

pay for the operations of the U.S. government. Accordingly, the Secret Service diligently monitors the integrity of U.S. currency, promptly investigating any reports of counterfeit dollars.

The efforts of the Secret Service attest to the fact that money isn't like ordinary goods and services; it plays a unique role in the economy; it is the essential channel

that links the various parts of the modern economy. In this chapter, we'll look at the role money plays, then look at how a modern monetary system works and at the institutions that sustain and regulate it. This topic is important in itself, and it's also essential background for the understanding of *monetary policy*, which we will examine in the next chapter.

WHAT YOU WILL LEARN IN THIS CHAPTER:

- ▶ The various roles **money** plays and the many forms it takes in the economy
- ▶ How the actions of private banks and the Federal Reserve determine the **money supply**
- ▶ How the Federal Reserve uses **open-market operations** to change the **monetary base**

The Meaning of Money

In everyday conversation, people often use the word *money* to mean “wealth.” If you ask, “How much money does Bill Gates have?” the answer will be something like, “Oh, \$40 billion or so, but who’s counting?” That is, the number will include the value of the stocks, bonds, real estate, and other assets he owns.

But the economist’s definition of money doesn’t include all forms of wealth. The dollar bills in your wallet are money; other forms of wealth—such as cars, houses, and stock certificates—aren’t money. What, according to economists, distinguishes money from other forms of wealth?

What Is Money?

Money is defined in terms of what it does: **money** is any asset that can easily be used to purchase goods and services. An asset is **liquid** if it can easily be converted into cash without much loss of value. Money consists of cash itself, which is liquid by definition, as well as other assets that are highly liquid.

You can see the distinction between money and other assets by asking yourself how you pay for groceries. The person at the cash register will accept dollar bills in return for milk and frozen pizza—but he or she won’t accept stock certificates or a collection of vintage baseball cards. If you want to convert stock certificates or vintage baseball cards into groceries, you have to sell them—trade them for money—and then use the money to buy groceries.

Of course, many stores allow you to write a check on your bank account in payment for goods (or to pay with a debit card that is linked to your bank account). Does that make your bank account money, even if you haven’t converted it into cash? Yes. **Currency in circulation**—actual cash in the hands of the public—is considered money. So are **checkable bank deposits**—bank accounts on which people can write checks.

Are currency and checkable bank deposits the only assets that are considered money? It depends. As we’ll see later, there are two widely used definitions of the **money supply**, the total value of financial assets in the economy that are considered money. The narrower definition considers only the most liquid assets to be money: currency in circulation, traveler’s checks, and checkable bank deposits. The broader definition includes these three categories plus other assets that are “almost” checkable, such as savings account deposits that can be transferred into a checking account with a phone call. Both definitions of the money supply, however, make a distinction between those assets that can easily be used to purchase goods and services, and those that can’t.

Money is any asset that can easily be used to purchase goods and services.

An asset is **liquid** if it can be quickly converted into cash without much loss of value.

Currency in circulation is cash held by the public.

Checkable bank deposits are bank accounts on which people can write checks.

The **money supply** is the total value of financial assets in the economy that are considered money.

Money plays a crucial role in generating *gains from trade*, because it makes indirect exchange possible. Think of what happens when a cardiac surgeon buys a new refrigerator. The surgeon has valuable services to offer—namely, heart operations. The owner of the store has valuable goods to offer: refrigerators and other appliances. It would be extremely difficult for both parties if, instead of using money, they had to directly barter the goods and services they sell. In a barter system, a cardiac surgeon and an appliance store owner could trade only if the store owner happened to want a heart operation *and* the surgeon happened to want a new refrigerator. This is known as the problem of finding a “double coincidence of wants”: in a barter system, two parties can trade only when each wants what the other has to offer. Money solves this problem: individuals can trade what they have to offer for money and trade money for what they want.

Because the ability to make transactions with money rather than relying on bartering makes it easier to achieve gains from trade, the existence of money increases welfare, even though money does not directly produce anything. As Adam Smith put it, money “may very properly be compared to a highway, which, while it circulates and carries to market all the grass and corn of the country, produces itself not a single pile of either.”

Let’s take a closer look at the roles money plays in the economy.

Roles of Money

Money plays three main roles in any modern economy: it is a *medium of exchange*, a *store of value*, and a *unit of account*.

Medium of Exchange Our cardiac surgeon/refrigerator example illustrates the role of money as a **medium of exchange**—an asset that individuals use to trade for goods and services rather than for consumption. People can’t eat dollar bills; rather, they use dollar bills to trade for edible goods and their accompanying services.

In normal times, the official money of a given country—the dollar in the United States, the peso in Mexico, and so on—is also the medium of exchange in virtually all transactions in that country. During troubled economic times, however, other goods or assets often play that role instead. For example, during economic turmoil people often turn to other countries’ moneys as the medium of exchange: U.S. dollars have played this role in troubled Latin American countries, as have euros in troubled Eastern European countries. In a famous example, cigarettes functioned as the medium of exchange in World War II prisoner-of-war camps. Even nonsmokers traded goods and services for cigarettes, because the cigarettes could in turn be easily traded for other items. During the extreme German inflation of 1923, goods such as eggs and lumps of coal became, briefly, mediums of exchange.

Store of Value In order to act as a medium of exchange, money must also be a **store of value**—a means of holding purchasing power over time. To see why this is necessary, imagine trying to operate an economy in which ice-cream cones were the medium of exchange. Such an economy would quickly suffer from, well, monetary meltdown: your medium of exchange would often turn into a sticky puddle before you could use it to buy something else. Of course, money is by no means the only store of value. Any asset that holds its purchasing power over time is a store of value. So the store-of-value role is a necessary but not distinctive feature of money.

Unit of Account Finally, money normally serves as the **unit of account**—the commonly accepted measure individuals use to set prices and make economic calculations. To understand the importance of this role, consider a historical fact: during the Middle Ages, peasants typically were required to provide landowners with goods and labor rather than money. A peasant might, for example, be required to work on the lord’s land one day a week and also hand over one-fifth of his harvest. Today, rents, like other prices, are almost always specified in money terms. That makes things much clearer: imagine how hard it would be to decide which apartment to rent if modern landlords followed medieval practice. Suppose, for example, that Mr. Smith says he’ll let you have a place if you

A **medium of exchange** is an asset that individuals acquire for the purpose of trading goods and services rather than for their own consumption.

A **store of value** is a means of holding purchasing power over time.

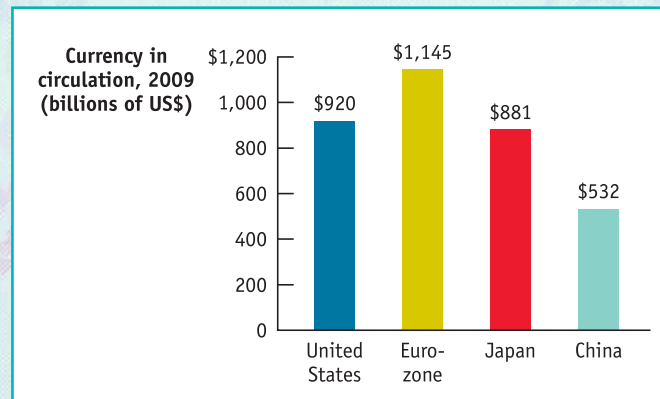
A **unit of account** is a measure used to set prices and make economic calculations.

Commodity money is a good used as a medium of exchange that has intrinsic value in other uses.



THE BIG MONEYS

Americans tend to think of the dollar as the world's leading currency—and it does remain the currency most likely to be accepted in payment around the globe. But there are other important currencies, too. One simple measure of a currency's importance is the value of the quantity of that currency in circulation. This figure shows the value, in billions of dollars, of the quantity of four major currencies in circulation at the end of 2009. The value of euros in circulation was greater than the value of dollars in circulation, despite the fact that the U.S. economy and the combined economies of the nations using the euro, the eurozone, are roughly of equal size. Japan's economy is much smaller, but the Japanese rely much more heavily on cash to make transactions than do Europeans and Americans, who rely more heavily on credit cards. So the value of yen in circulation was a close third. And the yuan is rapidly closing in on the rest, thanks to the rising demand for cash in China's rapidly growing economy.



Sources: Federal Reserve Bank of St. Louis; European Central Bank; Bank of Japan; The People's Bank of China.

clean his house twice a week and bring him a pound of steak every day, whereas Ms. Jones wants you to clean her house just once a week but wants four pounds of chicken every day. Who's offering the better deal? It's hard to say. If, on the other hand, Smith wants \$600 a month and Jones wants \$700, the comparison is easy. In other words, without a commonly accepted measure, the terms of a transaction are harder to determine, making it more difficult to make transactions and achieve gains from trade.

Types of Money

In some form or another, money has been in use for thousands of years. For most of that period, people used **commodity money**: the medium of exchange was a good, normally gold or silver, that had intrinsic value in other uses. These alternative uses gave commodity money value independent of its role as a medium of exchange. For example, cigarettes, which served as money in World War II POW camps, were also valuable because many prisoners smoked. Gold was valuable because it was used for jewelry and ornamentation, aside from the fact that it was minted into coins.

By 1776, the year in which the United States declared independence and Adam Smith published *The Wealth of Nations*, there was widespread use of paper money in addition to gold or silver coins. Unlike modern dollar bills, however, this paper money consisted of notes issued by private banks, which promised to exchange their

notes for gold or silver coins on demand. So the paper currency that initially replaced commodity money was **commodity-backed money**, a medium of exchange with no intrinsic value whose ultimate value was guaranteed by a promise that it could always be converted into valuable goods on demand.

The big advantage of commodity-backed money over simple commodity money, like gold and silver coins, was that it tied up fewer valuable resources. Although a note-issuing bank still had to keep some gold and silver on hand, it had to keep only enough to satisfy demands for redemption of its notes. And it could rely on the fact that on a normal day only a fraction of its paper notes would be redeemed. So the bank needed to keep only a portion of the total value of its notes in circulation in the form of gold and silver in its vaults. It could lend out the remaining gold and silver to those who wished to use it. This allowed society to use the remaining gold and silver for other purposes, all with no loss in the ability to achieve gains from trade.

In a famous passage in *The Wealth of Nations*, Adam Smith described paper money as a “waggon-way through the air.” Smith was making an analogy between money and an imaginary highway that did not absorb valuable land beneath it. An actual highway provides a useful service but at a cost: land that could be used to grow crops is instead paved over. If the highway could be built through the air, it wouldn’t destroy useful land. As Smith understood, when banks replaced gold and silver money with paper notes, they accomplished a similar feat: they reduced the amount of real resources used by society to provide the functions of money.

At this point you may ask, why make any use at all of gold and silver in the monetary system, even to back paper money? In fact, today’s monetary system goes even further than the system Smith admired, having eliminated any role for gold and silver. A U.S. dollar bill isn’t commodity money, and it isn’t even commodity-backed. Rather, its value arises entirely from the fact that it is generally accepted as a means of payment, a role that is ultimately decreed by the U.S. government. Money whose value derives entirely from its official status as a means of exchange is known as **fiat money** because it exists by government *fiat*, a historical term for a policy declared by a ruler.

Fiat money has two major advantages over commodity-backed money. First, it is even more of a “waggon-way through the air”—it doesn’t tie up any real resources, except for the paper it’s printed on. Second, the money supply can be managed based on the needs of the economy, instead of being determined by the amount of gold and silver prospectors happen to discover.

On the other hand, fiat money poses some risks. In this chapter’s opening story, we described one such risk—counterfeiting. (Counterfeiters usurp a privilege of the U.S. government, which has the sole legal right to print dollar bills. And the benefit that counterfeiters get by exchanging fake bills for real goods and services comes at the expense of the U.S. federal government, which covers a small but nontrivial part of its own expenses by issuing new currency to meet growing demand for money.)

The larger risk is that governments that can create money whenever they feel like it will be tempted to abuse the privilege.

Measuring the Money Supply

The Federal Reserve (an institution we’ll talk about shortly) calculates the size of two **monetary aggregates**, overall measures of the money supply, which differ in how strictly money is defined. The two aggregates are known, rather cryptically, as M1 and M2. (There used to be a third aggregate named—you guessed it—M3, but in 2006 the Federal Reserve concluded that measuring it was no longer useful.) M1, the narrowest definition,

Commodity-backed money is a medium of exchange with no intrinsic value whose ultimate value is guaranteed by a promise that it can be converted into valuable goods.

Fiat money is a medium of exchange whose value derives entirely from its official status as a means of payment.

A **monetary aggregate** is an overall measure of the money supply.

PITFALLS

WHAT’S NOT IN THE MONEY SUPPLY

Are financial assets like stocks and bonds part of the money supply? No, not under any definition, because they’re not liquid enough.

M1 consists, roughly speaking, of assets you can use to buy groceries: currency, traveler’s checks, and checkable deposits (which work as long as your grocery store accepts either checks or debit cards). M2 is broader, because it includes things like savings accounts that can easily and quickly be converted into M1. Normally, for example, you can switch funds between your savings and checking accounts with a click of a mouse or a call to an automated phone service.

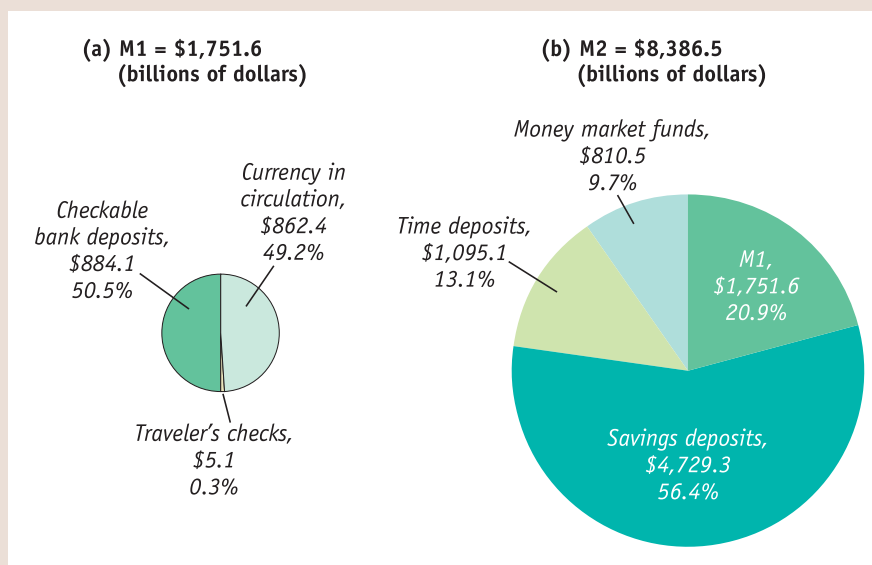
By contrast, converting a stock or a bond into cash requires selling the stock or bond—something that usually takes some time and also involves paying a broker’s fee. That makes these assets much less liquid than bank deposits. So stocks and bonds, unlike bank deposits, aren’t considered money.

FIGURE 16-1

Monetary Aggregates, November 2009

The Federal Reserve uses two definitions of the money supply, M1 and M2. As panel (a) shows, about half of M1 consists of currency in circulation, with checkable bank deposits making up almost all of the rest. M2, as panel (b) shows, has a much broader definition: it includes M1, plus a range of other deposits and deposit-like assets, making it about five times as large.

Source: Federal Reserve Bank of St. Louis.



contains only currency in circulation (also known as cash), traveler's checks, and checkable bank deposits. M2 adds several other kinds of assets, often referred to as **near-moneys**—financial assets that aren't directly usable as a medium of exchange but can be readily converted into cash or checkable bank deposits, such as savings accounts. Examples are time deposits such as small denomination CDs, which aren't checkable but can be withdrawn at any time before their maturity date by paying a penalty. Because currency and checkable deposits are directly usable as a medium of exchange, M1 is the most liquid measure of money.

Figure 16-1 shows the actual composition of M1 and M2 in November 2009, in billions of dollars. M1 is valued at \$1,751.6 billion, with approximately 49% accounted for by currency in circulation, approximately 50% accounted for by checkable bank deposits, and a tiny slice accounted for by traveler's checks. In turn, M1 made up 21% of M2, valued at \$8,386.5 billion. M2 consists of M1 plus other types of assets: two

FOR INQUIRING MINDS

What's with All the Currency?

Alert readers may be a bit startled at one of the numbers in the money supply: \$862.4 billion of currency in circulation. That's about \$2,800 in cash for every man, woman, and child in the United States. How many people do you know who carry \$2,800 in their wallets? Not many. So where is all that cash?

Part of the answer is that it isn't in individuals' wallets: it's in cash registers. Businesses as well as individuals need to hold cash.

Economists also believe that cash plays an important role in transactions that people want to keep hidden. Small businesses and the self-employed sometimes prefer to be paid in cash so they can avoid paying taxes by hiding income from the Internal Revenue Service. Also, drug dealers and other criminals obviously don't want bank records of their dealings. In fact, some analysts have tried to infer the amount of illegal activity in the economy

from the total amount of cash holdings held by the public.

The most important reason for those huge currency holdings, however, is foreign use of dollars. The Federal Reserve estimates that 60% of U.S. currency is actually held outside the United States—largely in countries in which residents are so distrustful of their national currencies that the U.S. dollar has become a widely accepted medium of exchange.



types of bank deposits, known as savings deposits and time deposits, both of which are considered noncheckable, plus money market funds, which are mutual funds that invest only in liquid assets and bear a close resemblance to bank deposits. These near-moneys pay interest while cash (currency in circulation) does not, and they typically pay higher interest rates than any offered on checkable bank deposits.

► **ECONOMICS IN ACTION**

The History of the Dollar

U.S. dollar bills are pure fiat money: they have no intrinsic value, and they are not backed by anything that does. But American money wasn't always like that. In the early days of European settlement, the colonies that would become the United States used commodity money, partly consisting of gold and silver coins minted in Europe. But such coins were scarce on this side of the Atlantic, so the colonists relied on a variety of other forms of commodity money. For example, settlers in Virginia used tobacco as money and settlers in the Northeast used "wampum," a type of clamshell.

Later in American history, commodity-backed paper money came into widespread use. But this wasn't paper money as we now know it, issued by the U.S. government and bearing the signature of the Secretary of the Treasury. Before the Civil War, the U.S. government didn't issue any paper money. Instead, dollar bills were issued by private banks, which promised that their bills could be redeemed for silver coins on demand. These promises weren't always credible because banks sometimes failed, leaving holders of their bills with worthless pieces of paper. Understandably, people were reluctant to accept currency from any bank rumored to be in financial trouble. In other words, in this private money system, some dollars were less valuable than others.

A curious legacy of that time was notes issued by the Citizens' Bank of Louisiana, based in New Orleans, that became among the most widely used bank notes in the southern states. These notes were printed in English on one side and French on the other. (At the time, many people in New Orleans, originally a colony of France, spoke French.) Thus, the \$10 bill read *Ten* on one side and *Dix*, the French word for "ten," on the other. These \$10 bills became known as "dixies," probably the source of the nickname of the U.S. South.

The U.S. government began issuing official paper money, called "greenbacks," during the Civil War, as a way to help pay for the war. At first greenbacks had no fixed value in terms of commodities. After 1873, the U.S. government guaranteed the value of a dollar in terms of gold, effectively turning dollars into commodity-backed money.

In 1933, when President Franklin D. Roosevelt broke the link between dollars and gold, his own federal budget director—who feared that the public would lose confidence in the dollar if it wasn't ultimately backed by gold—declared ominously, "This will be the end of Western civilization." It wasn't. The link between the dollar and gold was restored a few years later, then dropped again—seemingly for good—in August 1971. Despite the warnings of doom, the U.S. dollar is still the world's most widely used currency. ▲



► **CHECK YOUR UNDERSTANDING** 16-1

1. Suppose you hold a gift certificate, good for certain products at participating stores. Is this gift certificate money? Why or why not?
2. Although most bank accounts pay some interest, depositors can get a higher interest rate by buying a certificate of deposit, or CD. The difference between a CD and a checking account is that the depositor pays a penalty for withdrawing the money before the CD comes due—a period of months or even years. Small CDs are counted in M2, but not in M1. Explain why they are not part of M1.
3. Explain why a system of commodity-backed money uses resources more efficiently than a system of commodity money.

Solutions appear at back of book.

Near-moneys are financial assets that can't be directly used as a medium of exchange but can be readily converted into cash or checkable bank deposits.

►► **QUICK REVIEW**

- **Money** is any asset that can easily be used to purchase goods and services. Money consists of cash, which is liquid by definition, as well as other highly liquid assets. **Currency in circulation** and **checkable bank deposits** are both part of the **money supply**.
- Money plays three roles: as a **medium of exchange**, a **store of value**, and a **unit of account**.
- Historically, money took the form first of **commodity money**, then of **commodity-backed money**. Today the dollar is pure **fiat money**.
- The money supply is measured by two **monetary aggregates**: M1 and M2. M1 is the most liquid, consisting of currency in circulation, checkable bank deposits, and traveler's checks. M2 consists of M1 plus various kinds of **near-moneys**: savings deposits, time deposits, and money market funds.

Bank reserves are the currency banks hold in their vaults plus their deposits at the Federal Reserve.

A **T-account** is a tool for analyzing a business's financial position by showing, in a single table, the business's assets (on the left) and liabilities (on the right).

The Monetary Role of Banks

About half of M1, the narrowest definition of the money supply, consists of currency in circulation—\$1 bills, \$5 bills, and so on. It's obvious where currency comes from: it's printed by the U.S. Treasury. But the rest of M1 consists of checkable bank deposits, and savings deposits account for the great bulk of M2, the broader definition of the money supply. By either measure, then, bank deposits are a major component of the money supply. And this fact brings us to our next topic: the monetary role of banks.

What Banks Do

A bank uses liquid assets in the form of bank deposits to finance the illiquid investments of borrowers. Banks can create liquidity because it isn't necessary for a bank to keep all of the funds deposited with it in the form of highly liquid assets. Except in the case of a *bank run*—which we'll get to shortly—all of a bank's depositors won't want to withdraw their funds at the same time. So a bank can provide its depositors with liquid assets yet still invest much of the depositors' funds in illiquid assets, such as mortgages and business loans.

Banks can't, however, lend out all the funds placed in their hands by depositors because they have to satisfy any depositor who wants to withdraw his or her funds. In order to meet these demands, a bank must keep substantial quantities of liquid assets on hand. In the modern U.S. banking system, these assets take the form either of currency in the bank's vault or deposits held in the bank's own account at the Federal Reserve. As we'll see shortly, the latter can be converted into currency more or less instantly. Currency in bank vaults and bank deposits held at the Federal Reserve are called **bank reserves**. Because bank reserves are in bank vaults and at the Federal Reserve, not held by the public, they are not part of currency in circulation.

To understand the role of banks in determining the money supply, we start by introducing a simple tool for analyzing a bank's financial position: a **T-account**. A business's T-account summarizes its financial position by showing, in a single table, the business's assets and liabilities, with assets on the left and liabilities on the right. Figure 16-2 shows the T-account for a hypothetical business that *isn't* a bank—Samantha's Smoothies. According to Figure 16-2, Samantha's Smoothies owns a building worth \$30,000 and has \$15,000 worth of smoothie-making equipment. These are assets, so they're on the left side of the table. To finance its opening, the business borrowed \$20,000 from a local bank. That's a liability, so the loan is on the right side of the table. By looking at the T-account, you can immediately see what Samantha's Smoothies owns and what it owes. Oh, and it's called a T-account because the lines in the table make a T-shape.

Samantha's Smoothies is an ordinary, nonbank business. Now let's look at the T-account for a hypothetical bank, First Street Bank, which is the repository of \$1 million in bank deposits.

FIGURE 16-2

A T-Account for Samantha's Smoothies

A T-account summarizes a business's financial position. Its assets, in this case consisting of a building and some smoothie-making machinery, are on the left side. Its liabilities, consisting of the money it owes to a local bank, are on the right side.

Assets		Liabilities	
Building	\$30,000	Loan from bank	\$20,000
Smoothie-making machines	\$15,000		

FIGURE 16-3

Assets and Liabilities of First Street Bank

First Street Bank's assets consist of \$1,000,000 in loans and \$100,000 in reserves. Its liabilities consist of \$1,000,000 in deposits—money owed to people who have placed funds in First Street's hands.

Assets		Liabilities	
Loans	\$1,000,000	Deposits	\$1,000,000
Reserves	\$100,000		

Figure 16-3 shows First Street's financial position. The loans First Street has made are on the left side, because they're assets: they represent funds that those who have borrowed from the bank are expected to repay. The bank's only other assets, in this simplified example, are its reserves, which, as we've learned, can take the form either of cash in the bank's vault or deposits at the Federal Reserve. On the right side we show the bank's liabilities, which in this example consist entirely of deposits made by customers at First Street. These are liabilities because they represent funds that must ultimately be repaid to depositors. Notice, by the way, that in this example First Street's assets are larger than its liabilities. That's the way it's supposed to be! In fact, as we'll see shortly, banks are required by law to maintain assets larger by a specific percentage than their liabilities.

In this example, First Street Bank holds reserves equal to 10% of its customers' bank deposits. The fraction of bank deposits that a bank holds as reserves is its **reserve ratio**. In the modern American system, the Federal Reserve—which, among other things, regulates banks operating in the United States—sets a minimum required reserve ratio that banks are required to maintain. To understand why banks are regulated, let's consider a problem banks can face: *bank runs*.

The Problem of Bank Runs

A bank can lend out most of the funds deposited in its care because in normal times only a small fraction of its depositors want to withdraw their funds on any given day. But what would happen if, for some reason, all or at least a large fraction of its depositors *did* try to withdraw their funds during a short period of time, such as a couple of days?

The answer is that if a significant share of its depositors demand their money back at the same time, the bank wouldn't be able to raise enough cash to meet those demands. The reason is that banks convert most of their depositors' funds into loans made to borrowers; that's how banks earn revenue—by charging interest on loans. Bank loans, however, are illiquid: they can't easily be converted into cash on short notice. To see why, imagine that First Street Bank has lent \$100,000 to Drive-A-Peach Used Cars, a local dealership. To raise cash to meet demands for withdrawals, First Street can sell its loan to Drive-A-Peach to someone else—another bank or an individual investor. But if First Street tries to sell the loan quickly, potential buyers will be wary: they will suspect that First Street wants to sell the loan because there is something wrong and the loan might not be repaid. As a result, First Street Bank can sell the loan quickly only by offering it for sale at a deep discount—say, a discount of 50%, or \$50,000.

The upshot is that if a significant number of First Street's depositors suddenly decided to withdraw their funds, the bank's efforts to raise the necessary cash quickly would force it to sell off its assets very cheaply. Inevitably, this leads to a *bank failure*: the bank would be unable to pay off its depositors in full.

The **reserve ratio** is the fraction of bank deposits that a bank holds as reserves.

A **bank run** is a phenomenon in which many of a bank's depositors try to withdraw their funds due to fears of a bank failure.

Deposit insurance guarantees that a bank's depositors will be paid even if the bank can't come up with the funds, up to a maximum amount per account.

Reserve requirements are rules set by the Federal Reserve that determine the minimum reserve ratio for banks.

What might start this whole process? That is, what might lead First Street's depositors to rush to pull their money out? A plausible answer is a spreading rumor that the bank is in financial trouble. Even if depositors aren't sure the rumor is true, they are likely to play it safe and get their money out while they still can. And it gets worse: a depositor who simply thinks that *other* depositors are going to panic and try to get their money out will realize that this could "break the bank." So he or she joins the rush. In other words, fear about a bank's financial condition can be a self-fulfilling prophecy: depositors who believe that other depositors will rush to the exit will rush to the exit themselves.

A **bank run** is a phenomenon in which many of a bank's depositors try to withdraw their funds due to fears of a bank failure. Moreover, bank runs aren't bad only for the bank in question and its depositors. Historically, they have often proved contagious, with a run on one bank leading to a loss of faith in other banks, causing additional bank runs. The upcoming Economics in Action describes an actual case of just such a contagion, the wave of bank runs that swept across the United States in the early 1930s. In response to that experience and similar experiences in other countries, the United States and most other modern governments have established a system of bank regulations that protects depositors and prevents most bank runs.

Bank Regulation

Should you worry about losing money in the United States due to a bank run? No. After the banking crises of the 1930s, the United States and most other countries put into place a system designed to protect depositors and the economy as a whole against bank runs. This system has three main features: *deposit insurance*, *capital requirements*, and *reserve requirements*. In addition, banks have access to the *discount window*, a source of cash when it's needed.

Deposit Insurance Almost all banks in the United States advertise themselves as a "member of the FDIC"—the Federal Deposit Insurance Corporation. The FDIC provides **deposit insurance**, a guarantee that depositors will be paid even if the bank can't come up with the funds, up to a maximum amount per account. The FDIC currently guarantees the first \$250,000 of each account.

It's important to realize that deposit insurance doesn't just protect depositors if a bank actually fails. The insurance also eliminates the main reason for bank runs: since depositors know their funds are safe even if a bank fails, they have no incentive to rush to pull them out because of a rumor that the bank is in trouble.

Capital Requirements Deposit insurance, although it protects the banking system against bank runs, creates a well-known incentive problem. Because depositors are protected from loss, they have no incentive to monitor their bank's financial health, allowing risky behavior by the bank to go undetected. At the same time, the owners of banks have an incentive to engage in overly risky investment behavior, such as making questionable loans at high interest rates. That's because if all goes well, the owners profit; and if things go badly, the government covers the losses through federal deposit insurance.

To reduce the incentive for excessive risk-taking, regulators require that the owners of banks hold substantially more assets than the value of bank deposits. That way, the bank will still have assets larger than its deposits even if some of its loans go bad, and losses will accrue against the bank owners' assets, not the government. The excess of a bank's assets over its bank deposits and other liabilities is called the *bank's capital*. For example, First State Street Bank has capital of \$100,000, equal to about 9% of the total value of its assets. In practice, banks' capital is required to equal at least 7% of the value of their assets.

Reserve Requirements Another regulation used to reduce the risk of bank runs is **reserve requirements**, rules set by the Federal Reserve that set the minimum reserve ratio for banks. For example, in the United States, the minimum reserve ratio for checkable bank deposits is 10%.

The Discount Window One final protection against bank runs is the fact that the Federal Reserve, which we'll discuss more thoroughly later in this chapter, stands ready to lend money to banks in trouble, an arrangement known as the **discount window**. The ability to borrow money means a bank can avoid being forced to sell its assets at fire-sale prices in order to satisfy the demands of a sudden rush of depositors demanding cash. Instead, it can turn to the Fed and borrow the funds it needs to pay off depositors.

The **discount window** is an arrangement in which the Federal Reserve stands ready to lend money to banks in trouble.

► **ECONOMICS IN ACTION**

It's a Wonderful Banking System

Next Christmas time, it's a sure thing that at least one TV channel will show the 1946 film *It's a Wonderful Life*, featuring Jimmy Stewart as George Bailey, a small-town banker whose life is saved by an angel. The movie's climactic scene is a run on Bailey's bank, as fearful depositors rush to take their funds out.

When the movie was made, such scenes were still fresh in Americans' memories. There was a wave of bank runs in late 1930, a second wave in the spring of 1931, and a third wave in early 1933. By the end, more than a third of the nation's banks had failed. To bring the panic to an end, on March 6, 1933, the newly inaugurated president, Franklin Delano Roosevelt, declared a national "bank holiday," closing all banks for a week to give bank regulators time to close unhealthy banks and certify healthy ones.

Since then, regulation has protected the United States and other wealthy countries against most bank runs. In fact, the scene in *It's a Wonderful Life* was already out of date when the movie was made. But the last decade has seen several waves of bank runs in developing countries. For example, bank runs played a role in an economic crisis that swept Southeast Asia in 1997–1998, and in the severe economic crisis in Argentina which began in late 2001.

Notice that we said "most bank runs." There are some limits on deposit insurance; in the United States currently only \$250,000 per depositor, for each account ownership category, is insured. As a result, there can still be a rush out of a bank perceived as troubled. In fact, that's exactly what happened to IndyMac, a Pasadena-based lender that had made a large number of questionable home loans, in July 2008. As questions about IndyMac's financial soundness were raised, depositors began pulling out funds, forcing federal regulators to step in and close the bank. Unlike in the bank runs of the 1930s, however, most depositors got all their funds back—and the panic at IndyMac did not spread to other institutions. ▲



In July 2008, panicky IndyMac depositors lined up to pull their money out of the troubled California bank.

► **CHECK YOUR UNDERSTANDING 16-2**

1. Suppose you are a depositor at First Street Bank. You hear a rumor that the bank has suffered serious losses on its loans. Every depositor knows that the rumor isn't true, but each thinks that most other depositors believe the rumor. Why, in the absence of deposit insurance, could this lead to a bank run? How does deposit insurance change the situation?
2. A con artist has a great idea: he'll open a bank without investing any capital and lend all the deposits at high interest rates to real estate developers. If the real estate market booms, the loans will be repaid and he'll make high profits. If the real estate market goes bust, the loans won't be repaid and the bank will fail—but he will not lose any of his own wealth. How would modern bank regulation frustrate his scheme?

► **QUICK REVIEW**

- A **T-account** is used to analyze a bank's financial position. A bank holds **bank reserves**—currency in its vaults plus deposits held in its account at the Federal Reserve. The **reserve ratio** is the ratio of bank reserves to customers' bank deposits.
- Because bank loans are illiquid, but a bank is obligated to return depositors' funds on demand, **bank runs** are a potential problem. Although they took place on a massive scale in the United States during the 1930s, they have been largely eliminated through bank regulation in the form of **deposit insurance**, capital requirements, and **reserve requirements**, as well as through the availability of the **discount window**.

Determining the Money Supply

Without banks, there would be no checkable deposits, and so the quantity of currency in circulation would equal the money supply. In that case, the money supply would be solely determined by whoever controls government minting and printing presses. But banks do exist, and through their creation of checkable bank deposits they affect the money supply in two ways. First, banks remove some currency from circulation: dollar bills that are sitting in bank vaults, as opposed to sitting in people's wallets, aren't part of the money supply. Second, and much more importantly, banks create money by accepting deposits and making loans—that is, they make the money supply larger than just the value of currency in circulation. Our next topic is how banks create money and what determines the amount of money they create.

How Banks Create Money

To see how banks create money, let's examine what happens when someone decides to deposit currency in a bank. Consider the example of Silas, a miser, who keeps a shoebox full of cash under his bed. Suppose Silas realizes that it would be safer, as well as more convenient, to deposit that cash in the bank and to use his debit card when shopping. Assume that he deposits \$1,000 into a checkable account at First Street Bank. What effect will Silas's actions have on the money supply?

Panel (a) of Figure 16-4 shows the initial effect of his deposit. First Street Bank credits Silas with \$1,000 in his account, so the economy's checkable bank deposits rise by \$1,000. Meanwhile, Silas's cash goes into the vault, raising First Street's reserves by \$1,000 as well.

This initial transaction has no effect on the money supply. Currency in circulation, part of the money supply, falls by \$1,000; checkable bank deposits, also part of the money supply, rise by the same amount.

But this is not the end of the story, because First Street Bank can now lend out part of Silas's deposit. Assume that it holds 10% of Silas's deposit—\$100—in reserves and lends the rest out in cash to Silas's neighbor, Mary. The effect of this second stage is shown in panel (b). First Street's deposits remain unchanged, and so does the value of its assets. But the composition of its assets changes: by making the loan, it reduces its reserves by \$900, so that they are only \$100 larger than they were before Silas made his deposit.

FIGURE 16-4 Effect on the Money Supply of Turning Cash into a Checkable Deposit at First Street Bank

(a) Initial Effect Before Bank Makes a New Loan

Assets		Liabilities	
Loans	No change	Checkable deposits	+\$1,000
Reserves	+\$1,000		

(b) Effect When Bank Makes a New Loan

Assets		Liabilities	
Loans	+\$900	No change	
Reserves	-\$900		

When Silas deposits \$1,000 (which had been stashed under his bed) into a checkable bank account, there is initially no effect on the money supply: currency in circulation falls by \$1,000, but checkable bank deposits rise by \$1,000. The corresponding entries on the bank's T-account, depicted in panel (a), show deposits initially rising by \$1,000 and the bank's reserves initially rising by \$1,000. In the second stage,

depicted in panel (b), the bank holds 10% of Silas's deposit (\$100) as reserves and lends out the rest (\$900) to Mary. As a result, its reserves fall by \$900 and its loans increase by \$900. Its liabilities, including Silas's \$1,000 deposit, are unchanged. The money supply, the sum of checkable bank deposits and currency in circulation, has now increased by \$900—the \$900 now held by Mary.

In the place of the \$900 reduction in reserves, the bank has acquired an IOU, its \$900 cash loan to Mary. So by putting \$900 of Silas's cash back into circulation by lending it to Mary, First Street Bank has, in fact, increased the money supply. That is, the sum of currency in circulation and checkable bank deposits has risen by \$900 compared to what it had been when Silas's cash was still under his bed. Although Silas is still the owner of \$1,000, now in the form of a checkable deposit, Mary has the use of \$900 in cash from her borrowings.

And this may not be the end of the story. Suppose that Mary uses her cash to buy a television and a DVD player from Acme Merchandise. What does Anne Acme, the store's owner, do with the cash? If she holds on to it, the money supply doesn't increase any further. But suppose she deposits the \$900 into a checkable bank deposit—say, at Second Street Bank. Second Street Bank, in turn, will keep only part of that deposit in reserves, lending out the rest, creating still more money.

Assume that Second Street Bank, like First Street Bank, keeps 10% of any bank deposit in reserves and lends out the rest. Then it will keep \$90 in reserves and lend out \$810 of Anne's deposit to another borrower, further increasing the money supply.

Table 16-1 shows the process of money creation we have described so far. At first the money supply consists only of Silas's \$1,000. After he deposits the cash into a checkable bank deposit and the bank makes a loan, the money supply rises to \$1,900. After the second deposit and the second loan, the money supply rises to \$2,710. And the process will, of course, continue from there. (Although we have considered the case in which Silas places his cash in a checkable bank deposit, the results would be the same if he put it into any type of near-money.)

This process of money creation may sound familiar. In Chapter 15 we described the *multiplier process*: an initial increase in real GDP, caused by fiscal policy, leads to a rise in consumer spending, which leads to a further rise in real GDP, which leads to a further rise in consumer spending, and so on. What we have here is another kind of multiplier—the *money multiplier*. Next, we'll learn what determines the size of this multiplier.

Reserves, Bank Deposits, and the Money Multiplier

In tracing out the effect of Silas's deposit in Table 16-1, we assumed that the funds a bank lends out always end up being deposited either in the same bank or in another bank—so funds disbursed as loans come back to the banking system, even if not to the lending bank itself. In reality, some of these loaned funds may be held by borrowers in their wallets and not deposited in a bank, meaning that some of the loaned amount “leaks” out of the banking system. Such leaks reduce the size of the money multiplier, just as leaks of real income into savings reduce the size of the real GDP multiplier. (Bear in mind, however, that the “leak” here comes from the fact that borrowers keep some of their funds in currency, rather than the fact that consumers save some of their income.) But let's set that complication aside for a moment and consider how the money supply is determined in a “checkable-deposits-only” monetary system, where funds are always deposited in bank accounts and none are held in wallets as currency. That is, in our checkable-deposits-only monetary system, any and all funds borrowed from a bank are immediately deposited into a checkable bank account. We'll assume that banks are required to satisfy a minimum reserve ratio of 10% and that every bank lends out all of its **excess reserves**, reserves over and above the amount needed to satisfy the minimum reserve ratio.

TABLE 16-1

How Banks Create Money

	Currency in circulation	Checkable bank deposits	Money supply
First stage: Silas keeps his cash under his bed.	\$1,000	\$0	\$1,000
Second stage: Silas deposits cash in First Street Bank, which lends out \$900 to Mary, who then pays it to Anne Acme.	900	1,000	1,900
Third stage: Anne Acme deposits \$900 in Second Street Bank, which lends out \$810 to another borrower.	810	1,900	2,710

Excess reserves are a bank's reserves over and above its required reserves.

The **monetary base** is the sum of currency in circulation and bank reserves.

Now suppose that for some reason a bank suddenly finds itself with \$1,000 in excess reserves. What happens? The answer is that the bank will lend out that \$1,000, which will end up as a checkable bank deposit somewhere in the banking system, launching a money multiplier process very similar to the process shown in Table 16-1. In the first stage, the bank lends out its excess reserves of \$1,000, which becomes a checkable bank deposit somewhere. The bank that receives the \$1,000 deposit keeps 10%, or \$100, as reserves and lends out the remaining 90%, or \$900, which again becomes a checkable bank deposit somewhere. The bank receiving this \$900 deposit again keeps 10%, which is \$90, as reserves and lends out the remaining \$810. The bank receiving this \$810 keeps \$81 in reserves and lends out the remaining \$729, and so on. As a result of this process, the total increase in checkable bank deposits is equal to a sum that looks like:

$$\$1,000 + \$900 + \$810 + \$729 + \dots$$

We'll use the symbol rr for the reserve ratio. More generally, the total increase in checkable bank deposits that is generated when a bank lends out \$1,000 in excess reserves is:

$$(16-1) \text{ Increase in checkable bank deposits from } \$1,000 \text{ in excess reserves} = \\ \$1,000 + \$1,000 \times (1 - rr) + \$1,000 \times (1 - rr)^2 + \$1,000 \times (1 - rr)^3 + \dots$$

An infinite series of this form can be simplified to:

$$(16-2) \text{ Increase in checkable bank deposits from } \$1,000 \text{ in excess reserves} = \\ \$1,000/rr$$

Given a reserve ratio of 10%, or 0.1, a \$1,000 increase in excess reserves will increase the total value of checkable bank deposits by $\$1,000/0.1 = \$10,000$. In fact, in a checkable-deposits-only monetary system, the total value of checkable bank deposits will be equal to the value of bank reserves divided by the reserve ratio. Or to put it a different way, if the reserve ratio is 10%, each \$1 of reserves held by a bank supports $\$1/rr = \$1/0.1 = \$10$ of checkable bank deposits.

The Money Multiplier in Reality

In reality, the determination of the money supply is more complicated than our simple model suggests, because it depends not only on the ratio of reserves to bank deposits but also on the fraction of the money supply that individuals choose to hold in the form of currency. In fact, we already saw this in our example of Silas depositing the cash under his bed: when he chose to hold a checkable bank deposit instead of currency, he set in motion an increase in the money supply.

To define the money multiplier in practice, it's important to recognize that the Federal Reserve controls the *sum* of bank reserves and currency in circulation, called the *monetary base*, but it does not control the allocation of that sum between bank reserves and currency in circulation. Consider Silas and his deposit one more time: by taking the cash from under his bed and depositing it in a bank, he reduced the quantity of currency in circulation but increased bank reserves by an equal amount—leaving the *monetary base*, or net, unchanged. The **monetary base**, which is the quantity the monetary authorities control, is the sum of currency in circulation and reserves held by banks.

The monetary base is different from the money supply in two ways. First, bank reserves, which are part of the monetary base, aren't considered part of the money supply. A \$1 bill in someone's wallet is considered money because it's available for an individual to spend, but a \$1 bill held as bank reserves in a bank vault or deposited at the Federal Reserve isn't considered part of the money supply because it's not available for spending. Second, checkable bank deposits, which are part of the money supply because they are available for spending, aren't part of the monetary base.

FIGURE 16-5

The Monetary Base and the Money Supply

The monetary base is equal to bank reserves plus currency in circulation. It is different from the money supply, consisting mainly of checkable or near-checkable bank deposits plus currency in circulation. Each dollar of bank reserves backs several dollars of bank deposits, making the money supply larger than the monetary base.

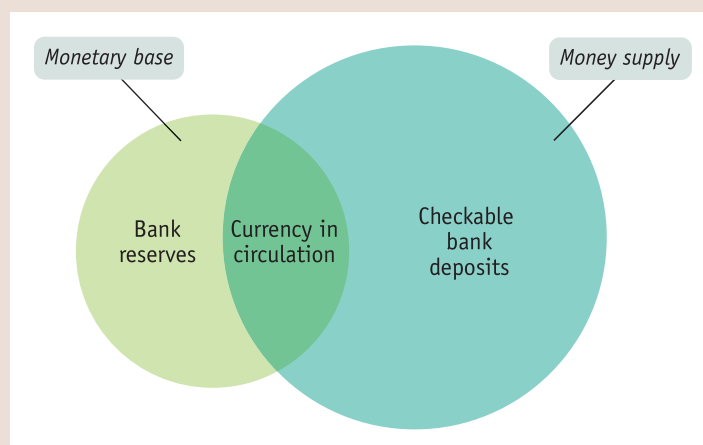


Figure 16-5 shows the two concepts schematically. The circle on the left represents the monetary base, consisting of bank reserves plus currency in circulation. The circle on the right represents the money supply, consisting mainly of currency in circulation plus checkable or near-checkable bank deposits. As the figure indicates, currency in circulation is part of both the monetary base and the money supply. But bank reserves aren't part of the money supply, and checkable or near-checkable bank deposits aren't part of the monetary base. In practice, most of the monetary base actually consists of currency in circulation, which also makes up about half of the money supply.

Now we can formally define the **money multiplier**: it's the ratio of the money supply to the monetary base. The actual money multiplier in the United States, using M1 as our measure of money, is about 1.9. That's a lot smaller than $1/0.1 = 10$, the money multiplier in a checkable-deposits-only system with a reserve ratio of 10% (the minimum required ratio for most checkable deposits in the United States). The reason the actual money multiplier is so small arises from the fact that people hold significant amounts of cash, and a dollar of currency in circulation, unlike a dollar in reserves, doesn't support multiple dollars of the money supply. Currency in circulation normally accounts for more than 90% of the monetary base. In August 2008, currency in circulation was \$831 billion, compared with a monetary base of \$840 billion. Since the financial crisis in fall 2008, reserves have significantly increased as banks reduced lending and held onto funds in the face of economic uncertainty. At the end of 2009, currency in circulation was \$925 billion, compared with a monetary base of slightly over \$2 trillion.

The **money multiplier** is the ratio of the money supply to the monetary base.

►ECONOMICS IN ACTION

Multiplying Money Down

In our hypothetical example illustrating how banks create money, we described Silas the miser taking the currency from under his bed and turning it into a checkable bank deposit. This led to an increase in the money supply, as banks engaged in successive waves of lending backed by Silas's funds. It follows that if something happened to make Silas revert to old habits, taking his money out of the bank and putting it back under his bed, the result would be less lending and, ultimately, a decline in the money supply. That's exactly what happened as a result of the bank runs of the 1930s.

Table 16-2 shows what happened between 1929 and 1933, as bank failures shook the public's confidence in the banking system. The second column shows the public's holdings of currency. This increased sharply, as

TABLE 16-2

The Effects of Bank Runs, 1929–1933

	Currency in circulation	Checkable bank deposits	M1
	(billions of dollars)		
1929	\$3.90	\$22.74	\$26.64
1933	5.09	14.82	19.91
Percent change	+31%	−35%	−25%

Source: U.S. Census Bureau (1975), *Historical Statistics of the United States*.

>> QUICK REVIEW

- ▶ Banks create money: when currency is deposited in a bank, the bank can lend the **excess reserves** arising from the new deposit, which leads to another round of new deposits in the banking system, and so on, generating a multiplier effect on the money supply.
- ▶ In a checkable-deposits-only system, the money supply would be equal to bank reserves divided by the reserve ratio. In reality, however, the picture is more complicated because the public holds some funds as cash rather than in checkable deposits.
- ▶ The **monetary base**, equal to bank reserves plus currency in circulation, overlaps but is not equal to the money supply, checkable bank deposits plus currency in circulation. The **money multiplier**, equal to the money supply divided by the monetary base, is around 1.9 in the United States.

many Americans decided that money under the bed was safer than money in the bank after all. The third column shows the value of checkable bank deposits. This fell sharply, through the multiplier process we have just analyzed, when individuals pulled their cash out of banks. Loans also fell because banks that survived the waves of bank runs increased their excess reserves, just in case another wave began. The fourth column shows the value of M1, the first of the monetary aggregates we described earlier. It fell sharply, because the total reduction in checkable or near-checkable bank deposits was much larger than the increase in currency in circulation. ▲

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> CHECK YOUR UNDERSTANDING 16-3

1. Assume that total reserves are equal to \$200 and total checkable bank deposits are equal to \$1,000. Also assume that the public does not hold any currency. Now suppose that the required reserve ratio falls from 20% to 10%. Trace out how this leads to an expansion in bank deposits.
2. Take the example of Silas depositing his \$1,000 in cash into First Street Bank and assume that the required reserve ratio is 10%. But now assume that each time someone receives a bank loan, he or she keeps half the loan in cash. Trace out the resulting expansion in the money supply.

Solutions appear at back of book.

The Federal Reserve System

Who's in charge of ensuring that banks maintain enough reserves? Who decides how large the monetary base will be? The answer, in the United States, is an institution known as the Federal Reserve (or, informally, as "the Fed"). The Federal Reserve is a **central bank**—an institution that oversees and regulates the banking system, and controls the monetary base. Other central banks include the Bank of England, the Bank of Japan, and the European Central Bank, or ECB. The ECB acts as a common central bank for 16 European countries: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, the Netherlands, Portugal, Spain, Slovakia, Slovenia, Cyprus, and Malta. The world's oldest central bank, by the way, is Sweden's Sveriges Riksbank, which awards the Nobel Prize in economics.

The Structure of the Fed

The legal status of the Fed, which was created in 1913, is unusual: it is not exactly part of the U.S. government, but it is not really a private institution either. Strictly speaking, the Federal Reserve System consists of two parts: the Board of Governors and the 12 regional Federal Reserve Banks.

The Board of Governors, which oversees the entire system from its offices in Washington, D.C., is constituted like a government agency: its seven members are appointed by the president and must be approved by the Senate. However, they are appointed for 14-year terms, to insulate them from political pressure in their conduct of monetary policy. Although the chairman is appointed more frequently—every four years—it's traditional for chairmen to be reappointed and serve much longer terms. For example, William McChesney Martin was chairman of the Fed from 1951 until 1970. Alan Greenspan, appointed in 1987, served as the Fed's chairman until 2006.

The 12 Federal Reserve Banks each serve a region of the country, providing various banking and supervisory services. One of their jobs, for example, is to audit the books of private-sector banks to ensure their financial health. Each regional bank is run by a board of directors chosen from the local banking and business community. The Federal Reserve Bank of New York plays a special role: it carries out *open-market operations*, usually the main tool of monetary policy. Figure 16-6 shows the 12 Federal Reserve districts and the city in which each regional Federal Reserve Bank is located.

A **central bank** is an institution that oversees and regulates the banking system and controls the monetary base.