

Function

Fostering Payment and Settlement System Safety and Efficiency

The Federal Reserve works to promote a safe, efficient, and accessible system for U.S. dollar transactions.

6

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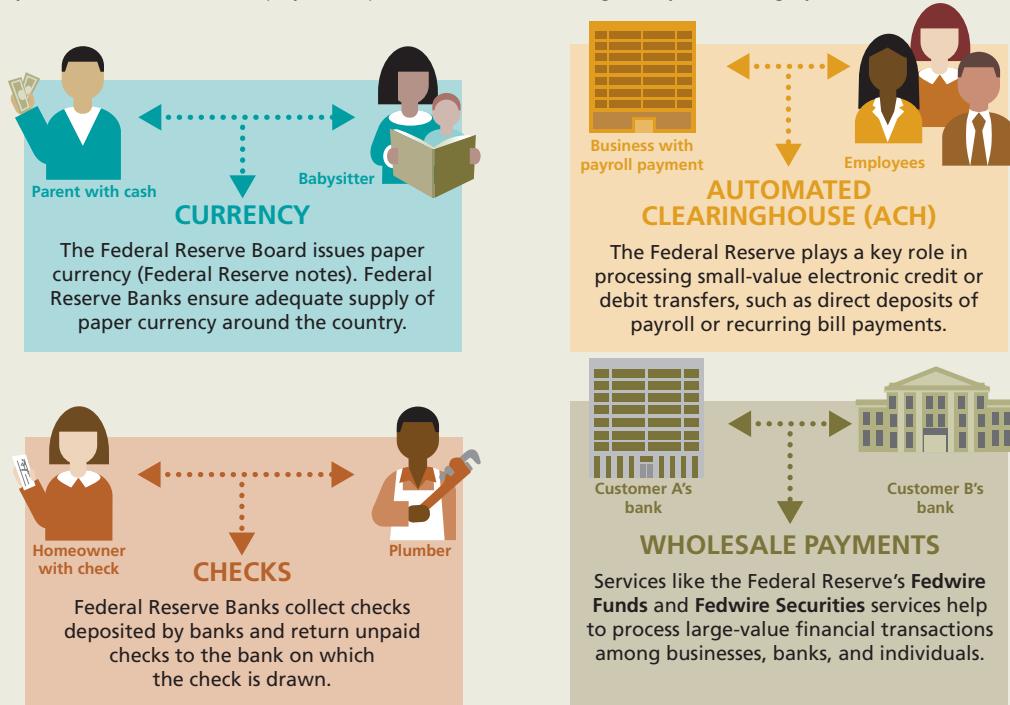
*A*n efficient, effective, and safe U.S. and global payment and settlement system is vital to the U.S. economy, and the Federal Reserve plays an important role in helping maintain that system's integrity.

The U.S. dollar payment and settlement system is composed of payment instruments and methods, systems, and institutions that have changed over time. The Federal Reserve provides currency and operates some elements of this system.

This system facilitates financial transactions and purchases of goods and services and the attendant movement of money at all levels of the U.S. economy—on behalf of individuals and institutions, buyers and sellers, consumers and businesses, investors and securities issuers—and supports interactions between the U.S. economy and others around the world. The importance of the payment system and a sound currency in our daily lives and interactions makes its safe and proper functioning essential to the health of the U.S. financial system and overall economy.

Figure 6.1. The Federal Reserve's role in everyday transactions

Whether you're paying your babysitter, shopping for groceries, or getting your paycheck, you're operating within the payment system. The Federal Reserve plays an important role in maintaining that system's integrity.



Overview of Key Federal Reserve Payment System Functions

The Federal Reserve performs several key functions to maintain the integrity of the payment system. These functions help keep cash, check, and electronic transactions moving reliably through the U.S. economy on behalf of consumers, businesses, and others participating in the economy. They include

- providing services to depository institutions and the U.S. federal government,
- regulating certain aspects of the payment system and supervising certain financial market utilities,
- providing intraday liquidity to payment system participants, and
- analyzing the system to help identify and implement improvements.

All these functions underpin U.S. financial markets and private-sector clearing, payment, and settlement arrangements; support the implementation of monetary policy; and contribute to the overall stability of the U.S. financial system and economy.

The Federal Reserve's Board of Governors in Washington, D.C., and the 12 Federal Reserve Banks located around the nation have distinct but complementary responsibilities with regard to the payment system.

In general, the Board is responsible for developing regulations and supervisory policies for elements of the payment system that fall within the Federal Reserve's jurisdiction. The Reserve Banks help supervise entities under the Federal Reserve's jurisdiction pursuant to these regulations and policies.

The Reserve Banks take the lead in providing accounts and payment services to depository institutions, the federal government, and certain

Major Events in the History of the Federal Reserve's Role in the U.S. Payment System

The Federal Reserve System was created by Congress to eliminate the severe financial crises that had periodically swept the nation by the early 1900s, particularly of the sort that occurred in 1907.

1907

Many banks and clearinghouses refuse to clear checks drawn on certain other banks, leading to the failure of otherwise solvent banks.

1913

Congress creates the Federal Reserve System, giving it the authority to establish a nationwide check-clearing system to eliminate system inefficiencies and inequities.

1918

The Reserve Banks establish Fedwire, the world's first wire transfer system.

1974

The Reserve Banks begin operating their automated clearinghouse service.

1980

The Monetary Control Act reaffirms the Federal Reserve's role in providing payment services.

2003

The Check Clearing for the 21st Century Act enables the transformation of the check-collection system from a paper-based to a virtually all-electronic system. The Board drafted this law, collaborating with various payment system stakeholders, and the Reserve Banks provided services to accelerate this transformation.

2010

The Dodd-Frank Wall Street Reform and Consumer Protection Act emphasizes the Federal Reserve's role in promoting financial stability and mitigating systemic risk in the financial system and expands its supervision of systemically important financial market utilities and payment, clearing, and settlement activities.

other entities (such as government-sponsored enterprises and international organizations), subject to oversight by the Board. The Reserve Banks also provide—subject to Board policies—intraday and overnight credit. Finally, both the Board and the Reserve Banks engage in payment system research and act as catalysts to improve the safety and efficiency of the payment system.

Providing Services to Banks and the Federal Government

The 12 Federal Reserve Banks and their various branches provide a range of payment and settlement services to the banking industry and the federal government. The Banks

- maintain accounts for depository institutions,
- transfer funds electronically,
- collect checks,
- distribute and receive currency and coin, and
- settle payments and eligible securities transactions by debiting and crediting the appropriate accounts at the Reserve Banks.

The Federal Reserve Banks also act as fiscal agents of the U.S. government and certain other entities. In other words, they act as the “government’s bank” and maintain the U.S. Treasury’s operating cash account; pay Treasury checks and process electronic payments; and issue, transfer, and redeem U.S. government securities.

The Federal Reserve has provided payment services to the banking industry since shortly after the Federal Reserve Banks were established in 1914. At the time, these services were for the most part (1) available only to banks that were members of the Federal Reserve System and (2) provided without explicit charge.

Monetary Control Act of 1980

Congress reaffirmed and expanded the Federal Reserve's role as a service provider with the enactment of the Monetary Control Act of 1980 (MCA), which gave all depository institutions access to the same pricing for the Federal Reserve's payment services and required the Federal Reserve to price specific types of services to recover fully the costs of providing these services over the long run.

The MCA also encourages competition between the Federal Reserve Banks and private-sector providers of payment services by requiring the Reserve Banks to recover not only their actual costs of providing priced services, but also the costs that would be incurred and profits that would be earned if a private firm had provided these services.

The Reserve Banks offer certain payment services in competition with the private sector. The Board has adopted clear policies to avoid conflicts of interest within Reserve Banks that could arise from providing priced payment services and carrying out monetary, supervisory, and lending responsibilities.

Federal Reserve Bank service fees

Under the Monetary Control Act and the Board's Principles for Pricing Federal Reserve Bank Services, the Board is required to set fees for Reserve Bank services to recover the actual and imputed costs of providing these services to the banking industry. The services include check clearing and collection, wire transfer of funds, automated clearinghouse, net settlement, securities services, and new services the Reserve Banks may offer. For the most up-to-date schedule of fees, go to www.frbservices.org/servicefees/index.html.

The U.S. Payment System Today and Reserve Bank Services

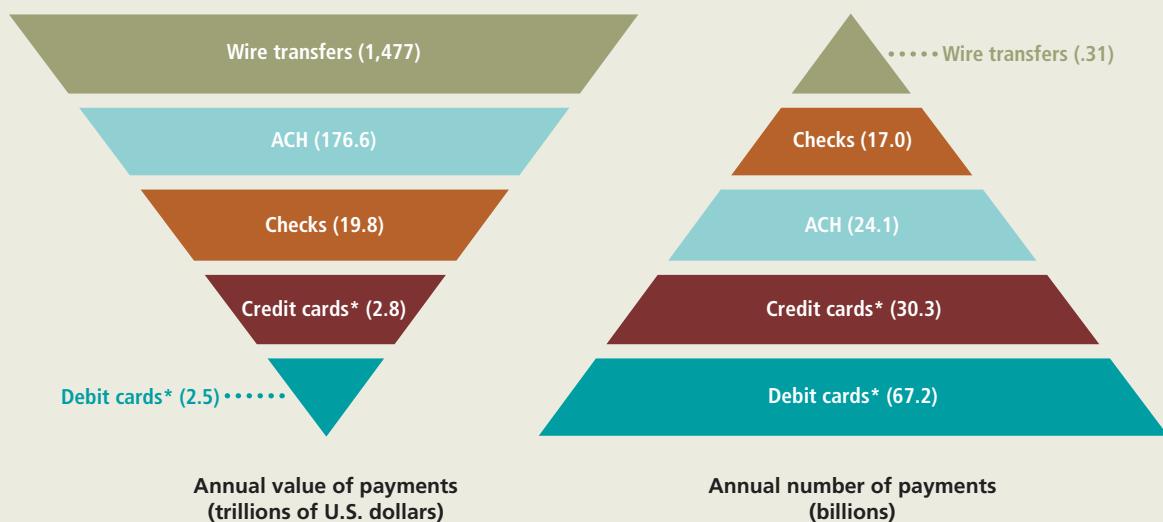
The U.S. payment system has evolved significantly since the Federal Reserve was established in 1913. At that time, cash and checks were the predominant means of payment. In 2013, 124 billion noncash transactions valued at \$1,446 trillion passed through the U.S. payment system. Measured by annual aggregate value, wire transfers, automated clearinghouse (ACH) payments, and checks were the leading payment methods in the United States. Measured by annual aggregate number, however, debit cards, credit cards, and ACH payments were the leading

payment methods (figure 6.2). Today's prominence of electronic payments reflects a long-term shift away from the use of checks, particularly in transactions between consumers and businesses.

The Federal Reserve's noncash payment and settlement services are typically categorized as retail or wholesale payment services. The check and ACH services are generally called retail payment services, and the Fedwire Funds and Securities Services and the National Settlement Service (NSS) are generally called wholesale services. These names reflect the lower typical value of the retail services. However, lower-value Fedwire transactions and higher-value check or ACH transactions are also used by individuals and businesses, respectively, to meet their payment needs.

In addition to providing noncash payment services, the Federal Reserve also ensures that the cash (currency and coin) in circulation is sufficient

Figure 6.2. Total noncash payments (Federal Reserve and private sector), 2014



Note: All figures include on-us transactions.

ACH Automated clearinghouse.

Source: Committee on Payments and Market Infrastructures (formerly the Committee on Payment and Settlement Systems) Redbook 2015 except those marked with an asterisk (*), which are projections based on the Redbook 2014. Both are available on the Bank for International Settlements website at www.bis.org/list/cpss/tid_57/index.htm.

to meet the public's demand and that depository institutions have ready access to Reserve Bank cash services.

Retail Payment Services

Guided by public and private cooperation, the U.S. payment system has evolved greatly to better serve all participants in the economy. Innovations and reforms have ushered in greater convenience in many ways, not least of which in the way individuals and institutions conduct transactions between and among themselves.

Check Service and Its Origins

Perhaps no aspect of the payment system illustrates its evolution better than the nation's check-clearing system. The Federal Reserve plays a key role in this system, serving as a major provider of paper and electronic services to depository institutions. In 2014, it collected nearly 6 billion checks, worth more than \$6 trillion.

In the early 1900s—before the creation of the Federal Reserve System—the nation's check system was paper-based and used primarily for transactions between banks (interbank transactions) and between businesses. The check-collection system at that time was quite inefficient; for example, banks commonly routed checks circuitously to avoid presentment fees, which banks receiving checks imposed on banks presenting checks for payment. Such routing resulted in extensive delays and inefficiencies in the check-collection system.

When the Federal Reserve Banks were established in 1914, Congress expected them to improve the efficiency of the check-collection system, which would benefit the depositors of checks by speeding up the process and eliminating the practice of paying checks at less than their full face value. This practice of not remitting payment for checks at face value was called "nonpar banking." In 1917, Congress amended the Federal Reserve Act to prohibit banks from charging the Reserve Banks presentment fees and to authorize nonmember banks as well as member banks to collect checks through the Federal Reserve System.

What is the automated clearinghouse (ACH)?

The ACH is a nationwide electronic network, developed jointly by the private sector and the Federal Reserve, for the exchange of electronic files of payment instructions among financial institutions, typically on behalf of customers. ACH transactions are payment instructions to either debit or credit an originator's deposit account at an originating depository institution. The ACH was developed in the early 1970s as a more efficient alternative to paper checks.

What are "clearing" and "settlement"?

Clearing is the transfer and confirmation of information between the payer's financial institution and payee's financial institution.

Settlement is the actual transfer of funds between the payer's financial institution and the payee's financial institution.

What is check truncation?

Check truncation is the practice of converting a paper check to electronic information, which is forwarded to the bank on which it was written.

Since then, the Federal Reserve has worked with the private sector to improve the efficiency and cost-effectiveness of the check-collection system. In its early years, the Federal Reserve took a number of steps to reduce nonpar banking. The prevalence of nonpar banking was substantially reduced by the 1920s but did not totally disappear in this country until 1980.

In the 1970s, check volume increased significantly, so the Federal Reserve established additional check-processing offices, called regional check-processing centers, in new locations throughout the country to improve further the efficiency of check clearing. In the 1980s, the Reserve Banks began to offer expanded return check services based on the new expeditious return rules adopted by the Board pursuant to the Expedited Funds Availability Act. In expanding their return check

Figure 6.3. What are all those numbers on your checks?

Public- and private-sector coordination and cooperation have led to dramatic improvements in the check-collection process, resulting in more efficient payment and settlement for individuals and institutions.



Bank routing number

The Federal Reserve and the banking industry developed the bank routing number system to facilitate the sorting, bundling, and shipment of paper checks. The routing number identifies the bank on which a check is drawn.

Account number

Individual account numbers are assigned to each account.

MICR

In the 1950s, the magnetic ink character (MICR) system for encoding pertinent data on checks was developed so that the data could be read electronically. The MICR system contributed significantly to the automation of check processing. In the 1960s, the Federal Reserve Banks began to require MICR-encoding of all checks deposited with them.

services, the Reserve Banks played a major role in speeding the return of unpaid checks to banks of first deposit—banks in which checks are initially deposited for collection.

Electronic Check Processing

The Federal Reserve served as a catalyst for the transition of the U.S. economy to today's electronic check-processing arrangements (including check truncation). As a general matter, the faster and more resilient electronic check-clearing and check-return methods have markedly improved the efficiency of the nation's payment system while at the same time proving less costly and less error prone.

In the 1990s, the Reserve Banks began offering electronic check presentation services to banks. By the early 2000s, about 20 to 25 percent of the checks the Reserve Banks handled were delivered electronically to paying banks through these services. Overall, most banks continued to simply demand that original checks be presented for payment. As a result, the nation's check-clearing system remained dependent on paper and vulnerable to disruptions in transportation networks.

In 2003, Congress passed the Check Clearing for the 21st Century Act (Check 21 Act), which facilitated electronic check processing by creating a new type of paper document, called a substitute check, which is the legal equivalent of the original check. The Check 21 Act enables banks to remove original paper checks from the check-collection system (called check truncation) and send digital images of checks electronically to banks with which they have agreements to do so, and send substitute checks to banks with which they do not. By creating widespread opportunities for the truncation of checks and associated cost savings, the act has resulted in the nation's interbank check-collection processes becoming almost entirely electronic.

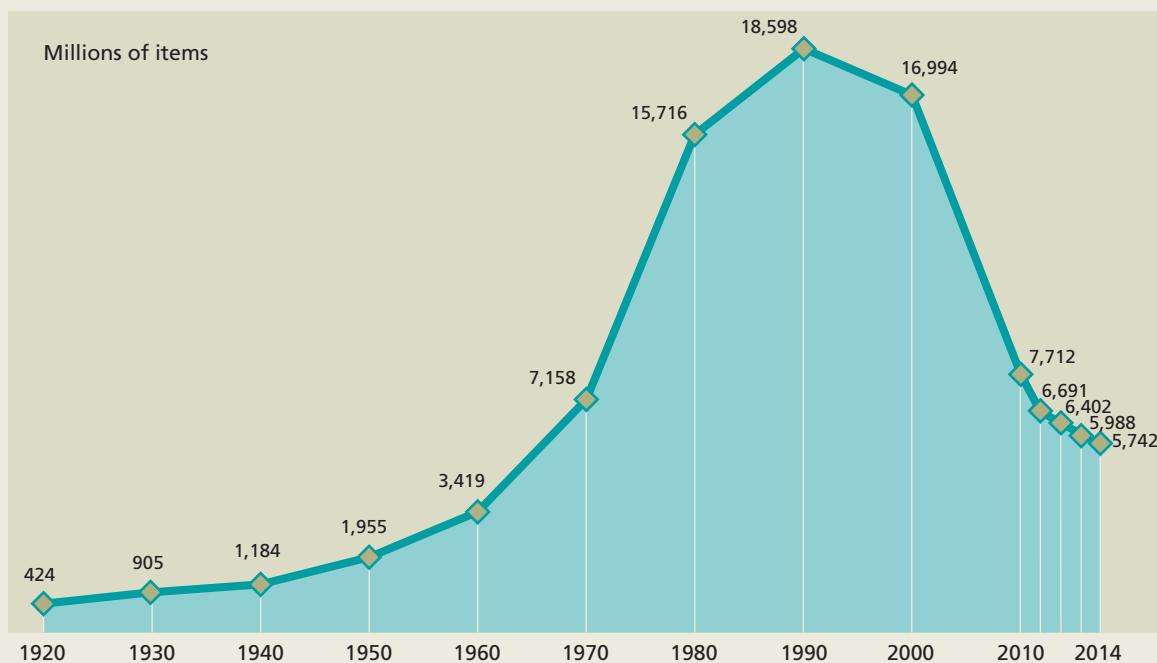
The banking system and the Federal Reserve itself have been able to almost completely eliminate the costly, dedicated air and ground transportation networks that were once used to deliver checks around the country on a daily basis. Further, banks' transition to electronic check

processing has enabled them to offer their customers new products and improved service.

Check volume in the United States peaked in the mid-1990s, when about 50 billion checks were written annually. Since that time, check volume has declined significantly as electronic forms of payment, such as debit cards, credit cards, and ACH payments, have become increasingly popular. In response to the growth in electronic check processing and the reduced number of checks being written, the Reserve Banks substantially reduced their costs and physical infrastructure associated with processing checks. The number of Reserve Bank offices processing paper checks declined from 45 in 2003 to just 1 beginning in 2010.

Figure 6.4. Checks collected by the Federal Reserve, selected years, 1920–2014

The number of checks written has been declining as individuals and institutions rely increasingly on electronic means to execute transactions.



For more information about the number and value of checks collected, visit the Payment Systems section of the Federal Reserve Board's website, www.federalreserve.gov.

Automated Clearinghouse Service

The ACH is a nationwide electronic payment system, developed jointly by the private sector and the Federal Reserve in the early 1970s as a more efficient alternative to checks. At that time, it seemed that the increasing volume of paper checks used by businesses and consumers would eventually exceed the ability of the existing equipment to process and sort the checks efficiently.

How ACH Works

The ACH has grown into a major nationwide electronic payment mechanism that processes files of electronic funds transfers (payments). In general, ACH transactions are either credit or debit transfers. In an ACH credit transfer, an individual, corporation, or other entity (originator) “pushes” or sends funds from its account to that of the receiver. In a debit transfer, the receiver authorizes an originator to “pull” funds from the receiver’s account.

The Reserve Banks and the Electronic Payments Network, a private organization, are currently the two national ACH operators. As an ACH operator, the Reserve Banks receive files of payments from originating institutions, edit and sort the payments, deliver the payments to receiving institutions, and settle the payments by crediting and debiting the institutions’ accounts. Unlike Fedwire transfers, which are processed and settled immediately, ACH transactions are value-dated—that is, the originator of the ACH transaction includes the settlement date in the payment instructions when they originate the transaction.

In the past, the United States had several regional ACH systems, but over time, the industry consolidated to the current structure of two national ACH systems. In 2014, the Federal Reserve processed more than 11.6 billion commercial ACH payments, worth approximately \$19.9 trillion, and more than 1.5 billion government ACH payments, worth approximately \$4.9 trillion.

The ACH was originally designed to help automate recurring payments, such as government benefit payments, payroll payments, and consumer

mortgage and utility payments. Much of the recent growth in ACH payments has resulted from one-time transactions such as consumer payments initiated over the Internet or telephone.

The Federal Reserve's Role in ACH Development

The Reserve Banks became an ACH operator in large part because of the Reserve Banks' role as fiscal agents of the U.S. Treasury and because of the synergies between the ACH and the Federal Reserve's then-existing check service. The U.S. Treasury, earlier than most businesses, embraced the use of the ACH as a potentially more efficient way to make many of the government's payments, particularly payrolls for military and civilian workers and benefit payments such as Social Security. (Until the mid-1980s, most ACH volume was originated by the federal government.) The combination of commercial and government ACH payments created economies of scale earlier than might otherwise have been the case, allowing the ACH to become a broadly used national service.

Initially, the ACH system relied on magnetic tapes and paper listings to exchange ACH files. Their use required physical transport of tapes between the participants in the ACH system, which made use of the then-existing Reserve Bank national check-transportation infrastructure (e.g., planes and trucks). In the mid-1990s, the Federal Reserve mandated that all institutions' ACH payment files be deposited electronically and all output files be delivered electronically. That is, all institutions dealing with the Federal Reserve directly were required to have an electronic connection to participate in the ACH.

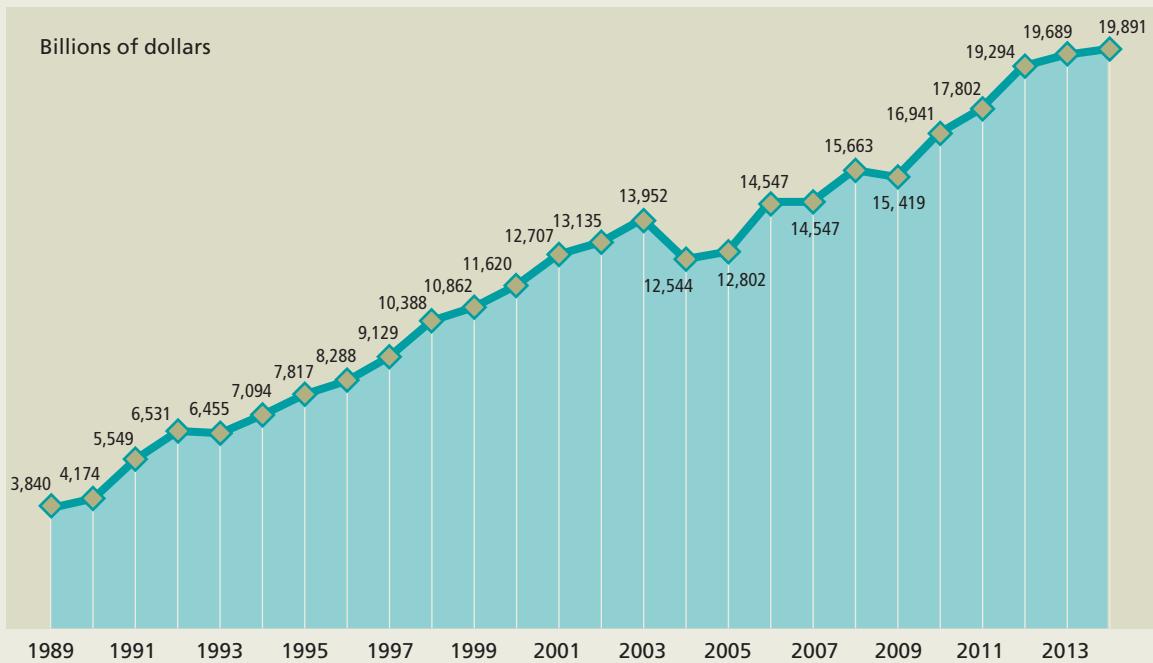
Figure 6.5. Examples of automated clearinghouse transfers

Automated clearinghouse (ACH) transfers can be categorized as either "credit transfers" or "debit transfers" based on the type of instruction sent by the originator of the transfer.

Credit transfer	Debit transfer
<ul style="list-style-type: none">• Payroll direct deposits• Government benefit payments, such as Social Security benefits• Corporate payments to contractors and vendors	<ul style="list-style-type: none">• Direct debits of recurring consumer bills, such as mortgages, utility payments, and insurance premiums• Checks converted by merchants to ACH debits• One-time payments authorized over the Internet or telephone

Figure 6.6. Commercial automated clearinghouse transactions processed by the Federal Reserve, 1989–2014

In less than 25 years, the value of commercial automated clearinghouse transactions processed by the Federal Reserve has more than quadrupled.



Source: Commercial automated clearinghouse transactions processed by the Federal Reserve—annual data (available in the Payment Systems section of the Federal Reserve Board's website, www.federalreserve.gov).

To provide a more cost-effective mechanism for cross-border payments, the Reserve Banks launched their first commercial international ACH service with Canada in 2001. The Reserve Banks have since established “FedGlobal” international ACH services to Europe and Latin America.

Wholesale Payment Services

Wholesale payments, such as those related to large commercial loans and transactions involving real estate, securities, and money markets, tend to be small in number and large in value, and typically support domestic and international commercial and financial activities. The

Reserve Banks operate services designed to support these complex, high-value transactions.

Fedwire Funds Service

The Fedwire Funds Service is a real-time gross settlement (RTGS) system through which participants are able to initiate electronic funds transfers that are processed individually in real time as the funds transfer instructions are received by the Reserve Banks. Once processed, Fedwire Funds transfers are final and irrevocable.

Established in 1918, Fedwire Funds was the world's first RTGS system. It initially used Morse code to communicate payment instructions via telegraph lines. Today, Fedwire Funds relies on secure, sophisticated proprietary data communications and data processing systems to ensure that each transfer is authorized by the sender and not altered while under the control of a Reserve Bank.

Participants—including depository institutions and other eligible financial institutions—use the Fedwire Funds Service to handle large-value, time-critical payments, such as settling interbank purchases and sales of federal funds; purchasing, selling, or financing securities transactions; and disbursing or repaying large loans. Participants also use the Fedwire Funds Service to make smaller-value funds transfers requiring immediate settlement, to make business-to-business remittance payments, and to complete the U.S. dollar leg of international transactions. Fedwire Funds transfers are settled individually by transferring balances held at Reserve Banks from the sending bank's account to the receiving bank's account.

As financial markets have become more global in scope, the operating hours of the Fedwire Funds Service have expanded to increase the amount of overlap with the hours of foreign markets. Fedwire Funds now opens at 9:00 p.m. eastern time (ET) on the night before a business day and closes at 6:30 p.m. ET on the business day. For example, processing on a Monday begins at 9:00 p.m. ET on Sunday and ends

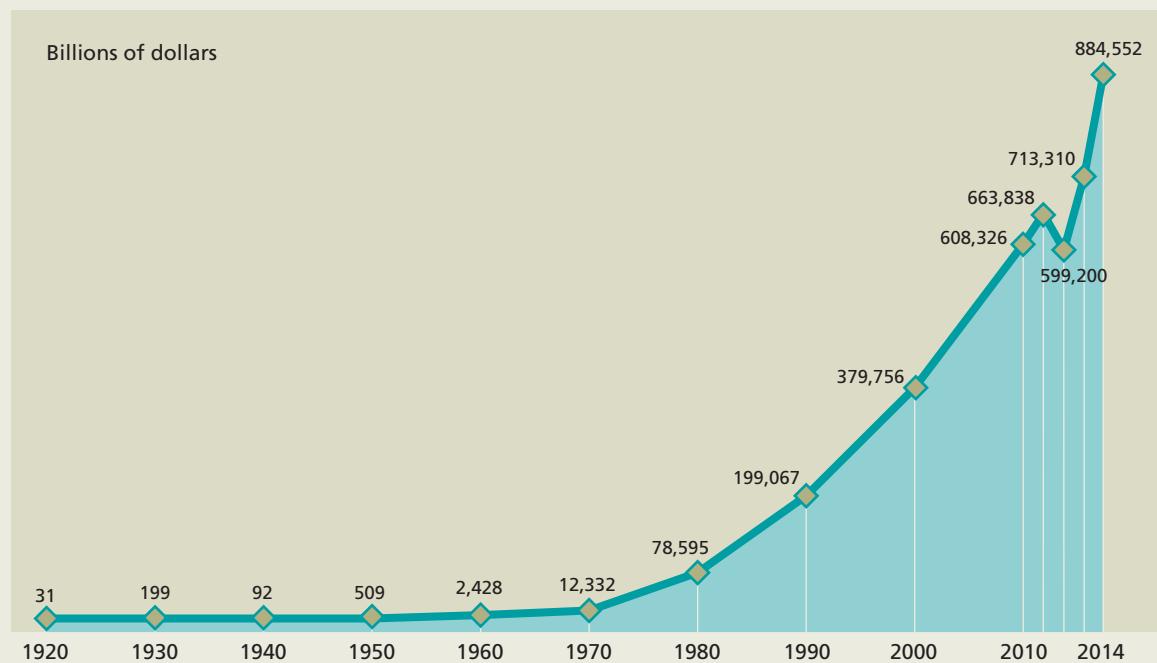
at 6:30 p.m. ET on Monday. In 2014, participants used the service to make 135 million transfers worth more than \$884 trillion.

Fedwire Securities Service

The Fedwire Securities Service is used by depository institutions and others with a Reserve Bank account to hold, maintain, and transfer securities issued by the U.S. Treasury and other federal agencies, government-sponsored enterprises, and certain international organizations, such as the World Bank. Participants use the Fedwire Securities Service to issue and redeem securities, to transfer securities to settle secondary market trades, to move collateral used to secure obligations, and to facilitate repurchase agreement (repo) transactions. Securities are kept in the form of electronic records held in custody accounts.

Figure 6.7. Electronic payments processed by Fedwire Funds, selected years, 1920–2014

Fedwire Funds is used by depository institutions and other financial institutions to make large-value, time-critical payments.



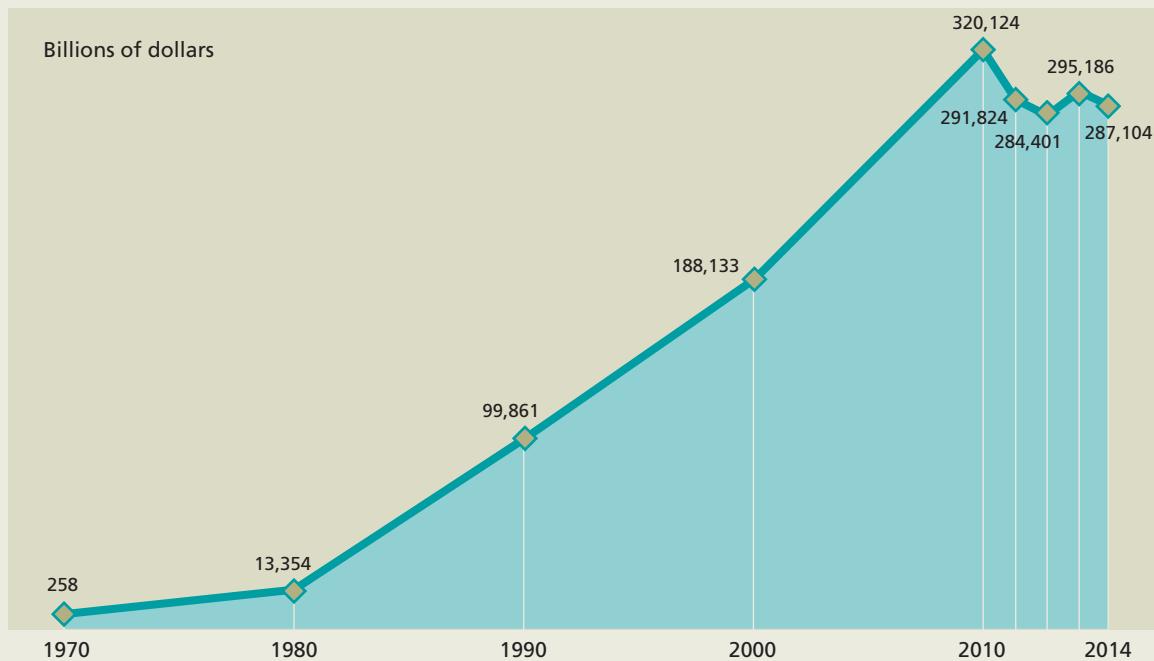
For more information about the number and value of transactions processed through the Federal Reserve's Fedwire Funds Service, visit the Payment Systems section of the Federal Reserve Board's website, www.federalreserve.gov.

Until the late 1960s, U.S. government securities were only available in paper form. As securities volumes grew, banks experienced paperwork backlogs and errors. To improve market efficiency and reduce risk, between 1965 and 1967, the Treasury began issuing securities in electronic form and the Federal Reserve implemented computer systems to record, service, and transfer them.

The Fedwire Securities Service operates Monday to Friday from 8:30 a.m. to 3:30 p.m. ET, though participants can reposition securities held in their accounts until 7:00 p.m. ET. In 2014, participants used the service to initiate more than 17 million securities transfers, worth more than \$287 trillion.

Figure 6.8. Securities transfers processed by Fedwire Securities Service, selected years, 1970–2014

Financial institutions and other parties use this service to hold, maintain, and transfer securities issued by the U.S. Treasury and other federal agencies, government-sponsored enterprises, and certain international organizations, such as the World Bank.



For more information about the number and value of transactions processed through the Federal Reserve's Fedwire Securities Service, visit the Payment Systems section of the Federal Reserve Board's website, www.federalreserve.gov.

National Settlement Service

The Federal Reserve's National Settlement Service (NSS) is used by participants in multilateral clearing arrangements to settle transactions on a multilateral basis through designated master accounts held at the Federal Reserve Banks. Approximately 17 NSS arrangements are currently in use by financial market utilities, check clearinghouse associations, and other entities.

Using an automated mechanism, an agent for a multilateral clearing arrangement submits a settlement file to a Reserve Bank. The settlement file contains a list of the debit or credit positions of the settling depository institutions in the arrangement that are to be settled.

The Reserve Bank first processes each debit individually, crediting those funds to a settlement account on its books. Once the debits have been processed, the Reserve Bank transfers funds from the settlement account to the accounts of the participants with credit positions. NSS reduces settlement risk for clearing arrangements because the funds transferred are final and irrevocable when the debits and credits are posted.

NSS is open Monday through Friday from 7:30 a.m. to 5:30 p.m. ET. In 2014, the Federal Reserve processed about 10,000 net settlement service files, worth more than \$17 trillion.

Cash Services

The Federal Reserve Board issues the nation's currency in the form of Federal Reserve notes to the Federal Reserve Banks, which, in turn, distribute currency to the public through approximately 8,500 banks, savings and loans, and credit unions. (The remaining depository institutions obtain cash services from correspondent banks rather than directly from a Reserve Bank.) Federal Reserve notes in circulation are liabilities of the Federal Reserve Banks and are collateralized by the assets of the Reserve Banks.

In contrast, coin in circulation is not a liability of the Federal Reserve Banks. The Treasury's United States Mint is the issuing authority for coin. The Reserve Banks buy coin at face value from the Mint and, in turn, sell it to depository institutions at face value. Coin held by the Reserve Banks is a non-interest-earning asset of the Banks.

Establishing and Maintaining a Reliable U.S. Currency

Although the issuance of paper money in this country dates back to 1690, the U.S. government did not issue paper currency until 1861, when Congress approved the issuance of demand Treasury notes.

Figure 6.9. Design of Federal Reserve notes aims to prevent counterfeiting

The Federal Reserve Board, the Treasury's Bureau of Engraving and Printing, and the U.S. Secret Service primarily redesign U.S. currency to stay ahead of counterfeiting threats and keep counterfeiting levels low.



Security thread.

Hold the note to light to see an embedded thread running vertically to the left of the portrait. The thread is imprinted with the letters USA and the numeral 100 in an alternating pattern and is visible from both sides of the note. The thread glows pink when illuminated by ultraviolet light.

3-D security ribbon.

Tilt the note back and forth while focusing on the blue ribbon. You will see the bells change to 100s as they move. When you tilt the note back and forth, the bells and 100s move side to side. If you tilt it side to side, they move up and down. The ribbon is woven into the paper, not printed on it.

Watermark.

Hold the note to light and look for a faint image of Benjamin Franklin in the blank space to the right of the portrait. The image is visible from both sides of the note.

Color-shifting ink.

Tilt the note to see the numeral 100 in the lower right corner of the front of the note shift from copper to green.

For more information on the security and design of Federal Reserve notes, go to <https://uscurrency.gov>.

All currency issued by the U.S. government since then remains legal tender. Today, virtually all currency in circulation is in the form of Federal Reserve notes, which were first issued in 1914.

As the issuing authority for Federal Reserve notes, the Board has a wide range of responsibilities related to paper money, from ensuring an adequate supply of currency to protecting and maintaining confidence in the currency. To protect the integrity of Federal Reserve notes, the Board works with the Reserve Banks, the Treasury Department, the Treasury's Bureau of Engraving and Printing (BEP), and the United States Secret Service to monitor counterfeiting threats for each denomination and to redesign notes to counter these threats.

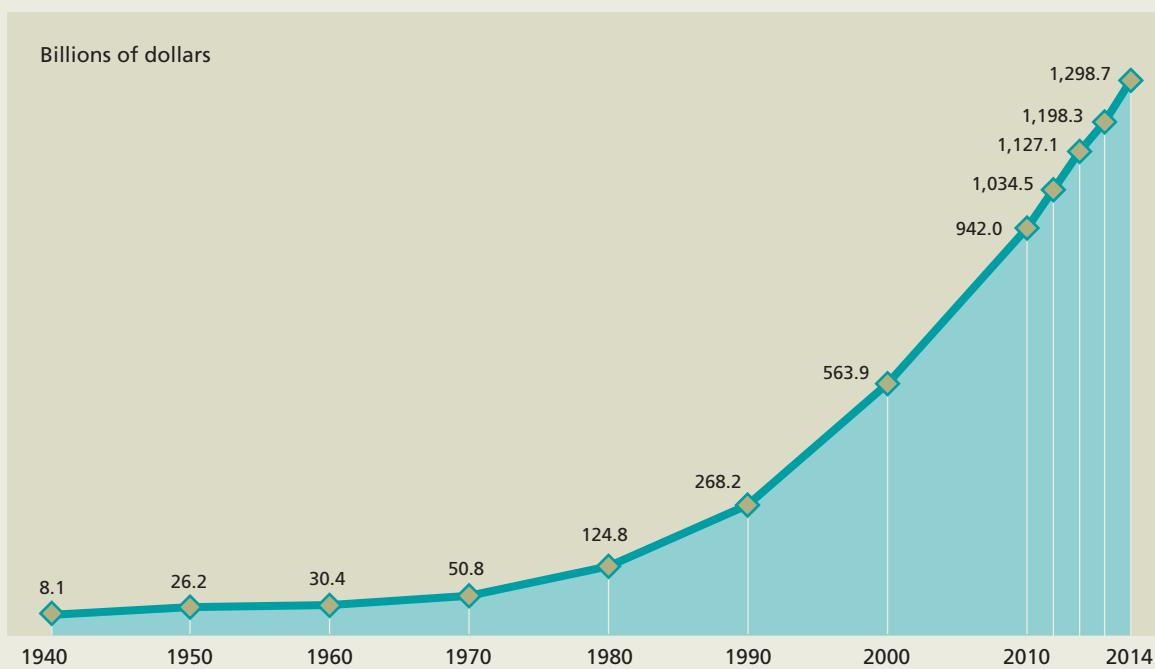
New designs of Federal Reserve notes are periodically introduced to make notes more difficult to counterfeit but still easy to authenticate as genuine. The Board manages a program to educate the public on the security and design features in Federal Reserve notes to help protect and maintain confidence in U.S. currency.

The Reserve Banks also help maintain confidence in our nation's currency by ensuring the quality and integrity of Federal Reserve notes in circulation. The Reserve Banks accept and process deposits of currency from depository institutions and credit their accounts at the Federal Reserve. Using high-speed sorting equipment, the Reserve Banks "piece-count" the deposits and remove worn and soiled currency and suspected counterfeits. The fit currency that remains is packaged and returned to the vault, to be used along with new currency to fill future orders from depository institutions. Notes that are unfit for circulation are destroyed. Suspected counterfeit notes are delivered to the United States Secret Service for analysis and final adjudication.

Each year, the Board determines the number of new Federal Reserve notes that are expected to be needed and submits a print order to the BEP. The order reflects the Board's estimate of the additional amount of currency that the public will demand in the upcoming year and destruction rates of unfit currency. The Board pays the BEP the cost of manu-

Figure 6.10. Value of U.S. currency in circulation, selected years, 1940–2014*

The Federal Reserve measures demand for U.S. currency, and the Reserve Banks ensure that depository institutions around the country have ready access to cash.



* Data include Federal Reserve notes and currency no longer issued but exclude coin and denominations larger than the \$100 note. For more information about the value and volume of currency in circulation and the volume, value, and cost of the new currency print order, visit the Payment Systems section of the Federal Reserve Board's website, www.federalreserve.gov.

factoring new currency and arranges and pays the cost of transporting the currency from the BEP's facilities to Reserve Bank cash offices.

Demand for currency comes from both domestic and international sources. Domestic demand for currency is largely based on the use of currency for transactions and is influenced primarily by income levels, prices of goods and services, the availability of alternative payment methods, and the opportunity cost of holding currency rather than an interest-bearing asset. In contrast, foreign demand for U.S. currency is influenced primarily by the political and economic uncertainties associated with certain foreign currencies. As of 2014, there were nearly \$1.3 trillion worth of Federal Reserve notes in circulation, and the Board

estimates that between one-half and two-thirds of the value of U.S. currency is held outside the United States.

Coin

The Reserve Banks' role in coin operations is more limited than their role in currency operations. Although the Reserve Banks store some coin in their own vaults, they also contract with armored carriers that operate coin terminals to store, process, and distribute coin on behalf of the Reserve Banks.

As the issuing authority for coins, the U.S. Mint determines annual coin production. The Reserve Banks order coin from the Mint and pay the Mint the full face value of the coin, rather than the cost to produce it. The Mint transports the coin to the Reserve Banks and the Reserve Banks' coin terminal locations.

Fiscal Agency Services: Acting as the U.S. Government Bank

The Federal Reserve Banks provide a range of services to the U.S. government, acting as the government's fiscal agent. These services include financial, account management, and securities services, as well as application development and technology infrastructure support.

Early History of Fiscal Agency and Depository Services

The provision of fiscal agency and depository services began in 1915 when the Treasury began transferring U.S. government funds on deposit at national banks to its account at Reserve Banks. This action established Reserve Banks as the key intermediaries through which funds are collected and disbursed for the federal government.

In 1917, the Federal Reserve performed the first public debt functions, when Reserve Banks were authorized to receive subscriptions on the First Liberty Loan—bonds issued to help finance the United States' World War I effort. After World War I, the government's need

to borrow compelled the Treasury to seek an operational alternative to its limited network of subtreasuries—field offices that functioned as the government’s bank in various regions of the country. The Federal Reserve subsumed these public debt-related activities, and the last subtreasury closed in 1921.

Reserve Bank fiscal agency services continued to grow in response to expanding government funding requirements. For example, the financing efforts associated with World War II increased the scope of Reserve Bank fiscal agency functions to include the sale and redemption of Series E savings bonds beginning in 1941. While initially known as Defense Bonds and War Savings Bonds, Series E bond issuance continued until 1980, with millions of Americans purchasing these bonds.

In the 1960s and 1970s, the Reserve Banks’ role as fiscal agents expanded to include services—primarily securities-related services—to other federal agencies, government-sponsored enterprises, and international organizations, either at the Treasury’s request or through a separate congressional mandate. As noted earlier, the federal government in the 1970s became an early user of ACH services to expedite the processing of government payments, and the ACH now plays a central role in the government’s payments and collections.

Reserve Banks currently provide fiscal agency services to a significant number of federal entities. Expenses associated with providing these services account for approximately 15 percent of the Federal Reserve’s total operating costs. The Treasury and other agencies reimburse the Reserve Banks for the cost of providing fiscal agency services.

Tax Collections, Payments, and Account Management

The Federal Reserve Banks accept deposits of federal taxes and fees, pay checks drawn on the Treasury’s account at the Federal Reserve, and make and receive electronic payments on behalf of the Treasury and government agencies. The Reserve Banks also process U.S. postal money orders and conduct other activities on behalf of certain government agencies.

Collection of taxes was once a paper-based, labor-intensive process, but over time, the Reserve Banks and commercial banks worked with the Treasury to provide secure and convenient ways to process tax collections electronically. In addition, the Reserve Banks operate Pay.gov, a Treasury program that allows the public to use the Internet to authorize and initiate payments to federal agencies.

Disbursements from the Treasury's account at the Federal Reserve are processed primarily through ACH payments or Fedwire Funds transfers or, to a limited extent, by check. The increased use of electronic payments provides the Treasury opportunities to minimize the costs and inefficiencies associated with the delivery of check payments and ultimately to reduce costs to U.S. taxpayers.

The Reserve Banks maintain the Treasury's operating account, provide accounting and reporting services, monitor collateral pledged to the government, and facilitate the investment of excess balances, as directed by the Treasury.

Treasury Security Auctions and Related Services

As fiscal agents, the Reserve Banks auction marketable Treasury securities and reissue and redeem savings bonds. In addition, the Reserve Banks provide securities-related services to federal agencies, government-sponsored enterprises, and certain international organizations under separate statutory authority.

Historically, Reserve Banks employed large staffs to process manually paper-based Treasury bills, notes, bonds, and savings bonds until the advent of marketable book-entry securities in the late 1960s.

Book-entry securities—which are electronic records rather than paper certificates—were created primarily to gain efficiencies in the secondary market for Treasury securities. Beginning in 1986, individual investors could also buy and hold marketable book-entry securities in the Treasury Direct system.

Over the years, the Reserve Banks have adapted their operations in support of the Treasury's securities programs and worked with the Treasury to respond to the declining volumes of paper-based products. The Reserve Banks also work with the banking industry to make use of the electronic check-collection mechanism to collect and process savings bonds submitted for redemption.

Using Technology to Modernize Federal Government Financial Services

In recent years, technological developments—many involving the use of Internet technologies—have provided new opportunities for the Reserve Banks to support the Treasury in modernizing federal government financial services, such as collections and payment processes, governmentwide financial reporting, and debt collection.

The Reserve Banks also actively support the Treasury's efforts to increase electronic payments transactions and reduce paper-based transactions, and to reengineer the government's accounting, reporting, and reconciliation processes. The Reserve Banks have also developed tools to help the Treasury and government agencies verify the accuracy of federal payments before they are made and to assist in the collection of delinquent debt.

Services to Foreign Central Banks and International Organizations

As the central bank of the United States, the Federal Reserve also provides correspondent banking services to foreign central banks and monetary authorities.

The Federal Reserve Bank of New York (FRBNY) provides several types of services to these organizations, including maintaining noninterest-bearing deposit accounts (in U.S. dollars), securities safekeeping accounts, and gold safekeeping. Some foreign official institutions direct a portion of their daily receipts and payments in U.S. dollars through their funds accounts at the Federal Reserve.

If an account contains excess funds, the foreign official institution may request that these funds be invested overnight in repurchase agreements (repos) with the FRBNY. If investments are needed for longer periods, the foreign official institution may provide instructions to the FRBNY to buy securities to be held in safekeeping. Conversely, the foreign institution may provide instructions to sell securities held in safekeeping, with the proceeds deposited in its account.

The FRBNY also provides securities-issuing and paying-agent services to international organizations such as the International Monetary Fund and the World Bank.

Regulating and Supervising the Payment System

For many decades, the Board's authority to regulate the payment system was limited to regulating payments handled by the Reserve Banks. The Board used this authority to regulate check payments collected or returned through the Reserve Banks and to regulate Fedwire Funds transfers.

Beginning in the 1970s, Congress directed the Board to implement several consumer protection statutes governing payments, including the Fair Credit Billing Act of 1974, the Electronic Fund Transfer Act of 1978, and the Expedited Funds Availability Act of 1987 (EFAA). The Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act) transferred the Board's rulemaking authority with respect to most consumer protection laws to the Consumer Financial Protection Bureau (CFPB), but the Board shares rulemaking authority with the CFPB with respect to the funds availability and disclosure requirements of the EFAA.

During the last two decades, Congress has directed the Board to prescribe regulations implementing a variety of other payments-related statutes. For example, the Board and the Treasury jointly promulgated regulations implementing the Unlawful Internet Gambling Enforcement Act of 2006, which requires designated payment system participants to establish policies and procedures to identify and block, or otherwise prevent or prohibit, unlawful Internet gambling transactions.

In 2010, the Dodd-Frank Act provided the Board additional authority to regulate and supervise certain payment, clearing, and settlement systems and activities that have been designated as systemically important, as well as prescribe rules related to debit card interchange fees. In 2011, the Board adopted rules implementing the Dodd-Frank Act's "Durbin amendment," which limits debit card interchange fees of

Figure 6.11. Federal Reserve regulations governing the payment system

The Federal Reserve has adopted the following set of regulations, which implement certain federal laws governing the U.S. payment system and the operations of participating institutions.

Regulation (by letter and name)	Description
J Collection of Checks and Other Items by Federal Reserve Banks and Funds Transfers Through Fedwire	Governs the collection and return of checks through the Reserve Banks and Fedwire funds transfers
CC Availability of Funds and Collection of Checks	Governs the availability of funds deposited in transaction accounts and the collection and return of checks
EE Netting Eligibility for Financial Institutions	Defines financial institutions to be covered by statutory provisions that validate netting contracts, thereby permitting one institution to pay or receive the net, rather than the gross, amount due, even if the other institution is insolvent
GG Prohibition on Funding of Unlawful Internet Gambling	Requires U.S. financial firms that participate in designated payment systems to establish and implement policies and procedures reasonably designed to prevent payments connected to unlawful Internet gambling
HH Designated Financial Market Utilities	Establishes standards and procedures related to the supervision of certain financial market utilities designated as systemically important
II Debit Card Interchange Fees and Routing	Establishes standards for debit card interchange fees and prohibits payment card network exclusivity arrangements and routing restrictions for debit card transactions

Note: For a list of regulations governing banks and banking, holding companies and nonbank financial companies, and securities credit transactions, see [section 5](#), "Supervising and Regulating Financial Institutions and Activities," on page 72. For a list of consumer and community affairs-related regulations, see [section 7](#), "Promoting Consumer Protection and Community Development," on page 152.

certain issuers and prohibits network exclusivity arrangements and routing restrictions. In 2012, pursuant to the Dodd-Frank Act, the Board adopted rules setting forth risk-management standards for certain financial market utilities (FMUs) and requirements regarding advanced notice to the Board from certain FMUs of material changes to their rules, procedures, or operations.

Expedited Funds Availability Act

The EFAA broadened the Federal Reserve Board's authority to regulate interbank payments, including payments not handled by the Reserve Banks.

The Board initially used this expanded authority to adopt rules to speed the return of unpaid checks. These rules reduced the risk that banks in which checks had first been deposited would have to make the funds from check deposits available for withdrawal (under EFAA's timing requirements) before learning whether the checks had been returned unpaid. In the 1990s, the Board used this authority to adopt its same-day settlement rule, which improved competition between correspondent banks and the Reserve Banks in the collection of checks, spurring further efficiencies.

Electronic Check Processing

To help facilitate the electronic collection and return of checks, in 2001, the Board proposed to Congress what would come to be known as the Check Clearing for the 21st Century Act. The Check 21 Act was enacted by Congress in 2003 and became effective in 2004. The Board adopted regulations implementing the act in 2004. To improve the efficiency of the check-collection process, the Check 21 Act enabled collecting banks to truncate all paper original checks, to send checks electronically to banks with which they have electronic exchange agreements, and to send paper substitute checks to banks with which they do not have such agreements. These changes materially hastened the electronic processing of checks.

Financial Market Utilities

The Federal Reserve regulates and supervises certain financial market utilities. FMUs are multilateral systems that provide the infrastructure for transferring, clearing, and settling payments, securities, and other financial transactions among financial institutions or between financial institutions and the system. These systems include payment systems, securities settlement systems, central securities depositories, and central counterparties.

FMUs play a critical role in the U.S. and global financial system. FMUs often give rise to risks and interdependencies among financial institutions both within and across national borders, creating the potential for widespread financial disruptions if an FMU fails to perform as expected. The Federal Reserve, with its mandate for financial stability, is particularly interested in the smooth functioning of these FMUs and their robust supervision.

The Federal Reserve regulates and supervises certain FMUs under several authorities. The Dodd-Frank Act sets forth an enhanced supervisory framework for FMUs that have been designated as systemically important by the Financial Stability Oversight Council. Among other things, the Dodd-Frank Act authorizes the Board to supervise certain designated FMUs and participate in the examinations of other designated FMUs. The Board also has other authority with respect to certain payment and settlement systems, such as authority to oversee Reserve Bank operations pursuant to the Federal Reserve Act.

The Board may also have an interest in the safety and efficiency of systems outside the United States that provide services to financial institutions supervised by the Board or that conduct activity that involves the U.S. dollar. In these cases, the Board will seek to cooperate with relevant authorities to share information, understand the risks that these systems pose to the U.S. financial system, and promote sound risk management.

Regulation HH sets the Board's risk-management standards for designated FMUs for which the Board is the supervisory agency pursuant to the Dodd-Frank Act. The Federal Reserve Policy on Payment System Risk (PSR policy) (www.federalreserve.gov/paymentsystems/psr_about.htm) sets forth the Board's views and related standards regarding risk management in payment, clearing, settlement, and recording systems more generally, including in payment and settlement systems operated by the Federal Reserve Banks.

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Providing Vital Banking System Liquidity

For many years prior to the 2007–09 financial crisis, depository institutions in the aggregate typically held few funds overnight in their accounts at Federal Reserve Banks relative to the trillions of dollars of payments processed daily by the System. To ensure the U.S. payment system's smooth functioning, the 12 Federal Reserve Banks extend intraday credit, or "daylight overdrafts."

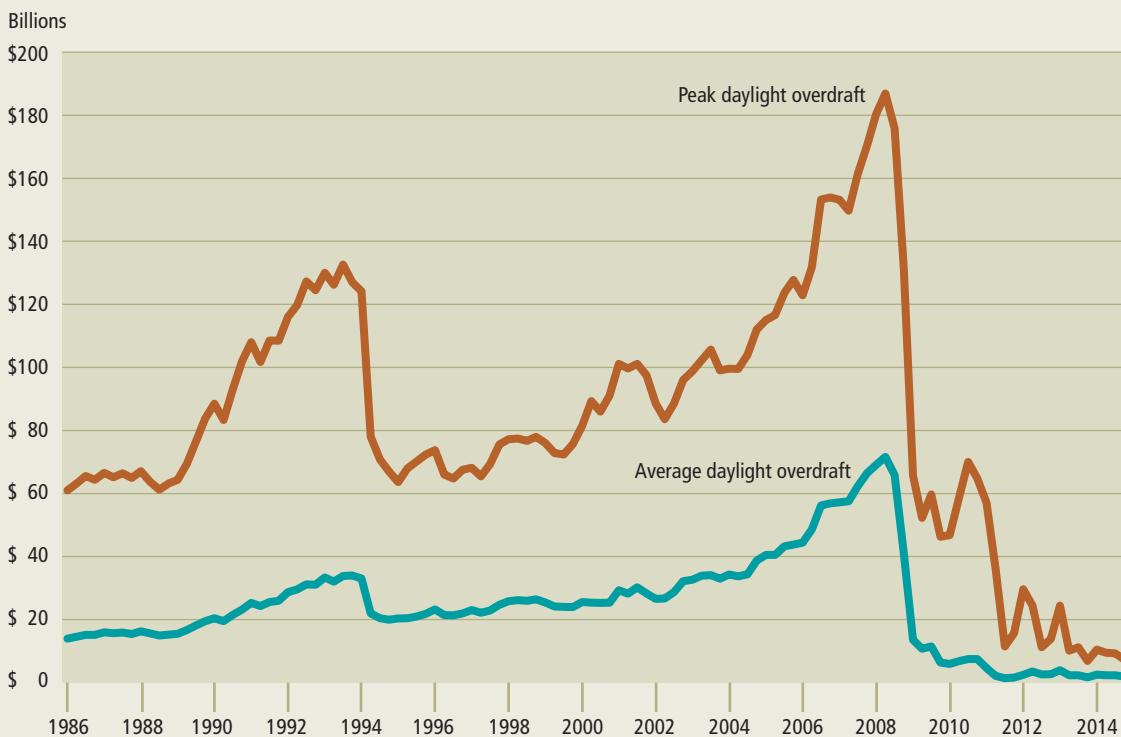
Institutions incur daylight overdrafts in their Federal Reserve accounts because of the mismatch in timing between the settlement of payments owed and the settlement of payments due. To address the risk of providing such credit, the PSR policy—adopted by the Federal Reserve Board in 1985 and adjusted since then—controls institutions' use of daylight overdrafts. The PSR policy balances the goals of ensuring smooth functioning of the payment system with the need to manage the direct risk to the Federal Reserve of offering institutions intraday credit.

The PSR policy establishes various measures to control the risks associated with daylight overdrafts. Beginning in 1985, the PSR policy set a maximum limit, or net debit cap, on depository institutions' daylight overdraft positions. Institutions must have regular access to the Federal

Reserve's discount window so that they can borrow overnight from their Reserve Bank to cover any daylight overdrafts that are not eliminated before the end of the day. Beginning in 1994, the Reserve Banks began charging fees to depository institutions for their use of daylight overdrafts as an economic incentive to reduce their overdrafts, thereby reducing direct Federal Reserve credit risk and contributing to economic efficiency. In 2011, the Board revised the PSR policy to recognize explicitly the role of the central bank in providing intraday balances and credit to healthy depository institutions and to provide collateralized intraday credit at a zero fee.

Figure 6.12. Peak and average daylight overdrafts of depository institutions, 1986–2014

The Federal Reserve measures the account balance of each depository institution at the end of each minute during the business day. An institution's peak daylight overdraft for a given day is its largest negative end-of-minute balance.



Note: Quarterly averages of daily data. The Federal Reserve measures each depository institution's account balance at the end of each minute during the business day. An institution's peak daylight overdraft for a given day is its largest negative end-of-minute balance. The System peak daylight overdraft for a given day is determined by adding the negative account balances of all depository institutions at the end of each minute and then selecting the largest negative end-of-minute balance. The average daylight overdraft for a given day is the sum of the average per-minute daylight overdrafts for all institutions on that day. Further data regarding peak and average daylight overdrafts can be found in the Payment Systems section of the Federal Reserve Board's website, www.federalreserve.gov.

Managing the Federal Reserve's direct credit risk from institutions' use of Federal Reserve intraday credit can prove crucial because there have been periods during which Reserve Bank exposure to daylight overdrafts has been significant and highly concentrated in a few institutions. For example, after the collapse of Lehman Brothers in September 2008, daylight overdraft activity rose to its highest level since the Federal Reserve began measuring it in the 1980s. Since 2008, higher overnight balances held at the Reserve Banks have been associated with lower levels of daylight overdrafts.

Despite the decline in overall levels of daylight overdrafts, this important tool continues to play a key role in many institutions' efforts to efficiently settle daily payments.

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Exploring and Implementing Payment System Improvements

Conducting Research and Analysis

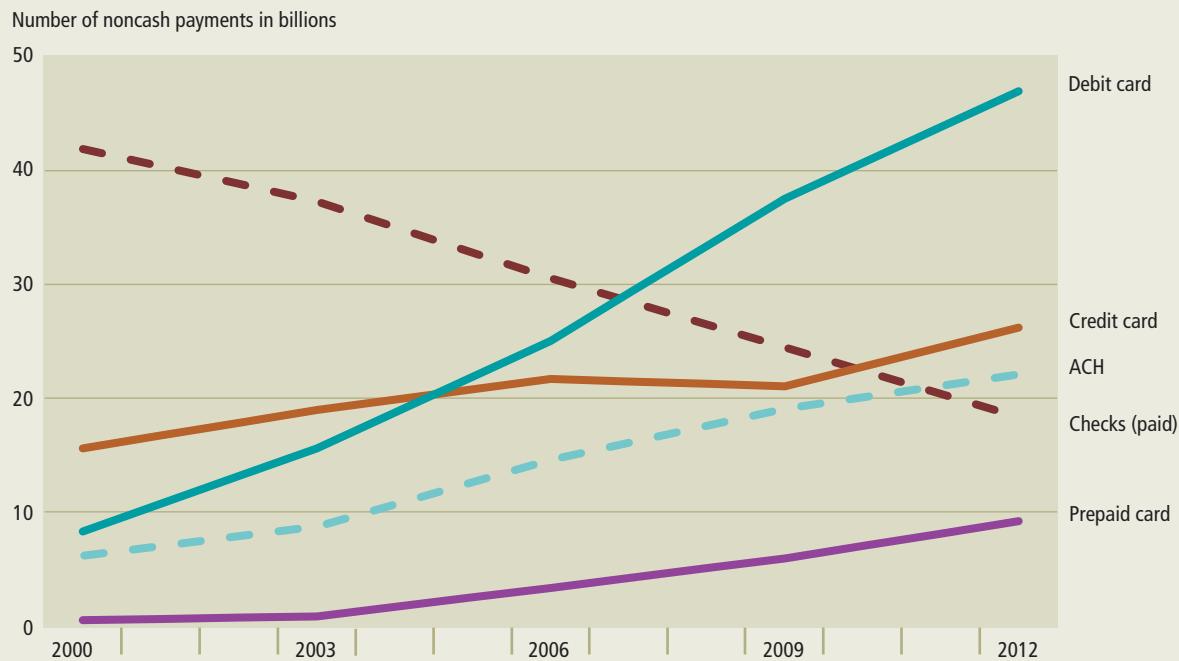
The Federal Reserve conducts research on a wide range of topics related to the design and activities of payment, clearing, and settlement (PCS) systems and financial market infrastructures, as well as the role of these systems in the commercial activities of consumers, businesses, and governments.

Both theoretical and empirical research and analysis of policy issues inform policymakers, the industry, and the public. Research topics include

- design of financial market infrastructure and risk management for complex financial instruments, including derivatives;
- analysis of technological change and market structure in payment and settlement activity;

Figure 6.13. As popularity of electronic payments grows, use of checks declines

The Federal Reserve monitors trends in the payment system, such as the increasing use of electronic forms of payment. Since 2000, the use of debit cards has experienced the most growth, while the use of checks has steadily declined.



Note: Years in between studies are estimated linearly.

ACH Automated clearinghouse.

Source: The 2013 Federal Reserve Payments Study (available on the Federal Reserve Board's website, www.federalreserve.gov).

- collection and analysis of data on the use of payment instruments and on the drivers of payment behavior; and
- the effect of Federal Reserve policies on market participants, such as the implications of daylight overdraft policy and the effect of payment regulations.

To inform its supervision of financial market infrastructures, the Federal Reserve analyzes financial and technological trends in payments and other financial instruments. Analysis often focuses on economic efficiency and risk, including systemic risk and the impact of financial institutions engaged in PCS activities on financial markets' stability. Some examples of recent research topics include the role of central counter-

parties in clearing over-the-counter financial transactions and developments and risks in the market for triparty repurchase agreements.

Serving as a Catalyst for System Improvements

As the central bank, the Federal Reserve can act as a catalyst to improve the safety and efficiency of PCS systems, working in cooperation with the private sector and other public-sector institutions, both domestically and internationally.

For example, to help facilitate the electronic collection and return of checks, the Federal Reserve worked collaboratively with representatives of depository institutions, businesses, consumer groups, and the Treasury to develop the draft legislation that became the Check 21 Act. In addition, the Federal Reserve provided leadership, working with other central banks and market regulators to develop and, more recently, to enhance risk-management standards for systemically important financial market infrastructures.

The Federal Reserve has also used its role as a leader and catalyst in facilitating collaboration among industry stakeholders to identify, develop, and implement improvements in the end-to-end speed, safety, and efficiency of U.S. payments. Building on extensive stakeholder outreach and market research, the Board and the Reserve Banks released the “Strategies for Improving the U.S. Payment System” paper in January 2015 (go to www.federalreserve.gov and click on Payment Systems). The paper communicates desired outcomes for the U.S. payment system and outlines the strategies and tactics the Federal Reserve will pursue, in collaboration with stakeholders, to help the country achieve these outcomes. As described in the paper, the Federal Reserve established a task force to identify effective approaches for implementing safe, ubiquitous, and faster payment capabilities, and a task force to advise the Federal Reserve on reducing payment fraud and advancing the safety, security, and resiliency of the payment system.

The Federal Reserve's research efforts may also act as a catalyst for change. For example, the Federal Reserve's payments surveys help inform the strategic plans of payment system participants by providing data and insights regarding payment trends.