1. The Federal Reserve balance sheet

Kristopher Dawsey, William B. English and Brian Sack

1.1 INTRODUCTION

The manner in which the Federal Reserve sets monetary policy and manages its balance sheet plays a critical role in financial markets. Its importance is perhaps most evident during periods of severe financial stress when the Federal Reserve (Fed) and other central banks have used their balance sheets to restore order to financial markets. But the presence of the Fed matters at all other times as well, as its asset holdings and its administered rates affect how financial markets operate and strongly influence the financial conditions experienced by all households and firms operating in the financial system in the United States and even globally.

The Federal Reserve’s policy decisions affect financial markets in a number of ways. First, through its monetary policy decisions and its communications about those decisions, the Fed effectively sets short-term interest rates and influences longer-term interest rates that, in turn, drive the valuations of assets across markets (Gurkaynak, Sack, & Swanson, 2005). Second, since the Global Financial Crisis (GFC), the Federal Reserve has engaged in large-scale asset purchases aimed at having additional influence on longer-term yields and broader financial conditions (Bernanke, 2012). Finally, when managing crises, the Fed can use its balance sheet to support financial firms and the functioning of financial markets. For example, the Fed has provided loans to financial firms facing funding difficulties both directly and through swap lines with foreign central banks. In addition, the Fed has conducted purchases of assets to support market functioning, including the very large purchases of Treasuries and agency mortgage-backed securities (MBS) conducted in response to the Covid-19 pandemic.

The liability side of the Fed’s balance sheet can also have significant effects on financial markets. Prior to the GFC, the Fed implemented monetary policy primarily by adjusting the supply of reserve balances held by banks. More recently, the level of reserve balances has increased greatly to accommodate the vast rise in Fed assets, and the Fed has launched an overnight repurchase program that has also become sizable. The Fed has used the payment of interest on reserves and on overnight reverse repurchase agreements to aid with the implementation of policy. The Fed’s liabilities also include the Treasury General Account, the account that the US Treasury Department uses to manage federal finances, which has also expanded greatly in size in recent years. A range of other institutions, including government agencies, designated financial market utilities, and foreign and international monetary authorities also hold funds in accounts at the Fed.

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1 We thank the participants in the Research Handbook of Financial Markets Conference sponsored by Bilkent University and CEPR, and particularly our discussants, Brian Madigan and Bill Nelson, as well as the editors, for useful comments and suggestions. Sean Fulmer provided excellent research assistance. All remaining errors are ours.

2 Of course, the Fed also affects markets by establishing and enforcing regulations on banking institutions and other activities. This chapter focuses on the Fed’s balance-sheet-related actions.
In the next part of this chapter, we provide a description of the mechanics of the Federal Reserve balance sheet and a brief history of how it has changed over time. We then give a more detailed description of the Fed’s balance sheet prior to the GFC, followed by a discussion of the changes to the balance sheet during and after the crisis and during the pandemic, and the reasons for those changes. We go on to discuss the new policy implementation framework necessitated by the changes in the balance sheet. We then turn to the effects of lending programs and purchases of private assets on the balance sheet. And we end with some thoughts on the possible future evolution of the Fed’s balance sheet and the key decisions that the Fed will have to make regarding its size and composition.

1.2 THE MECHANICS OF THE FED’S BALANCE SHEET

The size and structure of the Federal Reserve’s balance sheet are governed by a range of policy decisions. The largest influence on the balance sheet comes from the monetary policy decisions made by the Federal Open Market Committee (FOMC), which is the main monetary policymaking body of the Federal Reserve System. In recent years, the FOMC has set a target range for the overnight interest rate that it uses as its primary policy instrument (the federal funds rate) and has undertaken additional balance sheet actions (such as purchases of Treasury securities and agency MBS) to meet its economic objectives. However, the balance sheet is also affected by decisions by the Board of Governors, which sets the parameters for the Fed’s lending activities as well as the rate the Fed pays on reserve balances.

A snapshot of the Fed’s balance sheet on a recent date is reported in Table 1.1. As can be seen, the Fed held nearly $9 trillion of assets at that time, which of course represents a remarkable size for any single portfolio. As with any balance sheet, these asset holdings were funded with a corresponding set of liabilities, which on this date totaled about $8.9 trillion. For the

<table>
<thead>
<tr>
<th>Assets</th>
<th>Liabilities</th>
<th>$ billions</th>
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<tr>
<td>Treasury securities</td>
<td>Federal Reserve notes</td>
<td>5,753.4</td>
</tr>
<tr>
<td>Agency debt and agency mortgage-backed</td>
<td>Reverse repurchase agreements</td>
<td>2,693.7</td>
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<tr>
<td>Discount window loans</td>
<td>Reserves of banks</td>
<td>2.3</td>
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<td>Section 13(3) loans</td>
<td>Treasury general account</td>
<td>42.2</td>
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<tr>
<td>Central bank liquidity swaps</td>
<td>Foreign official and other deposits</td>
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</tr>
<tr>
<td>Foreign currency denominated assets</td>
<td>Other liabilities</td>
<td>20.0</td>
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<tr>
<td>Other assets</td>
<td>Total</td>
<td>398.8</td>
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<td>Total</td>
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<td>8,910.7</td>
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**Notes:** Section 13(3) loans include the Commercial Paper Funding Facility II, the Corporate Credit Facilities, the Main Street lending program, the Municipal Liquidity Facility, the Term Asset-Backed Security Loan Facility II, and the Paycheck Protection Program Liquidity Facility. Figure is net of the Treasury contributions to credit facilities. For a list of sources of information on the Federal Reserve balance sheet, see Appendix 1.1.


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discussion in the remainder of this chapter, it will be important to understand the mechanics of how these assets and liabilities end up on the Fed's balance sheet.

The largest component of assets on the balance sheet is the Fed’s securities portfolio, which is comprised almost entirely of US Treasury securities, agency debt, and agency-backed mortgage-backed securities. These assets are purchased in the market by the Open Market Desk (the Desk) at the Federal Reserve Bank of New York (the New York Fed), and the Treasury securities at most times are rolled over at Treasury auctions upon maturity. The authority to purchase these securities comes from Section 14 of the Federal Reserve Act, which grants the Fed permission to buy and sell in the open market “bonds and notes of the United States,... [and] any obligation which is a direct obligation of, or fully guaranteed as to principal and interest by, any agency of the United States.”

These holdings of securities reflect two broad purposes, which are described in more detail later (in Sections 1.4 and 1.5). First, the Fed’s asset holdings grow over time to create the liquidity that a growing economy and financial system needs, as reflected in the liabilities on the Fed’s balance sheet (described next). Second, as noted earlier, the FOMC has used asset purchases as a policy instrument since the GFC. These securities are held in what is called the System Open Market Account (SOMA) portfolio, which simply represents the collective portfolio of the Fed’s Reserve Banks.

The FOMC is able to assign the authority to conduct operations to any Reserve Bank, but it has for many decades chosen the New York Fed, given the market infrastructure and expertise that has been established by that Reserve Bank. In particular, at each policy meeting, the FOMC gives the New York Fed a directive for carrying out its policy decisions. The Desk has chosen to conduct most of its operations with a set of firms, called “primary dealers,” that meet a number of requirements in terms of their market-making activities and their participation in the Fed’s operations, although the set of counterparties has been expanded in recent years for some types of operations (as described in the following).

The asset side of the balance sheet also includes several other items. One potentially important item is repurchase agreements (RPs) against the same types of domestic securities that the Fed holds outright. In a repurchase agreement, the Fed purchases a security from the primary dealer while simultaneously agreeing to sell it back to them at a future date, typically the next business day. This type of operation in effect provides a short-term loan to the counterparty using the underlying asset as collateral, thereby increasing liquidity in the market by crediting the reserve account of the counterparty or the counterparty’s bank. While there were

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3 The Federal Reserve reports its securities holdings on an amortized cost basis, rather than a fair value basis. However, the Fed provides fair value figures on a quarterly basis in its “Reserve Bank Combined Quarterly Financial Report.” This report also provides information on unrealized gains and losses on securities holdings. The figures shown in the table are the face value of the securities held; the unamortized premiums and discounts are shown separately and not broken out by the type of security. “Agency” refers to US government-sponsored agencies such as Fannie Mae and Freddie Mac.

4 For more information, see Federal Reserve Bank of New York (2022a).

5 Somewhat confusingly, the Fed refers to these operations from the perspective of the counterparty. When a private firm does an RP, it is typically receiving funds and sending out the security — that is, it is funding the security. When the Fed does an RP, it is instead sending out funds and taking in the security — that is, it is conducting what is an RP for its counterparty.
essentially no RPs on the asset side of the balance sheet in the aforementioned snapshot, this has been a very large asset in the Fed’s portfolio at times.

A second category of asset corresponds to credit that the Federal Reserve has provided to banks and, on occasion, to non-bank firms or other entities. This credit includes discount window loans to banks, authorized under Section 10 of the Federal Reserve Act, and other types of lending to non-bank entities, authorized under Section 13. These will be described in greater detail in Section 1.7, and further details are provided in the chapter in the volume by Madigan and Nelson.

A third category of assets held is foreign assets, as the Fed maintains roughly $20 billion of assets denominated in Japanese yen and euros. This chapter does not discuss the purpose and management of these foreign asset holdings in detail. These assets have generally been rolled over for many years, with no active market operations that were intended to have an impact on FX markets.6

A final category of assets on the Fed’s balance sheet is central bank liquidity swaps. These are arrangements with foreign central banks under which US dollars are provided against foreign currency collateral. These transactions are authorized under Section 14 of the Federal Reserve Act. As described further in the following, the purpose of the swaps is to allow foreign central banks to on-lend the US dollars to financial firms in their jurisdictions and thereby ease strains in dollar funding markets abroad.

As noted earlier, the assets held by the Fed are almost entirely matched by liabilities on its balance sheet.7 The major categories of Fed liabilities are currency held by the public, bank reserves, reverse repurchase agreements, and the Treasury’s account at the Fed.8

It may be easiest to start with reserve balances, which are the balances that banks have in their accounts held with the Fed.9 These accounts, which are assets of the banks, represent pure liquidity for banks, in that they can use them to make immediate payments over the Fedwire system. When the Fed purchases Treasury or other securities from a bank, it credits its account with the payment for the securities, thereby creating liquidity (bank reserves) while reducing the bank’s holdings of Treasury securities. If the purchases are from a market participant other than a bank, that participant will have un-invested balances from its payment from the Fed, which will generally end up (at least temporarily) as a deposit in a bank, leaving

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6 The exception was that the Federal Reserve participated in a coordinated Group of Seven (G-7) intervention to sell Japanese yen in March 2011, in the wake of the earthquake and tsunami that struck Japan. For a description of activities surrounding the foreign asset holdings of the Fed, see the quarterly reports published by the New York Fed (for example, Federal Reserve Bank of New York, 2022b).

7 The gap between the assets and liabilities on the Fed’s balance sheet corresponds to the capital held by the Fed. Unlike some foreign central banks, the Federal Reserve holds little capital. In March 2022, Fed capital was only about $40 billion — roughly a half percent of Fed assets. While Fed earnings have been large in recent years (Federal Reserve, 2022), those earnings are almost entirely remitted to the Treasury each year. Indeed, Congress has on two occasions over the past decade required the Fed to transfer additional capital to the Treasury to help fund federal spending and has put limits on the Fed’s ability to accumulate capital.

8 In addition to those major liabilities, there is a variety of relatively small liabilities, including accounts maintained for various government agencies and clearing houses. We leave those aside in the discussion here.

9 All depository institutions – commercial banks, thrift institutions, and credit unions – are eligible to have accounts at the Fed. We use the term “banks” generically to refer to all depository institutions.
the banking system with more reserves (reserves end up being the asset that banks hold that corresponds to the increased liability in the form of the deposit).

If that were the only form of Fed-generated liquidity, it would be essentially a closed system in which all liquidity created by the Fed’s asset purchases would have to reside in the banking system (leaving currency aside for the moment). However, there are other Fed liabilities that provide more flexibility for the liquidity created by Fed purchases to be held in other forms. One important one is reverse repurchase agreements (RRPs), which are simply RPs done by the Fed in the opposite direction. That is, in an RRP, the Fed would sell securities to the counterparty while agreeing to buy them back on a later date, thereby draining bank reserves from the system. These operations allow the liquidity created by the Fed’s asset purchases to flow out of the banking system and into other institutions such as government-only money market mutual funds, since those institutions can hold RRPs but cannot hold reserves. In recent quarters, as the Fed’s securities holdings have reached new highs, RRPs have increased substantially.

Another notable liability for the Fed is Federal Reserve notes (currency). Households and other private agents hold some amounts of currency for making various routine transactions in the economy. The demand for currency therefore tends to grow as the size of the economy (nominal GDP) expands. In addition, the high degree of credibility enjoyed by the US dollar contributes to foreign demand for US currency. In fact, a majority of US currency outstanding is estimated to be held outside the borders of the United States (Judson, 2017). Because currency is obtained from banks, rising demand for currency would reduce bank reserves, at least in the first instance, if the Fed took no action. The Fed therefore needs to purchase assets over time to create the liquidity that ends up being held in the form of currency.

The final category of liability worth highlighting is the Treasury’s account, known as the Treasury General Account (TGA). This account is held at the Fed and is used by the Treasury to receive and make payments – that is, it is the account used for the majority of Treasury transactions. Given the volume of funds flowing in and out of the Treasury, managing the balance in this account and ensuring that it has sufficient funds is a complex process for the Treasury, and the Fed provides it with operational support for performing those functions. Of particular relevance for this chapter, balances held in the TGA are funds that are not available to the private markets. As such, an increase in the TGA balance drains liquidity from the financial system. The TGA used to be managed to maintain a very small and stable balance by shifting excess funds into accounts at depository institutions. But the Treasury has chosen to have TGA balances become much larger and more variable in recent years.10

10 The Treasury has seen this as a prudent shift to allow it to continue to make payments even if an unexpected event were to disrupt its inflows for several days, or to be ready for sizable outflows when legislative actions are pending. The shift in the Fed’s operating framework, discussed later in this chapter, accommodates such a shift in the Treasury’s cash management practices.
1.3 A HISTORICAL PERSPECTIVE ON THE FED’S BALANCE SHEET

Before turning to what the Fed’s balance sheet and operating regime have looked like in recent decades, it is useful to look at a longer history. This history demonstrates that the Fed's approach has varied considerably in the past, and it sheds some light on how the Fed arrived at its current regime. Over time, the variation in the Fed’s approach has been driven by the legal authority provided by Congress, the framework for implementing monetary policy, and the economic and political environment of the time.

One of the primary purposes of the Federal Reserve as outlined in the Federal Reserve Act of 1913 was to “furnish an elastic currency.” While it is not clear how exactly to interpret this purpose in the context of modern financial markets, it at least suggests that the Fed would vary the size or composition of its balance sheet based on private demand for its liabilities. In the early years, the Fed primarily met this responsibility by rediscounting “real bills” for banks. These bills were receivables from commercial transactions and other commercial paper, which the Fed would convert to liquid money in the form of Federal Reserve notes or reserves of banks. Indeed, for the first decade and a half after its founding in 1914, the Federal Reserve’s main assets were gold – as the United States was on the gold standard during this time – and real bills (Chen & Gibson, 2017).

An important turning point in the legal authority afforded to the Federal Reserve occurred in 1932 with the Glass-Steagall Act. At this time, Treasury securities became eligible to serve as explicit backing for the Federal Reserve’s liabilities, instead of the earlier focus on gold and real bills. As explained by Friedman and Schwartz (1963), Congress had grown frustrated with the Federal Reserve’s contractionary monetary policies during the Great Depression and leaned heavily on the Federal Reserve to undertake expansionary open market operations in 1932. This resulted in a substantial expansion of the Fed’s holdings of government securities, as shown in Figure 1. According to Meltzer (2004), while initially conceived of as a temporary Depression-era response, this ended up as a permanent change, relaxing one of the main constraints on the Federal Reserve’s ability to expand the size of its balance sheet. Over time, government securities became the dominant asset backing the Fed’s liabilities, while gold backing requirements were diminished in several steps starting in 1945 before ultimately being brought to zero in 1965 (Ramage, 1968).

Another shift in the size and composition of the Fed’s balance sheet came after the United States entered World War II. The Treasury Department requested that the Federal Reserve undertake open market operations in order to cap market interest rates on Treasury securities beginning in April 1942. This regime required considerable purchases of Treasury securities at times and persisted after the end of World War II (Chaurushiya & Kuttner, 2003). With the onset of the Korean War in 1950 and rising inflation associated with the war effort, the Federal Reserve became worried that maintaining the interest rate ceiling was inconsistent with achieving its monetary policy objectives. After the Fed-Treasury Accord of March 1951, explicit support to maintain the yield cap was gradually phased out over the remainder of the year. Perhaps seeking to more clearly demonstrate that there was no longer any target

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11 At the time, the real bills doctrine was a popular theory. It held that monetary expansion that matched the expansion in economic activity as reflected in circulation of such commercial bills would not be inflationary.
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for longer-term yields, the Federal Reserve implemented a “bills only” policy from 1953 to 1961, under which it restricted open market operations to Treasury bills only. This policy was abandoned in 1961 when higher bill yields were seen as desirable to stem the outflow of gold from the United States even though domestic economic considerations warranted low longer-term rates, and the Federal Reserve began buying longer-term securities again (Friedman & Schwartz, 1963). After the 1960s, the share of bills held generally fluctuated between one-third and one-half of the portfolio until the onset of the GFC.

A further important change in the Federal Reserve’s authority came with the Interest Adjustment Act of 1966, which allowed for purchases of Federal agency debt for the first time. At first, the federal Reserve was reluctant to insert itself into this market, for fear of becoming entangled in Federal housing policy at the expense of monetary policy considerations, and initially, only repurchase agreements, not outright purchases of agency debt, were allowed (Haltom & Sharp, 2014). During the expansionary monetary policy period of the 1970s, the Federal Reserve acquired a significant quantity of agency debt until this practice was stopped by Chairman Volcker in 1981. The Federal Reserve’s portfolio of agency debt declined to zero by the early 2000s as these securities matured.

As noted, the framework for implementing monetary policy was also a determinant of the Federal Reserve’s balance sheet. Early in the Federal Reserve’s history, monetary policy was

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12 This was the original “Operation Twist,” a term later also used for the Maturity Extension Program (MEP) announced in 2011 (Swanson, 2011).


Figure 1.1 The Federal Reserve’s assets as a percent of nominal GDP, 1914–2021

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primarily adjusted via the discount rate, the rate at which the Fed purchased bankers acceptances, and reserve requirements, with an eye toward arresting stresses that arose from time to time in the banking system. In fact, as noted by Meltzer (2004), in the early years the balance sheet was too small to effect the monetary tightening that might have been needed during WWI, as the Fed had insufficient securities to sell in its portfolio and was reluctant to adjust discount rates at that time. While short-term market rates were seen as a helpful indicator for assessing money market conditions, they were not a target in and of themselves until Treasury bill rates were pegged during WWII.

Despite acknowledging the relevance of the federal funds market, according to Meulendyke's history of the Federal Reserve's operating framework (1998), the Federal Reserve during the 1950s and 1960s was reluctant to adopt explicit targets for the federal funds rate due to the earlier negative experience with targeting bill yields. Instead, open market operations were used to adjust the balance sheet such that “free” reserve balances (that is, excess reserves less borrowed reserves) moved toward targeted levels. By the 1970s, the federal funds rate was seen as a useful intermediate target, and ranges for the federal funds rate were prescribed during intermeeting periods, within which fluctuations were allowed in order to try to hit reserves targets. These ranges were gradually narrowed over the course of the 1970s, from as wide as 1.5 percentage points early in the decade to as narrow as 25 basis points later in the decade.

In 1979 explicit targeting of the federal funds rate was thrown out, and monetary aggregates were made the focus of policy. This was seen as the most direct way to ensure that the inflation problem at the time could be contained. Over the course of the 1980s as inflation was brought under control, targets for the federal funds rate were again re-emphasized – in part due to instability in the relationship between the monetary aggregates and income and interest rates – and by 1988 the FOMC was giving primary weight to the federal funds rate as its policy instrument. However, it was not until 1994 that the directional objective for the rate (i.e., higher or lower) was clearly communicated in a policy statement after FOMC meetings. In 1995, numerical targets started to be announced, in basically the same form they are communicated to the public today.

Turning to the liability side of the balance sheet, for much of the Fed’s history reserve balances not only represented a liquid medium for interbank payments, but also a way of meeting reserve requirements – the liquidity buffer that needed to be held against deposits both to ensure banks could manage unexpected withdrawals and to facilitate the implementation of monetary policy. However, the extent to which these requirements were binding, and so encouraged trading of reserves among banks, varied significantly over time. For example, Goodfriend and Whelpley (1986) note that during the liquidity trap in the 1930s excess reserves were very abundant (Figure 1.2), and hence trading activity in the federal funds market dried up. In the 1940s, reserves remained effectively abundant due to the monetary

13 The discount window was initially not a single rate, but separate rates set independently by the Boards of the Reserve Banks, though subject to review and determination by the Board of Governors.

14 Goodfriend and Whelpley (1986) note that rates on overnight borrowing – conceptually very similar to the modern federal funds market – were quoted in the financial press as early as 1928. These rates were for two checks exchanged simultaneously, one drawn on the reserve account of the lending bank and one drawn on the clearinghouse account of the borrowing bank, the latter of which settled a day later than the former, hence the two taken together were a self-liquidating overnight loan of reserve balances.
regime needed to maintain the ceiling on Treasury bill rates. However, starting in the 1950s, as monetary policy tightened, reserve requirements became more binding, reserve scarcity grew, and trading in the federal funds market rose – continuing to be robust for most of the second half of the century (Anbil & Carlson, 2019). After the GFC, conditions moved back toward those seen in the 1930s, as large-scale asset purchases again boosted excess reserves to very high levels and trading in the federal funds market ebbed. In recent years reserve requirements were reduced significantly and increasingly became an afterthought in monetary and regulatory policy, as new prudential liquidity requirements were introduced that could be met with non-reserve assets (such as Treasury bills). In March 2020 the Federal Reserve officially dropped all reserve requirements to zero.

1.4 THE FED’S BALANCE SHEET LEADING UP TO THE GLOBAL FINANCIAL CRISIS

In the period leading up to the GFC, the Fed had settled into a fairly straightforward balance sheet approach and operating regime for implementing monetary policy. In this section, we consider both its outright holdings of assets and its use of temporary open market operations to achieve its federal funds rate target over this period.

Nearly all of the growth in the outright asset holdings on the Fed’s balance sheet over this period was driven by the expanding demand for currency by the general public, both in the United States and abroad. As noted earlier, it is natural for the demand for currency to increase

over time as nominal GDP grows. To accommodate that growth, the Fed expanded its holdings of Treasury securities over time. It did so by conducting periodic operations to purchase Treasury securities in the open market from the primary dealers. These purchases, which were referred to as “bill passes” or “coupon passes” depending on the securities purchased, were generally small in size and were designed to be market neutral, given their primary purpose.

On average over the period from 2002 to 2006, the Open Market Desk at the New York Fed carried out an average of 36 bill or coupon passes per year, with an average size of just over $1 billion. The maturity structure of the Treasury securities held by the Fed was not notably different from that of the outstanding stock of debt, although the SOMA portfolio was skewed somewhat in the direction of shorter maturities. By purchasing securities only as needed to match the growth in currency, and by not being aggressive in terms of the duration risk held in the SOMA portfolio, the Fed was attempting to leave as little imprint on the market as possible with its balance sheet.

The more active component of operations by the Fed involved the daily management of reserves by the Desk, which took place primarily through repurchase agreements (RPs). As noted earlier, RP operations serve to increase liquidity in the financial system, but they do so only temporarily, in a manner that automatically unwinds. In contrast, the coupon and bill passes described earlier also create liquidity, but they do so in a more permanent manner. Given that distinction, the uses of these tools can be understood by the needs that they were trying to address. Increases in currency demand are long-lasting, and the Desk therefore would meet currency demand through permanent increases in SOMA asset holdings. Short-run increases in the demand for liquidity by the banking sector, or temporary fluctuations in the TGA, were instead better met through RPs, which could be allowed to unwind quickly if needed.

The decision of how much liquidity to inject on any day through RPs was governed by the target for the federal funds rate. Over the period since 1997, the directive to the Desk has included an explicit target for the federal funds rate – the interest rate on uncollateralized overnight transactions between banks which has come to serve as the primary policy instrument of the FOMC. Moreover, as described earlier, the FOMC had begun explicitly referring to a federal funds rate target in 1995, and in its internal deliberations, it had implicitly prescribed a target for the federal funds rate for a number of years before that.

To hit the federal funds rate target, the Desk had to make a daily decision, with input from the staff of the Board of Governors, about how much liquidity to create on any given day given the anticipated demand for reserves on the day. Pushing more liquidity into the system through larger RPs would typically lower the federal funds rate, as banks would have more liquidity to meet their needs and would therefore have less demand to borrow from the federal funds market. Similarly, injecting fewer reserves into the system would put upward pressure on the federal funds rate. The process of determining daily open market operations involved a forecast of the daily demand for reserves, which was a complicated process involving a number of esoteric details about payment flows. That said, the operating framework was highly effective, with the federal funds rate trading very close to target on most days (see Figure 1.3).

The overall manner in which the Open Market Desk at the New York Fed chose to operate over this period was to set the outright holdings in SOMA at a level that would, by itself, leave a moderate but persistent reserve deficiency. This reserve deficiency would then be made up by conducting RP operations to generate the amount of liquidity needed to hit the federal funds rate target. In fact, over the period from 2002 to 2006, the Desk typically maintained
between $20 billion and $40 billion of RPs outstanding. This allowed them to take the level of reserves up or down quickly as needed to hit the federal funds rate target.

This system ran with relatively low aggregate reserve balances over this period. Since reserves earned no interest, banks had an incentive to economize on their reserve balances. As a consequence, the Fed could effect a nontrivial influence on the federal funds rate through relatively small variations (typically just several billion dollars) of reserves, giving it the control needed to hit the federal funds rate target. This operational system for controlling overnight rates is often called a “corridor” system since the supply of reserves provided determined the federal funds rate within a range – or corridor – above the rate paid on reserves (then zero) and below the rate charged on loans of reserves (the discount rate).\footnote{15 We are using the term “corridor system” flexibly here. Some commentators argue that a corridor system requires an above-zero rate paid on reserves to provide a floor for the system. We are considering the zero rate paid on reserves as the bottom of the corridor. The key aspect of the corridor system that we are highlighting, which holds under either definition, is that it requires active use of open market operations to achieve the supply of reserves that intersects the demand for reserves at the target rate.}

1.5 THE FED’S BALANCE SHEET SINCE THE GLOBAL FINANCIAL CRISIS

Once the GFC hit, the Fed’s balance sheet was transformed in important ways. The Fed ended up holding a much larger volume of assets in its portfolio, and it shifted its operating regime to a so-called “floor” system.

The evolution of the Fed’s balance sheet began in late 2007 and over the first half of 2008, well before the intense pressures created by the Lehman Brothers bankruptcy in September 2008. The Fed over that period launched a series of credit and liquidity facilities to address pressures in funding markets, as described in the next section and in the chapter by Madigan and Nelson in this volume. Those facilities, along with measures related to the collapse of

Source: Federal Reserve Economic Data (FRED).
Bear Stearns in March 2008, resulted in an expansion in the Fed’s holdings of instruments beyond the Treasury securities that had been typically held in the SOMA.

This liquidity, if left unchecked, would have put significant downward pressure on the federal funds rate in the open market, pushing it below the target established by the FOMC. In an effort to maintain the federal funds rate near target, the Desk decided to shed some of the Federal Reserve’s other asset holdings by running off maturing Treasury bills (that is, letting them mature without replacement). By doing so, it was trying to keep bank reserves in a range that allowed the target funds rate to be hit.16

This process of “sterilizing” the reserve injections coming from the credit facilities would soon be overwhelmed, though, by the massive expansion of the balance sheet that took place after the failure of Lehman Brothers. In the immediate aftermath of the Lehman failure, the use of the credit facilities expanded rapidly and new ones were launched. The volume of lending across all Fed facilities surged to nearly $1.9 trillion, far outstripping the Fed’s ability to shed other assets or otherwise drain the reserves created, as shown in Figure 1.4.

Moreover, the Fed also embarked on a large asset purchase program – the first step into a policy approach that has become known as quantitative easing or QE.17 The QE programs began with the announcement of $600 billion of purchases of agency debt and agency MBS in late November 2008. But the program quickly morphed into a more extensive program involving the purchase of over $1.7 trillion in Treasury debt, agency debt, and agency MBS that would last through March 2010. This program was later followed by a $600 billion second round of QE (QE2) that began in 2010, a $667 maturity extension program (MEP) that began in 2011, and a third round of asset purchases (QE3) that began in 2012 and would eventually increase the Fed’s security holdings by another $1.6 trillion (Table 1.2).

Based on all of those programs, the Fed ended up purchasing about $3.75 trillion of Treasury debt, agency debt, and agency MBS, on net, over the course of the GFC and the sluggish recovery that followed it. Since these assets were longer-term in nature (in contrast to the lending programs that were launched), these programs represented a fundamental transformation of the Federal Reserve’s balance sheet – one that would carry forward into the new operating framework for the Fed.

Purchases on this scale were a significant operational challenge for the Desk. Treasury securities were purchased over an internal system called FedTrade that let dealers make competitive offers to the Fed to ensure that the transactions occurred at fair market prices. While this was the standard operational system used by the Desk, it had never been employed to conduct outright purchases with that intensity. In addition, the Fed had never previously bought mortgage-backed securities, and hence it had to rely on external managers to conduct such purchases under close supervision and scrutiny by the New York Fed, at least for a time until it developed its own capabilities to do so (including eventually expanding FedTrade to include that asset class).

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16 In addition, the Fed and Treasury established the Supplementary Financing Program, under which the Treasury would issue Treasury bills beyond those needed to finance the government and hold the funds in its account at the Fed. The effect of such issues was to drain reserves from the banking system and help support the Fed’s policy implementation (Treasury Department, 2008).

17 The Fed initially made a distinction between quantitative easing, which had previously been implemented by the Bank of Japan and involved large increases in reserves intended to encourage bank lending, and large-scale asset purchases, under which the Fed purchased large volumes of longer-term securities with the aim of lowering longer-term interest rates. However, the two terms are now essentially used interchangeably in public discussions.
In all of these cases, the Desk had to set out a strategy determining which securities to purchase and the procedures for making those selections, within the broad policy parameters established by the FOMC. And it had to meet the operational challenges of implementing those purchases. The Desk had moved to conducting less than two outright operations a month of modest size, to an average of more than three operations a week in Treasury and agency debt with an average size of over $3 billion per operation, and nearly continuous purchases of MBS with an average of over $11 billion per week.

The purpose of the asset purchases was to make financial conditions more accommodative. In the Fed’s view, the primary channel for achieving this was by removing risk from the market, which was expected to lead the market to reprice the premiums for that risk through a “portfolio balance channel.” Since duration was the primary risk contained in the assets that the Fed was purchasing, it was thought that asset purchases would lower longer-term interest rates by reducing the term premium, with favorable knock-on effects to a wider range of asset prices. As Ben Bernanke put it, the Fed’s purchases of Treasury and agency securities “likely both reduced the yields on those securities and also pushed investors into holding other assets with similar characteristics, such as credit risk and duration. For example, some investors who sold MBS to the Fed may have replaced them in their portfolios with longer-term, high-quality corporate bonds, depressing the yields on those assets as well” (Bernanke, 2010).


Figure 1.4 The Federal Reserve’s assets and liabilities as a percent of nominal GDP, 2005–2021

In all of these cases, the Desk had to set out a strategy determining which securities to purchase and the procedures for making those selections, within the broad policy parameters established by the FOMC. And it had to meet the operational challenges of implementing those purchases. The Desk had moved to conducting less than two outright operations a month of modest size, to an average of more than three operations a week in Treasury and agency debt with an average size of over $3 billion per operation, and nearly continuous purchases of MBS with an average of over $11 billion per week.

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Even though the intended effects on financial conditions were associated with the asset side of the Fed’s balance sheet, this expansion in asset holdings required a similar expansion of the liability side of the Fed’s balance sheet, which created some meaningful operational challenges for the Fed. Most importantly, it meant that the supply of reserves over this period increased by more than $2.5 trillion, making it impossible for the Desk to control overnight interest rates in the same manner as it had prior to the crisis.

This situation necessitated a shift in the operating procedure of the Fed, which in turn required a change in the Federal Reserve Act. The Federal Reserve Board had long argued that Congress should provide it with the authority to pay interest on reserve balances. This was seen as desirable for several reasons (see Kohn, 2004). One reason given was that this authority could help the Fed implement monetary policy, since the rate paid on reserves would tend to put a floor under market rates. In 2006, Congress passed the Financial Services Regulatory Relief Act of 2006, which authorized the Federal Reserve to pay interest on balances held by banks but, for budgetary reasons, only made the authority effective in 2011. However, the Emergency Economic Stabilization Act of 2008, passed after the failure of Lehman Brothers, moved up the effective date to October 1, allowing the Fed to begin paying interest on reserve balances held by banks.

Table 1.2  Federal Reserve asset purchase programs

<table>
<thead>
<tr>
<th>Program</th>
<th>Announcement date(s)</th>
<th>Size</th>
<th>Dates of operations</th>
<th>Modal purchase pace</th>
</tr>
</thead>
<tbody>
<tr>
<td>QE1</td>
<td>November 25, 2008; increased March 18, 2009</td>
<td>$500bn agency MBS and $100bn agency debt initially; expanded to $300bn Treasuries, $175bn agency debt, and $1.25tn agency MBS</td>
<td>Nov 2008–Mar 2010</td>
<td>~$100bn/mo</td>
</tr>
<tr>
<td>Maturity Extension Program</td>
<td>September 21, 2011; extended June 20, 2012</td>
<td>$400bn longer-term Treasuries initially; expanded to $667bn</td>
<td>Sep 2011–Dec 2012</td>
<td>$45bn/mo</td>
</tr>
<tr>
<td></td>
<td>Agency MBS purchases announced in September 13, 2012; Treasury purchases announced in December 2012 as continuation of Maturity Extension Program</td>
<td>$790bn Treasuries and $823bn agency MBS</td>
<td>Sep 2012–Oct 2014</td>
<td>$85bn/mo ($45bn Treasuries, $40bn agency MBS)</td>
</tr>
<tr>
<td>Covid-era QE program</td>
<td>March 15, 2020</td>
<td>$3.2tn Treasuries, $1.3tn agency MBS</td>
<td>Mar 2020–Mar 2022</td>
<td>Very rapid pace earlier in the program; settled to $120bn/mo ($80bn Treasuries, $40bn agency MBS)</td>
</tr>
</tbody>
</table>

balances (IORB) to banks at a rate set by the Board of Governors. This administered rate became a key component of the Fed’s operational framework, effectively moving the Fed, at least for a time, to a floor system for managing its target rate.

The idea underlying the new system (described in more detail in the next section) was that market rates would not be able to fall too far below the IORB rate, since banks could always leave their excess funds at the Fed and earn that rate. While this system generally operated as intended, the floor on market rates proved soggy, with overnight interest rates trading notably below the IORB rate in the fall of 2008. The system relied on arbitrage performed by banks to pull market rates towards the IORB rate: if borrowing rates were below the IORB rate, banks could borrow funds in the market and then hold them at the Fed, earning the spread between them in a risk-free transaction. However, banks had various regulatory costs related to their balance sheet size that limited their willingness to do such transactions, and hence the wedge between market rates and the IORB rate was larger than expected.

This issue became inconsequential once the FOMC, in December 2008, decided to take the target policy rate all the way to its effective lower bound by cutting the target for the federal funds rate to a range of 0 to 25 basis points (zero is a harder floor on the federal funds rate for several technical reasons). However, the issue still lingered in the background, and, when the time came to consider raising rates, the Fed needed to decide on what tools would be used to implement policy.

A key innovation on this front was the decision to use RRPs in a more expansive manner. In particular, the FOMC ultimately decided to allow the Desk to implement RRPs as a fixed-rate, full-allotment overnight facility – that is, allowing participants to invest large amounts in the program at the offering rate. In effect, this extended the ability to pay interest on overnight balances at the Fed to a wider set of counterparties, only in the form of RRPs rather than bank reserves. This facility proved highly effective at placing a floor on overnight market interest rates – particularly for overnight repo rates – since this facility reached many of the institutions with excess funds that would have otherwise invested them in RRPs or federal funds transactions.

Once the economy had recovered sufficiently from the GFC, and interest rates had been raised well above the effective lower bound, the FOMC decided to begin reducing the size of the Fed’s balance sheet. In a set of principles published in June 2017, the FOMC said that it would “gradually reduce the Federal Reserve’s securities holdings by decreasing its reinvestment of the principal payments it receives from securities” (FOMC, 2017). To achieve this outcome, the Desk began to allow maturing securities to run off its books without reinvestment, up to caps on the monthly amount of run-off. The caps started out at a low level but were gradually raised until the allowed runoff reached $50 billion a month. Over the period from 2017 to 2019, the amount of securities held by the Fed declined steadily. However, the cumulative decline over this period ended up being only about $650 billion, as currency demand had continued to grow, and as the new regulatory environment for banks encouraged them to hold much higher levels of reserves than had been the case prior to the GFC. Indeed, the strength of the demand for reserves proved surprising to the Federal Reserve, as the decline in reserves to around $1.5 trillion in September 2019 led to unexpected pressure in money markets, particularly the market for RPs. In response, the Federal Reserve added reserves, initially through repo operations, and subsequently through outright purchases of Treasury bills (FOMC, 2019).
More recently, in response to the Covid shock to the economy, the Fed again turned to asset purchases and emergency lending programs, which have expanded its asset holdings. In March 2020, when it became clear that the pandemic was likely to have very adverse effects on the US and global economies, many investors tried to reduce their positions to limit their risk and build liquidity. However, broker-dealers were unable to handle the flow of transactions, and prices in many fixed-income markets declined notably amid disorderly market conditions. To improve functioning in the Treasury and agency MBS markets, the Fed announced on March 15 that it would purchase $500 billion in Treasury securities and $200 billion in agency mortgage-backed securities over “the coming months.” Unlike the Treasury purchases undertaken after the GFC, these purchases were made across the yield curve, without a focus on longer-term securities. Conditions remained badly strained, and on March 23, 2020, the Fed stated that it would purchase the securities “in the amounts needed to support smooth market functioning and effective transmission of monetary policy to broader financial conditions.” Overall, the Fed purchased a total of about $2.1 trillion of securities over the period through May 2020. As market conditions improved, it reduced the pace of purchases. In June 2020, the Fed said that it would continue to purchase $80 billion of Treasury securities and $40 billion of agency MBS per month “to sustain smooth market functioning.” In December 2020, it indicated that it would continue to make purchases at that pace, but effectively transitioned those purchases into an ongoing QE program aimed at supporting the economic recovery. Those purchases continued until October 2021, and then were gradually tapered to zero by March 2022, with total purchases reaching about $4.5 trillion.\(^{18}\)

The result of these purchases is that the Fed’s balance sheet became massive, as indicated in Table 1.1. Securities holdings in the SOMA portfolio reached roughly $8.5 trillion by early 2022, leaving nearly $4 trillion of reserves in the banking system and nearly $2 trillion in RRPs outstanding.

1.6 THE POST-CRISIS POLICY IMPLEMENTATION FRAMEWORK

As noted earlier, the expansion of the Fed’s balance sheet became intertwined with its decision to move to a new operating framework. As the economy continued to recover over the course of 2013 and 2014, the Fed began planning for how it would raise the federal funds rate when doing so became appropriate. Given the size of the balance sheet, the Fed would have to use a floor system at least initially, and it developed various tools that could be used to control rates. The first was the IORB rate, which had been used since the fall of 2008 to help put a floor under rates offered by banks. The second was the fixed-rate overnight reverse repurchase (ON RRP) program noted earlier, which would allow a range of RP investors to place funds at the Fed.\(^{19}\) In addition to these tools, the Fed tested auctions of term deposits to banks and of

\(^{18}\) See the post-FOMC statements for the March 15, June 9–10, and December 15–16, 2020 meetings.

\(^{19}\) The Desk began to build a more effective approach for conducting reverse repurchase agreements in large size as early as 2009, which involved a number of operational changes to reach a wider set of counterparties. It tested an ON RRP program with a broad set of counterparties – including primary dealers, government agencies, and money market mutual funds – in 2013 and 2014.
term RRP bids to the ON RRP counterparties as ways to drain reserves and potentially help put upward pressure on money market rates.

After considerable discussion in the spring of 2014, the FOMC announced in June that it would use the IORB rate as its primary tool when the time came to raise rates and that it would use the ON RRP program, and potentially other supplementary tools, to help ensure the effective implementation of monetary policy. The two administered rates would be set at levels intended to keep the federal funds rate in its target range. Initially, the FOMC imposed a cap on the size of the ON RRP program out of concern that a very large program could have adverse effects on the evolution of money markets. However, at the time of liftoff in late 2015, the FOMC removed the cap on the size of the ON RRP program to ensure that limits on the size of the program did not adversely affect policy implementation. In December 2015 the FOMC announced a 25 basis-point increase in the Federal funds rate; the new tools proved effective, and money market rates rose in line with the new target range despite the very large Fed balance sheet (Figure 1.5). Moreover, the ON RRP program proved to be of limited size at the time, and the cap on the size of the program was never reinstated.

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20 See Anderson et al. (2016) for a discussion.
21 The Fed also imposed a cap on the size of any individual counterparty’s ON RRP bids in order to limit the risk of strategic behavior by the participants. Those caps have been increased as the size of the program has risen in recent quarters.
While the floor system worked well at the time of liftoff, the Fed still needed to decide on the policy implementation framework that it would use over the longer run, once there was time to reduce the size of the balance sheet. Broadly, there were two options. First, the Fed could aim to return to a corridor system similar to that used prior to the GFC. In that case, the IORB rate (and perhaps the ON RRP rate) would provide the floor of the corridor, the discount rate would provide a rough ceiling for the corridor, and the actual federal funds rate would be in the middle of the corridor, with its level determined by the supply of and demand for reserves (Figure 1.6, left-hand side).  

In this option, the Desk would conduct regular – likely daily – open market operations to ensure that the federal funds rate traded near target. The second option was to continue to use a floor system, with a very large supply of reserves ensuring that the federal funds rate trades near the floor set by the IORB rate and the ON RRP rate (Figure 1.6, right-hand side). With this option, the FOMC could make decisions about its balance sheet independent of its decision on where to place the target federal funds rate.

In March 2019, the FOMC decided that its long-run policy implementation framework would be a floor system, using the administered rates on reserves and ON RRP to keep short-term market rates near the desired target.  

22 As noted in the following and in the chapter by Madigan and Nelson, the role of the discount rate as the ceiling of the corridor is hampered by the stigma associated with banks’ use of the discount window.

23 Formally, the IORB rate is set by the Board of Governors, while the rate on ON RRP is set by the FOMC. In practice, the two rates are set at the levels required to achieve the FOMC’s desired target range for the federal funds rate. The set of decisions required to implement the monetary policy decisions of the FOMC are reported in the Implementation Note published with the FOMC’s post-meeting statement.
following the GFC and appeared to provide good control over the federal funds rate and other short-term market rates. A return to a corridor system was seen as potentially making policy implementation more difficult because of the need to adjust the supply of reserves on a daily basis in response to changes in demand that would be difficult to forecast, particularly given the changes in markets and bank regulations since the GFC. A floor system would also give the Committee control over short-term interest rates even if, as in 2008–2009, the supply of reserves was boosted substantially by emergency liquidity provision or asset purchases. Another advantage of the floor system was that the high level of reserves could support financial stability and limit operational risks by ensuring a high level of liquidity in the system at all times, potentially limiting the need to provide additional liquidity on an emergency basis.

In addition to deciding on the implementation framework, the Committee also needed to agree on what interest rate or rates it would target. As a result of the high level of reserves and the ability to earn interest on them, the federal funds market became relatively small and somewhat idiosyncratic over the period after the GFC. The main lenders were the Federal Home Loan Banks, which had accounts at the Fed but were not eligible to receive interest, leading them to lend their overnight funds to banks in order to get a return on them. An alternative interest rate to target was the Overnight Bank Funding Rate (OBFR), which covered a broader set of lenders and so might provide a more robust measure of banks’ unsecured funding costs, particularly in times of market stress. Alternatively, a secured rate, such as the Secured Overnight Funding Rate (SOFR) could be used, as funding for banks and other financial firms had shifted toward secured markets over recent years, perhaps making the repo rate more important than unsecured funding rates for influencing broader financial conditions. However, the federal funds rate had been an effective tool for communication about the Fed’s policy intentions for a long time, and no change was made to the policy rate.

In 2021, the Fed decided to add two additional features to its operating framework – a standing RP facility for primary dealers and banks (the SRF), and a standing RP facility for foreign official institutions (called the FIMA repo facility). Use of these facilities would have the effect of adding liquidity (held as bank reserves or overnight RRPs) automatically whenever overnight interest rates reach the rates set on them. Nevertheless, it is still appropriate to think of the Fed as operating in a floor system, one in which it maintains considerable amounts of liquidity in the system through its outright asset holdings and relies primarily on the IORB rate and the ON RRP facility to influence overnight market interest rates. The standing repo facilities will act as a guardrail to automatically respond when unexpected developments or episodes of market stress put upward pressure on overnight interest rates.

### 1.7 LENDING AND PRIVATE ASSET PROGRAMS

In addition to the large-scale asset purchases undertaken to provide additional monetary accommodation at the lower bound, the Federal Reserve balance sheet has been deployed to address financial crises more directly by providing large volumes of liquidity and making purchases to support private asset markets. The Fed’s emergency lending programs undertaken in response to the GFC and the pandemic both left significant imprints on its balance sheet.
for a time. At their peak at the end of 2008, the Fed’s lending programs totaled nearly $1.9 trillion, divided roughly equally between credit provided directly to banks, credit provided to nonbanks, and swap lines with foreign central banks (to fund credit provided to banks in other jurisdictions). These emergency programs accounted for more than 80 percent of all Fed assets at the time (English & Mosser, 2020, table 2.1). Emergency lending programs surged again following the outbreak of the pandemic in 2020, but they remained more modest in size, peaking at around $700 billion, with the bulk accounted for by the swap lines with foreign central banks.

Federal Reserve lending and other related activities are authorized under several sections of the Federal Reserve Act. First, the Federal Reserve can provide credit to banks under its traditional discount window authority in Section 10 of the Federal Reserve Act.25 In ordinary times, such credit is available to banks on a short-term basis – generally overnight. During the GFC and also in response to the pandemic, the Federal Reserve eased the terms on discount window credit to encourage its use. In addition, during the GFC the Fed provided large amounts of discount window credit to banks in regular auctions under the Term Auction Facility (English & Mosser, 2020). Discount window credit (including discount window credit extended through the Term Auction Facility) peaked at more than $500 billion during the GFC, but only reached $50 billion in the spring of 2020.

Second, the Fed has broad lending authority in “unusual and exigent circumstances” under Section 13(3) of the Federal Reserve Act. During the GFC the Fed used this authority to provide liquidity to key institutions, including primary dealers and troubled systemically important firms, as well as to support important financial markets, including the commercial paper market and markets for asset-backed securities.26 Section 13(3) lending peaked at more than $700 billion in late 2008.27 In response to the pandemic, the Fed restarted virtually all of its crisis-era 13(3) programs and added newly developed programs to support lending to businesses and state and local governments. Nonetheless, total lending under the 13(3) programs during the pandemic peaked at less than $300 billion, well below the totals reached in 2008.

Third, Section 14 of the Federal Reserve Act gives the Federal Reserve the authority to provide liquidity to broker-dealers and others through open market operations. During the GFC, the Fed provided credit to broker-dealers under this authority through term repo operations against Treasury, agency debt, and agency MBS collateral (the so-called Single-Tranche Repo Program).28 However, that program was superseded by the Term Securities Lending Program (TSLF) and so never exceeded $80 billion (English & Mosser, 2020). Following the start of the pandemic in the spring of 2020, the Fed undertook large repo operations to provide liquidity to primary dealers. These operations peaked at more than $400 billion before falling back.

Finally, the Federal Reserve can use its open market authority under Section 14 of the Federal Reserve Act to engage in currency swaps with foreign central banks. Under these swaps, the Fed temporarily exchanges dollars for foreign currency; this can be very important.

25 See the detailed discussion of the discount window in the chapter by Madigan and Nelson.
26 For a more detailed discussion of these programs, see Logan, Nelson, and Parkinson (2020) and the Madigan and Nelson chapter in this volume.
27 For more details, see English and Mosser 2020, especially table 2.1 and notes.
28 Ordinarily, in the Fed’s RP operations, there are separate rates established for Treasury, agency debt, and agency MBS collateral. In a single-tranche operation, all types of collateral are accepted at the same rate. Such operations can ease pressures on dealer firms by allowing them to obtain financing without undue concern about the collateral they will have to provide.
in times of market stress because the foreign central banks can use the dollars provided to make dollar loans to financial firms in their jurisdictions. This mechanism ends up being crucial during periods of financial stress, given the global nature of dollar-denominated activity and the scope for dollar funding needs to arise in a number of different parts of the world. During the GFC, draws on swap lines by foreign central banks peaked at close to $600 billion; during the pandemic, such draws were also large, touching about $450 billion at the end of May 2020.

The Fed's emergency lending is intended to provide liquidity to support firms and markets during a crisis. Because the maturity of the credit is generally short and the interest rates are often elevated compared to market rates in normal times when conditions in funding and other markets recover, the lending programs tend to wind down endogenously as the loans are repaid. Thus, the sharp expansions in the size of the Fed balance sheet caused by emergency lending during crises reverse relatively quickly, in contrast to the effects of large-scale asset purchases, which are long-lived. For example, by the end of 2010, the GFC lending programs had declined by more than 90 percent and accounted for only about 6 percent of total Fed assets (Federal Reserve, 2010). Similarly, as the financial market effects of the pandemic waned, the Fed's loan programs decreased in size fairly rapidly. Currently, the programs total less than $50 billion – about half a percent of Fed assets (see Table 1.1).

It is important to note that the effect of an emergency program on total Fed assets may not be a useful measure of its effectiveness. For example, the Term Securities Lending Facility implemented in 2008 provided liquidity to primary dealers by swapping lower-quality collateral for Treasury securities, which the recipients could then use to raise funds in the repo market. As a result, the facility provided liquidity without an increase in Fed assets. Moreover, a commitment by the Federal Reserve to stand ready to purchase a class of assets may well be sufficient to improve market functioning without a significant increase in the size of the Fed's balance sheet. The pandemic programs aimed at the corporate bond market and the municipal securities market are good examples. Following the outbreak of Covid in the spring of 2020, the corporate and municipal bond markets were badly disrupted, with risk spreads widening sharply and trading conditions impaired. The Federal Reserve established the Primary Market Corporate Credit Facility (PMCCF) and the Secondary Market Corporate Credit Facility (SMCCF) in late March to provide support to the corporate bond market. The PMCCF was available to purchase bonds from investment-grade and selected near-investment-grade firms unable to issue in the primary market, and the SMCCF purchased a range of similarly rated corporate bonds in the secondary market. However, the announcement of the programs triggered a rapid improvement in market sentiment, even though they were not yet operational. As a consequence, the PMCCF was never utilized, and total purchases by

29 The intention of this structure was to provide liquidity to the primary dealers without increasing the supply of reserves and so affecting the implementation of the Fed’s interest rate policy under the policy implementation framework of the time.

30 In addition, during the GFC the Federal Reserve, the Treasury, and the FDIC took part in asset guarantee programs to support Citigroup and Bank of America. Under the terms of these agreements, the Treasury provided capital to the institutions, the FDIC agreed to cover losses on a pool of illiquid assets above a specified threshold, and the Fed committed to lend a fixed amount against the pool if losses exceeded a higher threshold. The programs appeared to shore up confidence in the two firms, and the Federal Reserve was never called upon to lend under them.
the SMCCF totaled only $14 billion – a small fraction of the capacity of the program. The introduction of the Municipal Liquidity Facility (MLF) in April 2020 similarly contributed to substantial improvement in the functioning of municipal securities markets, while total Fed purchases of municipal securities totaled only about $6 billion.

1.8 THE OUTLOOK FOR THE FED’S BALANCE SHEET

As a result of the very large size of its balance sheet and its critical role in a range of markets, the Federal Reserve has a tremendous influence on US financial developments. However, unlike a private investor aiming to maximize profits, the size and composition of the Fed’s balance sheet reflect the policy objectives of the Federal Reserve and the legal constraints under which it operates. In recent years, with two deep recessions driving the federal funds rate to its effective lower bound, the Fed has fostered its statutory objectives of maximum employment and stable prices by conducting large-scale purchases of Treasury securities and agency MBS. The result has been an extraordinary increase in Fed assets. On the liability side of the balance sheet, reserve balances have increased massively, and the Fed introduced an overnight reverse repo facility that has also risen to a very high level. In addition to the effects of these purchases, emergency liquidity provision also boosted the size of the Fed’s balance sheet, though those effects waned relatively quickly as the crises ebbed.

The operating regime of the Federal Reserve is likely to keep the balance sheet sizable, in order to provide a sufficient amount of liquidity to keep the floor system operating in an efficient manner. However, even in that case, the balance sheet certainly does not need to be as large as it was in early 2022. A key question going forward, therefore, is how the Fed should “normalize” the balance sheet as it withdraws policy accommodation.

The FOMC released a set of principles for reducing the size of the Fed’s balance sheet at its meeting in January 2022 (FOMC, 2022). Those principles largely followed the approach for policy normalization that was adopted after the Global Financial Crisis. In particular, the strategy involves first raising rates from the effective lower bound, and then reducing the Fed’s asset holdings primarily by not reinvesting some portion of the principal payments received on the securities in the Fed’s portfolio. This approach would result in a gradual normalization of the size of the Fed’s balance sheet over a period of several years. The principles also noted that, in the longer run, the FOMC intends to hold primarily Treasury securities in the SOMA portfolio. Achieving that outcome would require either reinvesting principal payments received on MBS in Treasury securities once the long-run size of the balance sheet has been reached, or outright sales of MBS at some stage.

Given the size of the balance sheet, this policy strategy involves some risk of the Fed not completing the normalization process before the next recession. If that recession also pushes the federal funds rate to its effective lower bound, then the Fed could end up restarting asset purchases to provide additional accommodation. The result could be a ratchet effect, in which the Fed’s balance sheet gets significantly larger in each recession and never returns to its previous size (even as a share of GDP) before the next recession. In addition, the ever-increasing amount of interest rate risk generated by larger holdings of longer-term securities funded by higher levels of interest-bearing reserves would presumably result in significant losses for the Fed at some stage. While not an economic problem, since the Federal Reserve
could still implement appropriate monetary policy, such losses could be a political problem for the Fed.\footnote{See Hall and Reis (2015) for a theoretical discussion of the limited economic effects of central bank losses. Given the Fed’s accounting – as noted earlier, the Fed doesn’t mark its securities to market – losses would likely only occur if the interest payments on reserves rose above the interest earned on Fed assets. Ordinarily, the Fed transfers its net profits to the Treasury. If there were losses, those transfers would cease, and under the Fed’s accounting rules it would accumulate a “deferred asset” equal to the cumulative size of its losses, keeping Fed capital positive. Once earnings became positive again, the Fed would retain earnings over time sufficient to offset the earlier losses and eliminate the deferred asset before resuming transfers to the Treasury. Presumably Congress and the Treasury would be unhappy about the effect of the loss of Fed transfers on the budget, but unless losses exceeded all future Fed profits, the Fed could continue to operate without any technical problem. See Carpenter et al. (2015) for a more detailed description of how this accounting would work and the Financial Accounting Manual for Federal Reserve Banks (2021) for the full story. See various editions of the Open Market Operations annual report from the New York Fed for projections of Fed income and for some calibration of the changes in income under alternative scenarios for interest rates.}

In making longer-run projections for the Fed’s balance sheet, it is also important to consider whether it will be influenced by major financial innovations or other structural changes to financial markets. One potentially important consideration in that regard is whether the Fed will choose to introduce some form of central bank digital currency (CBDC).\footnote{For a recent discussion of the issues, see BIS (2021). Private sector development of stablecoins could also have important effects on the Fed’s balance sheet, particularly if they were offered through banks that would in turn hold reserves.} At this time, Fed policymakers are still considering the possible benefits, costs, and risks of a Fed CBDC, and hence the outcome is uncertain.\footnote{Introduction of a CBDC would raise a number of difficult questions regarding the appropriate technology to use, the implications for users’ privacy, and the possible disintermediation of the banking system. See Federal Reserve (2022) and the references therein for a discussion.} On the one hand, Brainard (2021) provides a generally positive assessment, pointing to several possible benefits of a CBDC, including increased payment system efficiency and stability, greater competition for incumbent financial services providers, gains in financial inclusion, lower cross-border transactions costs, and preservation of public access to central bank money in a world where payments are increasingly electronic. On the other hand, Waller (2021) argues that private sector innovation, such as stablecoins, could be a more effective source of efficiency gains and increased competition for current intermediaries; the introduction of low-cost bank accounts would likely be a simpler and more effective spur to financial inclusion; ongoing efforts to improve cross border payment efficiency are likely to prove effective; and central bank provision of retail payments is likely to be less efficient over time than competitive private sector provision. If in the end the Fed does decide to launch a CBDC and the demand for it proves substantial, the CBDC could greatly increase the size of the Fed’s “normal” balance sheet, thereby trimming the cumulative reduction needed to reach that level (or eliminating it altogether). In effect, this shift would affect the Fed’s balance sheet similarly to a large increase in the demand for non-digital currency, and the Fed would have to hold assets to accommodate those balances.

Another key issue that could affect the Fed’s balance sheet over the longer term is whether it could be used to address new goals or objectives, such as limiting climate change. Central banks could, for example, adjust their collateral rules at the discount window to favor securities and loans related to green activities, or even purchase bonds issued to finance investments...
in such activities. However, these suggestions raise two significant issues. First, in the case of the Federal Reserve, such steps would go beyond the Fed’s current monetary policy mandate. The Federal Reserve Act calls for the Fed to conduct monetary policy to promote “maximum employment, stable prices, and moderate long-term interest rates.” Thus, the Fed’s mandate does not include addressing climate change or other possible objectives. Second, it is not clear that the Fed’s tools would be all that helpful in achieving these objectives. Except in unusual and exigent circumstances, the Fed cannot purchase corporate securities of any sort, so it would need to be given authority to purchase securities or provide loans financing green investments, perhaps at concessional rates. However, such programs would be essentially fiscal policy. Indeed, fiscal policy could be a far more powerful tool, allowing the government to provide large subsidies for particular types of investment or make such investments itself.

Overall, the discussion in this chapter of the Fed’s balance sheet decisions to date and the potential future course of the balance sheet highlights three broad points. First, the Fed’s balance sheet is tremendously important in terms of its influence on overall financial conditions and the functioning of financial markets. Second, the evolution of the Fed’s balance sheet is driven by the policy objectives of the Fed, the economic and financial shocks to which the Fed must respond, and the legal constraints on Fed activities. Finally, the Fed should manage its balance sheet in a flexible manner so that it can be used to address the key issues affecting financial markets at any particular time.

REFERENCES


34 See Network for Greening the Financial System (2021) for a discussion of targeted credit operations and collateral rules. See Varoufakis (2021) for using the Fed to finance green investment.

35 Of course, it is appropriate for the Fed to use its supervisory activities to ensure that banks are measuring and managing climate risks appropriately. See Brainard (2020).

36 Other central banks may not be similarly constrained. For example, the ECB has a primary mandate of price stability, but its secondary mandate is to “support the general economic policies in the [European] Union with a view to contributing to the achievement of the objectives of the Union” (Ioannidis et al., 2021). That broad mandate could allow the ECB to use its tools to support EU policies to address climate change.

37 At this time the United States doesn’t issue green sovereign securities such as the UK’s green gilts, which presumably would be clearly within the Fed’s mandate to purchase in normal times, if they existed.

38 Similar arguments may apply to other new objectives that have been proposed for the Fed. For example, some have suggested that the Fed should use its tools to foster a more equal distribution of income. But beyond the objective of maximum employment, it is not clear that the Fed’s tools are likely to be very effective. The fiscal authorities’ ability to tax and transfer seems a much more potent tool.


Brainard, L. (2020). Strengthening the financial system to meet the challenge of climate change. Speech at The Financial System & Climate Change: A Regulatory Imperative, hosted by the Center for American Progress, December 18.


APPENDIX 1.1: SOURCES OF INFORMATION ON THE FEDERAL RESERVE BALANCE SHEET

The following are useful sources of information on the Fed’s balance sheet:

1. By statute, the Fed publishes its balance sheet, as well as the balance sheets of each Reserve Bank, on a weekly basis on the H.4.1 Statistical Release, Factors Affecting Reserve Balances (https://www.federalreserve.gov/releases/h41/).
5. The results of auctions to purchase or sell securities are reported immediately on the website of the Federal Reserve Bank of New York (https://www.newyorkfed.org/markets/domestic-market-operations).
6. Transaction-level data on asset purchases and sales, including the names of individual counterparties, are published on the NY Fed website with a two-year lag (for example, https://www.newyorkfed.org/markets/omo_transaction_data).
7. Transaction-level data on discount window loans are also available with a two-year lag, on the website of the Board of Governors (https://www.federalreserve.gov/regreform/discount-window.htm).
8. Transaction-level data on emergency lending programs are published with a lag on the Board website (for example, https://www.federalreserve.gov/regreform/transaction-data.htm).