

Asset Classes and Financial Instruments

YOU LEARNED IN Chapter 1 that the process of building an investment portfolio usually begins by deciding how much money to allocate to broad classes of assets, such as safe money market securities or bank accounts, longer term bonds, stocks, or even asset classes like real estate or precious metals. This process is called *asset allocation*. Within each class the investor then selects specific assets from a more detailed menu. This is called *security selection*.

Each broad asset class contains many specific security types, and the many variations on a theme can be overwhelming. Our goal in this chapter is to introduce you to the important features of broad classes of securities. Toward this end, we organize our tour of financial instruments according to asset class.

Financial markets are traditionally segmented into **money markets** and **capital markets**. Money

market instruments include short-term, marketable, liquid, low-risk debt securities. Money market instruments sometimes are called *cash equivalents*, or just *cash* for short. Capital markets, in contrast, include longer term and riskier securities. Securities in the capital market are much more diverse than those found within the money market. For this reason, we will subdivide the capital market into four segments: longer term bond markets, equity markets, and the derivative markets for options and futures.

We first describe money market instruments. We then move on to debt and equity securities. We explain the structure of various stock market indexes in this chapter because market benchmark portfolios play an important role in portfolio construction and evaluation. Finally, we survey the derivative security markets for options and futures contracts.

2.1 The Money Market

The money market is a subsector of the fixed-income market. It consists of very short-term debt securities that usually are highly marketable. Table 2.1 lists outstanding volume in 2015 for some of the major instruments in this market. Many of these securities trade in large denominations and so are out of the reach of individual investors. Money

Table 2.1

Major components of
the money market

	\$ Billion
Federal funds and repurchase agreements	\$3,748
Small-denomination time deposits and savings deposits*	8,991
Large-denomination time deposits†	1,865
Treasury bills	1,527
Commercial paper	1,120
Money market mutual funds	2,716

*Small-denomination time deposits are less than \$100,000.

†Large-denomination time deposits are greater than \$100,000.

Sources: *Flow of Funds Accounts of the United States*, Board of Governors of the Federal Reserve System, March 2016.

market funds, however, are easily accessible to small investors. These mutual funds pool the resources of many investors and purchase a wide variety of money market securities on their behalf.

Treasury Bills

U.S. *Treasury bills* (T-bills, or just bills, for short) are the most marketable of all money market instruments. T-bills represent the simplest form of borrowing: The government raises money by selling bills to the public. Investors buy the bills at a discount from the stated maturity value. At the bill's maturity, the government pays the investor the face value of the bill. The difference between the purchase price and ultimate maturity value constitutes the investor's earnings.

T-bills are issued with initial maturities of 4, 13, 26, or 52 weeks. Individuals can purchase T-bills directly, at auction, or on the secondary market from a government securities dealer. T-bills are highly liquid; that is, they are easily converted to cash and sold at low transaction cost and with not much price risk. Unlike most other money market instruments, which sell in minimum denominations of \$100,000, T-bills sell in minimum denominations of only \$100, although \$10,000 denominations are far more common. The income earned on T-bills is exempt from all state and local taxes, another characteristic distinguishing them from other money market instruments.

Figure 2.1 is a partial listing of T-bill rates. Rather than providing prices of each bill, the financial press reports yields based on those prices. You will see yields corresponding to both bid and ask prices. The **ask price** is the price you would have to pay to buy a T-bill from a securities dealer. The **bid price** is the slightly lower price you would receive if you wanted to sell a bill to a dealer. The **bid-ask spread** is the difference in these prices, which is the dealer's source of profit. (Notice in Figure 2.1 that the bid *yield* is higher than the ask yield. This is because prices and yields are inversely related.)

The first two yields in Figure 2.1 are reported using the *bank-discount method*. This means that the bill's discount from its maturity or face value is "annualized" based on a 360-day year, and then reported as a percentage of face value. For example, for the highlighted bill maturing on October 27, 2016, days to maturity are 171 and the yield under the column labeled "ASKED" is given as .340%. This means that a dealer was willing to sell the bill at a discount from face value of $.340\% \times (171/360) = .1615\%$. So a bill with \$10,000 face value could be purchased for $\$10,000 \times (1 - .001615) = \$9,983.85$.

TREASURY BILLS					
MATURITY	DAYS TO MAT	BID	ASKED	CHG	ASKED YIELD
July 14, 2016	66	0.155	0.145	0.005	0.148
September 1, 2016	115	0.233	0.223	0.000	0.226
October 27, 2016	171	0.350	0.340	0.000	0.345
December 8, 2016	213	0.348	0.338	0.005	0.344
April 27, 2017	353	0.503	0.493	0.002	0.502

Figure 2.1 Treasury bill yields

Source: Compiled from data obtained from *The Wall Street Journal Online*, May 9, 2016.

Similarly, on the basis of the bid yield of .350%, a dealer would be willing to purchase the bill for $\$10,000 \times (1 - .00350 \times 171/360) = \$9,983.375$.

The bank discount method for computing yields has a long tradition, but it is flawed for at least two reasons. First, it assumes that the year has only 360 days. Second, it computes the yield as a fraction of par value rather than of the price the investor paid to acquire the bill.¹ An investor who buys the bill for the ask price and holds it until maturity will see her investment grow over 171 days by a multiple of $\$10,000/\$9,983.85 = 1.001618$, for a gain of .1618%. Annualizing this gain using a 365-day year results in a yield of $.1618\% \times 365/171 = .345\%$, which is the value reported in the last column under "ASKED YIELD." This last value is called the Treasury-bill's *bond-equivalent yield*.

Certificates of Deposit

A **certificate of deposit**, or CD, is a time deposit with a bank. Time deposits may not be withdrawn on demand. The bank pays interest and principal to the depositor only at the end of the fixed term of the CD. CDs issued in denominations greater than \$100,000 are usually negotiable, however; that is, they can be sold to another investor if the owner needs to cash in the certificate before its maturity date. Short-term CDs are highly marketable, although the market significantly thins out for maturities of 3 months or more. CDs are treated as bank deposits by the Federal Deposit Insurance Corporation, so they are currently insured for up to \$250,000 in the event of a bank insolvency.

Commercial Paper

Large, well-known companies often issue their own short-term unsecured debt notes rather than borrow directly from banks. These notes are called **commercial paper**. Very often, commercial paper is backed by a bank line of credit, which gives the borrower access to cash that can be used (if needed) to pay off the paper at maturity.

¹Both of these "errors" were dictated by computational simplicity in precomputer days. It is easier to compute percentage discounts from a round number such as par value rather than purchase price. It is also easier to annualize using a 360-day year, because 360 is an even multiple of so many numbers.

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Commercial paper maturities range up to 270 days, but most often, commercial paper is issued with a maturity of less than 1 or 2 months. Usually, it is issued in multiples of \$100,000. Therefore, small investors can invest in commercial paper only indirectly, via money market mutual funds.

Commercial paper is considered to be a fairly safe asset, because a firm's condition presumably can be monitored and predicted over a term as short as 1 month.

While most commercial paper is issued by nonfinancial firms, in recent years there was a sharp increase in *asset-backed commercial paper* issued by financial firms such as banks. This was short-term commercial paper typically used to raise funds for the institution to invest in other assets, most notoriously, subprime mortgages. These assets were in turn used as collateral for the commercial paper—hence the label “asset backed.” This practice led to many difficulties starting in the summer of 2007 when the subprime mortgagors began defaulting. The banks found themselves unable to issue new commercial paper to refinance their positions as the old paper matured.

Bankers' Acceptances

A **banker's acceptance** starts as an order to a bank by a bank's customer to pay a sum of money at a future date, typically within 6 months. At this stage, it is similar to a postdated check. When the bank endorses the order for payment as “accepted,” it assumes responsibility for ultimate payment to the holder of the acceptance. At this point, the acceptance may be traded in secondary markets like any other claim on the bank. Bankers' acceptances are considered very safe assets because traders can substitute the bank's credit standing for their own. They are used widely in foreign trade where the creditworthiness of one trader is unknown to the trading partner. Acceptances sell at a discount from the face value of the payment order, just as T-bills sell at a discount from par value.

Eurodollars

Eurodollars are dollar-denominated deposits at foreign banks or foreign branches of American banks. By locating outside the United States, these banks escape regulation by the Federal Reserve. Despite the tag “Euro,” these accounts need not be in European banks, although that is where the practice of accepting dollar-denominated deposits outside the United States began.

Most Eurodollar deposits are for large sums, and most are time deposits of less than 6 months' maturity. A variation on the Eurodollar time deposit is the Eurodollar certificate of deposit, which resembles a domestic bank CD except that it is the liability of a non-U.S. branch of a bank, typically a London branch. The advantage of Eurodollar CDs over Eurodollar time deposits is that the holder can sell the asset to realize its cash value before maturity. Eurodollar CDs are considered less liquid and riskier than domestic CDs, however, and thus offer higher yields. Firms also issue Eurodollar bonds, which are dollar-denominated bonds outside the U.S., although bonds are not a money market investment because of their long maturities.

Repos and Reverses

Dealers in government securities use **repurchase agreements**, also called “repos” or “RPs,” as a form of short-term, usually overnight, borrowing. The dealer sells government securities to an investor on an overnight basis, with an agreement to buy back those securities the next day at a slightly higher price. The increase in the price is the overnight interest. The dealer thus takes out a 1-day loan from the investor, and the securities serve as collateral.

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A *term repo* is essentially an identical transaction, except that the term of the implicit loan can be 30 days or more. Repos are considered very safe in terms of credit risk because the loans are backed by the government securities. A *reverse repo* is the mirror image of a repo. Here, the dealer finds an investor holding government securities and buys them, agreeing to sell them back at a specified higher price on a future date.

Federal Funds

Just as most of us maintain deposits at banks, banks maintain deposits of their own at a Federal Reserve bank. Each member bank of the Federal Reserve System, or “the Fed,” is required to maintain a minimum balance in a reserve account with the Fed. The required balance depends on the total deposits of the bank’s customers. Funds in the bank’s reserve account are called **federal funds**, or *fed funds*. At any time, some banks have more funds than required at the Fed. Other banks, primarily big banks in New York and other financial centers, tend to have a shortage of federal funds. In the federal funds market, banks with excess funds lend to those with a shortage. These loans, which are usually overnight transactions, are arranged at a rate of interest called the *federal funds rate*.

Although the fed funds market arose primarily as a way for banks to transfer balances to meet reserve requirements, today the market has evolved to the point that many large banks use federal funds in a straightforward way as one component of their total sources of funding. Therefore, the fed funds rate is simply the rate of interest on very short-term loans among financial institutions. While most investors cannot participate in this market, the fed funds rate commands great interest as a key barometer of monetary policy.

Brokers’ Calls

Individuals who buy stocks on margin borrow part of the funds to pay for the stocks from their broker. The broker in turn may borrow the funds from a bank, agreeing to repay the bank immediately (on call) if the bank requests it. The rate paid on such loans is usually about 1% higher than the rate on short-term T-bills.

The LIBOR Market

The **London Interbank Offered Rate (LIBOR)** is the rate at which large banks in London are willing to lend money among themselves. This rate, which is quoted on dollar-denominated loans, has become the premier short-term interest rate quoted in the European money market, and it serves as a reference rate for a wide range of transactions. For example, a corporation might borrow at a floating rate equal to LIBOR plus 2%.

LIBOR interest rates may be tied to currencies other than the U.S. dollar. For example, LIBOR rates are widely quoted for transactions denominated in British pounds, yen, euros, and so on. There is also a similar rate called EURIBOR (European Interbank Offered Rate) at which banks in the euro zone are willing to lend euros among themselves.

LIBOR is a key reference rate in the money market, and many trillions of dollars of loans and derivative assets are tied to it. Therefore, the 2012 scandal involving the fixing of LIBOR deeply shook these markets. The nearby box discusses those events.

Yields on Money Market Instruments

Although most money market securities are low risk, they are not risk-free. The securities of the money market promise yields greater than those on default-free T-bills, at

The LIBOR Scandals

LIBOR was designed initially as a survey of interbank lending rates but soon became a key determinant of short-term interest rates with far-reaching significance. More than \$500 trillion of derivative contracts have payoffs tied to it, and hundreds of trillions of dollars of loans and bonds with floating interest rates linked to LIBOR are currently outstanding. LIBOR is quoted for loans in five currencies (U.S. dollar, yen, euro, British pound, and Swiss franc) and for seven maturities ranging from a day to a year, although 3 months is the most common.

However, LIBOR is not a rate at which actual transactions occur; instead, it is just a survey of "estimated" borrowing rates, and this has made it vulnerable to tampering. Several large banks are asked to report the rate at which they *believe* they can borrow in the interbank market. Outliers are trimmed from the sample of responses, and LIBOR is calculated as the average of the mid-range estimates.

Over time, several problems surfaced. First, it appeared that banks understated the rates at which they claimed they could borrow in an effort to make themselves look financially stronger. Other surveys that asked for estimates of the rates at which *other* banks could borrow resulted in higher values. Moreover, LIBOR did not seem to reflect current market conditions. A majority of LIBOR submissions were unchanged from day to day even when other interest rates fluctuated, and

LIBOR spreads showed surprisingly low correlation with other measures of credit risk. Even worse, once the market came under scrutiny, it emerged that participating banks were colluding to manipulate their LIBOR submissions to enhance profits on their derivatives trades. Traders used e-mails and instant messages to tell each other whether they wanted to see higher or lower submissions. Members of this informal cartel essentially set up a "favor bank" to help each other move the survey average up or down depending on their trading positions.

To date, over \$5 billion of fines have been paid, among them, Deutsche Bank (\$2.5 billion), UBS (\$1.5 billion), Royal Bank of Scotland (\$612 million), and Barclays (\$450 million). But government fines may be only the beginning. A federal appeals court in 2016 ruled that private lawsuits involving anti-trust violations may proceed. Customers who borrowed funds at an interest rate tied to LIBOR argue that they were harmed by the collusion of participating banks to coordinate rates.

Several reforms have been suggested. The British Bankers Association, which until recently ran the LIBOR survey, yielded responsibility for LIBOR to British regulators. LIBOR quotes in less active currencies and maturities, where collusion is easier, have been eliminated. More substantive proposals would replace the survey rate with one based on actual, verifiable, transactions—that is, real loans among banks.

least in part because of greater relative riskiness. In addition, many investors require more liquidity; thus they will accept lower yields on securities such as T-bills that can be quickly and cheaply sold for cash. Figure 2.2 shows that bank CDs, for example, consistently have paid a premium over T-bills. Moreover, that premium increased with economic crises

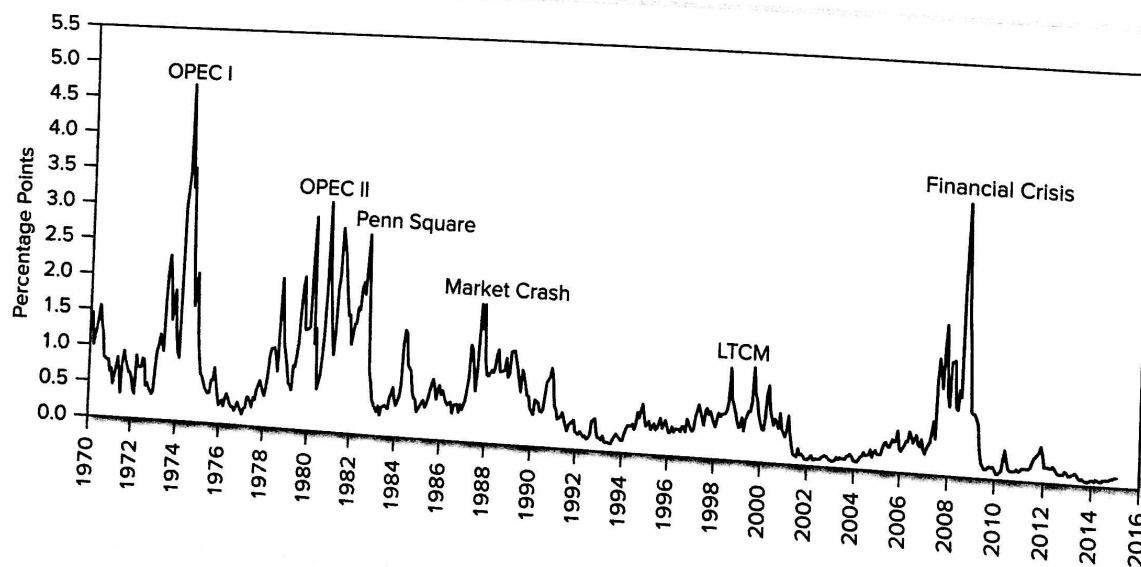


Figure 2.2 The spread between 3-month CD and Treasury bill rates

Money Market Funds and the Credit Crisis of 2008

Money market funds are mutual funds that invest in the short-term debt instruments that comprise the money market. They are required to hold only short-maturity debt of the highest quality: The average maturity of their holdings must be maintained at less than 3 months. Their biggest investments tend to be in commercial paper, but they also hold sizable fractions of their portfolios in certificates of deposit, repurchase agreements, and Treasury securities. Because of this very conservative investment profile, money market funds typically experience extremely low price risk. Investors for their part usually acquire check-writing privileges with their funds and often use them as a close substitute for a bank account. This is feasible because the funds almost always maintain share value at \$1.00 and pass along all investment earnings to their investors as interest.

Until 2008, only one fund had “broken the buck,” that is, suffered losses large enough to force value per share below \$1. But when Lehman Brothers filed for bankruptcy protection on September 15, 2008, several funds that had invested heavily in its commercial paper suffered large losses. The next day, the Reserve Primary Fund, the oldest money market fund, broke the buck when its value per share fell to only \$.97.

The realization that money market funds were at risk in the credit crisis led to a wave of investor redemptions similar to a run on a bank. Fearing further outflows, the U.S. Treasury announced that it would make federal insurance available to money market funds willing to pay an insurance fee. This program would thus be similar to FDIC bank insurance. With the federal insurance in place, the outflows were quelled.

However, the turmoil in Wall Street’s money market funds had already spilled over into “Main Street.” Fearing further investor redemptions, money market funds had become afraid to commit funds even over short periods, and their demand for commercial paper had effectively dried up. Firms throughout the economy had come to depend on those markets as a major source of short-term finance to fund expenditures ranging from salaries to inventories. Further breakdown in the money markets would have had an immediate crippling effect on the broad economy.

To end the panic and stabilize the money markets, the federal government decided to guarantee investments in money market funds. The guarantee did, in fact, calm investors and end the run, but it put the government on the hook for a potential liability of up to \$3 trillion—the assets held in money market funds at the time.

U.S. regulators have since approved a series of reforms to reduce the risks of runs on these funds. Institutional money market funds (those servicing institutions rather than private investors) are required to “float” the prices of their shares based on the value of their assets rather than maintain a fixed \$1 value per share. This limits the incentive during a crisis for investors to compete to be the first to withdraw funds while share prices are maintained at a nonsustainable level of \$1. In addition, funds will have the authority to either limit redemptions or impose redemption fees of up to 2% if a fund’s assets fall by more than 30%. Finally, the rules call for enhanced transparency, with greater disclosure of asset values, portfolio composition, and liquidity.

such as the energy price shocks associated with the two OPEC disturbances, the failure of Penn Square bank, the stock market crash in 1987, the collapse of Long Term Capital Management in 1998, and the financial crisis of 2008–2009. If you look back to Figure 1.1 in Chapter 1, you’ll see that the TED spread, the difference between the LIBOR rate and Treasury bills, also peaked during periods of financial stress.

Money market funds are mutual funds that invest in money market instruments and have become major sources of funding to that sector. The nearby box discusses the fallout of the credit crisis of 2008 on those funds.

2.2 The Bond Market

The bond market is composed of longer term borrowing or debt instruments than those that trade in the money market. This market includes Treasury notes and bonds, corporate bonds, municipal bonds, mortgage securities, and federal agency debt.

These instruments are sometimes said to comprise the *fixed-income capital market*, because most of them promise either a fixed stream of income or a stream of income that is determined according to a specific formula. In practice, these formulas can result in a flow of income that is far from fixed. Therefore, the term *fixed income* is probably not fully appropriate. It is simpler and more straightforward to call these securities either debt instruments or bonds.

Treasury Notes and Bonds

The U.S. government borrows funds in large part by selling **Treasury notes** and **Treasury bonds**. T-notes are issued with maturities ranging up to 10 years, while bonds are issued with maturities ranging from 10 to 30 years. Both notes and bonds may be issued in increments of \$100 but far more commonly trade in denominations of \$1,000. Both notes and bonds make semiannual interest payments called *coupon payments*, a name derived from precomputer days, when investors would literally clip coupons attached to the bond and present a coupon to receive the interest payment.

Figure 2.3 is a listing of Treasury issues. The bid price of the highlighted note, which matures in May 2019, is 99.8125. (This is the decimal version of $99\frac{104}{128}$. The minimum *tick size*, or price increment in the Treasury-bond market, is generally $\frac{1}{128}$ of a point.) Although bonds are typically traded in denominations of \$1,000 par value, prices are quoted as a percentage of par. Thus, the bid price should be interpreted as 99.8125% of par, or \$988.125 for the \$1,000 par value bond. Similarly, the ask price at which the bond could be sold to a dealer is 99.8281% of par, or \$998.281. The -0.0859 change means that the closing price on this day fell by .0859% of par value (equivalently, by $\frac{11}{128}$ of a point) from the previous day's close. Finally, the yield to maturity based on the ask price is .933%.

The **yield to maturity** reported in the last column is calculated by determining the semiannual yield and then doubling it, rather than compounding it for two half-year periods. This use of a simple interest technique to annualize means that the yield is quoted on an annual percentage rate (APR) basis rather than as an effective annual yield. The APR method in this context is also called the *bond equivalent yield*. We discuss the yield to maturity in more detail in Part Four.



Concept Check 2.1

What were the bid price, ask price, and yield to maturity of the 2% August 2025 Treasury bond displayed in Figure 2.3? What was its ask price the previous day?

LISTING OF TREASURY ISSUES

MATURITY	COUPON	BID	ASKED	CHG	ASKED YLD TO MAT
May 15, 2018	1.000	100.3984	100.4141	-0.0859	0.791
May 15, 2019	0.875	99.8125	99.8281	-0.0859	0.933
Feb 15, 2021	7.875	130.5781	130.5938	-0.2656	1.225
Aug 15, 2025	2.000	102.2813	102.2969	-0.3438	1.730
May 15, 2030	6.250	152.3984	152.4609	-0.7969	1.950
Nov 15, 2041	3.125	111.7891	111.8203	-0.8750	2.496
May 15, 2046	2.500	97.9922	98.0234	-0.9063	2.595

Figure 2.3 Listing of Treasury bonds and notes

Source: Compiled from data obtained from *The Wall Street Journal Online*, May 16, 2016.

Inflation-Protected Treasury Bonds

The best place to start building an investment portfolio is at the least risky end of the spectrum. Around the world, governments of many countries, including the United States, have issued bonds that are linked to an index of the cost of living in order to provide their citizens with an effective way to hedge inflation risk.

In the United States, inflation-protected Treasury bonds are called TIPS (Treasury Inflation Protected Securities). The principal amount on these bonds is adjusted in proportion to increases in the Consumer Price Index. Therefore, they provide a constant stream of income in real (inflation-adjusted) dollars. Yields on TIPS bonds should be interpreted as real or inflation-adjusted interest rates. We return to TIPS bonds in more detail in Chapter 14.

Federal Agency Debt

Some government agencies issue their own securities to finance their activities. These agencies usually are formed to channel credit to a particular sector of the economy that Congress believes might not receive adequate credit through normal private sources.

The major mortgage-related agencies are the Federal Home Loan Bank (FHLB), the Federal National Mortgage Association (FNMA, or Fannie Mae), the Government National Mortgage Association (GNMA, or Ginnie Mae), and the Federal Home Loan Mortgage Corporation (FHLMC, or Freddie Mac). The FHLB borrows money by issuing securities and lends this money to savings and loan institutions to be lent in turn to individuals borrowing for home mortgages.

Although the debt of federal agencies was never explicitly insured by the federal government, it had long been assumed that the government would assist an agency nearing default. Those beliefs were validated when Fannie Mae and Freddie Mac encountered severe financial distress in September 2008. With both firms on the brink of insolvency, the government stepped in, putting them both into conservatorship and assigning the Federal Housing Finance Agency to run the firms; however, it did in fact agree to make good on the firm's bonds.

International Bonds

Many firms borrow abroad and many investors buy bonds from foreign issuers. In addition to national capital markets, there is a thriving international capital market, largely centered in London.

A *Eurobond* is a bond denominated in a currency other than that of the country in which it is issued. For example, a dollar-denominated bond sold in Britain would be called a Eurodollar bond. Similarly, investors might speak of Euroyen bonds, yen-denominated bonds sold outside Japan. Because the European currency is called the euro, the term Eurobond may be confusing. It is best to think of them simply as international bonds.

In contrast to bonds that are issued in foreign currencies, many firms issue bonds in foreign countries but in the currency of the investor. For example, a Yankee bond is a dollar-denominated bond sold in the United States by a non-U.S. issuer. Similarly, Samurai bonds are yen-denominated bonds sold in Japan by non-Japanese issuers.

Municipal Bonds

Municipal bonds are issued by state and local governments. They are similar to Treasury and corporate bonds except that their interest income is exempt from federal income taxation. The interest income also is usually exempt from state and local taxation in the

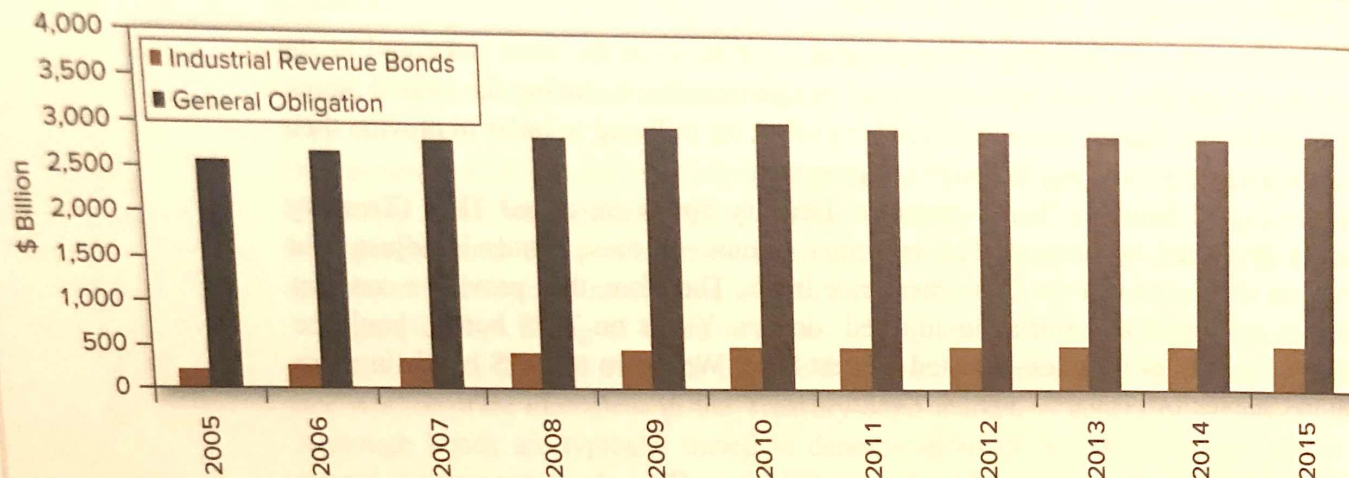


Figure 2.4 Tax-exempt debt outstanding

Source: *Flow of Funds Accounts of the United States*, Board of Governors of the Federal Reserve System, March, 2016.

issuing state. Capital gains taxes, however, must be paid on “munis” when the bonds mature or if they are sold for more than the investor’s purchase price.

General obligation bonds are backed by the “full faith and credit” (i.e., the taxing power) of the issuer, while *revenue bonds* are issued to finance particular projects and are backed either by the revenues from that project or by the particular municipal agency operating the project. Typical issuers of revenue bonds are airports, hospitals, and turnpike or port authorities. Obviously, revenue bonds are riskier in terms of default than general obligation bonds. Figure 2.4 plots outstanding amounts of both types of municipal securities.

An *industrial development bond* is a revenue bond that is issued to finance commercial enterprises, such as the construction of a factory that can be operated by a private firm. In effect, these private-purpose bonds give the firm access to the municipality’s ability to borrow at tax-exempt rates, and the federal government limits the amount of these bonds that may be issued.²

Like Treasury bonds, municipal bonds vary widely in maturity. A good deal of the debt issued is in the form of short-term *tax anticipation notes*, which raise funds to pay for expenses before actual collection of taxes. Other municipal debt is long term and used to fund large capital investments. Maturities range up to 30 years.

The key feature of municipal bonds is their tax-exempt status. Because investors pay neither federal nor state taxes on the interest proceeds, they are willing to accept lower yields on these securities.

An investor choosing between taxable and tax-exempt bonds must compare after-tax returns on each bond. An exact comparison requires a computation of after-tax rates of return that explicitly accounts for taxes on income and realized capital gains. In practice, there is a simpler rule of thumb. If we let t denote the investor’s combined federal plus local marginal tax bracket and r_{taxable} denote the total before-tax rate of return available

²A warning, however: Although interest on industrial development bonds usually is exempt from federal tax, it can be subject to the alternative minimum tax if the bonds are used to finance projects of for-profit companies.

on taxable bonds, then $r_{\text{taxable}}(1 - t)$ is the after-tax rate available on those securities.³ If this value exceeds the rate on municipal bonds, r_{muni} , the investor does better holding the taxable bonds. Otherwise, the tax-exempt municipals provide higher after-tax returns.

One way to compare bonds is to determine the interest rate on taxable bonds that would be necessary to provide an after-tax return equal to that of municipals. To derive this value, we set after-tax yields equal and solve for the **equivalent taxable yield** of the tax-exempt bond. This is the rate a taxable bond must offer to match the after-tax yield on the tax-free municipal.

$$r_{\text{taxable}}(1 - t) = r_{\text{muni}} \quad (2.1)$$

or

$$r_{\text{taxable}} = r_{\text{muni}} / (1 - t) \quad (2.2)$$

Thus the equivalent taxable yield is simply the tax-free rate divided by $1 - t$. Table 2.2 presents equivalent taxable yields for several municipal yields and tax rates.

This table frequently appears in the marketing literature for tax-exempt mutual bond funds because it demonstrates to high-tax-bracket investors that municipal bonds offer highly attractive equivalent taxable yields. Each entry is calculated from Equation 2.2. If the equivalent taxable yield exceeds the actual yields offered on taxable bonds, the investor is better off after taxes holding municipal bonds. Notice that the equivalent taxable interest rate increases with the investor's tax bracket; the higher the bracket, the more valuable the tax-exempt feature of municipals. Thus high-tax-bracket investors tend to hold municipals.

We also can use Equation 2.1 or 2.2 to find the tax bracket at which investors are indifferent between taxable and tax-exempt bonds. The cutoff tax bracket is given by solving Equation 2.2 for the tax bracket at which after-tax yields are equal. Doing so, we find that

$$\text{Cutoff tax bracket} = 1 - \frac{r_{\text{muni}}}{r_{\text{taxable}}} \quad (2.3)$$

Thus the yield ratio $r_{\text{muni}}/r_{\text{taxable}}$ is a key determinant of the attractiveness of municipal bonds. The higher the yield ratio, the lower the cutoff tax bracket, and the more individuals will prefer to hold municipal debt.

Figure 2.5 plots the ratio of 20-year municipal debt yields to the yield on Baa-rated corporate debt. The default risk of these corporate and municipal bonds may be comparable,

Marginal Tax Rate	Tax-Exempt Yield				
	1%	2%	3%	4%	5%
20%	1.25%	2.50%	3.75%	5.00%	6.25%
30	1.43	2.86	4.29	5.71	7.14
40	1.67	3.33	5.00	6.67	8.33
50	2.00	4.00	6.00	8.00	10.00

Table 2.2

Equivalent taxable yields corresponding to various tax-exempt yields

³An approximation to the combined federal plus local tax rate is just the sum of the two rates. For example, if your federal tax rate is 28% and your state rate is 5%, your combined tax rate would be approximately 33%. A more precise approach would recognize that state taxes are deductible at the federal level. Your after-tax proceeds would be $(1 - t_{\text{federal}}) \times (1 - t_{\text{state}})$. In our example, your after-tax proceeds on each dollar earned would be $(1 - .28) \times (1 - .05) = .684$, which implies a combined tax rate of $1 - .684 = .316$, or 31.6%.

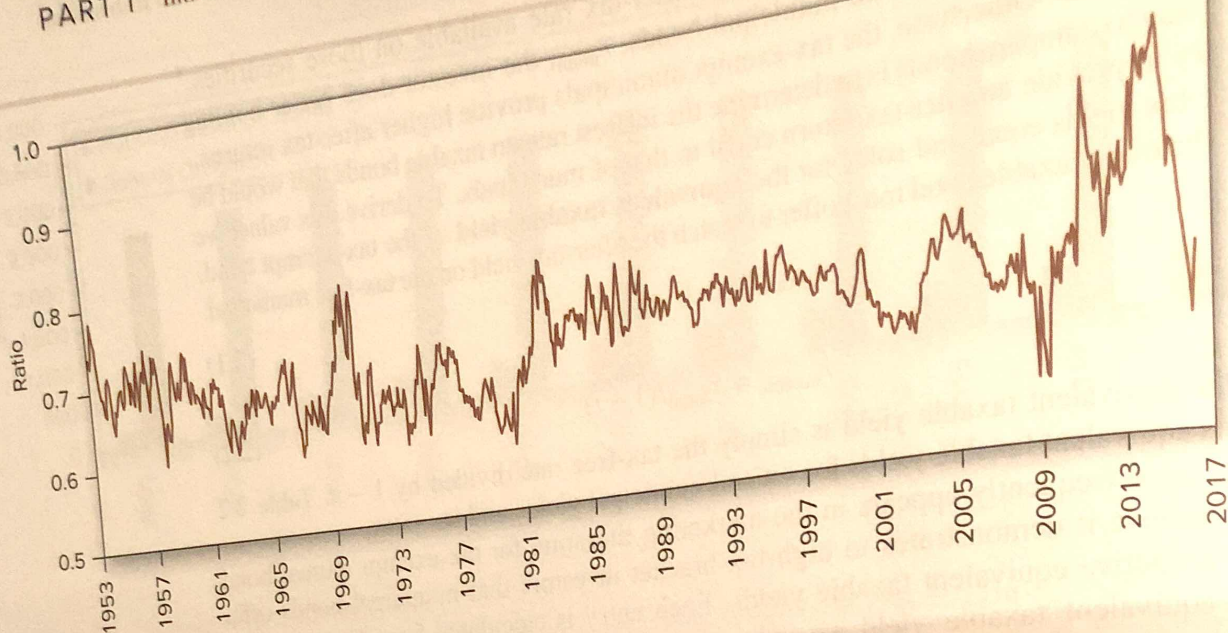


Figure 2.5 Ratio of yields on municipal debt to corporate Baa-rated debt
Source: Authors' calculations, using data from www.federalreserve.gov/releases/h15/data.htm.

but certainly will fluctuate over time. For example, the sharp run-up in the ratio in 2011 probably reflects increased concern at the time about the precarious financial condition of several states and municipalities, leading to higher credit spreads on their bonds.

Example 2.1 Taxable versus Tax-Exempt Yields

Figure 2.5 shows that for most of the last 30 years, the ratio of tax-exempt to taxable yields fluctuated around .70. What does this imply about the cutoff tax bracket above which tax-exempt bonds provide higher after-tax yields? Equation 2.3 shows that an investor whose tax bracket (federal plus local) exceeds $1 - .70 = .30$, or 30%, will derive a greater after-tax yield from municipals. As we pointed out, however, it is difficult to control precisely for differences in the risks of these bonds, so the cutoff tax bracket must be taken as approximate.

✓ Concept Check 2.2

Suppose your tax bracket is 30%. Would you prefer to earn a 6% taxable return or a 4% tax-free return? What is the equivalent taxable yield of the 4% tax-free yield?

Corporate Bonds

Corporate bonds are the means by which private firms borrow money directly from the public. These bonds are similar in structure to Treasury issues—they typically pay semi-annual coupons over their lives and return the face value to the bondholder at maturity. They differ most importantly from Treasury bonds in degree of risk. Default risk is a real consideration in the purchase of corporate bonds, and Chapter 14 discusses this issue

in considerable detail. For now, we distinguish only among *secured bonds*, which have specific collateral backing them in the event of firm bankruptcy; *unsecured bonds*, called *debentures*, which have no collateral; and *subordinated debentures*, which have a lower priority claim to the firm's assets in the event of bankruptcy.

Corporate bonds sometimes come with options attached. *Callable bonds* give the firm the option to repurchase the bond from the holder at a stipulated call price. *Convertible bonds* give the bondholder the option to convert each bond into a stipulated number of shares of stock. These options are treated in more detail in Chapter 14.

Mortgages and Mortgage-Backed Securities

Because of the explosion in mortgage-backed securities, almost anyone can invest in a portfolio of mortgage loans, and these securities have become a major component of the fixed-income market. As described in Chapter 1, a *mortgage-backed security* is either an ownership claim in a pool of mortgages or an obligation that is secured by such a pool. Most pass-throughs have traditionally been comprised of *conforming mortgages*, which means that the loans must satisfy certain underwriting guidelines (standards for the creditworthiness of the borrower) before they may be purchased by Fannie Mae or Freddie Mac. In the years leading up to the financial crisis, however, a large amount of *subprime mortgages*, that is, riskier loans made to financially weaker borrowers, were bundled and sold by “private-label” issuers. Figure 2.6 illustrates the explosive growth of both agency and private-label mortgage-backed securities, at least until the crisis.

In an effort to make housing more affordable to low-income households, Fannie and Freddie had been encouraged to buy subprime mortgage securities. As we saw in Chapter 1, these loans turned out to be disastrous, with trillion-dollar losses spread among banks, hedge funds and other investors, and Freddie and Fannie, which lost billions of dollars on the subprime mortgage pools they had purchased. You can see from Figure 2.6 that starting in 2007, the market in private-label mortgage pass-throughs began to shrink rapidly.

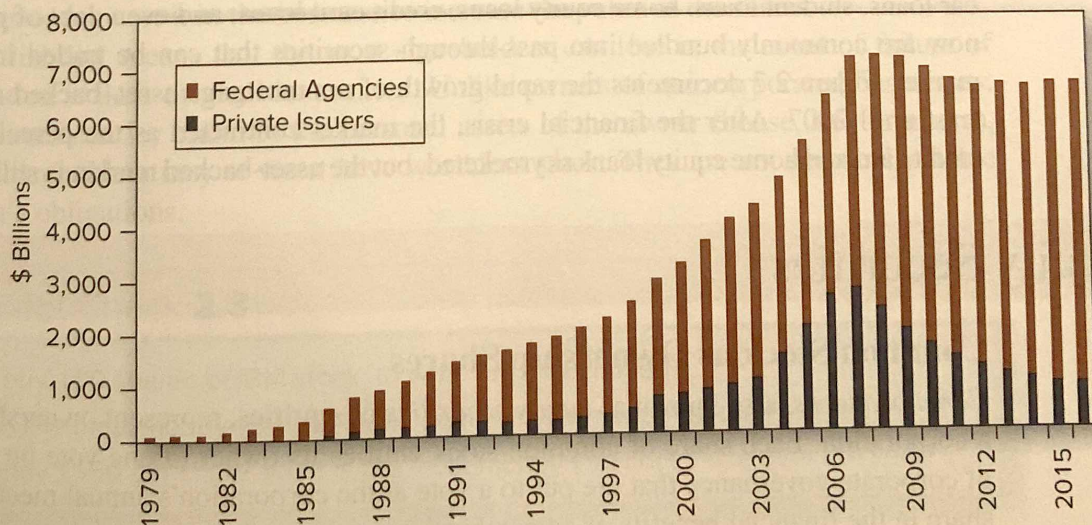


Figure 2.6 Mortgage-backed securities outstanding

Source: Flow of Funds Accounts of the United States, Board of Governors of the Federal Reserve System, March 2016.

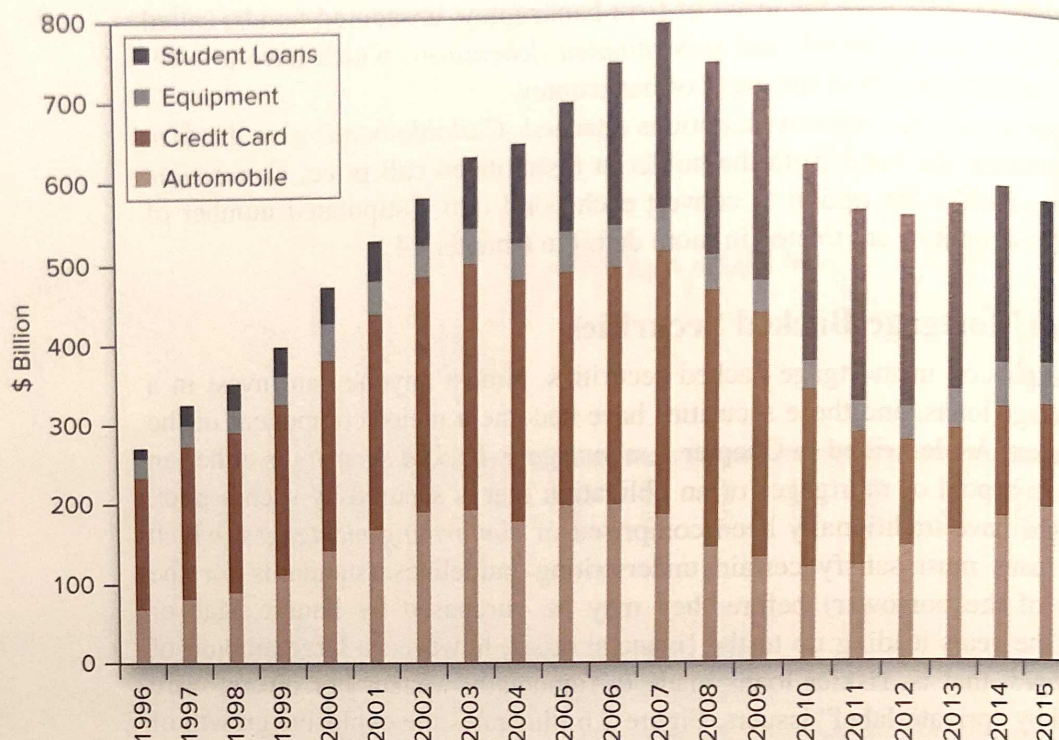


Figure 2.7 Asset-backed securities outstanding

Source: The Securities & Industry and Financial Markets Association, www.sifma.org.

Despite these troubles, few believe that securitization itself will cease, although practices in this market are likely to remain far more conservative than in previous years, particularly with respect to the credit standards that must be met by the ultimate borrower. Indeed, securitization has become an increasingly common staple of many credit markets. For example, car loans, student loans, home equity loans, credit card loans, and even debt of private firms now are commonly bundled into pass-through securities that can be traded in the capital market. Figure 2.7 documents the rapid growth of nonmortgage asset-backed securities, at least until 2007. After the financial crisis, the market contracted as the perceived risks of credit card and home equity loans skyrocketed, but the asset-backed market is still substantial.

2.3 Equity Securities

Common Stock as Ownership Shares

Common stocks, also known as *equity securities* or **equities**, represent ownership shares in a corporation. Each share of common stock entitles its owner to one vote on any matters of corporate governance that are put to a vote at the corporation's annual meeting and to a share in the financial benefits of ownership.⁴

The corporation is controlled by a board of directors elected by the shareholders. The board, which meets only a few times each year, selects managers who actually run

⁴A corporation sometimes issues two classes of common stock, one bearing the right to vote, the other not. Because of its restricted rights, the nonvoting stock might sell for a lower price.

the corporation on a day-to-day basis. Managers have the authority to make most business decisions without the board's specific approval. The board's mandate is to oversee the management to ensure that it acts in the best interests of shareholders.

The members of the board are elected at the annual meeting. Shareholders who do not attend the annual meeting can vote by *proxy*, empowering another party to vote in their name. Management usually solicits the proxies of shareholders and normally gets a vast majority of these proxy votes. Thus, management usually has considerable discretion to run the firm as it sees fit—without daily oversight from the equityholders who actually own the firm.

We noted in Chapter 1 that such separation of ownership and control can give rise to “agency problems,” in which managers pursue goals not in the best interests of shareholders. However, there are several mechanisms that alleviate these agency problems. Among these are compensation schemes that link the success of the manager to that of the firm; oversight by the board of directors as well as outsiders such as security analysts, creditors, or large institutional investors; the threat of a proxy contest in which unhappy shareholders attempt to replace the current management team; or the threat of a takeover by another firm.

The common stock of most large corporations can be bought or sold freely on one or more stock exchanges. A corporation whose stock is not publicly traded is said to be private. In most privately held corporations, the owners of the firm also take an active role in its management. Therefore, takeovers are generally not an issue.

Characteristics of Common Stock

The two most important characteristics of common stock as an investment are its **residual claim** and **limited liability** features.

Residual claim means that stockholders are the last in line of all those who have a claim on the assets and income of the corporation. In a liquidation of the firm's assets the shareholders have a claim to what is left after all other claimants such as the tax authorities, employees, suppliers, bondholders, and other creditors have been paid. For a firm not in liquidation, shareholders have claim to the part of operating income left over after interest and taxes have been paid. Management can either pay this residual as cash dividends to shareholders or reinvest it in the business to increase the value of the shares.

Limited liability means that the most shareholders can lose in the event of failure of the corporation is their original investment. Unlike owners of unincorporated businesses, whose creditors can lay claim to the personal assets of the owner (house, car, furniture), corporate shareholders may at worst have worthless stock. They are not personally liable for the firm's obligations.



Concept Check 2.3

- If you buy 100 shares of IBM stock, to what are you entitled?
- What is the most money you can make on this investment over the next year?
- If you pay \$150 per share, what is the most money you could lose over the year?

Stock Market Listings

Figure 2.8 presents key trading data for a small sample of stocks traded on the New York Stock Exchange. The NYSE is one of several markets in which investors may buy or sell shares of stock. We will examine these markets in detail in Chapter 3.

NAME	SYMBOL	CLOSE	NET CHG	VOLUME	52 WK HIGH	52 WK LOW	DIV	YIELD	P/E	YTD %CHG
Gap	GPS	21.81	0.14	4,948,832	40.64	21.11	0.92	4.22	9.82	-11.70
Gartner	IT	95.91	-1.50	587,975	97.98	77.80	....	....	46.33	5.74
GATX	GMT	44.23	0.03	407,499	57.93	33.53	1.60	3.62	8.90	3.95
Gazit-Globe	GZT	9.24	0.22	2,616	13.22	7.15	....	....	2.70	2.88
GCP Applied Technologies	GCP	22.45	-0.43	399,787	22.99	14.47	....	....	39.47	12.25
Genco Shipping&Trading	GNK	0.65	-0.12	276,030	7.85	0.45	....	....	....dd	-55.09
Generac Holdings	GNRT	7.02	-0.27	100,083	14.82	4.81	....	....	3.11	-25.71
General Cable	GNRC	34.82	0.03	318,868	43.75	26.29	....	....	35.17	16.96
General Dynamics	BGC	15.35	-0.65	851,418	21.31	6.21	0.72	4.69	....dd	14.30
General Electric	GE	142.97	-0.47	1,375,410	153.76	121.61	3.04	2.13	15.39	4.08
		29.87	-0.25	26,458,696	32.05	19.37	0.92	3.08	30.68	-4.11

Figure 2.8 Listing of stocks traded on the New York Stock Exchange

Source: Compiled from data from *The Wall Street Journal Online*, May 10, 2016.

To interpret Figure 2.8, consider the highlighted listing for General Electric. The table provides the ticker symbol (GE), the closing price of the stock (\$29.87), and its change (-\$.25) from the previous trading day. About 26.5 million shares of GE traded on this day. The listing also provides the highest and lowest price at which GE has traded in the last 52 weeks. The .92 value in the Dividend column means that the last quarterly dividend payment was \$.23 per share, which is consistent with annual dividend payments of $$.23 \times 4 = $.92. This corresponds to an annual dividend yield (i.e., annual dividend per dollar paid for the stock) of $.92/29.87 = .0308$, or 3.08%.$

The dividend yield is only part of the return on a stock investment. It ignores prospective **capital gains** (i.e., price increases) or losses. Low-dividend firms presumably offer greater prospects for capital gains, or investors would not be willing to hold these stocks in their portfolios. If you scan Figure 2.8, you will see that dividend yields vary widely across companies.

The P/E ratio, or **price-earnings ratio**, is the ratio of the current stock price to last year's earnings per share. The P/E ratio tells us how much stock purchasers must pay per dollar of earnings that the firm generates. For GE, the ratio of price to earnings is 30.68. The P/E ratio also varies widely across firms. Where the dividend yield and P/E ratio are not reported in Figure 2.8, the firms have zero dividends, or zero or negative earnings. We shall have much to say about P/E ratios in Chapter 18. Finally, we see that GE's stock price has decreased by 4.11% since the beginning of the year.

Preferred Stock

Preferred stock has features similar to both equity and debt. Like a bond, it promises to pay to its holder a fixed amount of income each year. In this sense, preferred stock is similar to an infinite-maturity bond, that is, a perpetuity. It also resembles a bond in that it does not convey voting power regarding the management of the firm. Preferred stock is an equity investment, however. The firm retains discretion to make the dividend payments to the preferred stockholders; it has no contractual obligation to pay those dividends. Instead, preferred dividends are usually *cumulative*; that is, unpaid dividends cumulate and must be paid in full before any dividends may be paid to holders of common stock. In contrast, the firm does have a contractual obligation to make the interest payments on the debt. Failure to make these payments sets off corporate bankruptcy proceedings.

Preferred stock also differs from bonds in terms of its tax treatment for the firm. Because preferred stock payments are treated as dividends rather than interest, they are not tax-deductible expenses for the firm. This disadvantage is somewhat offset by the fact that corporations may exclude 70% of dividends received from domestic corporations in the computation of their taxable income. Preferred stocks therefore make desirable fixed-income investments for some corporations.

Even though preferred stock ranks after bonds in terms of the priority of its claims to the assets of the firm in the event of corporate bankruptcy, it often sells at lower yields than corporate bonds. Presumably, this reflects the value of the 70% dividend exclusion, because the higher risk of preferred stock would tend to result in higher yields than those offered by bonds. Individual investors, who cannot use the tax exclusion, generally will find preferred stock yields unattractive relative to those on other available assets.

Preferred stock is issued in variations similar to those of corporate bonds. It may be callable by the issuing firm, in which case it is said to be *redeemable*. It also may be convertible into common stock at some specified conversion ratio. Adjustable-rate preferred stock is another variation that, like adjustable-rate bonds, ties the dividend to current market interest rates.

Depository Receipts

American Depositary Receipts, or ADRs, are certificates traded in U.S. markets that represent ownership in shares of a foreign company. Each ADR may correspond to ownership of a fraction of a foreign share, one share, or several shares of the foreign corporation. ADRs were created to make it easier for foreign firms to satisfy U.S. security registration requirements. They are the most common way for U.S. investors to invest in and trade the shares of foreign corporations.

2.4 Stock and Bond Market Indexes

Stock Market Indexes

The daily performance of the Dow Jones Industrial Average is a staple portion of the evening news report. Although the Dow is the best-known measure of the performance of the stock market, it is only one of several indicators. Other more broadly based indexes are computed and published daily. In addition, several indexes of bond market performance are widely available.

The ever-increasing role of international trade and investments has made indexes of foreign financial markets part of the general news as well. Thus foreign stock exchange indexes such as the Nikkei Average of Tokyo and the Financial Times index of London are fast becoming household names.

Dow Jones Industrial Average

The Dow Jones Industrial Average (DJIA) of 30 large, "blue-chip" corporations has been computed since 1896. Its long history probably accounts for its preeminence in the public mind. (The average covered only 20 stocks until 1928.)

Originally, the DJIA was calculated as the average price of the stocks included in the index. Thus, one would add up the prices of the 30 stocks in the index and divide by 30. The percentage change in the DJIA would then be the percentage change in the average price of the 30 shares.

This procedure means that the percentage change in the DJIA measures the return (excluding dividends) on a portfolio that invests one share in each of the 30 stocks in the index. The value of such a portfolio (holding one share of each stock in the index) is the sum of the 30 prices. Because the percentage change in the *average* of the 30 prices is the same as the percentage change in the *sum* of the 30 prices, the index and the portfolio have the same percentage change each day.

Because the Dow corresponds to a portfolio that holds one share of each component stock, the investment in each company in that portfolio is proportional to the company's share price. Therefore, the Dow is called a **price-weighted average**.

Example 2.2 Price-Weighted Average

Consider the data in Table 2.3 for a hypothetical two-stock version of the Dow Jones Average. Let's compare the changes in the value of the portfolio holding one share of each firm and the price-weighted index. Stock ABC starts at \$25 a share and increases to \$30. Stock XYZ starts at \$100, but falls to \$90.

Portfolio:	Initial value = \$25 + \$100 = \$125
	Final value = \$30 + \$90 = \$120
	Percentage change in portfolio value = $-5/125 = -.04 = -4\%$
Index:	Initial index value = $(25 + 100)/2 = 62.5$
	Final index value = $(30 + 90)/2 = 60$
	Percentage change in index = $-2.5/62.5 = -.04 = -4\%$

The portfolio and the index have identical 4% declines in value.

Notice that price-weighted averages give higher-priced shares more weight in determining performance of the index. For example, although ABC increased by 20%, while XYZ fell by only 10%, the index dropped in value. This is because the 20% increase in ABC represented a smaller price gain (\$5 per share) than the 10% decrease in XYZ (\$10 per share). The "Dow portfolio" has four times as much invested in XYZ as in ABC because XYZ's price is four times that of ABC. Therefore, XYZ dominates the average. We conclude that a high-price stock can dominate a price-weighted average.

Table 2.3

Data to construct stock price indexes

Stock	Initial Price	Final Price	Shares (million)	Initial Value of Outstanding Stock (\$ million)	Final Value of Outstanding Stock (\$ million)
ABC	\$ 25	\$30	20	\$500	\$600
XYZ	100	90	1	100	90
Total				\$600	\$690

You might wonder why the DJIA is now (in late 2016) at a level of about 19,000 if it is supposed to be the average price of the 30 stocks in the index. The DJIA no longer equals the average price of the 30 stocks because the averaging procedure is adjusted whenever a stock splits or pays a stock dividend of more than 10%, or when one company in the group of 30 industrial firms is replaced by another. When these events occur, the divisor used to compute the "average price" is adjusted so as to leave the index unaffected by the event.

Example 2.3 Splits and Price-Weighted Averages

Suppose XYZ were to split two for one so that its share price fell to \$50. We would not want the average to fall, as that would incorrectly indicate a fall in the general level of market prices. Following a split, the divisor must be reduced to a value that leaves the average unaffected. Table 2.4 illustrates this point. The initial share price of XYZ, which was \$100 in Table 2.3, falls to \$50 if the stock splits at the beginning of the period. Notice that the number of shares outstanding doubles, leaving the market value of the total shares unaffected.

We find the new divisor as follows. The index value before the stock split = $125/2 = 62.5$. We must find a new divisor, d , that leaves the index unchanged after XYZ splits and its price falls to \$50. Therefore, we solve for d in the following equation:

$$\frac{\text{Price of ABC} + \text{Price of XYZ}}{d} = \frac{25 + 50}{d} = 62.5$$

which implies that the divisor must fall from its original value of 2.0 to a new value of 1.20.

Because the split changes the price of stock XYZ, it also changes the relative weights of the two stocks in the price-weighted average. Therefore, the return of the index is affected by the split.

At period-end, ABC will sell for \$30, while XYZ will sell for \$45, representing the same negative 10% return it was assumed to earn in Table 2.3. The new value of the price-weighted average is $(30 + 45)/1.20 = 62.5$, the same as its value at the start of the year; therefore, the rate of return is zero, rather than the -4% return that we calculated in the absence of a split.

The split reduces the relative weight of XYZ because its initial price is lower; because XYZ is the poorer performing stock, the performance of the average is higher. This example illustrates that the implicit weighting scheme of a price-weighted average is somewhat arbitrary, being determined by the prices rather than by the outstanding market values (price per share times number of shares) of the shares in the average.

Stock	Initial Price	Final Price	Shares (million)	Initial Value of Outstanding Stock (\$ million)	Final Value of Outstanding Stock (\$ million)
ABC	\$25	\$30	20	\$500	\$600
XYZ	50	45	2	100	90
Total				\$600	\$690

Table 2.4

Data to construct price indexes after stock split

In the same way that the divisor is updated for stock splits, if one firm is dropped from the average and another firm with a different price is added, the divisor has to be updated to leave the average unchanged by the substitution. By 2016, the divisor for the Dow Jones Industrial Average had fallen to a value of about .146.

Because the Dow Jones averages are based on small numbers of firms, care must be taken to ensure that they are representative of the broad market. As a result, the composition of the average is changed every so often to reflect changes in the economy. Table 2.5 presents the composition of the Dow industrials in 1928 as well as its composition as of mid-2016. The table presents striking evidence of the changes in the U.S. economy in the last 85 years. Many of the “bluest of the blue chip” companies in 1928 no longer exist, and the industries that were the backbone of the economy in 1928 have given way to some that could not have been imagined at the time.

Dow Industrials in 1928	Current Dow Companies	Ticker Symbol	Industry	Year Added to Index
Wright Aeronautical	3M	MMM	Diversified industrials	1976
Allied Chemical	American Express	AXP	Consumer finance	1982
North American	Apple	AAPL	Electronic equipment	2015
Victor Talking Machine	Boeing	BA	Aerospace and defense	1987
International Nickel	Caterpillar	CAT	Construction	1991
International Harvester	Chevron	CVX	Oil and gas	2008
Westinghouse	Cisco Systems	CSCO	Construction	1991
Texas Gulf Sulphur	Coca-Cola	KO	Beverages	1987
General Electric	DuPont	DD	Chemicals	1935
American Tobacco	ExxonMobil	XOM	Oil and gas	1928
Texas Corp	General Electric	GE	Diversified industrials	1907
Standard Oil (NJ)	Goldman Sachs	GS	Investment banking	2013
Sears Roebuck	Home Depot	HD	Home improvement retailers	1999
General Motors	Intel	INTC	Semiconductors	1999
Chrysler	IBM	IBM	Computer services	1979
Atlantic Refining	Johnson & Johnson	JNJ	Pharmaceuticals	1997
Paramount Publix	JPMorgan Chase	JPM	Banking	1991
Bethlehem Steel	McDonald's	MCD	Restaurants	1985
General Railway Signal	Merck	MRK	Pharmaceuticals	1979
Mack Trucks	Microsoft	MSFT	Software	1999
Union Carbide	Nike	NKE	Apparel	2013
American Smelting	Pfizer	PFE	Pharmaceuticals	2004
American Can	Procter & Gamble	PG	Household products	1932
Postum Inc.	Travelers	TRV	Insurance	2009
Nash Motors	UnitedHealth Group	UNH	Health insurance	2012
American Sugar	United Technologies	UTX	Aerospace	1939
Goodrich	Verizon	VZ	Telecommunications	2004
Radio Corp	Visa	V	Electronic payments	2013
Woolworth	Wal-Mart	WMT	Retailers	1997
U.S. Steel	Walt Disney	DIS	Broadcasting and entertainment	1991

Table 2.5

Companies included in the Dow Jones Industrial Average: 1928 and 2016

**Concept Check 2.4**

Suppose the price of XYZ in Table 2.3 increases to \$110, while ABC falls to \$20. Find the percentage change in the price-weighted average of these two stocks. Compare that to the percentage return of a portfolio holding one share in each company.

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The Standard & Poor's 500 Index

The Standard & Poor's Composite 500 (S&P 500) stock index represents an improvement over the Dow Jones Averages in two ways. First, it is a more broadly based index of 500 firms. Second, it is a **market-value-weighted index**. In the case of the firms XYZ and ABC in Example 2.2, the S&P 500 would give ABC five times the weight given to XYZ because the market value of its outstanding equity is five times larger, \$500 million versus \$100 million.

The S&P 500 is computed by calculating the total market value of the 500 firms in the index and the total market value of those firms on the previous day of trading. The percentage increase in the total market value from one day to the next represents the increase in the index. The rate of return of the index equals the rate of return that would be earned by an investor holding a portfolio of all 500 firms in the index in proportion to their market values, except that the index does not reflect cash dividends paid by those firms.

Actually, most indexes today use a modified version of market-value weights. Rather than weighting by total market value, they weight by the market value of *free float*, that is, by the value of shares that are freely tradable among investors. For example, this procedure does not count shares held by founding families or governments. These shares are effectively not available for investors to purchase. The distinction is more important in Japan and Europe, where a higher fraction of shares are held in such non-traded portfolios.

Example 2.4 Value-Weighted Indexes

To illustrate how value-weighted indexes are computed, look again at Table 2.3. The final value of all outstanding stock in our two-stock universe is \$690 million. The initial value was \$600 million. Therefore, if the initial level of a market-value-weighted index of stocks ABC and XYZ were set equal to an arbitrarily chosen starting value such as 100, the index value at year-end would be $100 \times (690/600) = 115$. The increase in the index reflects the 15% return earned on a portfolio consisting of those two stocks held in proportion to outstanding market values.

Unlike the price-weighted index, the value-weighted index gives more weight to ABC. Whereas the price-weighted index fell because it was dominated by higher-price XYZ, the value-weighted index rises because it gives more weight to ABC, the stock with the higher total market value.

Note also from Tables 2.3 and 2.4 that market-value-weighted indexes are unaffected by stock splits. The total market value of the outstanding XYZ stock decreases from \$100 million to \$90 million regardless of the stock split, thereby rendering the split irrelevant to the performance of the index.



Concept Check 2.5

Reconsider companies XYZ and ABC from Concept Check 2.4. Calculate the percentage change in the market-value-weighted index. Compare that to the rate of return of a portfolio that holds \$500 of ABC stock for every \$100 of XYZ stock (i.e., an index portfolio).

A nice feature of both market-value-weighted and price-weighted indexes is that they reflect the returns to straightforward portfolio strategies. If one were to buy shares in each component firm in the index in proportion to its outstanding market value, the value-weighted index would perfectly track capital gains on the underlying portfolio. Similarly, a price-weighted index tracks the returns on a portfolio comprised of an equal number of shares of each firm.

Investors today can easily buy market indexes for their portfolios. One way is to purchase shares in mutual funds that hold shares in proportion to their representation in the S&P 500 or another index. These **index funds** yield a return equal to that of the index and so provide a low-cost passive investment strategy for equity investors. Another approach is to purchase an *exchange-traded fund*, or ETF, which is a portfolio of shares that can be bought or sold as a unit, just as one can buy or sell a single share of stock. Available ETFs range from portfolios that track extremely broad global market indexes all the way to narrow industry indexes. We discuss both mutual funds and ETFs in detail in Chapter 4.

Other U.S. Market-Value Indexes

The New York Stock Exchange publishes a market-value-weighted composite index of all NYSE-listed stocks, in addition to subindexes for industrial, utility, transportation, and financial stocks. These indexes are even more broadly based than the S&P 500. NASDAQ computes a Composite index of more than 3,000 firms traded on the NASDAQ market. The NASDAQ 100 is a subset of the larger firms in the Composite Index, but it accounts for a large fraction of its total market capitalization.

The ultimate U.S. equity index so far computed is the Wilshire 5000 index of the market value of essentially all actively traded stocks in the U.S. At one point, it included more than 5,000 stocks, but today, there are fewer than 4,000 stocks in the index. A similar comprehensive index is published by CRSP (the Center for Research in Security Prices at the University of Chicago).

Equally Weighted Indexes

Market performance is sometimes measured by an equally weighted average of the returns of each stock in an index. Such an averaging technique, by placing equal weight on each return, corresponds to an implicit portfolio strategy that invests equal dollar values in each stock. This is in contrast to both price weighting (which requires equal numbers of shares of each stock) and market-value weighting (which requires investments in proportion to outstanding value).

Unlike price- or market-value-weighted indexes, equally weighted indexes do not correspond to buy-and-hold portfolio strategies. Suppose that you start with equal dollar investments in the two stocks of Table 2.3, ABC and XYZ. Because ABC increases in value by 20% over the year while XYZ decreases by 10%, your portfolio no longer is equally weighted. It is now more heavily invested in ABC. To reset the portfolio to equal weights, you would need to rebalance: Sell off some ABC stock and/or purchase more XYZ stock. Such rebalancing would be necessary to align the return on your portfolio with that on the equally weighted index.

Foreign and International Stock Market Indexes

Development in financial markets worldwide includes the construction of indexes for these markets. Among these are the Nikkei (Japan), FTSE (U.K.; pronounced "footsie"), DAX (Germany), Hang Seng (Hong Kong), and TSX (Canada).

Regional Indexes			
Developed Markets		Countries	
	Emerging Markets	Developed Markets	Emerging Markets
EAFE (Europe, Australia, Far East)	Emerging Markets (EM)	Australia	Brazil
Europe	EM Asia	Austria	Chile
European Monetary Union (EMU)	EM Far East	Belgium	China
Far East	EM Latin America	Canada	Colombia
Kokusai (World excluding Japan)	EM Eastern Europe	Denmark	Czech Republic
Nordic countries	EM Europe	Finland	Egypt
North America	EM Europe and Middle East	France	Greece
Pacific		Germany	Hungary
World		Hong Kong	India
World excluding U.S.		Ireland	Indonesia
		Israel	Korea
		Italy	Malaysia
		Japan	Mexico
		Netherlands	Peru
		New Zealand	Philippines
		Norway	Poland
		Portugal	Russia
		Singapore	South Africa
		Spain	Taiwan
		Sweden	Thailand
		Switzerland	Turkey
		U.K.	
		U.S.	

Table 2.6

Sample of MSCI stock indexes
Source: MSCI, www.msci.com.

A leader in the construction of international indexes has been MSCI (Morgan Stanley Capital International), which computes dozens of country indexes and several regional indexes. Table 2.6 presents many of the indexes computed by MSCI.

Bond Market Indicators

Just as stock market indexes provide guidance concerning the performance of the overall stock market, several bond market indicators measure the performance of various categories of bonds. The three most well-known indexes are those of Merrill Lynch, Barclays, and the Citi Broad Investment Grade Bond Index. Figure 2.9 shows the components of the U.S. fixed-income market in 2016.

The major problem with bond market indexes is that true rates of return on many bonds are difficult to compute because the infrequency with which the bonds trade makes reliable up-to-date prices difficult to obtain. In practice, some prices must be estimated from bond-valuation models. These “matrix” prices may differ from true market values.

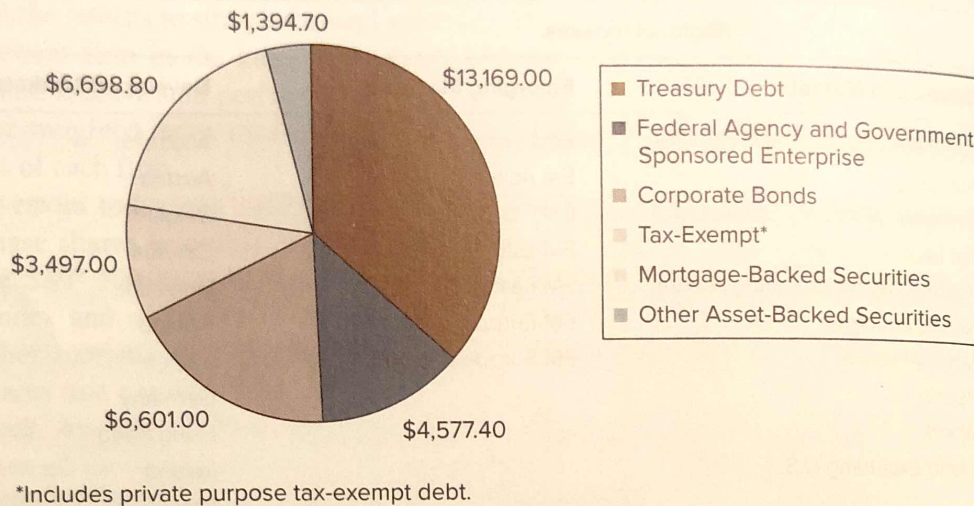


Figure 2.9 The U.S. fixed-income market (values in \$ billions)

Source: *Flow of Funds Accounts of the United States: Flows & Outstandings*, Board of Governors of the Federal Reserve System, March 2016.

2.5 Derivative Markets

Futures, options, and related derivatives contracts provide payoffs that depend on the values of other variables such as commodity prices, bond and stock prices, interest rates, or market index values. For this reason, these instruments sometimes are called **derivative assets**: Their values *derive from* the values of other assets. These assets are also called **contingent claims** because their payoffs are contingent on the value of other values.

Options

A **call option** gives its holder the right to purchase an asset for a specified price, called the **exercise** or **strike price**, on or before a specified expiration date. For example, a July call option on IBM stock with an exercise price of \$150 entitles its owner to purchase IBM stock for a price of \$150 at any time up to and including the expiration date in July. Each option contract is for the purchase of 100 shares. However, quotations are made on a per-share basis. The holder of the call need not exercise the option; it will be profitable to exercise only if the market value of the asset that may be purchased exceeds the exercise price.

When the market price exceeds the exercise price, the option holder may “call away” the asset for the exercise price and reap a payoff equal to the difference between the stock price and the exercise price. Otherwise, the option will be left unexercised. If not exercised before the expiration date of the contract, the option simply expires and no longer has value. Calls therefore provide greater profits when stock prices increase and thus represent bullish investment vehicles.

In contrast, a **put option** gives its holder the right to *sell* an asset for a specified exercise price on or before a specified expiration date. A July put on IBM with an exercise price of \$150 thus entitles its owner to sell IBM stock to the put writer at a price of \$150 at any time before expiration in July, even if the market price of IBM is lower than \$150. Whereas profits on call options increase when the asset increases in value, profits on put options

Expiration	Strike	Call	Put
June	145		
June	150	6.60	1.57
June	155	3.31	3.30
July	145	1.27	6.53
July	150	7.73	2.58
July	155	4.43	4.42
		2.28	7.30

Table 2.7

Prices of stock
options on IBM,
May 10, 2016

Note: IBM stock on this day was \$149.97.

Source: Compiled from data downloaded from Yahoo! Finance, May 10, 2016.

increase when the asset value falls. The put is exercised only if its holder can deliver an asset worth less than the exercise price in return for the exercise price.

Table 2.7 presents prices of IBM options on May 10, 2016. The price of IBM shares on this date was \$149.97. The first two columns give the expiration month and exercise (or strike) price for each option. We have included listings for call and put options with exercise prices of \$145, \$150, and \$155 per share and with expiration dates in June and July 2016.

For example, the July 2016 expiration call with an exercise price of \$150 last traded at \$4.43, meaning that an option to purchase one share of IBM at an exercise price of \$150 sold for \$4.43. Each option *contract* (on 100 shares) therefore cost \$443.

Notice that the prices of call options decrease as the exercise price increases. For example, the July expiration call with exercise price \$155 costs only \$2.28. This makes sense, because the right to purchase a share at a higher price is less valuable. Conversely, put prices increase with the exercise price. The right to sell IBM at a price of \$150 in July costs \$4.42, while the right to sell at \$155 costs \$7.30.

Option prices also increase with time until expiration. Clearly, one would rather have the right to buy IBM for \$150 at any time until July rather than at any time until June. Not surprisingly, this shows up in a higher price for the longer expiration options. For example, the call with exercise price \$150 expiring in July sells for \$4.43 compared to only \$3.31 for the June call.



Concept Check 2.6

What would be the profit or loss per share to an investor who bought the June 2016 expiration IBM call option with exercise price \$150 if the stock price at the expiration date is \$157? What about a purchaser of the put option with the same exercise price and expiration?

Futures Contracts

A **futures contract** calls for delivery of an asset (or in some cases, its cash value) at a specified delivery or maturity date for an agreed-upon price, called the futures price, to be paid at contract maturity. The *long position* is held by the trader who commits to purchasing the asset on the delivery date. The trader who takes the *short position* commits to delivering the asset at contract maturity.

Table 2.8

Corn futures prices
on the Chicago
Mercantile Exchange,
May 10, 2016

Maturity Date	Futures Price
July 2016	\$3.81
September 2016	3.83
December 2016	3.88
March 2017	3.96
May 2017	4.02
July 2017	4.07

Source: www.cmegroup.com.

Table 2.8 presents corn futures contracts on the Chicago Mercantile Exchange on May 10, 2016. Each contract calls for delivery of 5,000 bushels of corn. The first entry is for the nearest term or “front” contract, with maturity in July 2016. The futures price for delivery in May was \$3.81 per bushel.

The trader holding the long position profits from price increases. Suppose that at contract maturity, corn is selling for \$3.83 per bushel. The long position trader

who entered the contract at the futures price of \$3.81 on May 10 would pay the previously agreed-upon \$3.81 for each bushel of corn, which at contract maturity would be worth \$3.83.

Because each contract calls for delivery of 5,000 bushels, the profit to the long position would equal $5,000 \times (\$3.83 - \$3.81) = \$1,000$. Conversely, the short position must deliver 5,000 bushels for the previously agreed-upon futures price. The short position’s loss equals the long position’s profit.

The right to purchase the asset at an agreed-upon price, as opposed to the obligation, distinguishes call options from long positions in futures contracts. A futures contract *obliges* the long position to purchase the asset at the futures price; the call option, in contrast, *conveys the right* to purchase the asset at the exercise price. The purchase will be made only if it yields a profit.

Clearly, a holder of a call has a better position than the holder of a long position on a futures contract with a futures price equal to the option’s exercise price. This advantage, of course, comes only at a price. Call options must be purchased; futures contracts are entered into without cost. The purchase price of an option is called the *premium*. It represents the compensation the purchaser of the call must pay for the ability to exercise the option only when it is profitable to do so. Similarly, the difference between a put option and a short futures position is the right, as opposed to the obligation, to sell an asset at an agreed-upon price.

SUMMARY

1. Money market securities are very short-term debt obligations. They are usually highly marketable and have relatively low credit risk. Their low maturities and low credit risk ensure minimal capital gains or losses. These securities trade in large denominations, but they may be purchased indirectly through money market funds.
2. Much of U.S. government borrowing is in the form of Treasury bonds and notes. These are coupon-paying bonds usually issued at or near par value. Treasury notes and bonds are similar in design to coupon-paying corporate bonds.
3. Municipal bonds are distinguished largely by their tax-exempt status. Interest payments (but not capital gains) on these securities are exempt from federal income taxes. The equivalent taxable yield offered by a municipal bond equals $r_{\text{muni}}/(1 - t)$, where r_{muni} is the municipal yield and t is the investor’s tax bracket.
4. Mortgage pass-through securities are pools of mortgages sold in one package. Owners of pass-throughs receive the principal and interest payments made by the borrowers. The originator that issued the mortgage merely services it and “passes through” the payments to the purchasers of the mortgage. A federal agency may guarantee the payments of interest and principal on

mortgages pooled into its pass-through securities, but these guarantees are absent in private-label pass-throughs.

5. Common stock is an ownership share in a corporation. Each share entitles its owner to one vote on matters of corporate governance and to a prorated share of the dividends paid to shareholders. Stock, or equity, owners are the residual claimants on the income earned by the firm.
6. Preferred stock usually pays fixed dividends for the life of the firm; it is a perpetuity. A firm's failure to pay the dividend due on preferred stock, however, does not precipitate corporate bankruptcy. Instead, unpaid dividends simply cumulate. Variants of preferred stock include convertible and adjustable-rate issues.
7. Many stock market indexes measure the performance of the overall market. The Dow Jones averages, the oldest and best-known indicators, are price-weighted indexes. Today, many broad-based, market-value-weighted indexes are computed daily. These include the Standard & Poor's 500 stock index, the NYSE index, the NASDAQ index, the Wilshire 5000 index, and indexes of many non-U.S. stock markets.
8. A call option is a right to purchase an asset at a stipulated exercise price on or before an expiration date. A put option is the right to sell an asset at some exercise price. Calls increase in value while puts decrease in value as the price of the underlying asset increases.
9. A futures contract is an obligation to buy or sell an asset at a stipulated futures price on a maturity date. The long position, which commits to purchasing, gains if the asset value increases while the short position, which commits to delivering, loses.

money market
capital markets
ask price
bid price
bid-ask spread
certificate of deposit
commercial paper
banker's acceptance
Eurodollars
repurchase agreements
federal funds

London Interbank Offered
Rate (LIBOR)
Treasury notes
Treasury bonds
yield to maturity
municipal bonds
equivalent taxable yield
equities
residual claim
limited liability
capital gains

price-earnings ratio
preferred stock
price-weighted average
market-value-weighted index
index funds
derivative assets
(or contingent claims)
call option
exercise (or strike) price
put option
futures contract

KEY TERMS

Equivalent taxable yield: $\frac{r_{\text{muni}}}{1 - \text{tax rate}}$, where r_{muni} is the rate on tax-free municipal debt

KEY EQUATIONS

Cutoff tax rate (for indifference to taxable versus tax-free bonds): $1 - \frac{r_{\text{muni}}}{r_{\text{taxable}}}$

PROBLEM SETS

1. In what ways is preferred stock like long-term debt? In what ways is it like equity?
2. Why are money market securities sometimes referred to as "cash equivalents"?
3. Which of the following *correctly* describes a repurchase agreement?
 - a. The sale of a security with a commitment to repurchase the same security at a specified future date and a designated price.
 - b. The sale of a security with a commitment to repurchase the same security at a future date left unspecified, at a designated price.
 - c. The purchase of a security with a commitment to purchase more of the same security at a specified future date.

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SCHWESER