Principles of Economics

Money, the Federal Reserve, and the Interest Rate

Outline and Learning Objectives

25.1 An Overview of Money

- Define money and discuss its functions.

25.2 How Banks Create Money

- Explain how banks create money.

25.3 The Federal Reserve System

- Describe the functions and structure of the Federal Reserve System.

25.4 The Demand for Money

- Describe the determinants of money demand.

Chapter Outline and Learning Objectives

25.5 Interest Rates and Security Prices

- Define interest and discuss the relationship between interest rates and security prices.

25.6 How the Federal Reserve Controls the Interest Rate

- Understand how the Fed can change the interest rate.

Looking Ahead

Appendix: The Various Interest Rates in the U.S. Economy

- Explain the relationship between a 2-year interest rate and a 1-year

Chapter 25 Money, the Federal Reserve, and the Interest Rate

- In the last two chapters, we explored how consumers, firms, and the government interact in the goods market.
- In this chapter, we show how the money market works in the macro economy.

An Overview of Money

What Is Money?

- Money is a means of payment, a store of value, and a unit of account.

What Is Money?

A Means of Payment, or Medium of Exchange

- **barter** The direct exchange of goods and services for other goods and services.
- A barter system requires a double coincidence of wants for trade to take place. That is, to effect a trade, you have to find someone who has what you want and that person must also want what you have.
- **medium of exchange,** or **means of payment** What sellers generally accept and buyers generally use to pay for goods and services.

What Is Money?

A Store of Value

- **store of value** An asset that can be used to transport purchasing power from one time period to another.
- **liquidity property of money** The property of money that makes it a good medium of exchange as well as a store of value: It is portable and readily accepted and thus easily exchanged for goods.
- The main disadvantage of money as a store of value is that the value of money falls when the prices of goods and services rise.

What Is Money?

A Unit of Account

- **unit of account** A standard unit that provides a consistent way of quoting prices.

ECONOMICS IN PRACTICE

In the 19th century, rolls of red feathers harvested from the Scarlet Honeyeater bird were used as currency between the island of Santa Cruz and nearby Pacific Islands.

Their sole role was to serve as currency in a complex valuation system. More than 20,000 of these birds were killed each year to create this "money."

THINKING PRACTICALLY

1. Why do red feather rolls and dolphin teeth make good commodity monies, whereas coconut shells would not?

Commodity and Fiat Monies

- **commodity monies** Items used as money that also have intrinsic value in some other use.
- **fiat,** or **token, money** Items designated as money that are intrinsically worthless.
- **legal tender** Money that a government has required to be accepted in settlement of debts.

Commodity and Fiat Monies

- In addition to declaring its currency legal tender, the government usually promises the public that it will not print paper money so fast that it loses its value.
- **currency debasement** The decrease in the value of money that occurs when its supply is increased rapidly.

Measuring the Supply of Money in the United States

M1: Transactions Money

- **M1,** or **transactions money** Money that can be directly used for transactions.

  M1 ≡ currency held outside banks + demand deposits + traveler's checks + other checkable deposits

- M1 is a stock measure—it is measured at a point in time. M1 at the end of February 2015 was $2,988.2 billion.

Measuring the Supply of Money in the United States

M2: Broad Money

- **near monies** Close substitutes for transactions money, such as savings accounts and money market accounts.
- **M2,** or **broad money** M1 plus savings accounts, money market accounts, and other near monies.

M2 ≡ M1 + savings accounts + money market accounts + other near monies

- M2 at the end of February 2015 was $11,820.3 billion.

Measuring the Supply of Money in the United States

Beyond M2

- One of the very broad definitions of money includes the amount of available credit on credit cards as part of the money supply.
- There are no rules for deciding what is and is not money.
- For our purposes, *“money” will always refer to transactions money, or M1.*

How Banks Create Money

A Historical Perspective: Goldsmiths

- The origins of the modern banking system date back to the 15th and 16th centuries, when gold was used as money but was also inconvenient to carry around.
- People began to place their gold with goldsmiths for safekeeping. The receipts issued to the depositor became a form of paper money. The receipts were backed 100% by gold.
- The goldsmiths found that people did not come often to withdraw gold. People simple exchanged their paper receipts.

How Banks Create Money

A Historical Perspective: Goldsmiths

- Without adding any more gold to the system, the goldsmiths increased the amount of money in circulation.
- In normal times, goldsmiths were safe; but once people started to doubt the safety of the goldsmith, they would be foolish not to demand their gold back from the vault.
- **run on a bank** Occurs when many of those who have claims on a bank (deposits) present them at the same time.

How Banks Create Money

A Historical Perspective: Goldsmiths

- Today's bankers differ from goldsmiths in that today's banks are subject to a "required reserve ratio."
- Goldsmiths had no legal reserve requirements, although the amount they loaned out was subject to the restriction imposed on them by their fear of running out of gold.

ECONOMICS IN PRACTICE

In the 1946 film *It's a Wonderful Life*, George Bailey tells his bank depositors, "I don't have your money here.…What we need now is faith in each other."

In *Mary Poppins*, Tommy wants his tuppence back from a bank, which won't give it to him.

A bank hired Wyatt Earp to calm things down in 1909 when depositors stormed the bank to get their money out. He said that he had about $1 million in the wagon and began unloading the bars into the bank. He told the police to tell the crowd that "any gent who thinks he can find a better bank to put his money into to go and find it. But he'd better be damned careful he don't get hit over the head and robbed while he's doing it."

THINKING PRACTICALLY

1. How do Earp's remarks illustrate the advantages of paper money over gold?

Casey Tefertiller, *Wyatt Earp: The Life Behind the Legend*, John Wiley & Sons, Inc., 1997.

The Modern Banking System

A Brief Review of Accounting

$$\text{assets} - \text{liabilities} \equiv \text{net worth}$$

or:

$$\text{assets} \equiv \text{liabilities} + \text{net worth}$$

- Assets are things a firm owns that are worth something. A bank's most important assets are the loans it has made.
- Other bank assets include cash on hand (sometimes called vault cash) and deposits with the U.S. central bank.

The Modern Banking System

A Brief Review of Accounting

- **Federal Reserve Bank (the Fed)** The central bank of the United States.
- A firm's liabilities are its debts—what it owes.
- A bank's most important liabilities are its deposits.
- Net worth represents the value of the firm to its stockholders or owners.

The Modern Banking System

A Brief Review of Accounting

- **reserves** The deposits that a bank has at the Federal Reserve Bank plus its cash on hand.
- **required reserve ratio** The percentage of its total deposits that a bank must keep as reserves at the Federal Reserve.

FIGURE 25.1 T-Account for a Typical Bank (Millions of Dollars)

	Assets	Liabilities	
Reserves	20	100	Deposits
Loans	90	10	Net worth
Total	110	110	Total

The balance sheet of a bank must always balance, so that the sum of assets (reserves and loans) equals the sum of liabilities (deposits) and net worth.

The Creation of Money

- **excess reserves** The difference between a bank's actual reserves and its required reserves.

$$\text{excess reserves} \equiv \text{actual reserves} - \text{required reserves}$$

- When loans are converted into deposits, the supply of money increases.

FIGURE 25.2 Balance Sheets of a Bank in a Single-Bank Economy

Panel 1

Assets	Liabilities
Reserves 0	0 Deposits

Panel 2

Assets	Liabilities
Reserves 100	100 Deposits

Panel 3

Assets	Liabilities
Reserves 100 Loans 400	500 Deposits

In panel 2, there is an initial deposit of $100.

In panel 3, the bank has made loans of $400.

FIGURE 25.3 The Creation of Money When There Are Many Banks

Panel 1

	Assets	Liabilities
Bank 1	Reserves 100	100 Deposits
Bank 2	Reserves 80	80 Deposits
Bank 3	Reserves 64	64 Deposits

Panel 2

	Assets	Liabilities
Bank 1	Reserves 100 Loans 80	180 Deposits
Bank 2	Reserves 80 Loans 64	144 Deposits
Bank 3	Reserves 64 Loans 51.20	115.20 Deposits

Panel 3

	Assets	Liabilities
Bank 1	Reserves 20 Loans 80	100 Deposits
Bank 2	Reserves 16 Loans 64	80 Deposits
Bank 3	Reserves 12.80 Loans 51.20	64 Deposits

Summary:	Loans	Deposits
Bank 1	80	100
Bank 2	64	80
Bank 3	51.20	64
Bank 4	40.96	51.20
⋮	⋮	⋮
Total	400.00	500.00

In panel 1, there is an initial deposit of $100 in Bank 1. In panel 2, Bank 1 makes a loan of $80 by creating a deposit of $80. A check for $80 by the borrower is then written on Bank 1 (panel 3) and deposited in Bank 2 (panel 1). The process continues with Bank 2 making loans and so on.
In the end, loans of $400 have been made and the total level of deposits is $500.

The Money Multiplier

- An increase in bank reserves leads to a greater than one-for-one increase in the money supply.
- The relationship between the final change in deposits and the change in reserves that caused this change is the money multiplier.
- **money multiplier** The multiple by which deposits can increase for every dollar increase in reserves; equal to 1 divided by the required reserve ratio.

$$\text{money multiplier} \equiv \frac{1}{\text{required reserve ratio}}$$

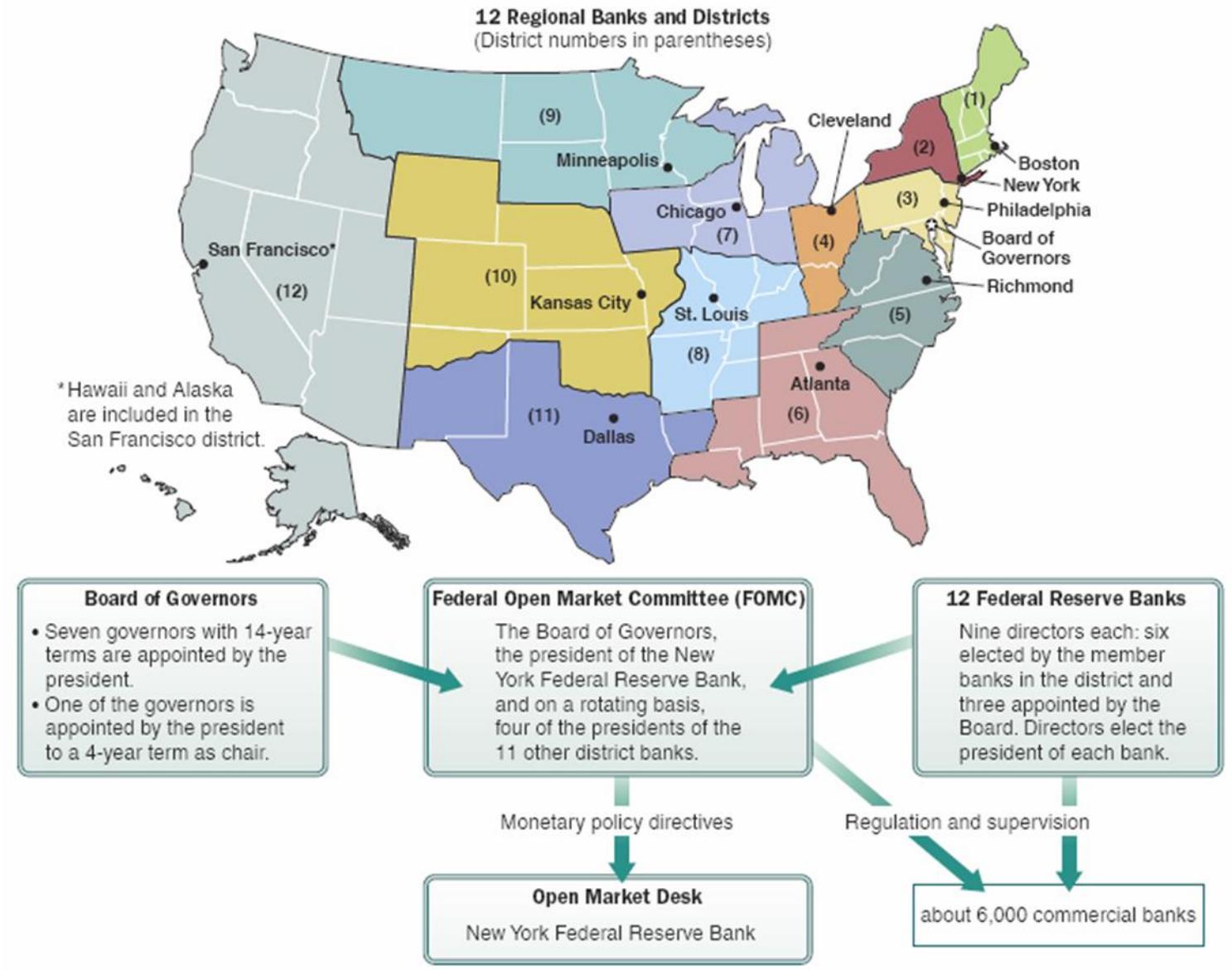
The Federal Reserve System

- Founded in 1913 by an act of Congress (to which major reforms were added in the 1930s), the Fed is the central bank of the United States.
- The Board of Governors is the most important group within the Federal Reserve System.
- The Fed is an independent agency in that it does not take orders from the president or from Congress.

The Federal Reserve System

- **Federal Open Market Committee (FOMC)** A group composed of the 7 members of the Fed's Board of Governors, the president of the New York Federal Reserve Bank, and 4 of the other 11 district bank presidents on a rotating basis; it sets goals concerning the money supply and interest rates and directs the operation of the Open Market Desk in New York.
- **Open Market Desk** The office in the New York Federal Reserve Bank from which government securities are bought and sold by the Fed.

FIGURE 25.4 The Structure of the Federal Reserve System



Functions of the Federal Reserve

- Central banks are sometimes known as “bankers’ banks.”
- The Fed’s crucial role is to control the money supply.
- The Fed also performs several important functions for banks, such as clearing interbank payments and assisting banks that are in difficult financial positions.
- The Fed is also responsible for managing exchange rates and the nation’s foreign exchange reserves.

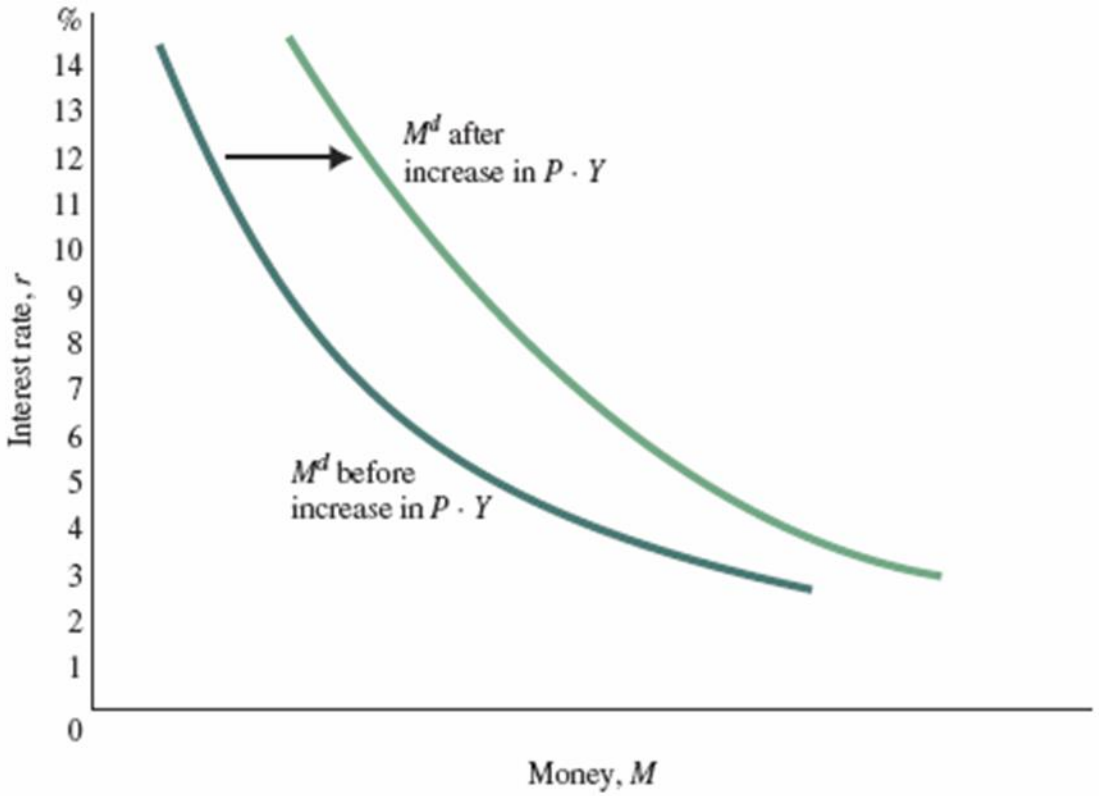
Functions of the Federal Reserve

- The Fed also facilitates the transfer of funds among banks and is responsible for many of the regulations governing banking practices and standards.
- **lender of last resort** One of the functions of the Fed: It provides funds to troubled banks that cannot find any other sources of funds.

The Demand for Money

- The amount of money you want to hold is:
  - Positively related to the size of your transactions
  - Negatively related to the interest rate, which is the opportunity cost of holding money

FIGURE 25.5 The Demand for Money



The quantity of money demanded (Md) depends negatively on the interest rate because the opportunity cost of holding money decreases as the interest rate falls.

An increase in transactions (P * Y) shifts the money demand curve to the right.

Interest Rates and Security Prices

- Interest-bearing securities (e.g., bonds and bills) are issued by firms and the government seeking to borrow money.
- Those securities are issued with a face value and fixed payments, or coupons, over time.
- When interest rates rise (fall), the prices of existing securities fall (rise).

ECONOMICS IN PRACTICE

In Chekhov's play *Uncle Vanya*, Alexander Vladimirovitch Serebryakov, a retired professor, proposes to sell his estate, which earns 2%, and invest the money in securities that yield 5% interest.

The problem is that if those securities yield a 5% interest rate, no investor will buy an estate earning only 2%. This is particularly the case if the estate is a riskier investment than the securities.

THINKING PRACTICALLY

1. What would happen to the value of the estate if the interest rate on the securities that Professor Serebryakov is talking about fell?

How the Federal Reserve Controls the Interest Rate

Tools Prior to 2008

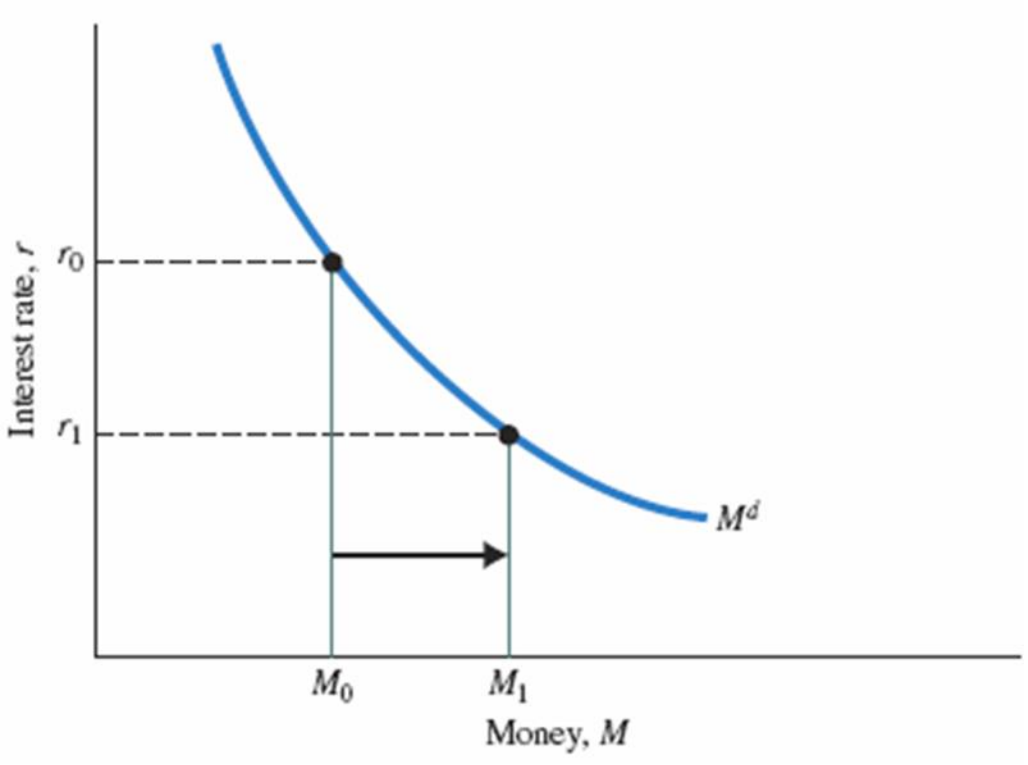
- Traditionally, the Fed had three tools to control the interest rate:
  1. Open market operations
  2. Changing the reserve requirement ratio
  3. Changing the discount rate that banks pay to the Fed to borrow reserves

How the Federal Reserve Controls the Interest Rate

Tools Prior to 2008

- **open market operations** The purchase and sale by the Fed of government securities in the open market.
- **discount rate** The interest rate that banks pay to the Fed to borrow from it.

FIGURE 25.6 The Equilibrium Interest Rate



Given a value of the money supply that the Fed chooses, the equilibrium interest rate can be read off of the money demand schedule.

If the Fed increases the money supply from M_0 to M_1, the interest rate falls from r_0 to r_1.

Expanded Fed Activities Beginning in 2008

- In March 2008, in response to financial troubles faced by many large financial institutions, the Fed became an active participant in the private banking system.
- In September 2008, the Fed began buying securities of Fannie Mae and Freddie Mac.
- In January 2009, the Fed began buying mortgage-backed securities that the private sector was reluctant to hold because of their perceived riskiness.
- In September 2012, the Fed opted to buy mortgage-backed securities and long-term government bonds to the tune of $85 billion per month.

The Federal Reserve Balance Sheet

TABLE 25.1 Assets and Liabilities of the Federal Reserve System, April 9, 2015 (Billions of Dollars)

	Assets		Liabilities
Gold	$ 11	$ 1,363	Currency in circulation
U.S. Treasury securities	2,460	2,793	Reserve balances
Federal agency debt securities	37	62	U.S. Treasury deposits
Mortgage-backed securities	1,732	310	All other liabilities and net worth
All other assets	288	$4,528	Total
Total	$4,528		

MyEconLab Real-time data

Source: Federal Reserve Statistical Release, Factors affecting Reserve Balances, Board of Governors of the Federal Reserve System.

Tools after 2008

- After 2008, the Fed began paying a small interest rate on the bank reserves it holds, leading to excess reserves considerably above zero.
- The traditional tools open market operations, reserve requirements ratio, and discount rate would become useless.

REVIEW TERMS AND CONCEPTS

- barter
- commodity monies
- currency debasement
- discount rate
- excess reserves
- Federal Open Market Committee (FOMC)
- Federal Reserve Bank (the Fed)
- fiat, or token, money
- legal tender
- ender of last resort
- liquidity property of money
- M1, or transactions money
- M2, or broad money
- medium of exchange, or means of payment
- money multiplier
- near monies
- Open Market Desk
- open market operations

REVIEW TERMS AND CONCEPTS

- required reserve ratio
- reserves
- run on a bank
- store of value
- unit of account

Equations:

- M1 ≡ currency held outside banks + demand deposits + traveler's checks + other checkable deposits
- M2 ≡ M1 + savings accounts + money market accounts + other near monies
- assets ≡ liabilities + net worth
- excess reserves ≡ actual reserves − required reserves
- $\text{money multiplier} \equiv \frac{1}{\text{required reserve ratio}}$

CHAPTER 25 APPENDIX:
The Various Interest Rates in the U.S. Economy

The Term Structure of Interest Rates

- The term structure of interest rates is the relationship among the interest rates offered on securities of different maturities.
- According to the expectations theory of the term structure of interest rates, the 2-year rate is equal to the average of the current 1-year rate and the 1-year rate expected a year from now.
- Fed behavior may directly affect people's expectations of the future short-term rates, which will then affect long-term rates.

Types of Interest Rates

- The three-month Treasury bill rate is the interest rate on government securities that mature in three months.
- Government securities with terms of 1 year or more are called *government bonds*. There are 1-year bonds, 2-year bonds, and so on, up to 30-year bonds.
- The federal funds rate is the rate banks are charged to borrow reserves from other banks.
- Commercial paper is short-term corporate IOUs that offer a designated rate of interest.

Types of Interest Rates

- The prime rate is a benchmark that banks often use in quoting interest rates to their customers.
- Corporations finance much of their investment by selling bonds to the public. Corporate bonds are classified by various bond dealers according to their risk. The interest rate on bonds rated AAA is the triple A corporate bond rate, the rate that the least risky firms pay on the bonds that they issue.