CHAPTER 5

The Federal Reserve and the Money Supply

Chapter Objectives

By the end of this chapter you should be able to:

1. Describe the structure of the Federal Reserve System
2. Know the primary responsibilities of the Federal Reserve
3. Appreciate why and how the Federal Reserve is independent of political pressure
4. Explain what money is
5. Describe how money is created and how banks participate in money expansion
6. Use the loanable funds theory to analyze how interest rates affect the money supply

Although the typical business or individual may never deal directly with the Federal Reserve or enter the lobby of one of its branches, it is the single most important and influential financial institution in the nation. The Federal Reserve is responsible for the stability of our economy, the security of our banks, and the creditworthiness of our government. In this chapter we will focus on the Federal Reserve's role in the determination of the money supply and its control over the state of the economy. Investors, businesses, and the government all carefully follow the actions of the Federal Reserve because it has such a significant impact on all aspects of the economic environment. For example, in December 1996 and again in February 1997, the Federal Reserve chairman touched off a major selling frenzy in the stock market with a casual comment in a speech about "irrational exuberance" by investors.

The Federal Reserve suffered several setbacks before becoming the powerful institution it now is. A precursor to the Federal Reserve was the First Bank, established in 1791. Unfortunately, because of fraud and

favoritism, Congress did not renew its charter when it expired in 1811. The Second Bank was chartered in 1816, but its charter was also not renewed when it expired after 20 years. Congress did not make another attempt at establishing a central bank until 1913, when it chartered the current Federal Reserve Bank (the Fed).

RESPONSIBILITIES OF THE FEDERAL RESERVE

A **central bank** is very important to the stability of the economy and health of the financial system. The **Federal Reserve Bank** of the United States (usually called just **the Fed)** has four primary responsibilities.

- *Supervising and regulating commercial banks:* The Fed shares regulatory responsibility over commercial banks with various other agencies. It also regulates bank holding companies and supervises state-chartered banks.
- *Serving the banking industry:* The Fed is the **banker's bank.** It facilitates the transfer of checks between commercial banks, provides wire services, replaces worn bills, and even provides loans to nationally chartered banks. The Fed holds and maintains accounts for national banks. These services are critical to the smooth operation of the industry.
- *Holding the U.S. Treasury checking account:* The U.S. government uses the Fed as its bank. The government writes checks, makes deposits, and otherwise does its banking using the New York branch of the Federal Reserve.
- *Implement monetary policy:* **Monetary policy** involves adjusting the level of the money supply in a way that stimulates or slows the economy. Monetary policy influences the economy through changes in interest rates.

The Fed's control over monetary policy is its most important function. When the Fed increases the amount of money in the economy, interest rates fall. This makes sense if you think of money as any other commodity, where the interest rate is the price of money. As with any commodity, when the supply increases, the price falls. So when the supply of money increases, interest rates fall.

Falling interest rates tend to stimulate the economy. Low rates make it cheaper for firms to borrow money, which increases investment in new plants, equipment, and other factors of production. This expansion by business increases the number of jobs, lowers unemployment, and otherwise increases economic activity. We can summarize this sequence of events symbolically as follows:

$$\uparrow \text{Money supply} \Rightarrow \downarrow \text{Interest rates} \Rightarrow \uparrow \text{Investment} \Rightarrow \uparrow \text{Employment} \Rightarrow \uparrow \text{Economic activity}$$

Similarly, if the Fed believes that the economy is overheated and that inflation is likely, it can slow the economy by reducing the money supply. A reduced money supply increases interest rates, which makes borrowing more expensive and slows corporate investing. This sequence of events can be summarized as follows:

$$\downarrow \text{Money supply} \Rightarrow \uparrow \text{Interest rates} \Rightarrow \downarrow \text{Investment} \Rightarrow \downarrow \text{Employment} \Rightarrow \downarrow \text{Economic activity}$$

The Fed has several mechanisms for controlling the money supply. These include:

- Open market operations
- Adjusting the discount rate
- Adjusting the reserve requirement

The most important of these mechanisms are* open market operations, *which are the buying and selling of government securities. The Fed can increase the money supply by buying government securities. When the Fed buys securities, it makes a deposit in a bank's account at the Fed in exchange for the securities. This deposit is now available to the bank for lending to its customers. The Fed can reduce the money supply by selling securities. When securities are sold, the Fed takes funds out of the bank's account at the Fed. This reduces the amount of funds banks have available to lend. By buying and selling government securities, the Fed respectively raises or lowers the amount that banks have available for lending. As we will learn later in this chapter, changes in the amount banks have available for lending ultimately results in changes in the money supply. These changes in the money supply, in turn, result in changes in interest rates.

The difficulty in controlling the economy with monetary policy is that there is a substantial delay between when a change in the money supply is made and when the economy reacts. This means that the Fed must project what changes the economy needs well in advance. This is a little like trying to drive a car when there is a 60-second delay between movement of the steering wheel and any change in the car's direction. It is generally agreed that it takes between 6 months and a year for changes in the money supply to affect the economy. Predicting what the economy needs up to a year in advance is tricky work. When the Fed makes a mistake it can be serious, because the economy can enter a recession or become overstimulated and have high inflation.

In addition to open market operations, the Fed has two methods for controlling the supply of money. One is to adjust the **discount rate,** the interest rate charged by the Fed when banks borrow money. In theory, if it costs more for banks to borrow money, they will charge higher rates on loans. This will slow investment spending by businesses and cool the economy. In truth, commercial banks seldom go to the Fed to borrow money. The money markets are sufficiently deep to provide all the funds banks require. The main purpose of the Fed changing the discount rate is to signal investors its intentions for future short-term interest rates.

The final tool available to the Fed is its authority to change **reserve requirements.** Every bank and S&L is required to set aside a portion of each deposit in its vault or in an account at the Fed. This reserve ensures that banks have sufficient liquidity to meet unexpected demand for cash from their depositors. As we will see later in this chapter, the reserve is also needed to control the growth of the money supply. We will return to our discussion of using changes in the reserve requirement to control the money supply after we learn how money is created. Table 5.1 shows the reserve requirement as it stood in November 2000.

TABLE 5.1 Reserve Requirements of Depository Institutions

Type of Deposit	Reserve Requirement	Effective Date
$0 million–$44.3 million	3%	12/30/99
More than $44.3 million	10	12/30/99
Nonpersonal time deposits	0	12/27/90
Eurocurrency liabilities	0	12/27/90

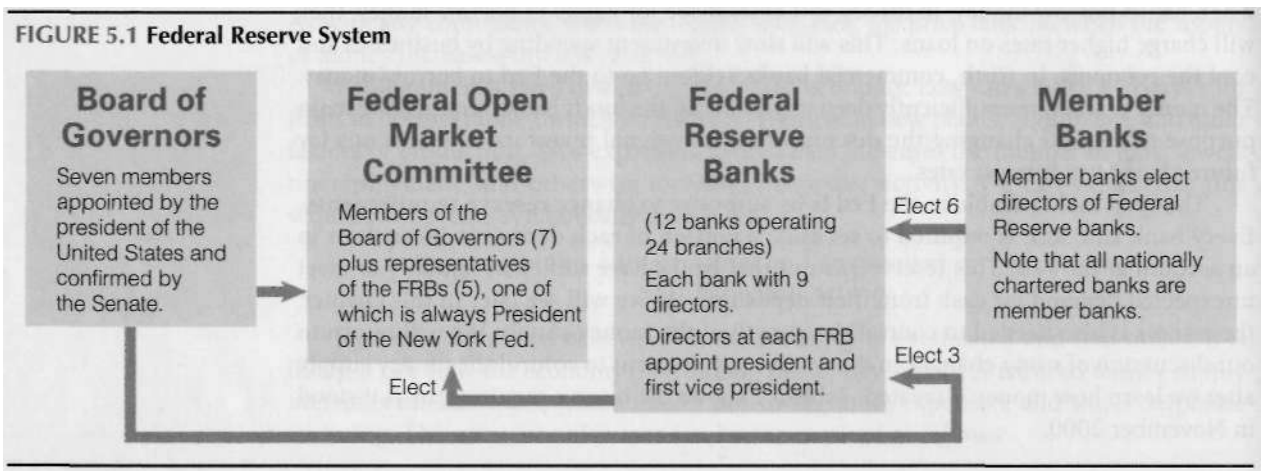
Source: Federal Reserve Bulletin, November 2000, table 1.15. See also http://www.ny.frb.org/pihome/fedpoint/fed45.html for more information on reserves.

The Fed has focused on various targets over the years while trying to control the economy. For example, between 1951 and 1965 the Fed set interest rate targets. When this failed to work well, it began targeting total reserves (1966-1970). Later, it focused on the monetary base (1971-1982) and more recently on various measures of the money supply. The Fed balances the benefits of low unemployment with the harm caused by high inflation. As investors gain confidence in the Fed's ability to avoid inflation, long-term interest rates continue to fall.

ORGANIZATION OF THE FED

Figure 5.1 shows the structure of the Federal Reserve System. Nationally chartered banks are required to be members of the Federal Reserve System. Each **member bank** subscribes to stock in the Fed and receives a fixed 6% dividend on the investment. The governing body of the Federal Reserve System is the Board of Governors. The Board of Governors and the chairman are appointed by the president of the United States and confirmed by the Senate. Each of the 12 district Federal Reserve Banks is supervised by its own board of directors consisting of nine members. Six are elected by the member banks of the district, and three are appointed by the Board of Governors. The 12 district banks are spread across the country, where they can facilitate check clearing and supply commercial banks with

FIGURE 5.1 Federal Reserve System



currency. There are a total of 24 branch banks that help serve commercial banks. Figure 5.2 shows the location of the 12 Federal Reserve Districts and the District Banks.

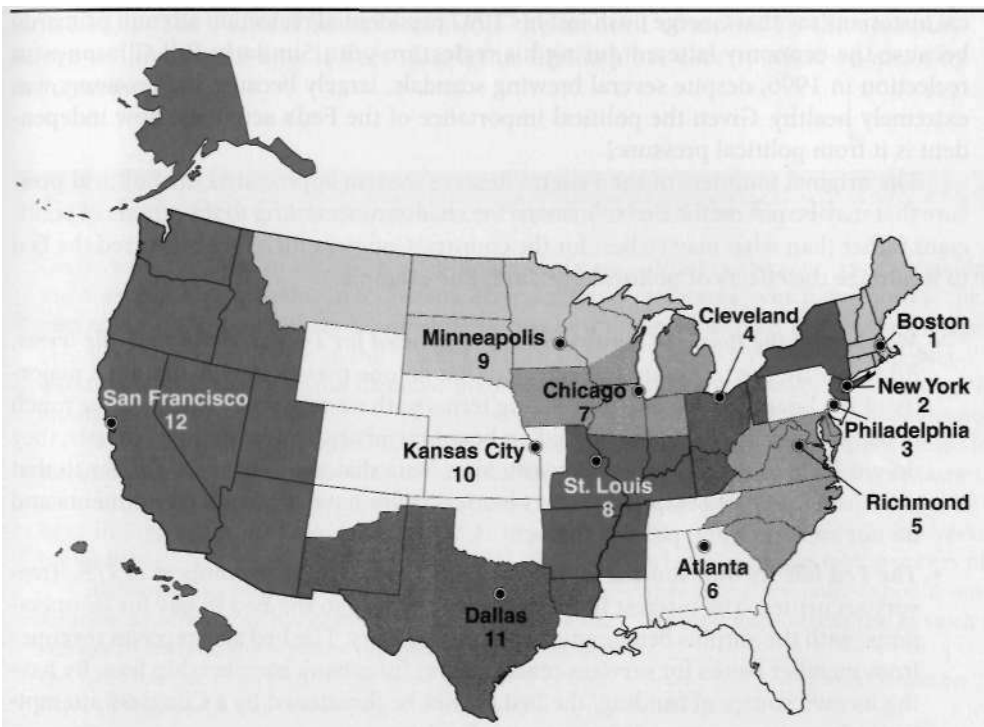
The seven members of the Board of Governors and five representatives from the Federal Reserve Banks form the **Federal Open Market Committee (FOMC),** which decides what action the Fed needs to take to keep the economy healthy. The president of the N.Y. Fed is always one of the five Fed members. This committee meets about every 6 weeks. Immediately following the meeting, the FOMC issues a press release that discusses in a brief and obscure way what the committee decided. Box 5.1 contains a copy of a typical press release. The full minutes of each meeting are released just following the next scheduled meeting, hence about 6 weeks after the meeting.

Before we investigate further how the Fed controls the economy, let us first review how it is able to take politically unpopular positions.

Self-Test Review Questions*

1. What is the function of the Open Market Committee?
2. Who appoints the chairman of the Board of Governors?
3. What are member banks?

* 1. To establish monetary policy, which is how the economy is to be controlled by changing the money supply;
2. The president of the United States.
3. All nationally chartered banks and other commercial banks that choose to join the Federal Reserve System.



Source: http://www.federalreserve.us/otherfrb.htm

FIGURE 5.2
The 12 Federal Reserve Districts

Box 5.1 Federal Reserve Press Release, November 15, 2000

For Immediate Release

The Federal Open Market Committee at its meeting today decided to maintain the existing stance of monetary policy, keeping its target for the federal funds rate at 6½ percent.

The utilization of the pool of available workers remains at an unusually high level, and the increase in energy prices, though having limited effect on core measures of prices to date, still harbors the possibility of raising inflation expectations. The Committee, accordingly, continues to see a risk of heightened inflation pressures. However, softening in business and household demand and tightening conditions in financial markets over recent months suggest that the economy could expand for a time at a pace below the productivity-enhanced rate of growth of its potential to produce.

Nonetheless, to date the easing of demand pressures has not been sufficient to warrant a change in the Committee's judgment that against the background of its long-run goals of price stability and sustainable economic growth and of the information currently available, the risks continue to be weighted mainly toward conditions that may generate heightened inflation pressures in the foreseeable future.

Source: www.federalreserve.gov/BoardDocs/Press/General/2000/20001115/DEFAULT.HTM.

FED'S POLITICAL INDEPENDENCE

Consider the control the Fed has over the economy. It can reduce unemployment, increase inflation, and otherwise dramatically influence the state of the economy. Clearly, politicians are very concerned with the activities of the Fed. For example, many political historians say that George Bush lost his 1992 presidential reelection attempt primarily because the economy faltered during his reelection year. Similarly, Bill Clinton won reelection in 1996, despite several brewing scandals, largely because the economy was extremely healthy. Given the political importance of the Fed's activities, how independent is it from political pressure?

The original founders of the Federal Reserve System appreciated the political pressure that may be put on the Fed to manage the economy according to the whims of politicians rather than what may be best for the country. Congress therefore organized the Fed to minimize the effects of political pressure. For example:

- ***Members of the Board of Governors are appointed for 14-year nonrenewable terms.*** Additionally, the terms are staggered so that no one president will appoint a majority of the board during one term. Long terms with no reappointment remove much of the pressure that could be placed on board members. Unlike elected officials, they do not have to answer to any constituency. Note that the concept is similar to that used for appointing Supreme Court justices, who have lifetime appointments and do not answer to any political power.
- ***The Fed has its own sources of income.*** The Fed holds large numbers of U.S. Treasury securities. The interest from the securities goes to the Fed to pay for its operations, with the surplus being returned to the Treasury. The Fed also receives revenues from member banks for services rendered and from bank membership fees. By having its own source of funding, the Fed cannot be threatened by a Congress attempting to force its own agenda by reducing funding.

The independence of the Fed allows it to pursue hard, politically unpopular monetary policies. For example, in the early 1980s, in an effort to reduce inflation, the Fed increased short-term interest rates to nearly 15%. This caused double-digit unemployment and a great deal of human suffering. On the other hand, it effectively reduced inflation to a level that has been maintained ever since. Most economists agree that the long-term benefits to the economy far outweigh the short-term hardship the Fed caused. It is unlikely that the Fed could have raised interest rates as high and for as long as was needed if it was not politically independent.

Congress often raises the issue of whether it is appropriate that officials who have never been elected by the public should have as much power as is entrusted to the governors of the Fed. Congress gave the Fed the independence to make the hard decisions needed to keep the economy healthy. As long as it does an effective job, this is unlikely to change. However, if Congress feels that the Fed is abusing its freedom, changes can be made. The influence that the Fed and, specifically, the Federal Reserve chairman hold over the markets is highlighted in Box 5.2.

The primary reason we are interested in the Federal Reserve in this course is that it has control over the money supply and through this control it influences the level of interest rates. Figure 5.3 shows the money growth rate and interest rates on the same graph. Although the money growth rate appears more volatile, interest rates and money clearly tend to move together. When the money growth rate rose between 1950 and 1980, the interest rate on long-term bonds rose as well. In the late 1980s and into the 1990s, the growth rate in the money supply fell, as did the interest rate on long-term bonds. The Federal Reserve controls the amount of money in the economy. Before we investigate how it does this, let us first explore exactly what we mean by the term *money.*

Box 5.2 Fed Chairman's Voice Heard Around the World

On December 5, 1996, in a scholarly after-dinner lecture to the American Enterprise Institute, Federal Reserve Chairman Alan Greenspan proved once again why he may be the second most powerful man in the country. With a single question, Greenspan sent the financial markets reeling around the world.

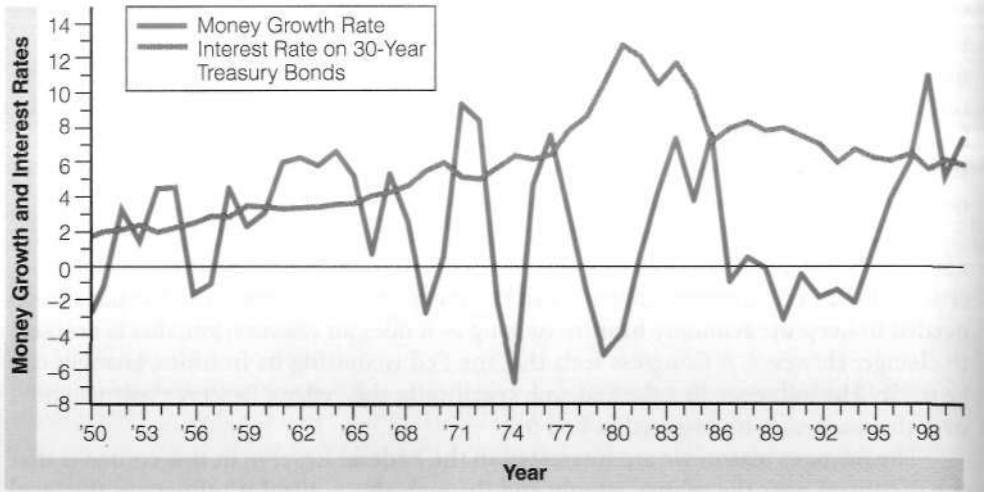
"How do we know when irrational exuberance has unduly inflated asset values, which then become subject to unexpected and prolonged contractions, as they have in Japan over the past decade?" Greenspan asked his audience.

Although Greenspan did not answer his own question, as soon as reports of his comments flashed across the screens of traders, stock prices tumbled as they absorbed the fact that the chairman of the most powerful central bank in the world was wondering out loud about "irrational exuberance" in stock and bond markets. The Tokyo exchange, which was open at the time of the speech, suffered its biggest 1-day loss of the year and stock markets from Sydney to London began falling as well. The next day the Dow Jones Industrial Average fell 140 points during the first hour of trading (although it recovered all but 55 points by the time the exchange closed for the day).

The Fed chairman can cause the market to rise as well. In March 1997, the Dow Jones Industrial Average rose 93.13 points, or 1.36%, its largest increase in over a year, when Greenspan told members of a House subcommittee that monetary policy should not be used as a means of stemming the recent rise in stock prices.

Source: Wall Street Journal, December 7, 1996, p. A4, and March 6, 1997, p. C2.

FIGURE 5.3
Money Growth Rates and Interest Rates for Each Year 1950–2000



Source: Federal Reserve Bulletin, Tables 1.10 and 1.35.

Self-Test Review Questions*

1. Why is it important that the Fed be politically independent?
2. What features make the Fed independent?

WHAT IS MONEY?

Historically, many items have been used as money. Specific types of shells served the purpose on South Pacific islands. Stones and metal also have been used as money at different times in history. Even in the United States, paper and various types of metal have been used as money. At one point gold coins were the predominant form of money, but today they are seldom used in trade.

You probably have some idea about what money is and is not. For example, we all agree that cash and coins are acceptable for paying debts and for buying goods, but consider other methods regularly used to pay for goods and services. Most of us have checking accounts and have found that checks are usually accepted by merchants. This suggests that the balances you hold in your checking account should also be considered money. Money held in savings accounts can be readily accessed and also used to pay for goods. Money, then, is anything that is generally acceptable in payment of goods and ser-

1. So that it can make politically unpopular decisions about fixing problems with the economy.
2. Long-term nonrenewable terms for governors and independent funding.

vices and for paying debts. For an item to be generally acceptable, the majority of the population must agree that the item has value and be willing to accept it in trade. Additionally, merchants must believe that the money represents a safe way to store wealth. Why will a jeweler agree to give you a diamond ring in exchange for a few small pieces of paper? It is because the population has agreed that these pieces of paper have value beyond their production cost. Why does a population agree that worthless paper currency has real value?

Back in history, people used to carry gold or other valuable goods around with them to meet their transaction needs. Somewhere along the line, a bright banker suggested that his customers leave the gold with the bank for safe keeping. The bank issued transferable receipts for the gold. In other words, the bank would give the gold to anyone who presented the receipt to the bank. Because the bank's customers found it much more convenient to use the receipts than to use gold, which was heavy and required weighing whenever used in trade, gold receipts became very popular. Everyone was willing to accept them because they knew they could be exchanged for gold at any time. Eventually, the government took over the business of printing the receipts and kept the gold that backed the receipts in Fort Knox. Each paper bill stated on the front that it could be exchanged for gold at a Federal Reserve Bank. Much later, the government dropped the gold standard, and gold receipts were replaced with Federal Reserve notes. The population continued to accept the notes as money because they trusted the government not to print too much. Currently, there is not nearly enough gold in Fort Knox to redeem all of the Federal Reserve notes in circulation. Paper currency continues to have value simply because the population has agreed that it does.

Money serves a number of purposes. It is a medium of exchange, a store of wealth, and a unit of account. Without money, the primary means of transacting business would be by barter, where one good is exchanged for another. Barter economies continue to exist in countries where the currency is not generally accepted as having value, as when a government has printed too much money.

It is clear that one of the important factors that affects the value of money is how much money is in circulation in the economy. Before we discuss the amount of money in the economy, we must define more precisely how the money supply is measured. M-1, the most basic definition of money, is coins and currency in circulation plus balances held in checking accounts at banks (called **demand deposits).** This also includes accounts held in negotiable order of withdrawal (NOW) accounts and in traveler's checks. Recall from Chapter 2 that NOW accounts are interest-bearing checking accounts held at banks. M-1 has been deemphasized in favor of M-2. M-2 is a broader definition of money that includes M-1 plus savings accounts and small-denomination time deposits. M-3 includes M-2 plus large time deposits, repurchase agreements, shares in money market mutual funds held by large corporations and financial institutions, and Eurodollars held by U.S. residents. Table 5.2 summarizes the components of the money supply. Each method of measuring the money supply provides different yet valuable information to those attempting to control it.

TABLE 5.2 Measures of the Monetary Aggregates

	Value as of August 2000 ($ billion)
M1 = Currency	523.1
+ Traveler's checks	9.2
+ Demand deposits	328.5
+ Other checkable deposits	241.2
Total M1	1,102.0
M2 = M1	
+ Savings deposits including MMDAs	1,813.1
+ Small time deposits	1,022.8
+ Money market mutual funds (retail)	890.3
Total M2	4,828.2
M3 = M2	
+ Large time deposits	777.6
+ Money market mutual funds (institutional)	704.9
+ Repurchase agreements	363.3
+ Eurodollars	174.1
Total M3	6,848.1

Source: Federal Reserve Bulletin, September 2000, Table 1.21.

HOW MONEY IS CREATED

Now that we know what money is and how it is measured, let us investigate how it is created. It may surprise you to learn that the amount of money in our economy is actually much more than has been issued by the government. This is because our banking system creates money in the process of making loans. Let us explore how this happens by looking at a very simplified example.

Suppose that First National Bank has the following balance sheet. It has $1,100 in capital, $900 in deposits from customers held in checking accounts (called demand accounts), $1,000 in cash, and $1,000 in government securities.

Initial Balance Sheet of First National Bank

Assets		Liabilities	
Cash	$1,000	Deposits	$900
Gov. securities	1,000	Capital	1,100
Total	$2,000	Total	$2,000

Suppose the Federal Reserve has set the reserve requirement at 10% of deposits. A loan by First National Bank of $910 to Joe Smith leaves $90 in reserves, which is 10% of the $900 deposit on hand. It must keep 10% of the deposits as reserves. Reserves can be in the form of cash held in the bank's vault or as deposits held in the bank's account at the Federal Reserve Bank.

Balance Sheet After Loan to Joe

Assets		Liabilities	
Cash	$90	Deposits	$900
Gov. securities	1,000	Capital	1,100
Loan to Joe Smith	910		
Total	$2,000	Total	$2,000

Suppose that Joe now deposits this loan back into First National. The following balance sheet results. (It does not matter whether Joe makes the deposit back into the same bank or another one. For simplicity we assume a one-bank system.)

Balance Sheet After Joe Deposits Loan Proceeds

Assets		Liabilities	
Cash	$1,000	Demand deposit	$900
Loan to Joe S.	910	Demand deposit to Joe S.	910
Gov. securities	1,000	Capital	1,100
Total	$2,910	Total	$2,910

As a result of the loan to Joe Smith, total deposits have increased by $910. These extra deposits provide the funds to make additional loans. A total of $1,810 is on deposit (the original $900 plus the $910 deposited by Joe Smith). Reserves on this total deposit amount are 10% of $1,810 = $1,810 x 0.10 = $181. With $1,000 in cash in the vault, the bank can still lend an additional $819 ($1,000 - $181 = $819). Now suppose that Mary Cate wants a loan for $819. This is the most that the bank can lend and still maintain a reserve of 10%. If this loan is also redeposited at First National, the following balance sheet results.

Balance Sheet After Second Loan is Made and Deposited

Assets		Liabilities	
Cash	$1,000	Original demand deposits	$900
Loan to Joe S.	910	Demand deposit for Joe S.	910
Loan to Mary Cate	819	Demand deposit for Mary C.	819
Gov. securities	1,000	Capital	1,100
Total	$3,729	Total	$3,729

Notice a few things about what is happening. First, because banks are required to maintain reserve requirements, the amount that can be lent to each subsequent borrower declines. Second, the total amount of demand deposits is increasing. Originally, there was $900 in checking accounts; then, after the loan to Joe Smith, there was $1,810. Now there is a total of $2,629 ($900 + $910 + $819 = $2,629) in checking accounts at First National. Remember how we measured money? The narrowest measure was M-l, which included cash and *demand deposits.* It does not matter whether there is only one bank in

the economy, as in this example, or many different banks. When loans are made, the proceeds are typically deposited into transaction accounts. Aggregate demand accounts across the banking system increase.

Look at the First National balance sheet one more time. There is $2,629 in total demand deposits. The amount of reserves required on the $2,629 in deposits is $262.90 ($2,629 x 0.10 = $262.90). With reserves equal to $1,000, the bank can continue to lend. If we were to extend this example until no excess reserves were available, we would find that the bank can create $10,000 in new money with its initial $1,000 cash. Later we will show an easy way to compute how much the money supply can expand.

What if there were no reserve requirements? ***If banks could lend 100% of deposited funds, then the money supply could increase infinitely. Recall our earlier discussion that money has value only because the population agrees that it does. If the money supply were to increase without restriction, it would stop having value.***

Fed's Role in the Money Supply Process

In the last section we saw how the money supply increases as banks lend and relend funds. Now suppose that the Federal Reserve buys government securities from the First National Bank. In this transaction, First National gives securities to the Fed and the Fed pays for the securities by making a deposit into the bank's account at the Federal Reserve Bank. This deposit can be used to satisfy the bank's reserve requirements, so it is often called a reserve. Reserves are included with the bank's cash balances when computing how much is available for lending. The money expansion process begins again. The process will also occur if the Federal Reserve buys securities from individuals or from businesses. Ultimately, the proceeds from the security sale are put into a bank, where they are lent, and the money supply increases. The following balance sheet for First National shows the effect of the Fed buying the bank's securities and putting the proceeds in the bank's account with the Fed (before any new money has been created as in the examples in the last section). Note that the government securities are gone and reserves have increased.

Balance Sheet Sale of Securities to Fed and Completion of Money Expansion

Assets		Liabilities	
Reserves and cash	$2,000	Original demand deposit	$900
Total loans	10,000	Total new deposits	10,000
		Capital	1,100
Total cash in vault	$12,000	Total liabilities and equity	$12,000

There are now excess reserves available for increased lending. If the Fed were to *sell* securities, total reserves in the banking system would *decrease.* When the Fed sells securities, money is taken out of the bank's account at the Fed and the bank receives securities in exchange. This reduces the amount that bank can lend. The effect of the Fed buying and selling securities on the money supply and interest rates is summarized in Table 5.3.

TABLE 5.3 **Summary of the Effect of the Fed Buying and Selling Securities**

Federal Reserve Action	Effect on Money Supply	Effect on Interest Rates
Fed **buys** securities	Money supply increases	Interest rates fall
Fed **sells** securities	Money supply decreases	Interest rates rise

Exactly how much will the money supply increase given an increase in cash at a bank? We can calculate the increase using the money multiplier.

Money Multiplier

The relationship between the change in the money supply and the change in reserves initiated by the Fed is expressed by the following equation, called the **money multiplier:**

$$\Delta D = \frac{\Delta R}{RR} \tag{5.1}$$

where

ΔD = the maximum possible change in demand deposits that can result from a change in reserves
ΔR = the dollar amount of the change in reserves
RR = the reserve requirement

The money multiplier can be used to compute the theoretical change in the money supply and a change in the reserves.

EXAMPLE 5.1 Change in the Money Supply

Suppose the Fed buys $100 million in bonds from banks and that the reserve requirement is 3%. What is the maximum amount that the money supply could increase from this transaction?

Solution

Plugging the numbers into Equation 5.1 yields

$$\Delta D = \$100{,}000{,}000/0.1 = \$1{,}000{,}000{,}000$$

A $100-million increase in reserves could increase the money supply by $3.3 billion. It is important to note that AD is the *potential* change in the money supply. ***The actual increase in the money supply will be much less than this amount.*** First, not all of the money lent by banks will be redeposited. Some of it will be used as transactional balances held by the individuals receiving the loans. This means that banks will not have the full amount of each loan available to relend. Second, not all of the banks will lend the maximum amount permitted by law. Often, there are not sufficient loan requests for a bank to lend all of its loanable money. Additionally, bank management may be conservative and want to maintain excess cash reserves.

One final point: The expansion of the money supply takes time. Many loans must be made before the full effect of an increase in reserves will be felt. Because it is not

certain exactly how much the money supply will increase, and because it takes many months for a change in reserves to ripple through the economy in the form of new loans, controlling the money supply is clearly a very difficult process.

In this section, we have discussed only one tool the Fed might use to change the money supply: buying and selling securities. In fact, this is the most common method used. Earlier we noted that an alternative method available to the Fed is adjusting the reserve requirement. The problem with this method is that a small change in the reserve requirement has a *tremendous* effect on the money supply because *all loans are affected*, not just new loans. Changing the reserve requirement to adjust the money supply is overkill and is rarely done.

Self-Test Review Questions*

1. What is the most important tool for controlling the money supply?
2. When is the Fed likely to decrease the money supply?
3. If the Fed wants to increase the money supply, will it buy or sell securities?
4. What is the greatest possible change in the money supply that would result from the Fed buying $100 million of government securities if the reserve requirement were 3%?

EXAMPLE 5.2 Federal Reserve and Changes to the Money Supply

Suppose the Fed has determined that the country is about to enter a recession and wants to avert a serious slowdown in the economy. The Fed determines that an increase of $50 billion in the money supply will be about right. How would the Fed go about increasing the money supply by this amount? Assume a 3% reserve requirement.

Solution

The first task is to decide whether the Fed needs to sell or buy securities. Because it wants to increase the money supply, it wants to increase reserves. This is done by buying securities. The second task is to estimate how much in securities the Fed needs to buy. We can solve for this figure by using the money multiplier:

$$\Delta D = \frac{\Delta R}{RR}$$

$$\$50 \text{ billion} = \frac{\Delta R}{0.03}$$

$$\$50 \text{ billion} \times 0.03 = \Delta R$$

$$\Delta R = \$1.5 \text{ billion}$$

If the Fed sells $1.5 billion in securities the money supply could increase by $50 billion. In fact, the Fed would have to sell more than this because not all reserves are used to increase the money supply.

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*1. Open market operations.
2. If inflation is increasing.
3. Buy.
4. $3,333.33 million ($100/0.03 = $3,333.33).

Now that we understand how the Fed controls the money supply, we can examine how changes in the money supply relate to changes in interest rates. One of the simpler yet most useful models for understanding how changes in the money supply influence interest rates is the loanable funds theory of interest rates.

EXTENSION 5.1

Loanable Funds Theory of Interest Rates

The **loanable funds theory** of interest rate determination focuses on the supply and demand for loanable funds. This simple theory ignores many issues that may be addressed in an economics class. However, this simplicity is what makes the theory useful. Once you understand it, you will be able to predict how interest rates will behave without complex models or computer-based estimation techniques. When you read an article in the paper, you will be able to mentally evaluate the topic's effect on interest rates. Whether you are investing on your own behalf or making investment decisions for your business, a basic understanding of how macroeconomic factors affect interest rates is critical. As we proceed in this book you will soon see that many individual and business decisions depend on the interest rate.

The concept behind the loanable funds theory is that the *supply* of funds available for lending must equal the *demand* for funds by those who want to borrow. Interest rates adjust to ensure that this equilibrium exists. Equilibrium occurs when the markets clear. "Clearing markets" is economic talk for supply equaling demand.

We will develop the theory by discussing first the determinants of the supply of loanable funds, then the determinants of the demand for loanable funds. Finally, we will put the supply and demand curves together to see how changes in either supply or demand affect interest rates.

What Determines the Supply of Loanable Funds

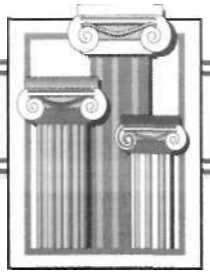
The supply of loanable funds is determined by two basic factors. One is the supply of savings by households, businesses, and government. The other is the amount of new money created by the Fed and the banking system.

Savings by households rise when interest rates are high. The reward for delaying consumption is greater with higher interest rates, so households save more. This positive relationship between savings and the level of interest rates is not as strong as one might think, however. Many savers have a wealth goal that motivates the amount they save. With higher interest rates, less must be saved to reach this goal.

The relationship between savings and interest rates is weaker for businesses and government than for households. The amount of savings here is usually determined more by earnings than by interest levels. ***To summarize, an increase in interest rates results in greater savings, although the relationship is somewhat weak.***

Savings is the principal source of loanable funds. However, new money introduced into the economy by the banking system can significantly increase the supply of loanable funds. As discussed in the last section, the amount of new money created is determined jointly by the Federal Reserve and the banking system. The Fed's introduction of

Careers in Finance



Academia

One career path often overlooked by undergraduate students is academics. Both the Federal Reserve and universities hire people with Ph.D.s to perform research and to teach. The academic lifestyle can be very appealing.

Most universities require a Ph.D. in the field in which the applicant plans to teach. There are about 100 universities in the country that offer Ph.D.s in finance. Faculty are typically in the classroom from 6 to 12 hours per week, depending on the research expectations of the school. The balance of the time faculty pursue their research interest.

The demand for finance faculty is very high, which is reflected in the starting salaries currently being offered. According to AACSB (American Assembly of Collegiate Schools of Business, International Association of Management Education), the accrediting body for schools of business, the average starting salary for new Ph.D.s in finance in 1999 was $90,000 for a 9-month contract. Most faculty started at over $100,000 when summer compensation was included.

To earn a Ph.D. you will spend about 4 years attending school after receiving you master's degree. During this time you will take classes, teach undergraduates, help sponsoring faculty with research, and write a dissertation. Most schools provide stipends that students can live on while working on their degrees.

If academics sounds appealing, talk to several of your professors about their careers and their experiences in graduate school.

new money is based on its expectations regarding the state of the economy. The expansion of the money supply based on this new money is determined by the commercial bank's ability and willingness to lend.

There is little evidence that either the Fed or commercial banks are influenced by interest rates in the money supply process. The principal factor that determines the amount of new money is the Fed's monetary policy. The Fed's goals are to minimize inflation, maximize employment, and maintain constant economic growth. The level of interest rates helps achieve these goals, but is not a part of them. **In *summary, then, there is little relationship between the level of interest rates and the amount of new money created.*** New money in the economy can affect the level of interest rates, but not the other way around.

The supply of loanable funds is the sum of the savings and the new money created. This is graphed by adding the two curves together. The effect of adding the new money curve to the savings curve is to simply shift the supply curve to the right, as in Figure 5.4.

What Determines the Demand for Loanable Funds?

Loanable funds are demanded by individuals, businesses, and governments. The relationship between each of these and the level of interest rates differs.

Research shows that a large change in interest rates is required to change individual borrowing demand. Certain types of consumer demand are more sensitive to interest rates than other types. For example, mortgage borrowing is more sensitive to interest rates than is short-term consumer debt. As interest rates increase, the demand for loanable funds falls.

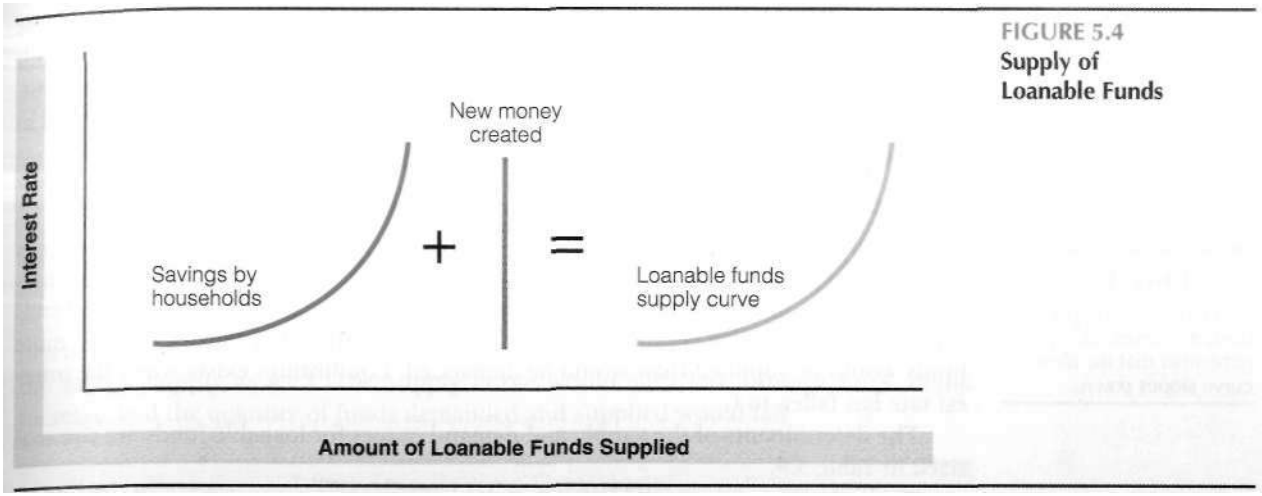


FIGURE 5.4
Supply of Loanable Funds

Business demand for loanable funds is influenced by a number of factors. The primary factors are spending for inventory, plant, and equipment. Borrowing for inventory is primarily a function of demand for the goods offered by the firm. When interest rates rise, firms become more aggressive about controlling inventory levels and reducing borrowing needs.

The demand for loanable funds to finance plant and equipment purchases is influenced primarily by long-term rates of interest, and small fluctuations have little impact on the demand for funds. Similarly, fluctuations in short-term rates have little effect on business demand.

There is little evidence that government demand for funds is influenced by interest rate levels. The difference between tax revenues and the demands by growing populations have more to do with the amount of government borrowing than do interest rates. In some isolated situations, governments take advantage of low rates to finance construction projects that might otherwise have been skipped or delayed.

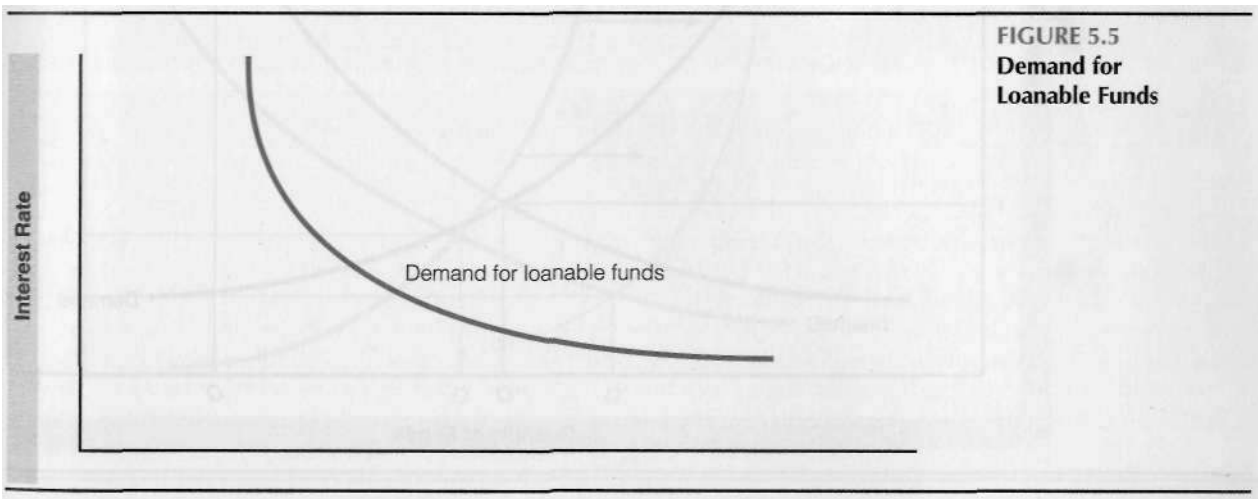


FIGURE 5.5
Demand for Loanable Funds

To summarize, the demand for loanable funds is a function of the demand for funds by individuals, businesses, and the government. In each case, the link is negative, but weak. This means that as interest rates fall, demand increases, but not by a large amount. The relationship between the demand for loanable funds and interest rates is graphed in Figure 5.5 (page 119).

Combining the Supply and Demand for Loanable Funds

Study Tip

When drawing supply and demand curves, always remember that the demand curve slopes down.

When the demand and supply curves are combined on one graph, their intersection tells us the level of interest rates and the quantity of loanable funds that will clear the market. In Figure 5.6, the interest rate in the market is i and the quantity of loanable funds supplied and demanded is Q. If the interest rate in the market was above i, say at i', more funds would be supplied than would be demanded. Equilibrium exists when the interest rate has fallen to i.

The determinants of the supply and demand curves for loanable funds are summarized in Table 5.4.

The real value of the loanable funds theory of interest rates is that it makes it possible to interpret changes in one of the variables. For example, what happens to interest

FIGURE 5.6
Demand and Supply of Loanable Funds

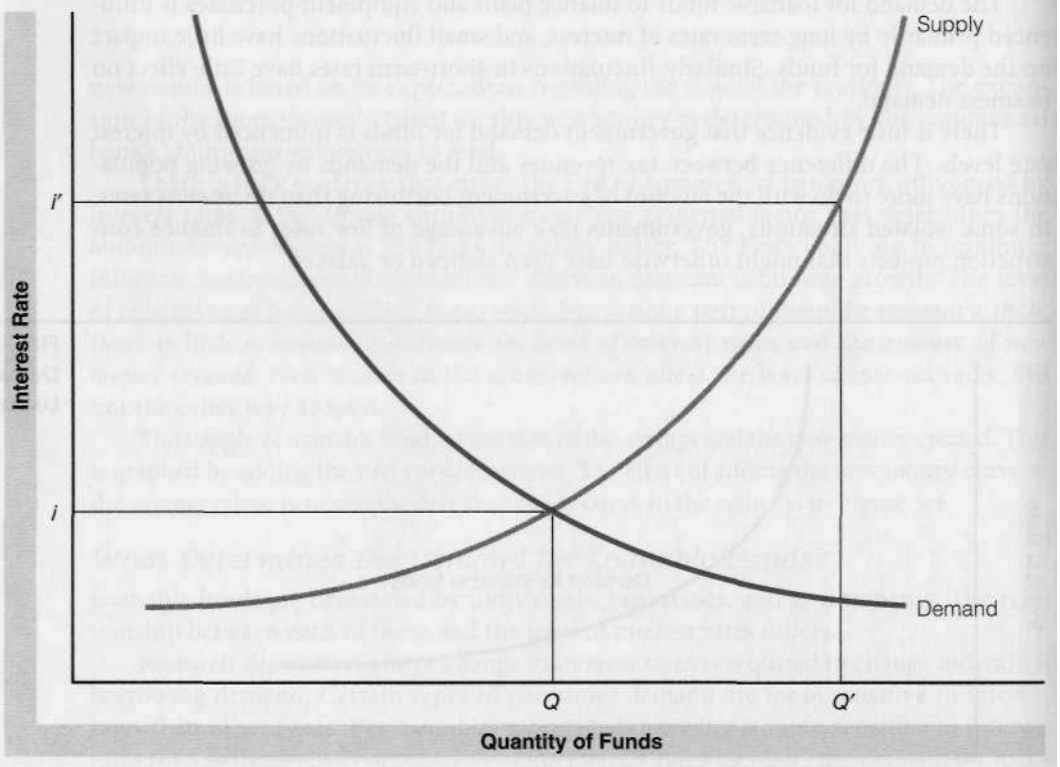


TABLE 5.4 Factors That Affect the Supply and Demand for Loanable Funds

Factors That Affect Supply of Loanable Funds	Factors That Affect Demand for Loanable Funds
Savings by individuals, business, and government	Demand by business, individuals, and government
New money created by the Fed	

rates if the Fed increases the money supply? From our earlier discussion we know that this will cause the supply curve to shift to the right. Figure 5.7 shows the effect of a shift in the supply curve. Interest rates fall from i to \ and the quantity of funds supplied and demanded increases from *Q* to *Q'*. We could easily find the effect of the Fed decreasing the money supply as well. The supply curve would shift left, interest rates would increase, and the quantity of funds demanded and supplied would fall.

Self-Test Review Questions*

1. What will happen to interest rates if consumers believe a recession is imminent and cut back on spending and borrowing?
2. What will happen to interest rates if the Fed buys bonds? ,

* 1. Demand will fall, so the demand curve will shift left. Interest rates and quantity demanded will fall.
2. If the Fed buys bonds, it is replacing bonds with cash in the economy. This increase in reserves shifts the supply curve right, lowers interest rates, and increases the amount of loanable funds.

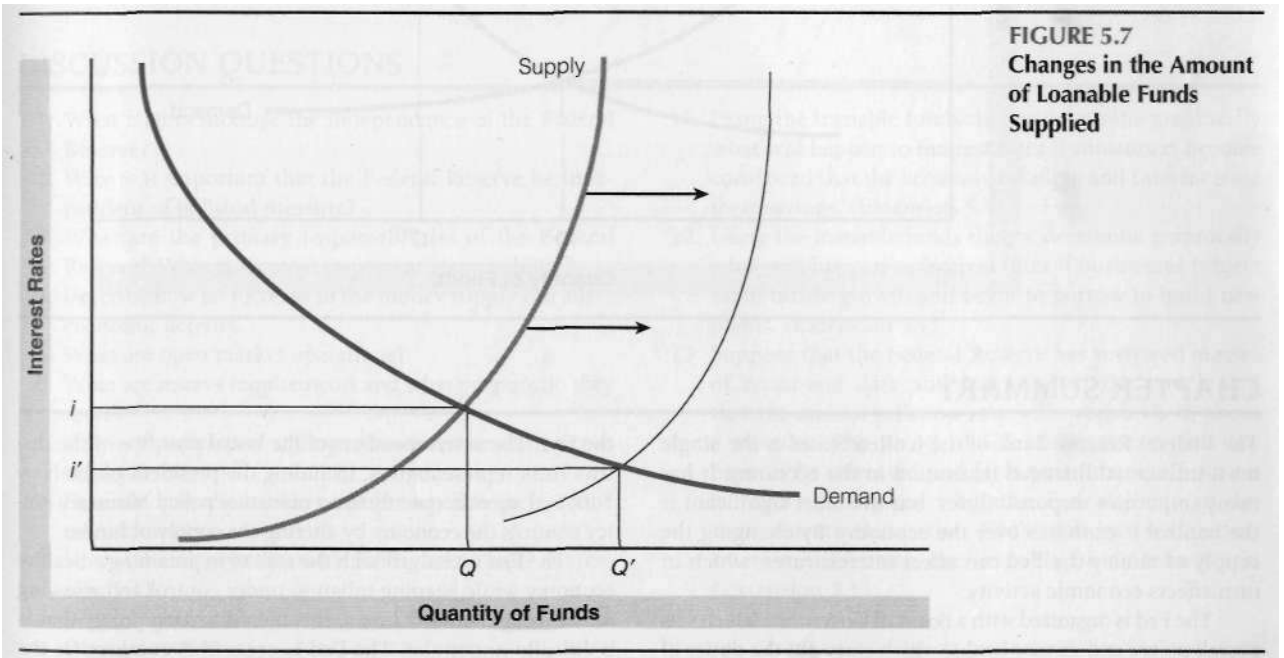


FIGURE 5.7
Changes in the Amount of Loanable Funds Supplied

Study Tip

Many students are confused by the difference between moving *along a* supply or demand curve and moving the *whole* curve. In this application, the determinants of supply and demand move the whole curve. We find the effect on interest rates and the money supply by finding the new intersection point.

The loanable funds framework can be used to anticipate the future of interest rate changes due to other macroeconomic factors as well. For example, suppose that you needed to predict next year's interest rates and after a thorough analysis of the economy decided that businesses were going to be expanding over the next 12 months. Business expansion would increase the demand for loanable funds. This would cause a shift in the demand curve to the right. Figure 5.8 shows that as the demand for loanable funds by businesses increases, interest rates increase from i to i' and the amount of loanable funds supplied increases from Q to Q'. Many economic issues can be analyzed using this simple framework. It also points out the important role interest rates have in the economy.

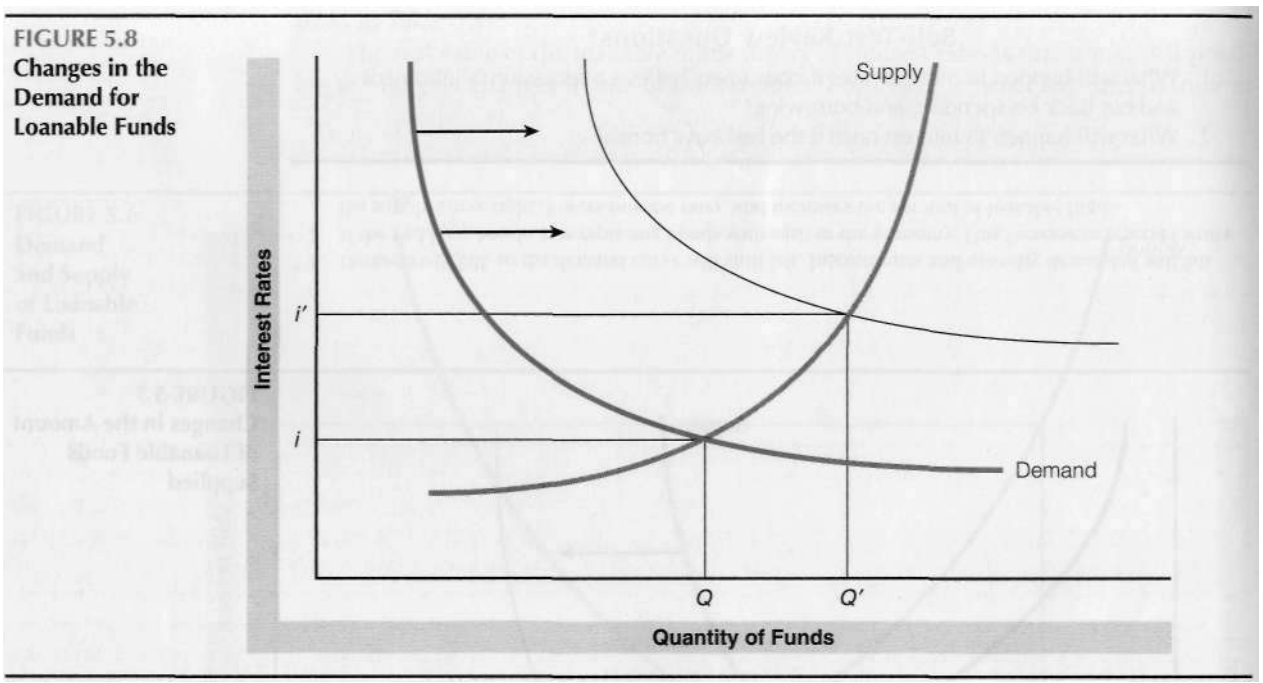


FIGURE 5.8
Changes in the Demand for Loanable Funds

CHAPTER SUMMARY

The Federal Reserve Bank of the United States is the single most influential financial institution in the economy. It has many important responsibilities, but the most significant is the control it exercises over the economy. By changing the supply of money the Fed can affect interest rates, which in turn affects economic activity.

The Fed is organized with a Board of Governors, which sets overall policy, and district banks, which carry out the duties of the Fed. The seven members of the board plus five of the district bank representatives, including the president of the New York Fed, meet frequently to set monetary policy. Monetary policy controls the economy by altering the supply of funds.

The Fed is charged with the task of maintaining a healthy economy while keeping inflation under control and allowing for future growth. At times, this means setting policy that is politically unpopular. The Fed is organized to minimize the

pffects of political pressure. By having long, nonrenewable terms and an independent source of funds, the Fed is able to follow the course of action it believes best for the country, despite what the president and Congress may suggest.

The Fed, along with the banking system, creates money. When the Fed deposits new money in a bank, a portion of the deposit is held as a reserve and the balance is lent out. The loan is subsequently deposited in a bank, where a reserve is held and the balance is again lent out. This process continues until no more can be lent. With the actual reserve requirement at about 3%, this means that $1 of new money could eventually create about $33. The actual increase for $1 of new money will be less than this because not every loan will be entirely redeposited and not every bank will make the maximum allowable loans.

When the Fed increases or decreases the amount of money it puts into the economy, it has no way of knowing exactly what the resulting effect on the money supply will be. This, as well as the difficulty in predicting the state of the economy months ahead of time, makes the job imposed on the Fed very difficult.

The loanable funds theory of interest rates is a useful tool to illustrate how Fed actions affect interest rates and to help you interpret how economic events might affect interest rates. The theory notes that interest rates fluctuate to make the demand for loanable funds equal to the supply of loanable funds. The supply of loanable funds increases when interest rates rise. The demand for loanable funds increases when interest rates fall. By adjusting the supply and demand curves, we can see how interest rates are affected by different events.

In the first five chapters of this text you have learned about many of the institutions, securities, and markets in the economy. Additionally, you have achieved an understanding of how interest rates are established by the markets and changed by the interaction of the Fed with the banking community. You now have an excellent background for continuing your study of finance. In Part Two we study investments.

KEY WORDS

banker's bank 104
central bank 104
demand deposits 111
discount rate 105
Federal Open Market Committee (FOMC) 107
Federal Reserve Bank (the Fed) 104
loanable funds theory 117
member bank 106
monetary policy 104
money multiplier 115
open market operations 105
reserve requirements 105

DISCUSSION QUESTIONS

1. What factors increase the independence of the Federal Reserve?
2. Why is it important that the Federal Reserve be independent of political pressure?
3. What are the primary responsibilities of the Federal Reserve? What is its most important responsibility?
4. Describe how an increase in the money supply can affect economic activity.
5. What are open market operations?
6. What are reserve requirements and what purpose do they serve?
7. Why is a population willing to accept paper currency as money?
8. Describe how the banking community can increase the money supply.
9. How is the supply of loanable funds determined? (Extension 5.1)
10. What factors affect the demand for loanable funds? (Extension 5.1)
11. Using the loanable funds theory, determine graphically what will happen to interest rates if consumers become convinced that the economy is failing and thus increase their savings. (Extension 5.1)
12. Using the loanable funds theory, determine graphically what will happen to interest rates if businesses project rapid future growth and begin to borrow to build new plants. (Extension 5.1)
13. Suppose that the Federal Reserve has reviewed masses of economic data and has reached the conclusion that the annual inflation rate will exceed 4% in about 6 months. The Board of Governors deems this too high to be tolerated and feels that immediate action is required. Discuss what the Fed is likely to do. Demonstrate how the Fed's actions will affect interest rates using the loanable funds framework. (Extension 5.1)

PROBLEMS

1. Consider the following scenario. Customers have made deposits of $2,000, and the bank also has $3,000 in capital, $2,500 in government securities, and $2,500 in cash. If the Federal Reserve has set the reserve requirement at 10%, what is the most money the bank can lend out? (Assume the funds are *not* redeposited into the bank.)
2. If the Fed buys $1,000,000 in bonds from banks and the reserve requirement is 10%, how much could this increase in reserves increase the money supply?
3. The actual increase in the money supply in Problem 2 will probably be less than the answer you found. Explain why.
4. If the Fed sells $250 million in securities and the reserve requirement is 3%, what will be the change in the money supply? (Be sure to note whether it will increase or decrease.)

WEB EXPLORATION 

1. The Federal Open Market Committee (FOMC) meets about every 6 weeks to discuss the state of the economy and to decide what actions the central bank should take. The minutes of these meetings are released after the next scheduled meeting; however, a brief press release is made available immediately. Find the schedule of minutes and press releases at www.federalreserve.gov/fomc/.
   a. When was the last scheduled meeting of the FOMC?
   b. Review the press release from that meeting. What did the committee decide to do about short-term interest rates?
   c Review the most recently published meeting minutes. What areas of the economy seemed to be of most concern to the committee members?
2. The Beige Book is published for public review. Go to the site listed above and find the Beige Book. What does it contain?
3. The Federal Reserve offers jobs and internships to business graduates. Go to www.federalreserve.gov/default.htm/ and click on the career opportunities link. Find the job that most appeals to you and report the following:
   a. Job title
   b. Job description
   c Salary range

MINI CASE

You have been assigned as a research assistant to the most recently appointed member of the Board of Governors of the Federal Reserve System, Dr. Bello, Dr. Bello is a highly regarded economist from the University of Columbia who has a firm grasp of monetary policy and its implementation. Your work to date has been more focused on financial analysis of troubled banks and you feel unprepared for the meeting scheduled with him for tomorrow to discuss the upcoming FOMC meeting. While you do not expect to become an economist overnight, you do wish to familiarize yourself with some of the topics he is likely to bring up.

a. Your first step is to learn what took place at the most recent FOMC meeting. Find and summarize in one short paragraph the contents of the press release (available at www.federalreserve.gov//fomc/).
b. You decide that the press release is too brief to give you a good idea of what the board was discussing. To get more information, review the most recently published FOMC minutes and summarize the major issues of concern to the Fed.
c You remember from your finance class that the Fed seemed to be very concerned about the level of inflation. Find the most recent inflation figures and determine whether you feel inflation is currently a serious problem. Consumer price data can be found at ftp://ftp.bls.gov/pub/special.requests/cpi/cpiai. txt. (See the Mini Case from Chapter 2 for a discussion on how to move this data into a spreadsheet.)
d. Identify factors that you think may lead to increased inflation. For each of these factors, discuss whether the situation is improving or deteriorating.
e. Based on your analysis, what action do you think the FOMC should take at its next meeting?
f. What actions do you think the FOMC may need to take sometime over the next year?