 13	1½–1¾	1.75	1.50
June 2018	June 14–September 26	1¾–2	1.95	1.75
September 2018	September 27–December 19	2–2¼	2.20	2.00
December 2018	December 20–December 31	2¼–2½	2.40	2.25

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

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Box 1

## Money Market Reference Rates

The Federal Reserve has taken a number of steps over the past several years to improve transparency and support the efficient functioning of money markets, including strengthening the production of the effective federal funds rate (EFFR) and introducing the overnight bank funding rate (OBFR). These efforts continued in 2018 with the introduction of a set of overnight Treasury repo reference rates, published in cooperation with the U.S. Treasury Department's Office of Financial Research (OFR); the issuance of Statements of Compliance of administered reference rates with the International Organization of Securities Commissions' (IOSCO) Principles for Financial Benchmarks; and the initiation of an effort to broaden the transactions supporting the calculation of the OBFR. In parallel, the Federal Reserve has continued to support the transition away from LIBOR toward more robust reference rates.

As announced in 2016, the New York Fed has cooperated with the OFR to produce three reference rates based on overnight Treasury repo transactions to improve repo market transparency. Secured markets—the Treasury repo market in particular—play a critical role in the efficient functioning of financial markets and the implementation of monetary policy.

The New York Fed began publishing the three repo rates—the Secured Overnight Financing Rate (SOFR), the Broad General Collateral Rate (BGCR), and the Tri-party General Collateral Rate (TGCR)—in April 2018, with average daily volumes

over the year of \$806 billion, \$395 billion, and \$379 billion, respectively. These rates are calculated using transaction data from various segments of the repo market to allow for potential future market evolution, are subject to a control framework designed to mitigate the risk of calculation errors or manipulation, and are supported by backup systems and a data waterfall to enable publication under contingent circumstances.

In an effort to increase visibility into the wholesale funding market and to enhance the robustness of the data used in calculating the OBFR, the Federal Reserve revised the FR 2420 *Report of Selected Money Market Rates* in October 2018 to include an additional segment of the market for unsecured bank funding transactions, referred to as “Selected Deposits,” and in February 2019 the New York Fed requested public feedback on its proposal to incorporate selected deposit data in the OBFR.<sup>a</sup> These transactions would capture certain short-term, wholesale unsecured deposits that are economically equivalent to Eurodollars and held at U.S. branches of banks that had fallen outside the scope of the FR 2420.<sup>b, c</sup>

While the Federal Reserve has not historically produced rates with the explicit goal of having them referenced in financial contracts, the rates have nonetheless frequently been used for this purpose. Therefore, the Federal Reserve is committed to administering its reference rates in alignment with international best practices, particularly the Principles for Financial Benchmarks published by

IOSCO. Accordingly, in January 2018, the New York Fed released a Statement of Compliance for the EFFR and the OBFR with the Principles for Financial Benchmarks published by IOSCO. In June 2018, it revised the Statement of Compliance to also cover the newly introduced SOFR, the BGCR, and the TGCR.<sup>d, e</sup>

Beyond these efforts to strengthen the newly introduced reference rates, the Federal Reserve continued to be engaged with the Alternative Reference Rates Committee (ARRC) to support the transition away from LIBOR toward more robust reference rates. The industry made notable progress in advancing the ARRC's Paced Transition Plan, including establishing the infrastructure for derivatives that reference SOFR, initiating trading in SOFR futures contracts and clearing of SOFR-based interest rate swaps, and changing the price alignment interest (PAI) discounting environment utilized by central counterparties on some SOFR-linked swaps.<sup>f</sup> Additionally, numerous SOFR-linked cash products were issued; during the year a variety of entities across several market segments issued more than \$30 billion in SOFR-linked instruments.

Finally, to further encourage use of the SOFR as a benchmark in a range of financial contracts, in July 2018 the Federal Reserve announced that it is considering publishing a set of backward-looking average term rates based on the SOFR, which could complement the ARRC's planned creation of a forward-looking term reference rate based on SOFR.<sup>g</sup>

<sup>a</sup>[https://www.newyorkfed.org/markets/opolicy/operating\\_policy\\_190205](https://www.newyorkfed.org/markets/opolicy/operating_policy_190205).

<sup>b</sup>Eurodollars are U.S. dollar-denominated deposits at non-U.S. banks or branches of U.S. banks outside the United States.

<sup>c</sup>For more information on the data gathered by the Desk on money market rates, see the FR 2420 report, [https://www.newyorkfed.org/banking/reportingforms/FR\\_2420.html](https://www.newyorkfed.org/banking/reportingforms/FR_2420.html).

<sup>d</sup>[https://www.newyorkfed.org/markets/opolicy/operating\\_policy\\_180118](https://www.newyorkfed.org/markets/opolicy/operating_policy_180118).

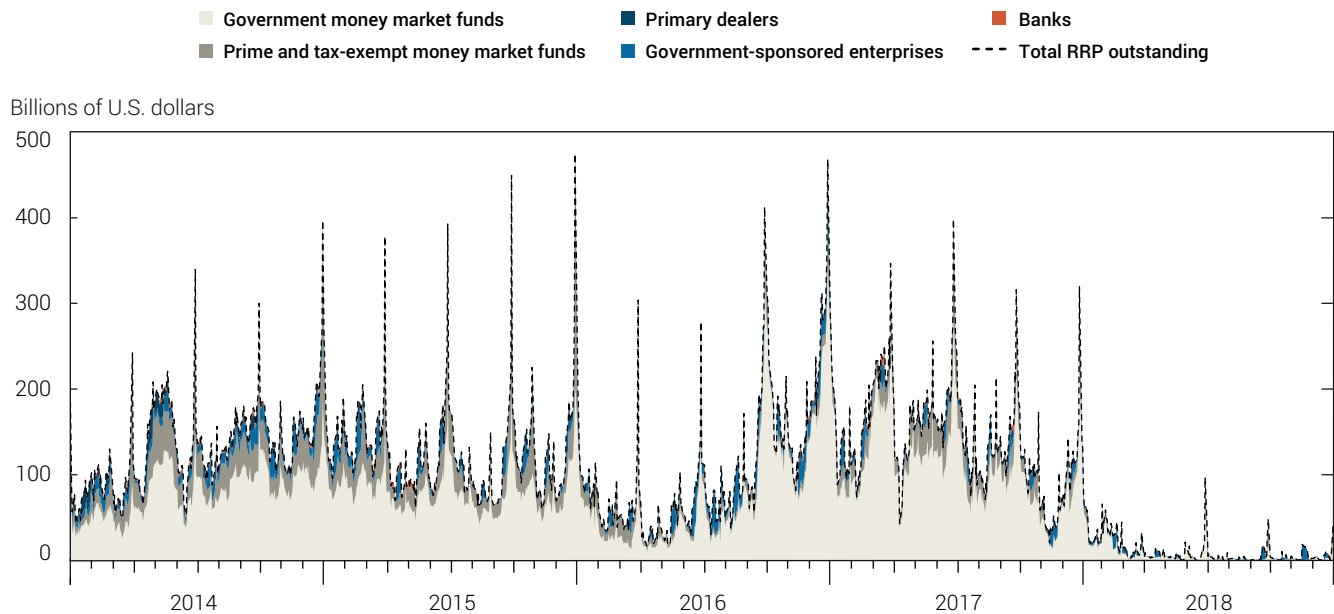
<sup>e</sup>[https://www.newyorkfed.org/markets/opolicy/operating\\_policy\\_180628](https://www.newyorkfed.org/markets/opolicy/operating_policy_180628).

<sup>f</sup>Information on the ARRC, including its Paced Transition Plan, can be found on the ARRC website, <https://www.newyorkfed.org/arrc/index.html>. Additional information can be found in the minutes of the October 31, 2017, ARRC meeting, <https://www.newyorkfed.org/medialibrary/microsites/arrc/files/2017/October-31-2017-ARRC-minutes.pdf>.

<sup>g</sup>For more information, see Randal K. Quarles's Introductory Remarks at the Alternative Reference Rates Committee Roundtable, New York Fed, July 19, 2018, <https://www.federalreserve.gov/newsevents/speech/quarles20180719a.htm>.

### OPEN MARKET OPERATIONS DURING 2018

Chart 1

**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.

In December 2015, when it commenced the normalization of monetary policy using its set of administered rates, the Federal Reserve set the IOER rate equal to the top of the target range for the federal funds rate and the offering rate associated with the ON RRP facility equal to the bottom of the target range.<sup>6</sup> With these settings for its administered rates, the Federal Reserve expected that by offering these alternative investments, competitive dynamics would maintain the federal funds rates well within the target range, with the IOER rate serving as a magnet for other money market rates. With overnight money market rates generally rising relative to the IOER rate in 2018, the Federal Reserve's technical adjustments at the June and December meetings, in which the IOER rate was increased by 5 basis points less than the increase in the target range, placed the IOER rate below the top of the target range. Setting the IOER rate at a spread to the top of the federal funds target range of initially 5 basis points, and then 10 basis points after the second adjustment, provided greater confidence that the EFFR would remain well within the target range in an environment of significant changes in money markets.

**REVERSE REPURCHASE AGREEMENTS**

To maintain the federal funds rate in the FOMC's target range, the FOMC directed the Desk to conduct ON RRP operations at an offering rate that was increased by 0.25 percentage point four times in 2018, ultimately reaching 2.25 percent. These operations were limited by the value of Treasury securities held outright in the SOMA that was available for such operations.<sup>7</sup> In addition, a daily limit of \$30 billion per counterparty continued to be imposed in ON RRP operations.

**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 MMFs, GSEs, and banks. The Desk's reverse repo operations were conducted over FedTrade, a proprietary trading 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. Since total demand at every operation in 2018 was significantly lower than the value of Treasury securities available

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for the operation, awards were always made at the specified offering rate to all counterparties.<sup>8</sup>

**Operational results.** Average daily take-up in the ON RRP operations decreased in 2018 to \$12 billion, representing the lowest daily average amount over a year since the introduction of the operation in 2013 (**Chart 1**). Excluding the first days of 2018, when take-up still reflected 2017 year-end effects, and outside of month-end dates, daily take-up in the ON RRP was muted. At month- and quarter-end dates, ON RRP take-up increased, but by a lower magnitude than had been observed in prior years.<sup>9</sup> As the availability of alternative investment options at more attractive rates, including rates on short-dated Treasury securities as well as rates on repos with securities dealers, increased in 2018, ON RRP take-up declined significantly, reaching a historical low of \$10 million on September 5, 2018. The decline in take-up was observed for all types of counterparties, but the relative size of the decline in take-up differed across groups. While MMFs continued to account for most ON RRP demand, with close to 80 percent of total take-up on average, GSEs increased their share from approximately 5 percent in 2017 to around 15 percent in 2018, on average.

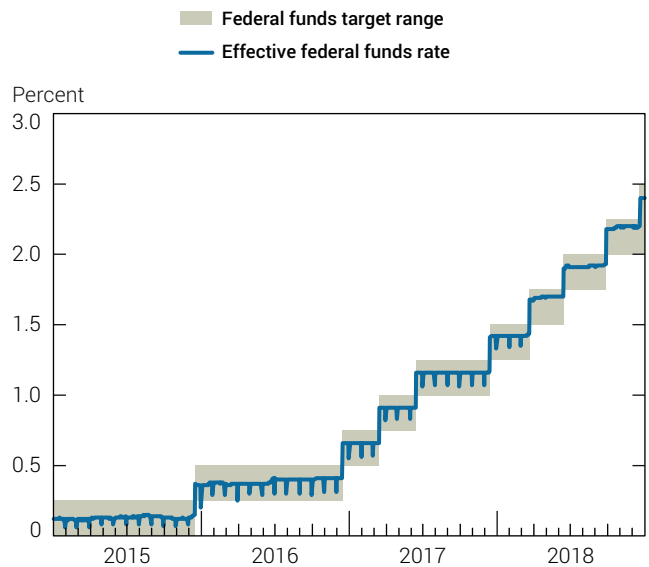
## MONEY MARKET DEVELOPMENTS

Use of IOER, with support from ON RRPs, successfully maintained the effective federal funds rate—a measure of the typical rate at which depository institutions and other eligible entities, primarily government-sponsored enterprises, conduct overnight unsecured transactions in central bank balances—within the FOMC’s target range throughout the year (**Chart 2**).

Each time the FOMC moved the IOER rate in accordance with an adjustment in the target rate range, the EFFR rose by a corresponding amount. Specifically, the EFFR rose by roughly 25 basis points following the increases in the federal funds target range and the IOER rate at the March and September FOMC meetings. The EFFR increased by roughly 20 basis points after the June and December FOMC meetings, at which the Committee increased the target range by 25 basis points and the IOER rate by 20 basis points. Each time, the distribution of trades in the federal funds market rose almost exactly by the amount of the adjustment

Chart 2

### Federal Funds Target Range and Effective Federal Funds Rate



Source: Federal Reserve Bank of New York.

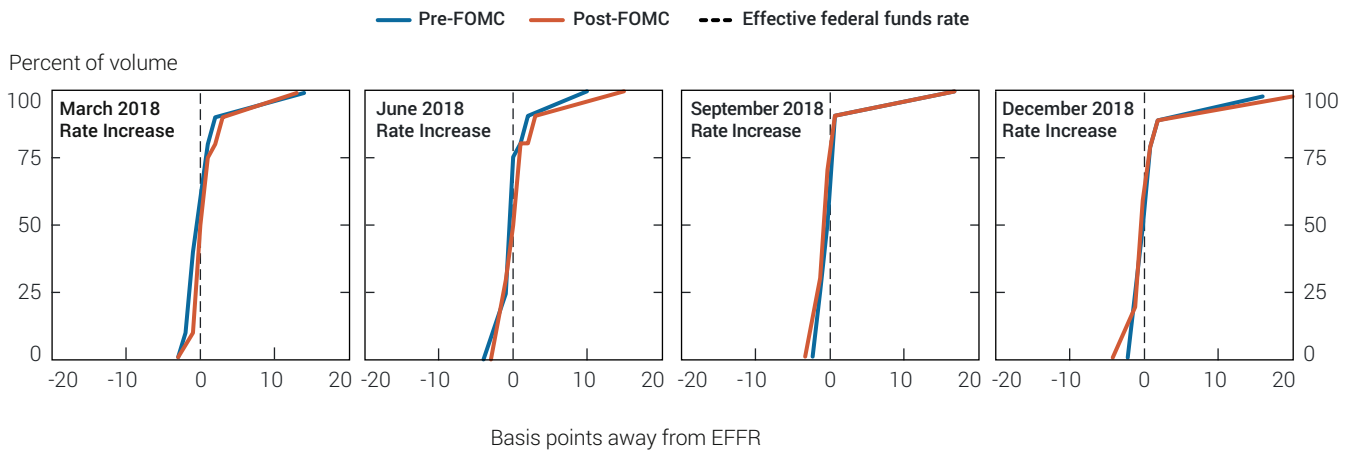
Note: Figures are daily.

in the IOER rate (**Chart 3**). Unlike in prior years, the EFFR remained stable around most month- and quarter-ends in 2018, a change from its tendency to decrease toward the bottom of the federal funds target range over period-ends.<sup>10</sup>

During 2018, a variety of trading dynamics across a range of money markets led to the bulk of federal funds transactions edging higher relative to the IOER rate, a development that in turn prompted the technical adjustment to the settings of the Federal Reserve’s tools. In particular, a significant increase in the issuance of Treasury bills had the effect of pushing rates on repurchase agreements higher, making repos a more attractive alternative investment for lenders in the federal funds market and thus drawing the supply of funds away from that market (**Box 2, p. 12**). Late in the year, in addition to the upward pressure from repo rates, increased demand for interest-bearing accounts offered by banks further reduced the supply of federal funds, adding upward pressure on the EFFR. Overnight repo rates rose above the top of the federal funds target range in December, by around 10 basis points, due to the Treasury supply effects. On the last day of the year, these effects were magnified by a sizable settlement of Treasury securities and elevated dealer inventories that, together with typical year-end

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Chart 3

**Average Distribution of Overnight Federal Funds Rates around the Effective Federal Funds Rate**

Source: Federal Reserve Bank of New York.

Notes: Each period comprises the ten non-month-end business days prior to and following a change to the federal funds target range. Distributions represent the volume-weighted 1st, 10th, 20th, 25th, 30th, 40th, 50th, 60th, 70th, 75th, 80th, 90th, and 99th percentiles of the spread between rates on federal funds transactions reported in the FR 2420 *Report of Selected Money Market Rates* at the time of publication and the concurrent effective federal funds rate.

balance sheet management activities, resulted in a temporary spike of roughly 50 basis points in overnight repo rates.

In addition, during 2018 there were changes in demand for federal funds amid the higher repo rates and the decline in reserves from very abundant levels. Some entities that tend to 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 reduced this arbitrage activity due to a narrowing in the spread. Meanwhile, some borrowers increased demand for federal funds from lenders that are treated more favorably in the liquidity coverage ratio (LCR) to improve their LCRs.<sup>11</sup> Additionally, some smaller domestic banks that generally have limited access to other short-term funding sources competed for federal funds by borrowing at higher rates. Notwithstanding the changing supply and demand-related trading dynamics, very few banks were willing to borrow in the federal funds market at rates above the IOER rate. The fact that the bulk of rates in the federal funds market remained within the target range suggested that the supply of reserve balances in the banking system remained ample during the year.

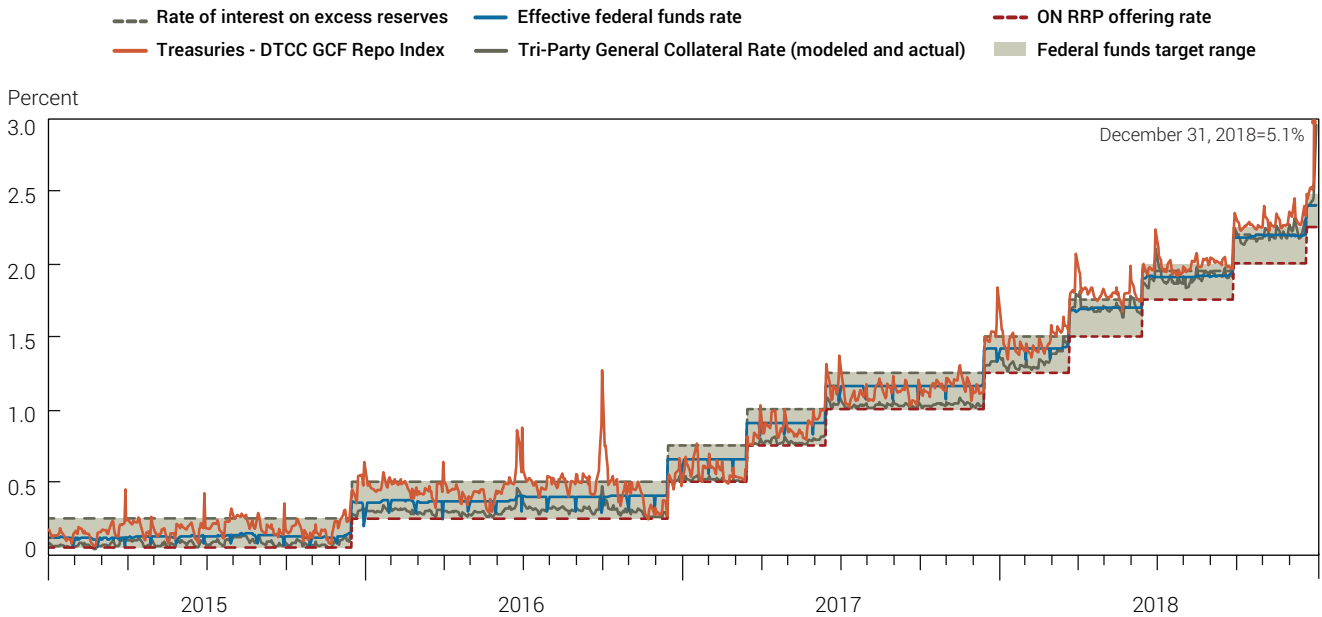
Data from a range of money markets demonstrate that the monetary policy implementation framework was successful in transmitting the monetary policy stance across a broad constellation

of short-term rates. Overnight rates in both secured and unsecured money markets moved up roughly 25 basis points with the increases in the IOER rate following the FOMC's March and September meetings and roughly 20 basis points with the increases in the IOER rate following the FOMC's June and December meetings—with some temporary exceptions of overnight repo rates, as discussed above—and fluctuated within generally stable ranges over the course of the year (**Chart 4**).<sup>12</sup> Moreover, although some short-term interest rates showed some upward movements during the year, the dispersion between various unsecured and secured overnight rates narrowed in 2018 and converged within the upper portion of the target range over the year (**Chart 5**).

The increase in overnight rates passed through into rates on term money market instruments, which generally increased in line with the Federal Reserve's policy rate increases. In 2018, the spread between the three-month LIBOR and overnight indexed swap rate showed some volatility in response to shifts in the supply of investable instruments, such as Treasury bills and commercial paper, rather than changes in the market assessment of bank credit risk. Nevertheless, term money markets continued to act as an important source of wholesale funding to firms in the United States and around the world.

## OPEN MARKET OPERATIONS DURING 2018

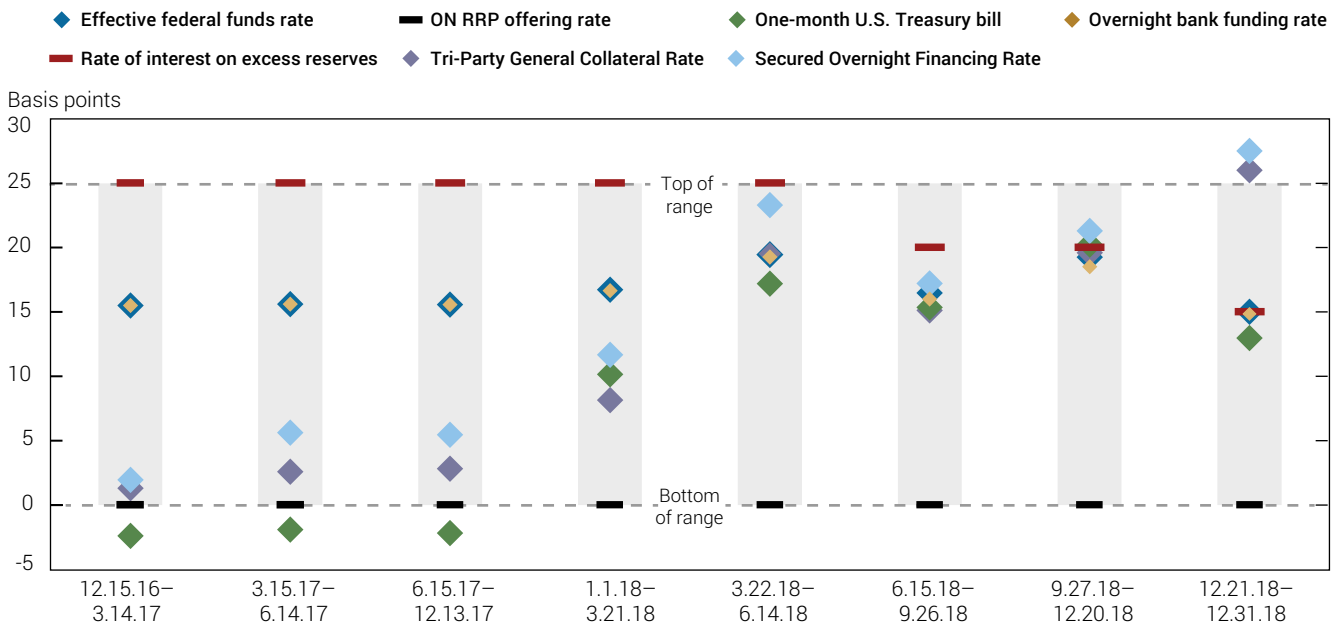
Chart 4  
**Overnight Money Market Rates**



Sources: Federal Reserve Bank of New York; DTCC Solutions LLC, an affiliate of The Depository Trust & Clearing Corporation; Bank of New York Mellon; JPMorgan Chase.

Notes: Figures are daily. Figures for the Tri-Party General Collateral Rate (TGCR) reflect the TGCR for April 3, 2018, through December 31, 2018, and modeled reproduction TGCR values for January 2, 2015, through April 2, 2018.

Chart 5  
**Overnight Rates within the Federal Funds Target Range**



Sources: Federal Reserve Bank of New York; Bloomberg Finance L.P.

Note: Data extend from December 15, 2016, through December 31, 2018, and the periods coincide with date ranges before and after increases in the FOMC's target range for the federal funds rate.

**OPEN MARKET OPERATIONS DURING 2018**

Box 2

## Secured Money Market Dynamics

The market for repurchase agreements secured by Treasury securities comprises three main segments: (1) a tri-party market, (2) a centrally cleared market, and (3) a bilateral market.<sup>a</sup> In the **tri-party market**, the cash lenders (for example, money market mutual funds) and cash borrowers (typically securities dealers) transact through a clearing bank that provides a range of collateral management, clearing, and settlement services. In the **centrally cleared market**, trades among several types of participants are conducted through The Depository Trust & Clearing Corporation's (DTCC) Fixed Income Clearing Corporation (FICC) service, with FICC serving as the central counterparty to all trades.<sup>b</sup> The **bilateral market** is thought of as being a market largely between securities dealers and leveraged accounts such as hedge funds, though details around these transactions remain unclear because of data scarcity.<sup>c</sup>

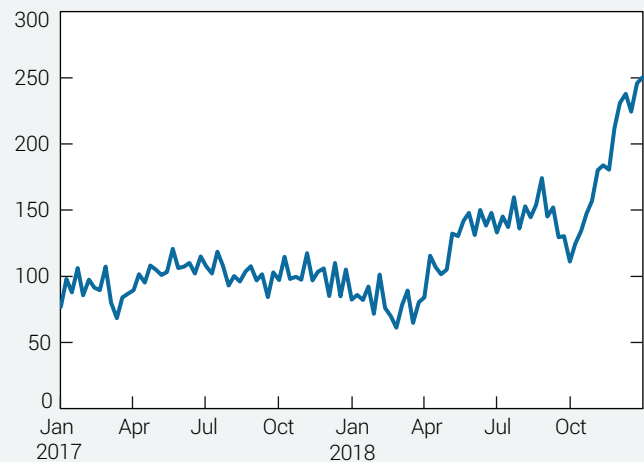
In 2018, two notable developments influenced the behavior and structure of U.S. Treasury repo markets.

The U.S. Treasury increased the net issuance of its marketable debt securities over the year by more than \$1 trillion—mainly by increasing the sizes of the

Treasury bill program and its auctions of nominal notes and bonds—to fund its rising near-term borrowing needs. The increase in net supply of U.S. Treasury securities and the concomitant increase in dealer holdings of Treasury securities observed throughout the year resulted in upward movements in repo rates. Securities dealers' business models typically rely on repo markets to finance securities inventories. Therefore, some dealers had to finance greater amounts of these securities in the repo markets because of higher Treasury issuance, thus creating upward pressure on repo rates. Additionally, increased Treasury bill yields associated with higher supply of Treasury bills drove some investments away from repos and toward Treasury bills. Overnight Treasury repo rates calculated and published by the New York Fed—the Secured Overnight Financing Rate (SOFR), the Broad General Collateral Rate (BGCR), and the Tri-party General Collateral Rate (TGCR)—fluctuated, but generally remained close to the effective federal funds rate (EFFR) throughout 2018, with an average spread of 2 to 4 basis points around the EFFR. However, repo rates temporarily rose above the federal funds target range on

### Primary Dealer Net Positioning in Treasury Securities

Billions of U.S. dollars



Source: Federal Reserve Bank of New York, FR 2004 data.

Note: Figures are weekly.

some occasions as a result of these Treasury supply effects, along with typical dynamics around month ends.

Meanwhile, some market participants' access to repo activity changed in 2018. In particular, so-called "sponsored" repo activity increased significantly during the year.

The FICC Sponsored Membership program allows "well capitalized" FICC members to sponsor their institutional clients, such as money market funds and hedge funds, to become cash lenders and/or borrowers in the bilateral FICC repo market. In the sponsored repo market, the

sponsoring FICC member facilitates transactions and guarantees the obligations of the sponsored client to FICC. Sponsored cash lenders potentially benefit from access to the higher lending rates, while sponsored cash borrowers are potentially able to access a larger pool of funds. Sponsored repo activity may help to reduce the rate differential that has typically existed among the various segments of the repo market reflecting segmentation in access, and may have contributed to the slight narrowing of the spread between the SOFR and the TGCR in the second half of 2018.

<sup>a</sup>Some features of the U.S. Treasury repo markets apply to other U.S. repo markets, such as the agency debt and mortgage-backed securities repo markets.

<sup>b</sup>The centrally cleared market is predominantly used by securities dealers and comprises two subsegments: (1) an interdealer general collateral finance (GCF) market for transactions between securities dealers, and (2) a cleared bilateral market between securities dealers and/or other investors—FICC's Delivery versus Payment Services.

<sup>c</sup>Further information on how these segments and transactions are taken into account in the production process for the New York Fed's overnight Treasury repo reference rates can be found in Box 2 in the "Monetary Policy Implementation" section of Open Market Operations during 2017. Transactions carried out in the bilateral market are currently not included in the calculation of the Desk's overnight Treasury repo reference rates.

### OPEN MARKET OPERATIONS DURING 2018

## BALANCE SHEET MANAGEMENT

During 2018, consistent with the June 2017 Addendum to the Policy Normalization Principles and Plans, the FOMC directed the Desk to roll over maturing Treasury securities and to reinvest principal payments received from agency debt and agency MBS holdings in agency MBS only to the extent that they exceeded gradually rising monthly redemption caps (Table 1, p. 6).

## TREASURY SECURITIES OPERATIONS

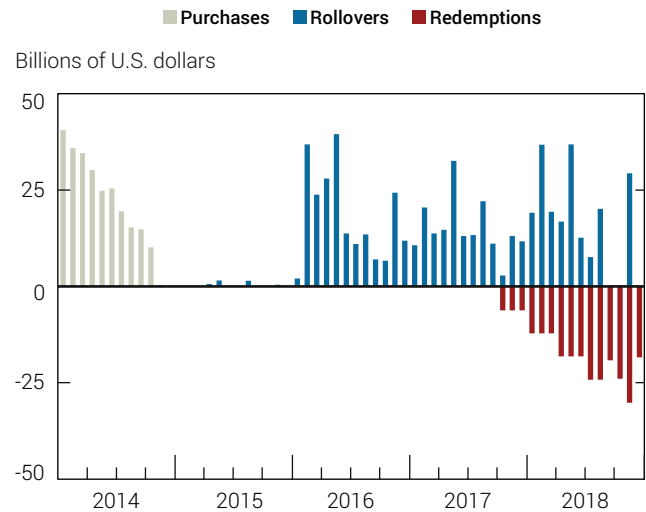
Throughout 2018, the FOMC continued to direct the Desk to roll over principal payments from maturing Treasury securities in excess of the monthly cap amount into new Treasury securities at auction. The cap amount increased in \$6 billion steps at three-month intervals throughout the year, from \$12 billion at the beginning of the year to its maximum value of \$30 billion in the fourth quarter of 2018.

### Rollovers

**Operational approach.** In line with long-standing practice, the Desk conducts Treasury rollovers by placing noncompetitive bids for the SOMA portfolio at Treasury auctions; these bids are treated as add-ons to announced auction sizes. The Desk rolls over the portion of monthly principal payments from SOMA holdings of maturing Treasury securities that exceeds the cap for that month, allocating that amount between the mid-month and end-of-month maturity dates in proportion to the amount of SOMA securities scheduled to mature on those dates. Bids for the SOMA securities at Treasury auctions are allocated across the securities being auctioned in proportion to their announced offering amounts.<sup>13</sup>

**Operational results.** The Desk rolled over \$197 billion in Treasury securities holdings in 2018, up from \$177 billion in the preceding year. Despite the increase in the redemption caps over the year, maturities in 2018 exceeded those in 2017, resulting in the higher reinvestment amount (Chart 6). The Desk redeemed \$229 billion in securities holdings over the course of 2018. The profile of securities acquired at auction is 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 rolls over reinvestments into newly issued three-, ten-, and thirty-year Treasury securities, while at the end of the month, reinvestments

Chart 6  
**SOMA Treasury Transactions and Redemptions**



Source: Federal Reserve Bank of New York.

can occur in newly issued two-, five-, seven-year, floating rate and inflation-linked Treasury securities. In 2018, there continued to be more end-of-month than mid-month rollovers; therefore, a larger proportion of the SOMA's maturing Treasury securities continued to be rolled into two-, five-, and seven-year Treasury securities (Chart 7).

## AGENCY MBS OPERATIONS

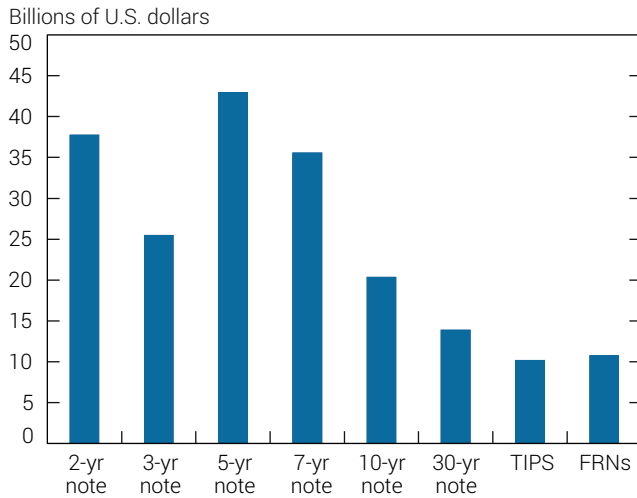
Throughout 2018, the FOMC continued to direct the Desk to reinvest agency debt and agency MBS principal payments in excess of the monthly cap into agency MBS. The cap amount increased in \$4 billion steps at three-month intervals throughout the year, from \$8 billion at the beginning of the year to its maximum value of \$20 billion in the fourth quarter of 2018. 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.

### 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

## OPEN MARKET OPERATIONS DURING 2018

Chart 7

**Distribution of SOMA Rollovers in 2018**

Source: Federal Reserve Bank of New York.

Note: Bars show the cumulative amount of Treasury securities acquired at each maturity point through rollovers in 2018.

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.<sup>14</sup>

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 cap amount from the amount of principal payments from agency debt and agency MBS expected to be received during each calendar month.<sup>15</sup>

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’s TBA purchases can settle—meaning that securities are delivered to the Federal Reserve—up to three months after the 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.

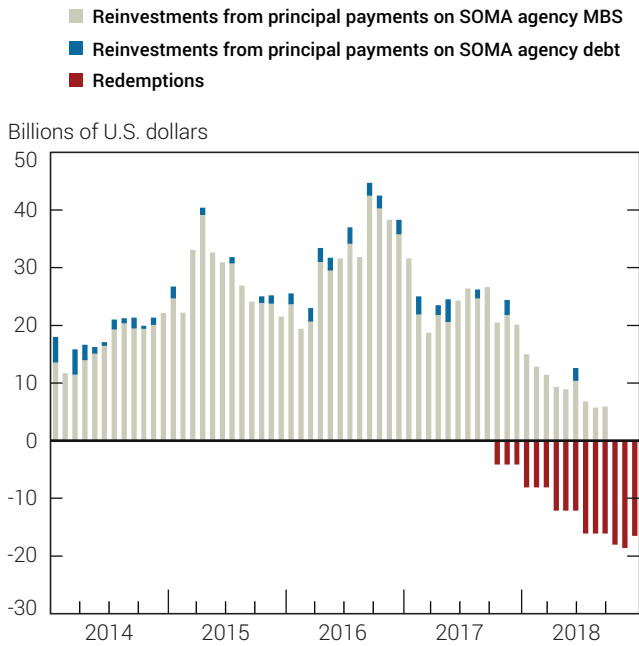
Starting with the October 2018 purchase period and for the remainder of the year, the Desk did not conduct reinvestment operations because the amount of principal payments from agency debt and agency MBS measured below the cap amount. However, it did conduct small-value purchases for operational readiness purposes. These exercises were conducted to maintain operational readiness to purchase agency MBS should the monthly principal payments exceed the cap amount. (See the “Operational Readiness” section of this report for a summary of monthly small-value exercises the Desk conducted starting in October.)

**Operational results.** The Desk received \$248.3 billion in principal payments from agency debt and agency MBS in 2018, a decline of \$54 billion from levels in 2017 (**Chart 8**).<sup>16</sup> Increases in the thirty-year primary mortgage rate over 2018 led to reduced incentive for homeowners to prepay their loans to refinance their mortgages. As the reinvestment caps were increased throughout the year, an increasing amount of principal payments were allowed to redeem without reinvestment. Specifically, of the principal payments received, \$87.5 billion was reinvested and \$160.8 billion was redeemed. This was a significant increase in redemptions relative to 2017, when a total of \$291 billion was reinvested and only \$12 billion was redeemed.

## OPEN MARKET OPERATIONS DURING 2018



Chart 8  
**SOMA Reinvestments and Redemptions of Agency MBS and Debt**



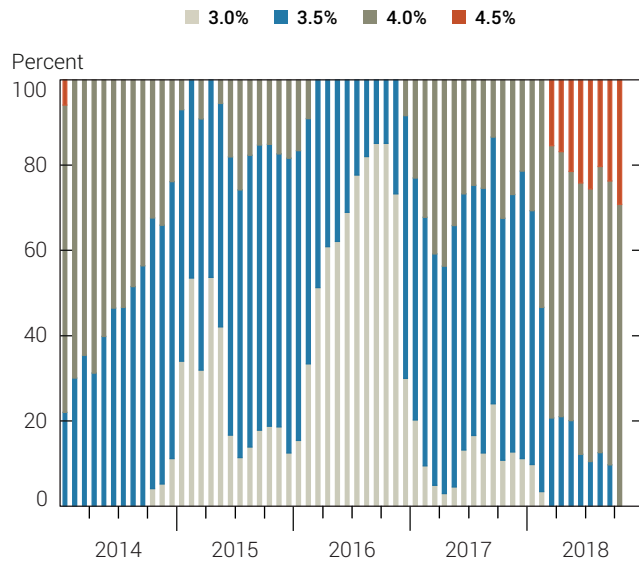
Source: Federal Reserve Bank of New York.  
 Note: Reinvestment purchases of agency MBS occur from mid-month to the following mid-month.

The increase in longer-term Treasury yields throughout much of 2018, which resulted, on average, in higher primary mortgage rates than in 2017, drove a moderate increase in the market’s production of higher-coupon agency MBS. This development prompted the Desk to shift the bulk of its thirty-year securities purchases from 3.5 percent coupons in 2017 to 4.0 percent coupons in 2018. Similarly, fifteen-year securities purchases largely shifted from 3.0 percent coupons in 2017 to 3.5 percent coupons in 2018 (Charts 9 and 10).

Nearly 92 percent of the Desk’s purchases in 2018 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.

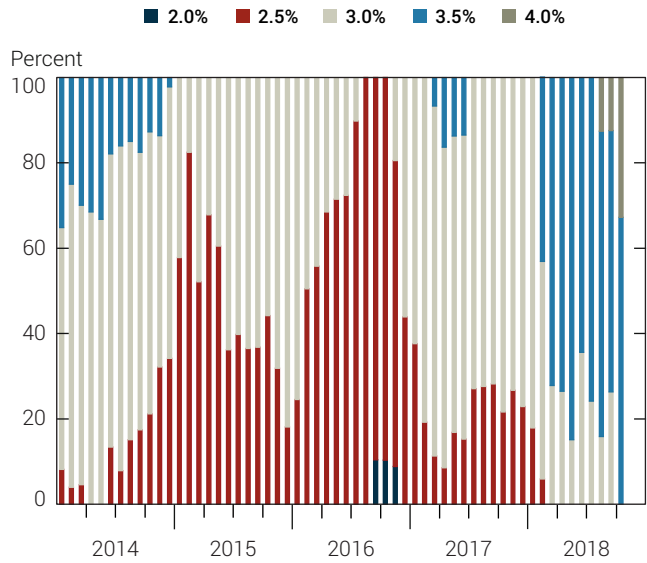
Desk purchases averaged approximately 9 percent of issuance of fixed-rate agency MBS over the course of 2018 (Table 3), a decline from last year’s average of 24 percent of issuance owing to the decrease in Desk reinvestment purchases.

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.

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.

OPEN MARKET OPERATIONS DURING 2018

Table 3

**Distribution of Agency MBS Operations in 2018**

Agency	Coupon (Percent)	SOMA Purchases (Billions of U.S. Dollars)	SOMA Purchases as a Share of Gross Issuance (Percent)
<b>30-year</b>			
Fannie Mae	3.0	0.6	13
	3.5	8.7	13
	4.0	20.9	11
	4.5	4.7	5
Freddie Mac	3.0	0.5	9
	3.5	6.4	12
	4.0	14.6	11
	4.5	3.4	5
Ginnie Mae	3.0	1.1	9
	3.5	10.4	13
	4.0	15.2	11
	4.5	4.6	5
<b>Subtotal</b>		<b>91.2</b>	<b>9</b>
<b>15-year</b>			
Fannie Mae	2.5	0.2	15
	3.0	2.0	18
	3.5	2.5	16
	4.0	0.1	1
Freddie Mac	2.5	0.2	14
	3.0	1.4	15
	3.5	2.0	15
	4.0	0.1	2
<b>Subtotal</b>		<b>8.4</b>	<b>12</b>
<b>Total</b>		<b>99.6</b>	<b>9</b>

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

Notes: Figures are for calendar year 2018 and are rounded. SOMA purchases as a share of gross issuance considers fixed-rate agency MBS issued in 2018, including non-TBA-eligible securities, and excludes purchases conducted for the purpose of testing operational readiness. Subtotal shares are calculated using gross issuance of all coupons with original terms to maturity of fifteen or thirty years, including those not purchased for the SOMA. Total share is calculated using gross issuance of all coupons and all original terms to maturity.

**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, and in accordance with the FOMC's directive, the Desk could conduct dollar roll sales to facilitate settlement.<sup>17</sup> 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.

Settlement of the Desk's agency MBS reinvestment transactions was smooth throughout 2018. As a consequence, the volume of dollar roll sales was very small, representing an average of 1.2 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.<sup>18</sup> Indeed, daily and intraday indicators of market functioning and liquidity conditions in the agency MBS market were healthy in 2018. 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 2018, and were slightly lower on net over the year.

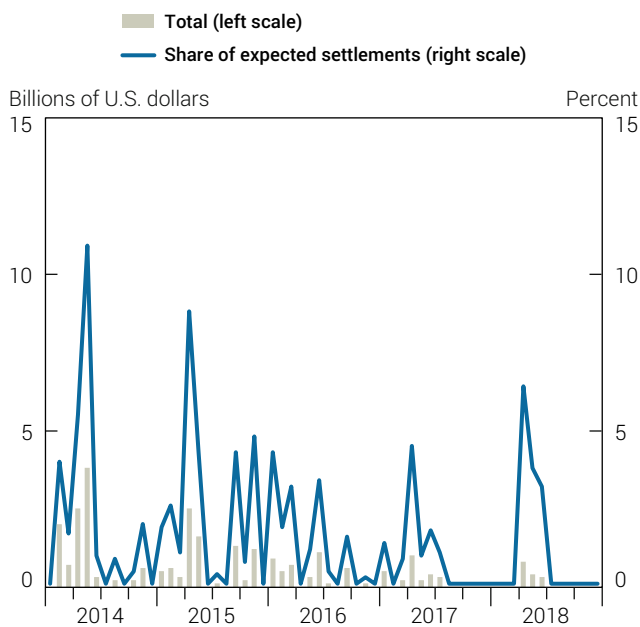
**CUSIP Aggregation**

In 2018, 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.<sup>19</sup> 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

**OPEN MARKET OPERATIONS DURING 2018**

Chart 11  
**SOMA Dollar Roll Sales**



Source: Federal Reserve Bank of New York.

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

costs, which are assessed on a per-CUSIP basis. In 2018, nearly 8,017 CUSIPs were aggregated into 15 new agency MBS; the newly aggregated securities had a face value of approximately \$244 billion at the time of issuance. Since the beginning of the 2015 CUSIP aggregation initiative, nearly 69,031 CUSIPs have been consolidated into 274 new agency MBS, with a face value of \$1.46 trillion at the time of issuance. Taking account of these aggregations, the SOMA agency MBS portfolio held 36,784 CUSIPs at the end of 2018.

## 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 2018, 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

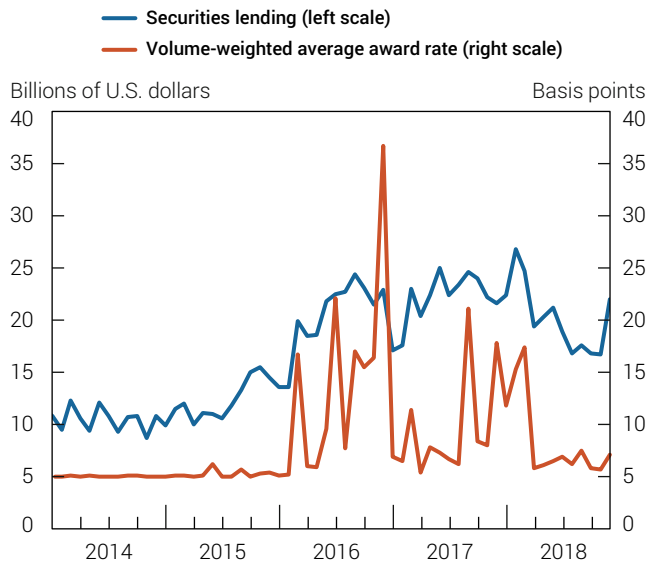
During 2018, SOMA securities lending volumes in Treasury securities averaged \$20 billion per day and the volume-weighted average bid fee on Treasury securities averaged 9 basis points, both slightly below levels in 2017 when volumes averaged \$22 billion per day and the volume-weighted average bid fee was 10 basis points (**Chart 12**).

The decline in dealer demand for borrowing Treasury securities from SOMA holdings was primarily the result of increased availability in the market of recent issues, given the increased net issuance of Treasury securities, and the lower number of episodes of on-the-run securities trading with an extreme scarcity premium compared with prior years.<sup>20</sup> Demand to borrow on-the-run securities from SOMA holdings also declined throughout the year because of the lower number of these securities available for borrowing from the SOMA Treasury securities portfolio as a result of reduced reinvestments.

Trading in the secondary Treasury market in general was liquid and efficient in 2018. Bid-ask spreads held steady at very narrow levels by historical standards, and trading volumes and quote

## OPEN MARKET OPERATIONS DURING 2018

Chart 12  
**SOMA Securities Lending in Treasuries**



Source: Federal Reserve Bank of New York.

Note: Figures are monthly averages of daily lending results.

sizes remained within historical ranges. The market experienced minimal settlement strains, an improvement from the prior year.

Agency debt was borrowed on only one occasion in 2018, far fewer occasions than in prior years. Loans of agency debt were collateralized with Treasury securities.

OPEN MARKET OPERATIONS DURING 2018

# Foreign Open Market Operations

Consistent with activity in recent years, the Desk conducted two types of foreign currency operations for the SOMA in 2018—the investment of SOMA foreign reserves and the execution of draw requests on standing U.S. dollar and foreign-currency liquidity 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 to meet anticipated foreign exchange intervention needs.<sup>21</sup> The stock of foreign reserves is largely a result of past intervention in foreign exchange markets. The FOMC and U.S. Treasury make decisions on foreign exchange intervention activity; in 2018, 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. Accordingly, 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. In 2018, the SOMA's foreign currency reserves were invested on an outright basis in German, French, Dutch, and Japanese government securities. Foreign currency reserves may also be invested 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

In 2018, the Desk conducted foreign sovereign debt transactions in the secondary market with commercial counterparties. Transactions were primarily conducted over TradeWeb, a commercial trading platform; in some instances, transactions were conducted over the phone. To ensure execution at competitive prices, the Desk solicited offers for individual securities from multiple counterparties simultaneously.

## INVESTMENT ACTIVITY

The Desk purchased foreign sovereign debt securities in the secondary market in order to meet its asset allocation target. The Desk also continued to maintain holdings of cash in various official accounts. As of year-end 2018, the SOMA foreign currency portfolio, on an amortized cost basis, totaled \$20.9 billion, compared with \$21.3 billion at the end of 2017. Since no transactions associated with foreign exchange intervention were undertaken and the interest income received was minimal given the low 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.<sup>22</sup> (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.<sup>23</sup> The U.S. dollar liquidity swap lines, which involve a temporary exchange of currencies between two central banks, are designed to

### OPEN MARKET OPERATIONS DURING 2018

improve liquidity conditions in 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.<sup>24</sup> Liquidity swaps are priced at the relevant U.S. dollar overnight indexed swap rate plus 50 basis points.

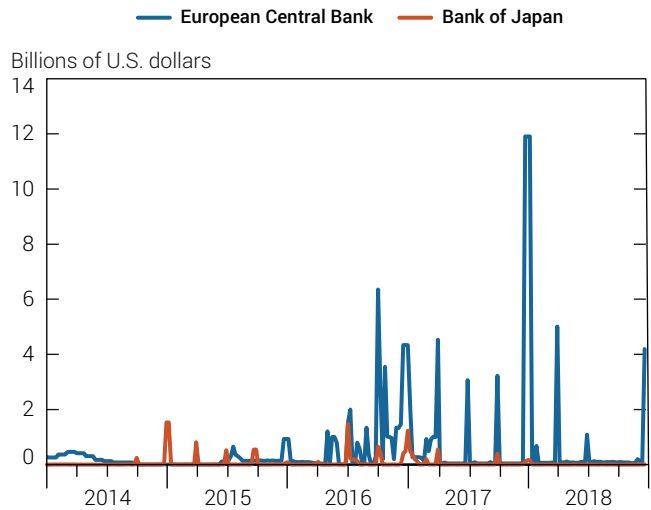
The Bank of England, Bank of Japan, European Central Bank, and Swiss National Bank currently hold weekly U.S. dollar liquidity-providing operations according to a schedule approved by the Chairman of the FOMC. When these operations are utilized, the FCB requests a draw on the U.S. dollar liquidity swap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

### OPERATIONAL RESULTS

Total dollar volume of U.S. dollar liquidity swap transactions fell 57 percent from 2017 to 2018. Outside of quarter-end periods, draws on the U.S. dollar liquidity swap lines with the European Central Bank and Bank of Japan peaked at \$672 million and \$6 million, respectively. At the end of each of the first three quarters of 2018, draws by the European Central Bank and Bank of Japan averaged \$2.1 billion and \$0.3 million, respectively, compared with \$3.6 billion and \$320 million, respectively, in 2017. At year-end 2018, draws on U.S. dollar liquidity swaps totaled \$4.2 billion and \$10 million for the European Central Bank and the Bank of Japan, respectively, compared with \$11.9 billion and \$160 million, respectively, at the end of 2017 (**Chart 13**).

Chart 13

### U.S. Dollar Liquidity Swaps Outstanding



Source: Federal Reserve Bank of New York.

Note: Figures are weekly.

Lower volumes of U.S. dollar liquidity swap transactions reflected an environment of more balanced demand and supply conditions in the foreign exchange swap market. Specifically, lower foreign demand for U.S. dollar assets, resulting from the flattening of the U.S. Treasury yield curve, reduced both U.S. dollar funding and hedging needs and thus demand for U.S. dollars in the foreign exchange swap market. Additionally, banks' ongoing adjustment to changes in the regulatory environment and corresponding improvement to their balance sheet management helped reduce constraints on banks' supply of U.S. dollars in the foreign exchange swap market, especially around quarter- and year-end dates, relative to previous years. This combination of lower private demand for U.S. dollars and improved conditions for banks to supply U.S. dollars contributed to pricing in the foreign exchange swap market that was generally lower than the rate offered on the U.S. dollar liquidity swap lines.

The Bank of Canada, Bank of England, 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 2018.

## OPEN MARKET OPERATIONS DURING 2018

# Operational Flexibility and Resiliency

In 2018, 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.<sup>25</sup>

### 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.<sup>26</sup> 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. There were twenty-three primary dealers in 2018.

### REVERSE REPURCHASE AGREEMENT COUNTERPARTIES

To enhance its ability to support the monetary policy objectives of the FOMC, the New York Fed has arrangements with an expanded set of counterparties with whom the Desk can conduct reverse repo

transactions. These RRP 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, 2018, there were 128 expanded RRP counterparties, comprising 98 money market funds from 31 investment management firms, 14 government-sponsored enterprises, and 16 banks.

### FOREIGN EXCHANGE COUNTERPARTIES

Foreign exchange counterparties are trading counterparties of the New York Fed in its foreign exchange operations conducted on behalf of the Federal Reserve and the U.S. Treasury. These counterparties 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. In addition, the New York Fed 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. There were twenty-one foreign exchange counterparties in 2018.

### 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, 2018, there

## OPEN MARKET OPERATIONS DURING 2018

were twenty-four foreign reserves management counterparties, representing 16 parent financial firms.

## Operational Readiness

Over the course of 2018, the Desk conducted small-value exercises in both domestic and foreign financial markets for the purpose of testing operational readiness. Small-value exercises involve end-to-end processes, 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 policy implementation operations. Small-value exercises are not executed to fulfill a policy directive, and thus the selection of an operation for testing should not be interpreted as a signal about the future timing or direction of changes in policy.

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 results were posted on the New York Fed's website (**Table 4**).

During the year, the Desk also took measures to improve operational readiness to transact in agency MBS. Starting in October 2018, principal paydowns of agency securities were below the \$20 billion cap each month, and thus, as directed by the FOMC, the Desk did not reinvest principal payments. However, at that time the Desk began conducting small-value purchases of these securities on a regular basis in order to maintain operational readiness. In addition, in line with expectations for the introduction of Uniform Mortgage-Backed Securities (UMBS) under the Federal Housing Finance Agency's Single Security Initiative (SSI), the Desk worked on developing the capability to purchase UMBS over the course of 2019 and to convert some portion of existing Freddie Mac MBS holdings to UMBS, enabling a more efficient management of the SOMA portfolio through, for example, additional aggregation of Fannie Mae and Freddie Mac CUSIPs.<sup>27</sup>

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.<sup>28</sup>

## Operational and Cyber Resiliency

The Federal Reserve, its counterparties, and its customers operate in an increasingly complex environment in which advanced trading systems and platforms, new technologies, and 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, 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 risks posed by cyber threats. Relatedly, the New York Fed also attested in 2017 and 2018 to the SWIFT Customer Security Programme (CSP).<sup>29</sup>

### OPEN MARKET OPERATIONS DURING 2018



Table 4

**Small-Value Exercise Results in 2018: Domestic Operations**

Operation Type	Operation Date	Maximum Amount (Millions of U.S. Dollars)	Operation Amount (Millions of U.S. Dollars)	Additional Information
Repurchase agreements	May 9	75	64	Term tenor; multi-tranche (Treasury, agency, and agency MBS)
	May 16	75	65	Overnight tenor; multi-tranche (Treasury, agency, and agency MBS)
	December 4	75	66	Term tenor; multi-tranche (Treasury, agency, and agency MBS)
	November 15	75	66	Overnight tenor; multi-tranche (Treasury, agency, and agency MBS)
Reverse repurchase agreements	May 14	175	87	Term tenor; Treasury collateral
	May 23	75	67	Overnight tenor; agency MBS collateral
	November 28	175	95	Term tenor; Treasury collateral
	November 19	75	72	Overnight tenor; agency MBS collateral
Treasury outright purchases	February 22	200	100	TIPS with maturities between 2 and 30 years
	August 16	100	100	Bills with maturities between 4 and 13 weeks
Treasury outright sales	April 5	200	100	TIPS with maturities between 2 and 10 years
	October 18	50	47	Bills with maturities between 3 and 4 weeks
Treasury bill rollovers	October 11	26	26	Rollover of October 11, 2018, bill into the 4-week bill
Securities lending	February 14	115	78	Conducted utilizing a backup tool
	October 24	115	71	Conducted utilizing a backup tool
Agency MBS TBA purchases	October 16– November 14	300	286	Monthly periods run from mid-month to mid-month
	November 15– December 13	300	290	Monthly periods run from mid-month to mid-month
	December 14– January 14	300	290	Monthly periods run from mid-month to mid-month
Agency MBS outright sales	May 22	90	60	3 specified pools
	May 24	90	60	3 specified pools
	November 27	90	67	3 specified pools
	November 29	90	67	3 specified pools
Agency MBS coupon swaps	April 24-25	20	5	Sell Fannie Mae 30-year 4.0% Buy Fannie Mae 30-year 4.5%
			5	Sell Ginnie Mae II 30-year 4.5% Buy Ginnie Mae II 30-year 3.5%
			5	Sell Fannie Mae 15-year 3.5% Buy Fannie Mae 15-year 3.0%
			5	Sell Freddie Mac 30-year 4.0% Buy Freddie Mac 30-year 4.5%
	August 20-21	20	5	Sell Fannie Mae 30-year 4.0% Buy Fannie Mae 30-year 4.5%
			5	Sell Fannie Mae 15-year 3.5% Buy Fannie Mae 15-year 3.0%
			5	Sell Ginnie Mae II 30-year 4.0% Buy Ginnie Mae II 30-year 4.5%
			5	Sell Freddie Mac 30-year 4.5% Buy Freddie Mac 30-year 3.5%

Source: Federal Reserve Bank of New York.

Note: Figures may be rounded.

**OPEN MARKET OPERATIONS DURING 2018**

Table 5

**Small-Value Exercise Results in 2018: Foreign Operations**

Operation Type	Operation Date	Operation Amount	Additional Information
Repurchase agreements	February 13	€1 million	Overnight tenor; euro-denominated sovereign debt
	July 10	€1 million	Overnight tenor; euro-denominated sovereign debt
	November 20	¥100 million	7-day tenor; yen-denominated sovereign debt
Term deposits	March 12	€1 million	Euro-denominated callable term deposit
	March 19	€1 million	Early liquidation of a euro-denominated callable term deposit
Sovereign debt sales	April 10	€1 million	Sale of euro-denominated sovereign debt
	December 11	¥100 million	Sale of yen-denominated sovereign debt
	March 22	CHF 51,000	Liquidity swap with the Swiss National Bank
Liquidity swaps	April 19	€51,000	Liquidity swap with the European Central Bank
	April 24	CAD 51,000	Liquidity swap with the Bank of Canada
	October 11	\$51,000 each	Liquidity swaps with the Bank of Canada, Bank of England, European Central Bank, and Swiss National Bank
	October 22	¥51,000	Liquidity swap with the Bank of Japan
	November 6	£51,000	Liquidity swap with the Bank of England

Source: Federal Reserve Bank of New York.

Note: Figures may be rounded.

Table 6

**Term Deposit Facility Operation Results in 2018**

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 17	May 24	7	IOER + 1 (176)	250.0	3.7	23
Aug 23	Aug 30	7	IOER + 1 (196)	250.0	2.5	19

Source: Board of Governors of the Federal Reserve System.

Note: Awarded amount figures may be rounded.

**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 2018, the New York Fed reinforced 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

**OPEN MARKET OPERATIONS DURING 2018**

locations throughout the Federal Reserve. 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.

## OPEN MARKET OPERATIONS DURING 2018



# Selected Balance Sheet Developments

The overall size of the Federal Reserve's balance sheet declined during 2018 as the FOMC continued the program, initiated in October 2017, of gradually reducing the Federal Reserve's domestic securities holdings. As a share of U.S. nominal GDP, the size of the balance sheet declined roughly 3 percent in 2018 to around 20 percent.

The decrease in the size of the balance sheet over the year was driven by a reduction in the SOMA's holdings of Treasury and agency securities; these declines were matched by a decline in reserve balances (**Box 3**).<sup>30</sup> In addition, during the year the composition of liabilities shifted, with growth in non-reserve liabilities marginally adding to the decline in reserve balances that resulted from the runoff in the portfolio. Non-reserve liabilities in aggregate grew slightly over the year, with increases in some of these liabilities, such as Federal Reserve notes and the Treasury General Account, largely offset by reduced usage of the ON RRP facility.

The portfolio continued to contribute to elevated levels of Federal Reserve income in 2018, although net income was lower than in 2017 because of higher interest expense. Remittances to the Treasury Department decreased during the year because of the decline in net income. The domestic portfolio moved to a small unrealized loss position in 2018 because of a rise in interest rates.

## Selected Assets

The SOMA comprises the Federal Reserve's domestic and foreign portfolios, as well as the short-term credit that the Federal Reserve extends to foreign central banks through 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.

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 SOMA's domestic securities portfolio, which consists of Treasury and agency securities held on an outright basis, continued to decrease in 2018 as securities were allowed to mature without reinvestment, subject to the redemption caps defined by the FOMC in the June 2017 Addendum to the Policy Normalization Principles and Plans. Since the start of the process of reducing the Federal Reserve's holdings of securities in October 2017, a total of \$405 billion of Treasury and agency securities holdings has been redeemed without reinvestment. This amount reflects decreases of \$243 billion in Treasury securities holdings and \$162 billion in agency debt and MBS holdings.

As of year-end 2018, the domestic SOMA portfolio was composed of Treasury securities totaling \$2.22 trillion (58 percent), agency MBS totaling \$1.64 trillion (42 percent), and agency debt totaling \$2 billion (less than 1 percent) (**Chart 14, p. 30**).<sup>31</sup> Although agency debt and agency MBS securities holdings declined at a slightly slower pace than Treasury securities holdings, the share of the portfolio held in each asset type changed only minimally in 2018.

### Treasury Holdings

During 2018, the par size of the Treasury portfolio declined from approximately \$2.45 trillion to approximately \$2.22 trillion as maturing Treasury securities were only reinvested to the extent that they exceeded the redemption cap, with the size of the cap gradually

## OPEN MARKET OPERATIONS DURING 2018

Box 3

# Explaining Changes in the Federal Reserve’s Balance Sheet

The Federal Reserve’s assets primarily comprise its holdings of domestic securities, namely Treasury and agency securities. Before the financial crisis, total assets were funded predominately by Federal Reserve notes and only in part by a number of other Federal Reserve liabilities, such as depository institutions’ reserve balances, the Treasury General Account (TGA), the foreign repo pool, and other deposits. Today, these other liabilities finance a larger share of assets. The overall size and composition of the balance sheet can be affected by the decisions of the Federal Reserve as well as by changes in the demand for Federal Reserve liabilities from depository institutions, from the Treasury, and from the public that are unrelated to monetary policy. The stylized representation of the central bank’s balance sheet shown below illustrates some of these mechanics.

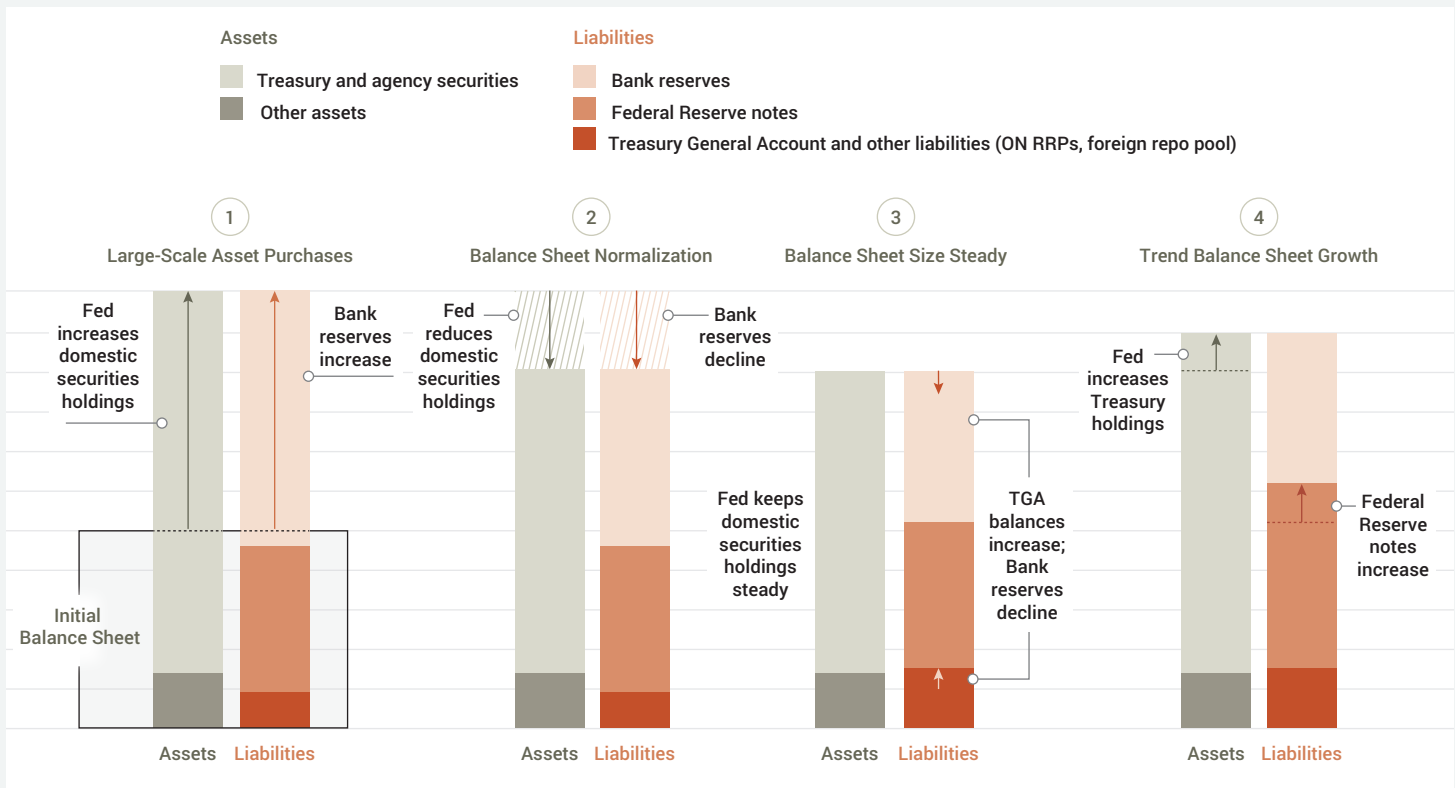
**Example 1** shows how the balance sheet would change if the FOMC decided

to purchase U.S. securities to ease monetary policy—for example, if more accommodative policy were needed than could be achieved by lowering short-term interest rates. Assets would increase as the FOMC directed purchases of domestic securities, such as Treasury securities; all else equal, these increases are funded with higher reserve balances that depository institutions hold at the Federal Reserve. This increase in reserves occurs because when the Federal Reserve purchases securities, it credits the account of the clearing depository institution used by the primary dealer from whom the securities are purchased. These actions would result in an increase in the size of both assets and liabilities and a change in the composition of liabilities.

**Example 2** shows the opposite situation. If the FOMC decided to shrink the size of its securities holdings—for example, by redeeming its holdings instead of reinvesting principal payments—as it

decided to do in 2017, the decreased amount of total assets would result in lower reserve balances, all else equal. For example, when the Federal Reserve redeems a Treasury security, the Treasury repays the Federal Reserve by reducing its balances with the Federal Reserve; reserves subsequently decline when the Treasury replenishes its cash balances. These actions would result in a decrease in the size of assets and liabilities and a change in the composition of liabilities.<sup>9</sup>

**Example 3** shows how the composition of the balance sheet would change if the Federal Reserve decided to keep the overall size of the balance sheet steady and let changes in reserve balances offset changes in the level of other liabilities. For example, all else equal, when tax payments are made to the Treasury, funds flow from the accounts of depository institutions to the Treasury’s account held at the Federal Reserve (the TGA). These developments result in a change in



## OPEN MARKET OPERATIONS DURING 2018

the composition of liabilities, while the size of the balance sheet remains unchanged.

**Example 4** shows how the balance sheet would change if the level of Federal Reserve liabilities increased and the FOMC decided to match this increase with greater holdings of securities. Prior to the crisis, persistent trend growth in Federal Reserve notes held by the public—reflecting growth in the size of the economy—was typically matched on the asset side by increased holdings of Treasury securities. Growth in Federal Reserve notes would initially be offset with lower reserve balances. This happens because when a U.S. depository institution needs more currency to meet its customers’ needs, it asks the Federal Reserve for more Federal Reserve notes. The Federal Reserve debits the account of the depository institution, resulting in a reduction in reserve balances. Then, the FOMC would purchase Treasury securities to replenish reserve balances on the liabilities side.

These developments result in a change in the composition of liabilities and an increase in the size of both assets and liabilities.

The size of the Federal Reserve’s balance sheet increased from \$900 billion at the end of 2006 to about \$4.5 trillion at the end of 2014—or from 6 percent of GDP to about 25 percent of GDP—mainly because of the Federal Reserve’s purchases of Treasury and agency securities under the various large-scale asset purchase programs conducted in response to persistent economic weakness following the financial crisis. The expansion in assets was funded primarily by an increase in the supply of reserve balances, which rose from about \$10 billion at the end of 2006 to a high of \$2.8 trillion—or almost 16 percent of GDP—in October 2014.

More recently, as the FOMC initiated its balance sheet normalization program in October 2017 to gradually reduce its securities holdings, the size of the Federal Reserve’s balance sheet declined by

around \$400 billion to \$3.9 trillion as of the end of 2018. While much of the associated decline in reserve balances—which at roughly \$1.6 trillion were almost 43 percent lower than peak levels reached in 2014—stemmed from the runoff in domestic securities holdings, declines were also the result of growth in liabilities other than reserve balances.

At around 20 percent of U.S. nominal GDP, the size of the Federal Reserve’s balance sheet is much smaller than that of other reserve-currency central banks in major advanced foreign economies operating with ample reserve balances—for example, this ratio is 38 percent for the European Central Bank and 100 percent for the Bank of Japan—although the difference partly stems from the Federal Reserve being much further along in the policy normalization process after the global financial crisis. Additionally, differences in central bank balance sheets reflect the disparate financial systems across countries.

<sup>32</sup>For a detailed discussion of balance sheet mechanics, see Deborah Leonard, Antoine Martin, and Simon Potter, “How the Fed Changes the Size of Its Balance Sheet,” *Liberty Street Economics* (blog), July 10, 2017, <http://libertystreeteconomics.newyorkfed.org/2017/07/how-the-fed-changes-the-size-of-its-balance-sheet.html>, and Deborah Leonard, Antoine Martin, Simon Potter, and Brett Rose, “How the Fed Changes the Size of Its Balance Sheet: The Case of Mortgage-Backed Securities,” *Liberty Street Economics* (blog), July 11, 2017, <http://libertystreeteconomics.newyorkfed.org/2017/07/how-the-fed-changes-the-size-of-its-balance-sheet-the-case-of-mortgage-backed-securities.html>.

rising for most of the year and reaching its maximum level of \$30 billion in October 2018.<sup>32</sup>

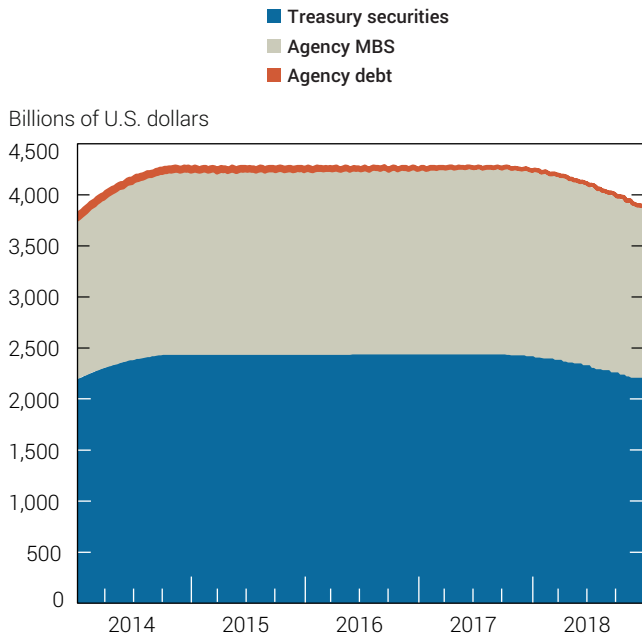
The weighted average maturity of the portfolio increased from 7.7 years to 8.1 years during the year as Treasury security redemptions left a larger proportion of longer-maturity securities in the portfolio. (For more information on Treasury rollovers, see the “Treasury Securities Operations” section of this report.) Specifically, the share of the Treasury portfolio held in nominal coupon securities with less than six years to maturity declined slightly over the period, while the share held in longer-term securities increased moderately, and Floating Rate Notes (FRNs) and Treasury Inflation-Protected Securities (TIPS) were broadly unchanged (**Chart 15**). 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 with three to six years to maturity. The percentage of the portfolio held in TIPS remained small and the share held in FRNs was minimal.

SOMA holdings of Treasury securities as a share of the outstanding Treasury market decreased over the course of the year from 17.0 percent to 14.2 percent because of the combined decline in the Federal Reserve’s Treasury securities holdings and the increase of roughly \$1.14 billion in Treasury marketable debt held by the public.<sup>33</sup> 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 earlier large-scale asset purchase programs. Roughly 29.6 percent of outstanding Treasury coupon securities with ten to thirty years remaining until maturity was held in the

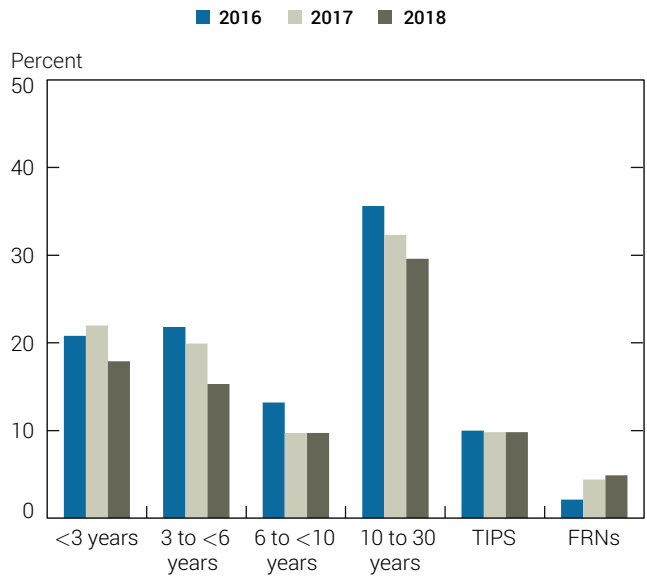
## OPEN MARKET OPERATIONS DURING 2018

Chart 14  
**Composition of SOMA Domestic Securities Holdings**



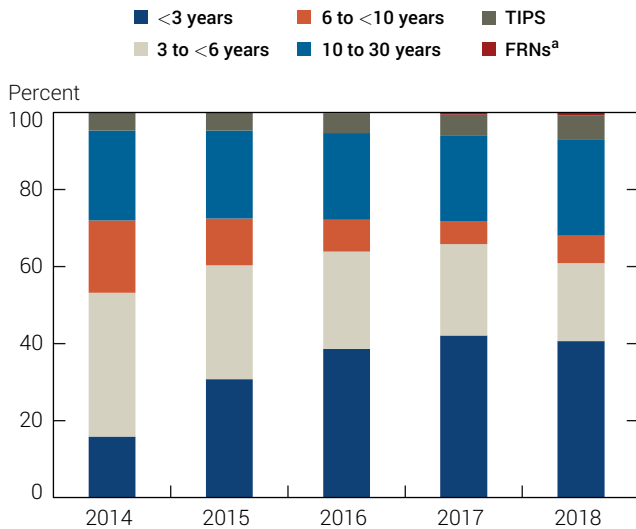
Source: Board of Governors of the Federal Reserve System.  
 Note: Figures are weekly and include unsettled holdings.

Chart 16  
**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 and exclude bills because the SOMA held zero bills in the years shown.

Chart 15  
**Distribution of SOMA Treasury Holdings**



Source: Federal Reserve Bank of New York.  
 Note: Figures are as of year-end.  
<sup>a</sup>Less than 1 percent of holdings in 2014, 2015, 2016, 2017, and 2018 are Floating Rate Notes (FRNs).

SOMA as of year-end, compared with 17.9 percent of outstanding Treasury coupon securities with up to three years remaining until maturity (Chart 16). Consistent with the SOMA’s concentrated holdings in longer-term securities, at the end of 2018, the weighted average maturity of the SOMA Treasury portfolio was greater than that of the outstanding stock of Treasury debt—8.1 years, as compared with 5.9 years.

**Agency MBS Holdings**

The SOMA’s holdings of agency MBS decreased by approximately \$146 billion during the 2018 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 reinvestment, see the “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 market, specifically in TBA contracts with coupon rates consistent with

**OPEN MARKET OPERATIONS DURING 2018**

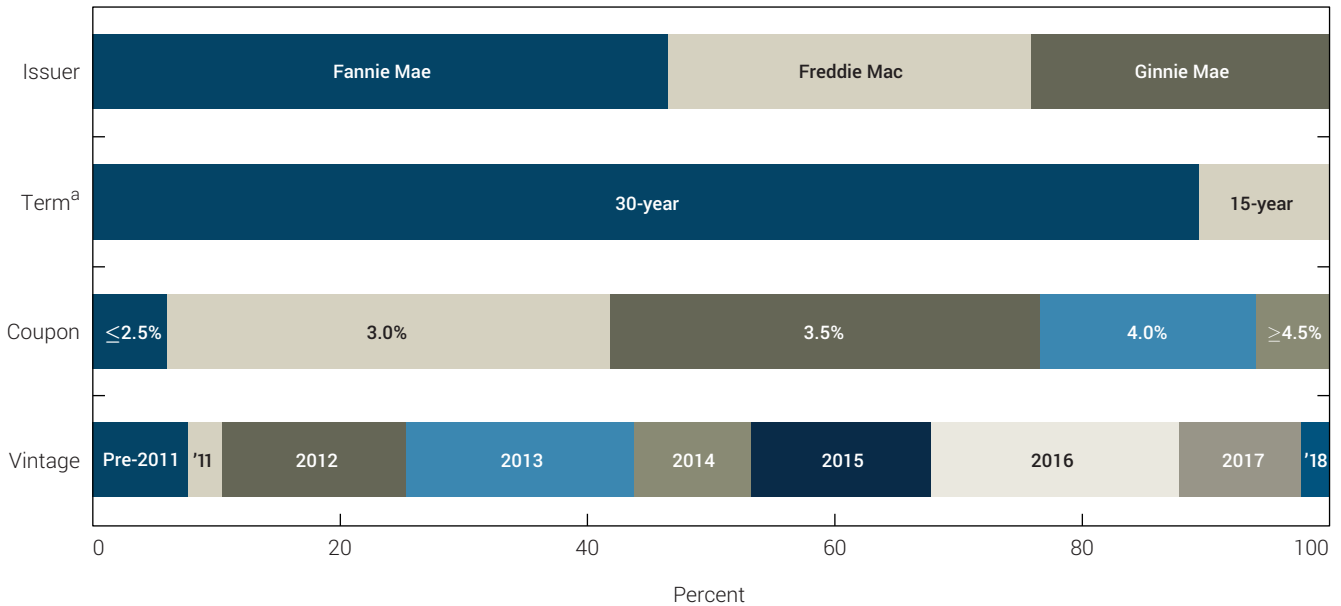


current agency MBS origination, agency MBS delivered to the SOMA were generally concentrated in more recently issued securities. Although these more recently issued securities were originated at higher mortgage rates than the securities that paid down over the course of the year, the small amount of purchases relative to the total agency MBS portfolio meant there was minimal effect on the overall composition of the portfolio. The composition of the portfolio across various dimensions—such as the agencies, terms, coupons, and vintages of the securities held—also evolved as a result of the replacement of securities refinanced or repaid over the years with newer securities. As of year-end, 32 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, 29 percent in MBS guaranteed by Freddie Mac, and 24 percent in MBS guaranteed by Ginnie Mae (Chart 17). Almost 90 percent of the portfolio was held in thirty-year MBS, with the remainder in fifteen-year MBS. As of the end of 2018, the weighted average life of the settled agency MBS

held in the SOMA was 6.96 years.<sup>34</sup> 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 2018.

SOMA holdings of agency MBS as a share of the outstanding stock of fixed-rate agency MBS declined during 2018, from 28 percent to 25 percent, as the size of agency MBS holdings decreased while the outstanding stock of agency MBS increased by roughly \$90 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 4.0 percent, slightly below the broader market’s weighted average coupon rate of 4.2 percent. Similarly, the weighted average age of loans held by the SOMA was fifty-three

Chart 17  
**Distribution of SOMA Agency MBS Holdings**



Source: Federal Reserve Bank of New York.

Notes: Figures are as of December 31, 2018. Holdings total \$1.64 trillion and consist of settled holdings only.

<sup>a</sup>Less than 1 percent of holdings are ten- and twenty-year agency MBS, which may be delivered into fifteen- and thirty-year TBA contracts, respectively.

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months, while the weighted average age of loans in the broader market was forty-six months.

### Agency Debt Holdings

Nearly \$2 billion in agency debt securities matured in 2018, leaving the SOMA with agency debt securities totaling roughly \$2 billion in face value at the end of the year—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 2019 and 2032 in small increments.

### PORTFOLIO RISK METRICS

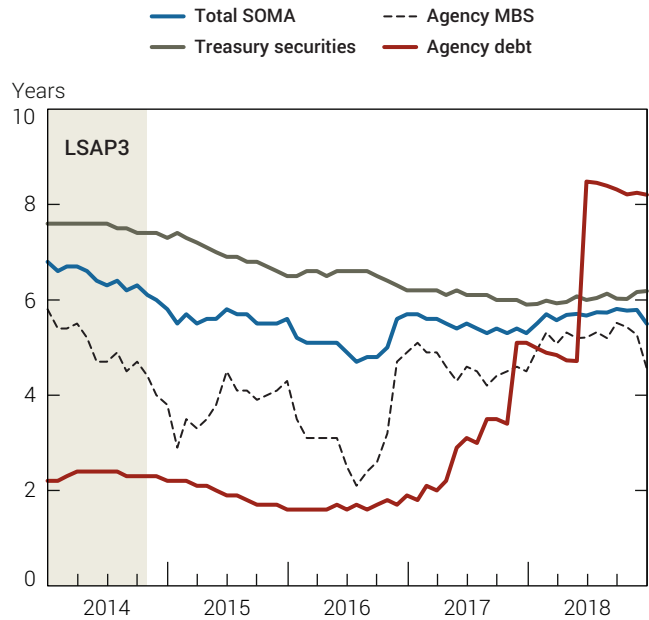
Duration measures the sensitivity of a security's price to changes in interest rates, and may be thought of as the weighted average time to maturity of cash flows from the portfolio. The longer the duration of a security, the more sensitive it will be to changes in interest rates. Duration is generally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

During 2018, the duration of the total SOMA domestic securities portfolio increased by 0.2 years to approximately 5.5 years. An increase of 0.3 years in the duration of the Treasury securities portfolio prompted the increase in the total portfolio's par-weighted average duration, as the duration of the agency MBS securities portfolio was little changed (**Chart 18**).<sup>35</sup> The duration of agency debt holdings increased by 3.1 years as a large share of the remaining agency debt portfolio matured; however, because the share of agency debt holdings is small, this development minimally impacted the average duration of the total portfolio.

The duration of Treasury securities held in the SOMA increased slightly, from 5.9 years to 6.2 years, largely as redemptions of Treasury securities holdings resulted in securities with longer maturities making up a larger share of the portfolio. The effective duration of the SOMA's holdings of agency MBS was unchanged over the year, on net, at 4.5 years, though it fluctuated during the year. Increases in duration in early 2018, prompted by an increase in primary mortgage rates, were offset by decreases in the fourth quarter as primary mortgage rates declined. The sensitivity of MBS duration to changes in interest rates highlights the prepayment risk absorbed by the SOMA portfolio—a risk arising from

Chart 18

### 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. Purchases of agency MBS under the third large-scale asset purchase program (LSAP3) began in September 2012.

the prepayment option embedded in agency MBS. (For more information, see Box 3, “Agency MBS Prepayment Uncertainty,” in the report, *Open Market Operations during 2017*).<sup>36</sup>

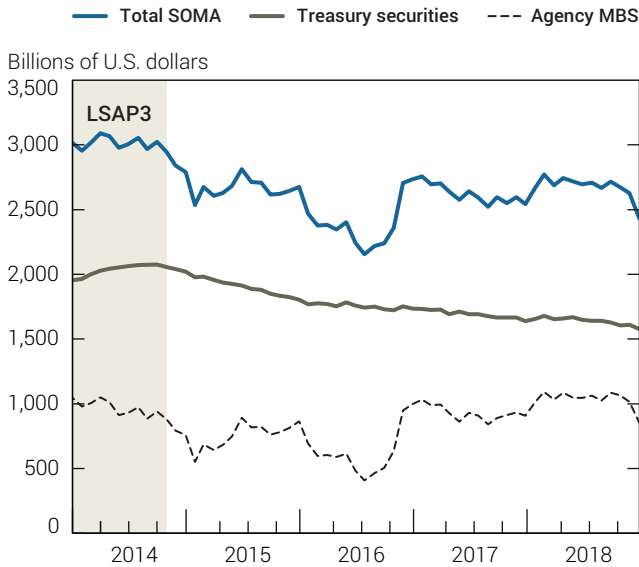
Measures of the dollar value of duration risk held in the SOMA portfolio declined slightly in 2018. One method of measuring dollar duration is in terms of ten-year equivalents—that is, the amount of ten-year Treasury securities that would be needed to match the duration risk of the portfolio. The SOMA portfolio's ten-year equivalent measure declined from \$2.54 trillion at the end of 2017 to \$2.51 trillion at the end of 2018 (**Chart 19**), driven by the decline in portfolio size, which more than offset the slight increase in the portfolio's weighted-average duration.

### SOMA FOREIGN CURRENCY-DENOMINATED HOLDINGS

The Federal Reserve holds foreign currency-denominated assets, which are invested to ensure adequate liquidity to meet

## OPEN MARKET OPERATIONS DURING 2018

Chart 19  
**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. Purchases of agency MBS under the third large-scale asset purchase program (LSAP3) began in September 2012. Agency debt is not shown owing to its minimal value.

anticipated foreign exchange intervention needs. (For more details, see the “Foreign Open Market Operations” section of this report.)

As of year-end 2018, the SOMA foreign currency portfolio totaled \$20.9 billion on an amortized cost basis, composed of \$12.4 billion of euro-denominated assets and \$8.5 billion of yen-denominated assets. The portfolio decreased \$400 million in U.S. dollar terms from 2017, primarily owing to an almost 5 percent depreciation of the euro against the dollar, which was partly offset by a nearly 3 percent appreciation of the yen against the dollar over the year. 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 20).

The duration of the SOMA’s holdings of euro-denominated assets was broadly unchanged during the year at 24.9 months at year-end 2018, while the duration of the SOMA holdings of

yen-denominated assets declined from 4.4 months at year-end 2017 to 2.4 months at year-end 2018.

**SHORT-TERM LIQUIDITY PROVISION**

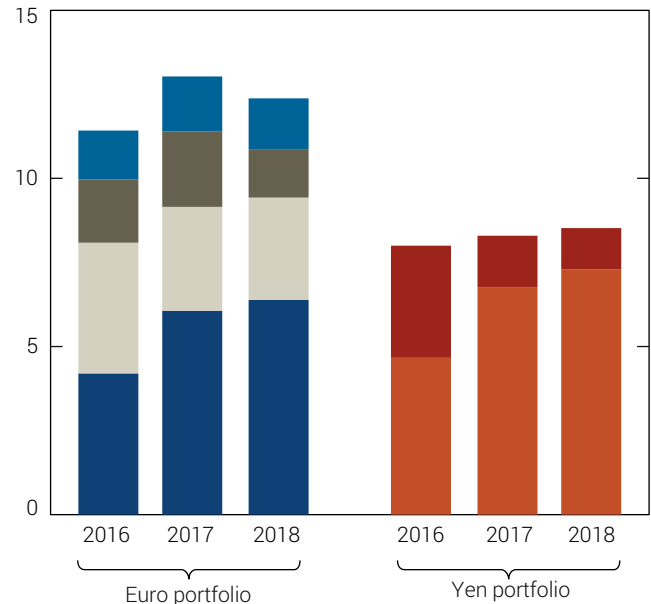
**PRIMARY CREDIT FACILITY**

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.<sup>37</sup> Loans are generally limited to overnight maturities and are initiated by depository institutions and approved by Reserve Banks. In 2018, the interest rate on primary credit loans began the year at 2 percent and was raised in conjunction with the FOMC’s decisions to raise the federal funds target range: the Board of Governors approved

Chart 20  
**Distribution of SOMA Foreign Currency Portfolio Holdings**



Billions of U.S. dollars

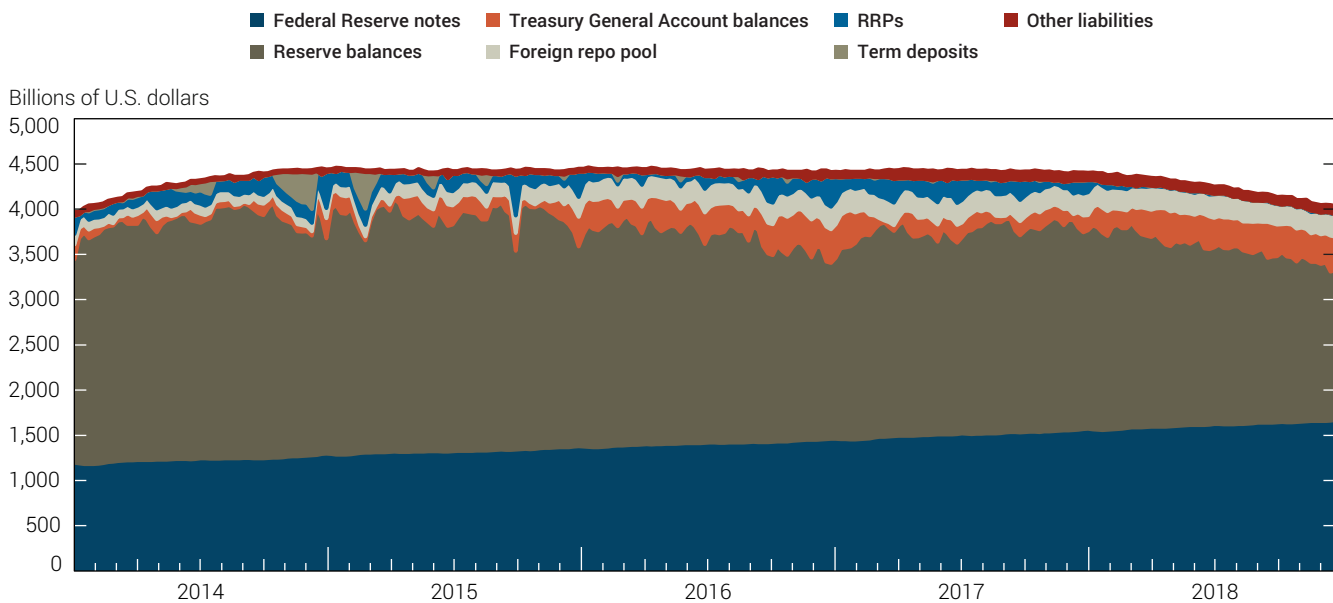


Source: Federal Reserve Bank of New York.

Note: Figures reflect amortized cost.

**OPEN MARKET OPERATIONS DURING 2018**

Chart 21  
**Federal Reserve Liabilities**



Source: Board of Governors of the Federal Reserve System.

Note: Figures are weekly.

25 basis point increases in March, June, September, and December, resulting in a discount rate of 3 percent by the end of the year.<sup>38</sup> 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 increased in 2018, though they remained within ranges seen in the post-crisis period. The average daily loan balance under primary credit rose from \$14 million in 2017 to \$21 million in 2018. The number of primary credit loans also increased, with a total of 2,810 loans originated in 2018, up from 2,495 loans in 2017. The majority of loans continued to be operational tests, but the number of non-test loans increased measurably, with a total of 1,052 loans in 2018, compared with 679 loans in 2017.<sup>39</sup> Despite this increase, the number of non-test loans remained within post-crisis ranges.

#### CENTRAL BANK LIQUIDITY SWAPS

The Federal Reserve maintains standing U.S. 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, swap line usage in 2018 reached its highest level at

the quarter- and year-end auctions of foreign central banks, with draws of around \$12 billion outstanding immediately following the 2017 year-end and around \$4.2 billion outstanding prior to the 2018 year-end. Including these year-end periods, the average outstanding value of swaps in 2018 totaled about \$677 million, \$181 million lower than in 2017. (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.<sup>40</sup> In 2018, the total level of liabilities and capital declined from the 2017 level, primarily as a result of the \$380 billion reduction in domestic securities holdings, which resulted in a decline in the level of reserve balances (Chart 21). In addition, the composition of liabilities shifted, with an increase in liabilities other than reserves and capital (Table 7) further reducing reserve balances; all else equal, an increase (decrease) in liabilities other than reserves results in a corresponding decrease (increase) in reserve balances.

#### OPEN MARKET OPERATIONS DURING 2018

Table 7

**Changes in Selected Federal Reserve Assets and Liabilities**

Billions of U.S. Dollars

	Assets <sup>a</sup>					Total <sup>b</sup>
	U.S. Treasury Securities	Agency MBS <sup>b</sup>	Agency Debt	Other Assets		
<b>Outstanding as of:</b>						
December 31, 2017	2,454.22	1,783.66	4.39	226.40		4,468.67
December 31, 2018	2,222.55	1,637.41	2.41	195.79		4,058.16
<b>Changes in the period</b>	(231.67)	(146.25)	(1.98)	(30.61)		(410.51)

	Liabilities						Total
	Reserve Balances	Federal Reserve Notes	Treasury General Account	ON RRP	Foreign Repo Pool	Other Liabilities and Capital	
<b>Outstanding as of:</b>							
December 31, 2017	1,954.43	1,570.73	228.93	319.60	244.36	150.62	4,468.67
December 31, 2018	1,555.95	1,671.44	402.14	41.85	262.16	124.62	4,058.16
<b>Changes in the period</b>	(398.48)	100.71	173.21	(277.75)	17.80	(26.00)	(410.51)

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

<sup>a</sup>Holdings of U.S. Treasury, agency MBS, and agency debt securities are face values.<sup>b</sup>Includes commitments to buy mortgage-backed securities.

The levels of many liabilities other than reserves and ON RRP, as well as the flows affecting their variability, are not closely related to monetary policy decisions.

**RESERVE BALANCES**

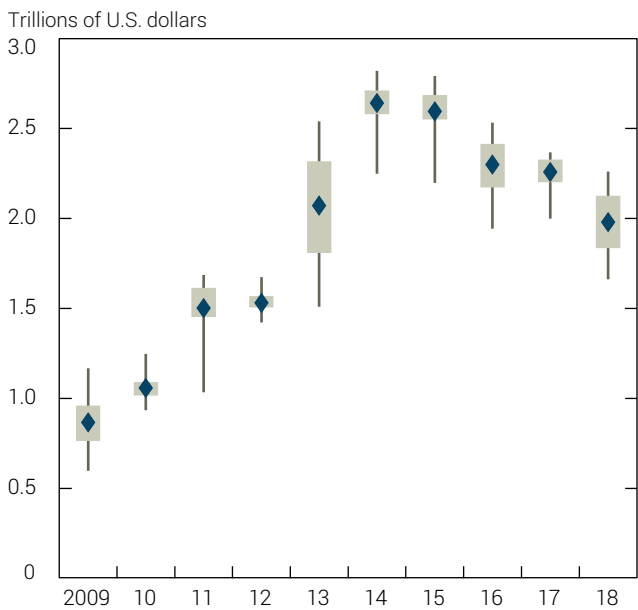
Reserve balances, which are deposits held by depository institutions at the Federal Reserve, represent one of the largest liabilities of the Federal Reserve.<sup>41</sup> Reserve balances outstanding totaled \$1.6 trillion at the end of 2018, down from \$2.0 trillion at the end of 2017 and about 43 percent lower than their October 2014 peak of \$2.8 trillion (**Chart 22**). 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.<sup>42</sup> 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.<sup>43</sup>

The \$398 billion decline in reserve balances in 2018 resulted primarily from the FOMC's program to reduce its Treasury and agency securities holdings from elevated levels. In addition, a modest aggregate increase in liabilities other than reserves added marginally to the decline in reserve balances. Reserves moved in a wider range than in 2017, as the domestic portfolio runoff reduced reserves to the lowest levels since early 2013 (**Chart 22**). On a day-to-day basis, reserves continued to be highly variable, with changes in TGA balances the largest contributor to that variability.

**OPEN MARKET OPERATIONS DURING 2018**

Chart 22  
**Reserve Balances**



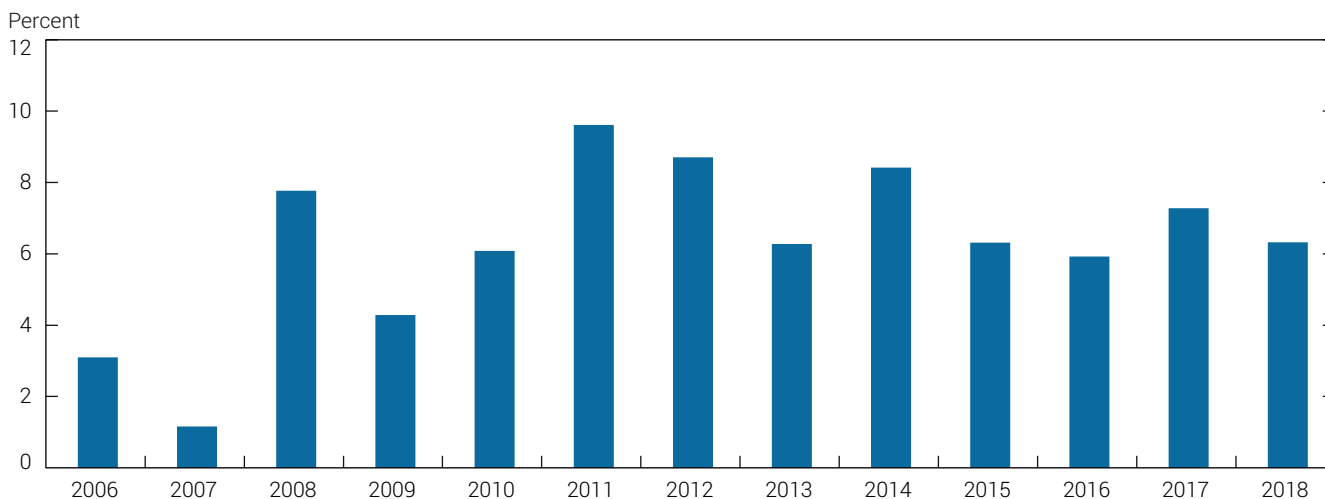
Source: Board of Governors of the Federal Reserve System.

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.

**FEDERAL RESERVE NOTES**

Federal Reserve notes, commonly known as currency in circulation (currency), remained an important liability in 2018, totaling \$1.6 trillion at the end of the year.<sup>44</sup> 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. The growth rate of currency outstanding has generally reflected the pace of expansion of economic activity in nominal terms, though it has also fluctuated somewhat with a variety of factors other than economic growth, such as the demand for U.S. currency in some emerging market economies, particularly during periods of heightened financial and political uncertainty.<sup>45</sup> In 2018, Federal Reserve notes outstanding grew about 6.3 percent, a pace slightly below the 6.7 percent increase registered in 2017 but within the range observed during the last decade (**Chart 23**). 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.

Chart 23  
**Growth of Federal Reserve Notes**



Source: Board of Governors of the Federal Reserve System.

Note: Figures for Federal Reserve notes reflect year-end Wednesday levels.

**OPEN MARKET OPERATIONS DURING 2018**

## REVERSE REPURCHASE AGREEMENTS

### OPEN MARKET OPERATIONS

Throughout 2018, the Federal Reserve conducted overnight reverse repurchase agreements to support the implementation of monetary policy. In 2018, average daily amounts outstanding declined significantly from the previous year because of the availability of alternative investment opportunities. (For more information on these operations and their results, see the “Short-Term Interest Rate Management” section of this report.)

### 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 holdings.<sup>46</sup> Upon maturity on the following business day, the securities are repurchased by the SOMA at a price that reflects a rate of return tied to comparable market-based Treasury repo rates.

This service both supports operational liquidity needs to clear and settle securities in these accounts and addresses a strong preference by many central banks to hold significant dollar liquidity buffers at the Federal Reserve for policy purposes. 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 after 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.

During most of 2018, the weekly average size of the foreign repo pool fluctuated within a range between \$218 billion and \$257 billion, similar to range levels of prior years. The size of the pool declined slightly in late summer and early autumn as account holders shifted funds to securities with longer terms and higher yields (Chart 24). It increased in December as some account holders shifted their holdings toward shorter-term investments in

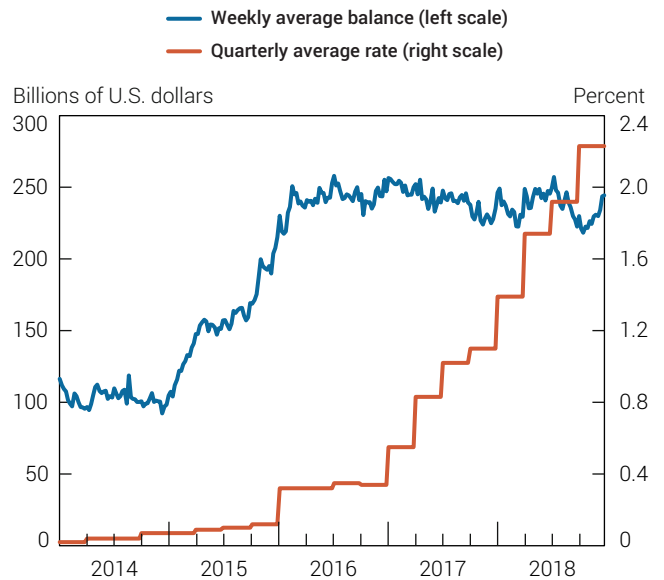
preparation for year-end. As a result of these shifts, variability in the weekly usage of the facility increased moderately throughout the year. The rate of return on the pool moved in line with other market-based Treasury repo rates throughout 2018, and generally rose in tandem with increases in the target range for the federal funds rate.

## 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 called the Treasury General Account to deposit income received from taxes paid to the U.S. government and to disburse payments, pay interest on federal debt, collect federal tax receipts, and settle Treasury security transactions. Since 2015, the Treasury has generally kept relatively high balances in this account in order to reduce the risk that a disruption in market access, such as an extreme weather or cyber event, could interrupt the Treasury’s ability to issue marketable debt

Chart 24  
Foreign Repo Pool



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

## OPEN MARKET OPERATIONS DURING 2018

to fund the U.S. government. Although the Federal Reserve does not pay interest to the Treasury on balances held in the TGA, the Treasury earns an implied return on these balances through the Federal Reserve's earnings remittances.

Before the financial crisis, TGA balances were small and stable, at around \$5 billion, to help reduce variability in bank reserves and support monetary policy implementation. To supplement TGA balances, Treasury held operating cash in accounts with certain depository institutions. In late 2008, TGA balances increased when the Federal Reserve lowered its policy rates toward the zero lower bound, because it became more convenient for the Treasury to keep balances in the TGA than in accounts with commercial banks.<sup>47</sup> In 2015, the Treasury announced that it would generally strive to maintain a TGA that was large enough to ensure that it could cover one week of payments and maturing debt, subject to a minimum of \$150 billion.<sup>48</sup>

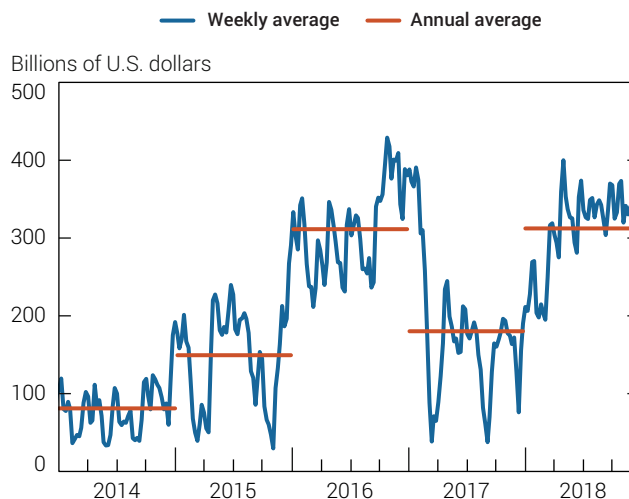
TGA balances typically exhibit significant variation around Treasury auction settlement dates and debt limit-related deadlines, and they are also affected by the timing of the receipt of tax payments.

The average weekly TGA balance during 2018 was \$315 billion, a notable increase from the roughly \$180 billion weekly average in 2017. However, during the year the average weekly TGA balance fluctuated within a narrower range than in 2017—from a low of \$195 billion to a high of \$400 billion. The average weekly TGA balance exceeded the Treasury's minimum balance of \$150 million for all weeks in 2018 (**Chart 25**).

#### 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).<sup>49</sup> 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 other financial transactions among financial institutions. Access to deposit accounts at the

Chart 25  
**Treasury General Account Balances**



Source: Board of Governors of the Federal Reserve System.

Note: Figures are averages of daily balances.

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 2018, aggregate balances of foreign official and other deposits remained relatively stable at around \$80 billion, after increasing in the prior two years because of the rising number of DFMUs holding such deposits.

#### TERM DEPOSITS

The Federal Reserve periodically conducted small-value exercises to test the Term Deposit Facility (TDF), through which it offers interest-bearing term deposits to depository institutions. TDF amounts outstanding ranged from \$2.5 billion to \$3.7 billion across two seven-day periods over the course of the year. (For more details, see the “Operational Flexibility and Resiliency” section of this report.)

### OPEN MARKET OPERATIONS DURING 2018



## Financial Results

The SOMA portfolio continued to contribute to elevated levels of Federal Reserve income and remittances to the U.S. Treasury in 2018, although these levels declined from the prior year. Since peaking in 2014, SOMA net income and remittances to the U.S. Treasury have declined primarily because of higher funding costs associated with rising short-term interest rates. As of year-end 2018, their levels remained historically elevated owing to the income from a sizable SOMA domestic portfolio.

### SOMA INCOME

In 2018, total SOMA income was \$107.3 billion, primarily derived from interest income on domestic securities holdings.<sup>50</sup> SOMA net income, which takes into account the costs of funding the portfolio, was \$68.8 billion in 2018, down from \$86.3 billion in 2017 (**Table 8**).<sup>51</sup> The \$17.5 billion decline stemmed primarily from the higher funding costs associated with rising short-term interest rates. However, the large size of the portfolio and its concentration in longer-term securities continued to generate substantial portfolio income in 2018.

### 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. Until early 2018, that limit was \$10 billion. The enactment of the Bipartisan Budget Act of 2018 on February 9 reduced the limit from \$10 billion to \$7.5 billion. The Economic Growth, Regulatory Relief, and Consumer Protection Act, which became public law on May 24, 2018, further reduced the limit from \$7.5 billion to \$6.825 billion. Including \$3.175 billion in remittances related to these reductions in the limit on the Reserve Bank capital surplus, the Federal Reserve remitted a total of \$65.4 billion to the Treasury during 2018, down from the \$80.6 billion remitted in 2017. The \$15.2 billion decline in remittances stemmed primarily from the decline in net income (**Chart 26**).

Table 8  
**SOMA Net Income**  
Billions of U.S. Dollars

	2018	2017
<b>Interest income</b>		
Treasury securities	62.8	64.3
Agency debt	0.2	0.4
Agency MBS	49.3	48.9
Other	—	—
	112.3	113.6
<b>Interest expense</b>		
Reverse repurchase agreements		
Overnight and term RRP	(0.2)	(1.2)
Foreign repo pool	(4.4)	(2.2)
Other	—	—
	(4.6)	(3.4)
<b>Non-interest income (loss)</b>		
Foreign currency translation gains (losses)	(0.4)	1.9
Other	—	0.1
	(0.4)	2.0
<b>SOMA income</b>	<b>107.3</b>	<b>112.2</b>
<b>Assumed funding cost</b>	<b>(38.5)</b>	<b>(25.9)</b>
<b>SOMA net income</b>	<b>68.8</b>	<b>86.3</b>

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

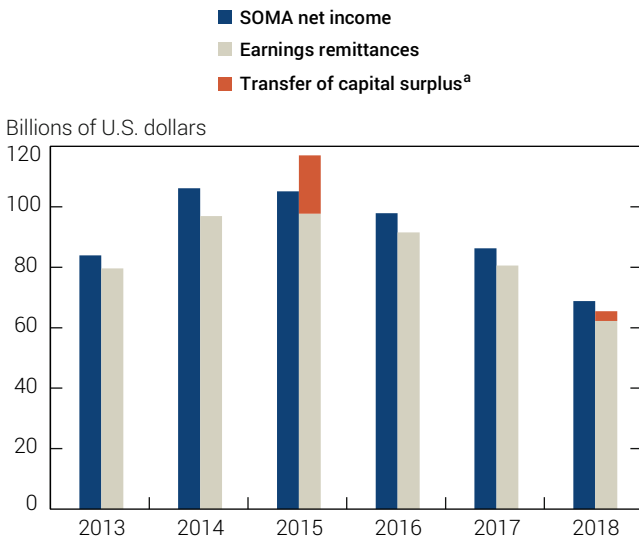
Notes: The assumed funding cost represents the interest expense on interest-bearing liabilities assumed to be associated with SOMA net assets in excess of Federal Reserve notes outstanding and the Treasury General Account balance held at the Federal Reserve Bank of New York. Actual interest expense on all non-SOMA interest-bearing liabilities of the Federal Reserve (including reserves and term deposits) totaled \$38.5 billion for 2018 and \$25.9 billion for 2017. 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 2018, an increase in longer-term interest rates resulted in the SOMA domestic portfolio moving from an unrealized gain position of \$80 billion at the end of 2017 to an unrealized loss position of \$6 billion at the

## OPEN MARKET OPERATIONS DURING 2018

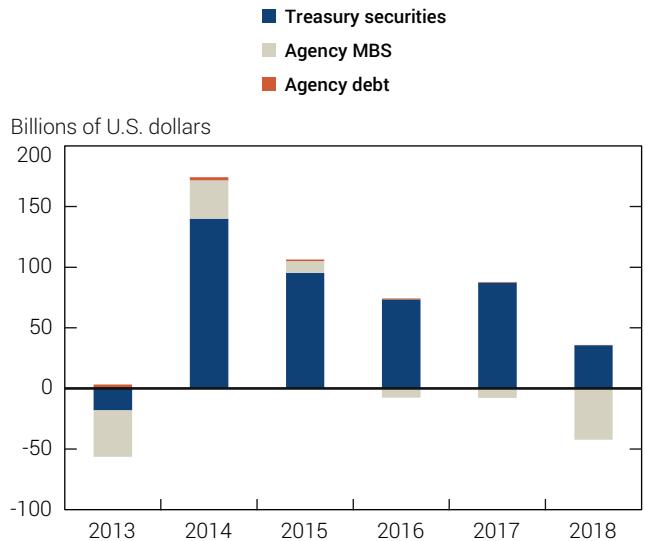
Chart 26  
**SOMA Net Income and Federal Reserve Remittances to the U.S. Treasury**



Sources: Federal Reserve Bank of New York; Federal Reserve System.

<sup>a</sup>Represents the transfer of capital to reduce the aggregate Reserve Bank surplus in 2015 to the \$10 billion limit under the Fixing America’s Surface Transportation Act (FAST Act), and in 2018 to the \$7.5 billion limit under the Bipartisan Budget Act of 2018 (Budget Act) and the \$6.825 billion limit under the Economic Growth, Regulatory Relief, and Consumer Protection Act (Economic Growth Act) of May 2018.

Chart 27  
**SOMA Domestic Portfolio Unrealized Gains and Losses**



Source: Federal Reserve System.

Note: Figures are as of year-end.

end of the year (Chart 27). The Treasury portfolio’s unrealized gain position decreased to roughly \$36 billion from \$87 billion at the end of 2017, and the agency MBS portfolio’s unrealized losses increased to roughly \$42 billion from \$8 billion at the end of 2017. Unrealized gains on the foreign portfolio increased to \$51 million at the end of 2018 from \$32 million at the end of 2017. Unrealized gains and losses are calculated as the difference

between the market value of the portfolio and its book value (which reflects amortized cost).<sup>52</sup>

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.

OPEN MARKET OPERATIONS DURING 2018

# Appendix 1: Authorization for Domestic Open Market Operations

On January 30, 2018, by unanimous vote, the FOMC voted to reaffirm with minimal changes the Authorization for Domestic Open Market Operations.

## Open Market Transactions

1. The Federal Open Market Committee (the “Committee”) authorizes and directs the Federal Reserve Bank selected by the Committee to execute open market transactions (the “Selected Bank”), to the extent necessary to carry out the most recent domestic policy directive adopted by the Committee:

A. To buy or sell in the open market securities that are direct obligations of, or fully guaranteed as to principal and interest by, the United States, and securities that are direct obligations of, or fully guaranteed as to principal and interest by, any agency of the United States, that are eligible for purchase or sale under Section 14(b) of the Federal Reserve Act (“Eligible Securities”) for the System Open Market Account (“SOMA”):

- i. As an outright operation with securities dealers and foreign and international accounts maintained at the Selected Bank: on a same-day or deferred delivery basis (including such transactions as are commonly referred to as dollar rolls and coupon swaps) at market prices; or
- ii. As a temporary operation: on a same-day or deferred delivery basis, to purchase such Eligible Securities subject to an agreement to resell (“repo transactions”) or to sell such Eligible Securities subject to an agreement to repurchase (“reverse repo transactions”) for a

term of 65 business days or less, at rates that, unless otherwise authorized by the Committee, are determined by competitive bidding, after applying reasonable limitations on the volume of agreements with individual counterparties;

- B. To allow Eligible Securities in the SOMA to mature without replacement;
- C. To exchange, at market prices, in connection with a Treasury auction, maturing Eligible Securities in the SOMA with the Treasury, in the case of Eligible Securities that are direct obligations of the United States or that are fully guaranteed as to principal and interest by the United States; and
- D. To exchange, at market prices, maturing Eligible Securities in the SOMA with an agency of the United States, in the case of Eligible Securities that are direct obligations of that agency or that are fully guaranteed as to principal and interest by that agency.

## Securities Lending

2. In order to ensure the effective conduct of open market operations, the Committee authorizes the Selected Bank to operate a program to lend Eligible Securities held in the SOMA to dealers on an overnight basis (except that the Selected Bank may lend Eligible Securities for longer than an overnight term to accommodate weekend, holiday, and similar trading conventions).

- A. Such securities lending must be:

### OPEN MARKET OPERATIONS DURING 2018

- i. At rates determined by competitive bidding;
  - ii. At a minimum lending fee consistent with the objectives of the program;
  - iii. Subject to reasonable limitations on the total amount of a specific issue of Eligible Securities that may be auctioned; and
  - iv. Subject to reasonable limitations on the amount of Eligible Securities that each borrower may borrow.
- B. The Selected Bank may:
- i. Reject bids that, as determined in its sole discretion, could facilitate a bidder's ability to control a single issue;
  - ii. Accept Treasury securities or cash as collateral for any loan of securities authorized in this paragraph 2; and
  - iii. Accept agency securities as collateral only for a loan of agency securities authorized in this paragraph 2.

## Operational Readiness Testing

3. The Committee authorizes the Selected Bank to undertake transactions of the type described in paragraphs 1 and 2 from time to time for the purpose of testing operational readiness, subject to the following limitations:
- A. All transactions authorized in this paragraph 3 shall be conducted with prior notice to the Committee;
  - B. The aggregate par value of the transactions authorized in this paragraph 3 that are of the type described in paragraph 1.A.i shall not exceed \$5 billion per calendar year; and
  - C. The outstanding amount of the transactions described in paragraphs 1.A.ii and 2 shall not exceed \$5 billion at any given time.

## Transactions with Customer Accounts

4. In order to ensure the effective conduct of open market operations, while assisting in the provision of short-term investments or other authorized services for foreign central bank and international accounts maintained at a Federal Reserve Bank (the "Foreign Accounts") and accounts maintained at a Federal Reserve Bank as fiscal agent of the United States pursuant to section 15 of the Federal Reserve Act (together with the Foreign Accounts, the "Customer Accounts"), the Committee authorizes the following when undertaken on terms comparable to those available in the open market:
- A. The Selected Bank, for the SOMA, to undertake reverse repo transactions in Eligible Securities held in the SOMA with the Customer Accounts for a term of 65 business days or less; and
  - B. Any Federal Reserve Bank that maintains Customer Accounts, for any such Customer Account, when appropriate and subject to all other necessary authorization and approvals, to:
    - i. Undertake repo transactions in Eligible Securities with dealers with a corresponding reverse repo transaction in such Eligible Securities with the Customer Accounts; and
    - ii. Undertake intra-day repo transactions in Eligible Securities with Foreign Accounts.

Transactions undertaken with Customer Accounts under the provisions of this paragraph 4 may provide for a service fee when appropriate. Transactions undertaken with Customer Accounts are also subject to the authorization or approval of other entities, including the Board of Governors of the Federal Reserve System and, when involving accounts maintained at a Federal Reserve Bank as fiscal agent of the United States, the United States Department of the Treasury.

## Additional Matters

5. The Committee authorizes the Chairman of the Committee, in fostering the Committee's objectives during any period between meetings of the Committee, to instruct the Selected Bank to act on behalf of the Committee to:
  - A. Adjust somewhat in exceptional circumstances the stance of monetary policy and to take actions that may result in material changes in the composition and size of the assets in the SOMA; or
  - B. Undertake transactions with respect to Eligible Securities in order to appropriately address temporary disruptions

of an operational or highly unusual nature in U.S. dollar funding markets.

Any such adjustment described in subparagraph A of this paragraph 5 shall be made in the context of the Committee's discussion and decision about the stance of policy at its most recent meeting and the Committee's long-run objectives to foster maximum employment and price stability, and shall be based on economic, financial, and monetary developments since the most recent meeting of the Committee. The Chairman, whenever feasible, will consult with the Committee before making any instruction under this paragraph 5.

## Appendix 2: 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 2018.

## Appendix 3: Domestic Policy Directives Issued to the Federal Reserve Bank of New York

In 2018, 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 the following domestic policy directives.

### OPEN MARKET OPERATIONS DURING 2018

## Open Market Operations from January 1 to January 31

*The FOMC issued the following domestic policy directive on December 13, 2017. This directive governed open market operations that were executed from January 1, 2018, through January 31, 2018.*

The Federal Open Market Committee directs the Desk to undertake open market operations as necessary to maintain the federal funds rate in a target range of 1¼ to 1½ percent, including overnight reverse repurchase operations (and reverse repurchase operations with maturities of more than one day when necessary to accommodate weekend, holiday, or similar trading conventions) at an offering rate of 1.25 percent, in amounts limited only by the value of Treasury securities held outright in the System Open Market Account that are available for such operations and by a per-counterparty limit of \$30 billion per day.

The Committee directs the Desk to continue rolling over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during December that exceeds \$6 billion, and to continue reinvesting in agency mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during December that exceeds \$4 billion. Effective in January, the Committee directs the Desk to roll over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during each calendar month that exceeds \$12 billion, and to reinvest in agency mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during each calendar month that exceeds \$8 billion. Small deviations from these amounts for operational reasons are acceptable.

The Committee also directs the Desk to engage in dollar roll and coupon swap transactions as necessary to facilitate settlement of the Federal Reserve's agency mortgage-backed securities transactions.

## Open Market Operations from February 1 to March 21

*The FOMC issued the following domestic policy directive on January 31, 2018. This directive governed open market operations that were executed from February 1, 2018, through March 21, 2018.*

The Federal Open Market Committee directs the Desk to undertake open market operations as necessary to maintain the federal funds rate in a target range of 1¼ to 1½ percent, including overnight reverse repurchase operations (and reverse repurchase operations with maturities of more than one day when necessary to accommodate weekend, holiday, or similar trading conventions) at an offering rate of 1.25 percent, in amounts limited only by the value of Treasury securities held outright in the System Open Market Account that are available for such operations and by a per-counterparty limit of \$30 billion per day.

The Committee directs the Desk to continue rolling over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during each calendar month that exceeds \$12 billion, and to reinvest in agency mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during each calendar month that exceeds \$8 billion. Small deviations from these amounts for operational reasons are acceptable.

The Committee also directs the Desk to engage in dollar roll and coupon swap transactions as necessary to facilitate settlement of the Federal Reserve's agency mortgage-backed securities transactions.

## Open Market Operations from March 22 to May 2

*The FOMC issued the following domestic policy directive on March 21, 2018. This directive governed open market operations that were executed from March 22, 2018, through May 2, 2018.*

The Federal Open Market Committee directs the Desk to undertake open market operations as necessary to maintain the

### OPEN MARKET OPERATIONS DURING 2018

federal funds rate in a target range of 1½ to 1¾ percent, including overnight reverse repurchase operations (and reverse repurchase operations with maturities of more than one day when necessary to accommodate weekend, holiday, or similar trading conventions) at an offering rate of 1.50 percent, in amounts limited only by the value of Treasury securities held outright in the System Open Market Account that are available for such operations and by a per-counterparty limit of \$30 billion per day.

The Committee directs the Desk to continue rolling over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during March that exceeds \$12 billion, and to continue reinvesting in agency mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during March that exceeds \$8 billion. Effective in April, the Committee directs the Desk to roll over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during each calendar month that exceeds \$18 billion, and to reinvest in agency mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during each calendar month that exceeds \$12 billion. Small deviations from these amounts for operational reasons are acceptable.

The Committee also directs the Desk to engage in dollar roll and coupon swap transactions as necessary to facilitate settlement of the Federal Reserve's agency mortgage-backed securities transactions.

## Open Market Operations from May 3 to June 13

*The FOMC issued the following domestic policy directive on May 2, 2018. This directive governed open market operations that were executed from May 3, 2018, through June 13, 2018.*

The Federal Open Market Committee directs the Desk to undertake open market operations as necessary to maintain the federal funds rate in a target range of 1½ to 1¾ percent, including overnight reverse repurchase operations (and reverse repurchase

operations with maturities of more than one day when necessary to accommodate weekend, holiday, or similar trading conventions) at an offering rate of 1.50 percent, in amounts limited only by the value of Treasury securities held outright in the System Open Market Account that are available for such operations and by a per-counterparty limit of \$30 billion per day.

The Committee directs the Desk to continue rolling over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during each calendar month that exceeds \$18 billion, and to reinvest in agency mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during each calendar month that exceeds \$12 billion. Small deviations from these amounts for operational reasons are acceptable.

The Committee also directs the Desk to engage in dollar roll and coupon swap transactions as necessary to facilitate settlement of the Federal Reserve's agency mortgage-backed securities transactions.

## Open Market Operations from June 14 to August 1

*The FOMC issued the following domestic policy directive on June 13, 2018. This directive governed open market operations that were executed from June 14, 2018, through August 1, 2018.*

The Federal Open Market Committee directs the Desk to undertake open market operations as necessary to maintain the federal funds rate in a target range of 1¾ to 2 percent, including overnight reverse repurchase operations (and reverse repurchase operations with maturities of more than one day when necessary to accommodate weekend, holiday, or similar trading conventions) at an offering rate of 1.75 percent, in amounts limited only by the value of Treasury securities held outright in the System Open Market Account that are available for such operations and by a per-counterparty limit of \$30 billion per day.

The Committee directs the Desk to continue rolling over at auction the amount of principal payments from the

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Federal Reserve's holdings of Treasury securities maturing during June that exceeds \$18 billion, and to continue reinvesting in agency mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during June that exceeds \$12 billion. Effective in July, the Committee directs the Desk to roll over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during each calendar month that exceeds \$24 billion, and to reinvest in agency mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during each calendar month that exceeds \$16 billion. Small deviations from these amounts for operational reasons are acceptable.

The Committee also directs the Desk to engage in dollar roll and coupon swap transactions as necessary to facilitate settlement of the Federal Reserve's agency mortgage-backed securities transactions.

## Open Market Operations from August 2 to September 26

*The FOMC issued the following domestic policy directive on August 1, 2018. This directive governed open market operations that were executed from August 2, 2018, through September 26, 2018.*

The Federal Open Market Committee directs the Desk to undertake open market operations as necessary to maintain the federal funds rate in a target range of 1¾ to 2 percent, including overnight reverse repurchase operations (and reverse repurchase operations with maturities of more than one day when necessary to accommodate weekend, holiday, or similar trading conventions) at an offering rate of 1.75 percent, in amounts limited only by the value of Treasury securities held outright in the System Open Market Account that are available for such operations and by a per-counterparty limit of \$30 billion per day.

The Committee directs the Desk to continue rolling over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during each calendar month that exceeds \$24 billion, and to reinvest in agency

mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during each calendar month that exceeds \$16 billion. Small deviations from these amounts for operational reasons are acceptable.

The Committee also directs the Desk to engage in dollar roll and coupon swap transactions as necessary to facilitate settlement of the Federal Reserve's agency mortgage-backed securities transactions.

## Open Market Operations from September 27 to November 8

*The FOMC issued the following domestic policy directive on September 26, 2018. This directive governed open market operations that were executed from September 27, 2018, through November 8, 2018.*

The Federal Open Market Committee directs the Desk to undertake open market operations as necessary to maintain the federal funds rate in a target range of 2 to 2¼ percent, including overnight reverse repurchase operations (and reverse repurchase operations with maturities of more than one day when necessary to accommodate weekend, holiday, or similar trading conventions) at an offering rate of 2.00 percent, in amounts limited only by the value of Treasury securities held outright in the System Open Market Account that are available for such operations and by a per-counterparty limit of \$30 billion per day.

The Committee directs the Desk to continue rolling over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during September that exceeds \$24 billion, and to continue reinvesting in agency mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during September that exceeds \$16 billion. Effective in October, the Committee directs the Desk to roll over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during each calendar month that exceeds \$30 billion, and to reinvest in agency mortgage-backed securities the amount of

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principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during each calendar month that exceeds \$20 billion. Small deviations from these amounts for operational reasons are acceptable.

The Committee also directs the Desk to engage in dollar roll and coupon swap transactions as necessary to facilitate settlement of the Federal Reserve's agency mortgage-backed securities transactions.

## Open Market Operations from November 9 to December 19

*The FOMC issued the following domestic policy directive on November 8, 2018. This directive governed open market operations that were executed from November 9, 2018, through December 19, 2018.*

The Federal Open Market Committee directs the Desk to undertake open market operations as necessary to maintain the federal funds rate in a target range of 2 to 2¼ percent, including overnight reverse repurchase operations (and reverse repurchase operations with maturities of more than one day when necessary to accommodate weekend, holiday, or similar trading conventions) at an offering rate of 2.00 percent, in amounts limited only by the value of Treasury securities held outright in the System Open Market Account that are available for such operations and by a per-counterparty limit of \$30 billion per day.

The Committee directs the Desk to continue rolling over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during each calendar month that exceeds \$30 billion, and to continue reinvesting in agency mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during each calendar month that exceeds \$20 billion. Small deviations from these amounts for operational reasons are acceptable.

The Committee also directs the Desk to engage in dollar roll and coupon swap transactions as necessary to facilitate settlement of the Federal Reserve's agency mortgage-backed securities transactions.

## Open Market Operations from December 20 to December 31

*The FOMC issued the following domestic policy directive on December 19, 2018. This directive governed open market operations that were executed from December 20, 2018, through December 31, 2018.*

The Federal Open Market Committee directs the Desk to undertake open market operations as necessary to maintain the federal funds rate in a target range of 2¼ to 2½ percent, including overnight reverse repurchase operations (and reverse repurchase operations with maturities of more than one day when necessary to accommodate weekend, holiday, or similar trading conventions) at an offering rate of 2.25 percent, in amounts limited only by the value of Treasury securities held outright in the System Open Market Account that are available for such operations and by a per-counterparty limit of \$30 billion per day.

The Committee directs the Desk to continue rolling over at auction the amount of principal payments from the Federal Reserve's holdings of Treasury securities maturing during each calendar month that exceeds \$30 billion, and to continue reinvesting in agency mortgage-backed securities the amount of principal payments from the Federal Reserve's holdings of agency debt and agency mortgage-backed securities received during each calendar month that exceeds \$20 billion. Small deviations from these amounts for operational reasons are acceptable.

The Committee also directs the Desk to engage in dollar roll and coupon swap transactions as necessary to facilitate settlement of the Federal Reserve's agency mortgage-backed securities transactions.

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# Appendix 4: Authorization for Foreign Currency Operations

On January 30, 2018, by unanimous vote, the FOMC voted to reaffirm without change the Authorization for Foreign Currency Operations.

## In General

1. The Federal Open Market Committee (the “Committee”) authorizes the Federal Reserve Bank selected by the Committee (the “Selected Bank”) to execute open market transactions for the System Open Market Account as provided in this Authorization, to the extent necessary to carry out any foreign currency directive of the Committee:
  - A. To purchase and sell foreign currencies (also known as cable transfers) at home and abroad in the open market, including with the United States Treasury, with foreign monetary authorities, with the Bank for International Settlements, and with other entities in the open market. This authorization to purchase and sell foreign currencies encompasses purchases and sales through standalone spot or forward transactions and through foreign exchange swap transactions. For purposes of this Authorization, foreign exchange swap transactions are: swap transactions with the United States Treasury (also known as warehousing transactions), swap transactions with other central banks under reciprocal currency arrangements, swap transactions with other central banks under standing dollar liquidity and foreign currency liquidity swap arrangements, and swap transactions with other entities in the open market.
  - B. To hold balances of, and to have outstanding forward contracts to receive or to deliver, foreign currencies.
2. All transactions in foreign currencies undertaken pursuant to paragraph 1 above shall, unless otherwise authorized by the Committee, be conducted:
  - A. In a manner consistent with the obligations regarding exchange arrangements under Article IV of the Articles of Agreement of the International Monetary Fund (IMF).<sup>53</sup>
  - B. In close and continuous cooperation and consultation, as appropriate, with the United States Treasury.
  - C. In consultation, as appropriate, with foreign monetary authorities, foreign central banks, and international monetary institutions.
  - D. At prevailing market rates.

## Standalone Spot and Forward Transactions

3. For any operation that involves standalone spot or forward transactions in foreign currencies:
  - A. Approval of such operation is required as follows:
    - i. The Committee must direct the Selected Bank in advance to execute the operation if it would result in the overall volume of standalone spot and forward transactions in foreign currencies, as defined in paragraph 3.C of this Authorization, exceeding \$5 billion since the close of the most recent regular meeting of the Committee. The Foreign Currency Subcommittee (the “Subcommittee”) must direct the Selected Bank in advance to execute the

operation if the Subcommittee believes that consultation with the Committee is not feasible in the time available.

- ii. The Committee authorizes the Subcommittee to direct the Selected Bank in advance to execute the operation if it would result in the overall volume of standalone spot and forward transactions in foreign currencies, as defined in paragraph 3.C of this Authorization, totaling \$5 billion or less since the close of the most recent regular meeting of the Committee.

B. Such an operation also shall be:

- i. Generally directed at countering disorderly market conditions; or
- ii. Undertaken to adjust System balances in light of probable future needs for currencies; or
- iii. Conducted for such other purposes as may be determined by the Committee.

C. For purposes of this Authorization, the overall volume of standalone spot and forward transactions in foreign currencies is defined as the sum (disregarding signs) of the dollar values of individual foreign currencies purchased and sold, valued at the time of the transaction.

## Warehousing

- 4. The Committee authorizes the Selected Bank, with the prior approval of the Subcommittee and at the request of the United States Treasury, to conduct swap transactions with the United States Exchange Stabilization Fund established by section 10 of the Gold Reserve Act of 1934 under agreements in which the Selected Bank purchases foreign currencies from the Exchange Stabilization Fund and the Exchange Stabilization Fund repurchases the foreign currencies from the Selected Bank at a later date (such purchases and sales also known as warehousing).

## Reciprocal Currency Arrangements, and Standing Dollar and Foreign Currency Liquidity Swaps

- 5. The Committee authorizes the Selected Bank to maintain reciprocal currency arrangements established under the North American Framework Agreement, standing dollar liquidity swap arrangements, and standing foreign currency liquidity swap arrangements as provided in this Authorization and to the extent necessary to carry out any foreign currency directive of the Committee.

A. For reciprocal currency arrangements all drawings must be approved in advance by the Committee (or by the Subcommittee, if the Subcommittee believes that consultation with the Committee is not feasible in the time available).

B. For standing dollar liquidity swap arrangements all drawings must be approved in advance by the Chairman. The Chairman may approve a schedule of potential drawings, and may delegate to the manager, System Open Market Account, the authority to approve individual drawings that occur according to the schedule approved by the Chairman.

C. For standing foreign currency liquidity swap arrangements all drawings must be approved in advance by the Committee (or by the Subcommittee, if the Subcommittee believes that consultation with the Committee is not feasible in the time available).

D. Operations involving standing dollar liquidity swap arrangements and standing foreign currency liquidity swap arrangements shall generally be directed at countering strains in financial markets in the United States or abroad, or reducing the risk that they could emerge, so as to mitigate their effects on economic and financial conditions in the United States.

E. For reciprocal currency arrangements, standing dollar liquidity swap arrangements, and standing foreign currency liquidity swap arrangements:

- i. All arrangements are subject to annual review and approval by the Committee;
- ii. Any new arrangements must be approved by the Committee; and
- iii. Any changes in the terms of existing arrangements must be approved in advance by the Chairman. The Chairman shall keep the Committee informed of any changes in terms, and the terms shall be consistent with principles discussed with and guidance provided by the Committee.

## Other Operations in Foreign Currencies

6. Any other operations in foreign currencies for which governance is not otherwise specified in this Authorization (such as foreign exchange swap transactions with private-sector counterparties) must be authorized and directed in advance by the Committee.

## Foreign Currency Holdings

7. The Committee authorizes the Selected Bank to hold foreign currencies for the System Open Market Account in accounts maintained at foreign central banks, the Bank for International Settlements, and such other foreign institutions as approved by the Board of Governors under Section 214.5 of Regulation N, to the extent necessary to carry out any foreign currency directive of the Committee.

- A. The Selected Bank shall manage all holdings of foreign currencies for the System Open Market Account:
  - i. Primarily, to ensure sufficient liquidity to enable the Selected Bank to conduct foreign currency operations as directed by the Committee;

ii. Secondly, to maintain a high degree of safety;

iii. Subject to paragraphs 7.A.i and 7.A.ii, to provide the highest rate of return possible in each currency; and

iv. To achieve such other objectives as may be authorized by the Committee.

B. The Selected Bank may manage such foreign currency holdings by:

i. Purchasing and selling obligations of, or fully guaranteed as to principal and interest by, a foreign government or agency thereof (“Permitted Foreign Securities”) through outright purchases and sales;

ii. Purchasing Permitted Foreign Securities under agreements for repurchase of such Permitted Foreign Securities and selling such securities under agreements for the resale of such securities; and

iii. Managing balances in various time and other deposit accounts at foreign institutions approved by the Board of Governors under Regulation N.

C. The Subcommittee, in consultation with the Committee, may provide additional instructions to the Selected Bank regarding holdings of foreign currencies.

## Additional Matters

8. The Committee authorizes the Chairman:

A. With the prior approval of the Committee, to enter into any needed agreement or understanding with the Secretary of the United States Treasury about the division of responsibility for foreign currency operations between the System and the United States Treasury;

B. To advise the Secretary of the United States Treasury concerning System foreign currency operations, and to

consult with the Secretary on policy matters relating to foreign currency operations;

C. To designate Federal Reserve System persons authorized to communicate with the United States Treasury concerning System Open Market Account foreign currency operations; and

D. From time to time, to transmit appropriate reports and information to the National Advisory Council on International Monetary and Financial Policies.

9. The Committee authorizes the Selected Bank to undertake transactions of the type described in this Authorization, and foreign exchange and investment transactions that it may be otherwise authorized to undertake, from time to time for the purpose of testing operational readiness. The aggregate amount of such transactions shall not exceed \$2.5 billion per calendar year. These transactions shall be conducted with prior notice to the Committee.

10. All Federal Reserve banks shall participate in the foreign currency operations for System Open Market Account in accordance with paragraph 3G(1) of the Board of Governors'

Statement of Procedure with Respect to Foreign Relationships of Federal Reserve Banks dated January 1, 1944.

11. Any authority of the Subcommittee pursuant to this Authorization may be exercised by the Chairman if the Chairman believes that consultation with the Subcommittee is not feasible in the time available. The Chairman shall promptly report to the Subcommittee any action approved by the Chairman pursuant to this paragraph.

12. The Committee authorizes the Chairman, in exceptional circumstances where it would not be feasible to convene the Committee, to foster the Committee's objectives by instructing the Selected Bank to engage in foreign currency operations not otherwise authorized pursuant to this Authorization. Any such action shall be made in the context of the Committee's discussion and decisions regarding foreign currency operations. The Chairman, whenever feasible, will consult with the Committee before making any instruction under this paragraph.

## Appendix 5: Foreign Currency Directive

On January 30, 2018, by unanimous vote, the FOMC voted to reaffirm without change the Foreign Currency Directive.

1. The Committee directs the Federal Reserve Bank selected by the Committee (the "Selected Bank") to execute open market transactions, for the System Open Market Account, in accordance with the provisions of the Authorization for Foreign

Currency Operations (the "Authorization") and subject to the limits in this Directive.

2. The Committee directs the Selected Bank to execute warehousing transactions, if so requested by the United States Treasury and if approved by the Foreign Currency Subcommittee (the "Subcommittee"), subject to the limitation

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that the outstanding balance of United States dollars provided to the United States Treasury as a result of these transactions not at any time exceed \$5 billion.

3. The Committee directs the Selected Bank to maintain, for the System Open Market Account:

A. Reciprocal currency arrangements with the following foreign central banks:

<i>Foreign central bank</i>	<i>Maximum amount (millions of dollars or equivalent)</i>
Bank of Canada	2,000
Bank of Mexico	3,000

B. Standing dollar liquidity swap arrangements with the following foreign central banks:

Bank of Canada  
Bank of England  
Bank of Japan  
European Central Bank  
Swiss National Bank

C. Standing foreign currency liquidity swap arrangements with the following foreign central banks:

Bank of Canada  
Bank of England  
Bank of Japan  
European Central Bank  
Swiss National Bank

4. The Committee directs the Selected Bank to hold and to invest foreign currencies in the portfolio in accordance with the provisions of paragraph 7 of the Authorization.

5. The Committee directs the Selected Bank to report to the Committee, at each regular meeting of the Committee, on transactions undertaken pursuant to paragraphs 1 and 6 of the Authorization. The Selected Bank is also directed to provide quarterly reports to the Committee regarding the management of the foreign currency holdings pursuant to paragraph 7 of the Authorization.

6. The Committee directs the Selected Bank to conduct testing of transactions for the purpose of operational readiness in accordance with the provisions of paragraph 9 of the Authorization.

## Appendix 6: 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](https://www.treasurydirect.gov/instit/annceresult/annceresult_query.htm).

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## Operations Disclosures

Operation Type	Operation Schedule	Operation Results	Additional Operations Data <sup>a</sup>	Transaction Data <sup>b</sup>
<b>Domestic open market operations</b>				
Overnight RRP	c	✓	✓	✓
Treasury rollovers		✓ <sup>d</sup>		
Agency MBS outright purchases	✓	✓	✓	✓
Agency MBS dollar rolls			✓	✓
Treasury securities lending	c	✓	✓	✓
<b>Foreign open market operations</b>				
Foreign sovereign debt purchases				✓
Central bank liquidity swaps			✓ <sup>e</sup>	
<b>Small-value exercises</b>				
Term RRP	✓	✓	✓	✓
Overnight RRP (with MBS collateral)	✓	✓	✓	✓
Repos	✓	✓		✓
Securities lending	✓	✓		✓
Treasury outright purchases and sales	✓	✓	✓	✓
Treasury rollovers with bills	✓	✓ <sup>d</sup>		
Agency MBS TBA purchases	✓	✓	✓	✓
Agency MBS outright sales	✓	✓	✓	✓
Agency MBS coupon swaps	✓	✓	✓	✓
Foreign sovereign debt sales				✓
Foreign currency repos <sup>f</sup>				✓
Central bank liquidity swaps			✓ <sup>g</sup>	

Source: Federal Reserve Bank of New York.

<sup>a</sup>Additional data could include details about types of counterparties, pricing, and higher-frequency transaction data.

<sup>b</sup>The 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.

<sup>c</sup>Since 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.

<sup>d</sup>SOMA awards are released by the U.S. Treasury after each auction.

<sup>e</sup>Transactions 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.

<sup>f</sup>In 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.

<sup>g</sup>Transactions between the New York Fed and foreign central bank counterparties are reported weekly by the New York Fed.

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# Appendix 7: 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 may be found.

## Federal Reserve Board

*FOMC rules and authorizations*

[https://www.federalreserve.gov/monetarypolicy/rules\\_authorizations.htm](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*

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

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

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

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

*Federal Reserve System financial reports*

[https://www.federalreserve.gov/monetarypolicy/bst\\_fedfinancials.htm](https://www.federalreserve.gov/monetarypolicy/bst_fedfinancials.htm)

*Detailed transaction information about discount window lending to depository institutions*

<https://www.federalreserve.gov/regreform/discount-window.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](https://www.newyorkfed.org/markets/annual_reports.html)

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

*Repurchase and reverse repurchase agreements*

[https://www.newyorkfed.org/markets/rrp\\_op\\_policies.html](https://www.newyorkfed.org/markets/rrp_op_policies.html)

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

[https://www.newyorkfed.org/markets/rrp\\_faq.html](https://www.newyorkfed.org/markets/rrp_faq.html)

*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/treasury-rollover-faq.html>

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

[https://www.newyorkfed.org/markets/sec\\_terms.html](https://www.newyorkfed.org/markets/sec_terms.html)

*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>

<https://www.newyorkfed.org/markets/ambs-treasury-faq.html>

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

[https://www.newyorkfed.org/markets/quar\\_reports.html](https://www.newyorkfed.org/markets/quar_reports.html)

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

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

*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](https://www.newyorkfed.org/markets/soma/sysopen_accholdings.html)

[https://www.newyorkfed.org/markets/OMO\\_transaction\\_data.html](https://www.newyorkfed.org/markets/OMO_transaction_data.html)

*Consolidated list of statements and operating policies across all Desk open market operations*

[https://www.newyorkfed.org/markets/op\\_policies.html](https://www.newyorkfed.org/markets/op_policies.html)

*Operational readiness*

<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/primarydealer_survey_questions.html)

[https://www.newyorkfed.org/markets/survey\\_market\\_participants](https://www.newyorkfed.org/markets/survey_market_participants)

*FR 2420 Report of Selected Money Rates*

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

<https://www.newyorkfed.org/markets/effr-obfr-data>

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

[https://www.newyorkfed.org/markets/opolicy/operating\\_policy\\_150708.html](https://www.newyorkfed.org/markets/opolicy/operating_policy_150708.html)

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

*Services for central banks and international institutions*

<https://www.newyorkfed.org/aboutthefed/fedpoint/fed20>

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# Endnotes

<sup>1</sup>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 the average cost of each purchased and sold security.

<sup>2</sup>See FOMC Communications Related to Policy Normalization, <https://www.federalreserve.gov/monetarypolicy/policy-normalization.htm>.

<sup>3</sup>Annual reports on open market operations and accompanying data can be found at [https://www.newyorkfed.org/markets/annual\\_reports.html](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 the report, and they do not warrant or guarantee the accuracy, timeliness, or completeness of information presented in the report.

<sup>4</sup>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.

<sup>5</sup>The Federal Reserve also sets the interest rate paid on required reserves (IORR), which is the same as the IOER rate as of year-end 2018.

<sup>6</sup>For information on the FOMC's Policy Normalization Principles and Plans, see related Federal Reserve statements, <https://www.federalreserve.gov/monetarypolicy/policy-normalization.htm>.

<sup>7</sup>In determining the value of Treasury securities available for ON RRP operations, the Desk took 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, and to serve as collateral for any outstanding term RRP operations.

<sup>8</sup>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.

<sup>9</sup>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://libtystreeteconomics.newyorkfed.org/2017/08/regulatory-incentives-and-quarter-end-dynamics-in-the-repo-market.html>.

<sup>10</sup>On January and February 2018 month-ends, the EFRR decreased by 8 and 7 basis points, respectively. On other 2018 month-end dates, the EFRR decreased by just 1 basis point or remained unchanged.

<sup>11</sup>Under the original proposed Basel III regulations and the U.S. implementation of Basel III, borrowing from public sector entities, such as Federal Home Loan Banks (FHLBs), is treated favorably compared to other wholesale short-term funding sources. When a bank borrows overnight from an FHLB, the run-off assumption is 40 percent. For example, a bank borrowing \$100 overnight from an FHLB and leaving the proceeds as reserves is able to increase its stock of high-quality liquid assets net of outflows by \$60.

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<sup>12</sup>Pronounced changes in net Treasury supply and reporting date effects occasionally pushed overnight Treasury repo rates above the top of the federal funds target range during 2018.

<sup>13</sup>The value of maturing SOMA holdings of Treasury notes and bonds, Treasury Inflation-Protected Securities (TIPS), and Floating Rate Notes (FRNs) on a given day is exchanged proportionally across all Treasury securities issued on that day. SOMA holdings of Treasury bills would typically be exchanged for newly issued bills. However, the SOMA has not owned any Treasury bills since 2012, when its Treasury bill holdings were allowed to mature without exchange as part of the Maturity Extension Program.

<sup>14</sup>The to-be-announced market is a forward market built on a trading convention that allows 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.

<sup>15</sup>For example, consider that a given month’s cap is \$8 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 \$18 billion. To determine the amount of reinvestment purchases of agency MBS, the Desk would subtract the \$8 billion cap from the total principal payments of \$20 billion. An announcement would be made on or around the ninth business day of that month indicating that the Desk would purchase \$12 billion of agency MBS, with operations taking place between the following business day and the ninth business day of the following month.

<sup>16</sup>While the principal received is based on agency debt and agency MBS payments received during each calendar month, the reinvestments and redemption figures are based on reinvestment cycle periods, which occur on a mid-month to mid-month basis.

<sup>17</sup>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.

<sup>18</sup>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 2018 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.

<sup>19</sup>CUSIPs are codes that identify financial securities, allowing for efficient clearing and settlement in capital markets. For details, see <http://www.cusip.com>.

<sup>20</sup>On-the-run Treasury securities are the most recently issued notes or bonds of a particular maturity, while off-the-run refers to Treasury securities that were issued before the most recent issue and are still outstanding.

<sup>21</sup>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.

<sup>22</sup>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](https://www.newyorkfed.org/markets/quar_reports.html).

<sup>23</sup>The Federal Reserve also maintains reciprocal currency arrangements of \$2 billion with the Bank of Canada and \$3 billion with the Banco de México. These arrangements were established in 1994 under the North American Framework Agreement (NAFA) to promote orderly currency exchange markets.

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

<sup>25</sup>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>.

<sup>26</sup>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.

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<sup>27</sup>SSI would replace Fannie Mae and Freddie Mac MBS contracts in the to-be-announced (TBA) market with new Uniform MBS TBA contracts into which both Fannie Mae and Freddie Mac MBS can be delivered. For additional information on the SSI, see <https://www.fhfa.gov/PolicyProgramsResearch/Policy/Pages/Securitization-Infrastructure.asp>.

<sup>28</sup>For more details on the term deposit facility and announcements of TDF operations and their results, see <https://www.federalreserve.gov/monetarypolicy/tdf.htm>.

<sup>29</sup>The CSP is a SWIFT initiative 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 on an annual basis against those controls. For more information, see <https://www.swift.com/insights/press-releases/swift-introduces-mandatory-customer-security-requirements-and-an-associated-assurance-framework>.

<sup>30</sup>Changes in the size of the Federal Reserve's balance sheet also reflect the amortization of premiums and accretion of discounts on SOMA domestic securities holdings, which totaled roughly \$18 billion during 2018.

<sup>31</sup>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 2018, net unsettled commitments totaled \$288 million.

<sup>32</sup>Because the decline in the portfolio corresponding to Treasury securities that matured at the end of December 2017 was not recorded until January 2, 2018, the \$232 billion decrease in Treasury securities holdings during 2018 was more than the \$229 billion of SOMA redemptions over the year. Specifically, \$6 billion of the Treasury securities that matured on Sunday, December 31, 2017, were treated as part of the December 2017 redemptions; however, the cash flows associated with those maturities and the corresponding decline in Treasury securities holdings occurred on the next business day, January 2, 2018. Additionally, around \$3 billion in inflation compensation over the year partly offset the decline in the portfolio.

<sup>33</sup>As of December 31, 2018, the U.S. Treasury had approximately \$15.59 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/2018/opds122018.pdf>.

<sup>34</sup>The weighted average life of an MBS refers to the expected time outstanding until mortgage principal is repaid. This calculation is dependent on a model of future prepayments and is therefore subject to some uncertainty and model sensitivity.

<sup>35</sup>“Modified duration” is used to calculate the duration of Treasury and agency debt securities, while “effective duration” is employed to measure the duration of mortgage-backed securities. 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 mortgage-backed securities 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.

<sup>36</sup>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.

<sup>37</sup>Depository institutions also have access to secondary credit and seasonal credit through the discount window.

<sup>38</sup>The Board of Governors approved requests submitted in March, June, September, and December by the Boards of Directors of the Federal Reserve Banks for 25 basis point increases in the primary credit rate.

<sup>39</sup>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.

<sup>40</sup>For a detailed discussion about the liabilities of the Federal Reserve, see the box entitled “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-mpr-part2.htm>. Additionally, see Thomas Haas, Sam Schulhofer-Wohl, and Anna Paulson, “The Structure of Federal Reserve Liabilities,” *Chicago Fed Letter* 395, 2018,

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<https://www.chicagofed.org/publications/chicago-fed-letter/2018/395>.

<sup>41</sup>Reserves may also be held as vault cash.

<sup>42</sup>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.

<sup>43</sup>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>.

<sup>44</sup>In this discussion, Federal Reserve notes outstanding are net of Federal Reserve Banks' holdings. 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 \$838 million in 2018.

<sup>45</sup>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>.

<sup>46</sup>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.

<sup>47</sup>For a detailed discussion on 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](https://www.newyorkfed.org/research/current_issues/ci18-3.html).

<sup>48</sup>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>.

<sup>49</sup>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.

<sup>50</sup>Interest income on foreign currency-denominated holdings was negative \$29 million in 2018.

<sup>51</sup>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.

<sup>52</sup>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>.

<sup>53</sup>In general, as specified in Article IV, each member of the IMF undertakes to collaborate with the IMF and other members to assure orderly exchange arrangements and to promote a stable system of exchange rates. These obligations include seeking to direct the member's economic and financial policies toward the objective of fostering orderly economic growth with reasonable price stability. These obligations also include avoiding manipulating exchange rates or the international monetary system in such a way that would impede effective balance of payments adjustment or to give an unfair competitive advantage over other members.

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