section 5

The Financial Sector

FUNNY MONEY

On October 2, 2004, FBI and Secret Service agents seized a shipping container that had just arrived in Newark, New Jersey, on a ship from China. Inside the container, under cardboard boxes containing plastic toys, they found what they were looking for: more than $300,000 in counterfeit $100 bills. Two months later, another shipment with $3 million in counterfeit bills was intercepted. Government and law enforcement officials began alleging publicly that these bills—which were high-quality fakes, very hard to tell from the real thing—were being produced by the government of North Korea.

The funny thing is that elaborately decorated pieces of paper have little or no intrinsic value. Indeed, a $100 bill printed with blue or orange ink literally wouldn't be worth the paper it was printed on. But if the ink on that decorated piece of paper is just the right shade of green, people will think that it's *money* and will accept it as payment for very real goods and services. Why? Because they believe, correctly, that they can do the same thing: exchange that piece of green paper for real goods and services.

"The Atrain Is On the Banks," by James Flora, 1996, © Jim Flora Art LLC; Courtesy Irwin Chusid and Barbara Economon. www.JimFlora.

Money is the essential channel that links the various parts of the modern economy.

In fact, here's a riddle: If a fake $100 bill from North Korea enters the United States, and nobody ever realizes it's fake, who gets hurt? Accepting a fake $100 bill isn't like buying a car that turns out to be a lemon or a meal that turns out to be inedible; as long as the bill's counterfeit nature remains undiscovered, it will pass from hand to hand just like a real $100 bill. The answer to the riddle is that the real victims of North Korean counterfeiting are U.S. taxpayers because counterfeit dollars reduce the revenues available to pay for the operations of the U.S. government. Accordingly, the Secret Service diligently monitors the integrity of U.S. currency, promptly investigating any reports of counterfeit dollars.

The efforts of the Secret Service attest to the fact that money isn't like ordinary goods and services. In this section we'll look at the role money plays, the workings of a modern monetary system, and the institutions that sustain and regulate it. We'll then see how models of the money and loanable funds markets help us understand *monetary policy* as carried out by our central bank—the *Federal Reserve*.

What you will learn in this **Module:**

- The relationship between savings and investment spending
- The purpose of the four principal types of financial assets: stocks, bonds, loans, and bank deposits
- How financial intermediaries help investors achieve diversification

Module 22
Saving, Investment, and the Financial System

Matching Up Savings and Investment Spending

Two instrumental sources of economic growth are increases in the skills and knowledge of the workforce, known as *human capital,* and increases in capital—goods used to make other goods—which can also be called *physical capital* to distinguish it from human capital. Human capital is largely provided by the government through public education. (In countries with a large private education sector, like the United States, private post-secondary education is also an important source of human capital.) But physical capital, with the exception of infrastructure such as roads and bridges, is mainly created through private investment spending—that is, spending by firms rather than by the government.

Who pays for private investment spending? In some cases it's the people or corporations who actually do the spending—for example, a family that owns a business might use its own savings to buy new equipment or a new building, or a corporation might reinvest some of its own profits to build a new factory. In the modern economy, however, individuals and firms who create physical capital often do it with other people's money—money that they borrow or raise by selling stock. If they borrow money to create physical capital, they are charged an interest rate. The **interest rate** is the price, calculated as a percentage of the amount borrowed, charged by lenders to borrowers for the use of their savings for one year.

To understand how investment spending is financed, we need to look first at how savings and investment spending are related for the economy as a whole.

The **interest rate** is the price, calculated as a percentage of the amount borrowed, charged by lenders to borrowers for the use of their savings for one year.

According to the **savings–investment spending identity,** savings and investment spending are always equal for the economy as a whole.

The Savings–Investment Spending Identity

The most basic point to understand about savings and investment spending is that they are always equal. This is not a theory; it's a fact of accounting called the **savings–investment spending identity.**

To see why the savings–investment spending identity must be true, first imagine a highly simplified economy in which there is no government and no interaction with

other countries. The overall income of this simplified economy would, by definition, be equal to total spending in the economy. Why? Because the only way people could earn income would be by selling something to someone else, and every dollar spent in the economy would create income for somebody. So in this simplified economy,

(22-1) Total income = Total spending

Now, what can people do with income? They can either spend it on consumption or save it. So it must be true that

(22-2) Total income = Consumer spending + Savings

Meanwhile, spending consists of either consumer spending or investment spending:

(22-3) Total spending = Consumer spending + Investment spending

Putting these together, we get:

(22-4) Consumer spending + Savings = Consumer spending + Investment spending

Subtract consumer spending from both sides, and we get:

(22-5) Savings = Investment spending

As we said, then, it's a basic accounting fact that savings equals investment spending for the economy as a whole.

So far, however, we've looked only at a simplified economy in which there is no government and no economic interaction with the rest of the world. Bringing these realistic complications back into the story changes things in two ways.

First, households are not the only parties that can save in an economy. In any given year the government can save, too, if it collects more tax revenue than it spends. When this occurs, the difference is called a **budget surplus** and is equivalent to savings by government. If, alternatively, government spending exceeds tax revenue, there is a **budget deficit**—a negative budget surplus. In this case we often say that the government is "dissaving": by spending more than its tax revenues, the government is engaged in the opposite of saving. We'll define the term **budget balance** to refer to both cases, with the understanding that the budget balance can be positive (a budget surplus) or negative (a budget deficit). **National savings** is equal to the sum of private savings and the budget balance, whereas private savings is disposable income (income after taxes) minus consumption.

Second, the fact that any one country is part of a wider world economy means that savings need not be spent on physical capital located in the same country in which the savings are generated. That's because the savings of people who live in any one country can be used to finance investment spending that takes place in other countries. So any given country can receive *inflows* of funds—foreign savings that finance investment spending in the country. Any given country can also generate *outflows* of funds—domestic savings that finance investment spending in another country.

The net effect of international inflows and outflows of funds on the total savings available for investment spending in any given country is known as the **capital inflow** into that country, equal to the total inflow of foreign funds minus the total outflow of domestic funds to other countries. Like the budget balance, a capital inflow can be negative—that is, more capital can flow out of a country than flows into it. In recent years the United States has experienced a consistent net inflow of capital from foreigners, who view our economy as an attractive place to put their savings. In 2008, for example, capital inflows into the United States were $707 billion.

The **budget surplus** is the difference between tax revenue and government spending when tax revenue exceeds government spending.

The **budget deficit** is the difference between tax revenue and government spending when government spending exceeds tax revenue.

The **budget balance** is the difference between tax revenue and government spending.

National savings, the sum of private savings and the budget balance, is the total amount of savings generated within the economy.

Capital inflow is the net inflow of funds into a country.

It's important to note that, from a national perspective, a dollar generated by national savings and a dollar generated by capital inflow are not equivalent. Yes, they can both finance the same dollar's worth of investment spending, but any dollar borrowed from a saver must eventually be repaid with interest. A dollar that comes from national savings is repaid with interest to someone domestically—either a private party or the government. But a dollar that comes as capital inflow must be repaid with interest to a foreigner. So a dollar of investment spending financed by a capital inflow comes at a higher *national* cost—the interest that must eventually be paid to a foreigner—than a dollar of investment spending financed by national savings.

istockphoto

The corner of Wall and Broad Streets is at the center of New York City's financial district.

So the application of the savings–investment spending identity to an economy that is open to inflows or outflows of capital means that investment spending is equal to savings, where savings is equal to national savings *plus* capital inflow. That is, in an economy with a positive capital inflow, some investment spending is funded by the savings of foreigners. And in an economy with a negative capital inflow (a net outflow), some portion of national savings is funding investment spending in other countries. In the United States in 2008, investment spending totaled $2,632 billion. Private savings were $2,506.9 billion, offset by a budget deficit of $683 billion and supplemented by capital inflows of $707 billion. Notice that these numbers don't quite add up; because data collection isn't perfect, there is a "statistical discrepancy" of $101 billion. But we know that this is an error in the data, not in the theory, because the savings–investment spending identity must hold in reality.

The Financial System

Financial markets are where households invest their current savings and their accumulated savings, or **wealth,** by purchasing *financial assets.*

A **financial asset** is a paper claim that entitles the buyer to future income from the seller. For example, when a saver lends funds to a company, the loan is a financial asset sold by the company that entitles the lender (the buyer) to future income from the company. A household can also invest its current savings or wealth by purchasing a **physical asset,** a claim on a tangible object, such as a preexisting house or preexisting piece of equipment. It gives the owner the right to dispose of the object as he or she wishes (for example, rent it or sell it).

If you were to go to your local bank and get a loan—say, to buy a new car—you and the bank would be creating a financial asset: your loan. A *loan* is one important kind of financial asset in the real world, one that is owned by the lender—in this case, your local bank. In creating that loan, you and the bank would also be creating a **liability,** a requirement to pay money in the future. So although your loan is a financial asset from the bank's point of view, it is a liability from your point of view: a requirement that you repay the loan, including any interest. In addition to loans, there are three other important kinds of financial assets: stocks, bonds, and *bank deposits.* Because a financial asset is a claim to future income that someone has to pay, it is also someone else's liability. We'll explain in detail shortly who bears the liability for each type of financial asset.

These four types of financial assets exist because the economy has developed a set of specialized markets, like the stock market and the bond market, and specialized institutions, like banks, that facilitate the flow of funds from lenders to borrowers. A well-functioning financial system is a critical ingredient in achieving long-run growth because it encourages greater savings and investment spending. It also ensures that savings and investment spending are undertaken efficiently. To understand how this occurs, we first need to know what tasks the financial system needs to accomplish. Then we can see how the job gets done.

A household's **wealth** is the value of its accumulated savings.

A **financial asset** is a paper claim that entitles the buyer to future income from the seller.

A **physical asset** is a claim on a tangible object that gives the owner the right to dispose of the object as he or she wishes.

A **liability** is a requirement to pay money in the future.

Three Tasks of a Financial System

There are three important problems facing borrowers and lenders: transaction costs, risk, and the desire for *liquidity*. The three tasks of a financial system are to reduce these problems in a cost-effective way. Doing so enhances the efficiency of financial markets: it makes it more likely that lenders and borrowers will make mutually beneficial trades—trades that make society as a whole richer.

Reducing Transaction Costs **Transaction costs** are the expenses of actually putting together and executing a deal. For example, arranging a loan requires spending time and money negotiating the terms of the deal, verifying the borrower's ability to pay, drawing up and executing legal documents, and so on. Suppose a large business decided that it wanted to raise $1 billion for investment spending. No individual would be willing to lend that much. And negotiating individual loans from thousands of different people, each willing to lend a modest amount, would impose very large total costs because each individual transaction would incur a cost. Total costs would be so large that the entire deal would probably be unprofitable for the business.

Fortunately, that's not necessary: when large businesses want to borrow money, they either get a loan from a bank or sell bonds in the bond market. Obtaining a loan from a bank avoids large transaction costs because it involves only a single borrower and a single lender. We'll explain more about how bonds work in the next section. For now, it is enough to know that the principal reason there is a bond market is that it allows companies to borrow large sums of money without incurring large transaction costs.

Reducing Risk A second problem that real-world borrowers and lenders face is **financial risk,** uncertainty about future outcomes that involve financial losses or gains. Financial risk (which from now on we'll simply call "risk") is a problem because the future is uncertain; it holds the potential for losses as well as gains.

Most people are risk-averse, although to differing degrees. A well-functioning financial system helps people reduce their exposure to risk. Suppose the owner of a business expects to make a greater profit if she buys additional capital equipment but isn't completely sure of this result. She could pay for the equipment by using her savings or selling her house. But if the profit is significantly less than expected, she will have lost her savings, or her house, or both. That is, she would be exposing herself to a lot of risk due to uncertainty about how well or poorly the business performs. So, being risk-averse, this business owner wants to share the risk of purchasing new capital equipment with someone, even if that requires sharing some of the profit if all goes well. How can she do this? By selling shares of her company to other people and using the money she receives from selling shares, rather than money from the sale of her other assets, to finance the equipment purchase. By selling shares in her company, she reduces her personal losses if the profit is less than expected: she won't have lost her other assets. But if things go well, the shareholders earn a share of the profit as a return on their investment.

By selling a share of her business, the owner has achieved *diversification:* she has been able to invest in several things in a way that lowers her total risk. She has maintained her investment in her bank account, a financial asset; in ownership of her house, a physical asset; and in ownership of the unsold portion of her business, also a physical asset. By engaging in **diversification**—investing in several assets with unrelated, or independent, risks—our business owner has lowered her total risk of loss. The desire of individuals to reduce their total risk by engaging in diversification is why we have stocks and a stock market.

Providing Liquidity The third and final task of the financial system is to provide investors with *liquidity,* which—like risk—becomes relevant because the future is uncertain. Suppose that, having made a loan, a lender suddenly finds himself in need of cash—say, to pay for a medical emergency. Unfortunately, if that loan was made to a business that used it to buy new equipment, the business cannot repay the loan on

Transaction costs are the expenses of negotiating and executing a deal.

Financial risk is uncertainty about future outcomes that involve financial losses and gains.

An individual can engage in **diversification** by investing in several different assets so that the possible losses are independent events.

istockphoto

short notice to satisfy the lender's need to recover his money. Knowing this in advance—that there is a danger of needing to get his money back before the term of the loan is up—our lender might be reluctant to lock up his money by lending it to a business.

An asset is **liquid** if it can be quickly converted into cash without much loss of value, **illiquid** if it cannot. As we'll see, stocks and bonds are a partial answer to the problem of liquidity. Banks provide a further way for individuals to hold liquid assets and still finance illiquid investments.

To help lenders and borrowers make mutually beneficial deals, then, the economy needs ways to reduce transaction costs, to reduce and manage risk through diversification, and to provide liquidity. How does it achieve these tasks? With a variety of financial assets.

Types of Financial Assets

In the modern economy there are four main types of financial assets: *loans,* bonds, stocks, and *bank deposits.* In addition, financial innovation has allowed the creation of a wide range of *loan-backed securities.* Each serves a somewhat different purpose. We'll explain loans, bonds, stocks, and loan-backed securities first. Then we'll turn to bank deposits when we explain the role banks play as financial intermediaries.

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

An asset is **illiquid** if it cannot be quickly converted into cash without much loss of value.

A **loan** is a lending agreement between an individual lender and an individual borrower.

A **default** occurs when a borrower fails to make payments as specified by the loan or bond contract.

Loans A **loan** is a lending agreement between an individual lender and an individual borrower. Most people encounter loans in the form of bank loans to finance the purchase of a car or a house. And small businesses usually use bank loans to buy new equipment.

The good aspect of loans is that a given loan is usually tailored to the needs of the borrower. Before a small business can get a loan, it usually has to discuss its business plans, its profits, and so on with the lender. This results in a loan that meets the borrower's needs and ability to repay.

The bad aspect of loans is that making a loan to an individual person or a business typically involves a lot of transaction costs, such as the cost of negotiating the terms of the loan, investigating the borrower's credit history and ability to repay, and so on. To minimize these costs, large borrowers such as major corporations and governments often take a more streamlined approach: they sell (or issue) bonds.

Bonds A bond is an IOU issued by the borrower. Normally, the seller of the bond promises to pay a fixed sum of interest each year and to repay the principal—the value stated on the face of the bond—to the owner of the bond on a particular date. So a bond is a financial asset from its owner's point of view and a liability from its issuer's point of view. A bond issuer sells a number of bonds with a given interest rate and maturity date to whoever is willing to buy them, a process that avoids costly negotiation of the terms of a loan with many individual lenders.

© PhotoSpin, Inc/Alamy

Bond purchasers can acquire information free of charge on the quality of the bond issuer, such as the bond issuer's credit history, from *bond-rating agencies* rather than having to incur the expense of investigating it themselves. A particular concern for investors is the possibility of **default,** the risk that the bond issuer might fail to make payments as specified by the bond contract. Once a bond's risk of default has been rated, it can be sold on the bond market as a more or less standardized product—a product with clearly defined terms and quality. In general, bonds with a higher default risk must pay a higher interest rate to attract investors.

Another important advantage of bonds is that they are easy to resell. This provides liquidity to bond purchasers. Indeed, a bond will often pass through many hands before it finally comes due. Loans, in contrast, are much more difficult to resell because, unlike bonds, they are not standardized: they differ in size, quality, terms, and so on. This makes them a lot less liquid than bonds.

Loan-backed Securities **Loan-backed securities,** assets created by pooling individual loans and selling shares in that pool (a process called *securitization*), have become extremely popular over the past two decades. While mortgage-backed securities, in which thousands of individual home mortgages are pooled and shares sold to investors, are the best-known example, securitization has also been widely applied to student loans, credit card loans, and auto loans. These loan-backed securities trade on financial markets like bonds and are preferred by investors because they provide more diversification and liquidity than individual loans. However, with so many loans packaged together, it can be difficult to assess the true quality of the asset. That difficulty came to haunt investors during the financial crisis of 2007–2008, when the bursting of the housing bubble led to widespread defaults on mortgages and large losses for holders of "supposedly safe" mortgage-backed securities, causing pain that spread throughout the entire financial system.

Stocks A stock is a share in the ownership of a company. A share of stock is a financial asset from its owner's point of view and a liability from the company's point of view. Not all companies sell shares of their stock; "privately held" companies are owned by an individual or a few partners, who get to keep all of the company's profit. Most large companies, however, do sell stock. For example, as this book goes to press, Microsoft has nearly 9 billion shares outstanding; if you buy one of those shares, you are entitled to one-nine billionth of the company's profit, as well as 1 of 9 billion votes on company decisions.

© PhotoSpin, Inc/Alamy

Why does Microsoft, historically a very profitable company, allow you to buy a share in its ownership? Why don't Bill Gates and Paul Allen, the two founders of Microsoft, keep complete ownership for themselves and just sell bonds for their investment spending needs? The reason, as we have just learned, is risk: few individuals are risk-tolerant enough to face the risk involved in being the sole owner of a large company.

Reducing the risk that business owners face, however, is not the only way in which the existence of stocks improves society's welfare: it also improves the welfare of investors who buy stocks (that is, shareowners, or shareholders). Shareowners are able to enjoy the higher returns over time that stocks generally offer in comparison to bonds. Over the past century, stocks have typically yielded about 7% after adjusting for inflation; bonds have yielded only about 2%. But as investment companies warn you, "Past performance is no guarantee of future performance." And there is a downside: owning the stock of a given company is riskier than owning a bond issued by the same company. Why? Loosely speaking, a bond is a promise while a stock is a hope: by law, a company must pay what it owes its lenders (bondholders) before it distributes any profit to its shareholders. And if the company should fail (that is, be unable to pay its interest obligations and declare bankruptcy), its physical and financial assets go to its bondholders—its lenders—while its shareholders typically receive nothing. So, although a stock generally provides a higher return to an investor than a bond, it also carries higher risk.

The financial system has devised ways to help investors as well as business owners simultaneously manage risk and enjoy somewhat higher returns. It does that through the services of institutions known as *financial intermediaries.*

Financial Intermediaries

A **financial intermediary** is an institution that transforms funds gathered from many individuals into financial assets. The most important types of financial intermediaries are *mutual funds, pension funds, life insurance companies,* and *banks.* About three-quarters of the financial assets Americans own are held through these intermediaries rather than directly.

A **loan-backed security** is an asset created by pooling individual loans and selling shares in that pool.

A **financial intermediary** is an institution that transforms the funds it gathers from many individuals into financial assets.

Mutual Funds As we've explained, owning shares of a company entails risk in return for a higher potential reward. But it should come as no surprise that stock investors can lower their total risk by engaging in diversification. By owning a *diversified portfolio* of stocks—a group of stocks in which risks are unrelated to, or offset, one another—rather than concentrating investment in the shares of a single company or a group of related companies, investors can reduce their risk. In addition, financial advisers, aware that most people are risk-averse, almost always advise their clients to diversify not only their stock portfolio but also their entire wealth by holding other assets in addition to stock—assets such as bonds, real estate, and cash. (And, for good measure, to have plenty of insurance in case of accidental losses!)

However, for individuals who don't have a large amount of money to invest—say $1 million or more—building a diversified stock portfolio can incur high transaction costs (particularly fees paid to stockbrokers) because they are buying a few shares of a lot of companies. Fortunately for such investors, mutual funds help solve the problem of achieving diversification without high transaction costs. A **mutual fund** is a financial intermediary that creates a stock portfolio by buying and holding shares in companies and then selling *shares of the stock portfolio* to individual investors. By buying these shares, investors with a relatively small amount of money to invest can indirectly hold a diversified portfolio, achieving a better return for any given level of risk than they could otherwise achieve.

Jay Brousseau/Getty Images

The daily performance of hundreds of different mutual funds is listed in the business section of most large city newspapers.

The mutual fund industry represents a huge portion of the modern U.S. economy, not just of the U.S. financial system. In total, U.S. mutual funds had assets of $10 trillion in late 2009. The largest mutual fund company at the end of 2009 was Fidelity Investments, which managed $1.5 trillion in funds.

We should mention, by the way, that mutual funds do charge fees for their services. These fees are quite small for mutual funds that simply hold a diversified portfolio of stocks, without trying to pick winners. But the fees charged by mutual funds that claim to have special expertise in investing your money can be quite high.

Pension Funds and Life Insurance Companies In addition to mutual funds, many Americans have holdings in **pension funds,** nonprofit institutions that collect the savings of their members and invest those funds in a wide variety of assets, providing their members with income when they retire. Although pension funds are subject to some special rules and receive special treatment for tax purposes, they function much like mutual funds. They invest in a diverse array of financial assets, allowing their members to achieve more cost-effective diversification and conduct more market research than they would be able to individually. At the end of 2009, pension funds in the United States held more than $9 trillion in assets.

Americans also have substantial holdings in the policies of **life insurance companies,** which guarantee a payment to the policyholder's beneficiaries (typically, the family) when the policyholder dies. By enabling policyholders to cushion their beneficiaries from financial hardship arising from their death, life insurance companies also improve welfare by reducing risk.

Banks Recall the problem of liquidity: other things equal, people want assets that can be readily converted into cash. Bonds and stocks are much more liquid than physical assets or loans, yet the transaction cost of selling bonds or stocks to meet a sudden expense can be large. Furthermore, for many small and moderate-size companies, the cost of issuing bonds and stocks is too large, given the modest amount of money they seek to raise. A *bank* is an institution that helps resolve the conflict between lenders' needs for liquidity and the financing needs of borrowers who don't want to use the stock or bond markets.

A bank works by first accepting funds from *depositors:* when you put your money in a bank, you are essentially becoming a lender by lending the bank your money. In return,

A **mutual fund** is a financial intermediary that creates a stock portfolio and then resells shares of this portfolio to individual investors.

A **pension fund** is a type of mutual fund that holds assets in order to provide retirement income to its members.

A **life insurance company** sells policies that guarantee a payment to a policyholder's beneficiaries when the policyholder dies.

you receive credit for a **bank deposit**—a claim on the bank, which is obliged to give you your cash if and when you demand it. So a bank deposit is a financial asset owned by the depositor and a liability of the bank that holds it.

A bank, however, keeps only a fraction of its customers' deposits in the form of ready cash. Most of its deposits are lent out to businesses, buyers of new homes, and other borrowers. These loans come with a long-term commitment by the bank to the borrower: as long as the borrower makes his or her payments on time, the loan cannot be recalled by the bank and converted into cash. So a bank enables those who wish to borrow for long lengths of time to use the funds of those who wish to lend but simultaneously want to maintain the ability to get their cash back on demand. More formally, a **bank** is a financial intermediary that provides liquid financial assets in the form of deposits to lenders and uses their funds to finance the illiquid investment spending needs of borrowers.

A **bank deposit** is a claim on a bank that obliges the bank to give the depositor his or her cash when demanded.

A **bank** is a financial intermediary that provides liquid assets in the form of bank deposits to lenders and uses those funds to finance the illiquid investment spending needs of borrowers.

In essence, a bank is engaging in a kind of mismatch: lending for long periods of time but also subject to the condition that its depositors could demand their funds back at any time. How can it manage that?

The bank counts on the fact that, on average, only a small fraction of its depositors will want their cash at the same time. On any given day, some people will make withdrawals and others will make new deposits; these will roughly cancel each other out. So the bank needs to keep only a limited amount of cash on hand to satisfy its depositors. In addition, if a bank becomes financially incapable of paying its depositors, individual bank deposits are currently guaranteed to depositors up to $250,000 by the Federal Deposit Insurance Corporation, or FDIC, a federal agency. This reduces the risk to a depositor of holding a bank deposit, in turn reducing the incentive to withdraw funds if concerns about the financial state of the bank should arise. So, under normal conditions, banks need hold only a fraction of their depositors' cash.

By reconciling the needs of savers for liquid assets with the needs of borrowers for long-term financing, banks play a key economic role.

Module 22 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. Rank the following assets from the lowest level to the highest level of (i) transaction costs, (ii) risk, (iii) liquidity. Ties are acceptable for items that have indistinguishable rankings.
   a. a bank deposit with a guaranteed interest rate
   b. a share of a highly diversified mutual fund, which can be quickly sold
   c. a share of the family business, which can be sold only if you find a buyer and all other family members agree to the sale
2. What relationship would you expect to find between the level of development of a country's financial system and its level of economic development? Explain in terms of the country's levels of savings and investment spending.

Tackle the Test: Multiple-Choice Questions

1. Decreasing which of the following is a task of the financial system?
   I. transaction costs
   II. risk
   III. liquidity
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III
2. Which of the following is NOT a type of financial asset?
   a. bonds
   b. stocks
   c. bank deposits
   d. loans
   e. houses

3. The federal government is said to be "dissaving" when
   a. there is a budget deficit.
   b. there is a budget surplus.
   c. there is no budget surplus or deficit.
   d. savings does not equal investment spending.
   e. national savings equals private savings.
4. A nonprofit institution collects the savings of its members and invests those funds in a wide variety of assets in order to provide its members with income after retirement. This describes a
   a. mutual fund.
   b. bank.
   c. savings and loan.
   d. pension fund.
   e. life insurance company.
5. A financial intermediary that provides liquid financial assets in the form of deposits to lenders and uses their funds to finance the illiquid investment spending needs of borrowers is called a
   a. mutual fund.
   b. bank.
   c. corporation.
   d. pension fund.
   e. life insurance company.

Tackle the Test: Free-Response Questions

1. Identify and describe the three tasks of a well-functioning financial system.

2. List and describe the four most important types of financial intermediaries.

Answer (6 points)

1 point: Decrease transaction costs

1 point: A well-functioning financial system facilitates investment spending by allowing companies to borrow large sums of money without incurring large transaction costs.

1 point: Decrease risk

1 point: A well-functioning financial system helps people reduce their exposure to risk, so that they are more willing to engage in investment spending in the face of uncertainty in the economy.

1 point: Provide liquidity

1 point: A well-functioning financial system allows the fast, low-cost conversion of assets into cash.

Module 23
The Definition and Measurement of Money

What you will learn in this Module:

- The definition and functions of money
- The various roles money plays and the many forms it takes in the economy
- How the amount of money in the economy is measured

The Meaning of Money

In everyday conversation, people often use the word *money* to mean "wealth." If you ask, "How much money does Bill Gates have?" the answer will be something like, "Oh, $50 billion or so, but who's counting?" That is, the number will include the value of the stocks, bonds, real estate, and other assets he owns.

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

What Is Money?

Money is defined in terms of what it does: **money** is any asset that can easily be used to purchase goods and services. In Module 22 we defined an asset as *liquid* if it can easily be converted into cash. Money consists of cash itself, which is liquid by definition, as well as other assets that are highly liquid.

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

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

Are currency and checkable bank deposits the only assets that are considered money? It depends. As we'll see later, there are two widely used definitions of the **money supply,**

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

Currency in circulation is cash held by the public.

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

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

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

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

the total value of financial assets in the economy that are considered money. The narrower definition considers only the most liquid assets to be money: currency in circulation, traveler's checks, and checkable bank deposits. The broader definition includes these three categories plus other assets that are "almost" checkable, such as savings account deposits that can be transferred into a checking account online with a few mouse clicks. Both definitions of the money supply, however, make a distinction between those assets that can easily be used to purchase goods and services, and those that can't.

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

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

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

Roles of Money

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

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

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

With permission of the New Zealand Ministry for Culture and Heritage

Gambling at the Stalag 383 prisoner of war camp during World War II was carried out using cigarettes as currency.

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

Unit of Account Finally, money normally serves as the **unit of account**—the commonly accepted measure individuals use to set prices and make economic calculations. To understand the importance of this role, consider a historical fact: during the Middle Ages, peasants typically were required to provide landowners with goods and labor rather than money. A peasant might, for example, be required to work on the landowner's land one day a week and also hand over one-fifth of his harvest. Today, rents, like other prices, are almost always specified in money terms. That makes things much clearer: imagine how hard it would be to decide which apartment to rent if modern landowners followed medieval practice. Suppose, for example, that Mr. Smith says he'll let you have a place if you clean his house twice a week and bring him a pound of steak every day, whereas Ms. Jones wants you to clean her house just once a week but wants four pounds of chicken every day. Who's offering the better deal? It's hard to say. If, on the other hand, Smith wants $600 a month and Jones wants $700, the comparison is easy. In other words, without a commonly accepted measure, the terms of a transaction are harder to determine, making it more difficult to make transactions and achieve gains from trade.

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

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

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

Types of Money

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

By 1776, the year in which the United States declared its independence and Adam Smith published *The Wealth of Nations,* there was widespread use of paper money in addition to gold or silver coins. Unlike modern dollar bills, however, this paper money consisted of notes issued by private banks, which promised to exchange their notes for gold or silver coins on demand. So the paper currency that initially replaced commodity money was **commodity-backed money,** a medium of exchange with no intrinsic value whose ultimate value was guaranteed by a promise that it could always be converted into valuable goods on demand.

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

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

At this point you may ask, why make any use at all of gold and silver in the monetary system, even to back paper money? In fact, today's monetary system goes even further than the system Smith admired, having eliminated any role for gold and silver. A U.S. dollar bill isn't commodity money, and it isn't even commodity-backed. Rather, its value arises entirely from the fact that it is generally accepted as a means of payment, a

fyi

The History of the Dollar

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

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

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

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

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

AP Photo/Don Heupel

The image of a valid U.S. five-dollar bill shows a pattern in the background of the Lincoln Memorial image as seen through a Document Security Systems, Inc. document verifier.

role that is ultimately decreed by the U.S. government. Money whose value derives entirely from its official status as a means of exchange is known as **fiat money** because it exists by government *fiat,* a historical term for a policy declared by a ruler.

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

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

The larger risk is that government officials who have the authority to print money will be tempted to abuse the privilege by printing so much money that they create inflation.

Measuring the Money Supply

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

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

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

fyi

What's with All the Currency?

Alert readers may be a bit startled at one of the numbers in the money supply: $861.1 billion of currency in circulation in January 2010. That's $2,789 in cash for every man, woman, and child in the United States. How many people do you know who carry $2,789 in their wallets? Not many. So where is all that cash?

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

Economists also believe that cash plays an important role in transactions that people want to keep hidden. Small businesses and the self-employed sometimes prefer to be paid in cash so they can avoid paying taxes by hiding income from the Internal Revenue Service. Also, drug dealers and other criminals obviously don't want bank records of their dealings. In fact, some analysts have tried to infer the amount of illegal activity in the economy from the total amount of cash holdings held by the public.The most important reason for those huge currency holdings, however, is foreign use of dollars. The Federal Reserve estimates that 60% of U.S. currency is actually held outside the United States—largely in countries in which residents are so distrustful of their national currencies that the U.S. dollar has become a widely accepted medium of exchange.

© S Meltzer/PhotoLink

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

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

In January 2010, M1 was valued at $1,676.4 billion, with approximately 51% accounted for by currency in circulation, approximately 48% accounted for by checkable bank deposits, and a tiny slice accounted for by traveler's checks. In turn, M1 made up 20% of M2, valued at $8,462.9 billion. M2 consists of M1 plus other types of assets: two types of bank deposits, known as savings deposits and time deposits, both of which are considered noncheckable, plus money market funds, which are mutual funds that invest only in liquid assets and bear a close resemblance to bank deposits. These near-moneys pay interest while cash (currency in circulation) does not, and they typically pay higher interest rates than any offered on checkable bank deposits.

Module 23 AP Review

Solutions appear at the back of the book.

Check Your Understanding

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

Tackle the Test: Multiple-Choice Questions

1. When you use money to purchase your lunch, money is serving which role(s)?
   I. medium of exchange
   II. store of value
   III. unit of account
   a. I only
   b. II only
   c. III only
   d. I and III only
   e. I, II, and III
2. When you decide you want "$10 worth" of a product, money is serving which role(s)?
   I. medium of exchange
   II. store of value
   III. unit of account
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III
3. In the United States, the dollar is
   a. backed by silver.
   b. backed by gold and silver.
   c. commodity-backed money.
   d. commodity money.
   e. fiat money.
4. Which of the following is the most liquid monetary aggregate?
   a. M1
   b. M2
   c. M3
   d. near-moneys
   e. dollar bills
5. Which of the following is the best example of using money as a store of value?
   a. A customer pays in advance for $10 worth of gasoline at a gas station.
   b. A babysitter puts her earnings in a dresser drawer while she saves to buy a bicycle.
   c. Travelers buy meals on board an airline flight.
   d. Foreign visitors to the United States convert their currency to dollars at the airport.
   e. You use $1 bills to purchase soda from a vending machine.

Tackle the Test: Free-Response Questions

1. a. What does it mean for an asset to be "liquid"?
   b. Which of the assets listed below is the most liquid? Explain.
   A Federal Reserve note (dollar bill)
   A savings account deposit
   A house
   c. Which of the assets listed above is the least liquid? Explain.
   d. In which monetary aggregate(s) calculated by the Federal Reserve are checkable deposits included?

Answer (6 points)

1 point: It can be easily converted into cash.

1 point: A Federal Reserve note

1 point: It is already cash.

1 point: A house

1 point: It takes time and resources to sell a house.

1 point: M1 and M2

2. a. The U.S. dollar derives its value from what? That is, what "backs" U.S. currency?
   b. What is the term used to describe the type of money used in the United States today?
   c. What other two types of money have been used throughout history? Define each.

What you will learn in this Module:

- Why a dollar today is worth more than a dollar a year from now
- How the concept of present value can help you make decisions when costs or benefits come in the future

Module 24 The Time Value of Money

The Concept of Present Value

Individuals are often faced with financial decisions that will have consequences long into the future. For example, when you decide to attend college, you are committing yourself to years of study, which you expect will pay off for the rest of your life. So the decision to attend college is a decision to embark on a long-term project.

The basic rule in deciding whether or not to undertake a project is that you should compare the benefits of that project with its costs, implicit as well as explicit. But making these comparisons can sometimes be difficult because the benefits and costs of a project may not arrive at the same time. Sometimes the costs of a project come at an earlier date than the benefits. For example, going to college involves large immediate costs: tuition, income forgone because you are in school, and so on. The benefits, such as a higher salary in your future career, come later, often much later. In other cases, the benefits of a project come at an earlier date than the costs. If you take out a loan to pay for a vacation cruise, the satisfaction of the vacation will come immediately, but the burden of making payments will come later.

How, specifically is time an issue in economic decision-making?

Borrowing, Lending, and Interest

In general, having a dollar today is worth more than having a dollar a year from now. To see why, let's consider two examples.

First, suppose that you get a new job that comes with a $1,000 bonus, which will be paid at the end of the first year. But you would like to spend the extra money now—say, on new clothes for work. Can you do that?

The answer is yes—you can borrow money today and use the bonus to repay the debt a year from now. But if that is your plan, you cannot borrow the full $1,000 today. You must borrow *less* than that because a year from now you will have to repay the amount borrowed *plus interest.*

Now consider a different scenario. Suppose that you are paid a bonus of $1,000 today, and you decide that you don't want to spend the money until a year from now. What do

you do with it? You put it in the bank; in effect, you are lending the $1,000 to the bank, which in turn lends it out to its customers who wish to borrow. At the end of a year, you will get *more* than $1,000 back—you will receive the $1,000 plus the interest earned.

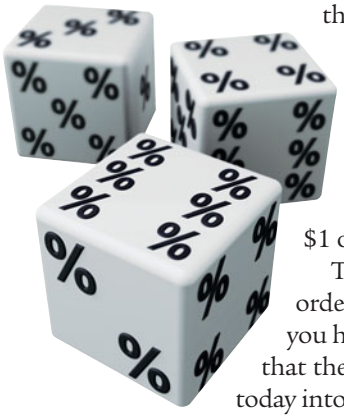
All of this means that having $1,000 today is worth more than having $1,000 a year from now. As any borrower and lender know, this is what allows a lender to charge a borrower interest on a loan: borrowers are willing to pay interest in order to have money today rather than waiting until they acquire that money later on. Most interest rates are stated as the percentage of the borrowed amount that must be paid to the lender for each year of the loan. Whether money is actually borrowed for 1 month or 10 years, and regardless of the amount, the same principle applies: money in your pocket today is worth more than money in your pocket tomorrow. To keep things simple in the discussions that follow, we'll restrict ourselves to examples of 1-year loans of $1.

Because the value of money depends on when it is paid or received, you can't evaluate a project by simply adding up the costs and benefits when those costs and benefits arrive at different times. You must take time into account when evaluating the project because $1 that is paid to you today is worth more than $1 that is paid to you a year from now. Similarly, $1 that you must pay today is more burdensome than $1 that you must pay next year. Fortunately, there is a simple way to adjust for these complications so that we can correctly compare the value of dollars received and paid out at different times.

Next we'll see how the interest rate can be used to convert future benefits and costs into what economists call *present values*. By using present values when evaluating a project, you can evaluate a project *as if* all relevant costs and benefits were occurring today rather than at different times. This allows people to "factor out" the complications created by time. We'll start by defining the concept of present value.

Defining Present Value

The key to the concept of present value is to understand that you can use the interest rate to compare the value of a dollar realized today with the value of a dollar realized later. Why the interest rate? Because the interest rate correctly measures the cost to you of delaying the receipt of a dollar of benefit and, correspondingly, the benefit to you of delaying the payment of a dollar of cost. Let's illustrate this with some examples.



Jorg Greuel/Getty Images

Suppose that you are evaluating whether or not to take a job in which your employer promises to pay you a bonus at the end of the first year. What is the value to you today of $1 of bonus money to be paid one year in the future? A slightly different way of asking the same question: what amount would you be willing to accept today as a substitute for receiving $1 one year from now?

To answer this question, begin by observing that you need *less* than $1 today in order to be assured of having $1 one year from now. Why? Because any money that you have today can be lent out at interest—say, by depositing it in a bank account so that the bank can then lend it out to its borrowers. This turns any amount you have today into a greater sum at the end of the year.

Let's work this out mathematically. We'll use the symbol r to represent the interest rate, expressed in decimal terms—that is, if the interest rate is 10%, then $r = 0.10$. If you lend out $\$X$, at the end of a year you will receive your $\$X$ back, plus the interest on your $\$X$, which is $\$X \times r$. Thus, at the end of the year you will receive:

(24-1) Amount received one year from now as a result of lending $\$X$ today = $\$X + \$X \times r = \$X \times (1 + r)$

The next step is to find out how much you would have to lend out today to have $1 a year from now. To do that, we just need to set Equation 24-1 equal to $1 and solve for $\$X$. That is, we solve the following equation for $\$X$:

(24-2) Condition satisfied when $1 is received one year from now as a result of lending $\$X$ today: $\$X \times (1 + r) = \$1$

Rearranging Equation 24-2 to solve for $X, the amount you need today in order to receive $1 one year from now is:

(24-3) Amount lent today in order to receive $1 one year from now = $X = $1/(1 + r)

The **present value** of $1 realized one year from now is equal to $1/(1 + r): the amount of money you must lend out today in order to have $1 in one year. It is the value to you today of $1 realized one year from now.

This means that you would be willing to accept today the amount $X defined by Equation 24-3 for every $1 to be paid to you one year from now. The reason is that if you were to lend out $X today, you would be assured of receiving $1 one year from now. Returning to our original question, this also means that if someone promises to pay you a sum of money one year in the future, you are willing to accept $X today in place of every $1 to be paid one year from now.

Now let's solve Equation 24-3 for the value of $X. To do this we simply need to use the actual value of r (a value determined by the financial markets). Let's assume that the actual value of r is 10%, which means that $r = 0.10$. In that case:

(24-4) Value of $X when $r = 0.10$: $X = $1/(1 + 0.10) = $1/1.10 = $0.91

So you would be willing to accept $0.91 today in exchange for every $1 to be paid to you one year from now. Economists have a special name for $X—it's called the **present value** of $1. Note that the present value of any given amount will change as the interest rate changes.

To see that this technique works for evaluating future costs as well as evaluating future benefits, consider the following example. Suppose you enter into an agreement that obliges you to pay $1 one year from now—say, to pay off a car loan from your parents when you graduate in a year. How much money would you need today to ensure that you have $1 in a year? The answer is $X, the present value of $1, which in our example is $0.91. The reason $0.91 is the right answer is that if you lend it out for one year at an interest rate of 10%, you will receive $1 in return at the end. So if, for example, you must pay back $5,000 one year from now, then you need to deposit $5,000 × 0.91 = $4,550 into a bank account today earning an interest rate of 10% in order to have $5,000 one year from now. (There is a slight discrepancy due to rounding.) In other words, today you need to have the present value of $5,000, which equals $4,550, in order to be assured of paying off your debt in a year.


mptvimages.com

In the 1971 movie *Willy Wonka and the Chocolate Factory,* Veruca Salt appreciated the added value of having things in the present. She wanted a "golden-egg-laying-goose NOW!"

These examples show us that the present value concept provides a way to calculate the value today of $1 that is realized in a year—regardless of whether that $1 is realized as a benefit (the bonus) or a cost (the car loan payback). To evaluate a project today that has benefits, costs, or both to be realized in a year, we just use the relevant interest rate to convert those future dollars into their present values. In that way we have "factored out" the complication that time creates for decision making.

Below we will use the present value concept to evaluate a project. But before we do that, it is worthwhile to note that the present value method can be used for projects in which the $1 is realized more than a year later—say, two, three, or even more years. Suppose you are considering a project that will pay you $1 *two* years from today. What is the value to you today of $1 received two years into the future? We can find the answer to that question by expanding our formula for present value.

Let's call $V the amount of money you need to lend today at an interest rate of r in order to have $1 in two years. So if you lend $V today, you will receive $V × (1 + r) in one year. And if you *re-lend* that sum for another year, you will receive $V × (1 + r) × (1 + r) = $V × (1 + r)^2 at the end of the second year. At the end of two years, $V will be worth $V × (1 + r)^2. In other words:

(24-5) Amount received in one year from lending $V = $V × (1 + r)

The **net present value** of a project is the present value of current and future benefits minus the present value of current and future costs.

Amount received in two years from lending $\$V = \$V \times (1 + r) \times (1 + r) = \$V \times (1 + r)^2$ and so on. For example, if $r = 0.10$, then $\$V \times (1.10)^2 = \$V \times 1.21$.

Now we are ready to answer the question of what $1 realized two years in the future is worth today. In order for the amount lent today, $\$V$, to be worth $1 two years from now, it must satisfy this formula:

(24-6) Condition satisfied when $1 is received two years from now as a result of lending $\$V$ today: $\$V \times (1 + r)^2 = \$1$

Rearranging Equation 24-6, we can solve for $\$V$:

(24-7) Amount lent today in order to receive $1 two years from now = $\$V = \$1/(1 + r)^2$

Given $r = 0.10$ and using Equation 24-7, we arrive at $\$V = \$1/1.21 = \$0.83$. So, when the interest rate is 10%, $1 realized two years from today is worth $0.83 today because by lending out $0.83 today you can be assured of having $1 in two years. And that means that the present value of $1 realized two years into the future is $0.83.

(24-8) Present value of $1 realized two years from now = $\$V = \$1/(1.10)^2 = \$1/1.21 = \$0.83$

From this example we can see how the present value concept can be expanded to a number of years even greater than two. If we ask what the present value is of $1 realized any number of years, represented by N, into the future, the answer is given by a generalization of the present value formula: it is equal to $\$1/(1 + r)^N$.

Using Present Value

Suppose you have to choose one of three hypothetical projects to undertake. Project A costs nothing and has an immediate payoff to you of $100. Project B requires that you pay $10 today in order to receive $115 a year from now. Project C gives you an immediate payoff of $119 but requires that you pay $20 a year from now. We'll assume that the annual interest rate is 10%—that is, $r = 0.10$.

The problem in evaluating these three projects is that their costs and benefits are realized at different times. That is, of course, where the concept of present value becomes extremely helpful: by using present value to convert any dollars realized in the future into today's value, you factor out the issue of time. Appropriate comparisons can be made using the **net present value** of a project—the present value of current and future benefits minus the present value of current and future costs. The best project to undertake is the one with the highest net present value.

Table 24.1 shows how to calculate net present value for each of the three projects. The second and third columns show how many dollars are realized and when

table **24.1**

The Net Present Value of Three Hypothetical Projects

Project	Dollars realized today	Dollars realized one year from today	Present value formula	Net present value given $r = 0.10$
A	$100	—	$100	$100.00
B	–$10	$115	$–10 + \$115/(1 + r)$	$94.55
C	$119	–$20	$\$119 - \$20/(1 + r)$	$100.82

fyi

How Big Is That Jackpot, Anyway?

For a clear example of present value at work, consider the case of lottery jackpots.

On March 6, 2007, Mega Millions set the record for the largest jackpot ever in North America, with a payout of $390 million. Well, sort of. That $390 million was available only if you chose to take your winnings in the form of an "annuity," consisting of an annual payment for the next 26 years. If you wanted cash up front, the jackpot was only $233 million and change.

Why was Mega Millions so stingy about quick payoffs? It was all a matter of present value. If the winner had been willing to take the annuity, the lottery would have invested the jackpot money, buying U.S. government bonds (in effect lending the money to the federal government). The money would have been invested in such a way that the investments would pay just enough to cover the annuity. This worked, of course, because at the interest rates prevailing at the time, the present value of a $390 million annuity spread over 26 years was just about $233 million. To put it another way, the opportunity cost to the lottery of that annuity in present value terms was $233 million.

So why didn't they just call it a $233 million jackpot? Well, $390 million sounds more impressive! But receiving $390 million over 26 years is essentially the same as receiving $233 million today.

David Gould/Photographers Choice RF/Getty Images

they are realized; costs are indicated by a minus sign. The fourth column shows the equations used to convert the flows of dollars into their present value, and the fifth column shows the actual amounts of the total net present value for each of the three projects.

For instance, to calculate the net present value of project B, we need to calculate the present value of $115 received in one year. The present value of $1 received in one year would be $\$1/(1+r)$. So the present value of $115 is equal to $115 \times \$1/(1+r)$; that is, $\$115/(1+r)$. The net present value of project B is the present value of today's and future benefits minus the present value of today's and future costs: $-\$10 + \$115/(1+r)$.

From the fifth column, we can immediately see which is the preferred project—it is project C. That's because it has the highest net present value, $100.82, which is higher than the net present value of project A ($100) and much higher than the net present value of project B ($94.55).

This example shows how important the concept of present value is. If we had failed to use the present value calculations and instead simply added up the dollars generated by each of the three projects, we could have easily been misled into believing that project B was the best project and project C was the worst.

Module 24 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. Consider the three hypothetical projects shown in Table 24.1. This time, however, suppose that the interest rate is only 2%.
   a. Calculate the net present values of the three projects. Which one is now preferred?
   b. Explain why the preferred choice is different with a 2% interest rate from with a 10% interest rate.

Tackle the Test: Multiple-Choice Questions

1. Suppose, for simplicity, that a bank uses a single interest rate for loans and deposits, there is no inflation, and all unspent money is deposited in the bank. The interest rate measures which of the following?
   I. the cost of using a dollar today rather than a year from now
   II. the benefit of delaying the use of a dollar from today until a year from now
   III. the price of borrowing money calculated as a percentage of the amount borrowed
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III
2. If the interest rate is zero, then the present value of a dollar received at the end of the year is
   a. more than $1.
   b. equal to $1.
   c. less than $1.
   d. zero.
   e. infinite.
3. If the interest rate is 10%, the present value of $1 paid to you one year from now is
   a. $0.
   b. $0.89.
   c. $0.91.
   d. $1.
   e. more than $1.
4. If the interest rate is 5%, the amount received one year from now as a result of lending $100 today is
   a. $90.
   b. $95.
   c. $100.
   d. $105.
   e. $110.
5. What is the present value of $100 realized two years from now if the interest rate is 10%?
   a. $80
   b. $83
   c. $90
   d. $100
   e. $110

Tackle the Test: Free-Response Questions

1. a. Calculate the net present value of each of the three hypothetical projects described below. Assume the interest rate is 5%.
   Project A: You receive an immediate payoff of $1,000.
   Project B: You pay $100 today in order to receive $1,200 a year from now.
   Project C: You receive $1,200 today but must pay $200 one year from now.
   b. Which of the three projects would you choose to undertake based on your net present value calculations? Explain.

Answer (5 points)

1 point: Project A net present value: $1,000

1 point: Project B net present value: –$100 + ($1,200/1.05) = $1,042.86

1 point: Project C net present value: $1,200 – ($200/1.05) = $1,009.52

1 point: Choose project B.

1 point: It has the highest net present value.

2. a. What is the amount you will receive in three years if you loan $1,000 at 5% interest?
   b. What is the present value of $1,000 received in three years if the interest rate is 5%?

What you will learn in this Module:

- The role of banks in the economy
- The reasons for and types of banking regulation
- How banks create money

Module 25 Banking and Money Creation

The Monetary Role of Banks

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

What Banks Do

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

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

To understand the role of banks in determining the money supply, we start by introducing a simple tool for analyzing a bank's financial position: a **T-account.** A business's T-account summarizes its financial position by showing, in a single table, the

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

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

figure 25.1

A T-Account for Samantha's Smoothies

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

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

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

The **required reserve ratio** is the smallest fraction of deposits that the Federal Reserve allows banks to hold.

business's assets and liabilities, with assets on the left and liabilities on the right. Figure 25.1 shows the T-account for a hypothetical business that *isn't* a bank—Samantha's Smoothies. According to Figure 25.1, Samantha's Smoothies owns a building worth $30,000 and has $15,000 worth of smoothie-making equipment. These are assets, so they're on the left side of the table. To finance its opening, the business borrowed $20,000 from a local bank. That's a liability, so the loan is on the right side of the table. By looking at the T-account, you can immediately see what Samantha's Smoothies owns and what it owes. Oh, and it's called a T-account because the lines in the table make a T-shape.

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

Figure 25.2 shows First Street's financial position. The loans First Street has made are on the left side because they're assets: they represent funds that those who have borrowed from the bank are expected to repay. The bank's only other assets, in this simplified example, are its reserves, which, as we've learned, can take the form either of cash in the bank's vault or deposits at the Federal Reserve. On the right side we show the bank's liabilities, which in this example consist entirely of deposits made by customers at First Street. These are liabilities because they represent funds that must ultimately be repaid to depositors. Notice, by the way, that in this example First Street's assets are larger than its liabilities. That's the way it's supposed to be! In fact, as we'll see shortly, banks are required by law to maintain assets larger by a specific percentage than their liabilities.

In this example, First Street Bank holds reserves equal to 10% of its customers' bank deposits. The fraction of bank deposits that a bank holds as reserves is its **reserve ratio.**

In the modern American system, the Federal Reserve—which, among other things, regulates banks operating in the United States—sets a **required reserve ratio,** which is the smallest fraction of bank deposits that a bank must hold. To understand why banks are regulated, let's consider a problem banks can face: *bank runs.*

figure 25.2

Assets and Liabilities of First Street Bank

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

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

The Problem of Bank Runs

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

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

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

What might start this whole process? That is, what might lead First Street's depositors to rush to pull their money out? A plausible answer is a spreading rumor that the bank is in financial trouble. Even if depositors aren't sure the rumor is true, they are likely to play it safe and get their money out while they still can. And it gets worse: a depositor who simply thinks that *other* depositors are going to panic and try to get

fyi

It's a Wonderful Banking System

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

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

Gabriel Bouys/AFP/Getty Images

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

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

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

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

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

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

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

their money out will realize that this could "break the bank." So he or she joins the rush. In other words, fear about a bank's financial condition can be a self-fulfilling prophecy: depositors who believe that other depositors will rush to the exit will rush to the exit themselves.

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

Bank Regulation

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

Deposit Insurance

Almost all banks in the United States advertise themselves as a "member of the FDIC"—the Federal Deposit Insurance Corporation. The FDIC provides **deposit insurance,** a guarantee that depositors will be paid even if the bank can't come up with the funds, up to a maximum amount per account. Currently, the FDIC guarantees the first $250,000 of each account. This amount will be subject to change in 2014.

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

Capital Requirements

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

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

Reserve Requirements

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

The Discount Window

One final protection against bank runs is the fact that the Federal Reserve, which we'll discuss more thoroughly later, stands ready to lend money to banks, an arrangement known as the **discount window.** The ability to borrow money

means a bank can avoid being forced to sell its assets at fire-sale prices in order to satisfy the demands of a sudden rush of depositors demanding cash. Instead, it can turn to the Federal Reserve and borrow the funds it needs to pay off depositors.

Determining the Money Supply

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

How Banks Create Money


Jonathan Kitchen/Photographer's Choice RF/Getty Images

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

Panel (a) of Figure 25.3 shows the initial effect of his deposit. First Street Bank credits Silas with $1,000 in his account, so the economy's checkable bank deposits rise by $1,000. Meanwhile, Silas's cash goes into the vault, raising First Street's reserves by $1,000 as well.

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

figure 25.3 Effect on the Money Supply of Turning Cash into a Checkable Deposit at First Street Bank

(a) Initial Effect Before Bank Makes a New Loan

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

(b) Effect When Bank Makes a New Loan

Assets		Liabilities
Loans	+$900	No change
Reserves	−$900	

When Silas deposits $1,000 (which had been stashed under his bed) into a checkable bank account, there is initially no effect on the money supply: currency in circulation falls by $1,000, but checkable bank deposits rise by $1,000. The corresponding entries on the bank's T-account, depicted in panel (a), show deposits initially rising by $1,000 and the bank's reserves initially rising by $1,000. In the second stage, depicted in panel (b), the bank holds 10% of Silas's deposit ($100) as reserves and lends out the rest ($900) to Mary. As a result, its reserves fall by $900 and its loans increase by $900. Its liabilities, including Silas's $1,000 deposit, are unchanged. The money supply, the sum of checkable bank deposits and currency in circulation, has now increased by $900—the $900 now held by Mary.

But this is not the end of the story because First Street Bank can now lend out part of Silas's deposit. Assume that it holds 10% of Silas's deposit—$100—in reserves and lends the rest out in cash to Silas's neighbor, Mary. The effect of this second stage is shown in panel (b). First Street's deposits remain unchanged, and so does the value of its assets. But the composition of its assets changes: by making the loan, it reduces its reserves by $900, so that they are only $100 larger than they were before Silas made his deposit. In the place of the $900 reduction in reserves, the bank has acquired an IOU, its $900 cash loan to Mary. So by putting $900 of Silas's cash back into circulation by lending it to Mary, First Street Bank has, in fact, increased the money supply. That is, the sum of currency in circulation and checkable bank deposits has risen by $900 compared to what it had been when Silas's cash was still under his bed. Although Silas is still the owner of $1,000, now in the form of a checkable deposit, Mary has the use of $900 in cash from her borrowings.

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

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

Table 25.1 shows the process of money creation we have described so far. At first the money supply consists only of Silas's $1,000. After he deposits the cash into a checkable bank deposit and the bank makes a loan, the money supply rises to $1,900. After the second deposit and the second loan, the money supply rises to $2,710. And the process will, of course, continue from there. (Although we have considered the case in which Silas places his cash in a checkable bank deposit, the results would be the same if he put it into any type of near-money.)

table **25.1**

How Banks Create Money

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

This process of money creation may sound familiar. Recall the *multiplier process* that we described in Module 16: an initial increase in real GDP leads to a rise in consumer spending, which leads to a further rise in real GDP, which leads to a further rise in consumer spending, and so on. What we have here is another kind of multiplier—the *money multiplier.* Next, we'll learn what determines the size of this multiplier.

Reserves, Bank Deposits, and the Money Multiplier

In tracing out the effect of Silas's deposit in Table 25.1, we assumed that the funds a bank lends out always end up being deposited either in the same bank or in another bank—so funds disbursed as loans come back to the banking system, even if not to the

lending bank itself. In reality, some of these loaned funds may be held by borrowers in their wallets and not deposited in a bank, meaning that some of the loaned amount "leaks" out of the banking system. Such leaks reduce the size of the money multiplier, just as leaks of real income into savings reduce the size of the real GDP multiplier. (Bear in mind, however, that the "leak" here comes from the fact that borrowers keep some of their funds in currency, rather than the fact that consumers save some of their income.) But let's set that complication aside for a moment and consider how the money supply is determined in a "checkable-deposits-only" monetary system, in which funds are always deposited in bank accounts and none are held in wallets as currency. That is, in our checkable-deposits-only monetary system, any and all funds borrowed from a bank are immediately deposited into a checkable bank account. We'll assume that banks are required to satisfy a minimum reserve ratio of 10% and that every bank lends out all of its **excess reserves,** reserves over and above the amount needed to satisfy the minimum reserve ratio.

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

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

Now suppose that for some reason a bank suddenly finds itself with $1,000 in excess reserves. What happens? The answer is that the bank will lend out that $1,000, which will end up as a checkable bank deposit somewhere in the banking system, launching a money multiplier process very similar to the process shown in Table 25.1. In the first stage, the bank lends out its excess reserves of $1,000, which becomes a checkable bank deposit somewhere. The bank that receives the $1,000 deposit keeps 10%, or $100, as reserves and lends out the remaining 90%, or $900, which again becomes a checkable bank deposit somewhere. The bank receiving this $900 deposit again keeps 10%, which is $90, as reserves and lends out the remaining $810. The bank receiving this $810 keeps $81 in reserves and lends out the remaining $729, and so on. As a result of this process, the total increase in checkable bank deposits is equal to a sum that looks like:

$$\$1{,}000 + \$900 + \$810 + \$729 + \ldots$$

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

(25-1) Increase in checkable bank deposits from $1,000 in excess reserves = $\$1{,}000 + \$1{,}000 \times (1 - rr) + \$1{,}000 \times (1 - rr)^2 + \$1{,}000 \times (1 - rr)^3 + \ldots$

As we have seen, an infinite series of this form can be simplified to:

(25-2) Increase in checkable bank deposits from $1,000 in excess reserves = $\$1{,}000/rr$

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

The Money Multiplier in Reality

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

To define the money multiplier in practice, we need to understand that the Federal Reserve controls the **monetary base,** the sum of currency in circulation and the

© Steve Hamblin/Alamy

reserves held by banks. The Federal Reserve does not determine how that sum is allocated between bank reserves and currency in circulation. Consider Silas and his deposit one more time: by taking the cash from under his bed and depositing it in a bank, he reduces the quantity of currency in circulation but increased bank reserves by an equal amount. So while the allocation of the monetary base changes—the amount in reserves grows and the amount in circulation shrinks—the total of these two, the monetary base, remains unchanged.

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

Figure 25.4 shows the two concepts schematically. The circle on the left represents the monetary base, consisting of bank reserves plus currency in circulation. The circle on the right represents the money supply, consisting mainly of currency in circulation plus checkable or near-checkable bank deposits. As the figure indicates, currency in circulation is part of both the monetary base and the money supply. But bank reserves aren't part of the money supply, and checkable or near-checkable bank deposits aren't part of the monetary base. In normal times, most of the monetary base actually consists of currency in circulation, which also makes up about half of the money supply.

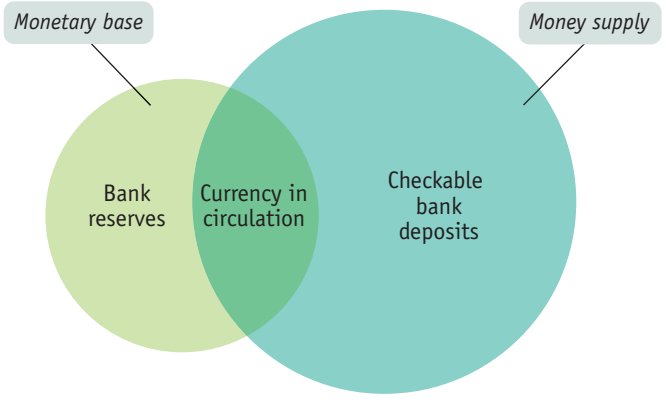
Now we can formally define the **money multiplier:** it's the ratio of the money supply to the monetary base. Most importantly, this tells us the total number of dollars created in the banking system by each $1 addition to the monetary base. In a simple situation in which banks hold no excess reserves and all cash is deposited in banks, the money multiplier is $1/rr$. So if the reserve requirement is 0.1 (the minimum required ratio for most checkable deposits in the United States), the money multiplier is $1/0.1 = 10$, and if the Federal Reserve adds $100 to the monetary base, the money supply will increase by $10 \times \$100 = \$1{,}000$. During normal times, the actual money multiplier in the United States, using M1 as our measure of money, is about 1.9. That's a lot smaller than 10. Normally, the reason the actual money multiplier is so small arises from the fact that people hold significant amounts of cash, and a dollar of currency in circulation, unlike a dollar in reserves, doesn't support multiple dollars of the money supply. In fact, currency in circulation normally accounts for more than 90% of the monetary base. But as this book went to press in early 2010, the money multiplier was even smaller, about 0.8. What was going on?

The **money multiplier** is the ratio of the money supply to the monetary base. It indicates the total number of dollars created in the banking system by each $1 addition to the monetary base.

figure 25.4

The Monetary Base and the Money Supply

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



The answer is that early 2010 was not a normal time: Starting in late 2008, legislation intended to stabilize the troubled U.S. economy made it much more attractive for banks to hold excess reserves. And banks responded by increasing their reserves tremendously, from $10 billion in 2008 to $1.2 trillion by January of 2010. And those large excess reserves—funds not lent out to potential borrowers—increased the monetary base without increasing the money supply. It was as if that money had "leaked" out of the money multiplier process and into excess reserves held by banks, reducing the size of the money multiplier.

Module 25 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. Suppose you are a depositor at First Street Bank. You hear a rumor that the bank has suffered serious losses on its loans. Every depositor knows that the rumor isn't true, but each thinks that most other depositors believe the rumor. Why, in the absence of deposit insurance, could this lead to a bank run? How does deposit insurance change the situation?
2. A con artist has a great idea: he'll open a bank without investing any capital and lend all the deposits at high interest rates to real estate developers. If the real estate market booms, the loans will be repaid and he'll make high profits. If the real estate market goes bust, the loans won't be repaid and the bank will fail—but he will not lose any of his own wealth. How would modern bank regulation frustrate his scheme?
3. Assume that total reserves are equal to $200 and total checkable bank deposits are equal to $1,000. Also assume that the public does not hold any currency and banks hold no excess reserves. Now suppose that the required reserve ratio falls from 20% to 10%. Trace out how this leads to an expansion in bank deposits.
4. Take the example of Silas depositing his $1,000 in cash into First Street Bank and assume that the required reserve ratio is 10%. But now assume that each recipient of a bank loan keeps half the loan in cash and deposits the rest. Trace out the resulting expansion in the money supply through at least three rounds of deposits.

Tackle the Test: Multiple-Choice Questions

1. Bank reserves include which of the following?
   I. currency in bank vaults
   II. bank deposits held in accounts at the Federal Reserve
   III. customer deposits in bank checking accounts
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III
2. The fraction of bank deposits actually held as reserves is the
   a. reserve ratio.
   b. required reserve ratio.
   c. excess reserve ratio.
   d. reserve requirement.
   e. monetary base.
3. Bank regulation includes which of the following?
   I. deposit insurance
   II. capital requirements
   III. reserve requirements
   a. I only
   b. II only
   c. III only
   d. I and II
   e. I, II, and III
4. Which of the following changes would be the most likely to reduce the size of the money multiplier?
   a. a decrease in the required reserve ratio
   b. a decrease in excess reserves
   c. an increase in cash holding by consumers
   d. a decrease in bank runs
   e. an increase in deposit insurance
5. The monetary base equals
   a. currency in circulation.
   b. reserves held by banks.
   c. currency in circulation − reserves held by banks.
   d. currency in circulation + reserves held by banks.
   e. currency in circulation/reserves held by banks.

Tackle the Test: Free-Response Questions

1. How will each of the following affect the money supply through the money multiplier process? Explain.
   a. People hold more cash.
   b. Banks hold more excess reserves.
   c. The Fed increases the required reserve ratio.

Answer (6 points)

1 point: It will decrease.

1 point: Money held as cash does not support multiple dollars in the money supply.

1 point: It will decrease.

1 point: Excess reserves are not loaned out and therefore do not expand the money supply.

1 point: It will decrease.

1 point: Banks will have to hold more as reserves and therefore loan out less.

2. The required reserve ratio is 5%.
   a. If a bank has deposits of $100,000 and holds $10,000 as reserves, how much are its excess reserves? Explain.
   b. If a bank holds no excess reserves and it receives a new deposit of $1,000, how much of that $1,000 can the bank lend out and how much is the bank required to add to its reserves? Explain.
   c. By how much can an increase in excess reserves of $2,000 change the money supply in a checkable-deposits-only system? Explain.

What you will learn in this **Module:**

- The history of the Federal Reserve System
- The structure of the Federal Reserve System
- How the Federal Reserve has responded to major financial crises

Module 26
The Federal Reserve System: History and Structure

The Federal Reserve System

Who's in charge of ensuring that banks maintain enough reserves? Who decides how large the monetary base will be? The answer, in the United States, is an institution known as the Federal Reserve (or, informally, as "the Fed"). The Federal Reserve is a **central bank**—an institution that oversees and regulates the banking system, and controls the monetary base. Other central banks include the Bank of England, the Bank of Japan, and the European Central Bank, or ECB.

An Overview of the Twenty-first Century American Banking System

Under normal circumstances, banking is a rather staid and unexciting business. Fortunately, bankers and their customers like it that way. However, there have been repeated episodes in which "sheer panic" would be the best description of banking conditions—the panic induced by a bank run and the specter of a collapse of a bank or multiple banks, leaving depositors penniless, bank shareholders wiped out, and borrowers unable to get credit. In this section, we'll give an overview of the behavior and regulation of the American banking system over the last century.

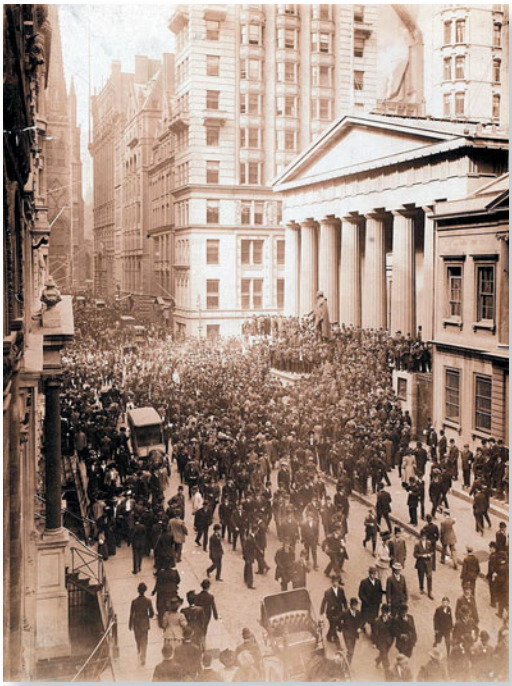
The creation of the Federal Reserve System in 1913 was largely a response to lessons learned in the Panic of 1907. In 2008, the United States found itself in the midst of a financial crisis that in many ways mirrored the Panic of 1907, which occurred almost exactly 100 years earlier.

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

Crisis in American Banking at the Turn of the Twentieth Century

The creation of the Federal Reserve System in 1913 marked the beginning of the modern era of American banking. From 1864 until 1913, American banking was dominated by a federally regulated system of national banks. They alone were allowed to issue currency, and the currency notes they issued were printed by the federal government with uniform size and design. How much currency a national bank could issue depended on its capital. Although this system was an improvement on the earlier period in which banks issued their own notes with no uniformity and virtually no regulation, the national banking regime still suffered numerous bank failures and major financial crises—at least one and often two per decade.

The main problem afflicting the system was that the money supply was not sufficiently responsive: it was difficult to shift currency around the country to respond quickly to local economic changes. (In particular, there was often a tug-of-war between New York City banks and rural banks for adequate amounts of currency.) Rumors that a bank had insufficient currency to satisfy demands for withdrawals would quickly lead to a bank run. A bank run would then spark a contagion, setting off runs at other nearby banks, sowing widespread panic and devastation in the local economy. In response, bankers in some locations pooled their resources to create local clearinghouses that would jointly guarantee a member's liabilities in the event of a panic, and some state governments began offering deposit insurance on their banks' deposits.



The Irma and Paul Milstein Division of United States History, New York Public Library

In both the Panic of 1907 and the financial crisis of 2008, large losses from risky speculation destabilized the banking system.

However, the cause of the Panic of 1907 was different from those of previous crises; in fact, its cause was eerily similar to the roots of the 2008 crisis. Ground zero of the 1907 panic was New York City, but the consequences devastated the entire country, leading to a deep four-year recession. The crisis originated in institutions in New York known as trusts, bank-like institutions that accepted deposits but that were originally intended to manage only inheritances and estates for wealthy clients. Because these trusts were supposed to engage only in low-risk activities, they were less regulated, had lower reserve requirements, and had lower cash reserves than national banks. However, as the American economy boomed during the first decade of the twentieth century, trusts began speculating in real estate and the stock market, areas of speculation forbidden to national banks. Being less regulated than national banks, trusts were able to pay their depositors higher returns. Yet trusts took a free ride on national banks' reputation for soundness, with depositors considering them equally safe. As a result, trusts grew rapidly: by 1907, the total assets of trusts in New York City were as large as those of national banks. Meanwhile, the trusts declined to join the New York Clearinghouse, a consortium of New York City national banks that guaranteed one another's soundness; that would have required the trusts to hold higher cash reserves, reducing their profits. The Panic of 1907 began with the failure of the Knickerbocker Trust, a large New York City trust that failed when it suffered massive losses in unsuccessful stock market speculation. Quickly, other New York trusts came under pressure, and frightened depositors began queuing in long lines to withdraw their funds. The New York Clearinghouse declined to step in and lend to the trusts, and even healthy trusts came under serious assault. Within two days, a dozen major trusts had gone under. Credit markets froze, and the stock market fell dramatically as stock traders were unable to get credit to finance their trades, and business confidence evaporated.

Fortunately, one of New York City's wealthiest men, the banker J. P. Morgan, quickly stepped in to stop the panic. Understanding that the crisis was spreading and would

soon engulf healthy institutions, trusts and banks alike, he worked with other bankers, wealthy men such as John D. Rockefeller, and the U.S. Secretary of the Treasury to shore up the reserves of banks and trusts so they could withstand the onslaught of withdrawals. Once people were assured that they could withdraw their money, the panic ceased. Although the panic itself lasted little more than a week, it and the stock market collapse decimated the economy. A four-year recession ensued, with production falling 11% and unemployment rising from 3% to 8%.

Responding to Banking Crises: The Creation of the Federal Reserve

Concerns over the frequency of banking crises and the unprecedented role of J. P. Morgan in saving the financial system prompted the federal government to initiate banking reform. In 1913 the national banking system was eliminated and the Federal Reserve System was created as a way to compel all deposit-taking institutions to hold adequate reserves and to open their accounts to inspection by regulators. The Panic of 1907 convinced many that the time for centralized control of bank reserves had come. The Federal Reserve was given the sole right to issue currency in order to make the money supply sufficiently responsive to satisfy economic conditions around the country.

The Structure of the Fed

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

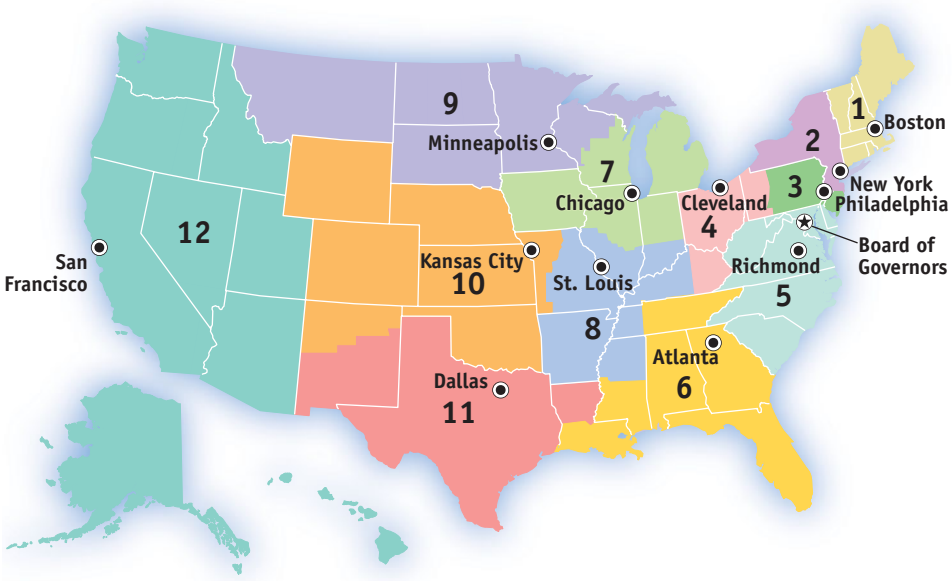
The Board of Governors, which oversees the entire system from its offices in Washington, D.C., is constituted like a government agency: its seven members are appointed by the president and must be approved by the Senate. However, they are appointed for 14-year terms, to insulate them from political pressure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

The 12 Federal Reserve Banks each serve a region of the country, known as a *Federal Reserve district,* providing various banking and supervisory services. One of their jobs, for example, is to audit the books of private-sector banks to ensure their financial health. Each regional bank is run by a board of directors chosen from the local banking and business community. The Federal Reserve Bank of New York plays a special role: it carries out *open-market operations,* usually the main tool of monetary policy. Figure 26.1 on the next page shows the 12 Federal Reserve districts and the city in which each regional Federal Reserve Bank is located.

Decisions about monetary policy are made by the Federal Open Market Committee, which consists of the Board of Governors plus five of the regional bank presidents. The president of the Federal Reserve Bank of New York is always on the committee, and the other four seats rotate among the 11 other regional bank presidents. The chair of the Board of Governors normally also serves as the chair of the Federal Open Market Committee.

The effect of this complex structure is to create an institution that is ultimately accountable to the voting public because the Board of Governors is chosen by the president and confirmed by the Senate, all of whom are themselves elected officials. But the long terms served by board members, as well as the indirectness of their appointment process, largely insulate them from short-term political pressures.

figure 26.1 The Federal Reserve System



The Federal Reserve System consists of the Board of Governors in Washington, D.C., plus 12 regional Federal Reserve Banks.

This map shows each of the 12 Federal Reserve districts.

Source: Board of Governors of the Federal Reserve System.

The Effectiveness of the Federal Reserve System

Although the Federal Reserve System standardized and centralized the holding of bank reserves, it did not eliminate the potential for bank runs because banks' reserves were still less than the total value of their deposits. The potential for more bank runs became a reality during the Great Depression. Plunging commodity prices hit American farmers particularly hard, precipitating a series of bank runs in 1930, 1931, and 1933, each of which started at midwestern banks and then spread throughout the country. After the failure of a particularly large bank in 1930, federal officials realized that the economy-wide effects compelled them to take a less hands-off approach and to intervene more vigorously. In 1932, the Reconstruction Finance Corporation (RFC) was established and given the authority to make loans to banks in order to stabilize the banking sector. Also, the Glass-Steagall Act of 1932, which increased the ability of banks to borrow from the Federal Reserve System, was passed. A loan to a leading Chicago bank from the Federal Reserve appears to have stopped a major banking crisis in 1932. However, the beast had not yet been tamed. Banks became fearful of borrowing from the RFC because doing so signaled weakness to the public. During the midst of the catastrophic bank run of 1933, the new U.S. president, Franklin Delano Roosevelt, was inaugurated. He immediately declared a "bank holiday," closing all banks until regulators could get a handle on the problem. In March 1933, emergency measures were adopted that gave the RFC extraordinary powers to stabilize and restructure the banking industry by providing capital to banks either by loans or by outright purchases of bank shares. With the new regulations, regulators closed nonviable banks and recapitalized viable ones by allowing the RFC to buy preferred shares in banks (shares that gave the U.S. government more rights than regular shareholders) and by greatly expanding banks' ability to borrow

from the Federal Reserve. By 1933, the RFC had invested over $16 billion (2008 dollars) in bank capital—one-third of the total capital of all banks in the United States at that time—and purchased shares in almost one-half of all banks. The RFC loaned more than $32 billion (2008 dollars) to banks during this period. Economic historians uniformly agree that the banking crises of the early 1930s greatly exacerbated the severity of the Great Depression, rendering monetary policy ineffective as the banking sector broke down and currency, withdrawn from banks and stashed under beds, reduced the money supply.

Although the powerful actions of the RFC stabilized the banking industry, new legislation was needed to prevent future banking crises. The Glass-Steagall Act of 1933 separated banks into two categories, **commercial banks,** depository banks that accepted deposits and were covered by deposit insurance, and **investment banks,** which engaged in creating and trading financial assets such as stocks and corporate bonds but were not covered by deposit insurance because their activities were considered more risky. Regulation Q prevented commercial banks from paying interest on checking accounts, in the belief that this would promote unhealthy competition between banks. In addition, investment banks were much more lightly regulated than commercial banks. The most important measure for the prevention of bank runs, however, was the adoption of federal deposit insurance (with an original limit of $2,500 per deposit).

These measures were clearly successful, and the United States enjoyed a long period of financial and banking stability. As memories of the bad old days dimmed, Depression-era bank regulations were lifted. In 1980 Regulation Q was eliminated, and by 1999, the Glass-Steagall Act had been so weakened that offering services like trading financial assets were no longer off-limits to commercial banks.

A **commercial bank** accepts deposits and is covered by deposit insurance.

An **investment bank** trades in financial assets and is not covered by deposit insurance.

A **savings and loan (thrift)** is another type of deposit-taking bank, usually specialized in issuing home loans.

The Savings and Loan Crisis of the 1980s

Along with banks, the banking industry also included **savings and loans** (also called S&Ls or **thrifts**), institutions designed to accept savings and turn them into long-term mortgages for home-buyers. S&Ls were covered by federal deposit insurance and were tightly regulated for safety. However, trouble hit in the 1970s, as high inflation led savers to withdraw their funds from low-interest-paying S&L accounts and put them into higher-paying money market accounts. In addition, the high inflation rate severely eroded the value of the S&Ls' assets, the long-term mortgages they held on their books. In order to improve S&Ls' competitive position versus banks, Congress eased regulations to allow S&Ls to undertake much more risky investments in addition to long-term home mortgages. However, the new freedom did not bring with it increased oversight, leaving S&Ls with less oversight than banks. Not surprisingly, during the real estate boom of the 1970s and 1980s, S&Ls engaged in overly risky real estate lending. Also, corruption occurred as some S&L executives used their institutions as private piggy banks. Unfortunately, during the late 1970s and early 1980s, political interference from Congress kept insolvent S&Ls open when a bank in a comparable situation would have been quickly shut down by bank regulators. By the early 1980s, a large number of S&Ls had failed. Because accounts were covered by federal deposit insurance, the liabilities of a failed S&L were now liabilities of the federal government, and depositors had to be paid from taxpayer funds. From 1986 through 1995, the federal government closed over 1,000 failed S&Ls, costing U.S. taxpayers over $124 billion dollars.

In a classic case of shutting the barn door after the horse has escaped, in 1989 Congress put in place comprehensive oversight of S&L activities. It also empowered Fannie Mae and Freddie Mac to take over much of the home mortgage lending previously done by S&Ls. Fannie Mae and Freddie Mac are quasi-governmental agencies created during the Great Depression to make homeownership more affordable for low- and moderate-income households. It has been calculated that the S&L crisis helped cause a steep slowdown in the finance and real estate industries, leading to the recession of the early 1990s.

A financial institution engages in **leverage** when it finances its investments with borrowed funds.

The **balance sheet effect** is the reduction in a firm's net worth from falling asset prices.

A **vicious cycle of deleveraging** takes place when asset sales to cover losses produce negative balance sheet effects on other firms and force creditors to call in their loans, forcing sales of more assets and causing further declines in asset prices.

Back to the Future: The Financial Crisis of 2008

The financial crisis of 2008 shared features of previous crises. Like the Panic of 1907 and the S&L crisis, it involved institutions that were not as strictly regulated as deposit-taking banks, as well as excessive speculation. Like the crises of the early 1930s, it involved a U.S. government that was reluctant to take aggressive action until the scale of the devastation became clear. In addition, by the late 1990s, advances in technology and financial innovation had created yet another systemic weakness that played a central role in 2008. The story of Long-Term Capital Management, or LTCM, highlights these problems.

Long-term Capital (Mis)Management Created in 1994, LTCM was a *hedge fund,* a private investment partnership open only to wealthy individuals and institutions. Hedge funds are virtually unregulated, allowing them to make much riskier investments than mutual funds, which are open to the average investor. Using vast amounts of **leverage**—that is, borrowed money—in order to increase its returns, LTCM used sophisticated computer models to make money by taking advantage of small differences in asset prices in global financial markets to buy at a lower price and sell at a higher price. In one year, LTCM made a return as high as 40%. LTCM was also heavily involved in *derivatives,* complex financial instruments that are constructed—derived—from the obligations of more basic financial assets. Derivatives are popular investment tools because they are cheaper to trade than basic financial assets and can be constructed to suit a buyer's or seller's particular needs. Yet their complexity can make it extremely hard to measure their value. LTCM believed that its computer models allowed it to accurately gauge the risk in the huge bets that it was undertaking in derivatives using borrowed money.

However, LTCM's computer models hadn't factored in a series of financial crises in Asia and in Russia during 1997 and 1998. Through its large borrowing, LTCM had become such a big player in global financial markets that attempts to sell its assets depressed the prices of what it was trying to sell. As the markets fell around the world and LTCM's panic-stricken investors demanded the return of their funds, LTCM's losses mounted as it tried to sell assets to satisfy those demands. Quickly, its operations collapsed because it could no longer borrow money and other parties refused to trade with it. Financial markets around the world froze in panic. The Federal Reserve realized that allowing LTCM's remaining assets to be sold at panic-stricken prices presented a grave risk to the entire financial system through the **balance sheet effect:** as sales of assets by LTCM depressed asset prices all over the world, other firms would see the value of their balance sheets fall as assets held on these balance sheets declined in value. Moreover, falling asset prices meant the value of assets held by borrowers on their balance sheet would fall below a critical threshold, leading to a default on the terms of their credit contracts and forcing creditors to call in their loans. This in turn would lead to more sales of assets as borrowers tried to raise cash to repay their loans, more credit defaults, and more loans called in, creating a **vicious cycle of deleveraging.** The Federal Reserve Bank of New York arranged a $3.625 billion bailout of LTCM in 1998, in which other private institutions took on shares of LTCM's assets and obligations, liquidated them in an orderly manner, and eventually turned a small profit. Quick action by the Federal Reserve Bank of New York prevented LTCM from sparking a contagion, yet virtually all of LTCM's investors were wiped out.

Subprime Lending and the Housing Bubble After the LTCM crisis, U.S. financial markets stabilized. They remained more or less stable even as stock prices fell sharply from 2000 to 2002 and the U.S. economy went into recession. During the recovery from the 2001 recession, however, the seeds for another financial crisis were planted.

The story begins with low interest rates: by 2003, U.S. interest rates were at historically low levels, partly because of Federal Reserve policy and partly because of large inflows of capital from other countries, especially China. These low interest rates helped cause a boom in housing, which in turn led the U.S. economy out of recession. As housing boomed, however, financial institutions began taking on growing risks—risks that were not well understood.

Traditionally, people were only able to borrow money to buy homes if they could show that they had sufficient income to meet the mortgage payments. Making home loans to people who didn't meet the usual criteria for borrowing, called **subprime lending,** was only a minor part of overall lending. But in the booming housing market of 2003–2006, subprime lending started to seem like a safe bet. Since housing prices kept rising, borrowers who couldn't make their mortgage payments could always pay off their mortgages, if necessary, by selling their homes. As a result, subprime lending exploded. Who was making these subprime loans? For the most part, it wasn't traditional banks lending out depositors' money. Instead, most of the loans were made by "loan originators," who quickly sold mortgages to other investors. These sales were made possible by a process known as **securitization:** financial institutions assembled pools of loans and sold shares in the income from these pools. These shares were considered relatively safe investments since it was considered unlikely that large numbers of home-buyers would default on their payments at the same time.

Subprime lending is lending to home buyers who don't meet the usual criteria for being able to afford their payments.

In **securitization** a pool of loans is assembled and shares of that pool are sold to investors.

But that's exactly what happened. The housing boom turned out to be a bubble, and when home prices started falling in late 2006, many subprime borrowers were unable either to meet their mortgage payments or sell their houses for enough to pay off their mortgages. As a result, investors in securities backed by subprime mortgages started taking heavy losses. Many of the mortgage-backed assets were held by financial institutions, including banks and other institutions playing bank-like roles. Like the trusts that played a key role in the Panic of 1907, these "nonbank banks" were less regulated than commercial banks, which allowed them to offer higher returns to investors but left them extremely vulnerable in a crisis. Mortgage-related losses, in turn, led to a collapse of trust in the financial system. Figure 26.2 shows one measure of this loss of trust: the TED spread, which is the difference between the interest rate on three-month loans that banks make to each other and the interest rate the federal government pays on three-month bonds. Since government bonds are considered extremely safe, the TED spread shows how much risk banks think they're taking on when lending to each other. Normally, the spread is around a quarter of a percentage point, but it shot up in August 2007 and surged to an unprecedented 4.64 percentage points in October 2008.

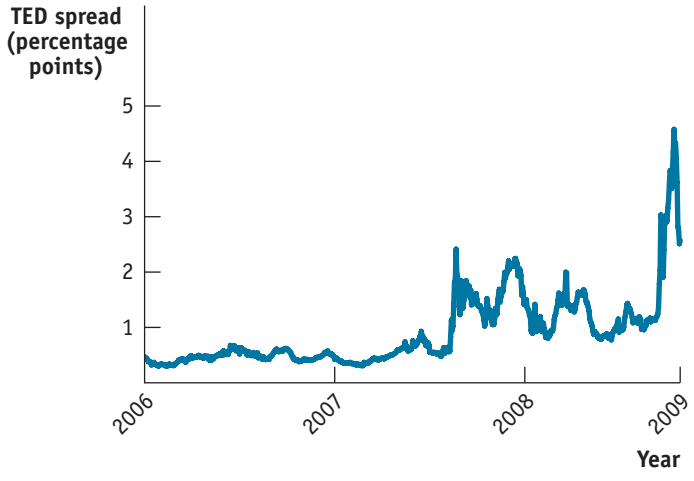
Crisis and Response The collapse of trust in the financial system, combined with the large losses suffered by financial firms, led to a severe cycle of deleveraging and a credit crunch for the economy as a whole. Firms found it difficult to borrow, even for short-term operations; individuals found home loans unavailable and credit card

figure 26.2

The TED Spread

The TED spread is the difference between the interest rate at which banks lend to each other and the interest rate on U.S. government debt. It's widely used as a measure of financial stress. The TED spread soared as a result of the financial crisis that started in 2007.

Source: British Bankers' Association; Federal Reserve Bank of St. Louis.



AP Photo/Charles Dharapak

Like FDR, Barack Obama, shown here with his team of economic advisers, was faced with a major financial crisis upon taking office.

limits reduced. Overall, the negative economic effect of the financial crisis bore a distinct and troubling resemblance to the effects of the banking crisis of the early 1930s, which helped cause the Great Depression. Policy makers noticed the resemblance and tried to prevent a repeat performance. Beginning in August 2007, the Federal Reserve engaged in a series of efforts to provide cash to the financial system, lending funds to a widening range of institutions and buying private-sector debt. The Fed and the Treasury Department also stepped in to rescue individual firms that were deemed too crucial to be allowed to fail, such as the investment bank Bear Stearns and the insurance company AIG.

In September 2008, however, policy makers decided that one major investment bank, Lehman Brothers, could be allowed to fail. They quickly regretted the decision. Within days of Lehman's failure, widespread panic gripped the financial markets, as illustrated by the late surge in the TED spread shown in Figure 26.2. In response to the intensified crisis, the U.S. government intervened further to support the financial system, as the U.S. Treasury began "injecting" capital into banks. Injecting capital, in practice, meant that the U.S. government would supply cash to banks in return for shares—in effect, partially nationalizing the financial system. This new rescue plan was still in its early stages when this book went to press, and it was too early to judge its success.

It is widely expected that the crisis of 2008 will lead to major changes in the financial system, probably the largest changes since the 1930s. Historically, it was considered enough to insure deposits and regulate commercial banks. The 2008 crisis raised new questions about the appropriate scope of safety nets and regulations. Like the crises preceding it, the financial crisis of 2008 exerted a powerful negative effect on the rest of the economy.

Module 26 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. What are the similarities between the Panic of 1907, the S&L crisis, and the crisis of 2008?
2. Why did the creation of the Federal Reserve fail to prevent the bank runs of the Great Depression? What measures did stop the bank runs?
3. Describe the balance sheet effect. Describe the vicious cycle of deleveraging. Why is it necessary for the government to step in to halt a vicious cycle of deleveraging?

Tackle the Test: Multiple-Choice Questions

1. Which of the following contributed to the creation of the Federal Reserve System?
   I. the bank panic of 1907
   II. the Great Depression
   III. the savings and loan crisis of the 1980s
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III
2. Which of the following is a part of both the Federal Reserve System and the federal government?
   a. the Federal Reserve Board of Governors
   b. the 12 regional Federal Reserve Banks
   c. the Reconstruction Finance Corporation
   d. commercial banks
   e. the Treasury Department

3. Which of the following is NOT a role of the Federal Reserve System?
   a. controlling bank reserves
   b. printing currency (Federal Reserve notes)
   c. carrying out monetary policy
   d. supervising and regulating banks
   e. holding reserves for commercial banks
4. Who oversees the Federal Reserve System?
   a. the presidents of the Regional Federal Reserve Banks
   b. the president of the United States
   c. the Federal Open Market Committee
   d. the Board of Governors of the Federal Reserve System
   e. the Reconstruction Finance Corporation
5. Which of the following contributed to the financial crisis of 2008?
   a. subprime lending
   b. securitization
   c. deleveraging
   d. low interest rates leading to a housing boom
   e. all of the above

Tackle the Test: Free-Response Questions

1. a. What group determines monetary policy?
   b. How many members serve in this group?
   c. Who always serves in this group?
   d. Who sometimes serves in this group? Explain.

Answer (5 points)

1 point: The Federal Open Market Committee (FOMC)

1 point: 12

1 point: Members of the Board of Governors and the New York Federal Reserve bank president

1 point: 4 of the other 11 Federal Reserve bank presidents

1 point: The 11 other Federal Reserve bank presidents rotate their service on the FOMC.

2. a. What does the Board of Governors of the Federal Reserve System do?
   b. How many members serve on the group?
   c. Who appoints members?
   d. How long do members serve?
   e. Why do they serve a term of this length?
   f. How long does the chair serve?

What you will learn in this **Module:**

- The functions of the Federal Reserve System
- The major tools the Federal Reserve uses to serve its functions

Module 27
The Federal Reserve: Monetary Policy

The Federal Reserve System

In the previous module, we learned that the Federal Reserve System serves as the central bank of the United States. It has two parts: the Board of Governors, which is part of the U.S. government, and the 12 regional Federal Reserve Banks, which are privately owned. But what are the functions of the Federal Reserve System, and how does it serve them?

The Functions of the Federal Reserve System

Today, the Federal Reserve's functions fall into four basic categories: providing financial services to depository institutions, supervising and regulating banks and other financial institutions, maintaining the stability of the financial system, and conducting monetary policy. Let's look at each in turn.

Provide Financial Services The 12 regional Federal Reserve Banks provide financial services to depository institutions such as banks and other large institutions, including the U.S. government. The Federal Reserve is sometimes referred to as the "banker's bank" because it holds reserves, clears checks, provides cash, and transfers funds for commercial banks—all services that banks provide for their customers. The Federal Reserve also acts as the banker and fiscal agent for the federal government. The U.S. Treasury has its checking account with the Federal Reserve, so when the federal government writes a check, it is written on an account at the Fed.

Supervise and Regulate Banking Institutions The Federal Reserve System is charged with ensuring the safety and soundness of the nation's banking and financial system. The regional Federal Reserve Banks examine and regulate commercial banks in their district. The Board of Governors also engages in regulation and supervision of financial institutions.

Maintain the Stability of the Financial System As we have seen, one of the major reasons the Federal Reserve System was created was to provide the nation with a safe and stable monetary and financial system. The Fed is charged with maintaining the integrity of the financial system. As part of this function, Federal Reserve banks provide liquidity to financial institutions to ensure their safety and soundness.

Conduct Monetary Policy One of the Federal Reserve's most important functions is the conduct of monetary policy. As we will see, the Federal Reserve uses the tools of monetary policy to prevent or address extreme macroeconomic fluctuations in the U.S. economy.

The **federal funds market** allows banks that fall short of the reserve requirement to borrow funds from banks with excess reserves.

The **federal funds rate** is the interest rate determined in the federal funds market.

The **discount rate** is the interest rate the Fed charges on loans to banks.

What the Fed Does

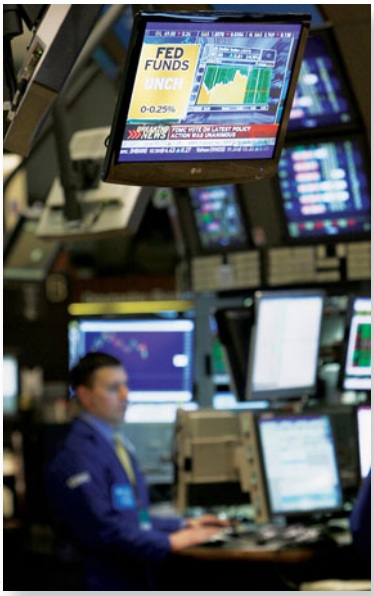
How does the Fed go about performing its functions? The Federal Reserve has three main policy tools at its disposal: *reserve requirements,* the *discount rate,* and, perhaps most importantly, *open-market operations.* These tools play a part in how the Fed performs each of its functions as outlined below.

The Reserve Requirement

In our discussion of bank runs, we noted that the Fed sets a minimum required reserve ratio, currently equal to 10% for checkable bank deposits. Banks that fail to maintain at least the required reserve ratio on average over a two-week period face penalties.

What does a bank do if it looks as if it has insufficient reserves to meet the Fed's reserve requirement? Normally, it borrows additional reserves from other banks via the **federal funds market,** a financial market that allows banks that fall short of the reserve requirement to borrow reserves (usually just overnight) from banks that are holding excess reserves. The interest rate in this market is determined by supply and demand but the supply and demand for bank reserves are both strongly affected by Federal Reserve actions. Later we will see how the **federal funds rate,** the interest rate at which funds are borrowed and lent in the federal funds market, plays a key role in modern monetary policy.

In order to alter the money supply, the Fed can change reserve requirements. If the Fed reduces the required reserve ratio, banks will lend a larger percentage of their deposits, leading to more loans and an increase in the money supply via the money multiplier. Alternatively, if the Fed increases the required reserve ratio, banks are forced to reduce their lending, leading to a fall in the money supply via the money multiplier. Under current practice, however, the Fed doesn't use changes in reserve requirements to actively manage the money supply. The last significant change in reserve requirements was in 1992.



Spencer Platt/Getty Images

A trader works on the floor of the New York Stock Exchange as the Federal Reserve announces that it will be keeping its key interest rate near zero.

The Discount Rate

Banks in need of reserves can also borrow from the Fed itself via the *discount window.* The **discount rate** is the interest rate the Fed charges on those loans. Normally, the discount rate is set 1 percentage point above the federal funds rate in order to discourage banks from turning to the Fed when they are in need of reserves.

In order to alter the money supply, the Fed can change the discount rate. Beginning in the fall of 2007, the Fed reduced the spread between the federal funds rate and the discount rate as part of its response to an ongoing financial crisis, described later in this module. As a result, by the spring of 2008 the discount rate was only 0.25 percentage points above the federal funds rate.

If the Fed reduces the spread between the discount rate and the federal funds rate, the cost to banks of being short of reserves falls; banks respond by increasing their

An **open-market operation** is a purchase or sale of government debt by the Fed.

lending, and the money supply increases via the money multiplier. If the Fed increases the spread between the discount rate and the federal funds rate, bank lending falls—and so will the money supply via the money multiplier.

The Fed normally doesn't use the discount rate to actively manage the money supply. Although, as we mentioned earlier, there was a temporary surge in lending through the discount window in 2007 in response to a financial crisis. Today, normal monetary policy is conducted almost exclusively using the Fed's third policy tool: open-market operations.

Open-Market Operations

Like the banks it oversees, the Federal Reserve has assets and liabilities. The Fed's assets consist of its holdings of debt issued by the U.S. government, mainly short-term U.S. government bonds with a maturity of less than one year, known as U.S. Treasury bills. Remember, the Fed isn't exactly part of the U.S. government, so U.S. Treasury bills held by the Fed are a liability of the government but an asset of the Fed. The Fed's liabilities consist of currency in circulation and bank reserves. Figure 27.1 summarizes the normal assets and liabilities of the Fed in the form of a T-account.

figure 27.1

The Federal Reserve's Assets and Liabilities

The Federal Reserve holds its assets mostly in short-term government bonds called U.S. Treasury bills. Its liabilities are the monetary base—currency in circulation plus bank reserves.

Assets	Liabilities
Government debt (Treasury bills)	Monetary base (Currency in circulation + bank reserves)

In an **open-market operation** the Federal Reserve buys or sells U.S. Treasury bills, normally through a transaction with *commercial banks*—banks that mainly make business loans, as opposed to home loans. The Fed never buys U.S. Treasury bills directly from the federal government. There's a good reason for this: when a central bank buys government debt directly from the government, it is lending directly to the government—in effect, the central bank is issuing "printing money" to finance the government's budget deficit. As we'll see later in the book, this has historically been a formula for disastrous levels of inflation.

The two panels of Figure 27.2 show the changes in the financial position of both the Fed and commercial banks that result from open-market operations. When the Fed buys U.S. Treasury bills from a commercial bank, it pays by crediting the bank's reserve account by an amount equal to the value of the Treasury bills. This is illustrated in panel (a): the Fed buys $100 million of U.S. Treasury bills from commercial banks, which increases the monetary base by $100 million because it increases bank reserves by $100 million. When the Fed sells U.S. Treasury bills to commercial banks, it debits the banks' accounts, reducing their reserves. This is shown in panel (b), where the Fed sells $100 million of U.S. Treasury bills. Here, bank reserves and the monetary base decrease.

You might wonder where the Fed gets the funds to purchase U.S. Treasury bills from banks. The answer is that it simply creates them with a stroke of the pen—or, these days, a click of the mouse—that credits the banks' accounts with extra reserves. (The Fed issues currency to pay for Treasury bills only when banks want the additional reserves in the form of currency.) Remember, the modern dollar is fiat money, which isn't backed by anything. So the Fed can create additional monetary base at its own discretion.

figure 27.2 Open-Market Operations by the Federal Reserve

(a) An Open-Market Purchase of $100 Million

	Assets		Liabilities	
Federal Reserve	Treasury bills	+$100 million	Monetary base	+$100 million

	Assets		Liabilities	
Commercial banks	Treasury bills	−$100 million	No change	
	Reserves	+$100 million		

(b) An Open-Market Sale of $100 Million

	Assets		Liabilities	
Federal Reserve	Treasury bills	−$100 million	Monetary base	−$100 million

	Assets		Liabilities	
Commercial banks	Treasury bills	+$100 million	No change	
	Reserves	−$100 million		

In panel (a), the Federal Reserve increases the monetary base by purchasing U.S. Treasury bills from private commercial banks in an open-market operation. Here, a $100 million purchase of U.S. Treasury bills by the Federal Reserve is paid for by a $100 million increase in the monetary base. This will ultimately lead to an increase in the money supply via the money multiplier as banks lend out some of these new reserves. In panel (b), the Federal Reserve reduces the monetary base by selling U.S. Treasury bills to private commercial banks in an open-market operation. Here, a $100 million sale of U.S. Treasury bills leads to a $100 million reduction in commercial bank reserves, resulting in a $100 million decrease in the monetary base. This will ultimately lead to a fall in the money supply via the money multiplier as banks reduce their loans in response to a fall in their reserves.

The change in bank reserves caused by an open-market operation doesn't directly affect the money supply. Instead, it starts the money multiplier in motion. After the $100 million increase in reserves shown in panel (a), commercial banks would lend out their additional reserves, immediately increasing the money supply by $100 million. Some of those loans would be deposited back into the banking system, increasing reserves

fyi

Who Gets the Interest on the Fed's Assets?

As we've just learned, the Fed owns a lot of assets—Treasury bills—which it bought from commercial banks in exchange for the monetary base in the form of credits to banks' reserve accounts. These assets pay interest. Yet the Fed's liabilities consist mainly of the monetary base, liabilities on which the Fed *doesn't* pay interest. So the Fed is, in effect, an institution that has the privilege of borrowing funds at a zero interest rate and lending them out at a positive interest rate. That sounds like a pretty profitable business. Who gets the profits?

You do—or rather, U.S. taxpayers do. The Fed keeps some of the interest it receives to finance its operations but turns most of it over to the U.S. Treasury. For example, in 2009 the Federal Reserve System received $52.1 billion in income—largely in interest on its holdings of Treasury bills, of which $46.1 billion was returned to the Treasury.

We can now finish the story of the impact of those forged $100 bills allegedly printed in North Korea. When a fake $100 bill enters circulation, it has the same economic effect as a real $100 bill printed by the U.S. government. That is, as long as nobody catches the forgery, the fake bill serves, for all practical purposes, as part of the monetary base. Meanwhile, the Fed decides on the size of the monetary base based on economic considerations—in particular, the Fed doesn't let the monetary base get too large because that can cause inflation. So every fake $100 bill that enters circulation basically means that the Fed prints one less real $100 bill. When the Fed prints a $100 bill legally, however, it gets Treasury bills in return—and the interest on those bills helps pay for the U.S. government's expenses. So a counterfeit $100 bill reduces the amount of Treasury bills the Fed can acquire and thereby reduces the interest payments going to the Fed and the U.S. Treasury. So taxpayers bear the real cost of counterfeiting.

again and permitting a further round of loans, and so on, leading to a rise in the money supply. An open-market sale has the reverse effect: bank reserves fall, requiring banks to reduce their loans, leading to a fall in the money supply.

Economists often say, loosely, that the Fed controls the money supply—checkable deposits plus currency in circulation. In fact, it controls only the monetary base—bank reserves plus currency in circulation. But by increasing or reducing the monetary base, the Fed can exert a powerful influence on both the money supply and interest rates. This influence is the basis of monetary policy, discussed in detail in Modules 28 and 29.

Module 27 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. Assume that any money lent by a bank is deposited back in the banking system as a checkable deposit and that the reserve ratio is 10%. Trace out the effects of a $100 million open-market purchase of U.S. Treasury bills by the Fed on the value of checkable bank deposits. What is the size of the money multiplier?

Tackle the Test: Multiple-Choice Questions

1. Which of the following is a function of the Federal Reserve System?
   I. examine commercial banks
   II. print Federal Reserve notes
   III. conduct monetary policy
   a. I only
   b. II only
   c. III only
   d. I and III only
   e. I, II, and III

2. Which of the following financial services does the Federal Reserve provide for commercial banks?
   I. clearing checks
   II. holding reserves
   III. making loans
   a. I only
   b. II only
   c. III only
   d. I and II
   e. I, II, and III

3. When the Fed makes a loan to a commercial bank, it charges
   a. no interest.
   b. the prime rate.
   c. the federal funds rate.
   d. the discount rate.
   e. the market interest rate.

4. If the Fed purchases U.S. Treasury bills from a commercial bank, what happens to bank reserves and the money supply?

	Bank reserves	*Money supply*
a.	increase	decrease
b.	increase	increase
c.	decrease	decrease
d.	decrease	increase
e.	increase	no change

5. When banks make loans to each other, they charge the
   a. prime rate.
   b. discount rate.
   c. federal funds rate.
   d. CD rate.
   e. mortgage rate.

Tackle the Test: Free-Response Questions

1. a. What are the three major tools of the Federal Reserve System?
   b. What would the Fed do with each tool to increase the money supply? Explain for each.

2. What are the four basic functions of the Federal Reserve System and what part of the system is responsible for each?

Answer (9 points)

1 point: The discount rate

1 point: The reserve requirement

1 point: Open-market operations

1 point: Decrease the discount rate

1 point: A lower discount rate makes it cheaper to borrow from the Fed so the money supply increases.

1 point: Decrease the reserve requirement

1 point: A lower reserve requirement allows banks to loan more, increasing the money supply.

1 point: Buy U.S. Treasury bills

1 point: When the Fed buys U.S. Treasury bills, banks' excess reserves increase. When lent out, these excess reserves increase the money supply with the assistance of the money multiplier.

What you will learn in this **Module:**

- What the money demand curve is
- Why the liquidity preference model determines the interest rate in the short run

Module 28
The Money Market

The Demand for Money

Remember that M1, the most commonly used definition of the money supply, consists of currency in circulation (cash), plus checkable bank deposits, plus traveler's checks. M2, a broader definition of the money supply, consists of M1 plus deposits that can easily be transferred into checkable deposits. We also learned why people hold money—to make it easier to purchase goods and services. Now we'll go deeper, examining what determines *how much* money individuals and firms want to hold at any given time.

The Opportunity Cost of Holding Money

Most economic decisions involve trade-offs at the margin. That is, individuals decide how much of a good to consume by determining whether the benefit they'd gain from consuming a bit more of any given good is worth the cost. The same decision process is used when deciding how much money to hold.

Individuals and firms find it useful to hold some of their assets in the form of money because of the convenience money provides: money can be used to make purchases directly, while other assets can't. But there is a price to be paid (an opportunity cost) for that convenience: money held in your wallet earns no interest.

As an example of how convenience makes it worth incurring some opportunity costs, consider the fact that even today—with the prevalence of credit cards, debit cards, and ATMs—people continue to keep cash in their wallets rather than leave the funds in an interest-bearing account. They do this because they don't want to have to go to an ATM to withdraw money every time they want to make a small purchase. In other words, the convenience of keeping some cash in your wallet is more valuable than the interest you would earn by keeping that money in the bank.

Even holding money in a checking account involves a trade-off between convenience and earning interest. That's because you can earn a higher interest rate by putting your money in assets other than a checking account. For example, many banks offer certificates of deposit, or CDs, which pay a higher interest rate than ordinary bank accounts. But CDs also carry a penalty if you withdraw the funds before a certain amount of time—say, six months—has elapsed. An individual who keeps funds in a checking account is forgoing the higher interest rate those funds would have earned if placed in a CD in return for the convenience of having cash readily available when needed.

Table 28.1 illustrates the opportunity cost of holding money in a specific month, June 2007. The first row shows the interest rate on one-month certificates of deposit—that is, the interest rate individuals could get if they were willing to tie their funds up for one month. In June 2007, one-month CDs yielded 5.30%. The second row shows the interest rate on interest-bearing bank accounts (specifically, those included in M1). Funds in these accounts were more accessible than those in CDs, but the price of that convenience was a much lower interest rate, only 2.478%. Finally, the last row shows the interest rate on currency—cash in your wallet—which was, of course, zero.

table **28.1**

Selected Interest Rates, June 2007

One-month CDs	5.30%
Interest-bearing demand deposits	2.478
Currency	0

Source: Federal Reserve Bank of St. Louis.

Table 28.1 shows the opportunity cost of holding money at one point in time, but the opportunity cost of holding money changes when the overall level of interest rates changes. Specifically, when the overall level of interest rates falls, the opportunity cost of holding money falls, too.

Table 28.2 illustrates this point by showing how selected interest rates changed between June 2007 and June 2008, a period when the Federal Reserve was slashing rates in an effort to fight off recession. Between June 2007 and June 2008, the federal funds rate, which is the rate the Fed controls most directly, fell by 3.25 percentage points. The interest rate on one-month CDs fell almost as much, 2.8 percentage points. That's not an accident: all **short-term interest rates**—rates on financial assets that come due, or mature, within less than a year—tend to move together, with rare exceptions. The reason short-term interest rates tend to move together is that CDs and other short-term assets (like one-month and three-month U.S. Treasury bills) are in effect competing for the same business. Any short-term asset that offers a lower-than-average interest rate will be sold by investors, who will move their wealth into a higher-yielding short-term asset. The selling of the asset, in turn, forces its interest rate up because investors must be rewarded with a higher rate in order to induce them to buy it. Conversely, investors will move their wealth into any short-term financial asset that offers an above-average interest rate. The purchase of the asset drives its interest rate down when sellers find they can lower the rate of return on the asset and still find willing buyers. So interest rates on short-term financial assets tend to be roughly the same because no asset will consistently offer a higher-than-average or a lower-than-average interest rate.

But as short-term interest rates fell between June 2007 and June 2008, the interest rates on money didn't fall by the same amount. The interest rate on currency, of course, remained at zero. The interest rate paid on demand deposits did fall, but by much less than short-term interest rates. As a result, the opportunity cost of holding money fell. The last two rows of Table 28.2 show the differences between the interest

Short-term interest rates are the interest rates on financial assets that mature within less than a year.

table **28.2**

Interest Rates and the Opportunity Cost of Holding Money

	June 2007	June 2008
Federal funds rate	5.25%	2.00%
One-month certificates of deposit (CD)	5.30	2.50
Interest-bearing demand deposits	2.773	1.353
Currency	0	0
CDs minus interest-bearing demand deposits	**2.527**	**1.147**
CDs minus currency	**5.30**	**2.50**

Source: Federal Reserve Bank of St. Louis.

fyi

Long-term Interest Rates

Long-term interest rates—rates on bonds or loans that mature in several years—don't necessarily move with short-term interest rates. How is that possible?

Consider the case of Millie, who has already decided to place $1,000 in CDs for the next two years. However, she hasn't decided whether to put the money in a one-year CD, at a 4% rate of interest, or a two-year CD, at a 5% rate of interest.

You might think that the two-year CD is a clearly better deal—but it may not be. Suppose that Millie expects the rate of interest on one-year CDs to rise sharply next year. If she puts her funds in a one-year CD this year, she will be able to reinvest the money at a much higher rate next year. And this could give her a two-year rate of return that is higher than if she put her funds into the two-year CD. For example, if the rate of interest on one-year CDs rises from 4% this year to 8% next year, putting her funds in a one-year CD will give her an annual rate of return over the next two years of about 6%, better than the 5% rate on two-year CDs.

The same considerations apply to investors deciding between short-term and long-term bonds. If they expect short-term interest rates to rise, investors may buy short-term bonds even if long-term bonds offer a higher interest rate. If they expect short-term interest rates to fall, investors may buy long-term bonds even if short-term bonds offer a higher interest rate.

In practice, long-term interest rates reflect the average expectation in the market about what's going to happen to short-term rates in the future. When long-term rates are higher than short-term rates, as they were in 2008, the market is signaling that it expects short-term rates to rise in the future.

Long-term interest rates are interest rates on financial assets that mature a number of years in the future.

The **money demand curve** shows the relationship between the quantity of money demanded and the interest rate.

rates on demand deposits and currency and the interest rate on CDs. These differences declined sharply between June 2007 and June 2008. This reflects a general result: the higher the short-term interest rate, the higher the opportunity cost of holding money; the lower the short-term interest rate, the lower the opportunity cost of holding money.

Table 28.2 contains only short-term interest rates. At any given moment, **long-term interest rates**—interest rates on financial assets that mature, or come due, a number of years into the future—may be different from short-term interest rates. The difference between short-term and long-term interest rates is sometimes important as a practical matter. Moreover, it's short-term rates rather than long-term rates that affect money demand, because the decision to hold money involves trading off the convenience of holding cash versus the payoff from holding assets that mature in the short-term—a year or less. For our current purposes, however, it's useful to ignore the distinction between short-term and long-term rates and assume that there is only one interest rate.

The Money Demand Curve

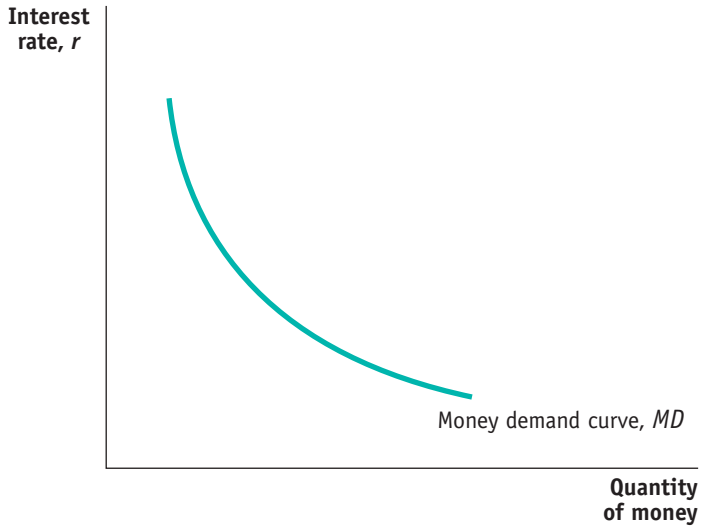
Because the overall level of interest rates affects the opportunity cost of holding money, the quantity of money individuals and firms want to hold is, other things equal, negatively related to the interest rate. In Figure 28.1, the horizontal axis shows the quantity of money demanded and the vertical axis shows the nominal interest rate, *r,* which you can think of as a representative short-term interest rate such as the rate on one-month CDs. Why do we place the nominal interest rate and not the real interest rate on the vertical axis? Because the opportunity cost of holding money includes both the real return that could be earned on a bank deposit and the erosion in purchasing power caused by inflation. The nominal interest rate includes both the forgone real return and the expected loss due to inflation. Hence, *r* in Figure 28.1 and all subsequent figures is the nominal interest rate.

The relationship between the interest rate and the quantity of money demanded by the public is illustrated by the **money demand curve,** *MD,* in Figure 28.1. The money demand curve slopes downward because, other things equal, a higher interest rate increases the opportunity cost of holding money, leading the public to reduce the quantity of money it demands. For example, if the interest rate is very low—say, 1%—the

figure 28.1

The Money Demand Curve

The money demand curve illustrates the relationship between the interest rate and the quantity of money demanded. It slopes downward: a higher interest rate leads to a higher opportunity cost of holding money and reduces the quantity of money demanded.



interest forgone by holding money is relatively small. As a result, individuals and firms will tend to hold relatively large amounts of money to avoid the cost and nuisance of converting other assets into money when making purchases. By contrast, if the interest rate is relatively high—say, 15%, a level it reached in the United States in the early 1980s—the opportunity cost of holding money is high. People will respond by keeping only small amounts in cash and deposits, converting assets into money only when needed.

You might ask why we draw the money demand curve with the interest rate—as opposed to rates of return on other assets, such as stocks or real estate—on the vertical axis. The answer is that for most people the relevant question in deciding how much money to hold is whether to put the funds in the form of other assets that can be turned fairly quickly and easily into money. Stocks don't fit that definition because there are significant broker's fees when you sell stock (which is why stock market investors are advised not to buy and sell too often); selling real estate involves even larger fees and can take a long time as well. So the relevant comparison is with assets that are "close to" money—fairly liquid assets like CDs. And as we've already seen, the interest rates on all these assets normally move closely together.

Shifts of the Money Demand Curve

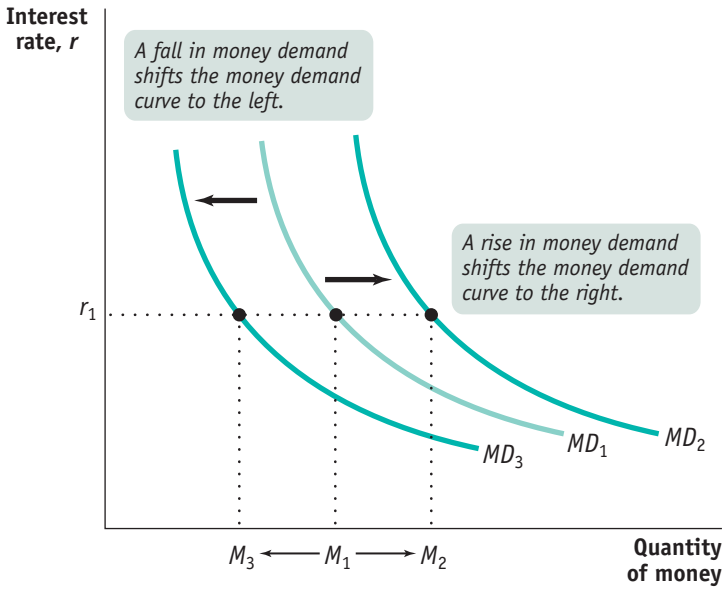
Like the demand curve for an ordinary good, the money demand curve can be shifted by a number of factors. Figure 28.2 on the next page shows shifts of the money demand curve: an increase in the demand for money corresponds to a rightward shift of the *MD* curve, raising the quantity of money demanded at any given interest rate; a fall in the demand for money corresponds to a leftward shift of the *MD* curve, reducing the quantity of money demanded at any given interest rate. The most important factors causing the money demand curve to shift are changes in the aggregate price level, changes in real GDP, changes in banking technology, and changes in banking institutions.

Changes in the Aggregate Price Level Americans keep a lot more cash in their wallets and funds in their checking accounts today than they did in the 1950s. One reason is that they have to if they want to be able to buy anything: almost everything costs more now than it did when you could get a burger, fries, and a drink at McDonald's for

figure 28.2

Increases and Decreases in the Demand for Money

A rise in money demand shifts the money demand curve to the right, from MD_1 to MD_2, and the quantity of money demanded rises at any given interest rate. A fall in money demand shifts the money demand curve to the left, from MD_1 to MD_3, and the quantity of money demanded falls at any given interest rate.



A re-creation of a McDonald's in the 1950s at the Ford Museum in Detroit, Michigan

45 cents and a gallon of gasoline for 29 cents. So higher prices increase the demand for money (a rightward shift of the *MD* curve), and lower prices reduce the demand for money (a leftward shift of the *MD* curve).

We can actually be more specific than this: other things equal, the demand for money is *proportional* to the price level. That is, if the aggregate price level rises by 20%, the quantity of money demanded at any given interest rate, such as r_1 in Figure 28.2, also rises by 20%—the movement from M_1 to M_2. Why? Because if the price of everything rises by 20%, it takes 20% more money to buy the same basket of goods and services. And if the aggregate price level falls by 20%, at any given interest rate the quantity of money demanded falls by 20%—shown by the movement from M_1 to M_3 at the interest rate r_1. As we'll see later, the fact that money demand is proportional to the price level has important implications for the long-run effects of monetary policy.

Changes in Real GDP Households and firms hold money as a way to facilitate purchases of goods and services. The larger the quantity of goods and services they buy, the larger the quantity of money they will want to hold at any given interest rate. So an increase in real GDP—the total quantity of goods and services produced and sold in the economy—shifts the money demand curve rightward. A fall in real GDP shifts the money demand curve leftward.

Changes in Technology There was a time, not so long ago, when withdrawing cash from a bank account required a visit during the bank's hours of operation. And since most people tried to do their banking during lunch hour, they often found themselves standing in line. So people limited the number of times they needed to withdraw funds by keeping substantial amounts of cash on hand. Not surprisingly, this tendency diminished greatly with the advent of ATMs in the 1970s. As a result, the demand for money fell and the money demand curve shifted leftward.

These events illustrate how changes in technology can affect the demand for money. In general, advances in information technology have tended to reduce the demand for money by making it easier for the public to make purchases without

holding significant sums of money. ATMs are only one example of how changes in technology have altered the demand for money. The ability of stores to process credit card and debit card transactions via the Internet has widened their acceptance and similarly reduced the demand for cash.


istockphoto

Changes in Institutions Changes in institutions can increase or decrease the demand for money. For example, until Regulation *Q* was eliminated in 1980, U.S. banks weren't allowed to offer interest on checking accounts. So the interest you would forgo by holding funds in a checking account instead of an interest-bearing asset made the opportunity cost of holding funds in checking accounts very high. When banking regulations changed, allowing banks to pay interest on checking account funds, the demand for money rose and shifted the money demand curve to the right.

Money and Interest Rates

The Federal Open Market Committee decided today to lower its target for the federal funds rate 75 basis points to 2¼ percent.

Recent information indicates that the outlook for economic activity has weakened further. Growth in consumer spending has slowed and labor markets have softened. Financial markets remain under considerable stress, and the tightening of credit conditions and the deepening of the housing contraction are likely to weigh on economic growth over the next few quarters.

So read the beginning of a press release from the Federal Reserve issued on March 18, 2008. (A basis point is equal to 0.01 percentage point. So the statement implies that the Fed lowered the target from 3% to 2.25%.) The federal funds rate is the rate at which banks lend reserves to each other to meet the required reserve ratio. As the statement implies, at each of its eight-times-a-year meetings, the Federal Open Market Committee sets a target value for the federal funds rate. It's then up to Fed officials to achieve that target. This is done by the Open Market Desk at the Federal Reserve Bank of New York, which buys and sells short-term U.S. government debt, known as Treasury bills, to achieve that target.

As we've already seen, other short-term interest rates, such as the rates on CDs, move with the federal funds rate. So when the Fed reduced its target for the federal funds rate from 3% to 2.25% in March 2008, many other short-term interest rates also fell by about three-quarters of a percentage point.

How does the Fed go about achieving a *target federal funds rate*? And more to the point, how is the Fed able to affect interest rates at all?

The Equilibrium Interest Rate

Recall that, for simplicity, we've assumed that there is only one interest rate paid on nonmonetary financial assets, both in the short run and in the long run. To understand how the interest rate is determined, consider Figure 28.3 on the next page, which illustrates the **liquidity preference model of the interest rate;** this model says that the interest rate is determined by the supply and demand for money in the market for money. Figure 28.3 combines the money demand curve, *MD,* with the **money supply curve,** *MS,* which shows how the quantity of money supplied by the Federal Reserve varies with the interest rate.

The Federal Reserve can increase or decrease the money supply: it usually does this through *open-market operations,* buying or selling Treasury bills, but it can also lend via the *discount window* or change *reserve requirements.* Let's assume for simplicity that the

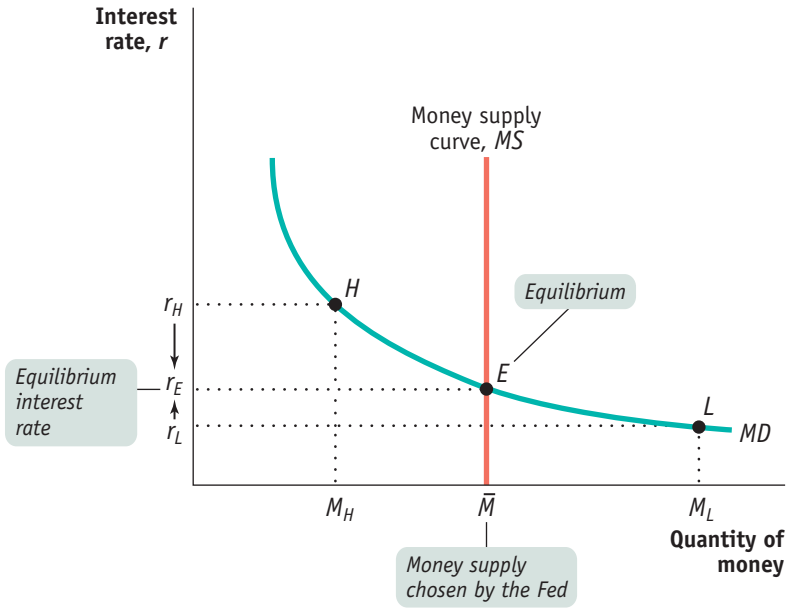
According to the **liquidity preference model of the interest rate,** the interest rate is determined by the supply and demand for money.

The **money supply curve** shows how the quantity of money supplied varies with the interest rate.

figure 28.3

Equilibrium in the Money Market

The money supply curve, *MS*, is vertical at the money supply chosen by the Federal Reserve, $\overline{M}$. The money market is in equilibrium at the interest rate r_E: the quantity of money demanded by the public is equal to $\overline{M}$, the quantity of money supplied. At a point such as *L*, the interest rate, r_L, is below r_E and the corresponding quantity of money demanded, M_L, exceeds the money supply, $\overline{M}$. In an attempt to shift their wealth out of nonmoney interest-bearing financial assets and raise their money holdings, investors drive the interest rate up to r_E. At a point such as *H*, the interest rate r_H is above r_E and the corresponding quantity of money demanded, M_H, is less than the money supply, $\overline{M}$. In an attempt to shift out of money holdings into nonmoney interest-bearing financial assets, investors drive the interest rate down to r_E.



Fed, using one or more of these methods, simply chooses the level of the money supply that it believes will achieve its interest rate target. Then the money supply curve is a vertical line, *MS* in Figure 28.3, with a horizontal intercept corresponding to the money supply chosen by the Fed, $\overline{M}$. The money market equilibrium is at *E*, where *MS* and *MD* cross. At this point the quantity of money demanded equals the money supply, $\overline{M}$, leading to an equilibrium interest rate of r_E.

To understand why r_E is the equilibrium interest rate, consider what happens if the money market is at a point like *L*, where the interest rate, r_L, is below r_E. At r_L the public wants to hold the quantity of money M_L, an amount larger than the actual money supply, $\overline{M}$. This means that at point *L*, the public wants to shift some of its wealth out of interest-bearing assets such as high-denomination CDs (which aren't money) into money. This has two implications. One is that the quantity of money demanded is *more* than the quantity of money supplied. The other is that the quantity of interest-bearing nonmoney assets demanded is *less* than the quantity supplied. So those trying to sell nonmoney assets will find that they have to offer a higher interest rate to attract buyers. As a result, the interest rate will be driven up from r_L until the public wants to hold the quantity of money that is actually available, *M*. That is, the interest rate will rise until it is equal to r_E.

Now consider what happens if the money market is at a point such as *H* in Figure 28.3, where the interest rate r_H is above r_E. In that case the quantity of money demanded, M_H, is less than the quantity of money supplied, $\overline{M}$. Correspondingly, the quantity of interest-bearing nonmoney assets demanded is greater than the quantity supplied. Those trying to sell interest-bearing nonmoney assets will find that they can offer a lower interest rate and still find willing buyers. This leads to a fall in the interest rate from r_H. It falls until the public wants to hold the quantity of money that is actually available, $\overline{M}$. Again, the interest rate will end up at r_E.

Two Models of the Interest Rate

Here we have developed what is known as the liquidity preference model of the interest rate. In this model, the equilibrium interest rate is the rate at which the quantity of money demanded equals the quantity of money supplied. This model is different from,

but consistent with, another model known as the loanable funds model of the interest rates, which is developed in the next module. In the loanable funds model, we will see that the interest rate matches the quantity of loanable funds supplied by savers with the quantity of loanable funds demanded for investment spending.

Module 28 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. Explain how each of the following would affect the quantity of money demanded, and indicate whether each change would cause a movement along the money demand curve or a shift of the money demand curve.
   a. Short-term interest rates rise from 5% to 30%.
   b. All prices fall by 10%.
   c. New wireless technology automatically charges supermarket purchases to credit cards, eliminating the need to stop at the cash register.
   d. In order to avoid paying taxes, a vast underground economy develops in which workers are paid their wages in cash rather than with checks.
2. How will each of the following affect the opportunity cost or benefit of holding cash? Explain.
   a. Merchants charge a 1% fee on debit/credit card transactions for purchases of less than $50.
   b. To attract more deposits, banks raise the interest paid on six-month CDs.
   c. Real estate prices fall significantly.
   d. The cost of food rises significantly.

Tackle the Test: Multiple-Choice Questions

1. A change in which of the following will shift the money demand curve?
   I. the aggregate price level
   II. real GDP
   III. the interest rate
   a. I only
   b. II only
   c. III only
   d. I and II only
   e. I, II, and III
2. Which of the following will decrease the demand for money?
   a. an increase in the interest rate
   b. inflation
   c. an increase in real GDP
   d. an increase in the availability of ATMs
   e. the adoption of Regulation Q
3. What will happen to the money supply and the equilibrium interest rate if the Federal Reserve sells Treasury securities?

	Money supply	*Equilibrium interest rate*
a.	increase	increase
b.	decrease	increase
c.	increase	decrease
d.	decrease	decrease
e.	decrease	no change

4. Which of the following is true regarding short-term and long-term interest rates?
   a. Short-term interest rates are always above long-term interest rates.
   b. Short-term interest rates are always below long-term interest rates.
   c. Short-term interest rates are always equal to long-term interest rates.
   d. Short-term interest rates are more important for determining the demand for money.
   e. Long-term interest rates are more important for determining the demand for money.
5. The quantity of money demanded rises (that is, there is a movement along the money demand curve) when
   a. the aggregate price level increases.
   b. the aggregate price level falls.
   c. real GDP increases.
   d. new technology makes banking easier.
   e. short-term interest rates fall.

Tackle the Test: Free-Response Questions

1. Draw three correctly labeled graphs of the money market. Show the effect of each of the following three changes on a separate graph.
   a. The aggregate price level increases.
   b. Real GDP falls.
   c. There is a dramatic increase in online banking.

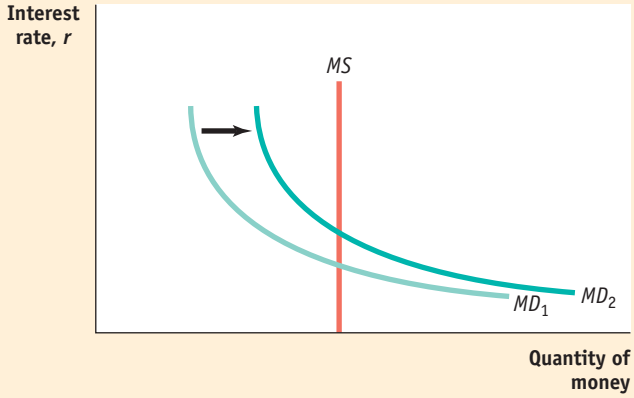
Answer (6 points)

1 point: The vertical axis is labeled "Interest rate" or "r" and the horizontal axis is labeled "Quantity of money."

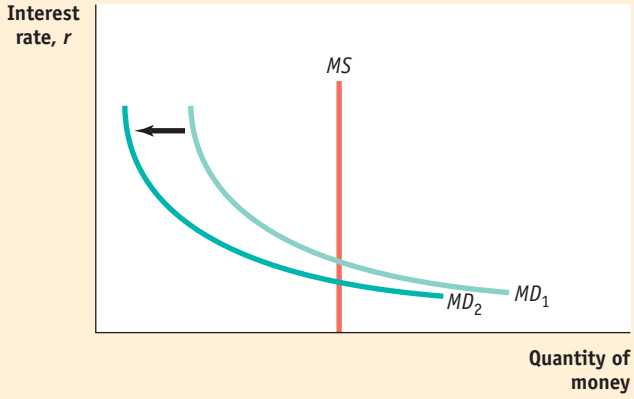
1 point: Money supply is vertical and labeled.

1 point: Money demand is negatively sloped and labeled.

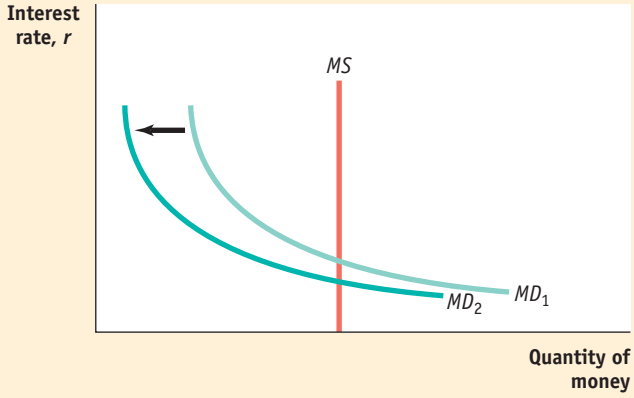
1 point: a. Money demand shifts right.



1 point: b. Money demand shifts left.



1 point: c. Money demand shifts left.



2. Draw a correctly labeled graph showing equilibrium in the money market. Select an interest rate below the equilibrium interest rate and explain what occurs in the market at that interest rate and how the market will eventually return to equilibrium.

Module 29 The Market for Loanable Funds

What you will learn in this Module:

- How the loanable funds market matches savers and investors
- The determinants of supply and demand in the loanable funds market
- How the two models of interest rates can be reconciled

The Market for Loanable Funds

Recall that, for the economy as a whole, savings always equals investment spending. In a closed economy, savings is equal to national savings. In an open economy, savings is equal to national savings plus capital inflow. At any given time, however, savers, the people with funds to lend, are usually not the same as borrowers, the people who want to borrow to finance their investment spending. How are savers and borrowers brought together?

Savers and borrowers are matched up with one another in much the same way producers and consumers are matched up: through markets governed by supply and demand. In the circular-flow diagram, we noted that the *financial markets* channel the savings of households to businesses that want to borrow in order to purchase capital equipment. It's now time to take a look at how those financial markets work.

The Equilibrium Interest Rate There are a large number of different financial markets in the financial system, such as the bond market and the stock market. However, economists often work with a simplified model in which they assume that there is just one market that brings together those who want to lend money (savers) and those who want to borrow (firms with investment spending projects). This hypothetical market is known as the **loanable funds market.** The price that is determined in the loanable funds market is the interest rate, denoted by *r*. It is the return a lender receives for allowing borrowers the use of a dollar for one year, calculated as a percentage of the amount borrowed.

Recall that in the money market, the *nominal* interest rate is of central importance and always serves as the "price" measured on the vertical axis. The interest rate in the loanable funds market can be measured in either real or nominal terms—with or without the inclusion of expected inflation that makes nominal rates differ from real rates. Investors and savers care about the *real* interest rate, which tells them the price paid for the use of money aside from the amount paid to keep up with inflation. However, in the real world neither borrowers nor lenders know what the future inflation rate will be when they make a deal, so actual loan contracts specify a nominal interest rate rather than a real interest rate. For this reason, and because it facilitates comparisons between

The **loanable funds market** is a hypothetical market that illustrates the market outcome of the demand for funds generated by borrowers and the supply of funds provided by lenders.

The **rate of return** on a project is the profit earned on the project expressed as a percentage of its cost.

the money market and the loanable funds market, the figures in this section are drawn with the vertical axis measuring the *nominal interest rate for a given expected future inflation rate.* As long as the expected inflation rate is unchanged, changes in the nominal interest rate also lead to changes in the real interest rate. We take up the influence of inflation later in this module.

We should also note at this point that there are, in reality, many different kinds of nominal interest rates because there are many different kinds of loans—short-term loans, long-term loans, loans made to corporate borrowers, loans made to governments, and so on. In the interest of simplicity, we'll ignore those differences and assume that there is only one type of loan. Figure 29.1 illustrates the hypothetical demand for loanable funds. On the horizontal axis we show the quantity of loanable funds demanded. On the vertical axis we show the interest rate, which is the "price" of borrowing. To see why the demand curve for loanable funds, *D,* slopes downward, imagine that there are many businesses, each of which has one potential investment project. How does a given business decide whether or not to borrow money to finance its project? The decision depends on the interest rate the business faces and the **rate of return** on its project—the profit earned on the project expressed as a percentage of its cost. This can be expressed in a formula as:

$$\textbf{(29-1)}\quad \text{Rate of return} = \frac{\text{Revenue from project} - \text{Cost of project}}{\text{Cost of project}} \times 100$$

A business will want a loan when the rate of return on its project is greater than or equal to the interest rate. So, for example, at an interest rate of 12%, only businesses with projects that yield a rate of return greater than or equal to 12% will want a loan. The demand curve in Figure 29.1 shows that if the interest rate is 12%, businesses will want to borrow $150 billion (point *A*); if the interest rate is only 4%, businesses will want to borrow a larger amount, $450 billion (point *B*). That's a consequence of our assumption that the demand curve slopes downward: the lower the interest rate, the larger the total quantity of loanable funds demanded. Why do we make that assumption? Because, in reality, the number of potential investment projects that yield at least 4% is always greater than the number that yield at least 12%.

figure 29.1

The Demand for Loanable Funds

The demand curve for loanable funds slopes downward: the lower the interest rate, the greater the quantity of loanable funds demanded. Here, reducing the interest rate from 12% to 4% increases the quantity of loanable funds demanded from $150 billion to $450 billion.

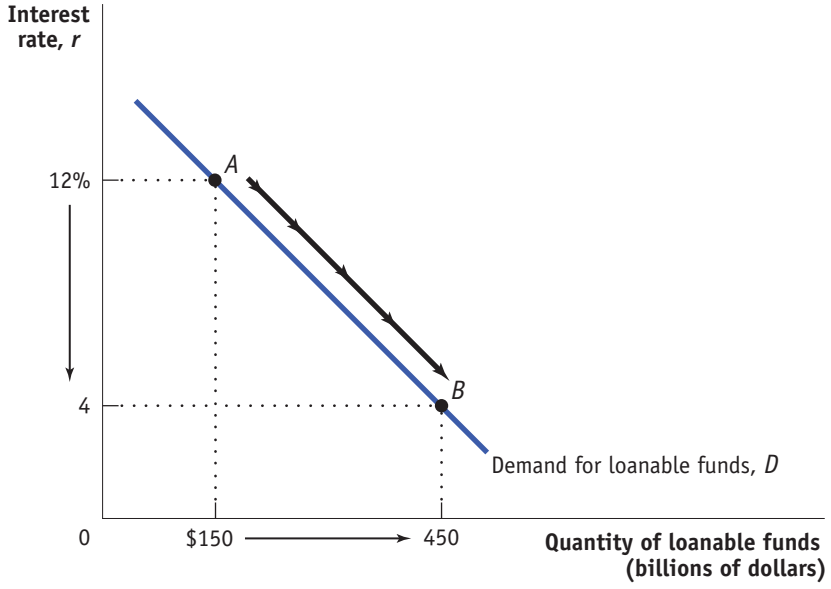


figure 29.2

The Supply of Loanable Funds

The supply curve for loanable funds slopes upward: the higher the interest rate, the greater the quantity of loanable funds supplied. Here, increasing the interest rate from 4% to 12% increases the quantity of loanable funds supplied from $150 billion to $450 billion.

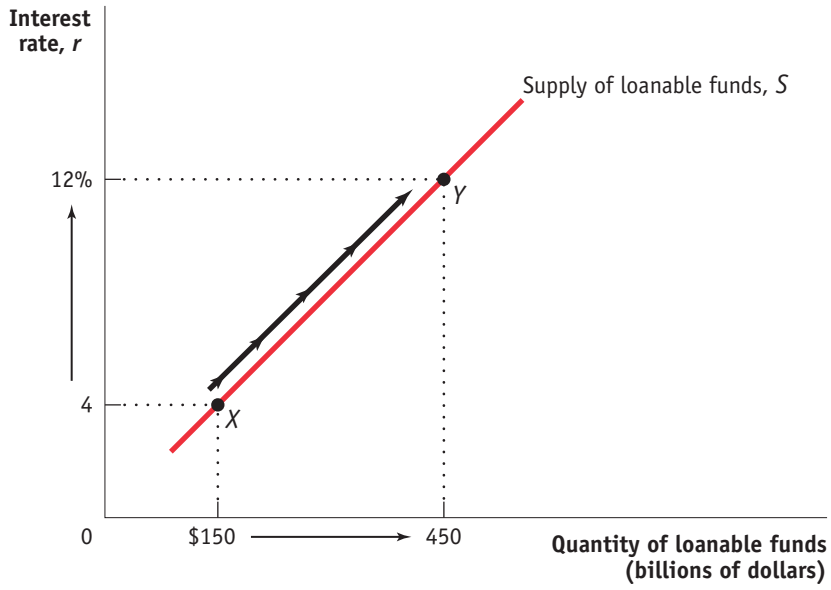


Figure 29.2 shows the hypothetical supply of loanable funds. Again, the interest rate plays the same role that the price plays in ordinary supply and demand analysis. Savers incur an opportunity cost when they lend to a business; the funds could instead be spent on consumption—say, a nice vacation. Whether a given individual becomes a lender by making funds available to borrowers depends on the interest rate received in return. By saving your money today and earning interest on it, you are rewarded with higher consumption in the future when your loan is repaid with interest. So it is a good assumption that more people are willing to forgo current consumption and make a loan when the interest rate is higher. As a result, our hypothetical supply curve of loanable funds slopes upward. In Figure 29.2, lenders will supply $150 billion to the loanable funds market at an interest rate of 4% (point *X*); if the interest rate rises to 12%, the quantity of loanable funds supplied will rise to $450 billion (point *Y*).

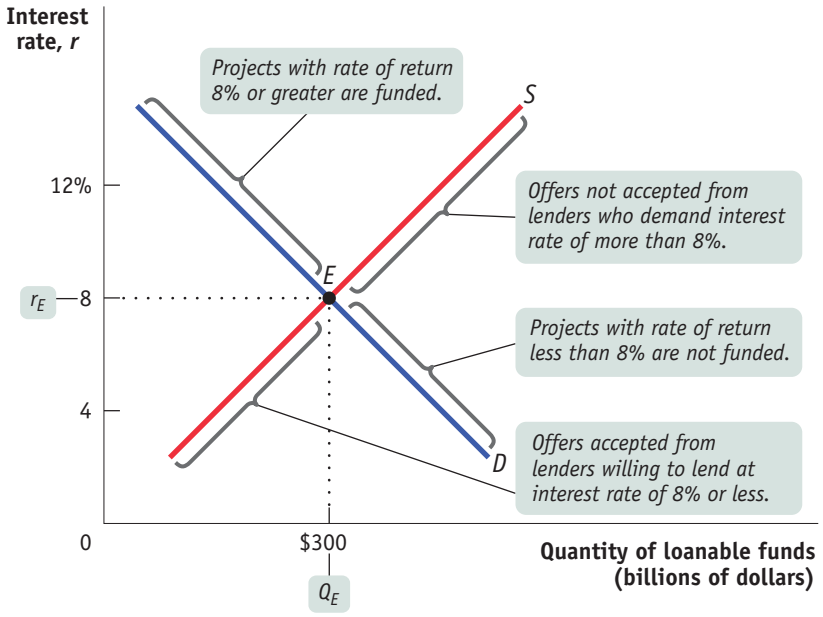
The equilibrium interest rate is the interest rate at which the quantity of loanable funds supplied equals the quantity of loanable funds demanded. As you can see in Figure 29.3 on the next page, the equilibrium interest rate, r_E, and the total quantity of lending, Q_E, are determined by the intersection of the supply and demand curves, at point *E*. Here, the equilibrium interest rate is 8%, at which $300 billion is lent and borrowed. Investment spending projects with a rate of return of 8% or more are funded; projects with a rate of return of less than 8% are not. Correspondingly, only lenders who are willing to accept an interest rate of 8% or less will have their offers to lend funds accepted.

Figure 29.3 shows how the market for loanable funds matches up desired savings with desired investment spending: in equilibrium, the quantity of funds that savers want to lend is equal to the quantity of funds that firms want to borrow. The figure also shows that this match-up is efficient, in two senses. First, the right investments get made: the investment spending projects that are actually financed have higher rates of return than those that do not get financed. Second, the right people do the saving: the potential savers who actually lend funds are willing to lend for lower interest rates than those who do not. The insight that the loanable funds market leads to an efficient use of savings, although drawn from a highly simplified model, has important implications for real life. As we'll see shortly, it is the reason that a well-functioning financial system increases an economy's long-run economic growth rate.

figure 29.3

Equilibrium in the Loanable Funds Market

At the equilibrium interest rate, the quantity of loanable funds supplied equals the quantity of loanable funds demanded. Here, the equilibrium interest rate is 8%, with $300 billion of funds lent and borrowed. Investment spending projects with a rate of return of 8% or higher receive funding; those with a lower rate of return do not. Lenders who demand an interest rate of 8% or lower have their offers of loans accepted; those who demand a higher interest rate do not.



Before we get to that, however, let's look at how the market for loanable funds responds to shifts of demand and supply.

Shifts of the Demand for Loanable Funds The equilibrium interest rate changes when there are shifts of the demand curve for loanable funds, the supply curve for loanable funds, or both. Let's start by looking at the causes and effects of changes in demand.

The factors that can cause the demand curve for loanable funds to shift include the following:

- *Changes in perceived business opportunities:* A change in beliefs about the rate of return on investment spending can increase or reduce the amount of desired spending at any given interest rate. For example, during the 1990s there was great excitement over the business possibilities created by the Internet, which had just begun to be widely used. As a result, businesses rushed to buy computer equipment, put fiber-optic cables in the ground, and so on. This shifted the demand for loanable funds to the right. By 2001, the failure of many dot-com businesses led to disillusionment with technology-related investment; this shifted the demand for loanable funds back to the left.
- *Changes in the government's borrowing:* Governments that run budget deficits are major sources of the demand for loanable funds. As a result, changes in the budget deficit can shift the demand curve for loanable funds. For example, between 2000 and 2003, as the U.S. federal government went from a budget surplus to a budget deficit, net federal borrowing went from *minus* $189 billion—that is, in 2000 the federal government was actually providing loanable funds to the market because it was paying off some of its debt—to *plus* $416 billion because in 2003 the government had to borrow large sums to pay its bills. This change in the federal budget position had the effect, other things equal, of shifting the demand curve for loanable funds to the right.

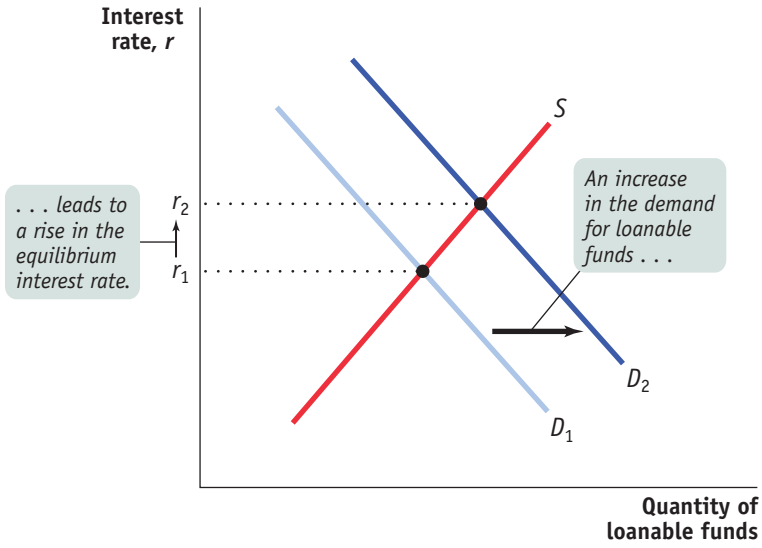

Brand-X Pictures

Figure 29.4 shows the effects of an increase in the demand for loanable funds. S is the supply of loanable funds, and D_1 is the initial demand curve. The initial equilibrium interest rate is r_1. An increase in the demand for loanable funds means that the quantity of funds demanded rises at any given interest rate, so the demand curve shifts rightward to D_2. As a result, the equilibrium interest rate rises to r_2.

figure 29.4

An Increase in the Demand for Loanable Funds

If the quantity of funds demanded by borrowers rises at any given interest rate, the demand for loanable funds shifts rightward from D_1 to D_2. As a result, the equilibrium interest rate rises from r_1 to r_2.



The fact that an increase in the demand for loanable funds leads, other things equal, to a rise in the interest rate has one especially important implication: beyond concern about repayment, there are other reasons to be wary of government budget deficits. As we've already seen, an increase in the government's deficit shifts the demand curve for loanable funds to the right, which leads to a higher interest rate. If the interest rate rises, businesses will cut back on their investment spending. So a rise in the government budget deficit tends to reduce overall investment spending. Economists call the negative effect of government budget deficits on investment spending **crowding out.** The threat of crowding out is a key source of concern about persistent budget deficits.

Crowding out occurs when a government deficit drives up the interest rate and leads to reduced investment spending.

Shifts of the Supply of Loanable Funds

Like the demand for loanable funds, the supply of loanable funds can shift. Among the factors that can cause the supply of loanable funds to shift are the following:

- *Changes in private savings behavior:* A number of factors can cause the level of private savings to change at any given rate of interest. For example, between 2000 and 2006 rising home prices in the United States made many homeowners feel richer, making them willing to spend more and save less. This had the effect of shifting the supply of loanable funds to the left. The drop in home prices between 2006 and 2009 had the opposite effect, shifting the supply of loanable funds to the right.
- *Changes in capital inflows:* Capital flows into a country can change as investors' perceptions of that country change. For example, Argentina experienced large capital inflows during much of the 1990s because international investors believed that economic reforms early in the decade had made it a safe place to put their funds. By the late 1990s, however, there were signs of economic trouble, and investors lost confidence, causing the inflow of funds to dry up. As we've already seen, the United States has received large capital inflows in recent years, with much of the money coming from China and the Middle East. Those inflows helped fuel a big increase in residential investment spending—newly constructed homes—from 2003 to 2006. As a result of the worldwide slump, those inflows began to trail off in 2008.


Photodisc

figure 29.5

An Increase in the Supply of Loanable Funds

If the quantity of funds supplied by lenders rises at any given interest rate, the supply of loanable funds shifts rightward from S_1 to S_2. As a result, the equilibrium interest rate falls from r_1 to r_2.

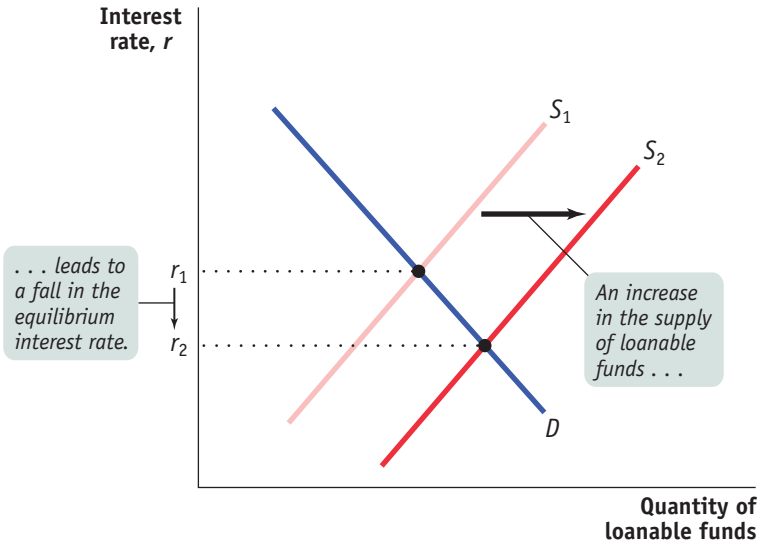


Figure 29.5 shows the effects of an increase in the supply of loanable funds. D is the demand for loanable funds, and S_1 is the initial supply curve. The initial equilibrium interest rate is r_1. An increase in the supply of loanable funds means that the quantity of funds supplied rises at any given interest rate, so the supply curve shifts rightward to S_2. As a result, the equilibrium interest rate falls to r_2.

Inflation and Interest Rates Anything that shifts either the supply of loanable funds curve or the demand for loanable funds curve changes the interest rate. Historically, major changes in interest rates have been driven by many factors, including changes in government policy and technological innovations that created new investment opportunities. However, arguably the most important factor affecting interest rates over time—the reason, for example, why interest rates today are much lower than they were in the late 1970s and early 1980s—is changing expectations about future inflation, which shift both the supply and the demand for loanable funds.

To understand the effect of expected inflation on interest rates, recall our discussion in Module 14 of the way inflation creates winners and losers—for example, the way that high U.S. inflation in the 1970s and 1980s reduced the real value of homeowners' mortgages, which was good for the homeowners but bad for the banks. We know that economists capture the effect of inflation on borrowers and lenders by distinguishing between the *nominal interest rate* and the *real interest rate,* where the distinction is as follows:

$$\text{Real interest rate} = \text{Nominal interest rate} - \text{Inflation rate}$$

The true cost of borrowing is the real interest rate, not the nominal interest rate. To see why, suppose a firm borrows $10,000 for one year at a 10% nominal interest rate. At the end of the year, it must repay $11,000—the amount borrowed plus the interest. But suppose that over the course of the year the average level of prices increases by 10%, so that the real interest rate is zero. Then the $11,000 repayment has the same purchasing power as the original $10,000 loan. In effect, the borrower has received a zero-interest loan.

Similarly, the true payoff to lending is the real interest rate, not the nominal rate. Suppose that a bank makes a $10,000 loan for one year at a 10% nominal interest rate. At the end of the year, the bank receives an $11,000 repayment. But if the average level

of prices rises by 10% per year, the purchasing power of the money the bank gets back is no more than that of the money it lent out. In effect, the bank has made a zero-interest loan.

The expectations of borrowers and lenders about future inflation rates are normally based on recent experience. In the late 1970s, after a decade of high inflation, borrowers and lenders expected future inflation to be high. By the late 1990s, after a decade of fairly low inflation, borrowers and lenders expected future inflation to be low. And these changing expectations about future inflation had a strong effect on the nominal interest rate, largely explaining why interest rates were much lower in the early years of the twenty-first century than they were in the early 1980s.

Let's look at how changes in the expected future rate of inflation are reflected in the loanable funds model.

In Figure 29.6, the curves S_0 and D_0 show the supply and demand for loanable funds given that the expected future rate of inflation is 0%. In that case, equilibrium is at E_0 and the equilibrium nominal interest rate is 4%. Because expected future inflation is 0%, the equilibrium expected real interest rate over the life of the loan, the real interest rate expected by borrowers and lenders when the loan is contracted, is also 4%.

Now suppose that the expected future inflation rate rises to 10%. The demand curve for funds shifts upward to D_{10}: borrowers are now willing to borrow as much at a nominal interest rate of 14% as they were previously willing to borrow at 4%. That's because with a 10% inflation rate, a 14% nominal interest rate corresponds to a 4% real interest rate. Similarly, the supply curve of funds shifts upward to S_{10}: lenders require a nominal interest rate of 14% to persuade them to lend as much as they would previously have lent at 4%. The new equilibrium is at E_{10}: the result of an expected future inflation rate of 10% is that the equilibrium nominal interest rate rises from 4% to 14%.

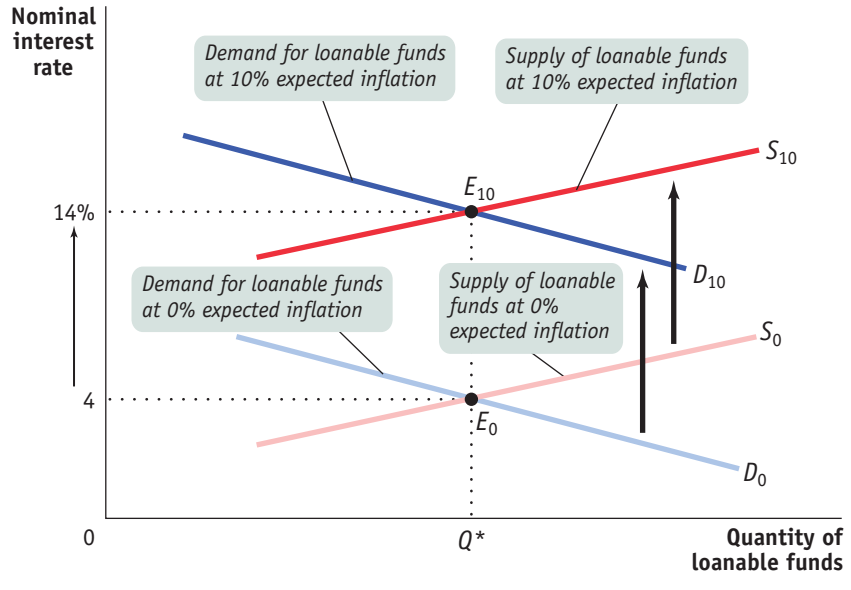
This situation can be summarized as a general principle, known as the **Fisher effect** (after the American economist Irving Fisher, who proposed it in 1930): *the expected real interest rate is unaffected by the change in expected future inflation.* According to the Fisher effect, an increase in expected future inflation drives up nominal interest rates, where each additional percentage point of expected future inflation drives up the nominal interest rate by 1 percentage point. The central point is that both lenders and borrowers

According to the **Fisher effect,** an increase in expected future inflation drives up the nominal interest rate, leaving the expected real interest rate unchanged.

figure 29.6

The Fisher Effect

D_0 and S_0 are the demand and supply curves for loanable funds when the expected future inflation rate is 0%. At an expected inflation rate of 0%, the equilibrium nominal interest rate is 4%. An increase in expected future inflation pushes both the demand and supply curves upward by 1 percentage point for every percentage point increase in expected future inflation. D_{10} and S_{10} are the demand and supply curves for loanable funds when the expected future inflation rate is 10%. The 10 percentage point increase in expected future inflation raises the equilibrium nominal interest rate to 14%. The expected real interest rate remains at 4%, and the equilibrium quantity of loanable funds also remains unchanged.



base their decisions on the expected real interest rate. As long as the level of inflation is expected, it does not affect the equilibrium quantity of loanable funds or the expected real interest rate; all it affects is the equilibrium nominal interest rate.

Reconciling the Two Interest Rate Models

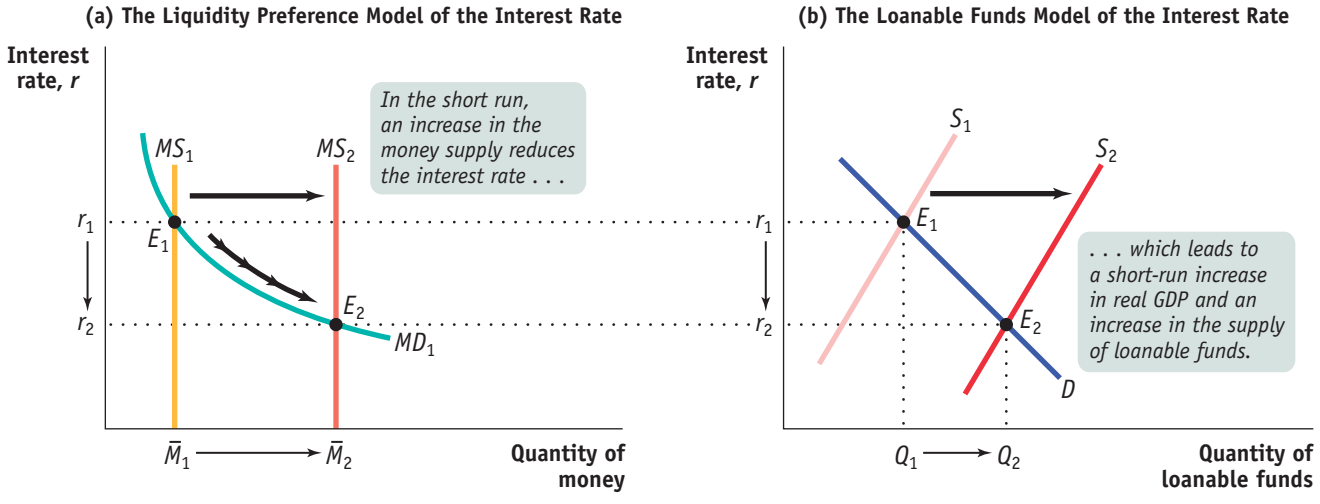
In Module 28 we developed what is known as the liquidity preference model of the interest rate. In that model, the equilibrium interest rate is the rate at which the quantity of money demanded equals the quantity of money supplied. In the loanable funds model, we see that the interest rate matches the quantity of loanable funds supplied by savers with the quantity of loanable funds demanded for investment spending. How do the two compare?

The Interest Rate in the Short Run

As we explained using the liquidity preference model, a fall in the interest rate leads to a rise in investment spending, *I,* which then leads to a rise in both real GDP and consumer spending, *C.* The rise in real GDP doesn't lead only to a rise in consumer spending, however. It also leads to a rise in savings: at each stage of the multiplier process, part of the increase in disposable income is saved. How much do savings rise? According to the *savings–investment spending identity,* total savings in the economy is always equal to investment spending. This tells us that when a fall in the interest rate leads to higher investment spending, the resulting increase in real GDP generates exactly enough additional savings to match the rise in investment spending. To put it another way, after a fall in the interest rate, the quantity of savings supplied rises exactly enough to match the quantity of savings demanded.

Figure 29.7 shows how our two models of the interest rate are reconciled in the short run by the links among changes in the interest rate, changes in real GDP, and

figure 29.7 The Short-run Determination of the Interest Rate



Panel (a) shows the liquidity preference model of the interest rate: the equilibrium interest rate matches the money supply to the quantity of money demanded. In the short run, the interest rate is determined in the money market, where an increase in the money supply, from $\overline{M}_1$ to $\overline{M}_2$, pushes the equilibrium interest rate down, from r_1 to r_2. Panel (b) shows the loanable funds model of the interest rate. The fall in the interest rate in the money market leads, through the multiplier effect, to an increase in real GDP and savings; to a rightward shift of the supply curve of loanable funds, from S_1 to S_2; and to a fall in the interest rate, from r_1 to r_2. As a result, the new equilibrium interest rate in the loanable funds market matches the new equilibrium interest rate in the money market at r_2.

changes in savings. Panel (a) represents the liquidity preference model of the interest rate. MS_1 and MD_1 are the initial supply and demand curves for money. According to the liquidity preference model, the equilibrium interest rate in the economy is the rate at which the quantity of money supplied is equal to the quantity of money demanded in the money market. Panel (b) represents the loanable funds model of the interest rate. S_1 is the initial supply curve and D is the demand curve for loanable funds. According to the loanable funds model, the equilibrium interest rate in the economy is the rate at which the quantity of loanable funds supplied is equal to the quantity of loanable funds demanded in the market for loanable funds.

In Figure 29.7 both the money market and the market for loanable funds are initially in equilibrium at E_1 with the same interest rate, r_1. You might think that this would happen only by accident, but in fact it will always be true. To see why, let's look at what happens when the Fed increases the money supply from $\overline{M}_1$ to $\overline{M}_2$. This pushes the money supply curve rightward to MS_2, causing the equilibrium interest rate in the market for money to fall to r_2, and the economy moves to a short-run equilibrium at E_2. What happens in panel (b), in the market for loanable funds? In the short run, the fall in the interest rate due to the increase in the money supply leads to a rise in real GDP, which generates a rise in savings through the multiplier process. This rise in savings shifts the supply curve for loanable funds rightward, from S_1 to S_2, moving the equilibrium in the loanable funds market from E_1 to E_2 and also reducing the equilibrium interest rate in the loanable funds market. And we know that savings rise by exactly enough to match the rise in investment spending. This tells us that the equilibrium rate in the loanable funds market falls to r_2, the same as the new equilibrium interest rate in the money market.

In the short run, then, the supply and demand for money determine the interest rate, and the loanable funds market follows the lead of the money market. When a change in the supply of money leads to a change in the interest rate, the resulting change in real GDP causes the supply of loanable funds to change as well. As a result, the equilibrium interest rate in the loanable funds market is the same as the equilibrium interest rate in the money market.

Notice our use of the phrase "in the short run." Changes in aggregate demand affect aggregate output only in the short run. In the long run, aggregate output is equal to potential output. So our story about how a fall in the interest rate leads to a rise in aggregate output, which leads to a rise in savings, applies only to the short run. In the long run, as we'll see next, the determination of the interest rate is quite different because the roles of the two markets are reversed. In the long run, the loanable funds market determines the equilibrium interest rate, and it is the market for money that follows the lead of the loanable funds market.

The Interest Rate in the Long Run

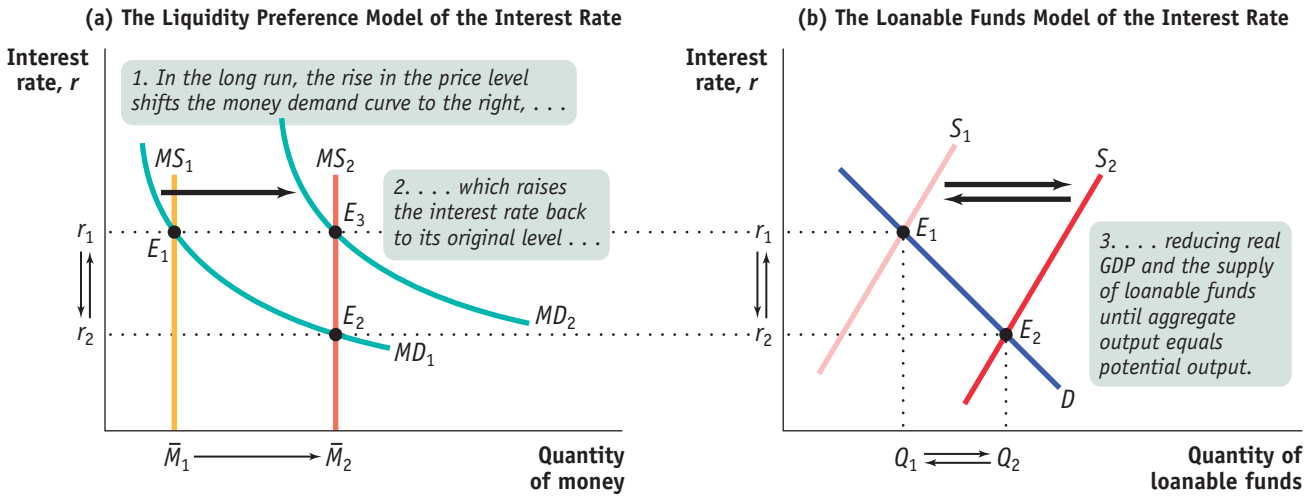
In the short run an increase in the money supply leads to a fall in the interest rate, and a decrease in the money supply leads to a rise in the interest rate. In the long run, however, changes in the money supply don't affect the interest rate.

Figure 29.8 on the next page shows why. As in Figure 29.7, panel (a) shows the liquidity preference model of the interest rate and panel (b) shows the supply and demand for loanable funds. We assume that in both panels the economy is initially at E_1, in long-run macroeconomic equilibrium at potential output with the money supply equal to $\overline{M}_1$. The demand curve for loanable funds is D, and the initial supply curve for loanable funds is S_1. The initial equilibrium interest rate in both markets is r_1.

Now suppose the money supply rises from $\overline{M}_1$ to $\overline{M}_2$. As we saw in Figure 29.7, this initially reduces the interest rate to r_2. However, in the long run the aggregate price level will rise by the same proportion as the increase in the money supply (due to the *neutrality of money,* a topic presented in detail in the next section). A rise in the aggregate price level increases money demand in the same proportion. So in the long run the money demand curve shifts out to MD_2, and the equilibrium interest rate rises back to its original level, r_1.

Panel (b) of Figure 29.8 shows what happens in the market for loanable funds. We saw earlier that an increase in the money supply leads to a short-run rise in real GDP and that

figure 29.8 The Long-run Determination of the Interest Rate



Panel (a) shows the liquidity preference model long-run adjustment to an increase in the money supply from $\bar{M}_1$ to $\bar{M}_2$; panel (b) shows the corresponding long-run adjustment in the loanable funds market. As we discussed in Figure 29.7, the increase in the money supply reduces the interest rate from r_1 to r_2, increases real GDP, and increases savings in the short run. This is shown in panel (a) and panel (b) as the movement from E_1 to E_2. In the long run, however, the increase in the money supply raises wages and other nominal prices; this shifts the money demand curve in panel (a) from MD_1 to MD_2, leading to an increase in the interest rate from r_1 to r_2 as the economy moves from E_2 to E_3. The rise in the interest rate causes a fall in real GDP and a fall in savings, shifting the loanable funds supply curve back to S_1 from S_2 and moving the loanable funds market from E_2 back to E_1. In the long run, the equilibrium interest rate is the rate that matches the supply and demand for loanable funds when real GDP equals potential output.

this shifts the supply of loanable funds rightward from S_1 to S_2. In the long run, however, real GDP falls back to its original level as wages and other nominal prices rise. As a result, the supply of loanable funds, S, which initially shifted from S_1 to S_2, shifts back to S_1.

In the long run, then, changes in the money supply do not affect the interest rate. So what determines the interest rate in the long run—that is, what determines r_1 in Figure 29.8? The answer is the supply and demand for loanable funds. More specifically, in the long run the equilibrium interest rate is the rate that matches the supply of loanable funds with the demand for loanable funds when real GDP equals potential output.

Module 29 AP Review

Solutions appear at the back of the book.

Check Your Understanding

1. Use a diagram of the loanable funds market to illustrate the effect of the following events on the equilibrium interest rate and quantity of loanable funds.
   a. An economy is opened to international movements of capital, and a capital inflow occurs.
   b. Retired people generally save less than working people at any interest rate. The proportion of retired people in the population goes up.
2. Explain what is wrong with the following statement: "Savings and investment spending may not be equal in the economy as a whole in equilibrium because when the interest rate rises, households will want to save more money than businesses will want to invest."
3. Suppose that expected inflation rises from 3% to 6%.
   a. How will the real interest rate be affected by this change?
   b. How will the nominal interest rate be affected by this change?
   c. What will happen to the equilibrium quantity of loanable funds?

Tackle the Test: Multiple-Choice Questions

1. A business will decide whether or not to borrow money to finance a project based on a comparison of the interest rate with the _____ from its project.
   a. expected revenue
   b. profit
   c. rate of return
   d. cost generated
   e. demand generated
2. The real interest rate equals the
   a. nominal interest rate plus the inflation rate.
   b. nominal interest rate minus the inflation rate.
   c. nominal interest rate divided by the inflation rate.
   d. nominal interest rate times the inflation rate.
   e. federal funds rate.
3. Which of the following will increase the demand for loanable funds?
   a. a federal government budget surplus
   b. an increase in perceived business opportunities
   c. a decrease in the interest rate
   d. positive capital inflows
   e. decreased private saving rates
4. Which of the following will increase the supply of loanable funds?
   a. an increase in perceived business opportunities
   b. decreased government borrowing
   c. an increased private saving rate
   d. an increase in the expected inflation rate
   e. a decrease in capital inflows
5. Both lenders and borrowers base their decisions on
   a. expected real interest rates.
   b. expected nominal interest rates.
   c. real interest rates.
   d. nominal interest rates.
   e. Nominal interest rates minus real interest rates.

Tackle the Test: Free-Response Questions

1. Draw a correctly labeled graph showing equilibrium in the loanable funds market.

Answer (6 points)

1 point: Vertical axis labeled "Interest rate" or "*r*"

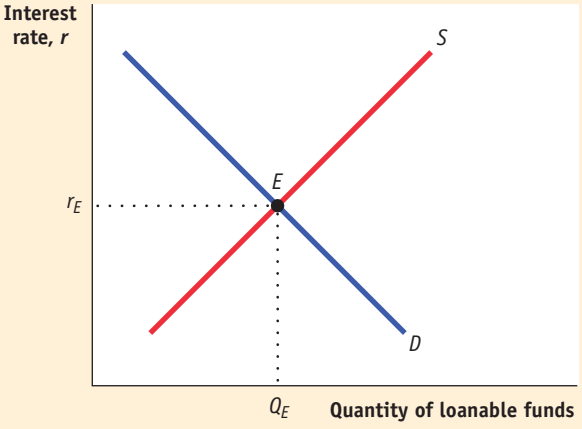
1 point: Horizontal axis labeled "Quantity of loanable funds"

1 point: Downward sloping demand curve for loanable funds (labeled)

1 point: Upward sloping supply curve for loanable funds (labeled)

1 point: Equilibrium quantity of loanable funds shown on horizontal axis below where curves intersect

1 point: Equilibrium interest rate shown on vertical axis across from where curves intersect



2. Does each of the following affect either the supply or the demand for loanable funds, and if so, does the affected curve increase (shift to the right) or decrease (shift to the left)?
   a. There is an increase in capital inflows into the economy.
   b. Businesses are pessimistic about future business conditions.
   c. The government increases borrowing.
   d. The private savings rate decreases.

Section 5 Review

Summary

1. Investment in physical capital is necessary for long-run economic growth. So in order for an economy to grow, it must channel savings into investment spending.
2. According to the **savings–investment spending identity,** savings and investment spending are always equal for the economy as a whole. The government is a source of savings when it runs a positive **budget balance,** also known as a **budget surplus;** it is a source of dissavings when it runs a negative budget balance, also known as a **budget deficit.** In a closed economy, savings is equal to **national savings,** the sum of private savings plus the budget balance. In an open economy, savings is equal to national savings plus **capital inflow** of foreign savings. When a capital outflow, or negative capital inflow, occurs, some portion of national savings is funding investment spending in other countries.
3. Households invest their current savings or **wealth**—their accumulated savings—by purchasing assets. Assets come in the form of either a **financial asset,** a paper claim that entitles the buyer to future income from the seller, or a **physical asset,** a claim on a tangible object that gives the owner the right to dispose of it as desired. A financial asset is also a **liability** from the point of view of its seller. There are four main types of financial assets: loans, bonds, stocks, and **bank deposits.** Each of them serves a different purpose in addressing the three fundamental tasks of a financial system: reducing **transaction costs**—the cost of making a deal; reducing **financial risk**—uncertainty about future outcomes that involves financial gains and losses; and providing **liquid** assets—assets that can be quickly converted into cash without much loss of value (in contrast to **illiquid** assets, which are not easily converted).
4. Although many small and moderate-size borrowers use bank **loans** to fund investment spending, larger companies typically issue bonds. Bonds with a higher risk of **default** must typically pay a higher interest rate. Business owners reduce their risk by selling stock. Although stocks usually generate a higher return than bonds, investors typically wish to reduce their risk by engaging in **diversification,** owning a wide range of assets whose returns are based on unrelated, or independent, events. Most people are risk-averse, viewing the loss of a given amount of money as a significant hardship but viewing the gain of an equal amount of money as a much less significant benefit. **Loan-backed securities,** a recent innovation, are assets created by pooling individual loans and selling shares of that pool to investors. Because they are more diversified and more liquid than individual loans, trading on financial markets like bonds, they are preferred by investors. It can be difficult, however, to assess their quality.
5. **Financial intermediaries**—institutions such as **mutual funds, pension funds, life insurance companies,** and **banks**—are critical components of the financial system. Mutual funds and pension funds allow small investors to diversify and life insurance companies allow families to reduce risk.
6. A bank allows individuals to hold liquid bank deposits that are then used to finance illiquid loans. Banks can perform this mismatch because on average only a small fraction of depositors withdraw their savings at any one time. Banks are a key ingredient in long-run economic growth.
7. **Money** is any asset that can easily be used to purchase goods and services. **Currency in circulation** and **checkable bank deposits** are both considered part of the **money supply.** Money plays three roles: it is a **medium of exchange** used for transactions, a **store of value** that holds purchasing power over time, and a **unit of account** in which prices are stated.
8. Over time, **commodity money,** which consists of goods possessing value aside from their role as money, such as gold and silver coins, was replaced by **commodity-backed money,** such as paper currency backed by gold. Today the dollar is pure **fiat money,** whose value derives solely from its official role.
9. The Federal Reserve calculates two measures of the money supply. M1 is the narrowest **monetary aggregate;** it contains only currency in circulation, traveler's checks, and checkable bank deposits. M2 includes a wider range of assets called **near-moneys,** mainly other forms of bank deposits, that can easily be converted into checkable bank deposits.
10. In order to evaluate a project in which costs or benefits are realized in the future, you must first transform them into their **present values** using the **interest rate,** r. The present value of $1 realized one year from now is $\$1/(1+r)$, the amount of money you must lend out today to have $1 one year from now. Once this transformation is done, you should choose the project with the highest **net present value.**
11. Banks allow depositors immediate access to their funds, but they also lend out most of the funds deposited in their care. To meet demands for cash, they maintain **bank reserves** composed of both currency held in vaults and deposits at the Federal Reserve. The **reserve ratio** is the ratio of bank reserves to bank deposits. A **T-account** summarizes a bank's financial position, with loans and reserves counted as assets, and deposits counted as liabilities.

12. Banks have sometimes been subject to **bank runs,** most notably in the early 1930s. To avert this danger, depositors are now protected by **deposit insurance,** bank owners face capital requirements that reduce the incentive to make overly risky loans with depositors' funds, and banks must satisfy **reserve requirements,** a legally mandated **required reserve ratio.**
13. When currency is deposited in a bank, it starts a multiplier process in which banks lend out **excess reserves,** leading to an increase in the money supply—so banks create money. If the entire money supply consisted of checkable bank deposits, the money supply would be equal to the value of reserves divided by the reserve ratio. In reality, much of the **monetary base** consists of currency in circulation, and the **money multiplier** is the ratio of the money supply to the monetary base.
14. In response to the Panic of 1907, the Fed was created to centralize holding of reserves, inspect banks' books, and make the money supply sufficiently responsive to varying economic conditions.
15. The Great Depression sparked widespread bank runs in the early 1930s, which greatly worsened and lengthened the depth of the Depression. Federal deposit insurance was created, and the government recapitalized banks by lending to them and by buying shares of banks. By 1933, banks had been separated into two categories: **commercial** (covered by deposit insurance) and **investment** (not covered). Public acceptance of deposit insurance finally stopped the bank runs of the Great Depression.
16. The **savings and loan (thrift)** crisis of the 1980s arose because insufficiently regulated S&Ls engaged in overly risky speculation and incurred huge losses. Depositors in failed S&Ls were compensated with taxpayer funds because they were covered by deposit insurance. However, the crisis caused steep losses in the financial and real estate sectors, resulting in a recession in the early 1990s.
17. During the mid-1990s, the hedge fund LTCM used huge amounts of **leverage** to speculate in global financial markets, incurred massive losses, and collapsed. LTCM was so large that, in selling assets to cover its losses, it caused **balance sheet effects** for firms around the world, leading to the prospect of a **vicious cycle of deleveraging.** As a result, credit markets around the world froze. The New York Fed coordinated a private bailout of LTCM and revived world credit markets.
18. **Subprime lending** during the U.S. housing bubble of the mid-2000s spread through the financial system via **securitization.** When the bubble burst, massive losses by banks and nonbank financial institutions led to widespread collapse in the financial system. To prevent another Great Depression, the Fed and the U.S. Treasury expanded lending to bank and nonbank institutions, provided capital through the purchase of bank shares, and purchased private debt. Because much of the crisis originated in nontraditional bank institutions, the crisis of 2008 raised the question of whether a wider safety net and broader regulation were needed in the financial sector.
19. The monetary base is controlled by the Federal Reserve, the **central bank** of the United States. The Fed regulates banks and sets reserve requirements. To meet those requirements, banks borrow and lend reserves in the **federal funds market** at the **federal funds rate.** Through the **discount window** facility, banks can borrow from the Fed at the **discount rate.**
20. **Open-market operations** by the Fed are the principal tool of monetary policy: the Fed can increase or reduce the monetary base by buying U.S. Treasury bills from banks or selling U.S. Treasury bills to banks.
21. The **money demand curve** arises from a trade-off between the opportunity cost of holding money and the liquidity that money provides. The opportunity cost of holding money depends on **short-term interest rates,** not **long-term interest rates.** Changes in the aggregate price level, real GDP, technology, and institutions shift the money demand curve.
22. According to the **liquidity preference model of the interest rate,** the interest rate is determined in the money market by the money demand curve and the **money supply curve.** The Federal Reserve can change the interest rate in the short run by shifting the money supply curve. In practice, the Fed uses open-market operations to achieve a target federal funds rate, which other short-term interest rates generally follow.
23. The hypothetical **loanable funds market** shows how loans from savers are allocated among borrowers with investment spending projects. In equilibrium, only those projects with a **rate of return** greater than or equal to the equilibrium interest rate will be funded. By showing how gains from trade between lenders and borrowers are maximized, the loanable funds market shows why a well-functioning financial system leads to greater long-run economic growth. Government budget deficits can raise the interest rate and can lead to **crowding out** of investment spending. Changes in perceived business opportunities and in government borrowing shift the demand curve for loanable funds; changes in private savings and capital inflows shift the supply curve.
24. Because neither borrowers nor lenders can know the future inflation rate, loans specify a nominal interest rate rather than a real interest rate. For a given expected future inflation rate, shifts of the demand and supply curves of loanable funds result in changes in the underlying real interest rate, leading to changes in the nominal interest rate. According to the **Fisher effect,** an increase in expected future inflation raises the nominal interest rate one-to-one so that the expected real interest rate remains unchanged.

Key Terms

Interest rate, p. 222
Savings–investment spending identity, p. 222
Budget surplus, p. 223
Budget deficit, p. 223
Budget balance, p. 223
National savings, p. 223
Capital inflow, p. 223
Wealth, p. 224
Financial asset, p. 224
Physical asset, p. 224
Liability, p. 224
Transaction costs, p. 225
Financial risk, p. 225
Diversification, p. 225
Liquid, p. 226
Illiquid, p. 226
Loan, p. 226
Default, p. 226
Loan-backed securities, p. 227
Financial intermediary, p. 227
Mutual fund, p. 228
Pension fund, p. 228
Life insurance company, p. 228
Bank deposit, p. 229
Bank, p. 229
Money, p. 231
Currency in circulation, p. 231
Checkable bank deposits, p. 231
Money supply, p. 231
Medium of exchange, p. 232
Store of value, p. 232
Unit of account, p. 233
Commodity money, p. 233
Commodity-backed money, p. 234
Fiat money, p. 234
Monetary aggregate, p. 234
Near-moneys, p. 235
Present value, p. 239
Net present value, p. 240
Bank reserves, p. 243
T-account, p. 243
Reserve ratio, p. 244
Required reserve ratio, p. 244
Bank run, p. 246
Deposit insurance, p. 246
Reserve requirements, p. 246
Discount window, p. 246
Excess reserves, p. 249
Monetary base, p. 249
Money multiplier, p. 250
Central bank, p. 253
Commercial bank, p. 257
Investment bank, p. 257
Savings and loan (thrift), p. 257
Leverage, p. 258
Balance sheet effect, p. 258
Vicious cycle of deleveraging, p. 258
Subprime lending, p. 259
Securitization, p. 259
Federal funds market, p. 263
Federal funds rate, p. 263
Discount rate, p. 263
Open-market operation, p. 264
Short-term interest rates, p. 269
Long-term interest rates, p. 270
Money demand curve, p. 270
Liquidity preference model of the interest rate, p. 273
Money supply curve, p. 273
Loanable funds market, p. 277
Rate of return, p. 278
Crowding out, p. 281
Fisher effect, p. 283

Problems

1. Given the following information about the closed economy of Brittania, what is the level of investment spending and private savings, and what is the budget balance? What is the relationship among investment spending, private savings, and the budget balance? Is national savings equal to investment spending? There are no government transfers.

GDP = $1,000 million T = $50 million
C = $850 million G = $100 million

2. Which of the following are examples of investment spending, investing in financial assets, or investing in physical assets?

a. Rupert Moneybucks buys 100 shares of existing Coca-Cola stock.

b. Rhonda Moviestar spends $10 million to buy a mansion built in the 1970s.

c. Ronald Basketballstar spends $10 million to build a new mansion with a view of the Pacific Ocean.

d. Rawlings builds a new plant to make catcher's mitts.

e. Russia buys $100 million in U.S. government bonds.

3. Explain how a well-functioning financial system increases savings and investment spending, holding the budget balance and any capital flows fixed.

4. What are the important types of financial intermediaries in the U.S. economy? What are the primary assets of these intermediaries, and how do they facilitate investment spending and saving?

5. For each of the following transactions, what is the initial effect (increase or decrease) on M1? or M2?

a. You sell a few shares of stock and put the proceeds into your savings account.

b. You sell a few shares of stock and put the proceeds into your checking account.

c. You transfer money from your savings account to your checking account.

d. You discover $0.25 under the floor mat in your car and deposit it in your checking account.

e. You discover $0.25 under the floor mat in your car and deposit it in your savings account.

6. There are three types of money: commodity money, commodity-backed money, and fiat money. Which type of money is used in each of the following situations?

a. Bottles of rum were used to pay for goods in colonial Australia.

b. Salt was used in many European countries as a medium of exchange.

c. For a brief time, Germany used paper money (the "Rye Mark") that could be redeemed for a certain amount of rye, a type of grain.

d. The town of Ithaca, New York, prints its own currency, Ithaca HOURS, which can be used to purchase local goods and services.

7. Indicate whether each of the following is part of M1, M2, or neither:

a. $95 on your campus meal card

b. $0.55 in the change cup of your car

c. $1,663 in your savings account

d. $459 in your checking account

e. 100 shares of stock worth $4,000

f. a $1,000 line of credit on your Sears credit card

8. You have won the state lottery. There are two ways in which you can receive your prize. You can either have $1 million in cash now, or you can have $1.2 million that is paid out as follows: $300,000 now, $300,000 in one year's time, $300,000 in two years' time, and $300,000 in three years' time. The interest rate is 20%. How would you prefer to receive your prize?

9. The drug company Pfizer is considering whether to invest in the development of a new cancer drug. Development will require an initial investment of $10 million now; beginning one year from now, the drug will generate annual profits of $4 million for three years.

a. If the interest rate is 12%, should Pfizer invest in the development of the new drug? Why or why not?

b. If the interest rate is 8%, should Pfizer invest in the development of the new drug? Why or why not?

10. Tracy Williams deposits $500 that was in her sock drawer into a checking account at the local bank.

a. How does the deposit initially change the T-account of the local bank? How does it change the money supply?

b. If the bank maintains a reserve ratio of 10%, how will it respond to the new deposit?

c. If every time the bank makes a loan, the loan results in a new checkable bank deposit in a different bank equal to the amount of the loan, by how much could the total money supply in the economy expand in response to Tracy's initial cash deposit of $500?

d. If every time the bank makes a loan, the loan results in a new checkable bank deposit in a different bank equal to the amount of the loan and the bank maintains a reserve ratio of 5%, by how much could the money supply expand in response to an initial cash deposit of $500?

11. Ryan Cozzens withdraws $400 from his checking account at the local bank and keeps it in his wallet.

a. How will the withdrawal change the T-account of the local bank and the money supply?

b. If the bank maintains a reserve ratio of 10%, how will the bank respond to the withdrawal? Assume that the bank responds to insufficient reserves by reducing the amount of deposits it holds until its level of reserves satisfies its required reserve ratio. The bank reduces its deposits by calling in some of its loans, forcing borrowers to pay back these loans by taking cash from their checking deposits (at the same bank) to make repayment.

c. If every time the bank decreases its loans, checkable bank deposits fall by the amount of the loan, by how much will the money supply in the economy contract in response to Ryan's withdrawal of $400?

d. If every time the bank decreases its loans, checkable bank deposits fall by the amount of the loan and the bank maintains a reserve ratio of 20%, by how much will the money supply contract in response to a withdrawal of $400?

12. In Westlandia, the public holds 50% of M1 in the form of currency, and the required reserve ratio is 20%. Estimate how much the money supply will increase in response to a new cash deposit of $500 by completing the accompanying table. (*Hint:* The first row shows that the bank must hold $100 in minimum reserves—20% of the $500 deposit—against this deposit, leaving $400 in excess reserves that can be loaned out. However, since the public wants to hold 50% of the loan in currency, only $400 × 0.5 = $200 of the loan will be deposited in round 2 from the loan granted in round 1.) How does your answer compare to an economy in which the total amount of the loan is deposited in the banking system and the public doesn't hold any of the loan in currency? What does this imply about the relationship between the public's desire for holding currency and the money multiplier?

Round	Deposits	Required reserves	Excess reserves	Loans	Held as currency
1	$500.00	$100.00	$400.00	$400.00	$200.00
2	200.00	?	?	?	?
3	?	?	?	?	?
4	?	?	?	?	?
5	?	?	?	?	?
6	?	?	?	?	?
7	?	?	?	?	?
8	?	?	?	?	?
9	?	?	?	?	?
10	?	?	?	?	?
Total after 10 rounds	?	?	?	?	?

13. What will happen to the money supply under the following circumstances in a checkable-deposits-only system?

a. The required reserve ratio is 25%, and a depositor withdraws $700 from his checkable bank deposit.

b. The required reserve ratio is 5%, and a depositor withdraws $700 from his checkable bank deposit.

c. The required reserve ratio is 20%, and a customer deposits $750 to her checkable bank deposit.

d. The required reserve ratio is 10%, and a customer deposits $600 to her checkable bank deposit.

14. Although the U.S. Federal Reserve doesn't use changes in reserve requirements to manage the money supply, the central bank of Albernia does. The commercial banks of Albernia have $100 million in reserves and $1,000 million in checkable deposits; the initial required reserve ratio is 10%. The commercial banks follow a policy of holding no excess reserves. The public holds no currency, only checkable deposits in the banking system.

a. How will the money supply change if the required reserve ratio falls to 5%?

b. How will the money supply change if the required reserve ratio rises to 25%?

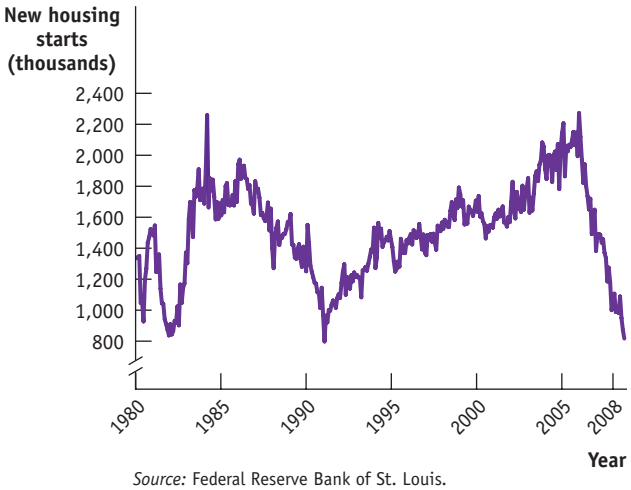
15. Using Figure 26.1 find the Federal Reserve district in which you live. Go to http://www.federalreserve.gov/bios/pres.htm, and click on your district to identify the president of the Federal Reserve Bank in your district. Go to http://www.federalreserve.gov/fomc/ and determine if the president of the Fed is currently a voting member of the Federal Open Market Committee (FOMC).

16. The Congressional Research Service estimates that at least $45 million of counterfeit U.S. $100 notes produced by the North Korean government are in circulation.

a. Why do U.S. taxpayers lose because of North Korea's counterfeiting?

b. As of September 2008, the interest rate earned on one-year U.S. Treasury bills was 2.2%. At a 2.2% rate of interest, what is the amount of money U.S. taxpayers are losing per year because of these $45 million in counterfeit notes?

17. The accompanying figure shows new U.S. housing starts, in thousands of units per month, between January 1980 and September 2008. The graph shows a large drop in new housing starts in 1984–1991 and 2006–2008. New housing starts are related to the availability of mortgages.



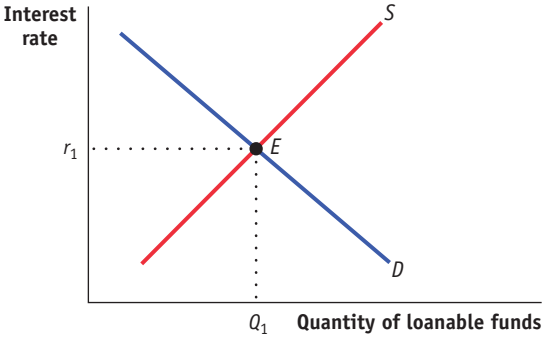
Source: Federal Reserve Bank of St. Louis.

a. What caused the drop in new housing starts in 1984–1991?

b. What caused the drop in new housing starts in 2006–2008?

c. How could better regulation of financial institutions have prevented these two occurrences?

18. Use the market for loanable funds shown in the accompanying diagram to explain what happens to private savings, private investment spending, and the rate of interest if the following events occur. Assume that there are no capital inflows or outflows.

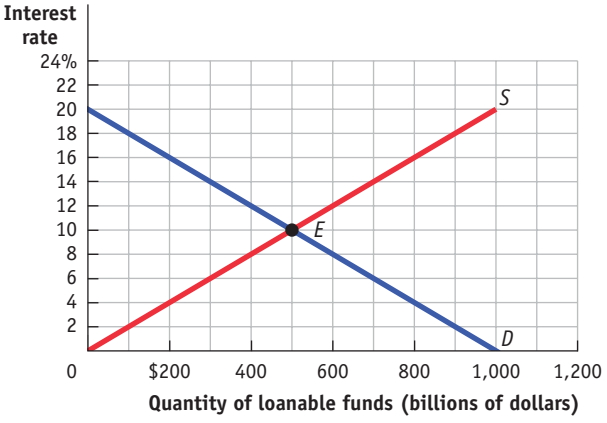


a. The government reduces the size of its deficit to zero.

b. At any given interest rate, consumers decide to save more. Assume the budget balance is zero.

c. At any given interest rate, businesses become very optimistic about the future profitability of investment spending. Assume the budget balance is zero.

19. The government is running a budget balance of zero when it decides to increase education spending by $200 billion and finance the spending by selling bonds. The accompanying diagram shows the market for loanable funds before the government sells the bonds. Assume that there are no capital inflows or outflows. How will the equilibrium interest rate and the equilibrium quantity of loanable funds change? Is there any crowding out in the market?



20. In 2006, Congress estimated that the cost of the Iraq War was approximately $100 billion a year. Since the U.S. government was running a budget deficit at the time, assume that the war was financed by government borrowing, which increases the demand for loanable funds without affecting supply. This question considers the likely effect of this government expenditure on the interest rate.

a. Draw typical demand (D_1) and supply (S_1) curves for loanable funds without the cost of the war accounted for. Label the vertical axis "Interest rate" and the horizontal axis "Quantity of loanable funds." Label

the equilibrium point (E_1) and the equilibrium interest rate (r_1).

b. Now consider a new diagram with the cost of the war included in the analysis. Shift the demand curve in the appropriate direction. Label the new equilibrium point (E_2) and the new equilibrium interest rate (r_2).

c. How does the equilibrium interest rate change in response to government expenditure on the war? Explain.

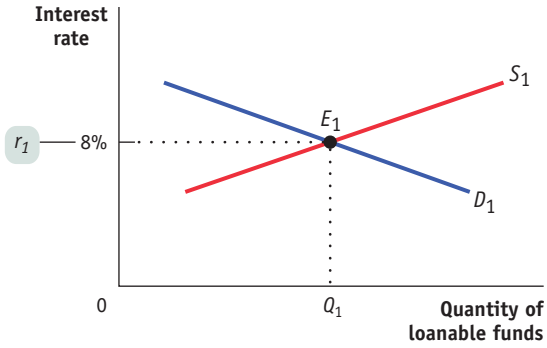
21. How would you respond to a friend who claims that the government should eliminate all purchases that are financed by borrowing because such borrowing crowds out private investment spending?

22. Boris Borrower and Lynn Lender agree that Lynn will lend Boris $10,000 and that Boris will repay the $10,000 with interest in one year. They agree to a nominal interest rate of 8%, reflecting a real interest rate of 3% on the loan and a commonly shared expected inflation rate of 5% over the next year.

a. If the inflation rate is actually 4% over the next year, how does that lower-than-expected inflation rate affect Boris and Lynn? Who is better off?

b. If the actual inflation rate is 7% over the next year, how does that affect Boris and Lynn? Who is better off?

23. Using the accompanying diagram, explain what will happen to the market for loanable funds when there is a fall of 2 percentage points in the expected future inflation rate. How will the change in the expected future inflation rate affect the equilibrium quantity of loanable funds?



24. Using a figure similar to Figure 29.7, explain how the money market and the loanable funds market react to a reduction in the money supply in the short run.

25. Contrast the short-run effects of an increase in the money supply on the interest rate to the long-run effects of an increase in the money supply on the interest rate. Which market determines the interest rate in the short run? Which market does so in the long run? What are the implications of your answers for the effectiveness of monetary policy in influencing real GDP in the short run and the long run?