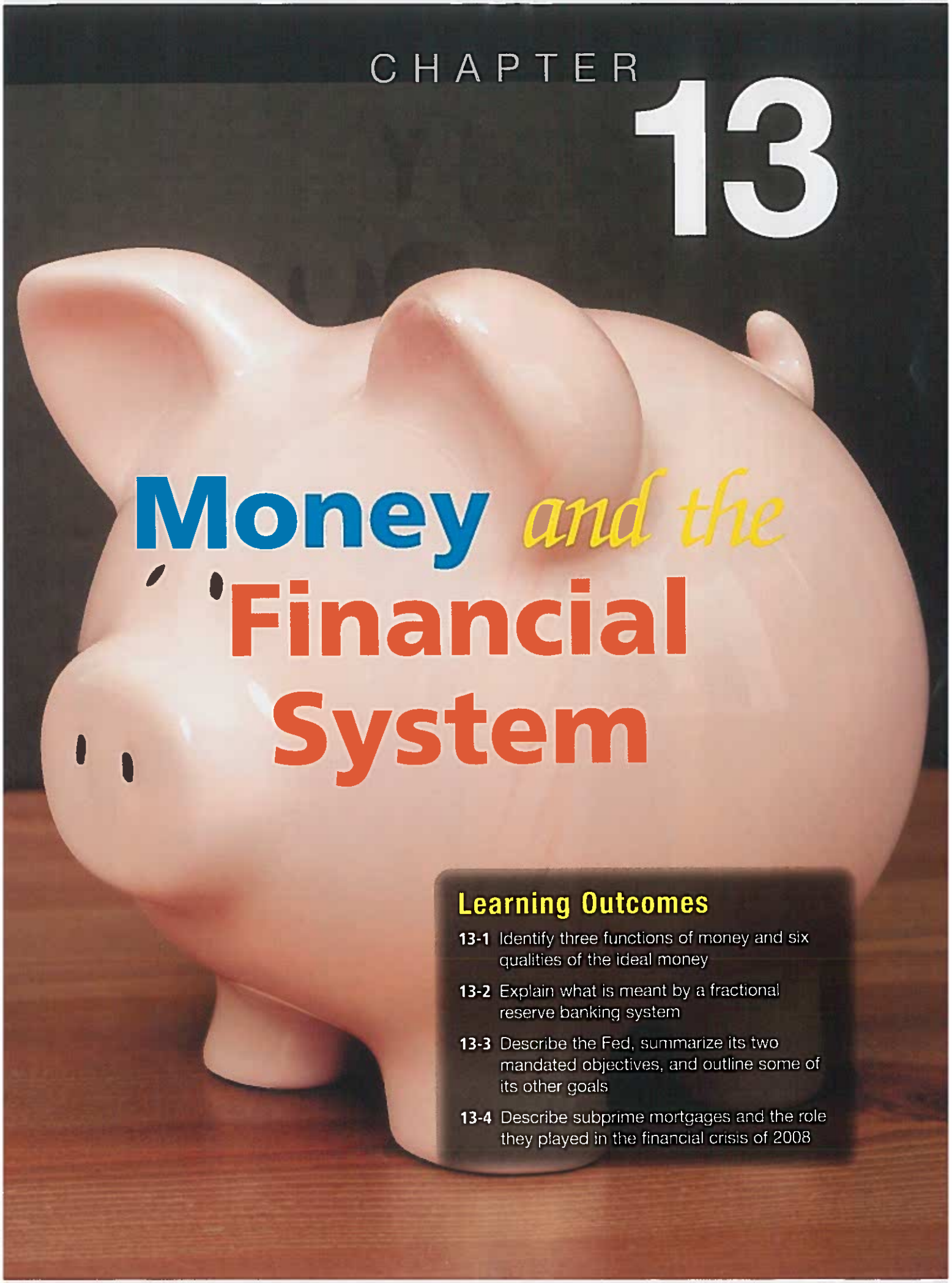
CHAPTER

13

Money and the Financial System



Learning Outcomes

13-1 Identify three functions of money and six qualities of the ideal money

13-2 Explain what is meant by a fractional reserve banking system

13-3 Describe the Fed, summarize its two mandated objectives, and outline some of its other goals

13-4 Describe subprime mortgages and the role they played in the financial crisis of 2008

"If Russia can't pay its bills, why doesn't it simply print more rubles?"

Why are you willing to exchange a piece of paper bearing Alexander Hamilton's portrait and the number 10 in each corner for a pepperoni pizza with extra cheese? Why do dimes and quarters have notched edges? If Russia can't pay its bills, why doesn't it simply print more rubles? Because money is banned in federal prisons, what do inmates use instead? What's the difference between the *Fed* and the *Feds*? Why was someone able to cash a check written on a clean but frayed pair of underpants? These and other questions are answered in this chapter, which introduces money and banking.

What do you think?

The government has an obligation to protect failing banks during depressions.

Strongly Disagree 1 2 3 4 5 6 7 *Strongly Agree*

The word *money* comes from the name of the goddess (*Juno Moneta*) in whose temple Rome's money was coined. Money has come to symbolize all personal and business finance. You can read *Money* magazine and the "Money" section of *USA Today*, and visit Websites such as www.moneyfactory.gov, site for the federal agency that prints money (a Google search for "money" returned over three billion hits). You can watch TV shows such as *Your Money, Mad Money, Fast Money*, and *Strictly Money*.

With money, you can articulate your preferences—after all, money talks. And when it talks, it says a lot, as in, "Put your money where your mouth is" and "Show me the money." Money is the grease that lubricates the wheels of market exchange (in fact, an old expression, "grease the palm," means to pay someone). Just as grease makes for an easier fit among gears, money reduces the friction—the transaction costs—of exchange. Too little leaves some parts creaking; too much gums up the works.

This chapter is obviously about money. We begin with the birth of money and trace its evolution in broad strokes from primitive economies to our own. Then we turn to developments in the United States, particularly the financial crisis of 2008, which was arguably the most important economic event since the Great Depression.

Topics discussed in Chapter 13 include

- Barter
- Functions of money
- Commodity and fiat money
- The Federal Reserve System
- Depository institutions
- U.S. banking structure
- Subprime mortgages
- Mortgage-backed securities

13-1 The Birth of Money

In the beginning, there was no money. The earliest families were largely self-sufficient. Each produced all it consumed and consumed all it produced, so there was little need for exchange. Without exchange, there was no need for money. When specialization first emerged, as some people went hunting and others took up farming, hunters and farmers had to trade. Thus, the specialization of labor resulted in exchange, but the assortment of goods traded was limited enough that people could easily exchange their products directly for other products—a system called *barter*.

> "Money fulfills three important functions: a medium of exchange, a unit of account, and a store of value."

13-1a Barter and the Double Coincidence of Wants

Barter depends on a **double coincidence of wants**, which occurs when each trader is willing to exchange his or her product for something the other trader has to offer. If a hunter was willing to exchange hides for a farmer's corn, that was a coincidence. But if the farmer was also willing to exchange corn for the hunter's hides, that was a double coincidence—a *double coincidence of wants*. As long as specialization was limited, to, say, two or three goods, mutually beneficial trades were relatively easy to come by—that is, trade wasn't much of a coincidence. As specialization increased, however, finding the particular goods that each trader wanted became more difficult.

In a barter system, traders must not only discover a double coincidence of wants; they must also agree on an exchange rate. How many bushels of corn should the hunter get for a hide? If only two goods are traded, only one exchange rate needs to be worked out. As the variety of goods traded increases, however, exchange rates multiply. Specialization increased the transaction costs of barter. A huge difference in the values of the units to be exchanged also made barter difficult. For example, a hunter wanting to buy a home that exchanged for 1,000 hides would be hard-pressed finding a home seller needing that many. High transaction costs of barter gave birth to money.

double coincidence of wants
Two traders are willing to exchange their products directly

money
Anything that is generally accepted in exchange for goods and services

medium of exchange
Anything that facilitates trade by being generally accepted by all parties in payment for goods or services

13-1b The Earliest Money and its Functions

Nobody actually recorded the emergence of money. We can only speculate about how it first came into use. Through experience with barter, traders may have found they could always find buyers for certain goods. If a trader could not find a good that he or she desired personally, some other good with a ready market could be accepted instead. So traders began to accept a certain good not for immediate consumption, but because that good could be easily traded later. For example, corn might have become acceptable because traders knew that it was always in demand. As one good became generally accepted in return for all other goods, that good began to function as **money**. *Any commodity that acquires a high degree of acceptability throughout an economy becomes money.*

Money fulfills three important functions: a *medium of exchange*, a *unit of account*, and a *store of value*. Let's consider each.

Medium of Exchange

Separating the sale of one good from the purchase of another requires an item acceptable to all involved in the transactions. If a society, by luck or by design, can find a commodity that everyone accepts in exchange for whatever is sold, traders can save time, disappointment, and sheer aggravation. Suppose corn takes on this role, a role that clearly goes beyond its role as food. We then call corn a medium of exchange because it is accepted in exchange by all buyers and sellers, whether or not they want corn to eat. A **medium of exchange** is anything that

is generally accepted in payment for goods and services. The person who accepts corn in exchange for some product believes corn can be traded later for whatever is desired.

In this example, corn is both a *commodity* and *money*, so we call it **commodity money**. The earliest money was commodity money. Gold and silver have been used as money for at least four thousand years. Cattle served as money, first for the Greeks, then for the Romans. In fact, the word *pecuniary* (meaning "of or relating to money") comes from the Latin word for cattle, *pecus*. Likewise, the word *fee* comes from the Old English word *feoh*, which also meant cattle. Roman soldiers received part of their pay in salt bricks; the salt portion was called the *salarium*, the origin of the word *salary*. Also used as money were wampum (strings of polished shells) and tobacco in colonial America, tea pressed into small cakes in Russia, rice in Japan, and palm dates in North Africa. Note that commodity money is a good, not a service; a service is intangible and cannot be held for later exchange.

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Unit of Account

A commodity such as corn that grows to be widely accepted becomes a **unit of account**, a standard on which prices are based. The price of hides or shoes or pots is measured in bushels of corn. Thus, corn serves not only as a medium of exchange; it also becomes a common denominator, a yardstick, for *measuring the value* of each product exchanged in the economy. Rather than having to determine exchange rates among all products, as required with a barter economy, people can price everything using a single measure, such as corn. For example, if a pair of shoes sells for 2 bushels of corn and a 5-gallon pot sells for 1 bushel of corn, then a pair of shoes has the same value in exchange as two 5-gallon pots.

Store of Value

Because people do not want to buy something every time they sell something, the purchasing power acquired through a sale must somehow be preserved. Money serves as a **store of value** when it retains purchasing power over time. The better it preserves purchasing power, the better money serves as a store of value, and the more willing people are to accept it and hold it. Consider again the distinction between a stock and a flow. Recall that a *stock* is an amount measured at a particular point in time, such as the amount of food in your refrigerator, or the amount of money you have with you right now. In contrast, a *flow* is an amount per unit of time, such as the calories you consume per day, or the income you earn per week. *Money* is a stock and *income* is a flow. Don't confuse money with income. The role of money as a stock is best reflected by money's role as a store of value.

13-1c Properties of the Ideal Money

The introduction of commodity money reduced the transaction costs of exchange compared with barter, but commodity money also involves some transaction costs. First, if the commodity money is perishable, as is corn, it must be properly stored or its quality deteriorates; even then, it won't maintain its quality for long. U.S. coins have a projected life of 30 years (a dollar note, only 18 months). So the ideal money should be *durable*. Second, if the commodity money is bulky, major purchases can become unwieldy. For example, truckloads of corn would be needed to purchase a home selling for 5,000 bushels of corn. So the ideal money should be *portable*, or easily carried. Dollar notes are easier to carry than dollar coins, which may explain why dollar coins never became popular in the United States, despite several attempts to introduce them. Third, some commodity money was not easily divisible into smaller units. For example, when cattle served as money, any price involving a fraction of a cow posed an exchange problem. So the ideal money should be *divisible*.

Fourth, if commodity money like corn is valued equally in exchange, regardless of its quality, people will eat the best corn and trade away the rest. As a result, the quality remaining in circulation declines, reducing its acceptability. To avoid this problem, the ideal money should be of *uniform quality*.

commodity money
Anything that serves both as money and as a commodity; money that has intrinsic value such as gold or silver coins

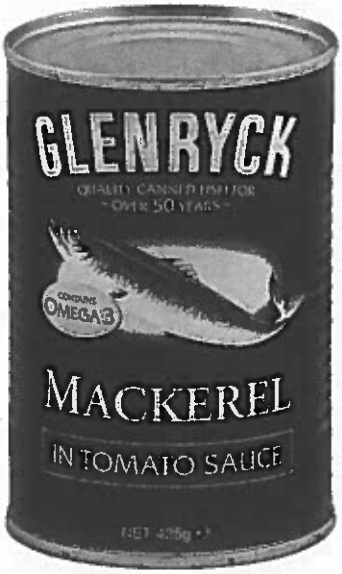
unit of account
A common unit for measuring the value of each good or service

store of value
Anything that retains its purchasing power over time

Fifth, commodity money often ties up otherwise valuable resources, so it has a higher opportunity cost than, say, paper money. For example, corn that is used for money cannot at the same time be used for corn on the cob, corn flour, popcorn, corn chips, corn oil, or biofuel. So the ideal money should have *a low opportunity cost.*

If the supply or demand for money fluctuates unpredictably, so will the economy's price level, and this is the final problem with commodity money. For example, if a bumper crop increases the supply of corn, more corn will be required to purchase other goods. This we call *inflation.* Likewise, any change in the demand for corn *as food* from, say, the growing popularity of corn chips, would affect the exchange value of corn. Erratic fluctuations in the market for corn limit its usefulness as money, particularly as a unit of account and a store of value. So the ideal money *should maintain a relatively stable value over time.* Money supplied by a responsible issuing authority is likely to retain its value better over time than money whose supply depends on uncontrollable forces of nature such as good or bad growing seasons.

What all this boils down to is that the ideal money is durable, portable, divisible, of uniform quality, has a low opportunity cost, and is relatively stable in value. These qualities are reinforced in Exhibit 1, which also lists the rationale, good examples, and bad examples. Please spend a minute now reviewing the table.



JEFF MORGAN 11/ALAMY

> "The ideal money is durable, portable, divisible, of uniform quality, has a low opportunity cost, and is relatively stable in value."

Mackerel Economics in Federal Prisons[1]

The economist R. A. Radford spent several years in prisoner-of-war camps in Italy and Germany during World War II, and he wrote about his experience. Although economic activity was sharply limited, many features of a normal economy were found in the prison life he observed. For example, in the absence of any official currency behind bars, cigarettes came to serve all three roles of money: medium of exchange, unit of account, and store of value. Cigarettes were of uniform quality, of limited supply (they came in rations from the International Red Cross), reasonably durable, and individually could support small transactions or, in packs, larger ones. Prices

1. R. A. Radford, "The Economic Organization of a P.O.W. Camp," *Economica*, 12 (November 1945): 189–201; Justin Scheck, "Mackerel Economics in Prisons Leads to Appreciation of the Oily Fillets," *Wall Street Journal*, 2 October 2008; and Ben Paynter, "Prison Economics," *Wired*, 31 January 2011, at http://www.wired.com/magazine/2011/01/st_prisoncurrencies/

Exhibit 1

Six Properties of Ideal Money

Quality	Rationale	Good Examples	Bad Examples
1. Durable	Money should not wear out quickly	Paper money; coins; sea shells	Strawberries; seafood
2. Portable	Money should be easy to carry, even relatively large sums	Diamonds; paper money	Lead bars; potatoes
3. Divisible	Market exchange is easier if denominations support a range of possible prices	Honey; paper money and coins	Cattle; diamonds
4. Uniform Quality	If money is not of uniform quality, people will hoard the best and spend the rest, reducing the quality in circulation	Salt bricks; paper money; coins	Diamonds
5. Low Opportunity Cost	The fewer resources tied up in creating money, the more available for other uses	Iron coins; paper money	Gold coins; diamonds; corn
6. Stable Value	People are more willing to accept and hold money if they believe it will keep its value over time	Anything whose supply can be limited by the issuing authority, such as paper money	Farm crops

measured in cigarettes became fairly uniform and well known throughout a camp of up to 50,000 prisoners of many nationalities and languages.

Now fast-forward half a century to the U.S. federal prison system. Prisoners are not allowed to hold cash. Whatever money sent by relatives or earned from prison jobs (at 40 cents an hour) goes into a prisoner's commissary account, which allows an inmate to buy items such as snacks and toiletries. In the absence of cash, to trade among themselves federal prisoners also came to settle on cigarettes as their commodity money (despite official prohibitions against trade of any kind among inmates). Cigarettes served as the informal money until 2004, when smoking was banned in all federal prisons.

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Once the ban took effect, the urge to trade created incentives to come up with some other commodity money. Prisoners tried other items sold at the commissary including postage stamps, cans of tuna, and Power Bars, but none of that seemed to catch on. Eventually prisoners settled on cans of mackerel, a bony, oily fish. So inmates informally use "macks"—as the commodity money came to be called—to settle gambling debts, to buy services from other inmates (such as haircuts, ironing, shoe shining, and cell cleaning), and to buy goods from other inmates (including special foods prepared with items from the commissary and illicit items such as home-brewed "prison hooch"). At those federal prisons where the commissary opens only one day a week, some prisoners fill the void by running mini-commissaries out of their lockers.

After wardens banned cans (because they could be refashioned into makeshift knives), the commodity money quickly shifted from cans of mackerel to plastic-and-foil pouches of mackerel. The mack is considered a good stand-in for the dollar because each pouch costs about $1 at the commissary, yet most prisoners, aside from weight-lifters seeking extra protein, would rather trade macks than eat them. And the mack is durable; unopened, a foil packet is good for years.

Wardens try to discourage the mackerel economy by limiting the amount of food prisoners can stockpile. Those caught using macks as money can lose commissary privileges, can be reassigned to a less desirable cell, or can even spend time in the "hole." Still, market forces are so strong that the mackerel economy survives in many federal prisons. Most state prisons have now banned smoking, and the mack has become the coin of the realm there too.

13-1d Coins

The division of commodity money into units was often natural, as in bushels of corn or heads of cattle. When rock salt was used as money, it was cut into uniform bricks. Because salt was usually of consistent quality, a trader had only to count the bricks to determine the amount of money. When silver and gold were used as money, both their quantity and quality were open to question. First, the amount had to be weighed, so transactions required scales. Second, because precious metals could be *debased* with cheaper metals, the quality of the metal had to be determined with each exchange. This was a nuisance.

This quantity and quality control problem was addressed by coining precious metals. *Coinage determined both the quantity and the quality of the metal.* Coins allowed payment by count rather than by weight. A flat surface on which this money was counted came to be called the *counter*, a term still used today. Initially, an image was stamped on only one side of a coin, leaving the other side blank. But people began shaving precious metal from the blank side. To prevent this, images were stamped on both sides. But another problem arose because bits of metal could still be clipped from the coin's edge. To prevent clipping, coins were bordered with a well-defined rim. If you have a dime or a quarter, notice the notches, or tiny serrations, on the edge. These serrations, throwbacks from the time when these coins were silver or gold, reduced the chances of "getting clipped."

Token money is money whose face value exceeds its production cost. Coins and paper money now in circulation in the United States are token money. For example, the 25-cent coin costs the U.S. Mint only about 10 cents to make. Minting 25-cent coins nets the U.S. Treasury hundreds of millions of dollars a year.

13-2 Money and Banking

For thousands of years, commodity money facilitated market exchange. Money existed long before banks did. Now we explore how banking developed a special role in supplying a nation's money.

token money
Money whose face value exceeds its cost of production

13-2a Early Banking

You have been around banks all your life, so you know more about them than you may think. But before we get to what you know, here's some background about how banking got started. The word *bank* comes from the Italian word *banca*, meaning "bench," which was a money changer's table. Banking spread from Italy to England, where London goldsmiths offered safekeeping for money and other valuables. The goldsmith gave depositors their money back on request, but because deposits by some tended to offset withdrawals by others, the amount of idle cash, or gold, in the vault changed little over time. Goldsmiths found that they could earn interest by lending from this pool of idle cash.

Goldsmiths offered depositors safekeeping, but visiting the goldsmith to get money to pay for each purchase became a nuisance. For example, a farmer might visit the goldsmith to withdraw enough money to buy a horse. The farmer would then pay the horse trader, who would promptly deposit the receipts with the goldsmith. Thus, money took a round-trip from goldsmith to farmer to horse trader and back to goldsmith. Because depositors soon grew tired of visiting the goldsmith every time they needed money, they began instructing the goldsmith to pay someone from their account. The payment amounted to moving gold from one stack (the farmer's) to another stack (the horse trader's). *These written instructions to the goldsmith were the first checks.* Checks have since become official looking, but they need not be, as evidenced by the actions of a Montana man who paid a speeding fine with instructions written on clean but frayed underpants. The Western Federal Savings and Loan of Missoula honored the "check."

check
A written order instructing the bank to pay someone from an amount deposited

fractional reserve banking system
Bank reserves amount to only a fraction of funds on deposit with the bank

bank notes
Originally, pieces of paper promising a specific amount of gold or silver to anyone who presented them to issuing banks for redemption; today, Federal Reserve notes are mere paper money

fiat money
Money not redeemable for any commodity; its status as money is conferred initially by government decree but eventually by common experience

By combining the ideas of cash loans and checks, the goldsmith soon discovered how to make loans by check. Rather than lend idle cash, the goldsmith could simply create a checking balance for the borrower. *The goldsmith could extend a loan by creating an account against which the borrower could write checks. In this way goldsmiths, or banks, were able to create a medium of exchange, or to "create money."* This money, based only on an entry in the goldsmith's ledger, was accepted because of the public's confidence that these claims would be honored.

The total claims against the goldsmith consisted of claims by people who had deposited their money plus claims by borrowers for whom the goldsmith had created deposits. Because these claims exceeded the value of gold on reserve, this was the beginning of a **fractional reserve banking system**, a system in which bank reserves amounted to just a fraction of total deposits. The *reserve ratio* measured reserves as a percentage of total claims against the goldsmith, or total deposits. For example, if the goldsmith had reserves of $6,000 but deposits of $10,000, the reserve ratio would be 60 percent. The goldsmith was relying on the fact that not everyone would ask for their deposits at the same time.

13-2b Bank Notes and Fiat Money

Another way a bank could create money was by issuing bank notes. **Bank notes** were pieces of paper promising the bearer specific amounts of gold or silver when the notes were presented to the issuing bank for redemption. In London, goldsmith bankers introduced bank notes about the same time they introduced checks. *Whereas checks could be redeemed only if endorsed by the payee, notes could be redeemed by anyone who presented them.* Paper money was often "as good as gold," because the bearer could redeem it for gold. In fact, paper money was more convenient than gold because it was less bulky and more portable.

The amount of paper money issued by a bank depended on that bank's estimate of the share of notes that would be redeemed. The higher the redemption rate, the fewer notes could be issued based on a given amount of reserves. Initially, these promises to pay were issued by private individuals or banks, but over time, governments took a larger role in printing and circulating notes. Once paper money became widely accepted, it was perhaps inevitable that governments would begin issuing **fiat money**, which derives its status as money from the power of the state, or by *fiat*. Fiat (pronounced "fee' at") money is money because the government says so. The word *fiat* is from Latin and means "so be it." Fiat money is not redeemable for anything other than more fiat money; it is not backed by something of intrinsic value. You can think of fiat money as mere paper money. It is acceptable not because it is intrinsically useful or valuable—as is corn or gold—but because the government says it's money. Fiat money is declared

legal tender by the government, meaning that you have made a valid and legal offer of payment of your debt when you pay with such money. *Gradually, people came to accept fiat money because they believed that others would accept it as well.* The currency issued in the United States and throughout most of the world is fiat money.

A well-regulated system of fiat money is more efficient for an economy than commodity money. Fiat money uses only paper and ink (a $1 note costs about 7 cents to make; a $100 note, about 10 cents), but commodity money ties up something intrinsically valuable. Paper money makes up only part of the money supply. Modern money also includes checking accounts, which are electronic entries in bank computers.

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13-2c The Value of Money

Money has grown increasingly more abstract—from a physical commodity, to a piece of paper representing a claim on a physical commodity, to a piece of paper of no intrinsic value, to an electronic entry representing a claim on a piece of paper of no intrinsic value. So why does money have value? The commodity feature of early money bolstered confidence in its acceptability. Commodities such as corn, tobacco, and gold had value in use even if for some reason they became less acceptable in exchange. When paper money came into use, its acceptability was initially fostered by the promise to redeem it for gold or silver. But because most paper money throughout the world is now fiat money, there is no promise of redemption. So why can a piece of paper bearing the portrait of Alexander Hamilton and the number 10 in each corner be exchanged for a pizza or anything else selling for $10? *People accept these pieces of paper because, through experience, they believe that others will do the same.* The acceptability of money, which we now take for granted, is based on decades of experience with the stability of its value and with the willingness of others to accept it as payment. As we will soon see, when money's value becomes questionable, so does its acceptability.

The *purchasing power* of money is the rate at which it exchanges for goods and services. The higher the price level in the economy, the less can be purchased with each dollar, so the less each dollar is worth. The purchasing power of each dollar over time varies inversely with the economy's price level. As the price level increases, the purchasing power of money falls. To measure the purchasing power of the dollar in a particular year, you first compute the price index for that year and then divide 100 by that price index. For example, relative to the base period of 1982 through 1984, the consumer price index for 2012 was 230. The purchasing power of a dollar was therefore 100/230, or $0.43, measured in 1982–1984 dollars. Exhibit 2 shows the steady decline in the purchasing power of the dollar since 1960, when it was worth $3.38 in 1982–1984 dollars. Put another way, as measured by the CPI, the value of a dollar—that is, what it could buy—fell by 87 percent between 1960 and 2013.

> "People accept these pieces of paper because, through experience, they believe that others will do the same."

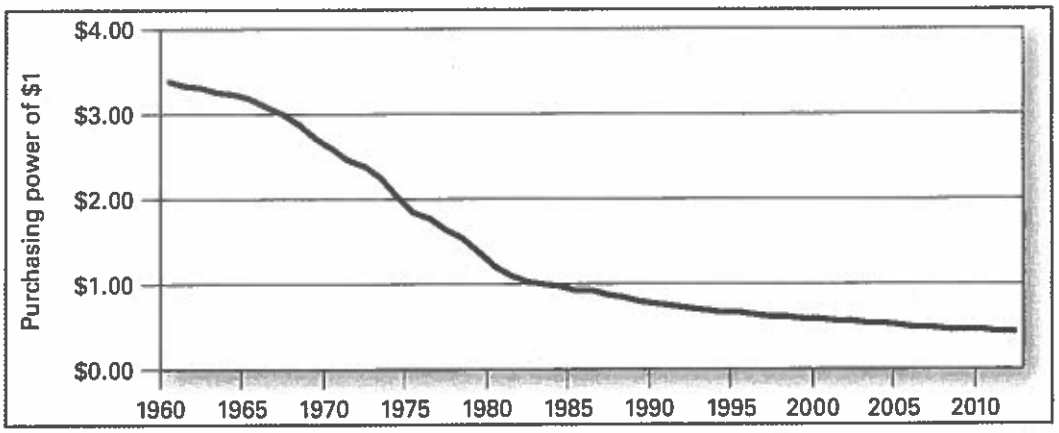
13-2d When Money Performs Poorly

One way to understand the functions of money is to look at instances where money did not perform well. In an earlier chapter, we mentioned hyperinflation in Zimbabwe. With prices growing by the hour, money no longer served as a reliable store of value, so workers couldn't wait to exchange their money for goods or for some "hard" currency—that is, a more stable currency. If inflation gets high enough, people no longer accept the nation's money and instead resort to some other means of exchange. On the other hand, if the supply of money dries

legal tender
U.S. currency that constitutes a valid and legal offer of payment of debt

Exhibit 2

Purchasing Power of $1.00 Measured in 1982–1984 Constant Dollars



SOURCE: Developed using CPI figures from the U.S. Bureau of Labor Statistics. For the latest CPI, go to http://www.bls.gov/cpi/home.htm.

up or if the price system is not allowed to function properly, barter may be the only alternative.

When the official currency fails to serve as a medium of exchange because of price controls or hyperinflation or when cash hoarding dries up money in circulation, some other means of exchange emerges. But this diverts more resources from production to exchange. A poorly functioning monetary system increases the transaction costs of exchange. *No machine increases the economy's productivity as much as properly functioning money.* Indeed, it seems hard to overstate the value of a reliable monetary system. This is why we pay so much attention to money and banking.

Let's turn now to the development of money and banking in the United States.

financial intermediaries Institutions such as banks, mortgage companies, and finance companies, that serve as go-betweens, borrowing from people who have saved to make loans to others

depository institutions Commercial banks and thrift institutions; financial institutions that accept deposits from the public

commercial banks Depository institutions that historically made short-term loans, primarily to businesses

thrift institutions, or thrifts Savings banks and credit unions; depository institutions that historically lent money to households

13-3 Financial Institutions in the United States

You have already learned about the origin of modern banks: Goldsmiths lent money from deposits held for safekeeping. So you already have some idea of how banks work. Recall from the circular-flow model that household saving flows into financial markets, where it is lent to investors. Financial institutions, such as banks, mortgage companies, and finance companies, accumulate funds from savers and lend them to borrowers. Financial institutions, or **financial intermediaries**, earn a profit by "buying low and selling high"—that is, by paying a lower interest rate to savers than they charge borrowers.

13-3a Commercial Banks and Thrifts

A wide variety of financial intermediaries respond to the economy's demand for financial services. **Depository institutions**—such as commercial banks, savings banks, and credit unions—obtain funds primarily by accepting customer *deposits*. Depository institutions play a key role in providing the nation's money supply. Depository institutions can be classified broadly into commercial banks and thrift institutions.

Commercial banks are the oldest, largest, and most diversified of depository institutions. They are called **commercial banks** because historically they made loans primarily to *commercial* ventures, or businesses, rather than to households. Commercial banks hold most deposits in the United States. **Thrift institutions**, or **thrifts**, include savings banks and credit unions. Historically, savings banks specialized in making home mortgage loans. Credit unions, which are more numerous but smaller than savings banks, extend loans only to their "members" to finance homes or other major consumer purchases, such as new cars. For the most part, this chapter will ignore credit unions, which are numerous but small and specialized.

13-3b Birth of the Fed

Before 1863, banks in the United States were chartered by the states in which they operated, so they were called *state banks*. These banks, like the English goldsmiths, issued bank notes. Notes from thousands of different banks circulated and most were redeemable for gold. The National Banking Act of 1863 and later amendments created a new system of federally chartered banks called *national banks*. National banks were authorized to issue notes and were regulated by the Office of the Comptroller of the Currency, part of the U.S. Treasury. State bank notes were taxed out of existence, but state banks survived by creating checking accounts for borrowers. To this day, the United States has a *dual banking system* consisting of state banks and national banks.

During the 19th century, the economy experienced a number of panic "runs" on banks by depositors seeking to withdraw their money. A panic was usually set off by the failure of some prominent financial institution. Fearful customers besieged their banks. Borrowers wanted additional loans and extensions of credit, and depositors wanted their money back. *As many depositors tried to withdraw their money, they couldn't because each bank held only a fraction of its deposits as cash reserves.* To reduce such panics, Congress created the Federal Reserve System in 1913 as the central bank and monetary authority of the United States.

Nearly all industrialized countries had formed central banks by 1900—such as the Bundesbank in Germany, the Bank of Japan, and the Bank of England, which has been around since 1694. But the American public's suspicion of monopoly power led to the establishment of not one central bank but separate banks in each of 12 Federal Reserve districts around the country. The new banks were named after the cities in which they were located—the Federal Reserve Banks of Boston, New York, Chicago, San Francisco, and so on, as shown in Exhibit 3 (which district are you in?). *Throughout most of its history, the United States had what is called a decentralized banking system. The Federal Reserve Act moved the country toward a system that was partly centralized and partly decentralized.* All national banks had to join the Federal Reserve System and thus were subject to new regulations issued by *the Fed*, as it came to be called (don't confuse *the Fed* with *the Feds*, shorthand for the FBI and other federal crime fighters). For state banks, membership was voluntary, and, to avoid the new regulations, most did not join.

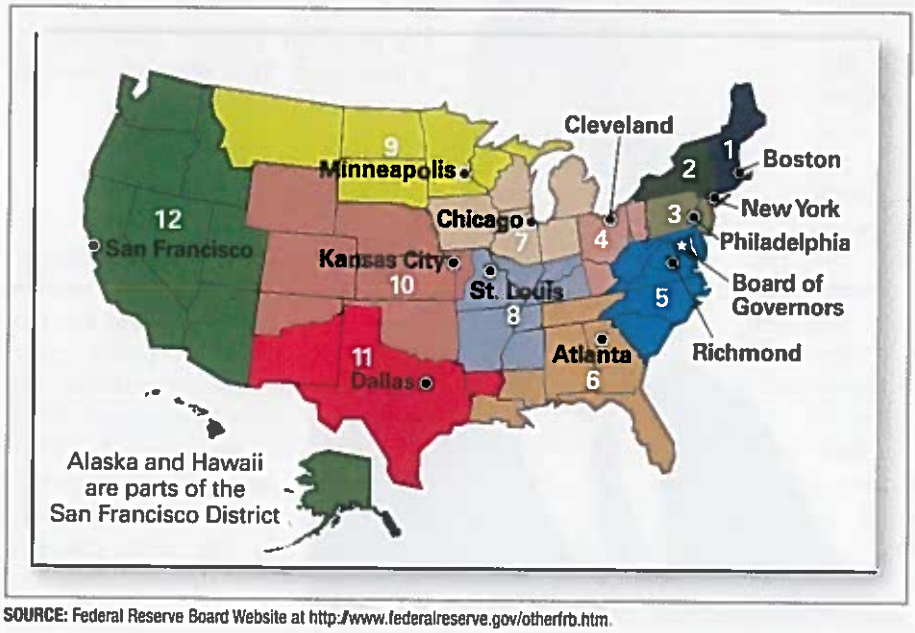
13-3c Powers of the Federal Reserve System

The Federal Reserve was authorized to ensure sufficient money and credit in the banking system as was needed to support a growing economy. The power to issue bank notes was taken away from national banks and turned over to Federal Reserve banks. (Take out a $1 note and notice what it says across the top: "FEDERAL RESERVE NOTE." On the front of a $1 note, the seal to the left of George Washington's portrait identifies which Federal Reserve bank issued the note.) The Federal Reserve was also granted other powers: *to buy and sell government securities, to extend loans to member banks, to clear checks in the banking system, and to require that member banks hold reserves equal to at least some specified fraction of their deposits.*

Federal Reserve banks do not deal with the public directly. Each may be thought of as a bankers' bank. Reserve banks hold deposits of member banks, just as depository

Exhibit 3

The Twelve Federal Reserve Districts



SOURCE: Federal Reserve Board Website at http://www.federalreserve.gov/otherfrb.htm.

Federal Reserve System, or the Fed
The central bank and monetary authority of the United States

institutions hold deposits of the public, and they extend loans to member banks, just as depository institutions extend loans to the public. The name *reserve bank* comes from the responsibility to hold member bank *reserves* on deposit.

Reserves are funds that banks have on hand or on deposit with the Fed to promote banking safety, to facilitate interbank transfers of funds, to satisfy the cash demands of their customers, and to comply with Federal Reserve regulations. By holding bank reserves, a Reserve bank can clear a check written by a depositor at one bank and deposited at another bank, much like the goldsmith's moving of gold reserves from the farmer's account to the horse trader's account. Reserve banks are also authorized to lend to banks in need of reserves; the interest rate charged is called the *discount rate*.

A member bank is required to own stock in its district Federal Reserve bank, and this entitles the bank to a 6 percent annual dividend. Any additional profit earned by the Reserve banks is turned over to the U.S. Treasury. So, technically, the Reserve banks are owned by the member banks in the district, but in practice the Fed is a not-for-profit, independent agency of the federal government. When the Fed chair gets grilled, it's by Congress, not by member banks.

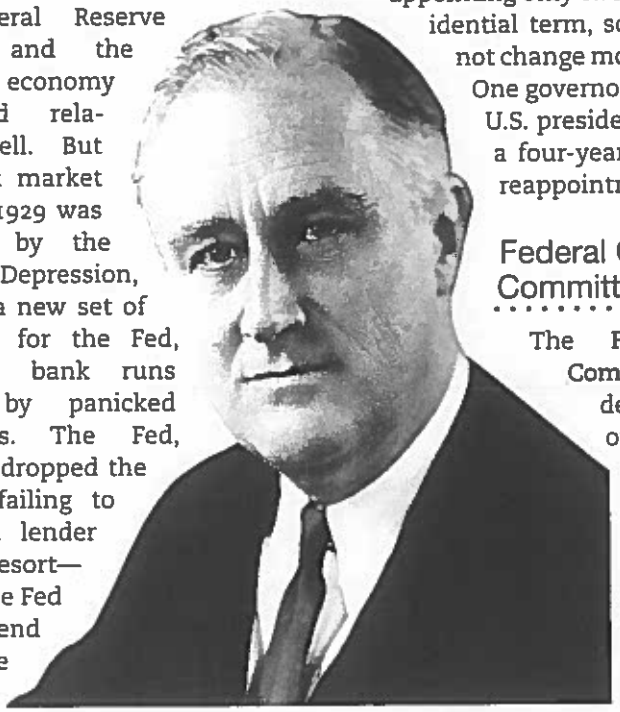
13-3d Banking Troubles During the Great Depression

reserves
Funds that banks use to satisfy the cash demands of their customers and the reserve requirements of the Fed; reserves consist of cash held by banks plus deposits at the Fed

Federal Open Market Committee
The 12-member group that makes decisions about open-market operations—purchases and sales of U.S. government securities by the Fed that affect the money supply and interest rates; consists of the seven Board governors plus five of the 12 presidents of the Reserve banks

open-market operations
Purchases and sales of government securities by the Fed in an effort to influence the money supply

From 1913 to 1929, both the Federal Reserve System and the national economy performed relatively well. But the stock market crash of 1929 was followed by the Great Depression, creating a new set of problems for the Fed, such as bank runs caused by panicked depositors. The Fed, however, dropped the ball by failing to act as a lender of last resort—that is, the Fed did not lend banks the money they needed to satisfy deposit withdrawals in cases of runs on otherwise sound banks. Many banks did not survive. Between 1930 and 1933, about 10,000 banks failed—about one-third of all U.S. banks. Most depositors at the failed banks lost everything.


ALLIANCE IMAGES/ALAMY

In his first inaugural address in 1933, newly elected President Franklin D. Roosevelt said, "The only thing we have to fear is fear itself," a statement especially apt for a fractional reserve banking system. Most banks were sound as long as people had confidence in the safety of their deposits. But if many depositors tried to withdraw their money, they could not do so because each bank held only a fraction of deposits as reserves. Bank legislation passed during the Great Depression shored up the banking system and centralized power with the Fed in Washington. Here are some features of that legislation.

Board of Governors

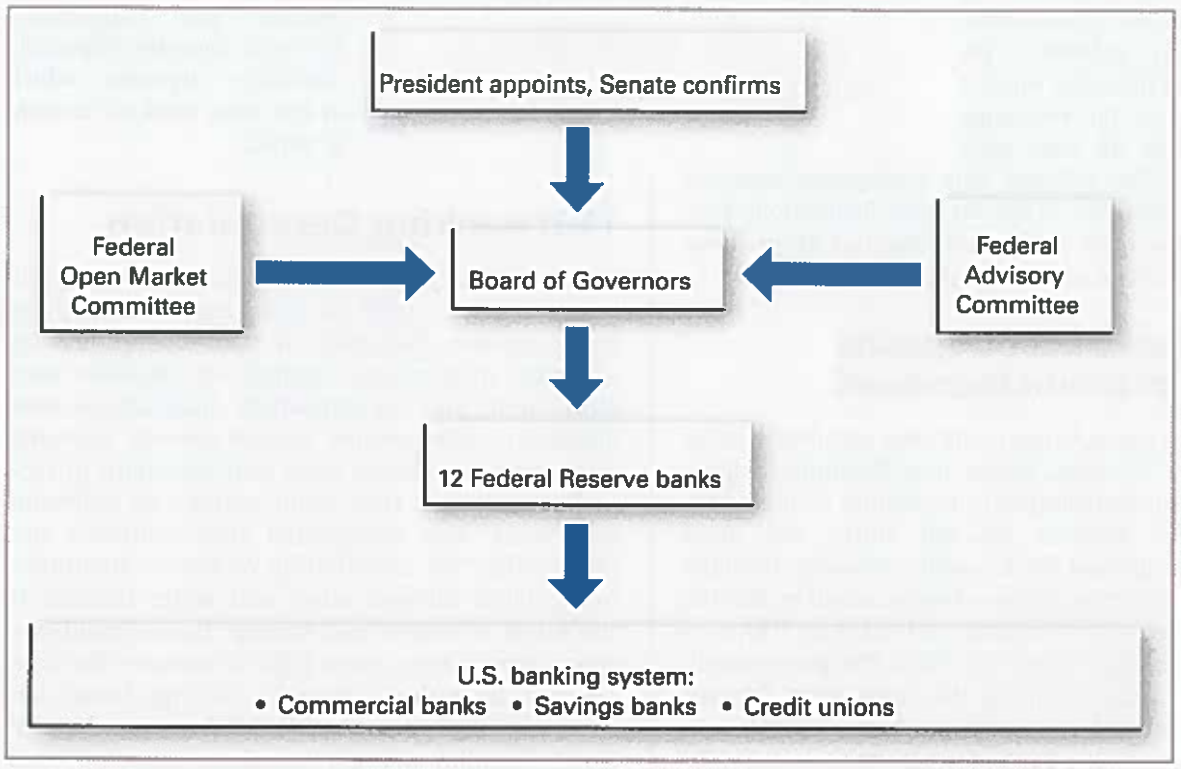
The *Board of Governors*, which consists of seven members appointed by the president and confirmed by the Senate, became responsible for setting and implementing the nation's monetary policy. *Monetary policy*, a term introduced in Chapter 3, is the regulation of the economy's money supply and interest rates to promote macroeconomic objectives. The Board of Governors now oversees the 12 Reserve banks, making the system more centralized. Each governor serves a 14-year nonrenewable term, with one term expiring every even-numbered year. *The long tenure is designed to insulate board members from political pressure.* A new U.S. president can be sure of appointing only two members during a presidential term, so a new president could not change monetary policy that much. One governor is also appointed by the U.S. president to chair the Board for a four-year term, with no limit on reappointments.

Federal Open Market Committee

The Federal Open Market Committee (FOMC) makes decisions about the key tool of monetary policy, open-market operations—the Fed's buying and selling of government securities (tools of monetary policy are examined in the next chapter). The FOMC consists of the 7 board governors

Exhibit 4

Organization Chart of the Federal Reserve System



plus 5 of the 12 presidents of the Reserve banks; the chair of the Board of Governors heads the group. Because the New York Federal Reserve bank carries out open-market operations, that bank's president always sits on the FOMC. The structure of the Federal Reserve System is presented in Exhibit 4. The FOMC and, less significantly, the Federal Advisory Committee (which consists of a banker from each of the 12 Reserve bank districts) advise the board.

> "The Federal Reserve System has a variety of tools to regulate the money supply."

Regulating the Money Supply

Because reserves amount to just a fraction of deposits, the United States has a *fractional reserve* banking system, as already noted. The Federal Reserve System has a variety of tools to regulate the money supply, including *(1) conducting open-market operations—buying and selling U.S. government securities; (2) setting the discount rate—the interest rate charged by Reserve banks for loans to member banks; and (3) setting legal reserve requirements for member banks.* We explore these tools in greater detail in the next chapter.

Deposit Insurance

Panic runs on banks stemmed from fears about the safety of bank deposits. The *Federal Deposit Insurance Corporation (FDIC)* was established in 1933 to insure the first $2,500 of each deposit account. Today the insurance ceiling is $250,000 per depositor per bank. Over 90 percent of all banks now purchase FDIC insurance, and deposits at FDIC-insured institutions totaled $10.8 trillion in 2013. Other insurance programs take care of the rest. *Deposit insurance, by calming fears about the safety of bank deposits, worked wonders to reduce bank runs.*

Goals of the Fed

The Fed's primary goals, its legal mandates, are price stability and maximum employment. Stable prices promote greater certainty, make economic planning easier, and help savers retain their spending power over time. Maximum employment means that jobs are easier to find so more people have money to spend.

Thus, price stability and maximum employment motivate Fed actions. But over the years, the Fed

has accumulated additional responsibilities. Here are four frequently mentioned goals of the Fed: (1) economic growth, (2) interest rate stability, (3) financial market stability, and (4) exchange rate stability. *All these goals boil down to low inflation; high employment; economic growth; and stability in interest rates, financial markets, and exchange rates.* As we will see, not all of these objectives can be achieved simultaneously.

> "The Fed's primary goals, its legal mandates, are price stability and maximum employment."

13-3e Banks Lost Deposits When Inflation Increased

Prior to the 1930s, banks could own corporate stocks and bonds, financial assets that fluctuated widely in value and contributed to instability of the banking system. Reforms enacted during the Great Depression limited bank assets primarily to loans and government securities—bonds issued by federal, state, and local governments. A *bond* is an IOU, so a government bond is an IOU from the government. Also, bank failures during the 1930s were thought to have resulted in part from fierce interest-rate competition among banks for customer deposits. To curb such competition, the Fed was empowered to set a ceiling on interest rates that banks could pay depositors.

These restrictions made banking a heavily regulated industry. Banks lost much of their freedom to wheel and deal, and the federal government insured most deposits. The assets banks could acquire were carefully limited, as were the interest rates they could offer depositors (checking deposits earned no interest). Banking thus became a highly regulated, even stuffy, industry. The term "banker's hours" was applied derisively to someone who had a short workday.

Ceilings on interest rates reduced interest-rate competition for deposits *among* banks. But a surge of inflation during the 1970s increased interest rates in the economy. When market interest rates rose above what banks could legally offer depositors, many withdrew their deposits and put them into higher-yielding alternatives. In 1972, Merrill Lynch, a major brokerage house, introduced an account combining a money market mutual fund with limited check-writing privileges. Money market mutual fund shares are claims on a portfolio, or collection, of short-term interest-earning assets. These mutual funds, as financial intermediaries, became stiff competition for bank deposits, especially checkable deposits, which at the time paid no interest at banks.

money market mutual fund
A collection of short-term interest-earning assets purchased with funds collected from many shareholders

13-3f Banking Deregulation

In response to the loss of deposits and other problems, Congress tried to ease regulations, giving banks greater discretion in their operations. For example, interest-rate ceilings for deposits were eliminated, and all depository institutions were allowed to offer money market deposit accounts. Such deposits jumped from only $8 billion in 1978 to $200 billion in 1982. Some states, like California and Texas, also deregulated state-chartered savings banks. The combination of deposit insurance, unregulated interest rates, and wider latitude in the kinds of assets that savings banks could purchase gave them a green light to compete for large deposits in national markets. Savings banks had been restricted to residential lending, but the 1982 legislation allowed them to make commercial loans. Once-staid financial institutions moved into the fast lane.

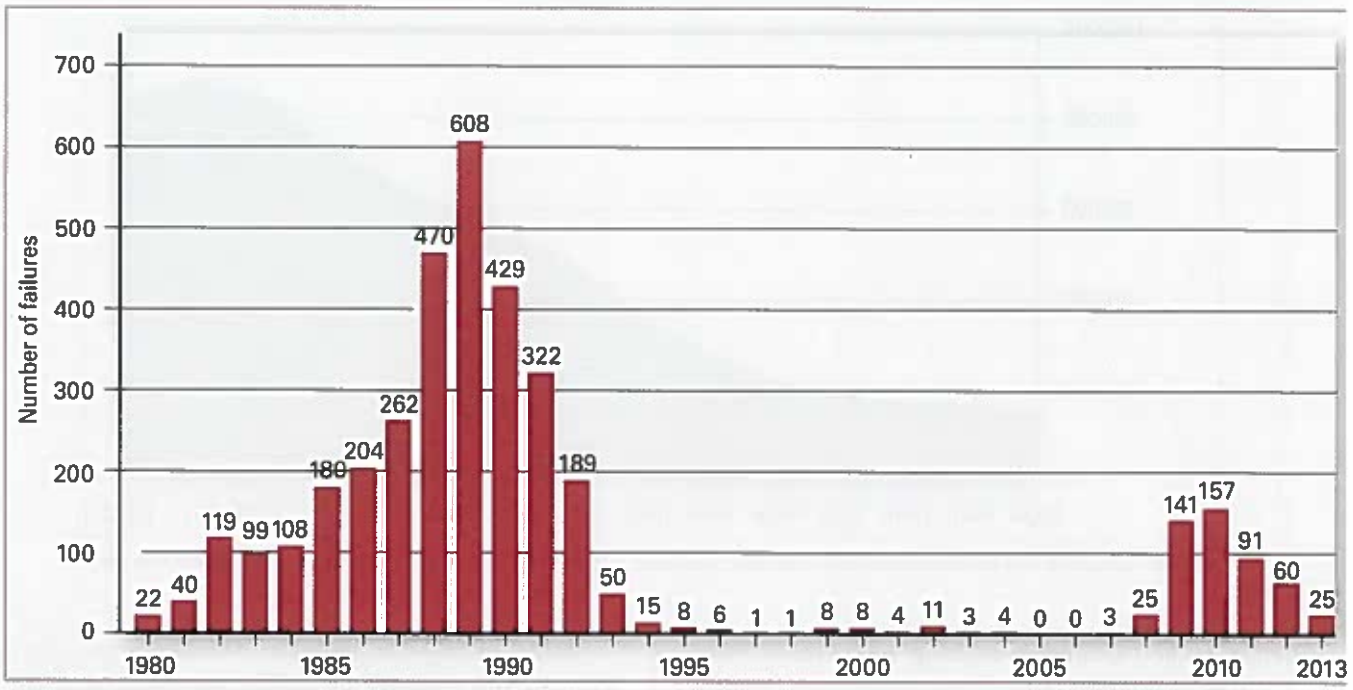
Banks could wheel and deal but with the benefit of deposit insurance. The combination of deregulation and deposit insurance encouraged some on the verge of failing to take bigger risks—to "bet the bank"—because their depositors would be protected by deposit insurance. This created a *moral hazard*, which in this case was the tendency of bankers to take unwarranted risks in making loans because deposits were insured. Banks that were virtually bankrupt—so-called zombie banks—were able to attract deposits because of deposit insurance. Zombie banks, by offering higher interest rates, also drew deposits away from healthier banks. Meanwhile, because deposits were insured, most depositors paid less attention to their banks' health. Thus, *deposit insurance, originally introduced during the Great Depression to prevent bank panics, caused depositors to become complacent about the safety of their deposits. Worse still, it caused those who ran troubled banks to take wild gambles to survive.*

13-3g Banks on the Ropes

Many of these gambles didn't pay off, particularly loans to real estate developers, and banks lost a ton of money. The insolvency and collapse of a

Exhibit 5

Number of U.S. Bank Failures Peaked in 1989



SOURCES: Based on annual reports from the Federal Deposit Insurance Corporation. For the latest figures, go to http://www.fdic.gov/bank/individual/failed/banklist.html. Figure for 2013 is projected based on failures through the first half of that year.

growing number of banks prompted Congress in 1989 to approve what was then the largest financial bailout of any U.S. industry—a measure that would eventually cost about $180 billion in today's dollars. Taxpayers paid 80 percent of the total, and banks paid the remaining 20 percent through higher deposit insurance premiums. The money was spent to close down failing banks, pay off insured depositors, and find healthier banks to take over the deposit accounts.

Exhibit 5 shows the number of bank failures in the United States by year since 1980. From their 1989 peak of 608, annual failures dropped to none in 2005 or 2006. About 3,000 banks failed between the early 1980s and early 1990s.

13-3h U.S. Banking Developments

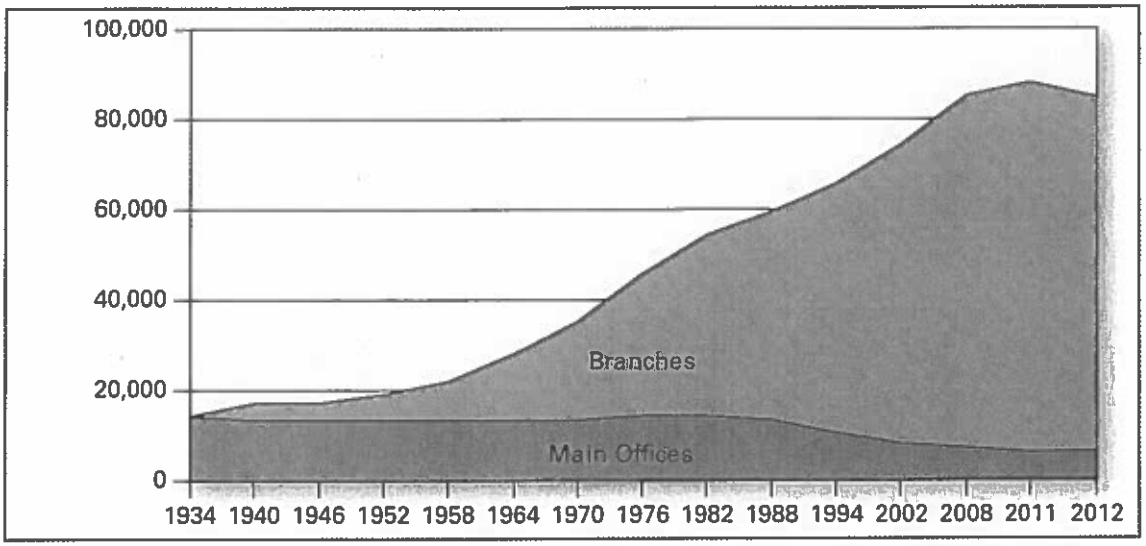
As failed banks disappeared or merged with stronger banks, the industry got healthier. Bank profits grew fourfold during the 1990s. Although the number of commercial banks fell by half since the mid-1980s, the United States, with about 6,900 FDIC-insured commercial banks in 2013, still had more than any other country. Other major economies have fewer than 1,000 commercial banks (Japan and Canada, for example, have fewer than 100 banks each, though most have many branches). The large number of U.S. banks reflects past restrictions on **bank branches**, which are additional offices that carry out banking operations. Again, Americans, fearing monopoly power, did not want any one bank to become too large or powerful. The combination of intrastate and interstate restrictions on branching spawned the many commercial banks that exist today, most of which are relatively small. For example, the bottom 98 percent of U.S. commercial banks in 2013 held just 20 percent of all deposits. Branching restrictions create inefficiencies, because banks cannot achieve optimal size and cannot easily diversify their portfolios of loans across different regions. Branching restrictions were one reason for bank failures during the Depression. Such restrictions meant a bank made loans primarily in one community—it had all its eggs in that basket.

In recent years, federal legislation has lifted some restrictions on interstate branching and on the kinds of assets that banks can own. Two developments allowed

bank branches
A bank's additional offices that carry out banking operations

Exhibit 6

Number of Commercial Banks Declined over the Last Three Decades, but the Number of Branches Continues to Grow



SOURCES: Figures are for FDIC-insured commercial banks in the United States based on Federal Deposit Insurance Corporation and the Federal Reserve Bank data.

banks to get around branching restrictions: bank holding companies and mergers. A **bank holding company** is a corporation that may own several different banks. The *Gramm-Leach-Bliley Act* of 1999 repealed some Depression-era restrictions on the kinds of assets a bank could own. A holding company can provide other services that banks are not authorized to offer, such as financial advising, leasing, insurance, credit cards, and securities trading. Thus, holding companies blossomed. About 90 percent of the nation's checking deposits are in banks owned by holding companies. But in the aftermath of the recent financial crises, policy makers restricted the kinds of assets a bank can own and trade, as you'll soon see.

Another important development that allowed banks to expand their geographical reach is *bank mergers*, which have spread the presence of some banks across the country. Banks are merging because they want more customers and expect the higher volume of transactions to reduce operating costs per customer. Nationwide banking is also seen as a way of avoiding the concentration of bad loans that sometimes occurs in one geographical area. The merger movement was initially fueled by a rising stock market and by federal legislation that facilitates consolidation of merged banks. More recently, some banks weakened by the financial crisis have been forced to merge with stronger banks to survive.

bank holding company
A corporation that owns banks

Bank holding companies and bank mergers have reduced the number of banks, but increased the number of branches. Exhibit 6 shows the number of commercial banks and bank branches in the United States since 1934. The number of banks, as indicated by "main offices," remained relatively constant between 1934 and 1982 but has since fallen by more than half as a result of failures, mergers, and holding companies. The number of bank branches increased steadily, however, more than doubling since 1982. So the number of branches per bank increased. In 1982, the average U.S. commercial bank had about 3 branches; by 2012, it had about 12 branches.

13-4 Banking During and After the Great Recession of 2007–2009

The biggest financial development in recent years has been the introduction of the subprime mortgage, which contributed to the crisis of 2008 and the severe recession. Here's what happened.

13-4a Subprime Mortgages and Mortgage-Backed Securities

Prior to 2000, only a credit worthy, or *prime*, borrower could get a home mortgage. But new statistical techniques and better computers supposedly increased a

lender's ability to assess the risk of a **subprime mortgage**, which is a mortgage for a borrower with a not-so-good credit rating. Any household with a credit history could be assigned a numerical credit score, and this score could be used to predict how likely that borrower would be to default on mortgage payments. Borrowers more likely to default would pay a higher interest rate to compensate the lender for their higher risk. Hundreds of mortgages could then be bundled together based on credit scores into a **mortgage-backed security**, which represents a claim on the monthly payments made on those mortgages. The idea is that subprime mortgages could be blended with other mortgages in whatever proportion needed to arrive at a particular level of default risk for the security. And a securities-rating agency could look at the mix of mortgages and assign that security an overall credit rating. A higher proportion of subprime loans would result in a higher-risk security, but would also yield a higher return for investors. Investors could choose securities based on their tolerance for risk. Mortgage-backed securities opened up new sources of financing for subprime borrowers.

After the U.S economy recovered from the recession of 2001, subprime mortgages grew in popularity. Fueled by cash flows coming into the United States from places like China, the sub prime market became a trillion-dollar business by 2007. This development was considered good for America because it gave more households access to mortgage credit. Subprime borrowers might pay higher interest rates than prime borrowers, but at least they could get mortgages. The availability of subprime mortgages turned some renters into homeowners, a group presumably more committed to the community. Indeed, federal regulators pressured financial institutions into lending to groups that before the advent of subprime mortgages had been underserved.

Subprime loans increased the demand for housing, which raised housing prices, which, in turn, fueled a boom in subprime loans in a reinforcing cycle. As home prices rose, many borrowers saw this as an opportunity to refinance. Based on the rising value of their homes, they would take out a bigger mortgage, use most of that money to pay off the old one, and still have money left over. Of course, monthly mortgage payments would increase too, but rising home prices meant that, in a pinch, the house could always be sold to pay off the mortgage. Home prices had been marching higher for at least two decades. Mortgage-backed securities were considered a safe investment offering an attractive return. They were sold around the world. Banks and other financial institutions bought a lot of them. What could go wrong?

13-4b Incentive Problems and the Financial Crisis of 2008

A subprime mortgage typically originated with a mortgage broker (two-thirds originated this way). The mortgage was then sold to an underwriter who bundled it with other mortgages and sold them as a mortgage-backed security to investors, the source of financing in the deal. Once the mortgage was originated, that mortgage broker earned a fee and soon lost interest in whether the borrower was good for the money. Research indicates that the riskier the loan, the higher the interest rate, and the more the broker made on that loan. Brokers had an incentive to encourage borrowers to apply for mortgages they could not afford, and some brokers falsified information on mortgage applications to make sure they would get approved. Some borrowers also exaggerated their income if there was no income verification (these became known as "liar's loans"). Making everything worse was lax regulation of mortgage originators, who were not required to tell borrowers whether or not they could afford the loans.

Meanwhile, banks and other financial institutions were earning attractive fees creating and selling mortgage-backed securities. Underwriters of mortgage-backed securities usually had little incentive to make sure that those who bought the securities would ultimately get paid.[2] Worse yet, the credit-rating agencies that evaluated these securities also had a conflict of interest. They earned their fees by assessing the riskiness of these securities. But underwriters could shop around for the credit-rating agency that offered the highest rating. Thus, mortgage-backed securities tended to get better ratings than they deserved—that is, the securities were actually more risky than their credit ratings indicated.

As housing prices rose and the profitability of converting mortgages into securities increased, underlying credit standards fell. Riskier borrowers could get mortgages with little trouble. The size of the mortgages increased, as did the loan-to-value ratio, meaning that instead of borrowing up to 80 percent of a home's value, home buyers could borrow

subprime mortgage
Mortgage for a borrower with a not-so-good credit rating

mortgage-backed security
A claim on payments made on the many mortgages bundled into this financial instrument

2. See, for example, Benjamin Keys et al., "Did Securitization Lead to Lax Screening? Evidence from Subprime Loans," *Quarterly Journal of Economics*, 125 (February 2010): 307–362.

REBECCA COOK/REUTERS/CORBIS

90 or even 100 percent of its value. And borrowers could often take out a second mortgage to pay for the down payment, so they ended up needing little or no money down to buy a house. In 2001 half of all mortgages required down payments of 20 percent or less; by 2006 at least half required down payments of only 10 percent or less, and a quarter of mortgages had no down payment requirements at all.

Bundling hundreds of mortgages into a single mortgage-backed security made for a complicated investment, and this worsened the incentive problems. Yet as long as home prices rose, everyone was happy—the borrower, the mortgage originator, the banker who underwrote and sold the mortgage-backed security, the credit-rater, and the investor who found the yield attractive.

> "Policy makers had not seen anything like this in their lifetimes."

But housing prices reached a level that in retrospect was far out of whack with fundamentals of the housing market. After peaking in 2006, housing prices began to fall. Between 2006 and the middle of 2008, U.S. home prices plunged 22 percent on average. With housing prices tumbling, all the corners cut in the mortgage market soon became obvious. Many mortgages slipped "underwater," meaning that borrowers owed more than the house was worth. Such borrowers had an incentive to stop making payments. Many did, and defaults rose sharply, leading to millions of foreclosures.

Mortgage-backed securities quickly turned into "troubled assets." Because nobody wanted them, their value plummeted. Rising home foreclosures fed into the full-scale global financial panic in September 2008. The collapse of a major investment bank, Lehman Brothers, signaled that other financial institutions could soon follow. Nobody wanted to lend money they might not get back. Credit dried up. Panic spread to consumers, who cut consumption because of falling home prices, mounting job losses, and a collapsing stock market.

13-4c The Troubled Asset Relief Program

Policy makers had not seen anything like this in their lifetimes. By early October 2008, a consensus had formed around a stopgap measure to help unfreeze credit markets and stabilize the banks. The **Troubled Asset Relief Program**, or **TARP**, authorized the U.S. Treasury to purchase up to $700 billion in mortgage-backed securities. The idea was to buy these illiquid, difficult-to-value assets and get them off the banks' books. Treasury officials soon decided that TARP money would not be used to buy troubled assets but instead would be invested directly into financial institutions that were sound except for their troubled assets. The idea was to infuse new financial capital into these financial institutions to prevent more failures and to get banks lending again. The failure of Lehman Brothers was such a shock to financial markets that policy makers wanted to prevent other financial giants from collapsing. A trillion-dollar institution such as AIG, with its financial ties to hundreds of other financial institutions, had become too big to fail—that is, its failure would have been such a disaster for the wider economy that failure had to be prevented, even if it required a financial bailout.

TARP money was used to buy stakes in banks large and small. (TARP money also bought government stakes in General Motors and Chrysler to keep the car makers operating.) Once financial markets stabilized a bit and the stock market recovered some ground, the value of the Treasury's investment increased; these bailouts were expected to cost taxpayers about $100 billion (about one third of that loss would stem from investments in the automakers). But housing

Troubled Asset Relief Program, or TARP
Government program that invested in financial institutions and automakers to help stabilize markets; in October 2008 budgeted at $700 billion but expected to cost much less

too big to fail
A financial institution had become so large and so interconnected with other financial institutions that its failure would be a disaster for the wider economy; its collapse had to be prevented even if that required a bailout

prices continued to fall, homes continued to slip under water, and banks continued to suffer from mortgage defaults. Underwater loans were greatest in Nevada, Arizona, Florida, Michigan, and California.

All these troubles contributed to a spike in bank failures. As was shown in Exhibit 5, failures increased from 25 in 2008 to 141 in 2009 to 157 in 2010. Bank failures abated to 91 in 2011 and to about 25 in 2013. Because of failures and mergers, the number of banks in the United States declined from about 18,000 in 1984 to less than half that in 2013. Eighty-five percent were commercial banks, and 15 percent were savings banks. Commercial banks account for the overwhelming share of deposits. The troubles created by subprime mortgages, mortgage-backed securities, and other financial problems prompted regulatory reform. That's discussed next.

13-4d The Dodd-Frank Act

On July 21, 2010, President Obama signed into law the most sweeping overhaul of financial regulations since the Great Depression. The **Dodd-Frank Wall Street Reform and Consumer Protection Act**, named for its sponsors in the Senate and House, took 18 months to develop and will take many years to implement. The legislation, which was 2,300 pages long, authorized 10 regulatory agencies to write and interpret hundreds of new rules governing financial markets.

Some provisions aim to remedy the incentive problems already discussed. To ensure that borrowers can repay a home loan, a mortgage originator must verify income, credit history, and job status. Mortgage originators cannot be paid more for funneling borrowers to riskier loans. To ensure that issuers of mortgage-backed securities are sensitive to the risk of these assets, issuers must retain at least 5 percent of the credit risk associated with the mortgages. And credit-rating agencies will be subject to new regulations.

For the first time, the law authorizes the Federal Reserve to regulate companies other than banks—such as insurance companies and investment firms—if they are mostly engaged in financial activities. The law imposes other regulations on banks, limiting their ability to trade on their own behalf and restricting their investments in hedge funds and private equity funds, which tend to be riskier.

The law establishes the *Financial Stability Oversight Council*, a super-regulator that monitors Wall Street's largest firms and other market participants to spot and respond to emerging systemic risks. The nine-member panel, led by the Treasury Department, includes regulators from other agencies. Regulators get new authority to seize and liquidate troubled financial firms if their failure would jeopardize the nation's financial stability (such as with AIG). The idea is that reducing systemic risk and maintaining financial stability become regulatory objectives. A new *Bureau of Consumer Financial Protection* has broad powers to write consumer-protection rules for banks and other firms that offer financial services.

Financial regulators get more funding, more information, and more power. Supporters say the law will reduce the likelihood of another financial crisis and will handle it better if one should occur. Others aren't so sure. Some economists argue that there are many ways a firm can take risks, and banning one form of risk-taking just shifts traders to other kinds of risk. For example, at a high enough interest rate, a bank may be willing to lend to extremely risky borrowers. What other unintended consequences will the new regulations create? Will regulations stifle financial innovation? Will U.S. financial institutions lose business to foreign competitors? Will the availability of credit be impaired by increased uncertainty and costs? Will new financial products be developed that make the regulations irrelevant? Will credit flows get choked by regulatory bureaucracy and politics? More generally, how will capitalism change if government regulators can seize and liquidate any financial institution? It's said that the military is often planning for the previous war. Are regulators, the same ones who allowed all this to happen in the first place, gearing up to prevent the next financial crisis?

13-4e Top Banks in America and the World

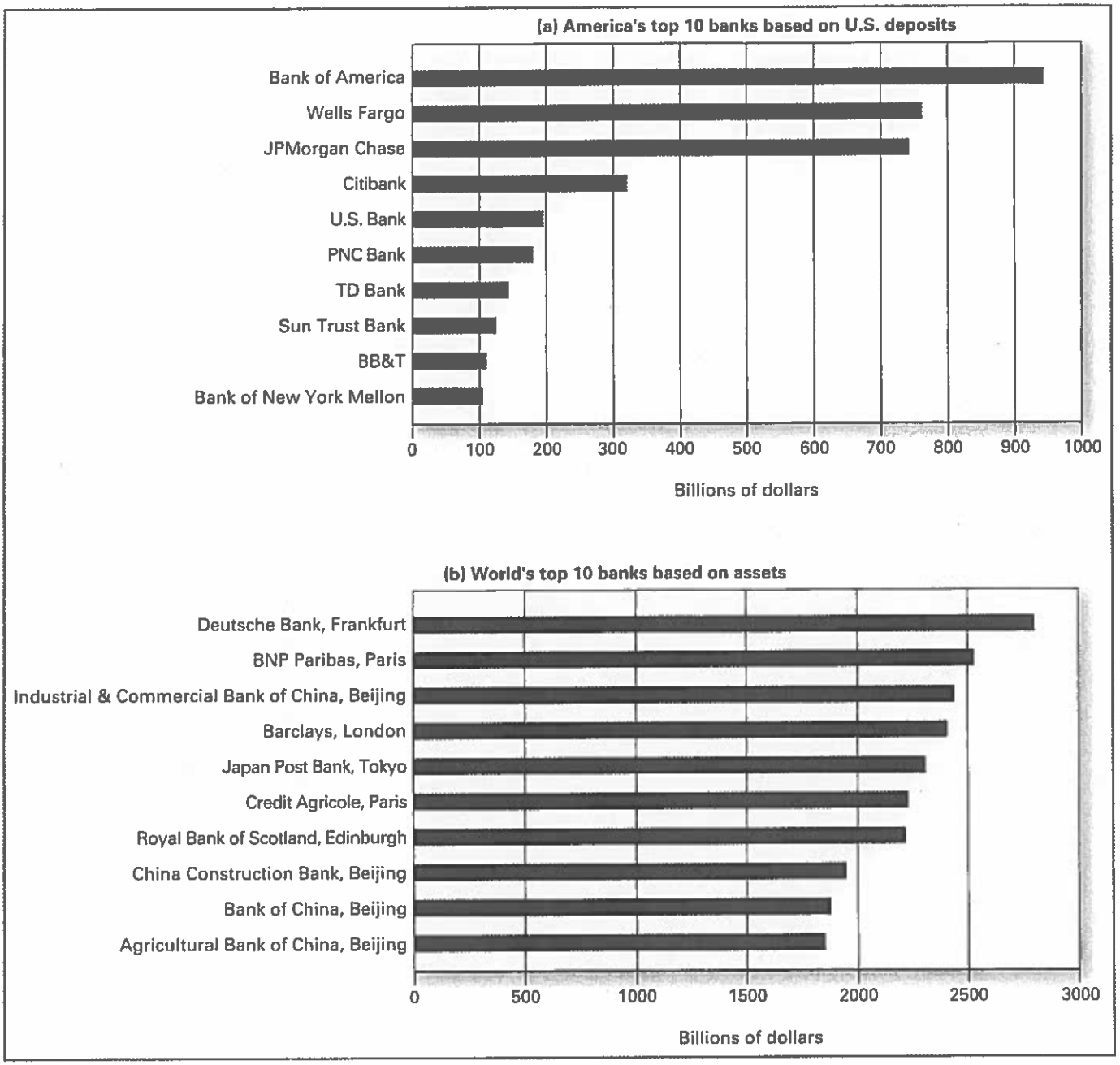
The financial crisis of 2008 and the recession rattled the banking world. Let's take a look at the biggest banks in America and in the world. Exhibit 7 (a) shows the top 10 U.S. banks based on their U.S. deposits. Notice the wide range in size, with the top bank holding over nine times the deposits as the bank ranked tenth. The top banks grew mostly through mergers and acquisitions. For example, BankAmerica and NationsBank merged to form Bank of America, which then acquired FleetBoston, a major bank in the Northeast, which itself was a product of several mergers. Bank of America now stretches from coast to coast with more than 5,800 branches.

Dodd-Frank Wall Street Reform and Consumer Protection Act
Sweeping regulatory changes aimed at preventing another financial crisis

Finally, because of the subprime mortgage and global financial crises of September 2008, some big banks that

Exhibit 7

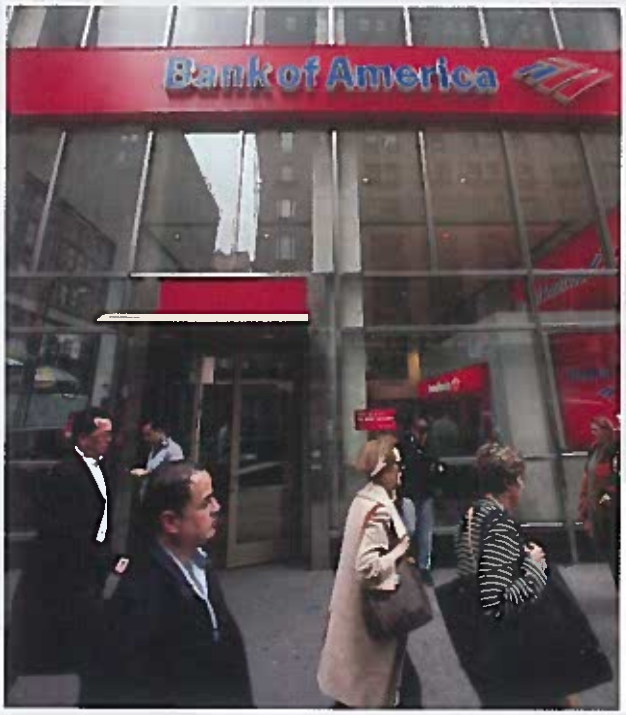
Top 10 Banks in America and the World



(A) SOURCE: Federal Deposit Insurance Corporation as of 2011.
(B) SOURCE: "Top 50 Banks in the World," Bankers' Almanac, available at http://www.bankersaccuity.com/resources/bank-rankings/. Figures are for year-end 2011.

were on the ropes had to be taken over by healthier banks. For example, Wachovia, in 2008 the nation's third-largest bank, had to merge with Wells Fargo, then the nation's fourth largest. And Washington Mutual, at the time the sixth-largest bank, was seized by the FDIC on September 25, 2008, after a 10 day bank run during which depositors withdrew $16 billion, or about 10 percent of all its deposits. The FDIC arranged for Washington Mutual to be acquired by JPMorgan Chase. You can see from panel (a) of Exhibit 7 that Wells Fargo most recently ranked second and JPMorgan Chase third among U.S. banks.

How big are U.S. banks on the world stage? Not very. No U.S. bank ranked among the top 10 based on



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worldwide assets. As shown by Exhibit 7 (b), China is home to 4 of the world's 10 largest banks. France and the United Kingdom each have two in the top 10. Thus, the United States has the largest economy in the world but has no bank among the top 10 in the world. This partly reflects America's lingering fear of big banks. Some U.S. banks may be considered "too big to fail," but they are still too small to rank among the world's largest.

13-5 Final Word

Money has grown increasingly more abstract over time, moving from commodity money to paper money that represented a claim on some commodity, such as gold, to paper money with no intrinsic value. As you will see, paper money constitutes only a fraction of the money supply. Modern money also consists of electronic entries in the banking system's computers. So money has changed from a physical commodity to an electronic entry. Money today does not so much change hands as change electronic accounts.

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30 years < Projected life of U.S. coins

Projected life of U.S. paper currency > 18 months

$10.8 trillion < Bank deposits insured by the FDIC in 2013

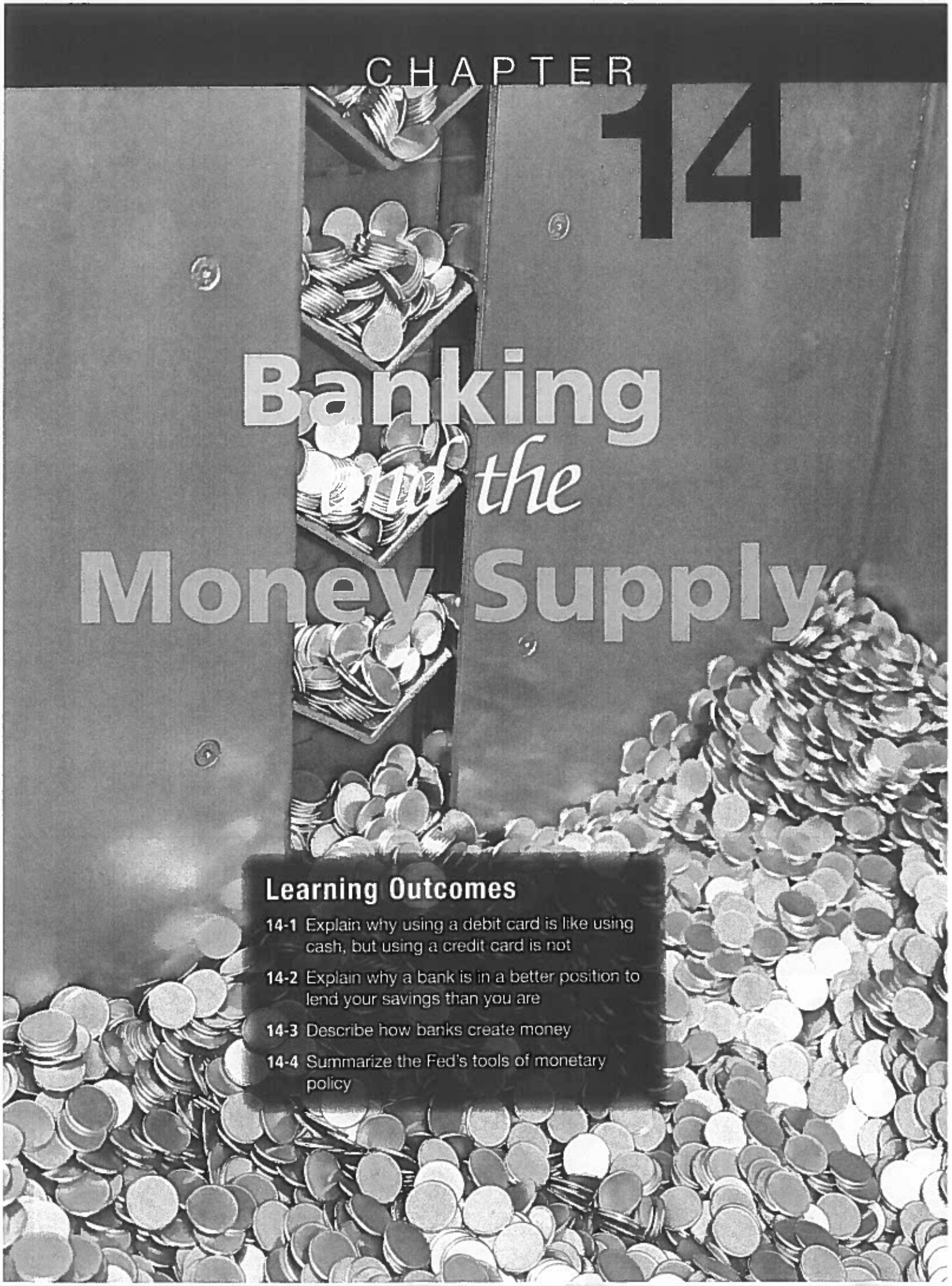
FDIC insurance ceiling per depositor per bank > $250,000

About 10,000 < U.S. bank failures from 1930 to 1933

U.S. bank failures from 2009 to 2013 > About 480

CHAPTER 14

Banking and the Money Supply



Learning Outcomes

14-1 Explain why using a debit card is like using cash, but using a credit card is not

14-2 Explain why a bank is in a better position to lend your savings than you are

14-3 Describe how banks create money

14-4 Summarize the Fed's tools of monetary policy

JIM WEST/ALAMY

"How is the Fed both literally and figuratively a money machine?"

How do banks create money? Why are banks called First Trust or Security National rather than Benny's Bank or Loadsamoney? How is the Fed both literally and figuratively a money machine? Why are we so interested in banks, anyway? After all, isn't banking a business like any other, such as dry cleaning, auto washing, or home remodeling? Why not devote a chapter to the home-remodeling business? Answers to these and related questions are provided in this chapter, which examines banking and the money supply.

What do you think?

Most banks don't take part in risky lending.

Strongly Disagree 1 2 3 4 5 6 7 Strongly Agree

In this chapter, we take a closer look at the unique role banks play in the economy. Banks are special in macroeconomics because, like the London goldsmith, they can convert a borrower's IOU into money, one key to a healthy economy. Because regulatory reforms have eliminated many of the distinctions between commercial banks and thrift institutions, all depository institutions are usually referred to more simply as banks.

We begin by going over the definitions of money, from the narrow to the broad view. Then, we look at how banks work and how they create money. We also consider the Fed in more detail. As you will see, the Fed attempts to control the money supply directly by issuing currency and indirectly by regulating bank reserves.

Topics discussed in Chapter 14 include

- Money aggregates
- Checkable deposits
- Balance sheets
- Money creation
- The money multiplier
- Tools of the Fed

14-1 Money Aggregates

When you think of money, what comes to mind is probably currency—dollar notes and coins. But as you learned in the last chapter, dollar notes and coins account for only part of the money supply. In this section, we consider two definitions of money.

14-1a Narrow Definition of Money: M1

Suppose you have some cash with you right now—dollar notes and coins. These are part of the money supply as narrowly defined. If you were to deposit this cash in your checking account, you could then write checks directing your bank to pay someone from your account. Checkable deposits are bank deposits that allow the account owner to write checks to third parties. Checkable deposits are included in the narrow definition of money and can also be tapped with a debit card. Banks hold a variety of checkable deposits. In recent years, financial institutions have developed other kinds of accounts that carry check-writing privileges but also earn interest.

Money aggregates are measures of the money supply defined by the Federal Reserve. The narrow definition, called M1, consists of currency (including coins) held by the nonbanking public, checkable deposits, and traveler's checks. Note that currency in bank vaults is not counted as part of the money supply because it is not being used as a medium of exchange—it's just sitting there out of circulation. But checkable deposits are money because their owners can write checks or use debit cards to tap them. Checkable deposits are the liabilities of the issuing banks, which stand ready to convert them into cash. But unlike cash, checks are not legal tender, as signs that say "No Checks!" attest.

The currency circulating in the United States consists mostly of Federal Reserve notes, which are produced by the U.S. Bureau of Engraving and Printing and are issued by and are liabilities of the 12 Federal Reserve banks. Nearly one-third of the Fed's liabilities consist of Federal Reserve notes. The Fed spends about $600 million a year printing, storing, and distributing notes. Because Federal Reserve notes are redeemable for nothing other than more Federal Reserve notes, U.S. currency is *fiat money*. The other component of currency is coins, manufactured by the U.S. Mint, which sells these coins to Federal Reserve banks at face value. Like paper money, U.S. coins are token money because their metal value is usually less than their face value (though metal values of the penny and the nickel may soon exceed their face values). The U.S. Mint, a division of the U.S. Treasury, reaps any profit from coin production (in 2012 this amounted to $208 million, mostly from quarters).

checkable deposits
Bank deposits that allow the account owner to write checks to third parties; debit cards can also access these deposits and transmit them electronically

money aggregates
Measures of the economy's money supply

M1
The narrow measure of the money supply, consisting of currency and coins held by the nonbanking public, checkable deposits, and traveler's checks

savings deposits
Deposits that earn interest but have no specific maturity date

MICHELE MOLINARI/ALAMY

This is the menu of a restaurant in Ecuador, where prices are in U.S. dollars.

As much as two-thirds of Federal Reserve notes now circulate abroad.[1] Some countries, such as Panama, Ecuador, and El Salvador, use U.S. dollars as their currency. In other countries, especially those that have experienced high inflation, U.S. dollars circulate alongside the local currency. In Vietnam, for example, some high-end restaurants list prices in U.S. dollars, not in dong, the national currency. Dollars circulating abroad are, in fact, a good deal for Americans because a $100 note that costs only about 10 cents to print can be "sold" to foreigners for $100 worth of goods and services. It's as if these countries were granting us an interest-free loan during the period the $100 note circulates abroad, usually years.

14-1b Broader Definition of Money: M2

Economists regard currency and checkable deposits as money because each serves as a medium of exchange, a unit of account, and a store of value. Some other financial assets perform the store-of-value function and can be converted into currency or to checkable deposits. Because these are so close to money, they are called near-monies and are included under a broader definition.

Savings deposits earn interest but have no specific maturity date. Banks often allow depositors to shift funds from savings accounts to checking accounts by phone, ATM card, or online, so distinctions

1. Louise L. Roseman, "State of U.S. Coins and Currency," Testimony Before the Committee on Financial Services, U.S. House of Representatives, Washington, D.C., 20 July 2010 at http://www.federalreserve.gov/newsevents/testimony/roseman20100720a.htm.

between narrow and broad definitions of money have become blurred. Time deposits (also called *certificates of deposit*, or CDs) earn a fixed rate of interest if held for a specified period, ranging from several months to several years. Premature withdrawals are penalized by forfeiture of some interest. Neither savings deposits nor time deposits serve directly as media of exchange, so they are not included in M1, the narrow definition of money.

Money market mutual fund accounts, mentioned in the previous chapter, are another component of money when defined more broadly. But, because of restrictions on the minimum balance, on the number of checks that can be written per month, and on the minimum amount of each check, these popular accounts are not viewed as money as narrowly defined.

Recall that M1 consists of currency (including coins) held by the nonbanking public, checkable deposits, and traveler's checks. M2 includes M1 as well as savings deposits, small-denomination time deposits, money market mutual fund accounts, and other miscellaneous near-monies. Exhibit 1 shows the size and relative importance of each money aggregate. As you can see, compared to M1, M2 is about four times larger. Thus, the narrow definition of money is only a fraction of the broader aggregate. But distinctions between M1 and M2 become less meaningful as banks allow depositors to transfer funds from one account to another.

14-1c Credit Cards and Debit Cards: What's the Difference?

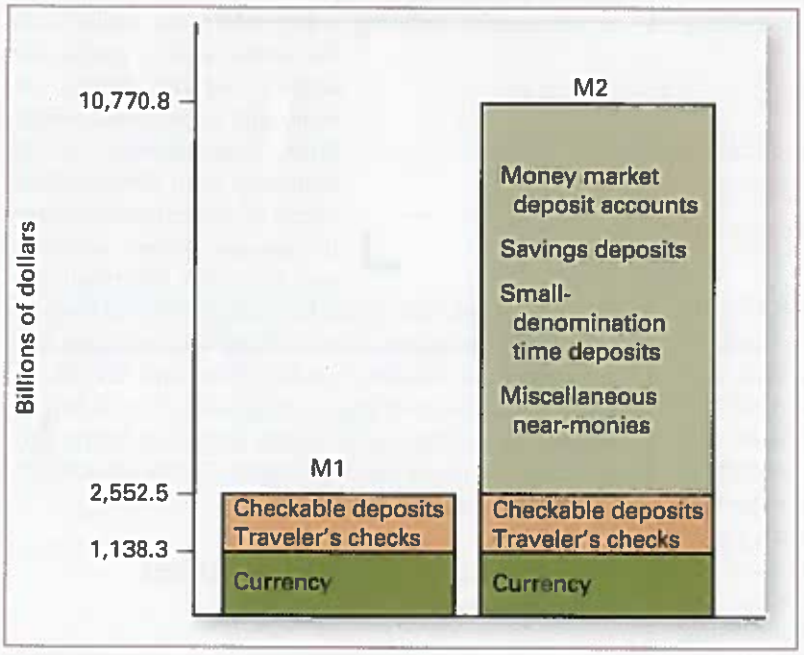
You may be curious why the narrow definition includes funds accessed by debit cards but not funds accessed by credit cards. After all, most sellers accept credit cards as readily as they accept cash, checks, or debit cards (online sellers even prefer credit cards), and credit cards finance more than 20 percent of all consumer purchases. Credit cards offer an easy way to get a loan from the card issuer. If you buy an airline ticket with a credit card, the card issuer lends you the money to pay for the ticket. You don't need money until you repay the credit card issuer. The credit card has not eliminated your use of money,

time deposits
Deposits that earn a fixed interest rate if held for the specified period, which can range from several months to several years; also called certificates of deposit

M2
A money aggregate consisting of M1 plus savings deposits, small-denomination time deposits, money market mutual funds, and other miscellaneous near-monies

Exhibit 1

Two Measures of the Money Supply (Week of August 26, 2013)



SOURCE: Based on seasonally adjusted averages for the week from the Federal Reserve Board. For the latest data, go to http://www.federalreserve.gov/releases/h6/Current/.

but merely delayed it. Three in four households have general purpose credit cards. About half of those with credit cards carry a balance from month to month, and that group's median balance is about $2,500.

On the other hand, when you use your debit card, you tap directly into your checking account, paying with electronic money—part of M1. Debit cards get their name because they *debit*, or draw down, your checking account immediately. A debit card, also called a check card or bank card, is issued by a bank, sometimes jointly with Visa, MasterCard, or other major card issuers. Even though debit cards look like credit cards, and even may bear a name such as Visa, they are not credit cards.

Many people prefer debit cards to checks because no checkbook is required and payments are made directly and immediately. Transactions using debit cards and other electronic transfers now exceed payments by check. Debit cards usually require a personal identification number, or PIN, to use. In that regard, debit cards are safer than credit cards, which could be used more easily by a thief. But debit cards have some disadvantages. Whereas a debit card draws down your checking account immediately, credit cards provide a grace period between a purchase and required payment. And some people prefer to borrow beyond the grace period—that is, they carry a balance from month to month. Also, because debit cards immediately reduce your checking account, you can't dispute a bill or withhold payment as you can after using a credit card and you can't stop payment as you can after writing a check. Still, debit cards, which came from nowhere a few years ago, are used by more than 60 percent of households today.

How often have you heard a store clerk ask, "Will that be cash or charge?" Exhibit 2 shows how consumers chose to pay for their purchases in 2005 and how they are expected to pay in 2015. Based on the number of transactions, debit cards ranked fourth in 2005 but are expected to climb to first by 2015. Checks ranked second in 2005 but are expected to drop to fifth by 2015. Based on the total dollar volume of purchases, debit cards are expected to climb from fifth in 2005 to second in 2015, and checks are expected to fall from first to fifth place. Thus, debit cards are on the rise and checks are on the decline, two ways of accessing bank deposits. Cash transactions are becoming less important. Still, credit cards will continue to fund major purchases.

> "The credit card has not eliminated your use of money, but merely delayed it."

debit card
Cards that tap directly into the depositor's bank account to fund purchases; also called check cards

Exhibit 2

Popularity of U.S. Consumer Payment Systems: 2005 versus 2015

Ranked by Number of Transactions			Ranked by Dollar Volume of Purchases		
	2005	2015		2005	2015
1	Cash	Debit	1	Checks	Credit
2	Checks	Cash	2	Credit	Debit
3	Credit	Credit	3	Cash	Other
4	Debit	Other	4	Other	Cash
5	Other	Checks	5	Debit	Checks

SOURCE: *The Nilson Report*, December 2010, Issue 962. Ranks for 2015 are projections. The "Other" category includes electronic payments.

New forms of payments are being tried every day. For example, some people are now using their smartphones as debit cards. Online payments are facilitated by systems such as Square, which operates like a credit card, and PayPal, which can be used like either a credit card or a debit card.

14-2 How Banks Work

Banks attract deposits from savers to lend to borrowers, earning a profit on the difference between the interest paid depositors and the interest charged borrowers. Savers need a safe place for their money, and borrowers need credit; banks try to earn a profit by serving both groups. To inspire depositor confidence, a bank usually presents an image of trust and assurance with an impressive building, a big safe often visible from the lobby, and a name that sounds serious. Banks are more apt to be called Fidelity Trust, First National, or U.S. Bankcorp than Benny's Bank, Loans 'R' Us, or Loadsamoney. In contrast, *finance companies* are financial intermediaries that do not get their funds from depositors, so they can choose names aimed more at borrowers—names such as Household Finance, Lending Tree, and The Money Store. Likewise, mortgage companies do not rely on depositors, so they pick names aimed at home buyers, names such as Lender's Depot, Quicken Loans, and Cheap Mortgages.

14-2a Banks Are Financial Intermediaries

By bringing together both sides of the money market, banks serve as financial intermediaries, or as go-betweens. They

gather various amounts from savers and repackage these funds into the amounts demanded by borrowers. Some savers need their money next week, some next year, some only after retirement. Likewise, borrowers need credit for different lengths of time. Banks, as intermediaries, offer desirable durations to both groups. In short, *banks reduce the transaction costs of channeling savings to creditworthy borrowers.* Here's how.

Coping with Asymmetric Information

Banks, as lenders, try to identify borrowers who are willing to pay interest and are able to repay their loans. But borrowers have more reliable information about their own credit history and financial plans than do lenders. Thus, in the market for loans, there is **asymmetric information**—an inequality in what's known by each party to the transaction. Asymmetric information is unequal information. This wouldn't be a problem if borrowers could be trusted to report relevant details to lenders. Some borrowers, however, have an incentive to suppress important information, such as other debts outstanding, a troubled financial history, or plans to use the borrowed money to fund a risky venture. Because of their experience and expertise in evaluating loan applicants, banks can better cope with asymmetric information than could an individual saver. Banks also know more about lending agreements than do individual savers. Thus, savers, rather than lending their money directly, are better off depositing their money in banks, and letting banks do the lending. *The economy is more efficient because banks develop expertise in evaluating creditworthiness, structuring loans, and enforcing loan contracts.*

> "The economy is more efficient because banks develop expertise in evaluating creditworthiness, structuring loans, and enforcing loan contracts."

Reducing Risk through Diversification

By developing a diversified portfolio of assets rather than lending funds to a single borrower, banks reduce the risk to each individual saver. A bank, in effect, lends a tiny fraction of each saver's deposits to each of its many borrowers. If one borrower fails to repay a loan, it hardly affects a large, diversified bank. Certainly such a default does not represent the personal disaster it would if one saver's entire nest egg had been loaned directly to that defaulting borrower.

Yet, as noted in the previous chapter, a bank can get into financial trouble if many borrowers fail to repay their loans. For example, when housing prices collapsed in 2007 and 2008, many borrowers owed the bank more than their homes were worth. Some borrowers stopped making mortgage payments. These homes went into foreclosure and banks suffered heavy losses. The problem of these bad loans rippled through the economy and contributed to the global financial crisis of September 2008 and the national recession of 2007–2009, the worst downturn since the Great Depression.

14-2b Starting a Bank

We could consider the operation of any type of depository institution (commercial bank, savings bank, or credit union), but let's focus on commercial banks because they are the most important in terms of total assets. What's more, the operating principles also apply to other depository institutions. Suppose some business leaders in your hometown want to open a commercial bank called Home Bank. To obtain a *charter*, or the right to operate, they must apply to the state banking authority in the case of a state bank or to the U.S. Comptroller of the Currency in the case of a national bank. The chartering agency reviewing the application judges the quality of management, the need for another bank in the region, the proposed bank's funding, and the likely success of the bank. Note that a proposed restaurant would not be subject to such scrutiny, but a failed restaurant is not nearly as problematic for a community as a failed bank.

Suppose the founders plan to invest $500,000 in the bank, and they so indicate on their application for a national charter. If their application is approved, they incorporate, issuing themselves shares of stock—certificates of ownership. Thus, they exchange $500,000 for shares of stock in the bank. These shares are called the *owners' equity*, or the **net worth**, of the bank. Part of the $500,000, say $50,000, is used to buy shares in their district Federal Reserve bank. So Home Bank is now a member of the Federal Reserve System. With the remaining $450,000, the owners acquire and furnish the bank building.

asymmetric information
A situation in which one side of the market has more reliable information than the other side

net worth
Assets minus liabilities; also called owners' equity

KEITH MORRIS/ALAMY

To focus our discussion, we examine the bank's **balance sheet**, presented in Exhibit 3. As the name implies, a balance sheet shows a balance between the two sides of the bank's accounts. The left side lists the bank's assets. An **asset** is any physical property or financial claim owned by the bank. At this early stage, assets include the building and equipment owned by Home Bank plus its stock in the district Federal Reserve bank. The right side lists the bank's liabilities and net worth. A **liability** is an amount the bank owes. So far the bank owes nothing, so the right side includes only the net worth of $500,000. The two sides of the ledger must always be equal, or in *balance*, which is why it's called a *balance sheet*. So assets must equal liabilities plus net worth:

Assets = Liabilities + Net worth

balance sheet
A financial statement at a given point in time that shows assets on one side and liabilities and net worth on the other side; because assets must equal liabilities plus net worth, the two sides of the statement must be in balance

asset
Anything of value that is owned

liability
Anything that is owed to other people or institutions

required reserves
The dollar amount of reserves a bank is obligated by regulation to hold as cash in the bank's vault or on account at the Fed

required reserve ratio
The ratio of reserves to deposits that banks are obligated by regulation to hold

excess reserves
Bank reserves exceeding required reserves

The bank is now ready for business. Opening day is the bank's lucky day, because the first customer carries in a briefcase full of $100 notes and deposits $1,000,000 into a new checking account. In accepting this cash, the bank promises to repay the depositor that amount. The deposit therefore is an amount the bank owes—it's a liability of the bank. As a result of this deposit, the bank's assets increase by $1,000,000 in cash and its liabilities increase by $1,000,000 in checkable deposits. Exhibit 4 shows the effects of this transaction on Home Bank's balance sheet. The right side now shows two claims on the bank's assets: claims by the owners, called net worth, and claims by nonowners, called liabilities, which at this point consist of checkable deposits.

Exhibit 3

Home Bank's Balance Sheet

Assets		Liabilities and Net Worth	
Building and furniture	$450,000	Net worth	$500,000
Stock in district Fed	50,000		
Total	$500,000	Total	$500,000

Exhibit 4

Home Bank's Balance Sheet after $1,000,000 Deposit into Checking Account

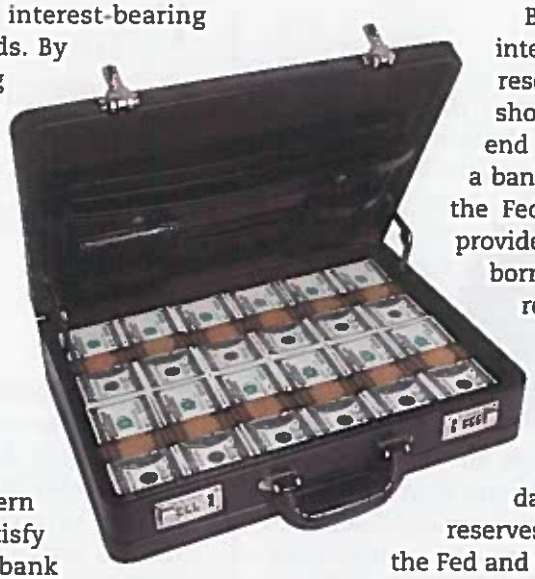
Assets		Liabilities and Net Worth	
Cash	$1,000,000	Checkable deposits	$1,000,000
Building and furniture	450,000	Net worth	500,000
Stock in district Fed	50,000		
Total	$1,500,000	Total	$1,500,000

14-2c Reserve Accounts

Where do we go from here? As mentioned in the previous chapter, banks are required by the Fed to set aside, or to hold in reserve, a percentage of their checkable deposits. The dollar amount that must be held in reserve is called **required reserves**—checkable deposits multiplied by the required reserve ratio. The **required reserve ratio** dictates the minimum proportion of deposits the bank must hold in reserve. The current reserve requirement is 10 percent on checkable deposits (other types of deposits have no reserve requirement). All depository institutions are subject to the Fed's reserve requirements. Reserves are held either as cash in the bank's vault, which earns the bank no interest, or as deposits at the Fed, where reserves earn a small rate of interest (most recently, one quarter of one percent, or 0.25 percent). Home Bank must therefore hold $100,000 as reserves, or 10 percent times $1,000,000.

Suppose Home Bank deposits $100,000 in a reserve account with its district Federal Reserve bank. Home Bank's reserves now consist of $100,000 in required reserves on deposit with the Fed and $900,000 in **excess reserves** held as cash in the vault. Home Bank earns no interest on cash in its vault. Excess reserves, however, can be used

to make loans or to purchase interest-bearing assets, such as government bonds. By law, the bank's interest-bearing assets are limited primarily to loans and to government securities. (Note that if a bank is owned by a holding company, the holding company has broader latitude in the kinds of assets it can own.)



DON FARRALL/PHOTODISC/GETTY IMAGES

14-2d Liquidity Versus Profitability

Like the early goldsmiths, modern banks must be prepared to satisfy depositors' requests for funds. A bank loses reserves whenever a depositor withdraws cash, writes a check that gets deposited in another bank, or uses a debit card that ultimately shifts deposits to another bank. The bank must be in a position to satisfy all depositor demands, even if many ask for their money at the same time. Required reserves are not meant to be used to meet depositor requests for funds; therefore, banks often hold excess reserves or other assets, such as government bonds, that can be easily liquidated, or converted to cash, to satisfy any unexpected demand for cash. Banks may also want to hold excess reserves in case a valued customer needs immediate credit.

The bank's portfolio manager must therefore structure assets with an eye toward liquidity but must not forget that survival also depends on profitability. Liquidity is the ease with which an asset can be converted into cash without a significant loss of value. *The objectives of liquidity and profitability are at odds.* For example, more liquid assets yield lower interest rates than less liquid assets do. The most liquid asset is cash in the bank's vault, but such reserves earn no interest.

At one extreme, suppose a bank is completely liquid, holding all its assets as cash in its vault. Such a bank would have no difficulty meeting depositors' demands for funds. This bank is playing it safe—too safe. The bank earns no interest and will fail. At the other extreme, suppose a bank uses all its excess reserves to acquire high-yielding but illiquid assets, such as long-term home loans. Such a bank runs into problems whenever withdrawals exceed new deposits. There is a trade-off between liquidity and profitability. The portfolio manager's task is to strike the right balance between liquidity, or safety, and profitability.

Because vault cash earns no interest, banks prefer to hold reserves at the Fed. Any bank short of required reserves at the end of the day can borrow from a bank that has excess reserves at the Fed. The federal funds market provides for day-to-day lending and borrowing among banks of excess reserves on account at the Fed. These funds usually do not leave the Fed—instead, they shift among accounts. For example, suppose that at the end of the business day, Home Bank has excess reserves of $100,000 on account with the Fed and wants to lend that amount to another bank that finished the day short $100,000 in required reserves. These two banks are brought together by a broker who specializes in the market for federal funds—that is, the market for reserves at the Fed. The interest rate paid on this loan is called the federal funds rate; this is the rate the Fed targets as a tool of monetary policy, but more on that later.

14-3 How Banks Create Money

Let's now discuss how the Fed, Home Bank, and the banking system as a whole can create fiat money. Excess reserves are the raw material the banking system uses to create money. Again, our discussion focuses on commercial banks because they are the largest and most important depository institutions, although thrifts operate the same way.

14-3a Creating Money through Excess Reserves

Suppose Home Bank has already used its $900,000 in excess reserves to make loans and buy government bonds and has no excess reserves left. In fact, let's assume there are no excess reserves in the banking system. With that as a point of departure, let's walk through the money creation process.

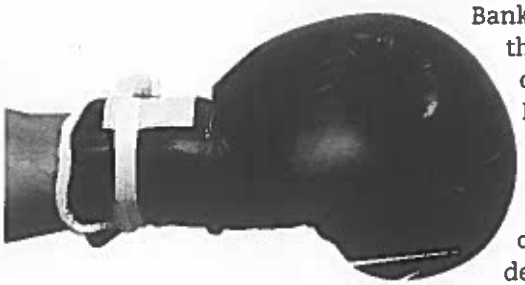
liquidity
A measure of the ease with which an asset can be converted into money without a significant loss of value

federal funds market
A market for overnight lending and borrowing of reserves among banks; the interbank market for reserves on account at the Fed

federal funds rate
The interest rate charged in the federal funds market; the interest rate banks charge one another for overnight borrowing; the Fed's target interest rate

Round One

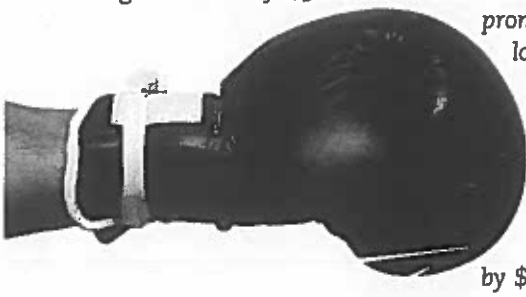
To start, suppose the Fed buys a $1,000 U.S. government bond from a securities dealer, with the transaction handled by the dealer's bank—Home Bank. The Fed pays the dealer by crediting Home Bank's reserve account with $1,000, so Home Bank can increase the dealer's checking account by $1,000. Where does the Fed get these reserves? It makes them up—creates them out of thin air, out of electronic ether! The securities dealer has exchanged one asset, a U.S. bond, for another asset, checkable deposits. A U.S. bond is not money, but checkable deposits are, so the money supply increases by $1,000 in this first round. Exhibit 5 shows changes in Home Bank's balance sheet as a result of the Fed's bond purchase. On the assets side, Home Bank's reserves at the Fed increase by $1,000. On the liabilities side, checkable deposits increase by $1,000. Of the dealer's $1,000 checkable deposit, Home Bank must set aside $100 in required reserves (based on a 10 percent required reserve ratio). The remaining $900 becomes excess reserves, which can fuel a further increase in the money supply.



GEORGE DOYLE/STOCKBYTE/GETTY IMAGES

Round Two

Suppose Home Bank is your regular bank, and you apply for a $900 loan to help pay student fees. Home Bank approves your loan and increases your checking account by $900. *Home Bank has converted your promise to repay the loan, your IOU, into a $900 checkable deposit. Because checkable deposits are money, this action increases the money supply* by $900. The money supply has increased by a total of $1,900 to this point—the $1,000 increase in the securities dealer's checkable deposits and now the $900 increase in your checkable deposits. In the process, what had been $900 in Home Bank's excess reserves now back up its loan to you. As shown in Exhibit 6, Home Bank's loans increase by $900 on the assets side because your IOU becomes the bank's asset. On the bank's liabilities side, checkable deposits increase by $900 because the bank has increased your account by that amount. In short, Home Bank has created $900 in checkable deposits based on your promise to repay the loan.



GEORGE DOYLE/STOCKBYTE/GETTY IMAGES

> "Home Bank has converted your promise to repay the loan, your IOU, into a $900 checkable deposit. Because checkable deposits are money, this action increases the money supply by $900."

When you write a $900 check for student fees, your college promptly deposits the check into its checking account at Merchants Trust, which increases the college's account by $900, and sends your check to the Fed. The Fed transfers $900 in reserves from Home Bank's account to Merchants Trust's account. The Fed then sends the check to Home Bank, which reduces your checkable deposits by $900. The Fed has thereby "cleared" your check by settling the claim that Merchants Trust had on Home Bank. Your $900 in checkable deposits at Home Bank has become your college's $900 in checkable deposits at Merchants Trust. The total increase in the money supply to this point is still $1,900.

GEORGE DOYLE/STOCKBYTE/GETTY IMAGES

Round Three

Merchants Trust now has $900 more in reserves on deposit with the Fed. After setting aside $90 as required reserves, or 10 percent of your college's checkable deposit increase, the bank has $810 in excess reserves. Suppose Merchants Trust lends this $810 to an English major starting a new business called "Note

Exhibit 5

Changes in Home Bank's Balance Sheet after the Fed Buys a $1,000 Bond from Securities Dealer

Assets		Liabilities and Net Worth	
Reserves at Fed	+$1,000	Checkable deposits	+$1,000

Exhibit 6

Changes in Home Bank's Balance Sheet after Lending $900 to You

Assets		Liabilities and Net Worth	
Loans	+$900	Checkable deposits	+$900

Exhibit 7

Changes in Merchants Trust's Balance Sheet after Lending $810 to English Major

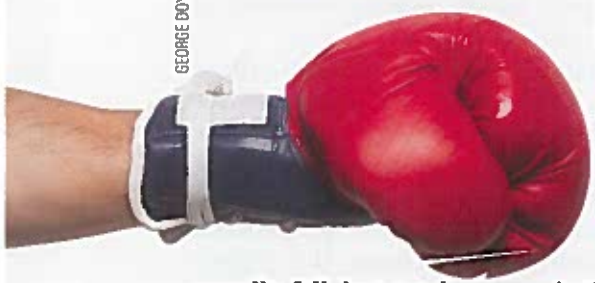
Assets		Liabilities and Net Worth	
Loans	+$810	Checkable deposits	+$810

This," an online note-taking service for students in large classes. Exhibit 7 shows assets at Merchants Trust are up by $810 in loans, and liabilities are up by $810 in checkable deposits. At this point, checkable deposits in the banking system, and the money supply in the economy, are up by a total of $2,710 (= $1,000 + $900 + $810), all springing from the Fed's original $1,000 bond purchase.

The $810 loan is spent at the college bookstore, which deposits the check in its account at Fidelity Bank. Fidelity credits the bookstore's checkable deposits with $810 and sends the check to the Fed for clearance. The Fed reduces Merchants Bank's reserves by $810 and increases Fidelity's by the same. The Fed then sends the check to Merchants, which reduces the English major's checkable deposits by $810. So checkable deposits are down by $810 at Merchants and up by the same amount at Fidelity. Checkable deposits are still up by $2,710, as the $810 in checkable deposits has simply shifted from Merchants Trust to Fidelity Bank.

Round Four and Beyond

We could continue the process with Fidelity Bank setting aside $81 in required reserves and lending $729 in excess reserves, but you get some idea of money creation by now. Notice the pattern of deposits and loans. Each time a bank gets a fresh deposit, 10 percent goes to required reserves. The rest becomes excess reserves, which fuel new loans or other asset acquisitions. The borrower writes a check, which the recipient deposits in a checking account, thereby generating excess reserves to support still more loans. Because this example began with the Fed, the Fed can rightfully claim, "The buck starts here"—a slogan that appeared on a large plaque in the Federal Reserve chairman's office.



GEORGE DOYLE/STOCKBYTE/GETTY IMAGES

To Review: An individual bank can lend no more than its excess reserves. When the borrower spends those funds, reserves at one bank usually fall, but total reserves in the banking system do not. The recipient bank uses most of the new deposit to extend more loans, creating more checkable deposits. The potential expansion of checkable deposits in the banking system therefore equals some multiple of the initial increase in reserves. Note that our example assumes that banks do not allow excess reserves to sit idle, that borrowed funds do not idle in checking accounts, and that the public does not hold some of the newly created money as cash. If excess reserves remained just that or if borrowed funds idled in checking accounts, they would not fuel an expansion of the money supply. And if people chose to hold borrowed funds in cash rather than in checking accounts, that idle cash would not add to reserves in the banking system.

14-3b A Summary of the Rounds

Let's review the money creation process: *The initial and most important step is the Fed's injection of $1,000 in fresh reserves into the banking system.* By buying the bond from the securities dealer, the Fed immediately increased the money supply by $1,000. Home Bank set aside $100 as required reserves and lent you its $900 in excess reserves. You paid your college fees, and the $900 ended up in your college's checkable account. This fueled more money creation, as shown in a series of rounds of Exhibit 8. As you can see, during each round, the increase in checkable deposits (column 1) minus the increase in required reserves (column 2) equals the potential increase in loans (column 3). Checkable deposits in this example can potentially increase by as much as $10,000.

In our example, money creation results from the Fed's $1,000 bond purchase from the securities dealer, but excess reserves would also have increased if the Fed purchased a $1,000 bond from Home Bank, lent Home Bank $1,000, or freed up $1,000 in excess reserves by lowering the reserve requirement.

Exhibit 8

Summary of the Money Creation Resulting from the Fed's Purchase of $1,000 U.S. Government Bond

Bank	(1) Increase in Checkable Deposits	(2) Increase in Required Reserves	(3) Increase in Loans (3) = (1) − (2)
Round 1. Home Bank	$1,000	$100	$900
Round 2. Merchants Trust	900	90	810
Round 3. Fidelity Bank	810	81	729
All remaining rounds	7,290	729	6,561
Totals	$10,000	$1,000	$9,000

What if the Fed paid the securities dealer in cash? By exchanging Federal Reserve notes, which become part of the money supply in the hands of the public, for a U.S. bond, which is not part of the money supply, the Fed would have increased the money supply by $1,000. Once the securities dealer put this cash into a checking account—or spent the cash, so the money ended up in someone else's checking account—the banking system's money creation process would have been off and running.

14-3c Reserve Requirements and Money Expansion

The banking system as a whole eliminates excess reserves by expanding the money supply. With a 10 percent reserve requirement, the Fed's initial injection of $1,000 in fresh reserves could support up to $10,000 in new checkable deposits in the banking system as a whole, *assuming no bank holds excess reserves, borrowed funds don't sit idle, and people don't want to hold more cash.*

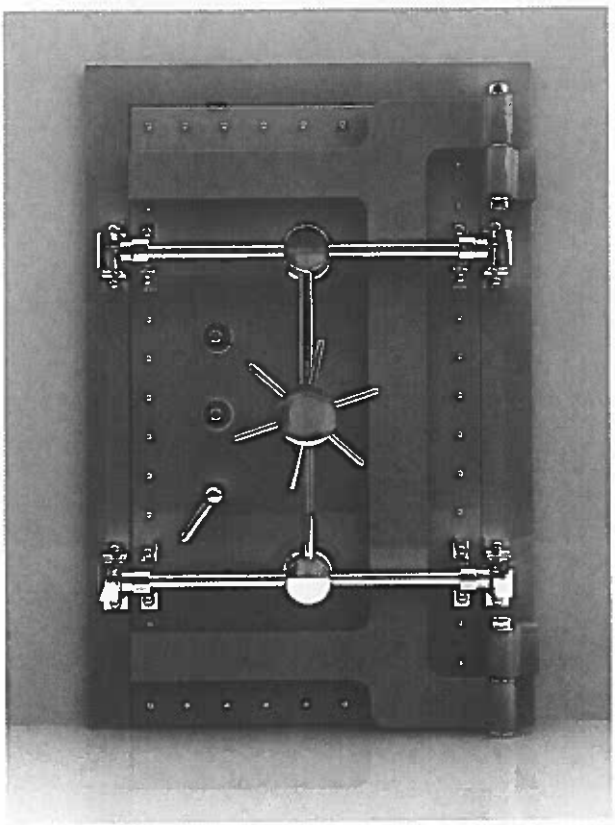
The multiple by which the money supply increases as a result of an increase in the banking system's reserves is called the **money multiplier**. The **simple money multiplier** equals the reciprocal of the required reserve ratio, or $1/r$, where r is the reserve ratio. In our example, the reserve ratio was 10 percent, or 0.1, so the reciprocal is 1/0.1, which equals 10. The formula for the multiple expansion of money supply can be written as follows:

$$\text{Change in the money supply} = \text{Change in fresh reserves} \times 1/r$$

Again, the simple money multiplier assumes that banks hold no excess reserves, that borrowers do not let the funds sit idle, and that people do not want to hold more cash. The higher the reserve requirement, the greater the fraction of deposits that must be held as reserves, so the smaller the money multiplier. A reserve requirement of 20 percent instead of 10 percent would mean each bank must set aside twice as much in required reserves. The simple money multiplier in this case would be 1/0.2, which equals 5. The maximum possible increase in checkable deposits resulting from an initial $1,000 increase in fresh reserves would therefore be $1,000 × 5, or $5,000. *Excess reserves fuel the deposit expansion process, and a higher reserve requirement drains this fuel from the banking system, thereby reducing the amount of new money that can be created.*

money multiplier
The multiple by which the money supply changes as a result of a change in fresh reserves in the banking system

simple money multiplier
The reciprocal of the required reserve ratio, or $1/r$; the maximum multiple of fresh reserves by which the money supply can increase



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> "Excess reserves fuel the deposit expansion process, and a higher reserve requirement drains this fuel from the banking system, thereby reducing the amount of new money that can be created."

On the other hand, with a reserve requirement of only 5 percent, banks would set aside less for required reserves, leaving more excess reserves available for loans. The simple money multiplier in that case would be 1/0.05, or 20. With $1,000 in fresh reserves and a 5 percent reserve requirement, the banking system could increase the money supply by a maximum of $1,000 × 20, which equals $20,000. Thus, the change in the required reserve

ratio affects the banking system's ability to create money.

In summary, money creation usually begins with the Fed injecting new reserves into the banking system. An individual bank lends an amount no greater than its excess reserves. The borrower's spending ends up in someone else's checking account, fueling additional loans. *The fractional reserve requirement is the key to the multiple expansion of checkable deposits.* If each $1 deposit had to be backed by $1 in required reserves, the money multiplier would be reduced to 1, which is no multiplier at all.

14-3d Limitations on Money Expansion

Various leakages from the multiple expansion process reduce the size of the money multiplier, which is why 1/r is called the *simple* money multiplier. You could think of "simple" as meaning maximum. To repeat, our example assumes (1) that banks do not let excess reserves sit idle, (2) that borrowers do something with the money, and (3) that people do not choose to increase their cash holdings. How realistic are these assumptions? With regard to the first, banks have a profit incentive to make loans or buy some higher interest-bearing asset with excess reserves. Granted, banks earn some interest on reserves deposited with the Fed, but the rate is typically much less than could be earned on loans or on most other interest-bearing assets. The second assumption is also easy to defend. Why would people borrow money if they didn't need it for something? The third assumption is trickier. Cash may sometimes be preferable to checking accounts because cash is more versatile, so people may choose to hold some of the newly created money as cash. To the extent that people prefer to hold idle cash, this drains reserves from the banking system. With less excess reserves, banks are less able to make loans, reducing the money multiplier. Incidentally, for the money multiplier to operate, a particular bank need not use excess reserves in a specific way; it could use them to pay all its employees a Christmas bonus, for that matter. As long as the money ends up as checkable deposits in the banking system, away we go with the money expansion process.

14-3e Multiple Contraction of the Money Supply

We have already outlined the money creation process, so the story of how the Federal Reserve System can reduce bank reserves, thereby reducing the money supply, can be a brief one. Again, we begin by assuming there are no excess reserves in the system and the reserve requirement is 10 percent. Suppose the Fed *sells* a $1,000 U.S. bond to a securities dealer and gets paid with a check drawn on the security dealer's account at Home Bank. So the Fed gets paid by drawing down Home Bank's reserves at the Fed by $1,000. The Fed has thereby reduced the money supply by $1,000 in this first round.

Because the dealer's checking account was reduced by $1,000, Home Bank no longer needs to hold $100 in required reserves. But Home Bank is still short $900 in required reserves (remember, when we started, there were no excess reserves in the banking system). To replenish reserves, Home Bank must recall loans (ask for repayment before the due date), or sell some other asset. As the poet Robert Frost wryly observed, "A bank is a place where they lend you an umbrella in fair weather and ask for it back when it begins to rain." Suppose the bank calls in $900 loaned to a local business, and the loan is repaid with a check written against Merchants Bank. When the check clears, Home Bank's reserves are up by $900, just enough to satisfy its reserve requirement, but Merchants Bank's reserves and checkable deposits are down by $900. Checkable deposits are now down $1,900 as a result of the Fed's purchase of a $1,000 bond. Because there were no excess reserves at the outset, the loss of $900 in reserves leaves Merchants $810 short of its required level of reserves, forcing that bank to get more reserves.

And so it goes down the line. The Fed's sale of government bonds reduces bank reserves, forcing banks to recall loans or to somehow replenish reserves. This reduces checkable deposits each additional round. *The maximum possible effect is to reduce the money supply by the original reduction in bank reserves times the simple money multiplier, which again equals 1 divided by the reserve requirement, or 1/r.* In our example, the Fed's sale of $1,000 in U.S. bonds could reduce the money supply by as much as $10,000.

Now that you have some idea how fractional reserve banking works, we are in a position to summarize the Federal Reserve's role in the economy.

14-4 The Fed's Tools of Monetary Control

As mentioned in the previous chapter, in its capacity as a bankers' bank, the Fed clears checks for, extends loans to, and holds deposits of banks. About half of the narrow definition of money (M1)

consists of checkable deposits. The Fed's control over checkable deposits works indirectly through its control over reserves in the banking system. You are already familiar with the Fed's three tools for controlling reserves: (1) open-market operations, or the buying and selling of U.S. government bonds; (2) the discount rate, which is the interest rate the Fed charges for loans it makes to banks; and (3) the required reserve ratio, which is the minimum fraction of reserves that banks must hold against deposits. Let's examine each of these in more detail, then look at some other Fed matters.

14-4a Open-Market Operations and the Federal Funds Rate

The Fed carries out open-market operations whenever it buys or sells U.S. government bonds in the open market. Decisions about open-market operations are made by the Federal Open Market Committee, or FOMC, which meets every six weeks and during emergencies. To increase the money supply, the Fed directs the New York Fed to buy U.S. bonds. This is called an **open-market purchase**. To reduce the money supply, the New York Fed is directed to carry out an **open-market sale**. Open-market operations are relatively easy to carry out. They require no change in laws or regulations and can be executed in any amount—large or small—chosen by the Fed. Their simplicity and ease of use make them the tool of choice for the Fed.

> "To increase the money supply, the Fed directs the New York Fed to buy U.S. bonds."

Through open-market operations, the Fed influences bank reserves and the *federal funds rate*, which is the interest rate banks charge one another for borrowing excess reserves at the Fed, typically just for a day or two. Banks that need reserves can borrow excess reserves from other banks, paying the federal funds rate of interest. The federal funds rate serves as a good indicator of the "tightness" of monetary policy. For example, suppose the Fed buys U.S. bonds in the open market and thereby increases reserves in the banking system. As a result, more banks have excess reserves. Demand for excess reserves in the federal funds market falls and supply increases, so the federal funds rate—the interest rate for borrowing reserves in this market—declines. We can expect this lower federal funds rate to spread quickly to the economy at large. The excess reserves that have created the lower federal funds rate prompt banks to lower short-term interest rates in general, and this increases the quantity of loans demanded by the public.

open-market purchase
The purchase of U.S. government bonds by the Fed to increase the money supply

open-market sale
The sale of U.S. government bonds by the Fed to reduce the money supply

discount rate
The interest rate the Fed charges banks that borrow reserves

14-4b The Discount Rate

The second monetary policy tool available to the Fed is the **discount rate**, which is the interest rate the Fed charges for loans it makes to banks. Banks borrow from the Fed to satisfy their reserve requirements. A lower discount rate reduces the cost of borrowing, encouraging banks to borrow reserves from the Fed. The Fed usually does not encourage banks to borrow, but the Fed considers itself as the "lender of last resort," and a lender during a financial crisis, as occurred between 2007 and 2010 when some homeowners defaulted on their mortgages.

There are actually two discount rates. The *primary discount rate* is usually one percentage point above the federal funds rate. Thus, discount borrowing is less attractive than borrowing through the federal funds market. But during a financial crisis, the Fed could lower the primary discount rate to supply liquidity to the banking system as it did 12 times between August 2007 and December 2008. The Fed charges more interest on loans to banks considered less sound than to other banks. This *secondary discount rate* is usually about one-half a percentage point higher than the primary discount rate.

The Fed uses the discount rate more as a signal to financial markets about its monetary policy than as a tool for increasing or decreasing the money supply. The discount rate might also be thought of

> "A lower discount rate reduces the cost of borrowing, encouraging banks to borrow reserves from the Fed."

as an emergency tool for injecting liquidity into the banking system in the event of some financial crisis, such as the global credit crisis of 2008. Discount loans outstanding jumped from only $2 billion in August 2007, before the trouble started, to more than $130 billion in April 2009, when the economy was in a sharp recession. (Discount loans have since returned to normal levels—$4.6 billion in July 2012.) Banks would prefer to borrow reserves from other banks in the federal funds market rather than borrow reserves directly from the Fed.

14-4c Reserve Requirements

The Fed also influences the money supply through reserve requirements, which are regulations regarding the minimum amount of reserves that banks must hold to back up deposits. Reserve requirements determine how much money the banking system can create with each dollar of fresh reserves. If the Fed increases the reserve requirement, then banks have less excess reserves to lend out. This reduces the banking system's ability to create money. On the other hand, a lower reserve requirement increases the banking system's ability to create money. Reserve requirements can be changed by a simple majority vote of the Board of Governors. But changes in the reserve requirement disrupt the banking system, so the Fed seldom makes such changes. As noted already, the current reserve requirement is 10 percent on checkable deposits and zero on other deposits; these have not changed in years. Some countries such as Australia, Canada, and the United Kingdom have no reserve requirement. Banks there still hold reserves to deal with everyday cash requirements and can borrow from their central banks (at relatively high rates) if necessary.

> "A lower reserve requirement increases the banking system's ability to create money."

14-4d Coping with Financial Crises

The Fed, through its regulation of financial markets, also tries to prevent major disruptions and financial panics. For example, during the uncertain days following the terrorist attacks of September 11, 2001, people used their ATM cards and debit cards to load up on cash. Some were hoarding cash. To ensure the banking system had sufficient liquidity, the Fed bought all the government securities offered for sale, purchasing a record $150 billion worth in two days.[2] The Fed also eased some regulations to facilitate bank clearances, especially for banks struck during the attacks. Likewise, when financial crises threatened in 1987, 1989, 1998, 2007, and 2008, the Fed worked to ensure the financial system had sufficient liquidity. For example, to calm fears during a rash of mortgage defaults in 2007 and 2008, the Fed lowered the discount rate from 6.25 percent to only 0.5 percent and encouraged banks to borrow from the Fed. To help banks improve their balance sheets, the Fed also began paying interest on bank reserves held at the Fed. To keep mortgage rates low, the Fed invested more than a $1 trillion in mortgage-backed securities. And to help prevent the insurance giant AIG from collapsing, the Fed invested more than $90 billion in the company. As a general approach, Ben Bernanke, the Fed chairman at the time, announced that the Fed would provide sufficient liquidity to reduce the harm of mortgage defaults on the overall economy. To prevent cash shortages during a crisis, the Fed stockpiles extra cash in bank vaults around the country and around the world.

14-4e The Fed Is a Money Machine

One way to get a better idea of the Fed is to review its balance sheet, shown as Exhibit 9, with assets on the left and liabilities and net worth on the right. Because of the mortgage crisis and global financial meltdown of 2008, investors were reluctant to buy mortgage-backed securities. So the Fed stepped in and began buying them in late 2008. As of September 18, 2013, these securities still accounted for 36 percent of the Fed's assets. U.S. government securities were 57 percent of Fed assets (during normal times they might account for 90 percent of assets). These IOUs from the federal government result from open-market operations, and they earn the Fed interest. Other assets include foreign currencies, most of which the Fed acquired during the financial crisis as foreign central banks swapped their currencies for U.S. dollars. Note that nearly all the Fed's assets earn interest.

2. Anita Rachavan, Susan Pulliam, and Jeff Opdyke, "Banks and Regulators Drew Together to Calm Rattled Markets after Attack," *Wall Street Journal*, 18 October 2001.

AP IMAGES/ SCOTT APPLEWHITE

On the other side of the ledger, Federal Reserve notes outstanding account for 31 percent of Fed liabilities. These notes—U.S. currency—are IOUs from the Fed and are therefore liabilities of the Fed, but the Fed pays no interest on these notes. Thus, nearly all the Fed's assets earn interest, whereas one of the Fed's primary liabilities—Federal Reserve notes—requires no interest payments by the Fed. The Fed does pay interest on excess reserves it holds in deposit, but that rate has been extremely low—again, just one quarter of one percent since early 2009. *The Fed is therefore both literally and figuratively a money machine. It is literally a money machine because it supplies the economy with Federal Reserve notes; it is figuratively a money machine because most assets earn interest, but a main liability requires no interest payments.* The Fed also earns revenue from discount lending to banks and from other services it provides banks. After covering its operating costs, paying a small amount of interest on bank reserves at the Fed, and paying a 6 percent dividend to the member banks, the Fed turns over any remaining income to the federal government. The Fed sent the U.S. Treasury $89 billion in 2012, a record amount.

On the right side of the ledger, you can see that depository institutions' reserves at the Fed totaled $2,265.7 billion (97 percent are excess reserves). This reflects a huge jump in recent years. One reason for the increase is that in late 2008, the Fed began paying a small amount of interest on excess bank reserves held by the Fed, as noted already. Also, because of the financial crisis, banks grew reluctant to make loans, preferring instead to let their excess reserves collect interest at the Fed. You can also see that the Fed held deposits of the U.S. Treasury, a reminder that the Fed is the federal government's banker.

14-5 Final Word

Banks play a unique role in the economy because they can transform someone's IOU into a checkable deposit, and a checkable deposit is money. The banking system's ability to expand the money supply depends on the amount of excess reserves in that system. In our example, it was the purchase of a $1,000 U.S. bond that started the ball rolling. The Fed can also increase reserves by lowering the discount rate enough to stimulate bank borrowing from the Fed (although the Fed changes the discount rate more to signal its policy than to alter the money supply). And, by reducing the required reserve ratio, the Fed not only instantly creates excess reserves in the banking system but also increases the money multiplier. In practice, the Fed rarely changes the reserve requirement because of the disruptive effect of such a change on the banking system. *To control the money supply, the Fed relies primarily on open-market operations.*

Exhibit 9

Federal Reserve Bank Balance Sheet as of September 18, 2013 (Billions)

Assets		Liabilities and Net Worth	
U.S. Treasury securities	$2,052.1	Depository institution reserves	2,265.7
Mortgage-backed securities	1,339.8	Federal Reserve notes outstanding	1,161.8
Other federal agency securities	63.7	U.S. Treasury balance	60.9
Foreign currencies	23.9	Other liabilities	178.9
Discount loans to depository institutions	0.3	Net worth	54.9
Bank buildings	2.3		
Other assets	240.1		
Total	$3,722.2	Total	$3,722.2

SOURCE: Federal Reserve Bank at http://www.federalreserve.gov/releases/h41/Current/.

Open-market operations can have a direct effect on the money supply, as when the Fed buys bonds from the public. But the Fed also affects the money supply indirectly, as when the Fed's bond purchase increases bank reserves, which then serve as fuel for the money multiplier. In the next chapter, we consider how changes in the money supply affect the economy.

2/3 of total U.S. currency
< Amount of U.S. currency held abroad

0.25%
< Interest rate paid by the Fed on excess bank reserves held at the Fed

U.S. Mint profit from coin production in 2012 >
$208 million

$89 billion
< The amount the Fed sent to the U.S. Treasury in 2012, a record amount

$600 million
< The annual cost of printing, storing, and distributing Federal Reserve notes

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CHAPTER 15

Monetary Theory and Policy

Learning Outcomes

15-1 Explain how the demand and supply of money determine the market interest rate

15-2 Outline the steps between an increase in the money supply and an increase in equilibrium output

15-3 Describe the relevance of velocity's stability on monetary policy

15-4 Summarize the specific policies the Fed pursued during and after the Great Recession

"How does the stock of money in the economy affect your ability to find a job?"

Why do people maintain checking accounts and have cash in their pockets, purses, wallets, desk drawers, coffee cans—wherever? In other words, why do people hold money? How does the stock of money in the economy affect your ability to find a job, get a student loan, buy a car, or pay credit card bills? What have economic theory and the historical record taught us about the relationship between the amount of money in the economy and other macroeconomic variables? Answers to these and related questions are addressed in this chapter, which examines monetary theory and policy in the short run and in the long run

What do you think?

I use a credit card to make most of my purchases.

Strongly Disagree 1 2 3 4 5 6 7 *Strongly Agree*

The amount of money in the economy affects you in a variety of ways, but to understand these effects, we must dig a little deeper. So far, we have focused on how banks create money. But a more fundamental question is how money affects the economy, a topic called *monetary theory*. Monetary theory explores the effect of the money supply on the economy's price level, employment, and growth. The Fed's control over the money supply is called *monetary policy*. In the short run, changes in the money supply affect the economy by working through changes in the interest rate. In the long run, changes in the money supply affect the price level. Monetary policy affects the interest you pay on a car loan and the interest you earn on a bank account.

Topics discussed in Chapter 15 include

- Demand and supply of money
- Money in the short run
- Federal funds rate
- Money in the long run
- Velocity of money
- Monetary policy targets

15-1 The Demand and Supply of Money

Let's begin by reviewing the important distinction between the *stock of money* and the *flow of income*. How much money do you have with you right now? That amount is a *stock*—an amount measured at a point in time. Income, in contrast, is a *flow*—an

amount measured per period of time. Income is a measure of how much money you receive per period. Income has no meaning unless the period is specified. You would not know whether to be impressed that a friend earned $400 unless you knew whether this was per month, per week, per day, or per hour.

The demand for money is a relationship between the interest rate and how much money people want to hold. Keep in mind that the quantity of money held is a stock measure. It may seem odd at first to be talking about the demand for money. You might think people would demand all the money they could get their hands on. But remember that money, the stock, is not the same as income, the flow. People express their demand for income by selling their labor and other resources. People express their demand for money by holding some of their wealth as money rather than holding other assets that earn more interest.

But we are getting ahead of ourselves. The question is: Why do people demand money? Why do people have money with them, stash money around the house, and have money in checking accounts? The most obvious reason people demand money is that money is a convenient medium of exchange. *People demand money to make purchases.*

15-1a The Demand for Money

Because barter represents an insignificant portion of exchange in the modern industrialized economy, households, firms, governments, and foreigners need money to conduct their daily transactions. Consumers need money to buy products, and firms need money to buy resources. *Money allows people to carry out economic transactions more easily and more efficiently.* With credit cards, the short-term loan delays the payment of money, but all accounts must eventually be settled with money.

The greater the value of transactions to be financed in a given period, the greater the demand for money. So the more active the economy is—that is, the more goods and services exchanged, reflected by real output—the more money demanded. Obviously an economy with a real GDP of $14 trillion needs more money than an economy half that size. Also, the higher the economy's price level, the greater the demand for money. The more things cost on average, the more money is needed to buy them. Shoppers in economies suffering from hyperinflation need mountains of cash.

demand for money
The relationship between the interest rate and how much money people want to hold

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You demand the money needed to fund your normal spending in the course of the day or week, and you may need money for unexpected expenditures. If you plan to buy lunch tomorrow, you will carry enough money to pay for it. But you may also want to be able to pay for other possible contingencies. For example, you could have car trouble or you could come across a sale on a favorite item. You can use checks, debit cards, or credit cards for some of these unexpected purchases, but you still feel safer with some extra cash. You may have a little extra cash with you right now for who knows what. Even you don't know.

The demand for money is rooted in money's role as a medium of exchange. But as we have seen, money is more than a medium of exchange; it is also a store of value. People save for a new home, for college, for retirement. People can store their purchasing power as money or as some other financial assets, such as corporate and government bonds. When people buy bonds and other financial assets, they are lending their money and are paid interest for doing so.

The demand for any asset is based on the services it provides. The big advantage of money as a store of value is its liquidity: Money can be immediately exchanged for whatever is for sale. In contrast, other financial assets, such as corporate or government bonds, must first be *liquidated*, or exchanged for money, which can then be used to buy goods and services. Money, however, has one major disadvantage when compared to other financial assets. Money in the form of currency and traveler's checks earns no interest, and the rate earned on checkable deposits is well below that earned on other financial assets; in recent years that rate has been close to zero. So holding wealth as money means giving up some interest. For example, suppose a business could earn 3 percent more interest by holding financial assets other than money. The opportunity cost of holding

$1 million as money rather than as some other financial asset would amount to $30,000 per year. *The interest forgone is the opportunity cost of holding money.*

15-1b Money Demand and Interest Rates

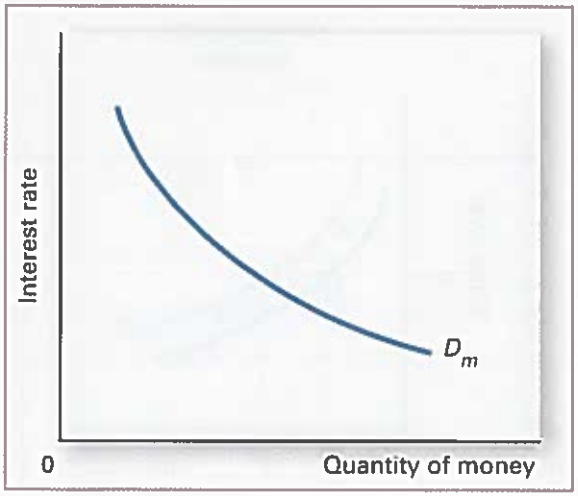
When the market interest rate is low, other things constant, the cost of holding money—the cost of maintaining liquidity—is low, so people hold more of their wealth in the form of money. Such was the case in 2013, when the interest paid on checking deposits was close to zero. When the interest rate is high, the cost of holding money is high, so people hold less of their wealth in money and more in other financial assets that pay higher interest. Thus, *other things constant, the quantity of money demanded varies inversely with the market interest rate.*

"The quantity of money demanded varies inversely with the market interest rate."

The money demand curve D_m in Exhibit 1 shows the quantity of money people demand at alternative interest rates, other things constant. Both the quantity of money and the interest rate are in nominal terms. *The money demand curve slopes downward because the lower the interest rate, the lower the opportunity cost of holding money.* Movements along the curve reflect the effects of changes in the interest rate on the quantity of money demanded. Assumed constant along the curve are the price level and real GDP. If either increases, the demand for money increases, as reflected by a rightward shift of the money demand curve.

Exhibit 1

Demand for Money



15-1c The Supply of Money and the Equilibrium Interest Rate

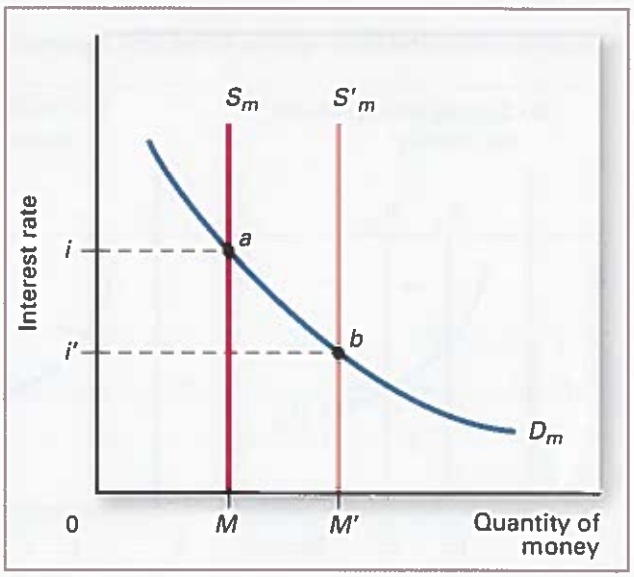
The supply of money—the stock of money available in the economy at a particular time—is determined primarily by the Fed through its control over currency and over excess reserves in the banking system. The supply of money S_m is depicted as a vertical line in Exhibit 2. *A vertical supply curve implies that the quantity of money supplied is independent of the interest rate.*

The intersection of the demand for money D_m with the supply of money S_m determines the equilibrium interest rate, i—the interest rate that equates the quantity of money demanded with the quantity supplied. At interest rates above the equilibrium level, the opportunity cost of holding money is higher, so the quantity of money people want to hold is less than the quantity supplied. At interest rates below the equilibrium level, the opportunity cost of holding money is lower, so the quantity of money people want to hold exceeds the quantity supplied.

If the Fed increases the money supply, the supply curve shifts to the right, as shown by the movement from S_m out to S'_m in Exhibit 2. At interest rate i, the quantity supplied now exceeds the quantity demanded. Because of the increased supply of

Exhibit 2

Effect of an Increase in the Money Supply



money, people are *able* to hold more money. But at interest rate *i* they are *unwilling* to hold that much. The opportunity cost of doing so is too high. Because people are now holding more of their wealth as money than they would like, they exchange some money for other financial assets, such as bonds. As the demand for bonds increases, bond sellers can pay less interest yet still attract enough buyers. The interest rate falls until the quantity of money demanded just equals the quantity supplied. With the decline in the interest rate to *i'* in Exhibit 2, the opportunity cost of holding money falls enough that the public is willing to hold the now-larger stock of money. Equilibrium moves from point *a* to point *b*. *For a given money demand curve, an increase in the money supply drives down the interest rate, and a decrease in the money supply drives up the interest rate.*

> "For a given money demand curve, an increase in the money supply drives down the interest rate, and a decrease in the money supply drives up the interest rate."

Now that you have some idea how money demand and money supply determine the market interest rate, you are ready to see how money fits into our model of the economy. Specifically, let's see how changes in the money supply affect aggregate demand and equilibrium output.

15-2 Money and Aggregate Demand in the Short Run

In the short run, money affects the economy through changes in the interest rate. Monetary policy influences the market interest rate, which in turn affects investment, a component of aggregate demand. Let's work through the chain of causation.

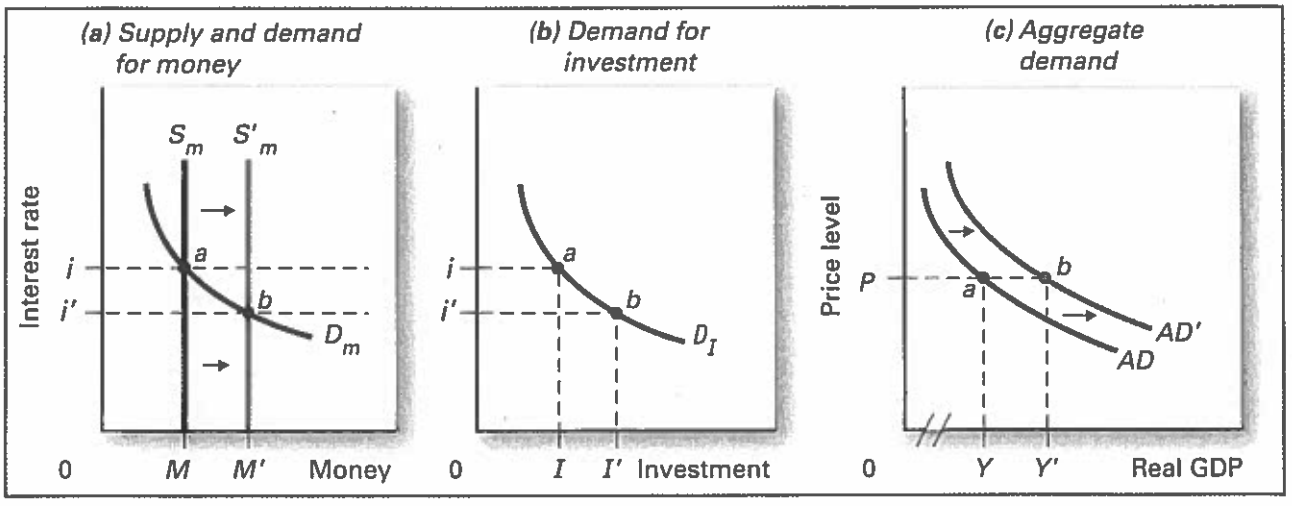
> "In the short run, money affects the economy through changes in the interest rate."

15-2a Interest Rates and Investment

Suppose the Fed believes that the economy is producing less than its potential and decides to stimulate output and employment by increasing the money supply. Recall from the previous chapter that the Fed's primary tool for increasing the money supply is open-market purchases of U.S. government securities. The three panels of Exhibit 3 trace the links between changes in the money supply and changes in aggregate demand. We begin with equilibrium interest rate i, which is determined in panel (a) by the intersection of the money demand curve D_m with the money supply curve S_m. Suppose the Fed purchases U.S. government bonds and thereby increases the money supply, as shown by a rightward shift of the money supply curve from S_m to S'_m. After

Exhibit 3

Effects of an Increase in the Money Supply on Interest Rates, Investment, and Aggregate Demand



the increase in the supply of money, people are holding more money than they would prefer at interest rate i, so they try to exchange one form of wealth, money, for other financial assets. Exchanging dollars for financial assets has no direct effect on aggregate demand, but it does reduce the market interest rate. At the lower interest rate i', the quantity of money demanded equals the quantity supplied.

A decline in the interest rate to i', other things constant, reduces the opportunity cost of financing new plants and equipment, thereby making new investment more profitable. Likewise, a lower interest rate reduces the cost of financing a new house. So a decline in the interest rate increases the quantity of investment demanded. Panel (b) shows the demand for investment D_I, first introduced several chapters back. When the interest rate falls from i to i', the quantity of investment demanded increases from I to I'.

If the spending multiplier exceeds 1, this increase in investment could lead to a greater increase in aggregate demand, reflected in panel (c) by a rightward shift of the aggregate demand curve from AD to AD'. At the given price level P, real GDP increases from Y to Y'. The sequence of events can be summarized as follows:

$$M\uparrow \rightarrow i\downarrow \rightarrow I\uparrow \rightarrow AD\uparrow \rightarrow Y\uparrow$$

An increase in the money supply, M, reduces the interest rate, i. The lower interest rate stimulates investment, I, which increases aggregate demand from AD to AD'. At a given price level, real GDP demanded increases from Y to Y'. The entire sequence is also traced out in each panel by the movement from point a to point b.

Note that the graphs presented here ignore any feedback effects of changes in real GDP on the demand for money. Because the demand for money depends on the level of real GDP, an increase in real GDP would shift the money demand curve to the right in panel (a). If we had shifted the money demand curve, the equilibrium interest rate would still have fallen, but not by as much, so investment and aggregate demand would not have increased by as much. Thus, Exhibit 2 is a simplified view, but it still captures the essentials of how changes in the money supply could affect the economy.

Now let's consider the effect of a Fed-orchestrated *increase* in interest rates. In Exhibit 3 such a policy could be traced by moving from point b to point a in each panel, but we dispense with a blow-by-blow discussion of the graphs. Suppose the Federal Reserve decides to reduce the money supply to cool down an overheated economy. A decrease in the money supply would increase the interest rate. At the higher interest rate, businesses find it more costly to finance plants and equipment, and households find it more costly to finance new homes. Hence, a higher interest rate reduces the amount invested. The resulting decline in investment leads to a decline in aggregate demand.

As long as the interest rate is sensitive to changes in the money supply, and as long as investment is sensitive to changes in the interest rate, changes in the money supply affect investment. The extent to which a given change in investment affects aggregate demand depends on the size of the spending multiplier.

15-2b Adding the Short-Run Aggregate Supply Curve

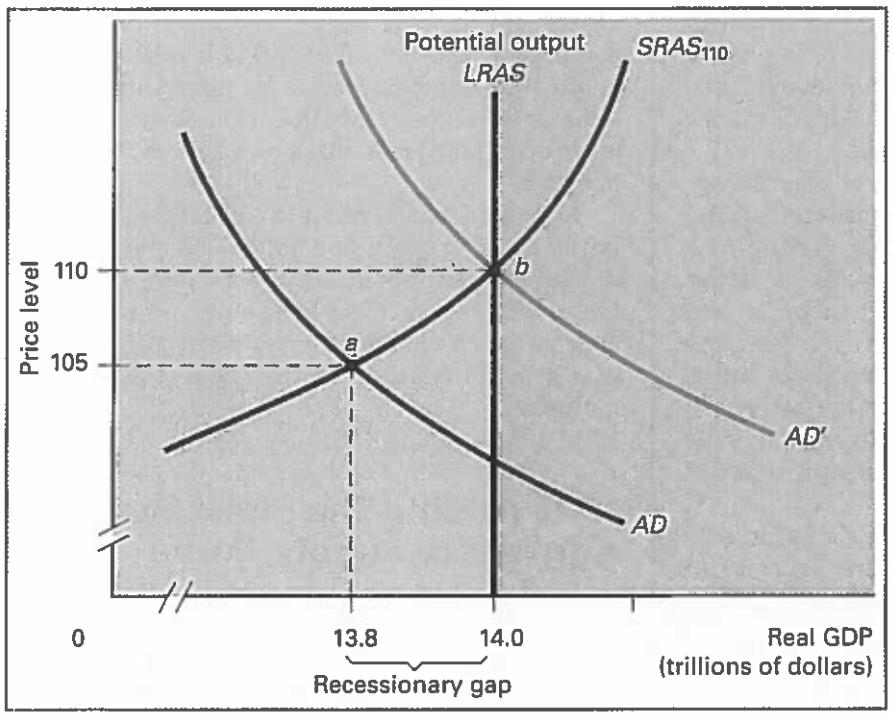
Even after tracing the effect of a change in the money supply on aggregate demand, we still have only half the story. To determine the effects of monetary policy on the equilibrium real GDP in the economy, we need the supply side. An aggregate supply curve helps show how a given shift of the aggregate demand curve affects real GDP and the price level. In the short run, the aggregate supply curve slopes upward, so the quantity supplied increases only if the price level increases. *For a given shift of the aggregate demand curve, the steeper the short-run aggregate supply curve, the smaller the increase in real GDP and the larger the increase in the price level.*

Suppose the economy is producing at point a in Exhibit 4, where the aggregate demand curve AD intersects the short-run aggregate supply curve $SRAS_{110}$, yielding a short-run equilibrium output of $13.8 trillion and a price level of 105. As you can see, the actual price level of 105 is below the expected price level of 110, and the short-run equilibrium output of $13.8 trillion is below the economy's potential of $14.0 trillion, yielding a recessionary gap of $0.2 trillion.

At point a, real wages are higher than had been negotiated and many people are looking for jobs. The Fed can wait to see whether the economy recovers on its own. Market forces could cause employers and workers to renegotiate lower nominal wages. This would lower production costs, pushing the short-run aggregate supply curve rightward, thus closing the recessionary gap. But if Fed officials are impatient with natural market forces, they could try to close the gap using an expansionary

Exhibit 4

Expansionary Monetary Policy to Close a Recessionary Gap



monetary policy. For example, during 2007 and 2008, the Fed aggressively cut the federal funds rate from 5.25 percent to between 0 and 0.25 percent to stimulate aggregate demand. If the Fed lowers that rate by just the right amount, this stimulates investment, thus increasing the aggregate demand curve enough to achieve a new equilibrium at point *b*, where the economy produces its potential output. Given all the connections in the chain of causality between changes in the money supply and changes in equilibrium output, however, it would actually be quite remarkable for the Fed to execute monetary policy so precisely. If the Fed overshot the mark and stimulated aggregate demand too much, this would open up an expansionary gap, thus creating inflationary pressure in the economy.

To Review: As long as the money demand curve and the investment demand curve each slope downward, an increase in the money supply reduces the market interest rate, increasing investment and consequently increasing aggregate demand. And as long as the short-run aggregate supply curve slopes upward, the short-run effect of an increase in the money supply is an increase in both real output and the price level. But here is one final qualification: Lowering the interest rate may not always stimulate investment. Economic prospects may become so glum that lower interest rates may fail to achieve the desired increase in aggregate demand. In response to the recent financial crisis, for example, the Fed cut the federal funds rate to near zero by the end of 2008, but investment in 2009 still dropped sharply.

That's the theory of monetary policy in the short run. Let's next look at the federal funds rate in practice.

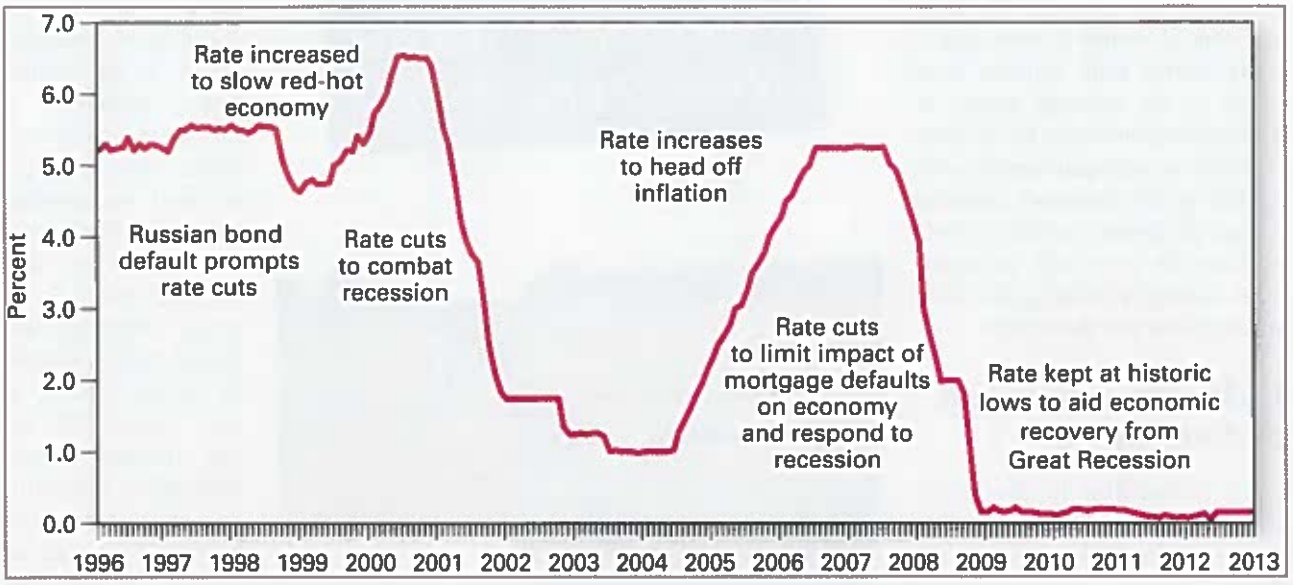
15-2c Recent History of the Federal Funds Rate

At 2:15 P.M. on December 16, 2008, immediately following a regular meeting, the Federal Open Market Committee (FOMC) announced that it would lower its target for the federal funds rate to between 0 and 0.25 percent, the tenth reduction in 15 months. As you know by now, the federal funds rate is the interest rate banks charge one another for overnight lending of reserves at the Fed. Because lowering the rate reduces the cost of covering any reserve shortfall, banks are more willing to lend to the public. To execute this monetary policy, the FOMC authorized the New York Fed to make open-market purchases to increase bank reserves until the federal funds rate fell to the target level.

For four decades, the Fed has reflected its monetary policy in this interest rate. (For a few years, the Fed targeted money aggregates, but more on that later.) There are many interest rates in the economy—for credit cards, new cars, mortgages, home equity loans, personal loans, business loans, and more. Why focus on such an obscure rate? First, by changing bank reserves through open-market operations, the Fed has a direct lever on the federal funds rate, so the Fed's grip on this rate is tighter than on any other market rate. Second, the federal funds rate serves as a benchmark for determining other short-term interest rates in the economy. For example, after the Fed announces a rate change, major banks around the country usually change by the same amount their prime interest rate—the interest rate banks charge their best corporate customers. The federal funds rate affects monetary and financial conditions, which in turn affect employment, aggregate output, and the price level. The Fed uses the federal

Exhibit 5

Recent Ups and Downs in the Federal Funds Rate



SOURCE: Based on monthly averages from the Federal Reserve System. Monthly averages are also available at http://www.thecommunitybanker.com/fedfundsrate-monthly.htm.

funds rate to pursue its twin goals of price stability and maximum employment.

Exhibit 5 shows the federal funds rate since early 1996. As a lesson in monetary policy, let's walk through the Fed's rationale. Between early 1996 and late 1998, the economy grew nicely with low inflation, so the FOMC stabilized the rate in a range of 5.25 percent to 5.5 percent. But in late 1998, a Russian default on its bonds and the near collapse of a U.S. financial institution created economic turmoil, prompting the FOMC to drop the target rate to 4.75 percent. By the summer of 1999, those fears had abated, and instead the FOMC became concerned that robust economic growth would trigger higher inflation. In a series of steps, the federal funds target was raised from 4.75 percent to 6.5 percent. The FOMC announced at the time that the moves "should markedly diminish the risk of rising inflation going forward." Some critics argued that the Fed's rate hikes contributed to the 2001 recession. In 2001, concerns about waning consumer confidence, weaker capital spending, and the 9/11 terrorist attacks prompted the FOMC to reverse course. Between the beginning of 2001 and mid-2003, the FOMC cut the rate from 6.5 percent to 1.0 percent, reflecting at the time the most concentrated monetary stimulus on record. The rate remained at 1.0 percent for a year. Some economists criticized the Fed for keeping rates too low too long. They charged that this "easy money" policy overstimulated the housing sector, encouraging some to buy homes they couldn't afford. These home purchases, critics argued, inflated the bubble in housing prices and sowed the seeds for mortgage defaults that hit years later.

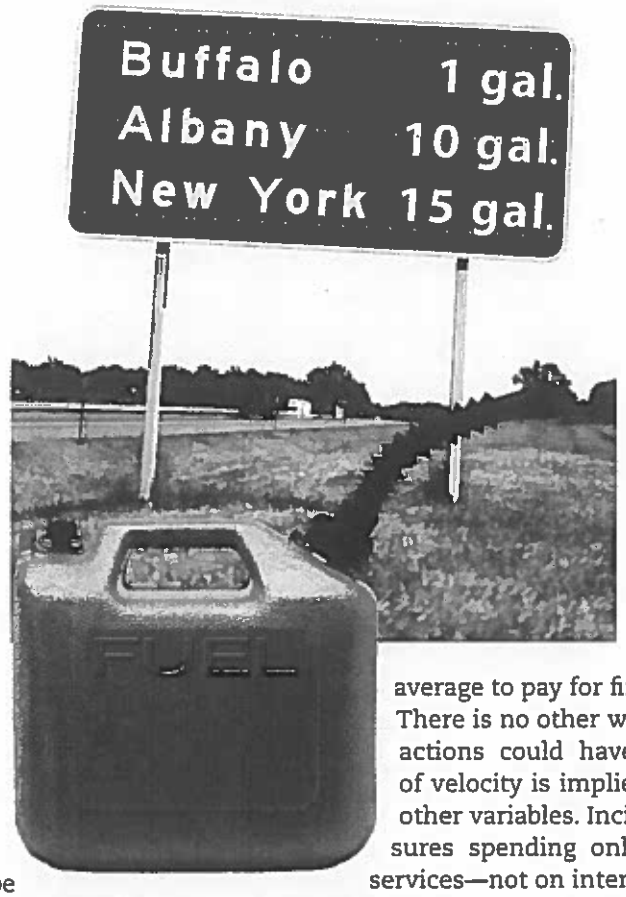
Anyway, after leaving the rate at 1.0 percent for a year, the FOMC began worrying again about inflationary pressure. Between June 2004 and June 2006, the target federal funds rate was increased from 1.0 percent to 5.25 percent in 17 steps. The FOMC then hit the pause button, leaving the rate at 5.25 percent for more than a year. This takes us up to September 2007, when troubles in the housing sector, a rising mortgage default rate, and a softening economy prompted the first in a series of federal funds rate cuts. After 10 cuts over 15 months, the target rate in December 2008 stood between 0 and 0.25 percent, the lowest in history. As you can see from Exhibit 5, the rate remained at a record low for years.

With the primary tool of monetary policy already at the bottom of its range, was the Fed out of ammunition in fighting the Great Recession? Another policy tool that the Fed relied upon more after 2008 is the way it communicates with the public, particularly its intentions about future policy.

15-3 Money and Aggregate Demand in the Long Run

When we looked at the impact of money on the economy in the short run, we found that money influences aggregate demand and equilibrium output

through its effect on the interest rate. Here we look at the long-run effects of changes in the money supply on the economy. *The long-run view of money is more direct: if the central bank supplies more money to the economy, sooner or later people spend more. But because the long-run aggregate supply curve is fixed at the economy's potential output, this greater spending simply increases the price level.* In short, more money is chasing the same output. Here are the details.



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15-3a The Equation of Exchange

Every transaction in the economy involves a two-way swap: The buyer exchanges money for goods and the seller exchanges goods for money. One way of expressing this relationship among key variables in the economy is the **equation of exchange**, first developed by classical economists. Although this equation can be arranged in different ways, depending on the emphasis, the basic version is

$$M \times V = P \times Y$$

where M is the quantity of money in the economy; V is the **velocity of money**, or the average number of times per year each dollar is used to purchase final goods and services; P is the average price level; and Y is real GDP. The equation of exchange says that the quantity of money in circulation, M, multiplied by V, the number of times that money changes hands, equals the average price level, P, times real output, Y. The price level, P, times real output, Y, equals the economy's nominal income and output, or nominal GDP.

equation of exchange
The quantity of money, *M*, multiplied by its velocity, *V*, equals nominal GDP, which is the product of the price level, *P*, and real GDP, *Y*; or $M \times V = P \times Y$

velocity of money
The average number of times per year each dollar is used to purchase final goods and services

quantity theory of money
If the velocity of money is stable, or at least predictable, changes in the money supply have predictable effects on nominal GDP

By rearranging the equation of exchange, we find that velocity equals nominal GDP divided by the money stock, or

$$V = \frac{P \times Y}{M}$$

For example, nominal GDP in 2013 was about 16.90 trillion, and the money stock as measured by M1 averaged about $2.54 trillion. The velocity of money indicates how often each dollar is used on average to pay for final goods and services during the year. So in 2013, velocity was $16.90 trillion divided by $2.54 trillion, or 6.65. Given GDP and the money supply, each dollar in circulation must have been spent 6.65 times on average to pay for final goods and services. There is no other way these market transactions could have occurred. The value of velocity is implied by the values of the other variables. Incidentally, velocity measures spending only on final goods and services—not on intermediate products, secondhand goods, financial assets, or illegal activity, even though such spending also occurs. So velocity underestimates how hard the money supply works during the year.

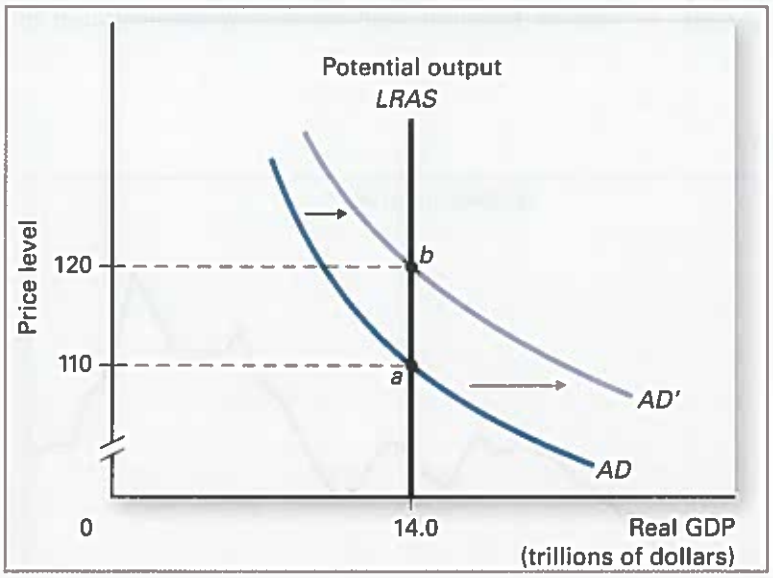
The equation of exchange says that total spending ($M \times V$) always equals total receipts ($P \times Y$), as was the case in our circular-flow analysis. As described so far, however, the equation of exchange is simply an *identity*—a relationship expressed in such a way that it is true by definition. Another example of an identity would be a relationship equating miles per gallon to the distance driven divided by the gasoline required.

15-3b The Quantity Theory of Money

If velocity is relatively stable over time, or at least predictable, the equation of exchange turns from an identity into a theory—the quantity theory of money. The **quantity theory of money** states that if the velocity of money is stable, or at least predictable, then the equation of exchange can be used to predict the effects of changes in the money supply on *nominal* GDP, $P \times Y$. For example, if M increases by 5 percent and V remains constant, then $P \times Y$, or

Exhibit 6

In the Long Run, an Increase in the Money Supply Results in a Higher Price Level, or Inflation



nominal GDP, must also increase by 5 percent. For a while, some economists believed they could use the equation of exchange to predict nominal output in the short run. Now, if at all, it's used primarily as a rough guide in the long run.

So an increase in the money supply results in more spending in the long run, meaning a higher nominal GDP. How is this increase in $P \times Y$ divided between changes in the price level and changes in real GDP? The answer does not lie in the quantity theory, for that theory is stated only in terms of nominal GDP. The answer lies in the shape of the aggregate supply curve.

The long-run aggregate supply curve is vertical at the economy's potential level of output. With real output, Y, fixed and the velocity of money, V, relatively stable, a change in the stock of money translates directly into a change in the price level. Exhibit 6 shows the effect of an increase in the money supply in the long run. An increase in the money supply causes a rightward shift of the aggregate demand curve, which increases the price level but leaves output unchanged at potential GDP. So the economy's potential output level is not affected by changes in the money supply. *In the long run, increases in the money supply, with velocity stable or at least not decreasing, result only in higher prices.* For example, an examination of 73 inflation periods across major economies since 1960 concludes that important triggers to inflation were expansionary monetary policies.[1]

To Review: If velocity is stable, or at least predictable, the quantity theory of money says that changes in the money supply will, in the long run, result in predictable effects on the economy's price level. Velocity's stability and predictability are key to the quantity theory of money. Let's consider some factors that might influence velocity.

15-3c What Determines the Velocity of Money?

Velocity depends in part on the customs and conventions of commerce. In colonial times, money could be tied up in transit for days as a courier on horseback carried a payment from a merchant in Boston to one in Baltimore. Today, the electronic transmission of funds occurs in an instant, so the same stock of money can move around much more quickly to finance many more transactions. *The velocity of money has also increased because of a variety of commercial innovations that facilitate exchange.* For example, a wider use of charge accounts and credit cards has reduced the need for shoppers to carry cash. Likewise, automatic teller machines have made cash more accessible at more times and in more places. What's more, debit cards are used at a growing number of retail outlets, so people need less "walking-around" money.

Another institutional factor that determines velocity is the frequency with which workers get paid. Suppose a worker who earns $52,000 per year gets paid $2,000 every two weeks. Earnings are spent evenly during the two-week period and are gone by the end of the period. In that

CLIFF LIPSON/CBS/GETTY IMAGES

"The better money serves as a store of value, the more money people hold, so the lower its velocity."

1. John Boschen and Charles Weise, "What Starts Inflation: Evidence from OECD Countries," *Journal of Money, Credit and Banking*, 35 (June 2003): 323–349.

case, a worker's average money balance during the pay period is $1,000. If a worker earns the same $52,000 per year but, instead, gets paid $1,000 weekly, the average money balance during the pay period falls to $500. *Thus, the more often workers get paid, other things constant, the lower their average money balances, so the more active the money supply and the greater its velocity.* Payment practices change slowly over time, and the effects of these changes on velocity are predictable.

Another factor affecting velocity depends on how stable money is as a store of value. *The better money serves as a store of value, the more money people hold, so the lower its velocity.* For example, the introduction of interest-bearing checking accounts made money a better store of value, so people were more willing to hold money in checking accounts; this financial innovation reduced velocity. On the other hand, when inflation increases, money turns out to be a poorer store of value. People become reluctant to hold money and try to exchange it for some asset that retains its value better. This reduction in people's willingness to hold money during periods of high inflation increases the velocity of money. During hyperinflations, workers usually get paid daily, boosting velocity even more. Thus, *velocity increases with a rise in the inflation rate, other things constant.* Money becomes a hot potato—nobody wants to hold it for long.

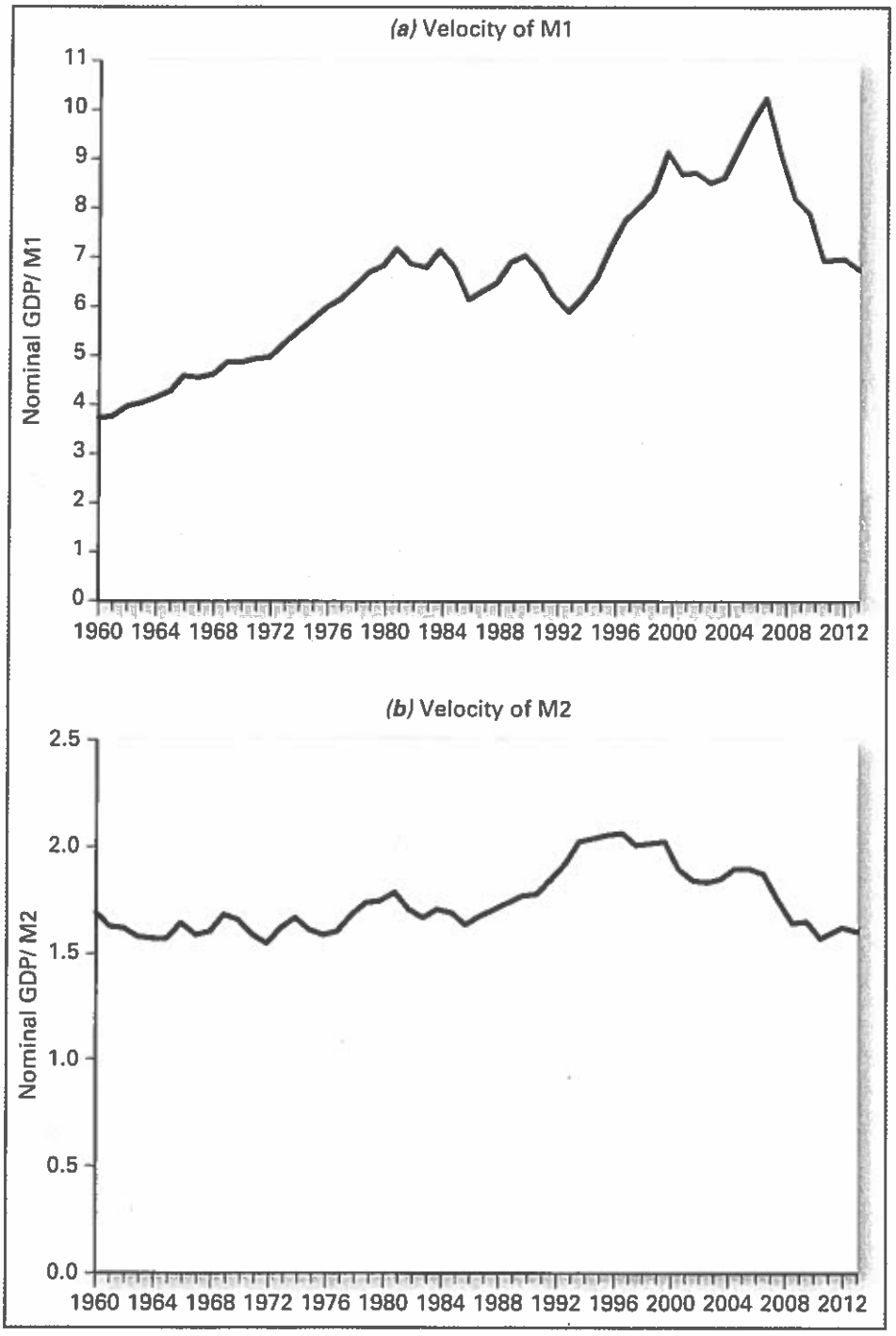
Again, the usefulness of the quantity theory in predicting changes in the price level in the long run hinges on how stable and predictable the velocity of money is over time.

15-3d How Stable Is Velocity?

Exhibit 7 graphs velocity since 1960, measured both as nominal GDP divided by M1 in panel (a) and as nominal GDP divided by M2 in panel (b).

Exhibit 7

The Velocity of Money



SOURCES: *Economic Report of the President*, February 2013, and the Federal Reserve Board. Velocity of 2013 is estimated by the author based on nominal GDP and the money supply figures through November 2013.

Between 1960 and 1980, M1 velocity increased steadily and in that sense could be considered at least predictable. M1 velocity bounced around during the 1980s. But in the early 1990s, more and more banks began offering money market funds that included limited check-writing privileges, or what is considered M2. Deposits shifted from M1 to M2, which increased the velocity of M1. Also in recent years, more people began using debit cards to pay directly at grocery stores, drugstores, and a growing number of outlets, and this too increased the velocity of M1 because people carried less cash (and because they could easily get cash back on debit-card transactions). M1 velocity increased from about 6.0 in 1993 to 10.2 in 2007. M1 velocity dropped since the 2007–2009 recession. Because of extremely low interest rates, the opportunity cost of holding wealth in the form of money declined, so the quantity of money demanded increased. Also, because of anxiety about the economy, people hoarded more cash, all of which slowed velocity to 6.65 by 2013. M2 velocity appears slightly more stable, as you can see by comparing the two panels in Exhibit 7.

For a few years, the Fed focused on changes in the money supply as a target for monetary policy in the short run. Because M1 velocity became so unstable during the 1980s, the Fed in 1987 switched from targeting M1 to targeting M2. But when M2 velocity became volatile in the early 1990s, the Fed announced that money aggregates, including M2, would no longer be considered reliable guides for monetary policy in the short run. *Since 1993, the equation of exchange has been considered only a rough guide linking changes in the money supply to inflation in the long run.*

What is the long-run relationship between increases in the money supply and inflation? Since the Federal Reserve System was established in 1913, the United States has suffered three episodes of high inflation, and each was preceded and accompanied by sharp increases in the money supply. These occurred from 1913 to 1920, 1939 to 1948, and 1967 to 1980.

15-4 Targets for Monetary Policy

In the short run, monetary policy affects the economy largely by influencing interest rates. In the long run, changes in the money supply affect the price level, though with an uncertain lag. Should monetary authorities focus on the interest rates in the short run or the supply of money in the long run? As we will see, the Fed lacks the tools to focus on both at the same time.

15-4a Contrasting Policies

To demonstrate the effects of different policies, we begin with the money market in equilibrium at point *e* in Exhibit 8. The interest rate is i and the money stock is M, values the monetary authorities find appropriate. Suppose there is an increase in the demand for money in the economy, perhaps because of an increase in nominal GDP. The money demand curve shifts to the right, from D_m to D'_m.

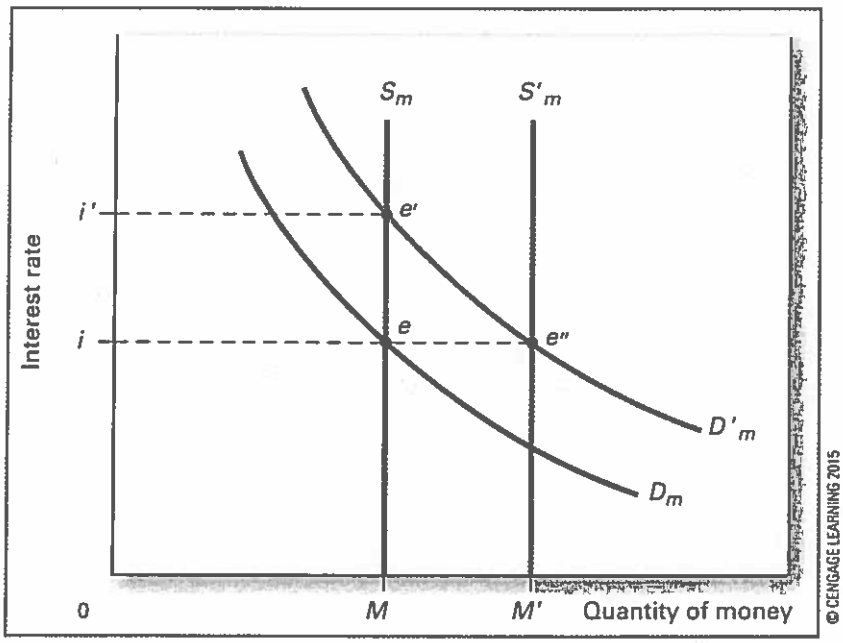
When confronted with an increase in the demand for money, monetary authorities can choose to do nothing, thereby allowing the interest rate to rise, or they can increase the money supply enough to hold the interest rate constant. If monetary authorities do nothing, the quantity of money in the economy remains at M, but the interest rate rises because the greater demand for money increases the equilibrium combination from point *e* up to point *e'*. Alternatively, monetary authorities can try to keep the interest rate at its initial level by increasing the supply of money from S_m to S'_m. In terms of possible combinations of the money stock and the interest rate, monetary authorities must choose from points lying along the new money demand curve, D'_m.

A growing economy usually needs a growing money supply to pay for the increase in aggregate output. If monetary authorities maintain a constant growth in the money supply, and if velocity remains stable, the interest rate fluctuates unless the growth in the supply of money each period just happens to match the growth in the demand for money (as in the movement from *e* to *e"* in Exhibit 8). Alternatively, monetary authorities could try to adjust the money supply each period by the amount needed to keep the interest rate stable. With this latter approach, changes in the money supply would have to offset any changes in the demand for money. This essentially is what the Fed does when it holds the federal funds target constant, as from late 2008 well into 2014.

Interest rate fluctuations could be harmful if they create undesirable fluctuations in investment. For interest rates to remain stable during economic expansions, the money supply would have to grow at the same rate as the demand for money. Likewise, for interest rates to remain stable during economic contractions, the money supply would have to shrink at the same rate as the demand for money. Hence, for monetary authorities to maintain

Exhibit 8

Targeting Interest Rates Versus Targeting the Money Supply



the interest rate at some specified level, the money supply must increase during economic expansions and decrease during contractions. But an increase in the money supply during an expansion would increase aggregate demand even more, and a decrease in the money supply during a contraction would reduce aggregate demand even more. *Such changes in the money supply would thus tend to worsen fluctuations in economic activity, thereby adding more instability to the economy.* With this in mind, let's review monetary policy over the years.

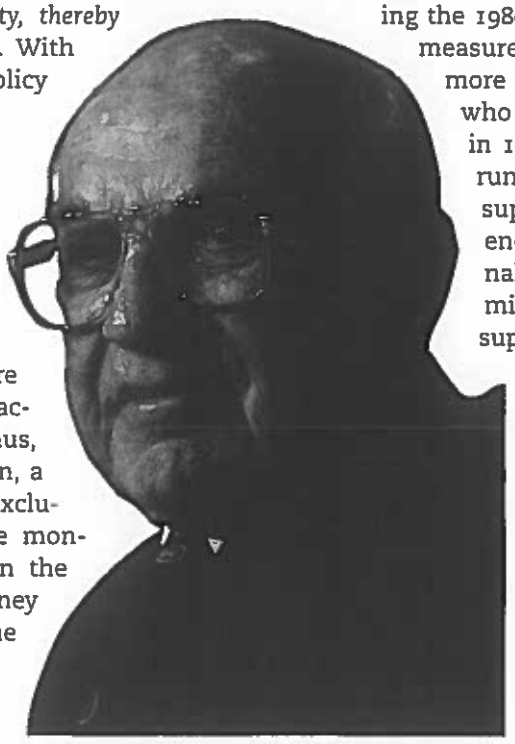
15-4b Targets before 1982

Between World War II and October 1979, the Fed attempted to stabilize interest rates. Stable interest rates were viewed as a prerequisite for an attractive investment environment and, thus, for a stable economy. Milton Friedman, a Nobel Prize winner, argued that this exclusive attention to interest rates made monetary policy a source of instability in the economy because changes in the money supply reinforced fluctuations in the economy. He said that the Fed should pay less attention to interest rates and instead should focus on a steady and predictable growth in the money supply. The debate raged during the 1970s, and Friedman won some important converts. Amid growing concern about a rising inflation rate, the Fed, under a new chairman, Paul Volcker, announced in October 1979 that it would deemphasize interest rates and would instead target specific money aggregates. Not surprisingly, interest rates became much more volatile.

But many observers believe that a sharp reduction in money growth in the latter half of 1981 caused the recession of 1982. Inflation declined rapidly, but unemployment climbed to 10 percent. People were worried. As you might expect, the Fed was widely criticized. Farmers, politicians, and businesspeople denounced Volcker. Emotions ran high. Volcker was reportedly even given Secret Service protection. In October 1982, three years after the focus on interest rates was dropped, Volcker announced that the Fed would again pay some attention to interest rates.

15-4c Targets after 1982

The Fed is always feeling its way, looking for signs about the direction of the economy. The rapid pace of financial innovations and deregulation during the 1980s made the definition and measurement of the money supply more difficult. Alan Greenspan, who became the Fed chairman in 1987, said that, in the short run, changes in the money supply "are not linked closely enough with those of nominal income to justify a single-minded focus on the money supply."[2] In 1993, he testified in Congress that the Fed would no longer target money aggregates, such as M1 and M2, as a guide to monetary policy. As we've seen, the Fed in recent years has targeted the federal funds rate. No



BROOKS KRAFT/CORBIS NEWS/CORBIS

2. Quoted in "Greenspan Asks That Fed Be Allowed to Pay Interest," *Wall Street Journal*, 11 March 1992.

central bank in a major economy now makes significant use of money aggregates to guide policy in the short run. Still, most policy makers also agree that in the long run, changes in the money supply influence the price level and inflation.

> "No central bank in a major economy now makes significant use of money aggregates to guide policy in the short run."

While monetary targets are important, also significant is what Fed officials have to say. For example, they might announce that they are following a problem closely and are prepared to stabilize financial markets as needed. Such reassurance is sometimes all that's required to calm market jitters.

15-4d Other Fed Responses to the Financial Crisis

As we have seen, the Fed shapes monetary policy in a variety of other ways, as it did during and after the Great Recession of 2007–2009. To get a flavor of what the Fed has been up to, let's take a look at some of its responses.

Bailing Out AIG

In September 2008, as the global financial crisis was spreading, the Fed teamed up with the U.S. Treasury with a $182.5 billion package to rescue the insurance giant AIG from failure. At the time, the company was so interconnected with other financial entities that regulators believed they could not risk another bankruptcy, particularly after the panic created by the failure of Lehman Brothers. The Fed purchased some of AIG's troubled assets, taking them off AIG's balance sheet. The Fed and the Treasury also lent AIG enough money to keep the company running. AIG survived, and by June 2012 it had paid back the Fed with interest.

Some critics charged that AIG and some other large financial institutions should not have been bailed out because they helped cause the financial crisis. The Fed chairman at the time, Ben Bernanke, said that the Fed tried to protect U.S. workers and consumers, groups that would have been hurt the most by a collapse of the financial system. He also noted that the Fed's investments that seemed like bailouts actually paid off well enough that the Fed sent $80 billion in "profit" to the U.S. Treasury in 2010 and $77 billion in 2011, record amounts to that point and nearly double what was sent in 2009. We should also note that a share of AIG stock, which was selling for as much as $1,400 before the financial crisis, plunged to just $10 by early 2009, so shareholders lost nearly all their investment. Not much of a bailout for them.

Reducing the Risk of "Too Big to Fail"

Large financial institutions like AIG have dealings with thousands of other financial entities, so if one of these giants fails, as Lehman Brothers did in September 2008, that entails much collateral damage on the wider economy. With tougher supervisory oversight and greater capital requirements, the Fed and other regulators are trying to reduce the chances that a big financial institution will fail. For example, the Fed helped conduct a **stress test** of the 19 largest banks to determine which ones needed additional financial capital to weather a bad economy. Many banks had to raise billions more in capital.

The Dodd-Frank Act gave the Fed and the FDIC expanded oversight of large financial institutions, especially those that were not depository institutions. Over the years, nonbank financial intermediaries such as mortgage companies, insurance companies, brokerage firms, money market mutual funds, and hedge funds came to represent a larger share of all lending in the economy, but because they did not rely on customer deposits, they were out of the Fed's scope and control. The Dodd-Frank Act brought this so-called **shadow banking system** under the Fed's regulatory control.

Again, the objective of regulations is to reduce the probability that a large financial institution will collapse. But if one of these financial giants should get into serious trouble, the approach going forward is to let it fail through an orderly liquidation of the firm's assets. To that end, the Fed and the FDIC have set out rules for so-called *living wills*, which will require each large financial institution, even one that appears in great shape, to prepare a blueprint for how it should be taken apart in the event of bankruptcy.

stress test
Bank regulators assessed the soundness of large banks to determine which ones needed more financial capital to weather a bad economy

shadow banking system
Financial institutions, such as mortgage companies and brokerage firms, that do not rely on deposits to make loans

Quantitative Easing

The Fed typically changes the federal funds rate by buying or selling short-term government securities. But with that interest rate already at rock bottom by late 2008, the Fed was looking for other ways to help the economy. The Fed's

answer was to buy long-term assets, such as government bonds and mortgage-backed securities. Doing so did not reduce short-term rates, which could not go lower, but it did bring down long-term rates, making investments more attractive. Purchasing mortgage-backed securities supported the mortgage and housing markets and helped stabilize financial markets more generally.

Through a variety of aggressive purchases since late 2008, the Fed added nearly $3 trillion in assets to its balance sheet. These asset purchases, called **quantitative easing**, directly lowered long-term interest rates, and indirectly raised bank reserves. Bank funds on deposit with the Fed increased by more than $2.2 trillion. In the fall of 2013, the Fed was contemplating more quantitative easing. Incidentally, quantitative easing is possible only if the central bank controls the money supply. The central banks of Greece and other euro zone countries do not issue the zone's common currency, and therefore cannot purchase assets in this way.

What are the risks of quantitative easing? The Fed could lose money on its purchases if these assets are sold back for less. Because the tool is unconventional and not well tested, nobody knows how much quantitative easing is too much. And too much money creation could trigger inflation, which is discussed next.

All these actions could be summed up as the *Fed trying to do whatever it takes to comply with its statutory mandate of price stability with maximum employment*. Fed officials did not want a repeat of the Great Depression, when they dropped the ball by not supplying the liquidity the financial system needed. As a result, some 10,000 banks failed during the Great Depression, versus about 500 since the onset of the Great Recession.

15-4e What about Inflation?

At press conferences, the head of the Fed makes sure to remind the public that the Fed's twin statutory mandates are price stability and maximum employment. In terms of price stability, the Fed seeks a target rate of 2 percent. Why not zero percent? According to the Fed, that would mean the economy at times would experience deflation—something the Fed wants to avoid. In terms of maximum employment, the Fed would like to see the unemployment rate get down to a range between 5.2 percent and 6.0 percent. Why not lower? The Fed believes a rate much below that would tighten labor markets too much, risking higher inflation.

quantitative easing
Fed purchases of long-term assets to stabilize financial markets, reduce long-term interest rates, and improve the investment environment

Because of asset purchases by the Fed, total assets on its balance sheet expanded from about $0.9 trillion in the summer of 2007, before the financial crisis, to about $3.7 trillion in September of 2013, with quantitative easing the major source. Some critics feared that buying all those assets would touch off inflation. Why didn't it, at least not as of 2013? Well, first, with unemployment above 7.0 percent, a figure well above the Fed's target rate for unemployment, there was still a lot of slack in the economy. Second, most of the funds that the Fed created to buy these assets ended up as idle bank reserves on account with the Fed. Remember that bank reserves are not part of the money supply. Banks were lending less because (1) the demand for loans was down, (2) lending standards had tightened, (3) banks were earning interest on their reserves at the Fed, and (4) the financial crisis made banks more wary of lending. In September 2013, banks had about $2.3 trillion on deposit with the Fed; this was up from only $13 billion in the summer of 2007, before the trouble started. Thus, bank reserves at the Fed increased more than 175-fold.

Still, as the Fed purchased nearly $3 trillion in assets, the money supply as measured by M1 did increase by $1.2 trillion, or about 85 percent, between 2007 and 2013, a period when real GDP grew by a total of only 7 percent. Shouldn't that combination result in inflation? Not if the velocity of M1 slowed down considerably, as it did. The lower interest rate reduced the opportunity cost of holding cash, so people held more of it. What's more, the uncertain economic times increased the demand for cash, with some people even hoarding it. All this slowed the velocity of M1, which decreased from 10.20 in 2007 to 6.65 in 2013, a drop of 35 percent. The drop in velocity meant that the increase in the money supply did not increase nominal spending that much and thus did not result in much inflation. Between 2007 and 2013 the price level increased by a total of only 13 percent.

At some point the Fed will have to unwind certain actions taken during the financial crisis, and it will have to do so in a way that's not inflationary. At the same time, if it sells its assets too quickly, the Fed must be mindful of the possibility of deflation, which is also bad news and can be self-reinforcing. For example, when home prices slide, few people want to buy because they expect prices to go lower; if enough people hold back, then, what do you know, prices drop even more. But inflation remains perhaps the bigger risk. Once banks tap their huge accumulation of excess reserves to make loans, the money supply will grow quickly. Unless velocity continues to drop, this growth in the money supply could trigger inflation. That's

why the Fed officials have made it clear that once the recovery picks up speed, they will begin selling assets to reduce bank reserves. But Fed officials have little experience with winding down assets of this magnitude. This effort will likely fall to the newly appointed to the Federal Reserve chair, Janet Yellen.

15-4f International Considerations

As national economies grow more interdependent, the Fed has become more sensitive to the global implications of its action. What happens in the United States often affects markets overseas and vice versa. The Fed has tried to sooth troubled world markets in a variety of ways. When Mexico faced financial difficulties in 1982 and again in 1994, Fed officials helped arrange loans to prevent a financial crisis. A worldwide financial panic in the fall of 1998 because of defaults on Russian bonds prompted the Fed to lower the federal funds rate to supply more liquidity here and abroad. And a worldwide shortage of credit in 2007–2009 caused by mortgage defaults in the United States prompted the Fed to supply additional liquidity to the banking system to ensure the orderly functioning of financial markets.

Central banks around the world have also begun coordinating their activities, particularly during economic turmoil. For example, in October 2008, during the global financial crisis, six major central banks reduced interest rates in a joint effort to restore financial stability to world markets. Chairman Bernanke said he was in frequent contact with other central bankers, including Mario Draghi, head of the European Central Bank. (Incidentally, Draghi, like Bernanke, earned a Ph.D. in economics from MIT.) Although not the main focus of monetary policy, international considerations are of growing importance to the Fed, particularly because of recent fiscal instability in the euro zone.

15-5 Final Word

This chapter has described two ways of viewing the effects of money on the economy's performance, but we should not overstate the differences. In the model that focuses on the short run, an increase in the money supply means that people are holding more money than they would like at the prevailing interest rate, so they exchange one form of wealth, money, for other financial assets, such as corporate or government bonds. This greater demand for other financial assets has no direct effect on aggregate demand, but it does reduce the interest rate, and thereby stimulates investment. The higher investment increases aggregate demand. The effect of this increase in demand on real output and the price level depends on the shape of the short-run aggregate supply curve.

In the model that focuses on the long run, changes in the money supply act more directly on the price level. If velocity is relatively stable or at least predictable, then a change in the money supply has a predictable effect on the price level in the long run. As long as velocity is not declining, an increase in the money supply means that people eventually spend more, increasing aggregate demand. But because long-run aggregate supply is fixed at the economy's potential output, increased aggregate demand leads simply to a higher price level, or to inflation.

$16.90 trillion — < U.S. nominal GDP in 2013

0–0.25% — < The Fed funds target rate since the 2008–2009 housing financial crisis

M1 money supply in 2013 > $2.54 trillion

2% — < The Fed's targeted rate of inflation

Velocity of M1 in 2013 > 6.65

5.2%–6.0% — < The Fed's targeted rate of unemployment
