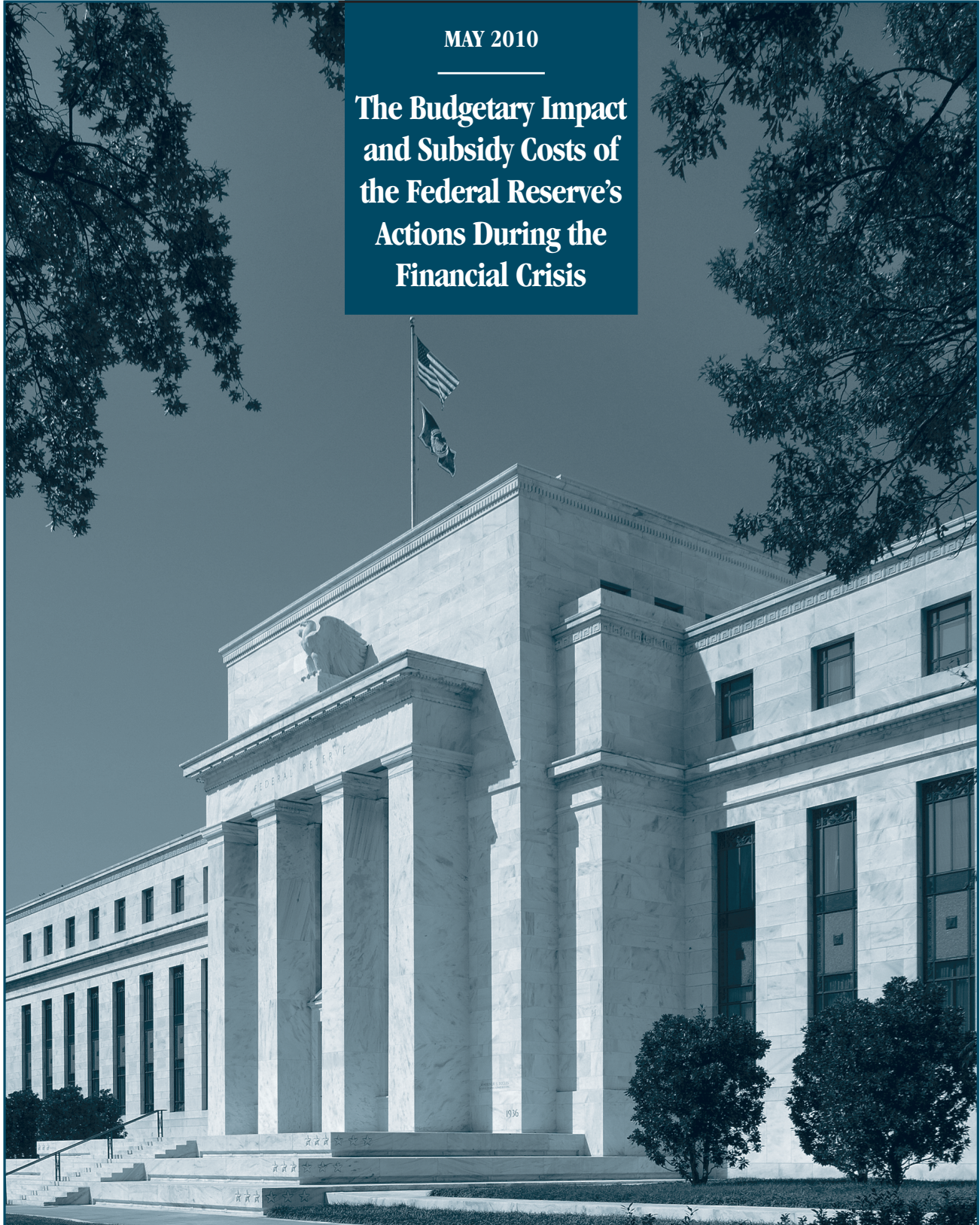


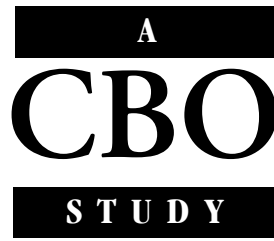
CONGRESS OF THE UNITED STATES
CONGRESSIONAL BUDGET OFFICE

A
CBO
STUDY

MAY 2010

**The Budgetary Impact
and Subsidy Costs of
the Federal Reserve's
Actions During the
Financial Crisis**





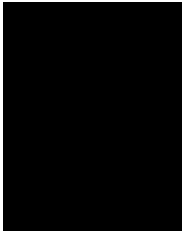
The Budgetary Impact and Subsidy Costs of the Federal Reserve's Actions During the Financial Crisis

May 2010

Notes

Unless otherwise indicated, all years referred to are calendar years.

On the cover: The Marriner S. Eccles Federal Reserve Board Building, Washington, D.C.,
photo by Britt Leckman.



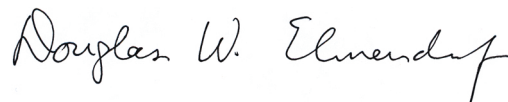
Preface

Over the past several years, the nation has experienced its most severe financial crisis since the Great Depression of the 1930s. In response, policymakers undertook a series of extraordinary actions to stabilize financial markets and institutions. The Federal Reserve System used its traditional policy tools to reduce short-term interest rates and increase the availability of funds to banks, and it created a variety of nontraditional credit programs to help restore liquidity and confidence to the financial sector. In doing so, it more than doubled the size of its asset portfolio to over \$2 trillion and assumed more risk of losses than it normally takes on.

This Congressional Budget Office (CBO) study—prepared at the request of the Ranking Member of the Senate Budget Committee—describes the various actions by the Federal Reserve to stabilize the financial markets and how those actions are likely to affect the federal budget in coming years. The report also presents estimates of the risk-adjusted (or fair-value) subsidies that the Federal Reserve provided to financial institutions through its emergency programs. Unlike the cash treatment of the Federal Reserve in the budget, fair-value subsidies include the cost of the risk that the central bank has assumed. Thus, those subsidies are a more comprehensive measure of the cost of the central bank's actions.

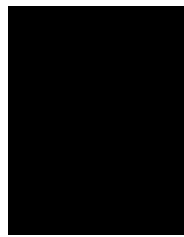
The report was written by Kim Kowalewski and Wendy Kiska of CBO's Macroeconomic Analysis Division, under the direction of Robert Dennis, and by Deborah Lucas of CBO's Financial Analysis Division. The report is based on an earlier draft written by Barbara Edwards of CBO's Tax Analysis Division and Thomas Woodward, formerly of CBO. Barbara Edwards, Wendy Kiska, and Steven Weinberg prepared the baseline budget estimates with the assistance of Francesca Castelli, and Wendy Kiska and Deborah Lucas prepared the estimates of the fair-value subsidies. Holly Battelle and Priscila Hammett provided valuable research assistance. Jennifer Gravelle, Jeffrey Holland, Damien Moore, and Steven Weinberg offered comments on earlier versions of the study.

Leah Mazade edited the manuscript, and Christine Bogusz proofread it. Jeanine Rees prepared the report for publication, and Maureen Costantino produced the cover. Lenny Skutnik printed the initial copies, Linda Schimmel coordinated the print distribution, and Simone Thomas prepared the electronic version for CBO's Web site (www.cbo.gov).



Douglas W. Elmendorf
Director

May 2010



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The Budgetary Impact and Subsidy Costs of the Federal Reserve's Actions During the Financial Crisis

Summary and Introduction

The financial system plays a vital role in the U.S. economy. It channels funds from savers to businesses, households, and governments that need money to finance investments and other expenditures, and it provides services that are essential for commercial and financial transactions. When the financial system is functioning smoothly, investors trade securities in liquid markets that provide reliable signals about the values of assets, and loans are readily available to creditworthy borrowers.¹ As the nation's central bank, the Federal Reserve System plays an important role in maintaining the stability and liquidity of the financial system through its conduct of monetary policy and its authority as a supervisor and regulator of banking institutions. (See Box 1 for more information about the Federal Reserve System.)

Over the past several years, the nation has experienced its most severe financial crisis since the Great Depression of the 1930s. Unexpected losses on subprime mortgages (loans made to borrowers with poorer-than-average credit) as well as heightened uncertainty about how exposed some financial institutions might be to additional losses led to a sharp decline in the liquidity of some markets and the availability of credit. The contraction in

lending became more severe as the turmoil spread beyond the subprime mortgage market, several large financial institutions failed, and the economy weakened. Net lending by the private financial sector fell from more than \$3.0 trillion in 2007 to annual rates of about \$1.4 trillion in the fourth quarter of 2008 and -\$1.8 trillion in the first quarter of 2009.²

In response to that contraction, the Federal Reserve undertook a series of extraordinary actions to stabilize financial markets and institutions. It continued to use its traditional monetary policy tools, but in addition, it created a variety of targeted credit programs to help restore liquidity and confidence to the financial sector. Its actions included:

- Expanding lending to depository institutions—that is, to financial institutions, such as commercial banks and savings and loan associations, whose liabilities largely consist of checking and savings accounts and other deposits;
- Creating new lending programs, or “facilities,” for nondepository financial institutions and other participants in the financial markets;
- Purchasing mortgage-related securities and medium- and long-term securities of the U.S. Treasury in the open market to put downward pressure on medium- and long-term interest rates in the mortgage and debt markets; and
- Extending support to financial institutions whose failures policymakers believed could lead to a systemic collapse of financial markets and institutions.

1. When the market for a financial asset is liquid, the asset can be readily and inexpensively converted to cash at a price that will not be very different from the price of the previous transaction. (Financial assets are claims that entitle the owner to receive a payment or a series of payments from an entity to which the owner has provided funds. They include bank accounts, retirement accounts, stocks and bonds, and various kinds of securities.) When markets become illiquid, large quantities of the asset cannot be sold (or bought) without at least temporarily depressing (or raising) the asset's price. The Federal Reserve can increase liquidity in a market—essentially make it easier to convert assets to cash—by standing ready to buy securities or to lend against them as collateral.

2. Net lending is negative when the amount of repayments and losses on all types of lending exceeds the amount of new lending.

Box 1.**Background on the Federal Reserve System**

The Federal Reserve System is the nation's central bank.¹ It was created by the Congress in 1913 to provide a safer, more flexible, and more stable monetary and financial system. Its duties have expanded to include:

- Conducting monetary policy by influencing the monetary and credit conditions in the economy in pursuit of maximum employment, stable prices, and moderate long-term interest rates;
- Supervising and regulating certain banking institutions both to ensure the safety and soundness of the U.S. banking and financial system and to protect the rights of consumers;
- Maintaining the stability of the financial system and containing the risk of a financial crisis; and
- Providing financial services to depository institutions (such as commercial banks, credit unions, and savings and loan associations), the U.S. government, and foreign official institutions. Those services include a major role in operating the nation's payments system—the paper-based and electronic mechanisms for moving funds, payments, and money among financial institutions throughout the country.

The Federal Reserve System comprises a board of governors and 12 Reserve Banks—in Atlanta, Bos-

ton, Chicago, Cleveland, Dallas, Kansas City, Minneapolis, New York, Philadelphia, Richmond, San Francisco, and St. Louis. (The geographic area that each Reserve Bank serves is known as a Federal Reserve District.) The Board of Governors of the Federal Reserve System is an agency of the federal government whose members are appointed by the President with the advice and consent of the Senate. The board supervises the Reserve Banks, which are the operating arms of the central bank.

The Reserve Banks were established by law as private institutions with certain privileges; however, that legislation restricts them to conducting business only as specified in the Federal Reserve Act.² Nominally, they are owned by their “stockholder,” or member, banks. Like those private institutions, the Reserve Banks establish their own compensation and hiring policies (subject to the oversight of the Board of Governors) and pay local property taxes.

Each Reserve Bank has its own board of nine directors who are chosen from outside the bank as provided by law. The Board of Governors appoints three directors to represent the public (they reflect a cross section of business, labor, and consumer interests within the Federal Reserve District); one director is appointed the chairman and another the deputy chairman. The member banks of the Federal Reserve District elect six directors—three to represent them and three to represent the public.

1. This box draws on material from Board of Governors of the Federal Reserve System, *The Federal Reserve System: Purposes and Functions*, 9th ed. (2005).

2. Information about the act is available at www.federalreserve.gov/aboutthefed/fract.htm.

Continued

In effect, the Federal Reserve assumed some of the credit-providing functions that participants in the financial markets were unable or unwilling to perform. In doing so, it also assumed significantly more risk of incurring losses than it normally takes on in its operations.

The Federal Reserve's activities during the crisis have had a striking impact on the amount and types of assets that it

holds (see Figure 1). In July 2007, before the financial crisis began, the Federal Reserve held about \$900 billion in assets; U.S. Treasury securities accounted for about \$790 billion of that amount. The central bank had acquired those securities during its normal operations in conducting monetary policy—the process of influencing the level of short-term interest rates and consequently the pace of U.S. economic activity. (Box 2 on page 6 outlines

Box 1.**Continued****Background on the Federal Reserve System**

Member banks must hold stock in their regional Federal Reserve Bank in an amount equal to 6 percent of their capital and surplus. Half that amount must be paid in to their Reserve Bank; the other half can be called in by the Board of Governors.³ The holding of such stock, however, does not carry with it the control and financial interest conveyed to holders of the common stock of for-profit organizations. Rather, it is a legal obligation of Federal Reserve membership, and the stock may not be sold or pledged as collateral for loans, nor may it be purchased by individuals or entities other than member banks. Member banks receive a 6 percent dividend annually on their paid-in stock, as specified by law.

The Federal Reserve System is considered to be an independent central bank because its decisions do not have to be ratified by the President or anyone else in the executive branch of government. Many experts consider that independence important for effective

3. The Board of Governors requires each Reserve Bank to maintain a surplus equal to the paid-in capital of its member banks.

polymaking by central banks.⁴ However, the system is subject to Congressional oversight. The Board of Governors must report annually to the Congress on the Federal Reserve's operations and semiannually on its conduct of monetary policy. Other actions and policies are also subject to Congressional scrutiny, and the Chairman and other members of the Board of Governors testify before the Congress frequently.⁵

The Federal Reserve finances its own operations and thus does not rely on Congressional appropriations for funding. It remits its net income from those operations to the Treasury.

4. See, for example, Christopher Crowe and Ellen E. Meade, "The Evolution of Central Bank Governance Around the World," *Journal of Economic Perspectives*, vol. 21, no. 4 (Fall 2007), pp. 69–90.

5. Moreover, the Board of Governors, the Federal Reserve Banks, and the Federal Reserve System as a whole are subject to several layers of audit and review. For example, the financial statements of the Board of Governors and the Reserve banks are audited annually by outside auditors.

the basic mechanics of monetary policy.) By the end of 2008, the value of the Federal Reserve's assets had grown to about \$2,275 billion; of that amount, loans and other support extended to financial institutions made up \$1,686 billion. At the end of 2009, when the turmoil in the financial markets had subsided, the total value of the central bank's assets remained essentially where it was at the end of 2008. The amount of direct loans and other support to financial institutions, though still quite high by historical standards, had fallen markedly by the end of 2009, to about \$280 billion, but holdings of mortgage-related securities had risen, to just over \$1,000 billion.

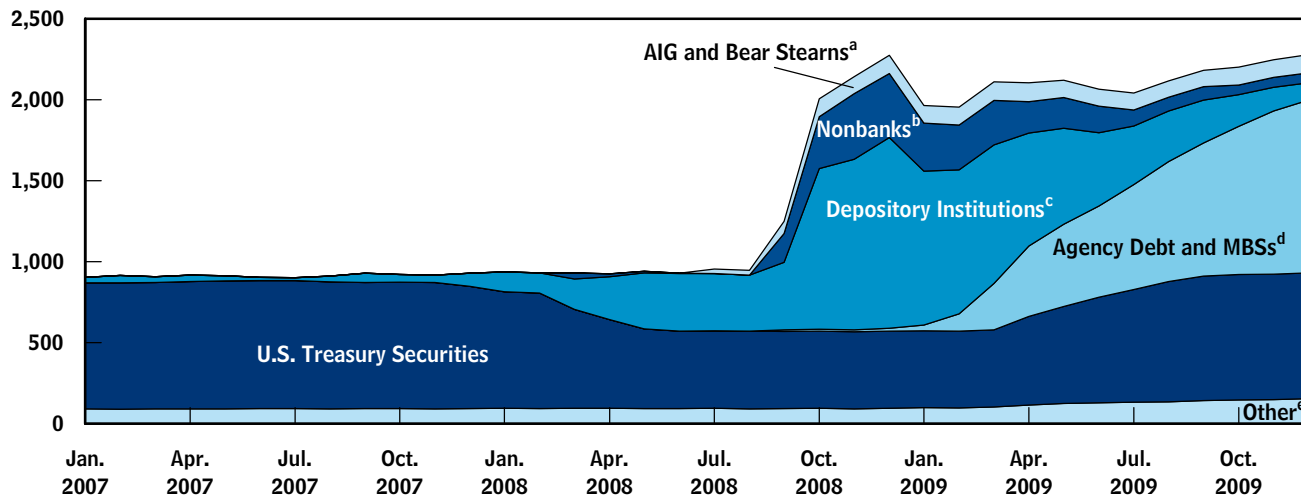
The Federal Reserve's activities during the crisis have also led to a marked shift in the composition of the central bank's liabilities (see Figure 2). Before the crisis, the major liability on the Federal Reserve's balance sheet was

the amount of currency (Federal Reserve notes) in circulation—about \$814 billion as of July 2007. At the end of 2009, the amount of reserves that banks held with the Federal Reserve was the central bank's largest liability. Such reserves have grown from about \$6 billion at the end of July 2007 to more than \$1,022 billion at the end of 2009; those reserves greatly exceed the amount that banks are required to hold.⁵ In effect, the Federal Reserve financed its activities during the crisis primarily by

5. A depository institution's reserve requirement is based on the type and amount of its deposits. Historically, most banks have held small amounts of excess reserves because reserves did not earn interest. However, the Emergency Economic Stabilization Act of 2008 (Division A of Public Law 110-343) authorized the Federal Reserve, as of October 1, 2008, to begin paying interest on reserves.

Figure 1.**Assets of the Federal Reserve Banks, January 2007 to December 2009**

(Billions of dollars)



Source: Congressional Budget Office based on data from the Federal Reserve.

Notes: Data are as of the last Wednesday of each month. The last data point is December 30, 2009.

Appendix A contains further information on the programs noted below.

- a. For the American International Group (AIG), the total consists of the outstanding balance on the line of credit, the assets of Maiden Lane II and Maiden Lane III, and the Federal Reserve's equity holdings in AIA Aurora Limited Liability Company (LLC) and ALICO Holdings LLC. For Bear Stearns, the total covers the assets of the initial Maiden Lane company.
- b. Consists of loans made by the Primary Dealer Credit Facility, the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility, the Commercial Paper Funding Facility, and the Term Asset-Backed Securities Loan Facility.
- c. Comprises loans through the discount window, the assets of the Term Auction Facility, central bank liquidity swaps, and repurchase agreements.
- d. Agency debt consists of securities of Fannie Mae, Freddie Mac, and the Federal Home Loan Banks. Agency mortgage-backed securities (MBSs) are securities guaranteed by Fannie Mae, Freddie Mac, and Ginnie Mae.
- e. Comprises gold stock, special drawing rights, Treasury currency outstanding, "float," and other assets.

creating bank reserves rather than by issuing more currency or increasing its other liabilities.⁴

The amount and composition of the central bank's assets and liabilities are major determinants of the Federal

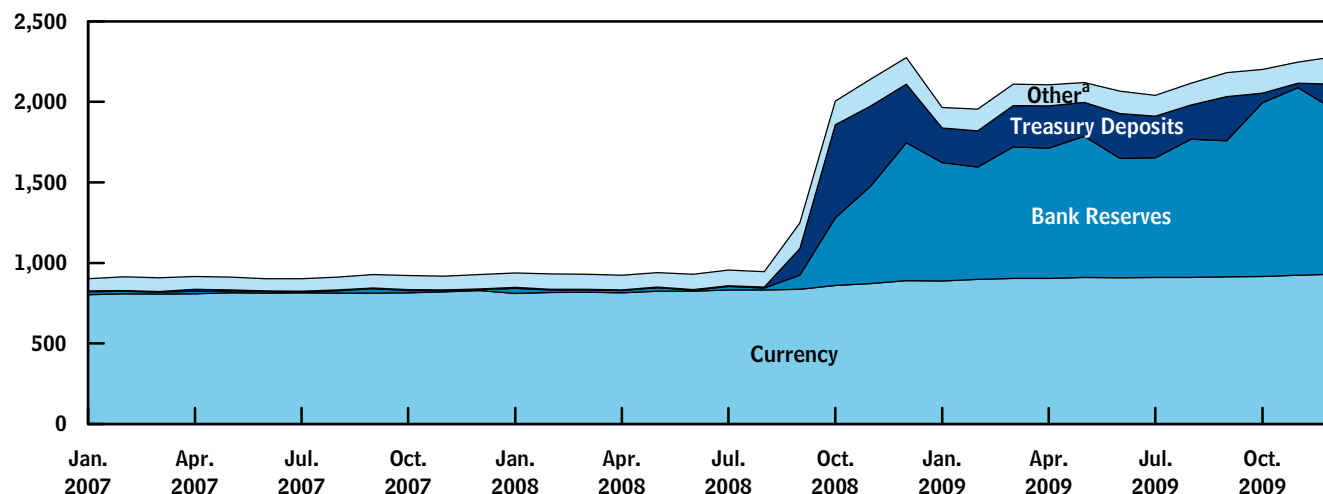
Reserve's impact on the federal budget. That impact is measured by the central bank's cash remittances to the Treasury, which are recorded as revenues in the budget. (The amount that is remitted is based on the Federal Reserve System's income from all of its various activities minus the costs of generating that income, dividend payments to banks that are members of the Federal Reserve System, and changes in the amount of the surplus that it holds on its books.) For fiscal years 2000 through 2008, annual remittances by the Federal Reserve ranged between \$19 billion and \$34 billion.

The Congressional Budget Office (CBO) projects that the Federal Reserve's actions to stabilize the financial system will boost its remittances to the Treasury during the next several years. That increase reflects the Federal

4. When the Federal Reserve makes a loan to a bank, for example, it credits the reserve balances of the bank by the amount of the loan, thereby increasing both its assets (its lending to banks) and its liabilities (reserve balances held at the Federal Reserve) by the same amount. For more information on the relationship between the Federal Reserve's activities during the financial crisis and bank reserves, see Todd Keister and James J. McAndrews, "Why Are Banks Holding So Many Excess Reserves?" *Current Issues in Economics and Finance*, Federal Reserve Bank of New York, vol. 15, no. 8 (December 2009), available at www.newyorkfed.org/research/current_issues/ci15-8.pdf.

Figure 2.**Liabilities of the Federal Reserve Banks, January 2007 to December 2009**

(Billions of dollars)



Source: Congressional Budget Office based on data from the Federal Reserve.

Note: Data are as of the last Wednesday of each month. The last data point is December 30, 2009.

a. Comprises reverse repurchase agreements (see Box 2), Treasury cash holdings, deposits other than those of the U.S. Treasury, and other Federal Reserve liabilities and capital.

Reserve's larger portfolio of assets, most of which are likely to earn a great deal more than the amount the system must pay in interest on reserves and its other liabilities. CBO projects that remittances will grow from about \$34 billion in fiscal year 2009 to more than \$70 billion in fiscal years 2010 and 2011.⁵

Projections of the Federal Reserve's remittances to the Treasury over the next few years, however, are more uncertain than projections made in the past. The system's asset holdings are now riskier, exposing the central bank to a considerably greater possibility of losses than its usual holdings of Treasury securities do. Moreover, the risk of losses from default associated with the amounts of the remittances is asymmetric. The chances are great that the Federal Reserve will remit slightly more than the amounts CBO expects. But there is also a small chance that it will remit much less—or even nothing—if serious problems reemerge in the financial markets or the economy greatly weakens again.

Measuring the impact of the Federal Reserve System's actions by the magnitude of its cash remittances to the Treasury fails to account for the cost of the risks to taxpayers from those actions. When the Federal Reserve invests in a risky security, it increases its expected net earnings because the return it anticipates on that security exceeds the interest rate it pays on the debt used to fund the purchase. If the Federal Reserve purchases the security at a fair market price, equivalent to what private investors would have paid, then the purchase creates no economic gain or loss for taxpayers; the price compensates the central bank for the risk it has assumed. By contrast, if the Federal Reserve purchases a risky security for more than the amount that private investors would have paid, it gives a subsidy to the seller of the security, creating an economic loss, or cost, for taxpayers.

The economic cost of the Federal Reserve System's actions to stabilize the financial markets—which incorporates the risks to taxpayers—can be estimated using "fair-value" subsidies. Fair value in many instances corresponds to market value; it is defined as the price that would be received by selling an asset in an orderly transaction between market participants on a designated

5. Congressional Budget Office, *An Analysis of the President's Budgetary Proposals for Fiscal Year 2011* (March 2010).

Box 2.**Monetary Policy**

A primary function of the Federal Reserve System is the conduct of monetary policy. The central bank is charged by the Congress to use monetary policy “to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates,” as required by the Federal Reserve Act.¹ Since the mid-1980s, the central bank has carried out that directive on a day-to-day basis primarily by targeting the federal funds rate—the interest rate that banks charge each other for overnight loans of their spare reserves.

The Federal Reserve influences the federal funds rate by changing the amount of available funds in the federal funds market. Before the financial crisis, the central bank altered the amount of funds primarily by buying and selling U.S. Treasury securities and by participating in repurchase and reverse repurchase agreements.² Those activities have direct effects on the federal funds rate and indirect effects on other interest rates in the financial markets. For example, when the Federal Reserve wants to lower the federal funds rate, it buys Treasury securities from dealers in the open market. (To raise the federal funds rate, it

sells securities.) Those transactions add to the supply of bank reserves that banks can lend in the overnight market—because the dealers deposit the proceeds of such sales in their banks—thereby lowering the federal funds rate and adding to the Federal Reserve’s holdings of Treasury securities. The central bank can also increase (or decrease) the amount of reserves by carrying out a repurchase (or a reverse repurchase) agreement.

The central bank has traditionally used two other methods as well for adjusting the amount of reserves in the banking system, although those methods are less useful for day-to-day adjustments of the federal funds rate. First, the Federal Reserve can increase the amount of reserves by making loans through its so-called discount window, a facility that makes collateralized loans (typically overnight) to banks and other depository institutions. However, the Federal Reserve has discouraged banks from using the discount window in situations that do not constitute an emergency. Consequently, the amount of discount-window lending is typically very small.

A second method that the central bank can use to adjust reserves is to change its reserve requirements—which specify the amount of reserves that depository institutions must hold at the Federal Reserve Banks. However, frequent alterations in the requirements are impractical.

Recently, the Federal Reserve was granted the authority to pay interest on bank reserves, giving it a new tool with which to influence the level of reserves in the system as well as interest rates in the broader financial market.

1. Information about the Federal Reserve Act of 1913 is available at www.federalreserve.gov/aboutthefed/fract.htm. Further discussion of the Federal Reserve’s monetary policy role is at www.federalreserve.gov/generalinfo/faq/faqmpo.htm.
2. Repurchase agreements are similar to collateralized loans. In a repurchase agreement, a primary dealer (a bank or another financial institution that meets the central bank’s capital and other requirements) *sells* high-quality securities, such as Treasury securities, to the Federal Reserve and agrees to buy them back on a set date and for a set price. In a reverse repurchase agreement, a dealer *buys* high-quality securities from the Federal Reserve and pledges to sell them back to the central bank on an agreed-upon date and at an agreed-upon price.

measurement date.⁶ Subsidies estimated on a fair-value basis provide a more comprehensive measure of cost than do estimates made on a cash basis: They take into account the discounted value of all future cash flows associated with a credit obligation, and they include the cost of bearing risk.⁷ CBO and the Administration's Office of Management and Budget (OMB) use a conceptually similar subsidy measure, as specified by the Emergency Economic Stabilization Act of 2008, to estimate the budgetary cost of the Troubled Asset Relief Program, or TARP.⁸ (CBO calls such subsidies "fair value" in part to distinguish them from subsidies calculated through the method specified by the Federal Credit Reform Act of 1990 and used by CBO and OMB to estimate the budgetary cost of federal credit programs.)⁹

In CBO's estimation, the fair-value subsidies conferred by the Federal Reserve System's actions to stabilize the financial markets totaled about \$21 billion (see Table 1 for details). The subsidies are estimated as of the date of inception of the main programs that the central bank put in place—when the major economic commitments occurred—and they incorporate CBO's projections of all future cash flows over the life of those facilities, the uncertainty surrounding the flows, and the expected rate of return that investors would have required for taking on the same obligations. The gains or losses that will ultimately be realized from the Federal Reserve's activities

will almost certainly deviate from CBO's estimates of the fair-value subsidies those actions provided. Such forward-looking estimates are based on averages over many possible future outcomes, whereas realized gains or losses reflect a particular outcome.

In total, the fair-value subsidies that CBO has estimated are modest when compared, for instance, with CBO's estimate of the \$189 billion subsidy provided by the TARP at its inception—even though most of the central bank's facilities were introduced near the height of the crisis, when the price of risk was substantial and the probability of default was elevated.¹⁰ The subsidies' relatively small magnitude reflects the fact that the Federal Reserve's potential for losses was limited in most instances by requirements for borrowers to provide collateral, by guarantees from the Treasury under the TARP and from the Federal Deposit Insurance Corporation (FDIC), or by various restrictions on the programs. Furthermore, some of the assistance that the Federal Reserve provided involved no subsidies because the transactions were conducted on a fair-value basis or at prices determined in competitive auctions—meaning that the central bank was fully compensated for the risks it assumed.

CBO's estimates of the economic subsidies that the Federal Reserve has provided are highly uncertain. The estimates necessarily rely on judgments about the probability that the crisis would have deepened or abated, about the sums that might be borrowed and their associated interest rates at such times, and about the severity of losses. Uncertainty also surrounds the discount rates used in CBO's calculations, but that effect is mitigated by the short time over which most of the facilities were scheduled to operate. Indeed, most programs have already been ended.

It bears emphasizing that CBO's fair-value estimates address the costs but not the benefits of the Federal Reserve's actions. In CBO's judgment, if the Federal Reserve had not strategically provided credit and enhanced liquidity, the financial crisis probably would

6. As such, a fair value reflects the presence of a risk premium, which is the additional rate of return that investors require to bear market risk—the risk that losses will be greatest during times of economic stress. See Financial Accounting Standards Board, *Statement of Financial Accounting Standards No. 157, Fair Value Measurements* (September 2006), p. 2.

7. The discounted value of a future stream of promised cash flows is the amount they are worth today—their present value. The discounted value is calculated by applying a "discount rate" to future cash flows that accounts for the time value of money and for the risk of the cash flows.

8. The measure is described in Congressional Budget Office, *The Troubled Asset Relief Program: Report on Transactions Through December 31, 2008* (January 2009).

9. For the Federal Credit Reform Act of 1990, see title XIII, section 13201, of the Omnibus Budget Reconciliation Act of 1990; 2 U.S.C. 661, 104 Stat. 1388-610. The law specifies that in calculating those subsidy costs, interest rates on Treasury securities with similar maturities be used as discount rates (to determine the present value of the expected cash flows associated with a loan or loan guarantee). Because Treasury securities are considered to have little chance of default, their interest rates do not include a charge for the cost of default risk.

10. CBO's estimates of the fair-value subsidies provided by the TARP at or near the inception date of that program are described in Congressional Budget Office, *The Troubled Asset Relief Program: Report on Transactions Through December 31, 2008*. By design, some activities pursued under the TARP involved a much greater assumption of risk by the government and the purchase of some assets at prices that were significantly above their fair values. CBO now estimates that the TARP will cost \$109 billion.

Table 1.**Fair-Value Subsidies Arising from the Federal Reserve's Actions During the Financial Crisis**

Program/Activity	Inception Date	Subsidy at Inception^a (Billions of dollars)
Lending to Depository Institutions		
Term Auction Facility	December 12, 2007	0
Repurchase agreements	Ongoing	0
Reciprocal currency arrangements	December 12, 2007	n.a.
Lending to Nondepository Financial Institutions and Other Market Participants		
Primary Dealer Credit Facility	March 17, 2008	0
Term Securities Lending Facility	March 27, 2008	0
Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility	September 22, 2008	2
Money Market Investor Funding Facility	October 21, 2008	0
Commercial Paper Funding Facility	October 27, 2008	2
Term Asset-Backed Securities Loan Facility	March 3, 2009	13
Direct Purchases of Securities	Ongoing	0
Support for Systemically Important Financial Institutions ^b		
Maiden Lane LLC	March 14, 2008	0
Maiden Lane II LLC	October 31, 2008	0
Maiden Lane III LLC	October 31, 2008	0
AIG revolving credit facility	September 16, 2008	2
Citigroup	November 23, 2008	2
Bank of America	January 16, 2009	1
Total		21

Source: Congressional Budget Office.

Notes: Subsidies estimated on a fair-value basis, unlike estimates made on a cash basis, take into account the discounted value of all future cash flows associated with a credit obligation and include noncash costs, such as that for bearing risk.

For further information on the programs and activities listed above, see Appendix A.

n.a. = not applicable; LLC = limited liability company; AIG = American International Group.

a. Numbers in the column do not add to the total because of rounding.

b. The Maiden Lane LLC was established in conjunction with the sale of the investment bank Bear Stearns to JPMorgan Chase & Company. Maiden Lanes II and III were established to provide support to AIG.

have been deeper and more protracted and the damages to the rest of the economy more severe. Measuring the benefits of the Federal Reserve's interventions in avoiding those worse outcomes is much more difficult than estimating the subsidy costs of the interventions, and CBO has not attempted to do so. It is likely, though, that the benefits of the Federal Reserve's actions to stabilize the financial system exceeded the relatively small costs reported here for fair-value subsidies.

Actions by the Federal Reserve to Address the Financial Crisis

In reacting to the recent turmoil in the financial markets, the Federal Reserve used its traditional tools for implementing monetary policy as well as new facilities to help restore liquidity and confidence within the financial markets and among institutions. Using its traditional tools, the Federal Reserve expanded lending to depository institutions and lowered its target for the overnight federal funds rate to almost zero to put downward pressure on market interest rates. The Federal Reserve also created new facilities to provide liquidity to nondepository financial institutions and other market participants and purchased mortgage-related securities and medium- and long-term U.S. Treasury securities in the open market. It also extended direct loans and other support to certain "systemically important" financial institutions (institutions whose financial problems during the crisis were believed to seriously threaten the stability of the financial system as a whole).

Expanded Lending to Depository Institutions

In its earliest actions to address the financial crisis, the Federal Reserve focused on providing liquidity to depository institutions, generally by using existing programs. It expanded opportunities for borrowing from its discount window, which serves as a backup source of liquidity for individual depository institutions, by reducing the cost of loans and extending their maximum maturity from overnight to 90 days. And it increased its use of repurchase agreements (short-term collateralized loans) to add liquidity to the banking system. Other actions included expanding its currency swap lines with foreign central banks to make additional dollar-denominated funding available to foreign commercial banks and creating the Term Auction Facility (TAF) to provide longer-term loans to depository institutions at market-determined rates of interest.¹¹ (Appendix A provides additional details

on those and other actions by the Federal Reserve to meet the crisis in the banking system.) Taken together, the outstanding amount of lending through those programs rose from about \$19 billion at the end of July 2007 to a peak of \$1,201 billion in December 2008. By the end of 2009, however, lending to depository institutions had fallen to about \$106 billion (see Figure 1 on page 4).

New Liquidity Programs for Nondepository Financial Institutions and Other Market Participants

As the crisis deepened, the Federal Reserve created new programs to provide liquidity directly to other financial institutions and participants in the financial markets—in particular, primary dealers, money market mutual funds, and participants in the markets for commercial paper and asset-backed securities.¹² Those institutions and participants directly or indirectly provide a significant amount of credit to consumers and businesses. In normal times, the Federal Reserve could have provided liquidity to many such institutions indirectly by providing additional reserves to banks, which could then have lent the funds to the institutions. However, the curtailment of banks' lending activities during the crisis blocked the normal channels through which the Federal Reserve could affect the financial markets and the economy more broadly. Consequently, the central bank created:

- The Primary Dealer Credit Facility and the Term Securities Lending Facility (TSLF), to provide primary dealers with access to short-term liquidity;
- The Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) and the

11. A currency swap line is an arrangement between the Federal Reserve and a foreign central bank to temporarily trade an amount of U.S. dollars for an equivalent amount of a foreign currency.

12. Primary dealers—commercial banks as well as brokers and dealers who buy and sell U.S. government and other securities in the private financial markets—trade with the Federal Reserve. Such firms must meet requirements set by the central bank for liquidity and capital as well as for other aspects of their operations. The market for commercial paper (unsecured short-term promissory notes issued primarily by corporations) is an important source of funding for financial institutions and some commercial firms. Asset-backed securities derive their income from the assets—for example, a pool of credit card loans—that back the securities.

Money Market Investor Funding Facility (MMIFF), to ease the liquidity problems of money market funds;¹³

- The Commercial Paper Funding Facility (CPFF), to support the issuance of commercial paper by buying highly rated offerings; and
- The Term Asset-Backed Securities Loan Facility (TALF), to encourage the issuance of asset-backed securities and hence increase the availability of credit to businesses and households.

Total lending by those facilities (excluding the TSLF, which lent securities rather than cash) peaked at over \$400 billion in late November 2008 and then declined to approximately \$62 billion at the end of 2009 (see Figure 1 on page 4). In October 2008, the TSLF had loans totaling close to \$200 billion; by August 2009, it had no outstanding loans.

Open-Market Purchases of Securities

The Federal Reserve began purchasing medium- and long-term securities (those with maturities of 2 to 10 years and more than 10 years, respectively) in the open market in late 2008 in an effort to lower medium- and long-term interest rates, including mortgage rates, and thereby support the housing market and the broader economy. The Federal Reserve stated that it would purchase as much as \$200 billion (later reduced to \$175 billion) in debt securities—known as agency debt—from Fannie Mae, Freddie Mac, and the Federal Home Loan Banks, as well as up to \$1,250 billion in mortgage-backed securities guaranteed by Fannie Mae, Freddie Mac, and Ginnie Mae—known as agency MBSs.¹⁴ (A mortgage-backed security is a claim on the cash flows of a pool of mortgages.) By the end of 2009, the Federal Reserve owned \$160 billion of agency debt and \$908 billion of agency MBSs. Over the course of that year, the central bank had also purchased \$300 billion of medium- and long-term Treasury securities.

13. Money market mutual funds are a significant source of short-term funding for financial institutions as well as for some corporations and government entities. For investors, the funds are an alternative to bank deposits: They pay a slightly higher rate of interest, but they expose investors to greater risk because they are not insured.

Support for Systemically Important Financial Institutions

In conjunction with the Treasury and the Federal Deposit Insurance Corporation, the Federal Reserve provided substantial additional support to four institutions whose financial problems during the crisis were believed to seriously threaten the financial system's stability.

- The Federal Reserve created the Maiden Lane facility in conjunction with the sale of the troubled investment firm Bear Stearns to the bank JPMorgan Chase & Company. The facility, which is structured as a limited liability company, received financing from the Federal Reserve to purchase about \$30 billion of Bear Stearns' assets, which were residential and commercial mortgage loans and other mortgage-related assets.¹⁵ (In essence, the Federal Reserve owns those underlying assets.)
- The Federal Reserve also provided assistance to American International Group (AIG), a large financial institution with businesses in insurance and other financial products. The assistance mainly included a line of credit and the creation of the Maiden Lane II and Maiden Lane III facilities, which own a portion of AIG's asset-backed securities financed by the central bank. (Here again, the Federal Reserve effectively

14. Fannie Mae and Freddie Mac (formally, the Federal National Mortgage Association and the Federal Home Loan Mortgage Corporation) are two federally chartered institutions that provide credit guarantees for almost half of the outstanding residential mortgages in the United States. After the two firms experienced sizable losses on their mortgage-related investments and guarantees, the Treasury placed them in conservatorship—essentially the government took control of them—in September 2008. Ginnie Mae is a government-owned corporation that guarantees securities backed by federally insured loans—mainly loans insured by the Federal Housing Administration and the Department of Veterans Affairs. The Federal Home Loan Banks are government-sponsored enterprises that lending institutions use to obtain low-cost financing through “advances,” which are loans backed by high-quality collateral.

15. In a limited liability company, the profits and losses of the business pass through to its owners, although, as the name implies, this particular legal structure offers protection from personal liability for business debts, just as a corporation does.

owns the underlying assets.)¹⁶ Maiden Lane II holds residential MBSs, whereas Maiden Lane III holds collateralized debt obligations—that is, securities backed by a pool of various assets.

- The Federal Reserve, together with the Treasury's Troubled Asset Relief Program and the FDIC, provided guarantees on certain assets owned by the commercial banks Citigroup and Bank of America. Under the agreements, the Federal Reserve would provide so-called contingent loans to the banks in the event that losses on the assets exceeded the amounts covered by the TARP and the FDIC.¹⁷ By December 2009, those agreements had been terminated.

The Projected Impact of the Federal Reserve's Actions on the Federal Budget

In the course of its regular activities, the Federal Reserve generates a stream of income in excess of its expenses and other payments that flows to the Treasury and reduces the budget deficit. Ordinarily, most of that income arises from the interest paid on Treasury securities that the Federal Reserve acquires in carrying out monetary policy. The central bank's other major sources of income are the interest on its investments in foreign currency and on loans to depository institutions, and the fees it receives for services it provides to such institutions—such as check clearing, transfers of funds, and automated clearinghouse operations. The central bank's income minus its expenses, the dividends paid to member banks, and additions to its surplus account is remitted to the Treasury and appears in the federal budget as revenues—specifically, the remittances are labeled “deposits of earnings of the Federal Reserve System” under the category “miscellaneous receipts.”¹⁸ Annual remittances by the

Federal Reserve during fiscal years 2000 to 2008 ranged between \$19 billion and \$34 billion.

The Federal Reserve's actions to stabilize the financial markets are likely to significantly increase the amount of its remittances over the next few years. CBO incorporates estimates of the Federal Reserve's annual remittances in its 10-year baseline projections of the federal budget. In CBO's estimation, remittances will more than double from about \$34 billion in fiscal year 2009 to over \$70 billion in fiscal years 2010 and 2011 but then taper off to \$41 billion in 2013.¹⁹ The near-term increase in remittances reflects CBO's expectations that the size of the Federal Reserve's asset portfolio will remain unusually large for the next few years and that the return on those assets will exceed the interest rate that the Federal Reserve pays on reserves. The projected decline in remittances between 2011 and 2013 reflects CBO's assumptions that short-term interest rates will be higher and the Federal Reserve will be reducing its asset holdings, primarily its holdings of agency MBSs. After 2013, CBO projects, annual remittances will rise gradually to \$55 billion in 2020, in line with growth in the overall economy, and derive increasingly from interest receipts on the central bank's holdings of Treasury securities.

The expansion of the central bank's activities has also significantly increased the uncertainty associated with its remittances over the next several years. That is because some of the Federal Reserve's new credit activities entail considerably more risk of losses—from increased interest rates, defaults, or prepayment of the mortgages backing its MBSs—than its normal asset holdings entail. Moreover, the Maiden Lane facilities are a source of greater expected volatility in the central bank's remittances because changes in the fair values of the facilities' assets flow through to the Federal Reserve's reported earnings.²⁰ In addition, the risk of default associated with the Federal Reserve's remittances is asymmetric, with a large proba-

16. The Federal Reserve also created the Securities Borrowing Facility to help AIG avoid selling a portfolio of residential mortgage-backed securities in a weak market, but the facility was terminated about two months later upon the creation of Maiden Lane II. See Board of Governors of the Federal Reserve System, *Report Pursuant to Section 129 of the Emergency Economic Stabilization Act of 2008: Securities Borrowing Facility for American International Group, Inc.*, available at www.federalreserve.gov/monetarypolicy/files/129aigsecborrowfacility.pdf.

17. The contingent loan to the Bank of America was in the form of a line of credit, which was never opened.

18. The Federal Reserve's expenses include those for its operations (mostly salaries and employee benefits) and various interest payments, such as interest on reserves (see Box 1 on page 2).

19. Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2010 to 2020* (January 2010), pp. 91–92.

20. The accounting treatment of the assets held by the Maiden Lane facilities differs from the treatment of the Federal Reserve's other assets, most of which are valued at their historical cost. As a result, earnings on those assets are based on realized gains and losses rather than on changes in the assets' estimated fair values.

bility of slightly more in remittances than the amount CBO expects but a small probability of much less in the event that serious problems reemerge in the financial markets or the economy goes into another downturn.²¹

Effects of the Federal Reserve's Liquidity Programs and Purchases of Securities

CBO's projections of the Federal Reserve's annual remittances to the Treasury depend on projections of the size and composition of the central bank's portfolio of assets and the returns expected from it. Those estimated returns depend in turn on projections of economic activity, the stance of monetary policy, and developments in the financial markets. CBO expects that the Federal Reserve's increased income over the next several years will largely derive from its substantial holdings of agency debt and agency MBSs. (CBO's projections reflect only a small amount of income from the emergency liquidity facilities that the central bank established because most of those facilities were winding down and ceasing operation during the first half of fiscal year 2010.) Indeed, CBO expects the Federal Reserve to earn more than \$45 billion annually in interest income from its holdings of agency debt and agency MBSs in fiscal years 2010 and 2011, accounting for about two-thirds of its income. Offsetting some of that income, however, will be interest that the Federal Reserve pays on bank reserves. The interest rate on reserves is a short-term rate; CBO expects short-term interest rates to rise as the economy continues to recover but to remain lower than the interest rates on the Federal Reserve's longer-term assets.

Size of the Federal Reserve's Asset Portfolio. In its latest set of baseline economic projections issued in January 2010, CBO concluded that the economy would grow at a subdued pace over the next few years.²² That pace in part reflects CBO's assessment that financial systems both in the United States and abroad will take some time to heal. CBO believes that in those circumstances, the Federal Reserve will implement monetary policy by slowly reducing the amount of liquidity in the financial markets over

the next two years, while the economy is recovering from the recession. CBO has thus assumed that the central bank will carefully reduce the size of its asset portfolio, raise the interest rate that it pays on reserves (which will lead to higher short-term interest rates in the financial markets), and otherwise adjust the amount of its other liabilities to manage the reduction in liquidity. The total amount of the Federal Reserve's assets in CBO's projection begins to fall later this year, but it remains above \$2 trillion through the early part of 2012.

The Federal Reserve faces a considerable challenge in reducing the amount of liquidity in the financial system in a way that supports the economic recovery but avoids creating either inflationary or deflationary conditions. An overly slow reduction in the amount of liquidity would keep interest rates low for too long, overstimulating economic activity and contributing to higher inflation. Conversely, an overly rapid reduction in liquidity would raise interest rates too quickly, possibly stifling the economic recovery and creating deflationary conditions. Balancing those risks and choosing a course of action are difficult because the Federal Reserve must of necessity act on the basis of incomplete information and uncertain forecasts, at times in response to rapidly changing circumstances.

The unprecedented nature of recent economic developments and the central bank's response to those occurrences suggest that the potential for error in predicting monetary policy is greater than usual. When the Federal Reserve begins to withdraw excess liquidity from the financial markets, it can choose different combinations of reducing its asset holdings and raising the interest rate that it pays on bank reserves. The central bank may decide to sell some of its assets—in particular, its agency MBSs—or it may simply allow those MBS holdings to decline as the underlying mortgages are repaid. The speed with which the Federal Reserve reduces those holdings, however, will probably depend on conditions in the housing market and in the market for those securities—a faster recovery of such markets would encourage the central bank to reduce its MBS holdings more quickly.

The Federal Reserve could also tighten monetary policy by increasing the interest it pays on excess reserves, thereby encouraging banks to continue holding large amounts on deposit. Such a policy would effectively neutralize those funds (and the liquidity they represent) because banks would not be loaning them out to the private sector.

21. If such losses occurred and caused the Federal Reserve's net earnings to become negative, the central bank would have no income to remit to the Treasury. In that case, the Treasury would not be obligated to make payments to the Federal Reserve to cover the losses.

22. See Chapter 2 in Congressional Budget Office, *The Budget and Economic Outlook: Fiscal Years 2010 to 2020*.

Nevertheless, because the Federal Reserve has never had to manage such a large reduction in its asset holdings, it is difficult to forecast the path that the central bank will take. Any of the measures to reduce liquidity in the financial markets would reduce the central bank's net interest income; the amount of the reduction would vary with the course and extent of the action taken.

Composition of the Federal Reserve's Asset Portfolio.

CBO expects that the Federal Reserve's holdings of agency debt and agency MBSs will account for a significant share of its asset portfolio over the next few years. By the second half of the 2010–2020 projection period, the Federal Reserve's asset holdings will largely consist of Treasury securities, in CBO's view.

Expected Returns on the Federal Reserve's Agency Debt and Agency MBSs. CBO used market data to estimate the rates of return on the Federal Reserve's purchases of agency debt and agency MBSs. Specifically, it computed average returns for the central bank's holdings on the basis of the characteristics of the securities that the Federal Reserve purchased and the market interest rates for those securities at the time they were acquired.

Effects of Support for Systemically Important Institutions

CBO estimates that the Federal Reserve's support of institutions whose failures might have threatened the stability of the financial system will increase its net income by about \$17 billion over the fiscal year 2010–2020 period.²³ That figure consists of a projected return of \$8 billion on the three Maiden Lane facilities and interest of \$9 billion on the line of credit to AIG. The contingent loan arrangements with Citigroup and Bank of America have been terminated.

The Maiden Lane Facilities. The effect of the Maiden Lane facilities on the Federal Reserve's remittances to the Treasury is measured by the facilities' net income, which comprises both realized and unrealized gains and losses

on the facilities' portfolios of assets (see Appendix B). (Unrealized gains and losses are determined by changes in the fair values of those assets.) That definition of net income follows from the particular accounting standards that the Federal Reserve uses for those facilities.

CBO anticipates that over the lifetimes of the Maiden Lane facilities (that is, from the inception of the programs through fiscal year 2020), the Federal Reserve will gain \$200 million in income from its investment in the initial Maiden Lane company (related to the Bear Stearns transaction) and \$2 billion each from its investments in Maiden Lane II and Maiden Lane III (both related to support for AIG). Those estimates include losses that have already occurred. As of September 30, 2009, the value of the assets in all of the Maiden Lane facilities had dropped by \$7.4 billion. Approximately half that loss—\$3.7 billion—has been allocated to the Federal Reserve.²⁴

CBO expects positive returns from all three facilities because the assets were purchased at their fair values.²⁵ CBO assumed that each facility's portfolio would have an expected return of 6.5 percent and that the assets had terms of between 2½ and 5 years. (CBO based its assumption about expected returns on those earned by securities bought and sold in the private markets.)

Of course, the returns realized on asset-backed securities such as those in the Maiden Lane portfolios could deviate significantly from what is expected, given the uncertainty about the returns on the underlying assets. The actual outcomes from the Maiden Lane investments depend on what happens to the economy, and the Federal Reserve could experience significant losses if the economy worsens. Also a possibility, though, is that it could reap large gains if the market for asset-backed securities turns around more quickly than has been anticipated.

Line of Credit for the American International Group.

CBO estimates that the Federal Reserve will earn almost

23. That estimate incorporates the assumption that the facilities remain on the central bank's balance sheet until they are completely wound down. However, the Treasury has announced its intention to assume financial responsibility for the Maiden Lane facilities "[i]n the longer term and as its authorities permit." See *The Role of the Federal Reserve in Preserving Financial and Monetary Stability: Joint Statement by the Department of the Treasury and the Federal Reserve* (March 23, 2009), available at www.treas.gov/press/releases/tg66.htm. Such action would not change the financial position of the federal government.

24. Of that \$3.7 billion loss, \$3.1 billion is attributable to the initial Maiden Lane company and \$600 million to Maiden Lane II. The central bank has suffered no losses on its investment in Maiden Lane III.

25. The investment advisers hired to value the assets of the Maiden Lane facilities had to determine the fair value of the securities by using valuation models that were based on uncertain projections of future cash flows and the operative discount rate. The securities had become highly illiquid: Very few transactions—and their accompanying prices—were available for comparison, and the prices that were observed showed substantial volatility.

\$12 billion in interest over the lifetime of the loans made to AIG under its line of credit. (The central bank had earned \$3 billion of that amount before the start of fiscal year 2010.) That estimate is based on CBO's projections of the interest rate on the loan (the three-month Libor plus 3 percentage points), the loan's outstanding balance, and the fee of 0.75 percent on the unused portion of the line of credit.²⁶ CBO also judged that default losses on the line of credit would be negligible (because the loan is collateralized by all of the assets of AIG and its subsidiaries) and that the facility would cease operating, on schedule, in August 2013.

Contingent Loans to Bank of America and Citigroup.

CBO's current projections do not incorporate the contingent lines of credit offered to Bank of America and Citigroup. In September 2009, Bank of America terminated its provisional loan agreement with the Treasury, the FDIC, and the Federal Reserve and paid an exit fee of \$57 million to the central bank. In December of that year, Citigroup also terminated its agreement with those parties and paid an exit fee of \$50 million.

Estimates of Fair-Value Subsidies from the Federal Reserve's Actions

From an economic perspective, the higher rate of return that CBO expects on the Federal Reserve's riskier assets is compensation for the central bank's increased exposure to the risks associated with those investments and not a true gain of value to the Treasury. A more comprehensive measure of the costs of the Federal Reserve's activities during the recent crisis that takes the value of risk bearing into account is the economic, or fair-value, subsidies that the central bank provided to financial institutions in the form of credit and guarantees. The concept of fair value has been increasingly used to account for financial obligations in the private sector; it is defined as the price that would be received by selling an asset in an orderly transaction between willing market participants on a specified measurement date.

In general, a fair-value subsidy arises whenever the Federal Reserve accepts terms on the financing it is providing that are less stringent than the terms that investors would

demand for taking on comparable risks.²⁷ The cost of such subsidies is borne by taxpayers because the credit assistance that the Federal Reserve chooses to provide affects the size and timing of its remittances to the Treasury. For instance, the central bank's activities create a fair-value subsidy when the principal amount of a loan it makes exceeds the value to private investors of the promised repayments from the loan. But when the Federal Reserve acquires assets at their fair values, as it effectively did through its Maiden Lane facilities, it does not confer subsidies on the sellers of those assets because the assets' purchase prices represented fair compensation for the risks that the central bank was assuming. Similarly, the Federal Reserve's purchases of agency debt, agency MBSs, and long-term Treasury securities do not give rise to fair-value subsidies because those transactions all occurred in the open market.

Economic subsidies can be defined more or less broadly. For this analysis, CBO estimated only those subsidies that arose from activities of the Federal Reserve that exposed it to market risk—the risk that defaults will be unusually high during times of stress in the economy. Many of the central bank's actions that were aimed at increasing liquidity and lowering interest rates involved a negligible risk of losses from default. However, some of the Federal Reserve's actions provided financial institutions with credit at a price lower than that available from the markets and thus could be viewed as having conferred a subsidy. For instance, the Federal Reserve's actions through its Term Auction Facility appear to have involved very little default risk because the loans extended through the TAF were highly secured. However, the terms that the central bank offered on those loans were probably more favorable to the borrowing banks than the terms they could have obtained privately, as evidenced by the large volume of lending (over \$450 billion) through the TAF at the height of the crisis. As a practical matter, it would be extremely difficult to estimate those more broadly defined subsidies, and CBO has not attempted to do so.

The central bank's interventions took a number of forms that exposed it to varying degrees of risk. CBO used several modeling approaches to estimate the fair value of the

26. Libor is the London interbank offered rate, an indication of the interest rate at which banks borrow unsecured funds from other banks in the London interbank market. The rates are published for different loan maturities and used as benchmarks for rates on interbank loans worldwide.

27. In general, an economic subsidy can exist even though a program has positive net income if the costs that are used to determine net income are not comprehensive. The conceptual issues surrounding estimates of economic subsidies for credit are described in Congressional Budget Office, *Estimating the Value of Subsidies for Federal Loans and Loan Guarantees* (August 2004).

assets of the different facilities, but all relied on data about market prices to draw inferences about the cost of the risks being assumed. On the basis of those models, CBO estimated that when the programs were introduced, the Federal Reserve conferred fair-value subsidies totaling approximately \$21 billion. (Most of that amount—an estimated \$13 billion—is attributable to the Term Asset-Backed Securities Loan Facility.) The Federal Reserve will realize actual gains or losses from those programs that will almost certainly differ from CBO's estimates of the fair-value subsidies, which reflect the wide range of outcomes that were possible when the programs were initiated.

Methodological Considerations

The idea that investors require compensation for assuming certain risks is central to the concept of fair value. Investors require a return that compensates them for the “time value of money”—that a dollar today is worth more than a dollar in the future because it can earn interest—and that covers the losses expected from default. In addition, investors require a “risk premium”—an expected return in excess of the risk-free rate—that compensates them for bearing certain types of risk, such as market risk.²⁸ CBO and the Office of Management and Budget use a subsidy measure that includes the cost of market risk to estimate the budgetary cost of the Troubled Asset Relief Program, as specified by the Emergency Economic Stabilization Act of 2008.²⁹ CBO calls such subsidies fair-value subsidies in part to distinguish them from those that CBO and OMB calculate to estimate the budgetary cost of federal credit programs, as specified in the Federal Credit Reform Act of 1990. Subsidies calculated under the requirements of that law take into account the time value of money and expected losses but not the cost of market risk. Specifically, the act specifies that expected cash flows should be discounted at the interest rates of maturity-matched Treasury securities. As a result, such subsidy measures do not include a charge for the cost of risk.

The fair value of an asset is generally the same as its market price when the asset is traded in a market that is functioning normally. However, when few or no similar private transactions occur or when there is no comparable private contract, then fair values must be approximated. During the financial crisis, private investors clearly viewed the risk of default as extremely costly, as evidenced by the marketwide decline in the price of securities that carried even moderate amounts of default risk. For most of the Federal Reserve's programs that are evaluated here, CBO used comparable market interest rates to impute market-risk premiums and thus calculate the fair-value subsidies that the central bank was providing. When comparable rates were not available, CBO approximated risk premiums by using historical relationships and available market data on related transactions.

In valuing assets, fair-value accounting does not generally distinguish between the effect of market risk and the effect of liquidity risk—the risk that selling an asset in an inactive market could require a significant concession by the seller on its price—although exceptions have recently been made.³⁰ It is hard to draw a clear distinction, either in theory or in practice, between a premium to compensate an investor for market risk and a premium to compensate for liquidity risk. In fact, some analysts view the liquidity premium as a component of the market risk premium rather than as an addition to it because investors place a high value on liquidity during times of market stress, when a lack of liquidity can be costly. In general, attempts by researchers to identify a separate liquidity premium have produced inconsistent results. CBO did not attempt such a decomposition; its measure of the risk premium includes any liquidity premium. In addition, CBO did not adjust its results for any administrative costs in excess of the fees that were collected, because it expects such amounts to be relatively small.

A basic principle in valuing assets is that the cost of capital for a particular activity is based on the risk of the activity itself but is largely independent of how it is financed. Following that principle, the discount rates CBO used in calculating fair-value subsidies reflect the

28. A fuller explanation of the market risk premium and how it affects the price of assets and their expected returns can be found in any standard textbook on corporate finance. See, for example, Chapter 9 in Richard A. Brealey, Stewart C. Myers, and Franklin Allen, *Principles of Corporate Finance*, 9th ed. (New York: McGraw-Hill/Irwin, 2008).

29. See, for example, Congressional Budget Office, *The Troubled Asset Relief Program: Report on Transactions Through December 31, 2008*. Discounting expected future cash flows to the present with a discount rate that takes into account the market risk premium is a common approach to estimating the fair value of a financial asset.

30. On April 2, 2009, the Financial Accounting Standards Board voted to revise its Statement of Financial Accounting Standards No. 157 to account for fair-value calculations when a market is inactive. The effect of the revision is that in such circumstances, banks have more leeway to use their own judgment to determine whether an asset has suffered a decline in its fair value.

risk associated with the assets under consideration, not the Federal Reserve's cost of borrowing. Borrowing costs are not in themselves a measure of the cost of capital for any specific activity but instead depend on the totality of the central bank's activities. Associating the cost of capital with the riskiness of the acquired assets is analogous to the way CBO estimates subsidies under the TARP: Such subsidies are based on the riskiness of the assets that the Treasury has acquired and not simply on its low cost of borrowing (stemming from the government's ability to raise taxes to cover the debt).

Considerable uncertainty surrounds CBO's estimates of fair-value subsidies, which rely on assumptions about factors that are difficult to quantify, such as the probability, at the time the policies were implemented, that the crisis would deepen or abate, the amount that would be borrowed and the interest rates on that borrowing at such times, and the severity of any realized losses. The uncertainty associated with the estimates is asymmetric—that is, there is a high probability that the Federal Reserve will experience negligible losses or realize gains and a much smaller chance that it will experience significant losses. The possibility of such losses in part reflects the increase in borrowing that could occur under the Federal Reserve's riskier programs: For some of those programs, the central bank announced borrowing limits, but for others, no explicit limits were set.³¹ As it turned out, in the months after those programs were introduced, the amounts lent by the riskiest facilities rose rapidly to total about \$500 billion in December 2008. A few months later, however, such lending had begun a gradual decline as market conditions improved (see Figure 3).

For each of the Federal Reserve's stabilization programs, CBO reports the cost of fair-value subsidies at the program's inception date. Those estimates capture the full value of the Federal Reserve's commitments at the time they were made, taking into account all future cash flows over the life of the program and the uncertainty sur-

rounding them. The Federal Reserve made significant—and in several cases repeated—changes to some of the programs as conditions in the markets changed. However, for this analysis, CBO based each set of its estimates on the information available at the time the program was created and did not adjust the estimates for subsequent changes that it could not have anticipated.

Subsidy Estimates

In CBO's estimation, the total amount of fair-value subsidies conferred by the Federal Reserve's new emergency facilities at the time that the programs were created was about \$21 billion (see Table 1 on page 8). Subsidy amounts varied considerably by program, but for the most part, they were modest. Several programs involving loans that were backed only by risky collateral, that had interest rates that were administratively set by the Federal Reserve, and that would extend over months or years gave rise to most of the subsidy costs. For other programs that were structured to pose very little risk to the central bank or that explicitly extended credit by using a competitive auction or a fair-value basis, economic subsidies were judged to be negligible.

The Federal Reserve's emergency programs as well as the actions taken by the Treasury under the TARP involved subsidies conferred on financial institutions by the federal government. However, the total amount of subsidies provided by the Federal Reserve is much smaller than the subsidy arising from the TARP, which CBO estimated to be \$189 billion at the program's inception. By design, the TARP encompassed a much greater assumption of risk by the government and some purchases of assets at prices significantly above their fair values.

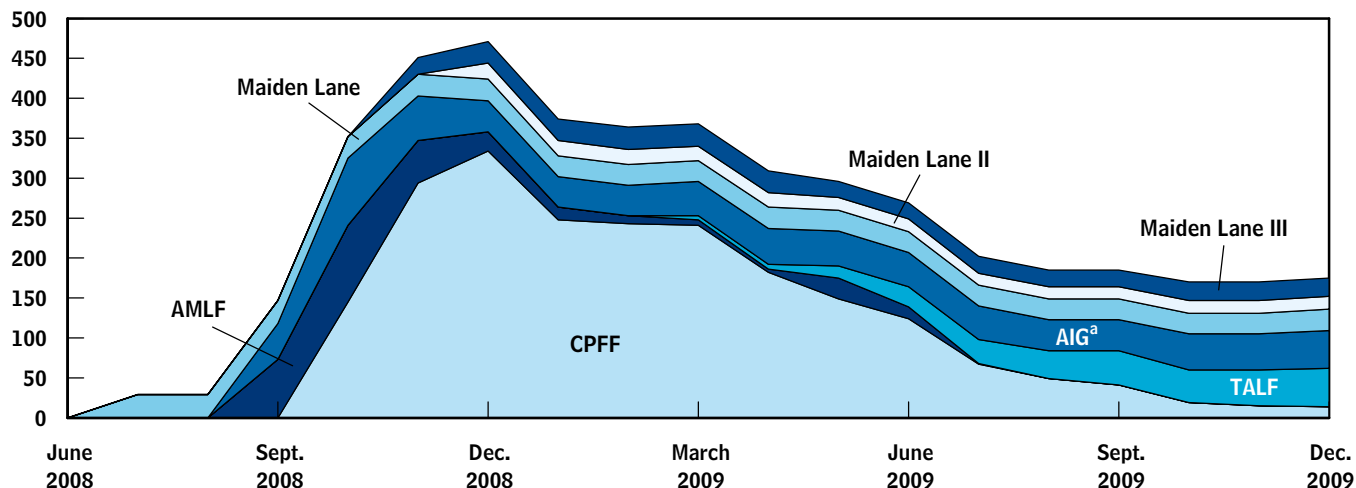
Expanded Lending to Depository Institutions. In CBO's view, the expanded use of the Federal Reserve's discount window, lending by the Term Auction Facility, and, before 2009, the increased use of repurchase agreements did not create significant subsidies. The reciprocal currency arrangements (dollar swaps) that the central bank engaged in at various times throughout the crisis were struck at terms favorable to the Federal Reserve and thus had negative subsidies—they created profits for the government.

CBO judges the fair-value subsidies conferred by the expanded use of the discount window and repurchase agreements to be negligible. That broader use is an

31. No upper bounds were set on lending through the Primary Dealer Credit Facility, the Commercial Paper Funding Facility, or the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility. Caps of \$540 billion and \$200 billion were placed on lending through the Money Market Investor Funding Facility and the Term Asset-Backed Securities Loan Facility, respectively. (For additional detail, see Appendix A.) Lending in support of specific institutions was initially \$85 billion for AIG, \$220 billion for Citigroup, and \$87 billion for Bank of America.

Figure 3.**Funding Provided Through Selected Federal Reserve Programs**

(Billions of dollars)



Source: Congressional Budget Office based on data from the Federal Reserve.

Notes: Further information on the programs can be found in Appendix A.

TALF = Term Asset-Backed Securities Loan Facility; AMLF = Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility; CPFF = Commercial Paper Funding Facility.

- a. The data for the American International Group (AIG) comprise the outstanding balance on the line of credit plus equity holdings in AIA Aurora Limited Liability Company (LLC) and ALICO Holdings LLC.

extension of the Federal Reserve's normal lending activities, which are structured to minimize the risk of loss. The loans and agreements have short terms and are well collateralized; moreover, the loans from the discount window are recourse loans—that is, in case of default, the Federal Reserve has recourse to the assets of borrowers beyond the collateral that has been provided. On repurchase agreements, borrowers pay market rates of interest.

CBO has also concluded that the subsidies associated with the TAF are negligible. In principle, the longer-maturity loans offered under the facility exposed the Federal Reserve to greater risk of loss than does its traditional overnight lending through the discount window. However, the TAF's requirements for large amounts of collateral up front to secure the loans made losses unlikely. Moreover, a TAF loan by design carried a market-based interest rate because the rate was determined through a competitive auction (the minimum rate was 0.25 percent). Another reason to believe that the TAF offered little if any subsidy is that the facility's auctions were consistently undersubscribed after the height of the crisis, suggesting that many potential borrowers did not find

the funds attractive even when they carried the minimum allowable rate under the facility.

The dollar swaps with foreign central banks have resulted in gains for the Federal Reserve. However, CBO did not have enough information about the terms on the swaps at the time the program was announced to estimate the prospective value of those commitments. As it turned out, the swaps exposed the Federal Reserve to very little risk of default because the other parties to the arrangements were foreign central banks, not the foreign private banks that borrowed the dollar-denominated funds from their central banks. Nevertheless, the Federal Reserve received interest payments on the swaps that included compensation for the risk associated with the private foreign banks that ultimately borrowed the funds.³² As a result, the interest rates charged on the swaps more than compensated the Federal Reserve for its risk exposure.

32. The interest rates that the Federal Reserve received on the swaps were determined in competitive auctions whose participants were the private foreign banks.

New Liquidity Programs for Nondepository Financial Institutions and Other Market Participants. The Federal Reserve created several programs to provide liquidity to nondepository institutions. Some of the facilities were designed to protect the central bank entirely from losses as a result of defaults or to compensate it at near-market rates for the risks associated with such lending. But other facilities that the Federal Reserve established exposed it to risk that was not fully counterbalanced by higher interest rates or some other type of protection, such as collateral. In those cases, the Federal Reserve provided a subsidy to borrowers.

The Primary Dealer Credit Facility. With this facility, the Federal Reserve extended the use of its discount window to primary dealers—large financial institutions that are authorized to trade directly with the Federal Reserve System. As with traditional loans from the discount window, the Federal Reserve's risk of losses on loans to primary dealers was minimal because the loans were for short terms and were well collateralized; in addition, the Federal Reserve had recourse to the borrowers' assets in the event of their default. Hence, CBO estimates that the amount of the fair-value subsidies provided on loans from this facility was negligible.

The Term Securities Lending Facility. The Federal Reserve created the Term Securities Lending Facility early in 2008 to strengthen the financing position of primary dealers and generally improve conditions in the financial markets. Through the facility, it lent Treasury securities to primary dealers for terms of 28 days; the loans were backed by dealers' pledged collateral of high-grade securities. Dealers paid interest on the loaned securities at a rate determined in competitive auctions, and as a result, CBO has estimated that the loans were unsubsidized.

The Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility and the Money Market Investor Funding Facility. The Federal Reserve created these programs to increase liquidity in the market for asset-backed commercial paper and to assure investors that money market mutual funds would have sufficient liquidity to meet the elevated demand that the financial crisis might generate for the redemption of shares in the funds. (Large redemptions from money market funds are extremely rare except during periods of severe financial distress.) Under the terms of the AMLF, the Federal Reserve provided loans to depository institutions to purchase highly rated asset-backed commercial paper from money market mutual funds at a fixed interest rate—the primary credit

rate.³³ The commercial paper that was purchased served as collateral for the loan, and the Federal Reserve had no further recourse to the borrowers' assets in the event of default on the loan.

The MMIFF was a related facility that effectively supplemented the AMLF. CBO judged that the MMIFF would be used only in times of extreme distress; as a result, it estimated a negligible cost arising from the facility's activities. In fact, the MMIFF was never used and was discontinued on October 30, 2009.

Two factors suggest that the AMLF provided a subsidy to participants in the financial markets by charging a rate of interest that did not fully cover the riskiness of the collateral (the commercial paper) it was accepting on its loans. First, had the crisis worsened, the market value of the collateral would probably have fallen below the principal owed on the loans, leaving the Federal Reserve exposed to losses. Second, although only highly rated commercial paper was eligible as collateral, credit ratings became less informative during the financial crisis, and money market mutual funds had an incentive to sell the AMLF their holdings of highly rated but relatively risky and illiquid paper, because there was no penalty for doing so.³⁴ CBO's estimates of fair-value subsidies take into account the heightened level and volatility of commercial paper rates as well as the likelihood of additional borrowing from the facility in the event of a crisis (see Appendix B).

CBO estimates that at the inception of the AMLF, in September 2008, fair-value subsidies totaled about \$2 billion, reflecting the highly distressed market conditions prevailing at the time.

The Commercial Paper Funding Facility. The Federal Reserve designed the Commercial Paper Funding Facility, like the AMLF, to relieve stress in the money markets by increasing the liquidity of high-quality commercial paper. The CPFF was a limited liability company authorized to buy highly rated, three-month dollar-denominated commercial paper (including asset-backed commercial paper)

33. The primary credit rate is the interest rate at which an eligible depository institution may borrow funds, typically for a short period, directly from the discount window at a Federal Reserve Bank.

34. Considerable variation can be found in the quality of the securities within a rating class, including the class that comprises highly rated commercial paper. Variation was even greater during the crisis, when the financial condition of issuers of the paper was changing rapidly.

using financing provided by the Federal Reserve. The commercial paper that it purchased served as collateral for that financing, and the Federal Reserve had recourse only to the assets of the facility.

The CPFF generated a subsidy because it provided participants in the financial markets with the option of borrowing money against risky collateral at terms that did not adjust with changes in conditions in the markets. The Federal Reserve charged an interest rate on loans through the CPFF that was high enough to discourage use of the facility under normal market conditions but that made its use attractive during times of extreme financial distress.³⁵ It is exactly at those times that the market value of the collateral for such loans would be at the greatest risk of falling short of the loans' principal, leaving the Federal Reserve at risk for losses. CBO's estimate of fair-value subsidies for the CPFF takes into account the heightened level and volatility of rates during the crisis, but it also factors in the assumption that conditions will tend to revert to normal over time (see Appendix B).

CBO estimates that at the inception of the CPFF, in October 2008, the facility created a subsidy of about \$2 billion. (At that point, the CPFF was scheduled to operate only until April 30, 2009, but the Federal Reserve later extended its operations to February 1, 2010. However, because CBO's analysis is intended to indicate the subsidy provided at the program's inception, the estimate does not take the cost of that extension into account.) As in the case of the other emergency facilities, the initial subsidy reflected conditions in the financial markets at that time.

The Term Asset-Backed Securities Loan Facility. The financial crisis also caused a severe and protracted decline in the availability of financing for longer-term asset-backed securities. In November 2008, the Federal Reserve announced that it was creating the TALF to support segments of the asset-backed securities market that provide a significant portion of the funding for certain types of

commercial and consumer credit, such as commercial mortgages, auto loans, and credit cards. The facility was not actually opened until March 3, 2009, which CBO treats as the date of the program's inception.

The TALF exposes the Federal Reserve to the risk of losses from defaults because it provides multiyear funding against risky asset-backed securities. At the inception of the program, the TALF offered three-year loans; shortly thereafter, it extended the term to five years for loans against some types of collateral, such as securities backed by student loans or commercial mortgages. Loans from the TALF carry administratively set interest rates that differ for various types of qualifying collateral and loan maturities.

Despite the riskiness of the collateral backing the loans and their extended maturities (which leave lenders vulnerable to changes in economic conditions), three factors mitigate but do not eliminate the default risk that the Federal Reserve assumes when it makes such loans. First, the Treasury has provided the central bank with "first-loss protection" on the loans, whereby the Treasury absorbs the first \$20 billion of realized losses through the TARP. Second, the accumulated interest income on the TALF loans can be used to cover losses. Third, the Federal Reserve imposes "haircut" provisions that limit the amount of a loan to less than the full value of the collateral backing it. The riskier the class of assets backing the loan, the larger is the haircut that the central bank requires. CBO's estimate of the fair-value subsidy from the TALF takes those three types of protection into account (see Appendix B).

In CBO's estimation, a subsidy of roughly \$13 billion was generated at the inception of the TALF. Although the volume of lending under the program was initially small and increased only slowly, the subsidy that CBO calculated at the program's inception reflects the possibility that financial conditions might have worsened, leading to greater participation in the facility (as other alternatives became more expensive or unavailable) as well as losses that would have exceeded the amount of protection provided by the TARP.

Open-Market Purchases of Securities. Securities that the Federal Reserve purchases in the open market or in competitive auctions, in CBO's estimation, are acquired at prices that reflect their fair value. That reasoning applies to mortgage-backed securities, agency debt, and Treasury

35. The interest rate on the paper being purchased was the three-month overnight indexed swap rate plus 1 percentage point (for unsecured paper) and 3 percentage points (for asset-backed paper). (The three-month overnight indexed swap rate is a measure of the average federal funds rate that market participants expect over the next three months.) There was also a surcharge of 1 percentage point on unsecured paper, and each borrower paid a facility fee equal to 10 basis points (a basis point is one-hundredth of a percentage point) of the maximum amount of its commercial paper that the CPFF might own.

securities. As such, no fair-value subsidy is associated with those transactions.

Nevertheless, such transactions confer valuable benefits on participants in the financial markets that might be considered subsidies under a more comprehensive definition of the term. The Federal Reserve's purchases of securities boost the demand for them, thereby increasing their liquidity, pushing up their prices (and benefiting the securities' existing owners), and lowering their associated interest rates (which in the mortgage markets benefits home buyers).³⁶ However, the central bank's purchases also impose costs. For example, lower interest rates in general reduce the interest income of savers, whereas lower rates on mortgages increase the rate at which homeowners prepay their mortgages, which diminishes the stream of income that owners of existing mortgage-backed securities receive.

Support for Systemically Important Financial Institutions. Despite the serious financial problems that led the Federal Reserve to create facilities to support financial institutions it identified as systemically important—such as AIG and Citigroup—the central bank initially provided either no subsidy or only a small one to those institutions, in CBO's estimation. In the case of the Maiden Lane facilities, which were established to facilitate the Bear Stearns and AIG transactions, the Federal Reserve initially provided support on fair-value terms. Its bolstering of Citigroup and Bank of America was structured so that the risk of losses was primarily borne by other federal entities, such as the Treasury (using funding from the TARP) and the FDIC.

The Maiden Lane Facilities. CBO estimates that no economic subsidies were associated with these facilities at their inception because the Federal Reserve reported that

it had acquired portfolios of risky securities equal in fair-value terms to the principal amounts of the loans that it extended. (In other words, there was an equal exchange of value.)

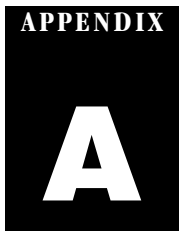
Line of Credit to the American International Group. The Federal Reserve initially extended an \$85 billion line of credit to AIG to help it meet its obligations and restructure its operations with minimal disruption to the economy. CBO's estimate of the subsidy conferred at the inception of the program, when the line of credit was established, is about \$2 billion. That estimate, however, is considerably more uncertain than estimates for the Federal Reserve's other programs because very little information was available about AIG's financial condition. A measure that is sometimes informative is the rates that other lenders offer on financing. However, in this case, such rates are not valid points of comparison because they take into account the government's backing, without which AIG would have failed. The Federal Reserve charged AIG very high interest rates on the loans, but the fact that AIG relied heavily on the line of credit and continues to draw on it suggests that the central bank's terms have continued to be more favorable than those available from private lenders.

Contingent Loans to Citigroup and Bank of America. The contingent loans to Citigroup and Bank of America initially provided small subsidies, in CBO's estimation. For the Citigroup portfolio, CBO estimated fair-value subsidies of about \$2 billion at the inception of the program. That amount is sensitive to assumptions about the size of the risk premium (among other factors), which CBO estimated to be 8 percent. If the risk premium was assumed to be 6 percent, then the subsidy at the inception of the program would be about -\$4 billion; if the risk premium was assumed to be 10 percent, then the subsidy would be about \$8 billion.

The Federal Reserve was less exposed to losses from the Citigroup program than were the Treasury and the FDIC because those latter organizations had to absorb losses before the Federal Reserve suffered any. In addition, the central bank benefited from a relatively high rate of interest on the contingent loan—the three-month overnight indexed swap rate plus 300 basis points—even though its risk was fairly limited.

On Bank of America's contingent loan, the subsidy that the Federal Reserve provided at the program's inception was less than \$1 billion, in CBO's judgment.

36. The impact of the Federal Reserve's purchases in the market is analogous to the impact of foreign official purchases in the market for U.S. Treasury debt. A study that found evidence suggesting that those foreign purchases had a large effect on the prices of Treasury securities was Ben S. Bernanke, Brian P. Sack, and Vincent R. Reinhart, "Monetary Policy Alternatives at the Zero Bound: An Empirical Assessment," *Brookings Papers on Economic Activity*, no. 2 (2004). The impact on prices in the bond markets from large-sized transactions and a high frequency of purchases was examined by Michael Fleming in "Measuring Treasury Market Liquidity," *Federal Reserve Bank of New York Economic Policy Review* (September 2003), and by Michael Brandt and Kenneth Kavajecz in "Price Discovery in the U.S. Treasury Market: The Impact of Orderflow and Liquidity on the Yield Curve," *Journal of Finance*, vol. 59, no. 6 (December 2004).



Programs Created by the Federal Reserve During the Financial Crisis

During the past several years, the Federal Reserve significantly expanded the amount and availability of its lending to a broad range of financial institutions. It did so by invoking its authority under section 13(3) of the Federal Reserve Act of 1913 to lend “[i]n unusual and exigent circumstances” to “any individual, partnership, or corporation . . . unable to secure adequate credit accommodations from other banking institutions.”¹

Using that authority, the central bank expanded existing lending programs that provide liquidity to depository institutions, such as banks and credit unions, whose liabilities largely consist of checking and savings accounts and other deposits.² It also created new programs to provide liquidity to nondepository financial institutions and other market participants, such as brokers and dealers in securities and money market mutual funds; purchased mortgage-related securities on the open market to try to help lower medium- and long-term interest rates and improve the flow of credit in the market for home mortgages; and extended direct loans and other support to certain “systemically important” financial institutions—those whose failures the central bank believed could lead to a systemic collapse of financial markets and institutions.

Now that the turmoil in the financial markets has subsided and most of the liquidity programs have ended, the Federal Reserve’s holdings of mortgage-related securities and its support of systemically important financial insti-

tutions remain on its balance sheet. (The lending programs are summarized in Table A-1.)

Expanded Lending to Depository Institutions

The Federal Reserve’s earliest actions to address the financial crisis, apart from the reduction in its target for the federal funds rate (the interest rate that banks charge each other for overnight loans of their spare reserve balances and that figures in the Federal Reserve’s conduct of monetary policy), focused on providing liquidity to depository institutions.³ The central bank eased the terms on which depository institutions could borrow from its so-called discount window, increased its use of repurchase agreements to add liquidity to the banking system, expanded its currency swap lines with foreign central banks, and created the Term Auction Facility (TAF) to provide loans with longer terms through the discount window.

Expansion of Lending Through the Discount Window

The Federal Reserve extends credit directly to depository institutions through its discount-window program, or facility. The discount window operates as a backup source of liquidity for individual depository institutions that

1. Further information about the law is available at www.federalreserve.gov/aboutthefed/fract.htm.

2. The Federal Reserve can increase liquidity in a market—essentially make it easier to convert assets to cash—by standing ready to buy securities or to lend against them as collateral.

3. Monetary policy comprises the actions of a central bank to influence the availability and cost of money and credit as a means of helping to promote the goals of maximum employment, stable prices, and moderate long-term interest rates. The traditional tools of monetary policy include open-market operations, direct lending to depository institutions, and reserve requirements for certain deposit liabilities of depository institutions. (Reserves are an amount of funds held back from investment by a bank to meet probable or possible demands.) For additional information, see Box 2 on page 6.

Table A-1.**Overview of the Federal Reserve's Lending Programs During the Financial Crisis**

	Participants	Collateral	Collateral "Haircuts" ^a	Loan Term	Interest Rates	Recourse ^b
Discount Window	Depository institutions	Full range of discount-window collateral (most loans that are not past due and most highly rated securities)	Haircuts for securities are between 1 percent and 18 percent of estimated fair market values; haircuts for loans are between 4 percent and 56 percent.	Typically overnight but up to 90 days during the financial crisis	Set as a spread over the target for the federal funds rate (the rate banks charge each other for overnight loans of their spare reserve balances)	Yes
Reciprocal Currency Arrangements	Selected central banks ^c	Foreign currency and eligible collateral in the central bank's jurisdiction	No	Overnight to 3 months	Equal to the rate earned by the foreign central banks on their loans to private banks	No
Term Auction Facility	Sound depository institutions	Full range of discount-window collateral (most loans that are not past due and most highly rated securities)	The same haircuts as for discount-window lending	Initially 28 days or 84 days	Set by auction. The minimum bid rate is the rate of interest that Federal Reserve Banks pay on excess reserve balances.	Yes
Primary Dealer Credit Facility	Primary dealers ^d	Full range of collateral accepted for triparty repurchase agreements (those in which a custodian bank or international clearing organization acts as an intermediary between the two parties to the agreement)	For collateral that is eligible for the Federal Reserve's open market operations (OMOs)—that is, Treasury securities, agency debt, and agency mortgage-backed securities—the haircuts are those used for OMOs. For non-OMO-eligible collateral, haircuts are based on the riskiness of the asset and are generally higher than for OMO-eligible collateral.	Overnight	Equal to the primary credit rate (the rate that sound banks pay on loans from the discount window) in effect at the Federal Reserve Bank of New York	Yes

Continued

Table A-1.

Continued

Overview of the Federal Reserve's Lending Programs During the Financial Crisis

	Participants	Collateral	Collateral "Haircuts" ^a	Loan Term	Interest Rates	Recourse ^b
Term Securities Lending Facility	Primary dealers ^d	Treasury securities, agency debt, and agency mortgage-backed securities, and all investment-grade debt securities	For collateral that is eligible for the Federal Reserve's open market operations (OMOs)—that is, Treasury securities, agency debt, and agency mortgage-backed securities—the haircuts are those used for OMOs. For non-OMO-eligible collateral, haircuts are based on the riskiness of the asset and are generally higher than for OMO-eligible collateral.	28 days	Set in an auction process subject to a minimum bid rate of 10 or 25 basis points, depending on the type of collateral used in the auction	No
Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility	Depository institutions, bank holding companies, and U.S. branches and agencies of foreign banks	Highly rated asset-backed commercial paper	No	Maturity date of the asset-backed commercial paper but a 270-day maximum	Equal to the primary credit rate (the rate that sound banks pay on loans from the discount window) in effect at the Federal Reserve Bank of Boston at the time the advance is made	No
Money Market Investor Funding Facility	Eligible money market mutual funds and other money market investors	U.S. dollar-denominated certificates of deposit, bank notes, and commercial paper issued by highly rated financial institutions	No	Overnight	Equal to the primary credit rate (the rate that sound banks pay on loans from the discount window) in effect at the Federal Reserve Bank of New York	Yes
Commercial Paper Funding Facility	Eligible issuers of commercial paper	Newly issued 3-month unsecured and asset-backed commercial paper from eligible U.S. issuers	No	3 months	The lending rate on asset-backed commercial paper is the 3-month overnight indexed swap (OIS) rate plus 300 basis points; for unsecured commercial paper, the rate is the 3-month OIS rate plus 100 basis points and an unsecured-credit surcharge of 100 basis points.	Yes

Continued

Table A-1.

Continued

Overview of the Federal Reserve's Lending Programs During the Financial Crisis

	Participants	Collateral	Collateral "Haircuts" ^a	Loan Term	Interest Rates	Recourse ^b
Term Asset-Backed Securities Loan Facility	Investors in the United States who own eligible collateral	Recently originated U.S. dollar-denominated AAA-rated asset-backed securities and commercial mortgage-backed securities ^e	Haircuts vary from 5 percent to 16 percent, depending on the class of assets and a security's average life but not on the borrower.	3 or 5 years	Varies by the type of collateral securing the loan (and in some cases by the term of the loan)	No

Source: Congressional Budget Office.

Notes: See the text for further information on the programs in the table.

A basis point is one-hundredth of a percentage point.

- The percentage of the collateral's value that cannot be used to back a loan.
- In the event of a borrower's defaulting on a loan, the Federal Reserve has the right to collect the unpaid balance from the borrower.
- European Central Bank, Bank of England, Swiss National Bank, Bank of Japan, Reserve Bank of Australia, Banco Central do Brasil, Bank of Canada, Danmarks Nationalbank, Bank of Korea, Bank of Mexico, Reserve Bank of New Zealand, Norway's Norges Bank, Monetary Authority of Singapore, and Sweden's Sveriges Riksbank.
- Primary dealers are commercial banks and broker-dealers in securities that trade U.S. government and selected other securities with the Federal Reserve.
- Underlying assets on the AAA-rated securities include auto loans, student loans, credit card loans, small business loans guaranteed by the Small Business Administration, mortgage-servicing advances, business equipment-related loans or leases, vehicle fleet leases, "floorplan" loans, and commercial mortgages.

are experiencing a temporary shortfall of reserves. The terms of loans from the window are very short, typically overnight, and the loans are backed by collateral. The interest rate on such loans—known as the discount rate—is usually set higher than the Federal Reserve's target for the federal funds rate.

Before the financial crisis, the total amount of borrowing from the discount window was small, for two main reasons: The Federal Reserve discouraged depository institutions from using the window as a regular source of funds, and a stigma attached to banks that borrowed from the window at a rate of interest that was higher than prevailing market rates (because such borrowing gave rise to suspicions that the banks might be in financial trouble).⁴ Early in the crisis, the Federal Reserve sought to encourage borrowing from the window as a way of providing additional liquidity, and so it increased the term for borrowing to a maximum of 90 days and lessened the difference—known as the spread—between the discount rate

and the federal funds rate.⁵ The Federal Reserve extended the maturity on loans and lowered the cost of borrowing through the discount window several times during the crisis.

The outstanding amount of lending through the discount window (excluding lending for exceptional but predictable seasonal needs) spiked as the financial crisis unfolded, and it remained very high, by historical standards, at the end of 2009. Such credit increased from \$3 million in July 2007 to \$4.5 billion at the end of 2007; it peaked at almost \$111 billion at the end of October 2008. The amount of outstanding loans from the discount window fell to about \$49 billion by the end of June 2009 and to \$20 billion by the end of last year.

4. See William C. Dudley, Executive Vice President, Federal Reserve Bank of New York, "May You Live in Interesting Times" (remarks at the Federal Reserve Bank of Philadelphia, October 17, 2007).

5. As the financial crisis subsided, the Federal Reserve has begun to normalize the terms for borrowing from the discount window. The maximum term of primary credit loans—loans to generally sound depository institutions—from the discount window fell to 28 days in January 2010 and to overnight in March (before the crisis, the typical term for such credit). In addition, in February of this year, the Federal Reserve raised the interest rate on primary credit from 0.5 percent to 0.75 percent.

Expanded Use of Repurchase Agreements

The Federal Reserve provided additional liquidity to depository institutions by increasing the amount of its repurchase agreements (“repos”) with its primary dealers.⁶ A repurchase agreement is similar to a collateralized loan. The Federal Reserve simultaneously agrees to buy a security and sell it back to the dealer on an agreed-upon day—typically the following day but sometimes many days later. The difference between the price paid by the dealer to buy back the security and the price originally paid for it by the Federal Reserve is the interest that the primary dealer pays to the central bank for the term of the agreement. The interest rate depends on the riskiness of the collateral (that is, the security used in the agreement) and the creditworthiness of the borrower. Repurchase agreements increase reserves in the banking system until the dealer buys back the security because dealers deposit the proceeds of such sales in their banks.

In March 2008, to address strains in the markets for agency debt and agency-guaranteed mortgage-backed securities (MBSs), the Federal Reserve significantly increased its use of repurchase agreements by initiating the Single-Tranche Open Market Operations Program.⁷ The agreements had terms of 28 days, and the securities eligible for repurchase included agency debt and MBSs guaranteed by the agencies. Near the end of 2008, for example, agency MBSs made up 89 percent of the collateral for those agreements.⁸

The total amount of the repurchase agreements involving the Federal Reserve doubled to almost \$110 billion after the Single-Tranche Program began, and it remained high throughout the summer of 2008. As conditions in the

financial markets improved, the Federal Reserve gradually reduced its repurchase transactions, and the amount outstanding reached zero in early 2009.

Extension of Reciprocal Currency Arrangements

In conjunction with other central banks, the Federal Reserve authorized reciprocal currency arrangements, also known as liquidity swap lines, to make available liquidity that was denominated in a foreign currency when it was temporarily needed. In the case of dollar swaps, the Federal Reserve makes a collateralized loan of U.S. dollars to a foreign central bank; because the responsibility to repay the loan rests with that bank, the credit risk that the Federal Reserve assumes (the risk that economic loss will result from the borrowers’ failure to repay the loan) is exceedingly small.

Dollar Swap Lines. In December 2007, the Federal Reserve authorized the establishment of U.S. dollar swap lines to help the European Central Bank and the Swiss National Bank provide dollar-denominated liquidity to foreign private banks in maturities ranging from overnight to three months. The foreign central banks obtained dollars to lend to institutions in their jurisdictions, and the Federal Reserve received assets denominated in euros and Swiss francs. Those arrangements initially provided dollars in amounts of up to \$20 billion and \$4 billion to the European Central Bank and the Swiss National Bank, respectively.⁹ Because the demand for dollar funding continued to grow, the Federal Reserve set up swap lines with other central banks, and it increased the size and lengthened the terms of its existing lines with the European Central and Swiss National Banks. In the fall of 2008, the Federal Reserve eliminated the formal limits on the amounts of those lines as well as on the swap lines that had been set up with the Bank of Japan and the Bank of England, and it authorized new liquidity swap lines with 10 other central banks.¹⁰ At the end of June 2009, the total amount of swaps outstanding was \$119 billion, considerably less than the peak amount

6. Primary dealers—commercial banks as well as brokers and dealers in securities who buy and sell U.S. government and other securities in the private financial markets—trade with the Federal Reserve. Such firms must meet requirements set by the central bank for liquidity and capital as well as for other aspects of their operations.

7. A mortgage-backed security is a claim on the cash flows of a pool of mortgages. In this context, the “agencies” are Fannie Mae, Freddie Mac, Ginnie Mae, and the Federal Home Loan Banks. All of those entities issue debt to fund their operations, and all but the Federal Home Loan Banks guarantee mortgage-backed securities.

8. Federal Reserve Bank of New York, *Domestic Open Market Operations During 2008: A Report Prepared for the Federal Open Market Committee by the Markets Group of the Federal Reserve Bank of New York* (January 2009), p. 11, footnote 7, available at www.newyorkfed.org/markets/omo/omo2008.pdf.

9. Board of Governors of the Federal Reserve System, *Monetary Policy Report to the Congress* (February 24, 2009), p. 48, available at www.federalreserve.gov/monetarypolicy/files/20090224_mprfullreport.pdf.

10. Those banks were the Reserve Bank of Australia, the Banco Central do Brasil, the Bank of Canada, the Danmarks Nationalbank, the Bank of Korea, the Bank of Mexico, the Reserve Bank of New Zealand, Norway’s Norges Bank, the Monetary Authority of Singapore, and Sweden’s Sveriges Riksbank.

of \$583 billion at the end of 2008. The Federal Reserve terminated those swap lines on February 1, 2010.

Foreign-Currency Swap Lines. In April 2009, the Federal Reserve announced that foreign-currency swap lines had been set up with the Bank of England, the European Central Bank, the Bank of Japan, and the Swiss National Bank. Those liquidity lines were designed to give the Federal Reserve the capacity to provide U.S. financial institutions with liquidity denominated in foreign currencies. Through the swap lines, the Federal Reserve had access to sterling in amounts of up to £30 billion (approximately \$44 billion at the time of the announcement), to euros in amounts of up to €80 billion (about \$100 billion), to yen in amounts of up to ¥10 trillion (about \$100 billion), and to Swiss francs in amounts of up to CHF40 billion (about \$35 billion). The Federal Reserve did not draw on those lines, and they expired on February 1, 2010.

Establishment of the Term Auction Facility

The Federal Reserve created the Term Auction Facility in December 2007 as an extension of the discount window.¹¹ At two-week intervals, the central bank initially auctioned a fixed amount of funds, secured by qualifying collateral, for terms of 28 or 84 days to depository institutions that were eligible to borrow under the primary credit program of the discount window.¹² The funds were not available to the borrowing institution immediately but were disbursed three days after the auction. Those features of the TAF meant that it was not suited to institutions that were experiencing a sudden need for liquidity, and thus borrowing from the TAF was less likely to raise concerns in the market about an institution's viability. As a result, depository institutions were expected to be more inclined to borrow through the TAF than through the normal discount window.

Indeed, term auction credit accounted for the majority of the Federal Reserve's lending to depository institutions during the crisis. At the peak of such lending, in early March 2009, loans through the TAF amounted to \$493 billion, or almost 90 percent of total borrowing by depositories. By mid-2009, as the strains in the financial

markets eased, banks' use of the TAF fell off sharply, and loans by the facility amounted to \$283 billion. Consequently, the central bank has reduced the amount and maturity of the credit available at the auctions.¹³ By the end of 2009, the amount of TAF loans had dropped to \$76 billion.

New Programs for Nondepository Financial Institutions and Other Market Participants

As the financial crisis deepened, the Federal Reserve created new programs to provide liquidity directly to other financial institutions and market participants—in particular, primary dealers, money market mutual funds, and participants in the markets for commercial paper and asset-backed securities.

The Primary Dealer Credit Facility

Exercising its emergency authority in March 2008, the Federal Reserve extended the privilege of discount-window borrowing to primary dealers through its new Primary Dealer Credit Facility (PDCF). Many dealers faced difficulties in financing their holdings of mortgage-backed and other securities. In more normal circumstances, they would have funded a significant portion of those holdings through repurchase agreements, with more than half of the contracts having overnight maturities.¹⁴ But the prices of securities backed by subprime and other risky mortgages (loans made to borrowers with poorer-than-average credit) fell as losses on the underlying loans mounted, and the dealers had trouble finding counterparties (the legal and financial term for the other parties to the dealers' contracts) who would accept those securities as collateral for repurchase agreements. Many dealers faced the prospect of selling some of their securities at a substantial loss, which would have put further downward pressure on prices and possibly threatened some dealers with insolvency.

11. The Federal Reserve has indicated that the TAF could become a permanent addition to its tools for implementing monetary policy.

12. In contrast, primary credit is available on a very short term basis, typically overnight.

13. The last auction was on March 8, 2010, and the minimum rate was 0.5 percent, up from the previous minimum of 0.25 percent.

14. For more information on the repo market, see Tobias Adrian, Christopher R. Burke, and James J. McAndrews, "The Federal Reserve's Primary Dealer Credit Facility," *Current Issues in Economics and Finance*, Federal Reserve Bank of New York, vol. 15, no. 4 (August 2009); and Peter Hördahl and Michael R. King, "Developments in Repo Markets During the Financial Turmoil," *BIS Quarterly Review* (Bank for International Settlements, December 2008), pp. 37–53.

The amount of borrowing under the PDCF fluctuated markedly in 2008 but wound down to zero in 2009. By March 26, 2008, less than two weeks after the facility's creation, borrowings had climbed to more than \$37 billion. The outstanding amount of loans from the PDCF began to fall steadily after that, and by the beginning of July, the facility was little used. When the turmoil in the financial markets intensified in September 2008, the PDCF's balance soared from zero to almost \$147 billion on October 1. Since then, the need for the facility has diminished, and by the end of May 2009, lending by the PDCF had halted. The Federal Reserve terminated the facility on February 1, 2010.

The Term Securities Lending Facility

The Federal Reserve created the Term Securities Lending Facility (TSLF) in March 2008 to strengthen the financing position of primary dealers and, more generally, to foster improved conditions in the financial markets.¹⁵ Through the TSLF, the Federal Reserve loaned U.S. Treasury securities to primary dealers in two types of auctions that differed by the collateral that dealers could offer in exchange for the loans.¹⁶ The Federal Reserve made available up to \$200 billion of Treasury securities to lend to primary dealers for terms of 28 days.

In July 2008, the Federal Reserve created the TSLF Options Program to auction options to obtain shorter-term TSLF loans on future dates. The options program was intended to enhance the effectiveness of the TSLF by offering liquidity during periods when the demand for short-term funds was high, such as at the end of a quarter.

By the last quarter of 2008, the amount of borrowing under the TSLF was close to the maximum. However, as conditions in the markets improved, borrowing diminished until outstanding loans totaled \$27 billion at the

end of May 2009. Consequently, in June of that year, the Federal Reserve announced that it was scaling back the program, and activity had ceased by the end of August. The facility expired on February 1, 2010.

The Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility

Money market mutual funds typically invest in short-term debt, such as Treasury bills, certificates of deposit, and commercial paper (unsecured short-term promissory notes issued primarily by corporations).¹⁷ With those investments, money market funds provide a significant amount of financing for the asset-backed commercial paper market, on which some financial institutions depend for short-term loans. Unexpected losses at one such fund as a result of the bankruptcy of the Lehman Brothers investment bank in the fall of 2008 triggered a run by the fund's investors. That brought about a loss of confidence in the safety of money market funds more generally and led many investors to redeem their shares.

The Federal Reserve created the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF) on September 19, 2008, to help money market funds meet spikes in the demand for redemptions and to foster confidence in the markets for asset-backed commercial paper and in the broader money markets.¹⁸ The AMLF provided funding to depository institutions and bank holding companies to finance their purchases of high-quality asset-backed commercial paper from money market funds under certain conditions.¹⁹

Lending through the AMLF began the week of September 22, 2008; by the beginning of October, the facility's balance had shot up to \$152 billion. The balance steadily

15. The TSLF is an expanded version of the SOMA (System Open Market Account) securities lending program that the Federal Reserve has offered since 2002. That program provides primary dealers with overnight loans of particularly sought after Treasury securities in exchange for other Treasury securities as collateral. Just before the TSLF was created, lending under the SOMA securities lending program averaged about \$15 billion.

16. The two types of auctions were known as Schedule 1 and Schedule 2. In the first, loans could be collateralized by Treasury securities, agency debt, and agency MBSs; in the second, they could be backed by the collateral eligible for Schedule 1 auction loans as well as by highly rated corporate, municipal, mortgage-backed, and asset-backed securities.

17. Money market mutual funds are a significant source of short-term funding for financial institutions as well as for some corporations and government entities. For investors, the funds are an alternative to bank deposits: They pay a slightly higher rate of interest, but they expose investors to greater risk because they are not insured.

18. In addition, on September 29, the Treasury began a temporary guarantee program, funded under the Troubled Asset Relief Program, to protect shareholders of money market mutual funds from losses. The program ended as scheduled on September 18, 2009.

19. A bank holding company is broadly defined as any company that has control over a bank. Becoming a bank holding company provides a corporate and legal status that in many cases brings greater financial flexibility and makes it easier for banks to raise capital.

declined to less than \$1 billion in April 2009, but it temporarily rose to almost \$29 billion in early May and then fell to less than \$16 billion at the end of June 2009.²⁰ With liquidity in the money markets improving significantly, the Federal Reserve announced in June 2009 that it would restrict participation in the AMLF to money market mutual funds that were experiencing “material” withdrawals of funds. The program expired on February 1, 2010.

The Money Market Investor Funding Facility

To ensure that money market funds had sufficient backup liquidity to pay investors in the event of a run, the Federal Reserve created the Money Market Investor Funding Facility in October 2008. The program was initially structured to provide financing to five special-purpose vehicles (SPVs). SPVs are legal entities that are created to serve a particular function; the SPVs in this case were authorized to purchase dollar-denominated certificates of deposit, bank notes, and commercial paper from eligible participants in the money markets.²¹ (The commercial paper that the SPVs bought had to be issued by highly rated financial institutions and have remaining maturities of at least 7 days and no more than 90 days.) The Federal Reserve set the maximum amount of purchases by all of the SPVs at \$600 billion. However, the backup facility was never used, and its authority expired on October 30, 2009.

The Commercial Paper Funding Facility

The market for commercial paper is an important source of short-term funding for financial institutions and for some commercial firms. In the fall of 2008, the commercial paper market was under considerable

strain—which was exacerbated by the bankruptcy of Lehman Brothers—because money market mutual funds and other investors that needed liquidity became increasingly reluctant to purchase commercial paper, especially at maturities that extended beyond overnight. As a result, the volume of outstanding commercial paper diminished, interest rates on longer-term commercial paper rose significantly, and an increasingly large percentage of outstanding paper had to be refinanced each day.²²

The Federal Reserve created the Commercial Paper Funding Facility (CPFF) in October 2008 to address the difficulties in the commercial paper market. The facility bought highly rated, three-month dollar-denominated commercial paper (including asset-backed commercial paper) using financing provided by the Federal Reserve. The central bank set the borrowing terms so as to discourage the use of the facility except when the spreads between the interest rates on commercial paper and those on relatively risk-free securities (in general, Treasury securities) reached abnormally high levels. The interest rate on the paper was set at the three-month overnight indexed swap rate plus 1 percentage point for unsecured paper and 3 percentage points for asset-backed paper.²³ A surcharge of 1 percentage point was also levied on unsecured paper, and each issuer was required to pay a fee to the facility equal to 10 basis points (a basis point is one-hundredth of a percentage point) of the maximum amount of the issuer’s commercial paper that the CPFF might own.²⁴

Use of the facility increased rapidly. By the end of 2008, net holdings in the CPFF’s portfolio amounted to

20. The temporary increase in May in the amount borrowed through the AMLF occurred at about the time of the release of the results of the Federal Reserve’s Supervisory Capital Assessment Program (commonly known as the bank stress tests), which measured the adequacy of the capital of major financial institutions. See Board of Governors of the Federal Reserve System, *Federal Reserve System Monthly Report on Credit and Liquidity Programs and the Balance Sheet* (June 2009), available at www.federalreserve.gov/monetarypolicy/files/monthlyclbreport200906.pdf.

21. Institutions that were eligible to sell assets to the SPVs included money market funds and other investors in the money markets, such as U.S.-based securities lenders and investment funds that operate in a manner similar to money market funds—for example, certain local government investment pools, common trust funds, and collective investment funds.

22. See Board of Governors of the Federal Reserve System, “2008 Monetary Policy Releases: October 7, 2008” (press release), available at www.federalreserve.gov/newsevents/press/monetary/20081007c.htm.

23. The three-month overnight indexed swap rate is a measure of the average federal funds rate that market participants expect over the next three months.

24. The maximum amount of a single issuer’s commercial paper that the CPFF might own at any time was the greatest amount of U.S. dollar-denominated commercial paper that the issuer had outstanding on any day between January 1 and August 31, 2008. Once the total amount of an issuer’s outstanding commercial paper held by all investors (including the CPFF) equaled or exceeded the issuer’s limit, the CPFF would not purchase additional commercial paper from that issuer. See www.newyorkfed.org/markets/cpff_terms_conditions.html.

\$334 billion. By the end of June 2009, the facility's holdings had fallen to \$124 billion. Some of that decline, according to the Federal Reserve, can be traced to the lack of renewal of a significant portion of the maturing issues, possibly because improvements in overall market conditions may have allowed some borrowers to secure funding from other sources.²⁵ By the end of 2009, the facility held \$14 billion in loans. Like many of the other lending facilities that the Federal Reserve created during the crisis, the CPFF expired on February 1, 2010.

The Term Asset-Backed Securities Loan Facility

In addition to its effects on short-term financing, the financial crisis caused a severe decline in the availability of financing for longer-term asset-backed securities. In November 2008, the Federal Reserve created the Term Asset-Backed Securities Loan Facility (TALF) to support segments of the market for asset-backed securities that provide a significant portion of the funding for certain types of commercial and consumer credit. Under the program, the Federal Reserve was prepared to lend up to \$200 billion to holders of certain AAA-rated asset-backed securities (that is, those assigned the highest possible commercial rating and hence the least risk of default) whose underlying assets consisted of recently originated qualifying loans.²⁶ (Included were auto loans, student loans, credit card loans, equipment loans, "floorplan" loans, insurance premium finance loans, loans guaranteed by the Small Business Administration, and residential mortgage-servicing advance receivables.)²⁷ Also eligible as collateral were certain high-quality commercial

mortgage-backed securities issued before January 1, 2009. Loans from the TALF are limited to terms of three or five years and carry administratively set interest rates that differ for various types of qualifying collateral and loan maturities.²⁸

Lending under the TALF has gradually increased since the facility began operating in March 2009, rising from less than \$5 billion during that month to more than \$25 billion at the end of June and almost \$48 billion at the end of the year. Unless the Federal Reserve extends the deadlines, the TALF is scheduled to stop making loans against newly issued commercial mortgage-backed securities on June 30, 2010; it stopped making loans against all other collateral on March 31, 2010.

Open-Market Purchases of Securities

The Federal Reserve began purchasing securities in late 2008 in an effort to lower medium- and long-term interest rates, including mortgage rates, and thereby support the housing market and the broader economy. Fannie Mae and Freddie Mac—the two government-sponsored enterprises that together accounted for about one-half of the outstanding amount of home mortgages—had had trouble raising funds as their losses mounted in 2008, and their difficulties continued after they were put into conservatorship (placed under government control) by their regulator, the Federal Housing Finance Agency, in September 2008.²⁹ In addition, the demand for mortgage-backed securities guaranteed by the two companies fell as investors worried about the companies' ability to honor their guarantees on the MBSs. Consequently, the Federal Reserve began purchasing the securities (agency debt) issued by Fannie Mae, Freddie Mac, and the Federal Home Loan Banks as well as mortgage-

25. See Board of Governors of the Federal Reserve System, *Federal Reserve System Monthly Report on Credit and Liquidity Programs and the Balance Sheet*, p. 9.

26. The Federal Reserve announced in February 2009 (see www.federalreserve.gov/monetarypolicy/20090210b.htm) that it was prepared to increase the size of the program to as much as \$1 trillion.

27. Floorplan loans include revolving lines of credit to finance the inventories of motor vehicle dealers. Insurance premium finance loans include loans originated for the purpose of paying premiums on property and casualty insurance; they do not include deferred payment obligations acquired from insurance companies. Eligible mortgage-servicing advance receivables include receivables created by principal and interest, tax and insurance, and corporate advances made by residential mortgage servicers approved by Fannie Mae or Freddie Mac under pooling and servicing agreements or similar servicing agreements. For more information, see www.newyorkfed.org/markets/talf_terms.html.

28. Five-year terms may be used for loans secured by Small Business Administration (SBA) Pool Certificates or by SBA Development Company Participation Certificates, or for securities backed by student loans or commercial mortgage loans.

29. Fannie Mae and Freddie Mac were originally created as federally chartered institutions but were privately owned and operated. Designed to facilitate the flow of investment funds to the housing market, they pool mortgages purchased from mortgage lenders and sell them as mortgage-backed securities, collecting annual guarantee fees on the mortgages they securitize. In return, Fannie Mae and Freddie Mac cover any losses that occur if the underlying mortgage loans default. The companies also hold mortgage loans in their portfolios and purchase mortgage-backed securities (their own or those of other institutions), from which they earn a return.

backed securities guaranteed by Fannie Mae, Freddie Mac, and Ginnie Mae (agency MBSs).³⁰ The central bank also purchased long-term Treasury securities in 2009.

Agency Debt

The Federal Reserve began purchasing the debt of Fannie Mae, Freddie Mac, and the Federal Home Loan Banks at auction in September 2008. At first, it purchased only short-term debt, with maturities of one year or less. Then, in November of that year, the central bank announced that it would acquire up to \$100 billion in agency debt, and it began purchasing debt with longer terms in December. In March 2009, the central bank announced that it had increased to \$200 billion the maximum amount of agency debt that it would purchase, but in early November, it stated that it would instead purchase a total of about \$175 billion by the end of March 2010. By the end of 2009, it had purchased almost \$160 billion in agency debt.

Agency Mortgage-Backed Securities

Initially, the Federal Reserve announced plans to buy up to \$500 billion in agency MBSs, and it began making those purchases in mid-January 2009. In March, the central bank raised the planned amount of purchases to \$1,250 billion. At the beginning of July 2009, the Federal Reserve owned \$462 billion in those securities. At the end of 2009, it owned \$908 billion.

Medium- and Long-Term Treasury Securities

At the end of July 2007, before the financial crisis began, the Federal Reserve owned \$514 billion in Treasury notes and bonds.³¹ That amount had fallen to \$457 billion by mid-2008. In March 2009, the Federal Reserve announced its intention to purchase up to \$300 billion in notes and bonds over the following six months. By the

end of October of that year, the central bank had completed those purchases, bringing the amount of its holdings of notes and bonds to just over \$756 billion.

Support for Systemically Important Financial Institutions

In conjunction with the Treasury and the Federal Deposit Insurance Corporation (FDIC), the Federal Reserve has provided substantial additional support to four institutions whose financial problems were believed to seriously threaten the stability of the financial system. That support included lending to the first Maiden Lane facility (related to the sale of the investment bank Bear Stearns), a line of credit to the American International Group (AIG), lending to the Maiden Lane II and Maiden Lane III facilities (which own certain assets formerly owned by AIG), and so-called contingent lines of credit (components of the asset guarantees, which can be drawn on as needed) to Citigroup and Bank of America.

Lending Related to the Sale of the Bear Stearns Companies

In mid-March 2008, the large investment bank Bear Stearns informed the Federal Reserve, the Treasury, and the Securities and Exchange Commission that it might soon be unable to roll over (or refinance) its liabilities related to repurchase agreements. That possibility raised the concern that the sudden failure of Bear Stearns might have a chaotic effect on key financial markets, creating turmoil that could have severely undermined confidence and cast doubt on the financial stability of other major financial firms.

To prevent the adverse economic consequences that could have been triggered by a disorderly failure of Bear Stearns, the Federal Reserve, in consultation with the Treasury, agreed to extend funding to Bear Stearns through JPMorgan Chase & Company, to provide some time to resolve Bear Stearns' problems.³² JPMorgan Chase subsequently agreed to purchase Bear Stearns and assume its financial obligations; the acquisition was completed on June 26, 2008. However, JPMorgan Chase did not acquire all of

30. The Federal Home Loan Banks are government-sponsored enterprises that lending institutions use to obtain low-cost financing through "advances," which are loans backed by high-quality collateral. Ginnie Mae is a government-owned corporation that guarantees securities backed by federally insured loans—mainly loans insured by the Federal Housing Administration and the Department of Veterans Affairs.

31. The Treasury issues notes with maturities that range from 2 to 10 years and bonds with maturities of 30 years. (At the end of July 2007, the Federal Reserve also held more than \$277 billion in short-term Treasury bills.)

32. The Federal Reserve extended a loan of \$13 billion through the discount window to JPMorgan Chase on March 14, 2008. That loan was repaid three days later with almost \$4 million of interest.

the nearly \$400 billion in assets in Bear Stearns' portfolio. As part of the agreement, mortgage-related assets from Bear Stearns valued at approximately \$30 billion were segregated into a newly formed limited liability company (LLC) called Maiden Lane.³³ Maiden Lane's assets were financed by loans of nearly \$29 billion from the Federal Reserve Bank of New York and \$1 billion from JPMorgan Chase, with JPMorgan Chase liable for the first \$1 billion of any losses sustained by Maiden Lane. (The overall portfolio is managed and will be liquidated by BlackRock, an investment management firm retained by the Federal Reserve Bank of New York.)

That arrangement is a significant shift from the Federal Reserve's usual policy of extending loans that not only have recourse provisions—in the event of default, the central bank has recourse to the assets of borrowers beyond the collateral provided—but also protection through collateral requirements. Although the financing takes the form of a loan from the Federal Reserve Bank of New York to Maiden Lane, the Federal Reserve essentially has acquired the underlying assets—that is, it has taken on all of the risk of those assets (with the exception of the \$1 billion from JPMorgan Chase) and has control of the Maiden Lane facility.

Support to American International Group

AIG, a large and diversified financial institution, experienced serious financial problems in September 2008 stemming from one of its subsidiaries' involvement in the market for subprime residential mortgage loans. AIG suffered large losses on its investments in securities backed by subprime mortgages and on the credit default swaps—essentially insurance policies—it sold on such securities.³⁴ AIG faced a crisis as its lenders, worried about its capacity to meet its debts, refused to continue to provide financing. With slightly more than \$1 trillion in consolidated assets at the end of September 2008, AIG was an important firm with dealings around the world. Its collapse would have created problems for its counterparties and

for other financial institutions at a time when the financial markets had been badly shaken by the failure of Lehman Brothers a few days earlier.

The assistance that the Federal Reserve provided to AIG was channeled through four distinct facilities: a line of credit, the Securities Borrowing Facility, Maiden Lane II, and Maiden Lane III.

The line of credit to AIG is a facility that has been modified significantly since it was initiated on September 16, 2008. At that time, the Federal Reserve agreed to lend AIG up to \$85 billion to help it meet its obligations and sell some of its businesses with the least possible disruption to the overall economy. As part of the arrangement, the U.S. government received warrants (a warrant provides the option but not the obligation to purchase stock at a fixed price) for a 79.9 percent ownership stake in AIG and the right to veto the payment of dividends to common and preferred shareholders. On October 8, following the revelation of additional problems at AIG, the Federal Reserve announced the creation of the Securities Borrowing Facility, under which it would lend up to about \$38 billion against investment-grade debt securities held by AIG. ("Investment grade" is a rating that indicates that a municipal or corporate bond has a relatively low risk of default.)

In November 2008, the arrangement with AIG was again modified to provide additional federal support. The Treasury announced that it would purchase \$40 billion of newly issued AIG preferred shares under the TARP, which allowed the Federal Reserve to reduce the total amount available under the line of credit from \$85 billion to \$60 billion. The central bank also lengthened the maximum term of its loans under the line of credit to five years and lowered the interest rate on the outstanding balances as well as the fee charged on the unused portion of the credit line.³⁵

33. An LLC offers protection from personal liability for business debts, just as a corporation does. The profits and losses of the business pass through to its owners, as they would if the business were a partnership or sole proprietorship.

34. For a detailed explanation of AIG's financial problems, see William K. Sjostrom Jr., "The AIG Bailout," *Washington and Lee Law Review*, vol. 66 (November 1, 2009), available at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1346552.

35. As of November 5, 2008, AIG had approximately \$61 billion outstanding under the line of credit and \$19.9 billion in outstanding advances under the Securities Borrowing Facility. See Board of Governors of the Federal Reserve System, *Report Pursuant to Section 129 of the Emergency Economic Stabilization Act of 2008: Restructuring of the Government's Financial Support to the American International Group, Inc., on November 10, 2008*, available at www.federalreserve.gov/monetarypolicy/files/129aigrestructure.pdf.

In November as well, the Federal Reserve announced plans to restructure its lending related to AIG by extending credit to two newly formed limited liability companies:

- The first, Maiden Lane II LLC, received a loan of \$22.5 billion from the Federal Reserve and a subordinated loan—a loan that is repaid after the loan from the Federal Reserve—of \$1 billion from AIG, with which Maiden Lane purchased residential mortgage-backed securities from AIG. As a result of those actions, the Securities Borrowing Facility established on October 8 was subsequently repaid and terminated.
- The second new company, Maiden Lane III LLC, received a loan of \$30 billion from the Federal Reserve and a subordinated loan of \$5 billion from AIG. With those funds, it purchased certain securities as part of an arrangement to terminate related credit default swap contracts that AIG had written.

Under Maiden Lane II and Maiden Lane III, the Federal Reserve essentially acquired mortgage-backed securities at prices judged to represent fair values—that is, the prices that would be received by selling the assets in orderly transactions between market participants. Ultimately, the central bank will realize gains or losses on those securities, depending on the underlying loans' performance over time.

In June 2009, the Federal Reserve agreed to reduce the line of credit to AIG by \$25 billion in exchange for preferred shares in two of AIG's largest life insurance units outside of the United States: American International Assurance and American Life Insurance Company. That transaction was completed in December 2009.

The assistance to AIG from federal sources totaled approximately \$128 billion outstanding at the end of 2009. Of that amount, \$81 billion had been provided by the Federal Reserve, and \$47 billion had come from the TARP.

Contingent Loan to Citigroup

The financial condition of Citigroup, the largest commercial bank in the United States at the beginning of 2008, deteriorated near the end of that year, raising questions about the bank's solvency. On November 23, 2008,

the Treasury and the FDIC arranged a guarantee (against losses) on \$301 billion of Citigroup's assets, more than half of which were residential and commercial real estate loans. The guarantee on the bank's residential assets was to last for 10 years; the guarantee on its nonresidential assets was for 5 years. Under that arrangement, the first \$39.5 billion in losses would be absorbed by Citigroup. Additional losses (subject to loss sharing of 10 percent by Citigroup) would be absorbed first by the Treasury (up to \$5 billion), then by the FDIC (up to \$10 billion), and finally by the Federal Reserve (the remainder). In the event that losses exceeded the resources pledged by Citigroup, the Treasury, and the FDIC, the Federal Reserve would be obligated to issue a nonrecourse loan to Citigroup, backed by the remaining assets, with an interest rate tied to an overnight borrowing rate plus 3 percentage points. Effectively, if that contingency had arisen, the assets would have been sold to the central bank at their current values.

In December 2009, Citigroup terminated its agreement with the Treasury, the Federal Deposit Insurance Corporation, and the Federal Reserve and paid an exit fee of \$50 million to the central bank. The Federal Reserve experienced no losses on this guarantee because Citigroup never used the line of credit.

Contingent Loan to Bank of America

Bank of America experienced intense borrowing problems early in 2009, when it announced losses on its business operations in the fourth quarter of 2008. The Treasury and the FDIC agreed to guarantee \$118 billion of the bank's assets under terms similar to those extended to Citigroup. The guarantee on the bank's residential assets was to last 10 years; the guarantee on its nonresidential assets was for 5 years. Under the guarantee agreement, the first \$10 billion in losses would be absorbed by Bank of America. Additional losses (subject to loss sharing of 10 percent by the bank) would be absorbed by the Treasury (up to \$7.5 billion) and the FDIC (up to \$2.5 billion). If the backing to be provided by those two entities was exhausted, the Federal Reserve would be obligated to lend Bank of America up to a maximum of \$87.2 billion with the bank's remaining assets as collateral. Bank of America did not request activation of the guarantee and in September 2009 paid an exit fee of \$57 million to the Federal Reserve to terminate the arrangement.

CBO's Fair-Value Models

Some of the Federal Reserve's programs to provide credit to financial institutions during the financial crisis offered terms that were more favorable than the terms those borrowers could have obtained from private investors—thereby providing fair-value subsidies on that credit. To estimate such subsidies, the Congressional Budget Office (CBO) developed a stochastic simulation model for each major program. In general, under that approach, CBO projected probability distributions of future cash flows associated with each program and then discounted the cash flows to their present value using rates that reflected the risk associated with the particular flows.¹ The probability distribution of a program's cash flows depended on several factors: the program's rules and structure; the probability distributions of interest rates, default rates, and recovery rates on defaults; and how the demand for a program was affected by those variables.

CBO used such models to estimate the fair-value subsidies provided by the Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility (AMLF), the Commercial Paper Funding Facility (CPFF), and the Term Asset-Backed Securities Loan Facility (TALF). CBO also used a similar approach to evaluate the subsidies provided by the contingent loan programs that the Federal Reserve extended to Citigroup and Bank of America. (For additional information on the programs, see Appendix A.)

The Asset-Backed Commercial Paper Money Market Mutual Fund Liquidity Facility

CBO's estimate of the subsidies provided by the AMLF is based on a model of the probability distribution of future spreads, or differences, between the interest rates on three-month AA-rated asset-backed commercial paper and the primary credit rate and a rule for when and how much depositories will borrow to fund their commercial paper purchases. The model uses historical data on those spreads, which are a measure of stress in the market for commercial paper. In addition, the model accounts for the heightened level and volatility of commercial paper rates during a crisis.

In the model, new borrowing through the facility occurs when the spread rises above its long-run level by two or more standard deviations. At such a time, some money market funds may experience a surge in the demand for redemptions that could result in new borrowing under the facility. CBO assumed that new borrowing would equal, on average, 2 percent of outstanding balances in U.S. money market mutual funds. It also assumed that the new loans and their underlying collateral would have average maturities of 90 days and that once the loans matured, additional borrowing would not occur unless crisis conditions continued or reemerged.²

1. Each discount rate reflects a premium over the rate on a Treasury security that accounts for the "market risk" associated with the programs—the risk that losses will be largest when the economy is weak and the economic cost of the losses is greatest.

2. The maturity of the collateral (the commercial paper) for such borrowing may extend in some cases to 270 days, but because shorter loan terms are more common for commercial paper, CBO assumed that the average maturity backing the loans was 90 days. Assuming a longer (or shorter) maturity would increase (or decrease) the estimated subsidy.

CBO calculated the monthly value of the subsidies provided by the facility in two steps. First, it multiplied the facility's outstanding balances by 1 percent or the spread between the commercial paper and the primary credit rate, whichever was larger. It then discounted those monthly values back to September 2008, the date of the program's inception. The subsidies are based on averages calculated from more than 5,000 stochastic simulations.

The Commercial Paper Funding Facility

CBO's estimate of the subsidies provided through the CPFF, like its estimate for the AMLF, is based on a stochastic model of commercial paper spreads and a rule for when and how much commercial paper will be sold to this facility. CBO calibrated the model of commercial paper spreads by using historical data, taking into account the heightened level and volatility of rates during the crisis.

CBO assumed that new borrowing under the facility would occur only when rate spreads increased above their average precrisis level by two or more standard deviations. It also assumed that the amount of the facility's new borrowing would respond to interest rate conditions similarly to the way such borrowing responded in the early months of the program.

CBO calculated the monthly subsidy value by multiplying the facility's outstanding balances by the maximum of 1 percent or the difference between an interest rate on three-month AA-rated commercial paper (calculated as one-third of the rate on financial paper plus two-thirds of the rate on asset-backed paper) and the rate charged to borrowers under the facility by the Federal Reserve.³ It then discounted those monthly values back to October 2008, when the program was created. CBO's estimates are based on averages calculated over 5,000 simulations of the stochastic model.

3. The rate charged by the Federal Reserve depends on whether the commercial paper serving as collateral is backed by assets. The rate is set at a spread over the three-month overnight indexed swap rate, which is closely related to other overnight bank rates, such as the federal funds rate and the overnight Libor rate.

The Term Asset-Backed Securities Loan Facility

CBO's approach to estimating the economic subsidy created by the Federal Reserve's activities through the TALF is based on several factors:

- The type of securities that serve as collateral and the risk associated with them;
- The effect of protection against losses provided by the Troubled Asset Relief Program (TARP) and the Federal Reserve's "haircut" provisions, which restrict the amount of a loan to less than the value of the posted collateral;
- The prevailing market rates for loans backed by similar collateral; and
- The projected volume of future lending, which is based on CBO's 10-year (2011 to 2020) baseline budget projections for the program.

In estimating subsidies generated by the TALF's activities, CBO used market rates to calibrate a stochastic pricing model for each type of asset-backed security that was used as collateral for a loan; it then used the model to estimate the fair value of the TALF's cash flows to the Federal Reserve, taking into account the protection against losses that various features of the facility afforded. The amount of protection offered by the Treasury was uncertain. It was initially set at \$20 billion and was not explicitly raised when the Federal Reserve announced that it would consider expanding the size of the facility from \$200 billion to \$1 trillion. In calculating subsidies, CBO considered it likely that additional TARP protection would have been advanced had the volume of borrowing or the amounts of losses increased, and thus it assumed that the TARP would also cover 70 percent of any losses by the TALF in excess of the \$20 billion that was explicitly provided. CBO based its subsidy calculations on projections of the amount of TALF lending that would be outstanding over time—CBO assumed \$40 billion in new activity each month over the life of the facility.

Contingent Loans to Citigroup and Bank of America

The Federal Reserve offered Citigroup and Bank of America contingent loans that provided the banks with

the option of drawing funds at a future date at a preset interest rate, with the funds to be secured only by risky collateral. Those contracts gave the banks a valuable funding alternative but one that they would be likely to use only if the terms were more attractive than what was available in the open market. To the extent that the fair value of the option exceeded the value of the fees and the interest that the Federal Reserve could expect to receive, the option provided a fair-value subsidy to the banks.

CBO calculated the subsidy using a stochastic model of the Federal Reserve's expected cash flows under those

arrangements. The model used projected future interest payments, repayments of principal, losses from default, and the value of the collateral assets.⁴ CBO assumed, on the basis of the riskiness of the various classes of assets that could serve as collateral, that at the time the contingent loans were set up, the fair value of that collateral was significantly less than the amount that could be borrowed.

4. CBO modeled those cash flows using an expected net charge-off rate (loan losses minus recoveries, as a percentage of outstanding loans) each period that was consistent with its economic forecast.