

# Chapter 2      Asset Classes and Financial Instruments

## ● Chapter Objectives

- Distinguish among the major assets that trade in money markets and in capital markets.
- Describe the construction of stock market indexes.
- Calculate the profit and loss on investments in options and futures contracts.

- A selection of the markets, instruments, and indexes covered in this chapter appears in Table 2.1.

**TABLE 2.1**

**Financial markets and indexes**

short-term

**The money market**

Treasury bills  
 Certificates of deposit  
 Commercial paper  
 Bankers' acceptances  
 Eurodollars  
 Repos and reverses  
 Federal funds  
 Brokers' calls

**Indexes**

Dow Jones averages  
 Standard & Poor's indexes  
 Bond market indicators  
 International indexes

long-term

**The bond market**

Treasury bonds and notes  
 Federal agency debt  
 Municipal bonds  
 Corporate bonds  
 Mortgage-backed securities

**Equity markets**

Common stocks  
 Preferred stocks

**Derivative markets**

Options  
 Futures and forwards  
 Swaps

## 2.1 The Money Market

- The **money market** is a subsector of the debt market.
  - ◆ It includes short-term, highly liquid, and relatively low-risk debt instrument.
  - ◆ Many of these securities trade in large **denominations** and so are out of the reach of individual investors.
- Money market mutual 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 holder receives from the government a payment equal to the face value of the bill.

- ◆ The difference between the purchase price and the ultimate maturity value represents the investor's earnings.
- T-bills are issued with initial maturities of 4, 13, 26, or 52 weeks.
- Individuals can purchase T-bills directly from the Treasury 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 little 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 more common.
- While the income earned on T-bills is taxable at the federal level, it is exempt from all state and local taxes, another characteristic distinguishing T-bills from other money market instruments.

- Figure 2.2 is a partial listing of T-bills from *The Wall Street Journal* online (look for *Market Data* tab and then *Money Rates* under *Additional Data*).

<b>Treasury Bills</b>					
<b>MATURITY</b>	<b>DAYS TO MATURITY</b>	<b>BID</b>	<b>ASKED</b>	<b>CHG</b>	<b>ASKED YIELD</b>
Nov 28 14	73	0.010	0.005	−0.005	0.005
Jan 02 15	108	0.015	0.010	0.000	0.010
Mar 12 15	177	0.045	0.040	0.000	0.041
May 28 15	254	0.045	0.040	−0.005	0.041
Jul 23 15	310	0.080	0.075	0.000	0.076

Source: *The Wall Street Journal Online*, September 16, 2014

- ◆ 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 asked prices.

- ◆ The *asked 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-asked spread* is the difference in these prices, which is the dealer's source of profit.
- ◆ 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 par value.
- ◆ An example:
  - ✓ For the highlighted bill maturing on March 12, days to maturity are 177 and the yield under the column labeled ASKED is given as 0.040%. This means that a dealer was willing to sell the bill at a discount from face value of  $0.040\% \times (177/360) = .0197\%$ . So a bill with \$10,000 face value could be purchased for  $\$10,000 \times (1 - .000197) = \$9,998.033$ .

- ✓ Similarly, on the basis of the bid yield of 0.045%, a dealer would be willing to *purchase* the bill for  $\$10,000 \times [1 - .00045 \times (177/360)] = \$9,997.788$ .
- ✓ Notice that prices and yields are inversely related, so the higher bid *yield* reported in Figure 2.1 implies a lower bid *price*.
- ◆ 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.
- ◆ Bond-equivalent yield
  - ✓ An investor who buys the bill for the asked price and holds it until maturity will see her investment grow over 177 days by a multiple of  $\$10,000/\$9,998.033 = 1.000197$ , for a gain of .0197%.
  - ✓ Annualizing this return using a 365-day year results in a yield of  $.0197\% \times 365/177 = .041\%$ , which is the value reported in the last column under “ASK YLD.” This last value is called the Treasury bill’s ***bond-equivalent yield***.

## ● Certificates of Deposit

- A **certificate of deposit** (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 larger 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 three months or more.
- CDs are treated as bank deposits by the Federal Deposit Insurance Corporation, so they are 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 directly to the public, rather than borrowing from banks. These notes are called **commercial paper** (CP).
  - ◆ Sometimes, commercial paper (CP) 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.
  - ◆ CP maturities range up to 270 days.
  - ◆ CP most commonly is issued with maturities of less than one or two months in denominations of multiples of \$100,000.
    - ✓ Therefore, small investors can invest in commercial paper only indirectly, through money market mutual funds.
- CP is considered to be a fairly safe asset, given that a firm's condition presumably can be monitored and predicted over a term as short as one month.
  - ◆ CP trades in secondary markets and so is quite liquid.
  - ◆ Most issues are rated by at least one agency such as Standard & Poor's.

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

## ● Bankers' Acceptances

- A **bankers' 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 six months.
  - ◆ At this stage, it is like 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 much like any other claim on the bank.
- Bankers’ acceptances are considered very safe assets, as they allow traders to 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 Board.

- Despite the tag “Euro,” these accounts need not be in European banks.
- Most Eurodollar deposits are for large sums, and most are time deposits of less than six months’ maturity.
- A variation on the Eurodollar time deposit is the Eurodollar certificate of deposit.
  - ◆ A Eurodollar CD resembles a domestic bank CD except 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 so offer higher yields.
- Firms also issue Eurodollar bonds, that is, dollar-denominated bonds outside the U.S.
  - ◆ Such bonds are not a money market investment by virtue 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 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 one-day loan from the investor.
    - ✓ The securities serve as collateral for the loan.
- A **term repo** is essentially an identical transaction, except 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 with an agreement to resell them at a specified higher price on a future date.

## ● Brokers' Calls (Broker's Call Loans)

- 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 one percentage point higher than the rate on short-term T-bills.

## ● Federal Funds

- Banks maintain deposits of their own at the Federal Reserve Bank, or the Fed.
  - ◆ Each member bank of the Federal Reserve System 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*.
  - ◆ 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 rates ~~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.

## ● The LIBOR Market

- The **London Interbank Offer Rate (LIBOR)** is the rate at which large banks in London are willing to lend money among themselves.
- This rate has become the premier short-term interest rate quoted in the European money market and serves as a reference rate for a wide range of transactions.
- ◆ For example, a corporation might borrow at a rate equal to LIBOR plus two percentage points.

- 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 Offer Rate) at which banks in the euro zone are willing to lend euros among themselves.

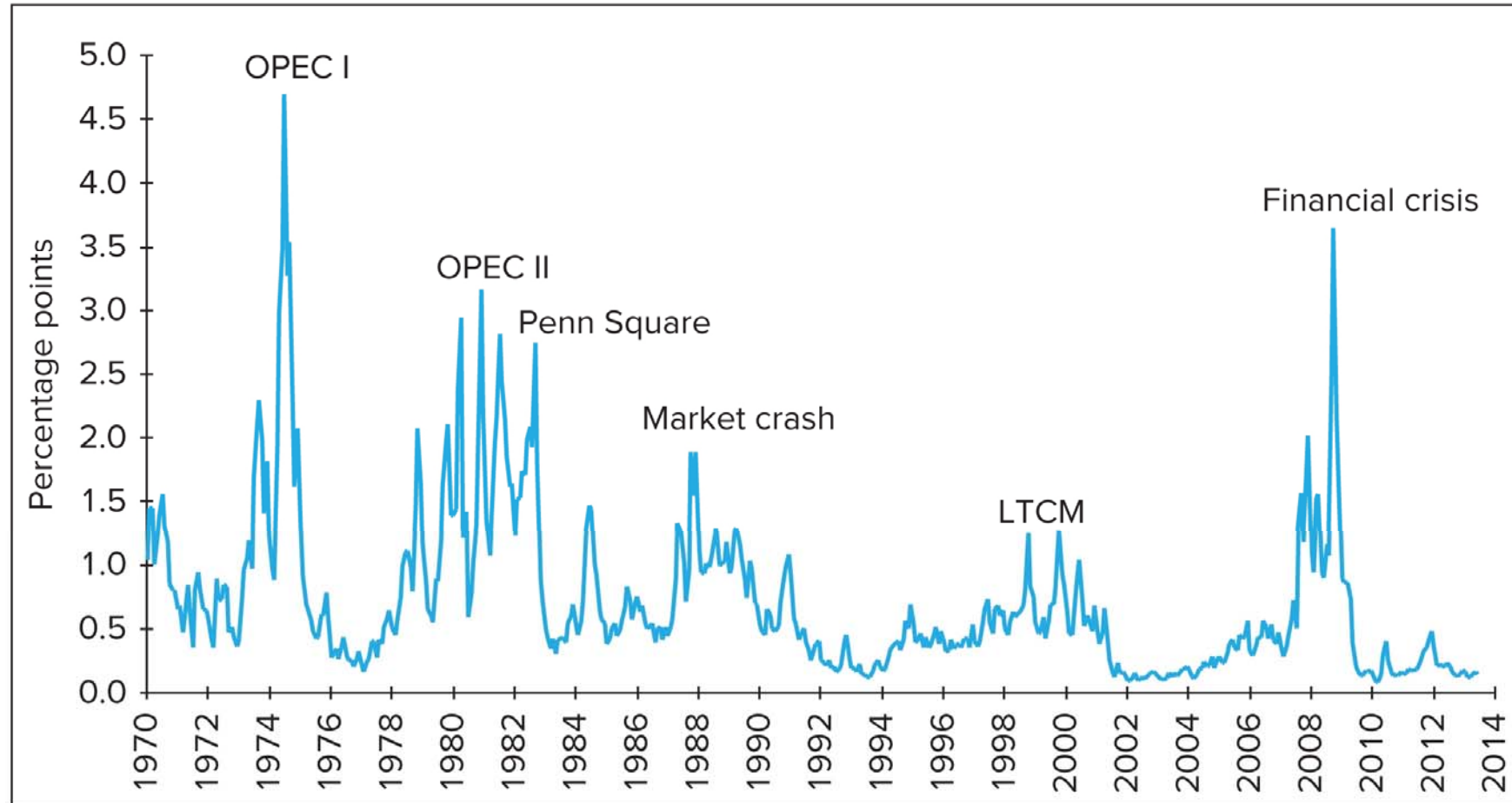
## ● **Yields on Money Market Instruments**

- Although most money market securities are of low risk, they are not risk-free.
- The securities of the money market promise yields greater than those on default-free T-bills, at least in part because of their greater relative risk.
- Investors who require more liquidity also will accept lower yields on securities, such as T-bills, that can be more quickly and cheaply sold for cash.



- Figure 2.2 shows that bank CDs, for example, consistently have paid a risk premium over T-bills.

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- ◆ As Figure 2.2 shows, that premium increases with economic crises such as the energy price shocks associated with the Organization of Petroleum Exporting Countries (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 resulting from the breakdown of the subprime mortgage market beginning in 2007.
- ◆ 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 the Treasury bill rate, also peaked during the financial crisis.

## 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 stream of income that is determined according to a specified formula.

### ● Treasury Notes and Bonds

- Debt obligations of the federal government with original maturities of one year or more
- The U.S. government borrows funds in large part by selling **Treasury notes** and **bonds**.
  - ◆ **T-notes** are issued with original maturities ranging up to **10 years**.
  - ◆ **T-bonds** are issued with maturities ranging from **10 to 30 years**.
  - ◆ Both bonds and notes may be issued in increments of \$100, but far more commonly trade in denominations of \$1,000.
  - ◆ Both bonds and notes make semiannual interest payments called *coupon payments*.

- Figure 2.4 is an excerpt from a listing of Treasury issues in *The Wall Street Journal Online*.

MATURITY	COUPON	BID	ASKED	CHG	ASKED YLD TO MATURITY
2015 Feb 15	4.000	101.6250	101.6328	−0.0078	0.046
2017 May 15	4.500	109.3516	109.3750	0.0234	0.927
2020 Feb 15	3.625	108.8906	108.9375	0.0938	1.880
2025 Feb 15	7.625	146.1719	146.2500	0.2031	2.541
2030 May 15	6.250	141.3125	141.3906	0.2734	2.934
2036 Feb 15	4.500	121.3359	121.4141	0.2578	3.121
2044 Aug 15	3.125	95.9297	95.9922	0.1875	3.338

Source: Compiled from data from *The Wall Street Journal Online*, September 16, 2014

- ◆ The highlighted bond matures in May 2017.
- ◆ The coupon income or interest paid by the bond is 4.5% of par value, meaning that for a \$1,000 face value bond, \$45 in annual interest payments will be made in two semiannual installments of \$22.50 each.

- ◆ The bid price of the highlighted bond is 109.3516.
  - ✓ This is the decimal version of  $109(45/128)$ .
  - ✓ The minimum *tick size*, or price increment in the Treasury bond market, is generally  $1/128$  of a point.
- ◆ Although bonds are typically traded in denominations of \$1,000 par value, prices are quoted as a percentage of par value.
  - ✓ Thus, the bid price should be interpreted as 109.3516% of par or \$1,093.516 for the \$1,000 par value bond.
  - ✓ Similarly, the ask price at which the bond could be sold to a dealer is 109.375% of par, or \$1,093.75.
- ◆ The 0.0234 change means that the asked price on this day increased by 0.0234% of par value (equivalently, by  $3/128$  of a point) from the previous day's close.
- ◆ Finally, the yield to maturity on the bond based on the asked price is 0.927%.

◆ The *yield to maturity* reported in the last column is a measure of the annualized rate of return to an investor who buys the bond for the asked price and holds it until maturity.

✓ It accounts for both coupon income as well as the difference between the purchase price of the bond and its final value of \$1,000 at maturity.

## ● Inflation-Protected Treasury Bonds

■ Around the world, governments of many countries, including the U.S., 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 Consumer Price Index.

◆ Therefore, they provide a constant stream of income in real (inflation-adjusted) dollars, and the real interest rates you earn on these securities are risk-free if you hold them to maturity.

## ● Federal Agency Debt

- Some government agencies issue their own securities to finance their activities.
  - ◆ These agencies usually are formed for public policy reasons to channel credit to a particular sector of the economy that Congress believes is not receiving adequate credit through normal private sources.
- The major mortgage-related agencies are as follows:
  - ◆ The Federal Home Loan Bank (FHLB)
  - ◆ The Federal National Mortgage Association (FNMA, or Fannie Mae)
  - ◆ The Government National Mortgage Association (GNMA, or Ginnie Mae)
  - ◆ The Federal Home Loan Mortgage Corporation (FHLMC, or Freddie Mac)
- Although the debt of federal agencies is not explicitly insured by the federal government, it has long been assumed the government would assist an agency nearing default.
  - ◆ Those beliefs were validated when Fannie Mae and Freddie Mac actually encountered severe financial distress in September 2008.

- ✓ With both firms on the brink of insolvency, the government stepped in and put them both into conservatorship, assigned the Federal Housing Finance Agency to run the firms, but 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 market, there
- 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.
- Since the new European currency is called the *euro*, the term *Eurobond* may be confusing.
  - ◆ It is best to think of Eurobonds 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 U.S. by a non-U.S. issuer.
  - ◆ Similarly, Samurai bonds are yen-denominated bonds sold in Japan by non-Japanese issuers.

## ● **Municipal Bonds**

- **Municipal bonds** (“munis”) are issued by state and local governments.
- They are similar to Treasury and corporate bonds, except their interest income is exempt from federal income taxation and from state and local taxation in the issuing state.
  - ◆ Capital gains taxes, however, must be paid on munis if the bonds mature or are sold for more than the investor’s purchase price.

- There are basically two types of municipal bonds.
  - ◆ *General obligation bonds* are backed by the “full faith and credit” (i.e., the taxing power) of the issuer.
  - ◆ *Revenue bonds* are issued to finance particular projects and are backed either by the revenues from that project or by the municipal agency operating the project.
- Revenue bonds are riskier in terms of default than general obligation bonds.
- 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, this device gives 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.
- 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* that raise funds to pay for expenses before actual collection of taxes.
  - ◆ Other municipal debt may be 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 needs to compare after-tax returns on each bond.
  - ◆ An exact comparison requires the computation of after-tax rates of return with explicit recognition of 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 rate and  $r$  denote the total before-tax rate of return available on taxable bonds, then  $r(1 - t)$  is the after-tax rate available on those securities.
      - If  $r(1 - t)$  exceeds the rate on municipal bonds,  $r_m$ , the investor does better holding the taxable bonds.
      - If  $r(1 - t)$  is less than  $r_m$ , the tax-exempt municipals provide higher after-tax returns.

- One way of comparing 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 would need to offer in order to match the after-tax yield on the tax-free municipal.

$$r(1 - t) = r_m \quad (2.1)$$

or

$$r = \frac{r_m}{1-t} \quad (2.2)$$

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.

<div> <b>TABLE 2.2</b>           Equivalent taxable yields corresponding to various tax-exempt yields         </div>					
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	7.15
40	1.67	3.33	5.00	6.67	8.33
50	2.00	4.00	6.00	8.00	10.00

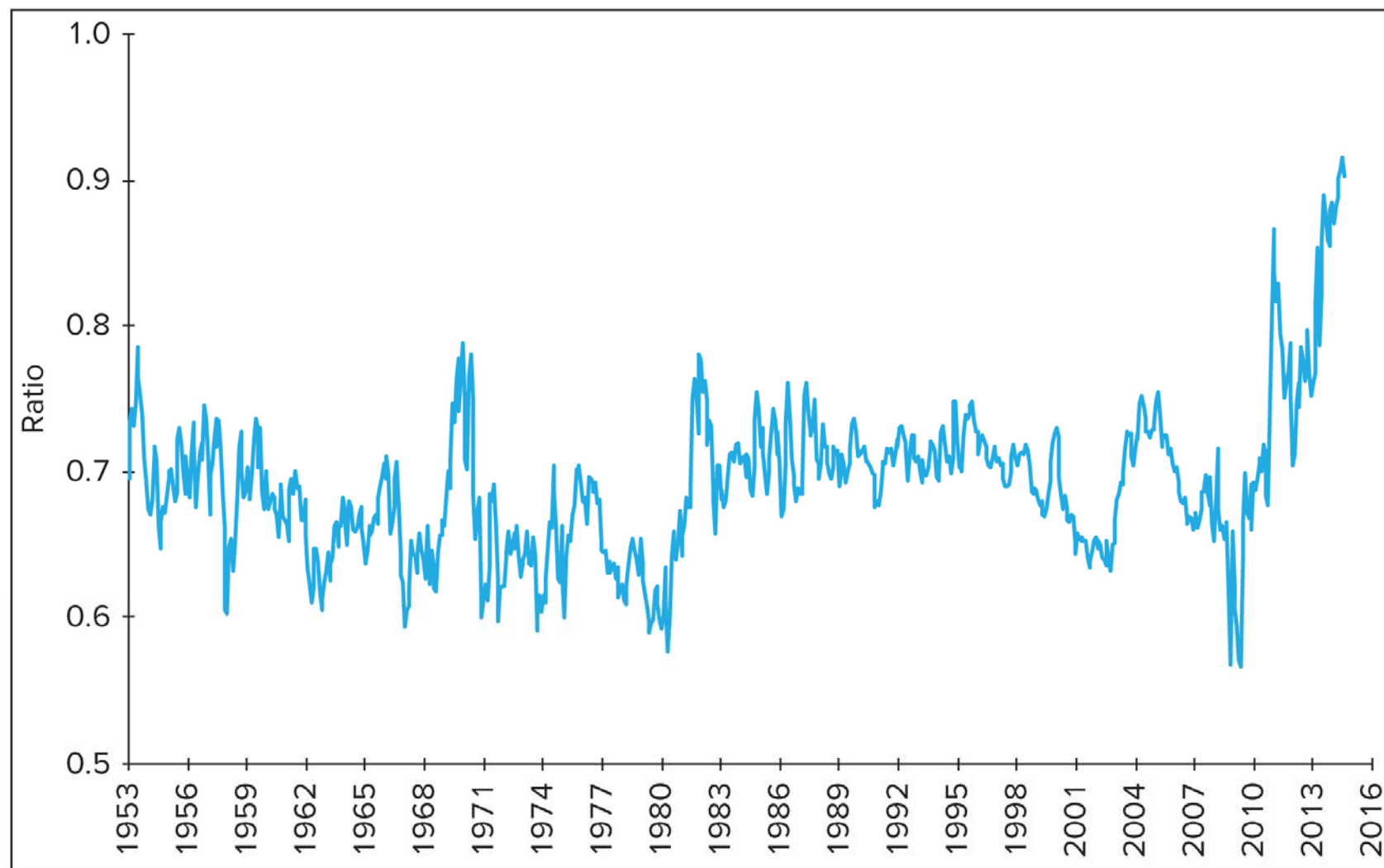
- ✓ Each entry is calculated from Equation 2.2.

- ✓ If the equivalent taxable yield exceeds the actual yields offered on taxable bonds, after taxes the investor is better off holding municipal bonds.
- ✓ 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-bracket individuals 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 2.1 for the tax bracket at which after-tax yields are equal. Doing so, we find

$$t = 1 - \frac{r_m}{r} \quad (2.3)$$

- ◆ Thus, the yield ratio  $r_m/r$  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.



Source: [www.federalreserve.gov/releases/h15/data.htm](http://www.federalreserve.gov/releases/h15/data.htm).

◆ The default risk on these bonds may be roughly comparable in many periods but certainty will fluctuate over time.

✓ For example, the sharp run-up in the ratio starting 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 (until 2011), the ratio of tax-exempt to taxable yields fluctuated around .75. 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 combined tax bracket (federal plus local) exceeds  $1 - .75 = .25$  or 25%, will derive a greater after-tax yield from municipals.

✓ As we point 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.



## ● Corporate Bonds

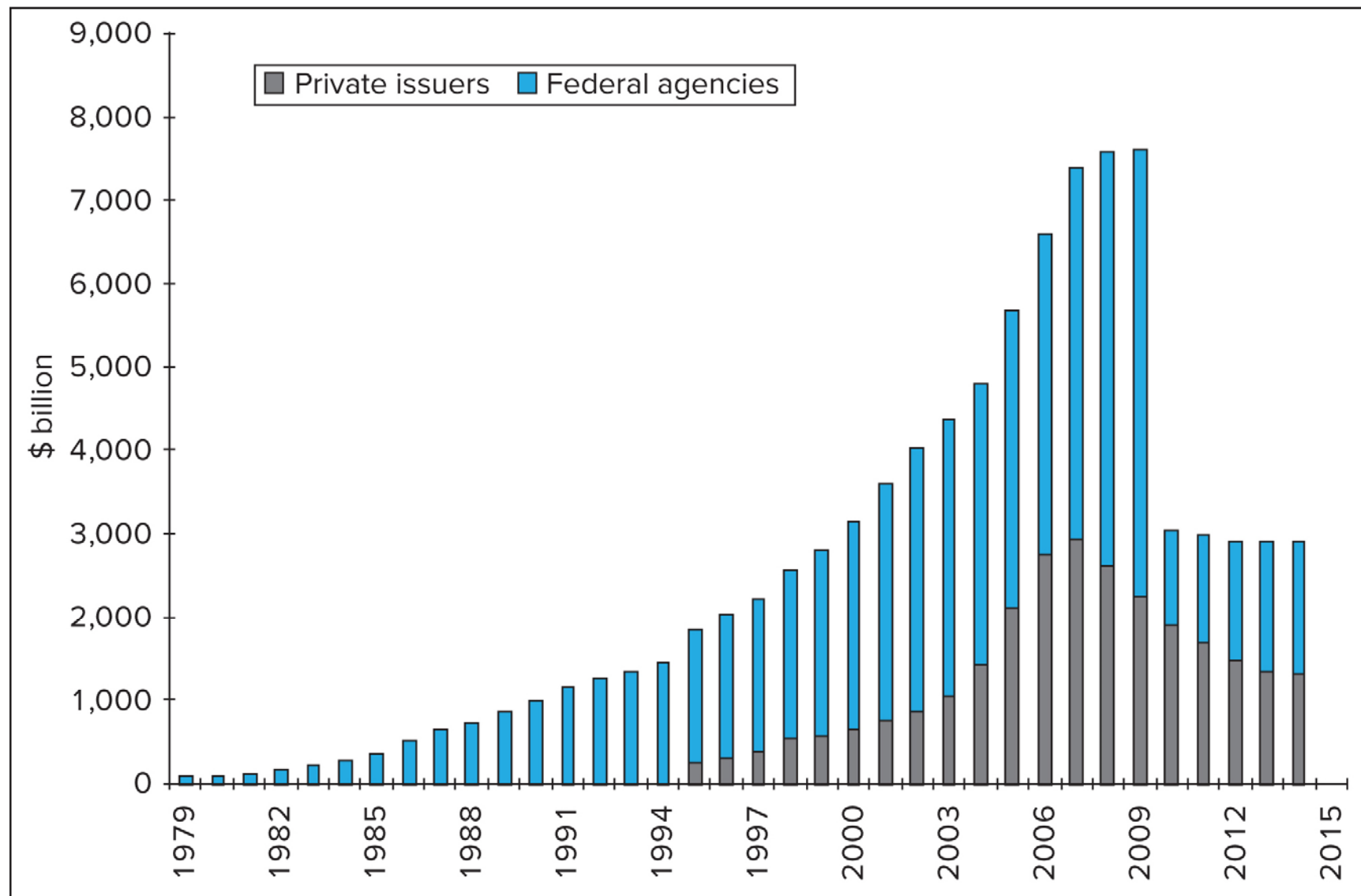
- **Corporate bonds** are the means by which private firms borrow money directly from the public.
  - ◆ These bonds are structured much like Treasury issues in that they typically pay semiannual coupons over their lives and return the face value to the bondholder at maturity.
  - ◆ Where they differ most importantly from Treasury bonds is in risk.
- Default risk is a real consideration in the purchase of corporate bonds.
- Secured bonds have specific collateral backing them in the event of firm bankruptcy.
- Unsecured bonds, called *debentures*, have no collateral.
- Subordinated debentures 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.

## ● **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 traditionally comprised *conforming mortgages*, which meant that the loans had to satisfy certain **underwriting** guidelines (standards for the creditworthiness of the borrower) before they could 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 these securities, at least until the crisis.



Source: *Flow of Funds Accounts of the U.S.*, Board of Governors of the Federal Reserve System, June 2014

- In an effort to make housing more affordable to low-income households, the government-sponsored enterprises were encouraged to buy subprime mortgage securities.
  - ◆ These loans turned out to be disastrous, with trillion-dollar losses spread among banks, hedge funds and other investors, and Freddie Mac and Fannie Mae, which lost billions of dollars on the subprime mortgages 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.
  - ◆ Agency pass-throughs shrank even more **precipitously** following an agreement for Freddie and Fannie to wind down purchases of mortgages for new pass-throughs.
  - ◆ At the same time, existing pass-throughs shrank as healthy loans were paid off and delinquent loans were removed from outstanding pools.

## 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 owners to one vote on any matters of corporate governance put to a vote at the corporation's annual meeting and to a share in the financial benefits of ownership (e.g., the right to any dividends that the corporation may choose to distribute).
- A 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 run the corporation on a day-to-day basis.
  - ◆ Managers have the authority to make most business decisions without the board's approval.
  - ◆ The board's mandate is to oversee 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 designed to alleviate these agency problems. Among these are:
    - ✓ Compensation schemes that link the success of the manager to that of the firm
    - ✓ Over-sight 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
- ✓ 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 of the stock markets.
  - ◆ 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. Takeovers generally are not an issue.

## ● Characteristics of Common Stock

- The two most important characteristics of common stock as an investment are its residual claim and its limited liability features.
- **Residual claim** means 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 claim to what is left after paying all other claimants, such as the tax authorities, employees, suppliers, bondholders, and other creditors.

- ◆ In a going concern, shareholders have claim to the part of operating income left after interest and income taxes have been paid.

- ✓ Management either can 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 event of the failure of the corporation ~~is~~ their original investment.

- ◆ Shareholders<sup>in</sup> are not like owners of unincorporated businesses, whose creditors can lay claim to the personal assets of the owner—such as houses, cars, and furniture.

- ◆ In the event of the firm's bankruptcy, corporate stockholders at worst have worthless stock. They are not personally liable for the firm's obligations: Their liability is limited.

## ● 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.



G	SYMBOL	CLOSE	NET CHG	VOLUME	52 WEEK HIGH	52 WEEK LOW	DIV	YIELD	PE	YTD % CHG
Gap	GPS	44.12	0.09	2,696,353	46.84	36.13	0.88	1.99	15.99	12.90
Gartner	IT	76.36	0.02	372,214	76.82	56.57	....	....	36.71	7.47
GasLog	GLOG	24.91	1.11	1,291,997	32.44	14.02	0.48	1.93	40.84	45.76
GasLog Partners	GLOP	31.59	1.24	34,738	37.39	25.50	....	....	0.04	20.99
GATX	GMT	64.10	0.83	259,151	69.87	45.27	1.32	2.06	14.54	22.87
Gazit-Globe	GZT	12.61	0.26	7,478	14.07	12.12	....	....	1.69	−5.97
GenCorp	GY	17.31	−0.01	451,629	19.77	15.01	....	....	7.58	−3.94
Generac Holdings	GNRC	42.72	−0.53	651,462	62.50	39.01	....	....	15.82	−24.58
General Cable	BGC	20.47	−0.16	983,060	34.61	20.21	0.72	3.52	....dd	−30.40
General Dynamics	GD	127.75	0.90	1,244,284	128.34	83.61	2.48	1.94	19.30	33.70
General Electric	GE	26.21	0.29	27,026,512	28.09	23.50	0.88	3.36	18.23	−6.49

Note: dd means that P/E cannot be computed because earnings were negative.

Source: Compiled from data from *The Wall Street Journal Online*, September 17, 2014

◆ 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 (\$26.21), and its change (+\$0.29) from the previous trading day.
- ✓ Over 27 million shares of GE traded on this day.
- ✓ The table also provides the highest and lowest price at which GE has traded in the last 52 weeks.

- ✓ The .88 value in the DIV column means that the last quarterly dividend payment was \$.22 per share, which is consistent with annual dividend payments of  $$.22 \times 4 = $.88$ .
- ✓ This corresponds to a dividend yield (i.e., annual dividend per dollar paid for the stock) of  $.88/26.21 = .0336$  or 3.36%.
- ◆ The dividend yield is only part of the return on a stock investment.
  - ✓ It ignores prospective *capital gains* (i.e., price increases) or losses.
- ◆ Shares in 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 can Figure 2.8, you will see that dividend yields vary widely across companies.
- ◆ The P/E ratio, or price-to-earnings ratio, is the ratio of the current stock price to last year's earnings.
  - ✓ The P/E ratio tells us how much stock purchasers must pay per dollar of earnings the firm generates for each share.
  - ✓ For GE, the ratio of price to earnings is 18.23.

- ✓ 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.
- ✓ Finally, we see that GE's stock price has declined by 6.49% 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 stream 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 give the holder voting power regarding the firm's management.
- ◆ 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 timely 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 as interest on debt, they are not tax-deductible expenses for the firm.
  - ◆ This disadvantage is largely 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 claim to the assets of the firm in the event of corporate bankruptcy, preferred stock often sells at lower yields than corporate bonds.
  - ◆ Presumably this reflects the value of the 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 70% exclusion, generally will find preferred stock yields unattractive relative to those on other available assets.
- Corporations issue preferred stock in variations similar to those of corporate bonds.
  - ◆ Preferred stock can be **callable** by the issuing firm, in which case it is said to be *redeemable*.
  - ◆ It also can be convertible into common stock at some specified conversion ratio.
  - ◆ A relatively recent innovation is adjustable-rate preferred stock, which, like adjustable-rate bonds, ties the dividend rate 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.
  - ◆ While 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.
  - ◆ Thus, foreign stock exchange indexes such as the Nikkei Average of Tokyo or the *Financial Times* index of London have become household names.

### ● Dow Jones Averages

- The Dow Jones Industrial Average (DJIA) of 30 large, “blue-chip” corporations has been computed since 1896.

- Originally, the DJIA was calculated as the simple average of the stocks included in the index.
  - ◆ So, if there were 30 stocks in the index, one would add up the value of the 30 stocks 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 any dividends paid) 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.



- The Dow measures the return (excluding dividends) on a portfolio that holds one share of each stock.
  - ◆ The amount of money invested in each company represented in the portfolio is proportional to that company's share price, so 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 DJIA.

TABLE 2.3 Data to construct stock price indexes					
Stock	Initial Price	Final Price	Shares (millions)	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

- ◆ 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 the 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 dollar 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.
- You might wonder why the DJIA is now (in mid-2015) at a level of about 18,000 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, 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 firm XYZ from Example 2.2 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.

**TABLE 2.4** Data to construct stock price indexes after stock split

Stock	Initial Price	Final Price	Shares (millions)	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

- ◆ We find the new divisor as follows.
  - ✓ The index value before the stock split was  $125/2 = 62.5$ .

- ✓ 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:

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

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 2.4.
- ✓ The new value of the price-weighted average is  $(30 + 45)/1.2 = 62.5$ .
  - The index is unchanged, so the rate of return is zero, greater than the -4% return that would have resulted in the absence of a split.
- ✓ The relative weight of XYZ, which is the poorer-performing stock, is reduced by a split because its price is lower; so 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.
- 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 mid-2015, the divisor for the Dow Jones Industrial Average had fallen to a value of about .150.

## ● Standard & Poor's Indexes

- 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 value, except that the index does not reflect cash dividends paid by those firms.
- 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 arbitrary chosen starting value such as 100, the index value at year-end would be  $100 \times (690/600) = 115$ .
- ✓ The increase in the index would reflect 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 rose because it gave 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 increases from \$100 million to \$110 million regardless of the stock split, thereby rendering the split irrelevant to the performance of the index.



- 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 each share 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 equal 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 as well as other stock indexes.
    - ✓ These *index funds* yield a return equal to that of the particular 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 a single share would be traded.

✓ Available ETFs range from portfolios that track extremely broad global market indexes all the way to narrow industry indexes.

## ● 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.

■ The National Association of Securities Dealers publishes an index of more than 3,000 firms traded on the NASDAQ market.

■ 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.

◆ Despite its name, the index actually includes about 6,000 stocks.

■ The performance of many of these indexes appears daily in *The Wall Street Journal*.

## ● 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 a portfolio strategy that places 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 you start with equal dollar investments in the two stocks of Table 2.4, ABC and XYZ.
    - ✓ Because ABC increases in value by 20% over the year, while XYZ decreases by 10%, your portfolio is no longer equally weighted but is now more heavily invested in ABC.

- ✓ To reset the portfolio to equal weights, you would need to rebalance: Either sell 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)
  - ◆ TSX (Toronto)
- A leader in the construction of international indexes has been MSCI (Morgan Stanley Capital International), which computes over 50 country indexes and several regional indexes.
  - ◆ Table 2.6 presents many of the indexes computed by MCSI.

**TABLE 2.6** MSCI stock indexes

Regional Indexes		Countries	
Developed Markets	Emerging Markets	Developed Markets	Emerging Markets
EAFE (Europe, Australasia, Far East)	Emerging Markets (EM)	Australia	Brazil
EASEA (EAFE excluding Japan)	EM Asia	Austria	Chile
Europe	EM Far East	Belgium	China
EMU	EM Latin America	Canada	Colombia
Far East	EM Eastern Europe	Denmark	Czech Republic
Kokusai (World excluding Japan)	EM Europe	Finland	Egypt
Nordic Countries	EM Europe & Middle East	France	Hungary
North America		Germany	India
Pacific		Greece	Indonesia
World		Hong Kong	Korea
G7 countries		Ireland	Malaysia
World excluding U.S.		Israel	Mexico
		Italy	Peru
		Japan	Philippines
		Netherlands	Poland
		New Zealand	Russia
		Norway	South Africa
		Portugal	Taiwan
		Singapore	Thailand
		Spain	Turkey
		Sweden	
		Switzerland	
		U.K.	
		U.S.	

## ● 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 groups of indexes:
    - ✓ Merrill Lynch
    - ✓ Barclays (formerly Lehman Brothers)
    - ✓ Salomon Smith Barney (now part of Citigroup)
- The major problem with these indexes is that true rates of return on many bonds are difficult to compute because bonds trade infrequently, which makes it hard to get reliable, up-to-date prices.
  - ◆ In practice, some prices must be estimated from bond valuation models.
    - ✓ These so-called matrix prices may differ from true market values.

## 2.5 DERIVATIVE MARKETS

- Futures and options provide **payoffs** that depend on the values of other assets, such as commodity prices, bond and stock prices, or market index values.
  - ◆ For this reason, these instruments sometimes are called **derivative assets**: Their values derive from or are **contingent** on the values of other assets.

### ● 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 some specified expiration date.
  - ◆ An example:
    - ✓ An October call option on Apple stock with exercise price \$110 entitles its owner to purchase Apple stock for a price of \$110 at any time up to and including the option's expiration date in October.
    - ✓ Each option contract is for the purchase of 100 shares, with **quotations** made on a per share basis.

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- ✓ The holder of the call need not exercise the option.
  - It will make sense 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 benefit 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, the option expires and no longer has value.
- ◆ Calls, therefore, provide greater profits when stock prices increase and so represent bullish investment vehicles.

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- A **put option** gives its holder the right to sell an asset for a specified exercise price on or before a specified expiration date.
  - ◆ An example:
    - ✓ An October put on Apple with exercise price \$110 entitles its owner to sell Apple stock to the put writer at a price of \$110 at any time before expiration in October even if the market price of Apple is lower than \$110.
  - ◆ Whereas profits on call options increase when the asset increases in value, profits on put options 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.
- Figure 2.10 is an **excerpt** of options quotations for Apple.
  - ◆ The price of Apple shares on this date was \$101.05.
  - ◆ 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 \$95 through \$105 per share and with expiration dates in September and October of 2014.

<b>Apple (AAPL)</b>		<b>Underlying stock price = \$101.05</b>	
<b>Expiration</b>	<b>Strike</b>	<b>Call</b>	<b>Put</b>
September	95	6.20	0.21
October	95	6.35	0.33
September	100	2.20	1.18
October	100	2.62	1.55
September	105	0.36	4.35
October	105	0.66	4.75

Source: [www.cboe.com](http://www.cboe.com), September 17, 2014

- ◆ The next columns provide the prices of each option.
  - ✓ For example, the October 2014 expiration call with an exercise price of \$100 sold for \$2.62. Each option *contract* (on 100 shares) therefore cost \$262.
- ◆ Notice that the prices of call options decrease as the exercise price increases.
  - ✓ For example, the October expiration call with exercise price \$105 cost only \$.66.
  - ✓ 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 Apple at a price of \$100 in October costs \$1.55 while the right to sell at \$105 cost \$4.75.
- ◆ Option prices also increase with time until expiration.
  - ✓ Clearly, one would rather have the right to buy Apple for \$100 at any time until October rather than at any time until September. Not surprisingly, this shows up in a higher price for the October expiration options.
  - ✓ For example, the call with exercise price \$100 expiring in September sold for only \$2.20 compared to \$2.62 for the October call.

## ● 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 commodity on the delivery date.

◆ The trader who takes the short position commits to delivering the commodity at contract maturity.

■ Figure 2.11 illustrates the listing of the corn futures contract on the Chicago Board of Trade for September 17, 2014.

MONTH	LAST	CHG	OPEN	HIGH	LOW	VOLUME	OPEN INT
Dec '14	341'6	−2'0	343'2	344'2	339'2	74580	796121
Mar '15	354'0	−1'4	355'4	356'0	351'0	19416	201794
May '15	362'4	−1'6	364'0	364'2	359'4	6153	51800
Jul '15	369'6	−1'4	371'2	371'2	366'6	5171	76051
Sep '15	377'2	−2'0	378'0	378'0	375'0	1791	20972
Dec '15	388'2	−1'6	389'4	390'0	385'4	3876	99741

Source: Data from *The Wall Street Journal Online*, September 17, 2014

- ◆ Each contract calls for delivery of 5,000 bushels of corn.
- ◆ Each row details prices for contracts expiring on various dates.
- ◆ The first row is for the nearest term or “front” contract, with maturity in December 2014.
- ◆ The most recent price was \$3.4175 per bushel. (The numbers after each apostrophe denote eights of a cent.)

- ◆ That price is down \$.02 from yesterday's close.
- ◆ The next columns show the contract's opening price that day as well as the high and low price.
- ◆ Volume is the number of contracts trading that day; open interest is the number of outstanding contracts.
- The trader holding the long position profits from price increases.
  - ◆ Suppose that at expiration, corn is selling for \$3.6175 per bushel.
  - ◆ The long position trader who entered the contract at the futures price of \$3.4175 on September 17 would pay that previously agreed-upon price for each bushel of corn, which at contract maturity would be worth \$3.6175.
  - ◆ Because each contract calls for delivery of 5,000 bushels, the profit to the long position, ignoring brokerage fees, would equal  $5,000 \times (\$3.6175 - \$3.4175) = \$1,000$ .
  - ◆ 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 distinction between the *right to purchase* and the *obligation to purchase* the asset is the difference between a call option and a long position in a futures contract.
  - ◆ A futures contract *obliges* the long position to purchase the asset at the futures price.
  - ◆ The call option merely *conveys the right* to purchase the asset at the exercise price.  
The purchase will be made only if it yields a profit.
- Clearly, the 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.* 有代價的
  - ◆ Call options must be purchased.
  - ◆ Futures investments are contracts only.
- 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.