CHAPTER THREE

# How Securities Are Traded

**THIS CHAPTER WILL** provide you with a broad introduction to the many venues and procedures available for trading securities in the United States and international markets. We will see that trading mechanisms range from direct negotiation among market participants to fully automated computer crossing of trade orders.

The first time a security trades is when it is issued to the public. Therefore, we begin with a look at how securities are first marketed to the public by investment bankers, the midwives of securities. We turn next to a broad survey of how already-issued securities may be traded among investors, focusing on the differences between dealer markets, electronic markets, and specialist markets. With this background, we consider specific trading arenas such as the New York Stock Exchange, NASDAQ, and several all-electronic markets. We compare the mechanics of trade execution and the impact of cross-market integration of trading.

We then turn to the essentials of some specific types of transactions, such as buying on margin and short-selling stocks. We close the chapter with a look at some important aspects of the regulations governing security trading, including insider trading laws and the role of security markets as self-regulating organizations.

## 3.1 How Firms Issue Securities

Firms regularly need to raise new capital to help pay for their many investment projects. Broadly speaking, they can raise funds either by borrowing money or by selling shares in the firm. Investment bankers are generally hired to manage the sale of these securities in what is called a **primary market** for newly issued securities. Once these securities are issued, however, investors might well wish to trade them among themselves. For example, you may decide to raise cash by selling some of your shares in Apple to another investor. This transaction would have no impact on the total outstanding number of Apple shares. Trades in existing securities take place in the **secondary market.**

Shares of *publicly listed* firms trade continually on well-known markets such as the New York Stock Exchange or the NASDAQ Stock Market. There, any investor can choose to buy shares for his or her portfolio. These companies are also called *publicly traded, publicly owned,* or just *public companies.* Other firms, however, are *private corporations,*

whose shares are held by small numbers of managers and investors. While ownership stakes in the firm are still determined in proportion to share ownership, those shares do not trade in public exchanges. While many private firms are relatively young companies that have not yet chosen to make their shares generally available to the public, others may be more established firms that are still largely owned by the company's founders or families, and others may simply have decided that private organization is preferable.

## Privately Held Firms

A privately held company is owned by a relatively small number of shareholders. Privately held firms have fewer obligations to release financial statements and other information to the public. This saves money and frees the firm from disclosing information that might be helpful to its competitors. Some firms also believe that eliminating requirements for quarterly earnings announcements gives them more flexibility to pursue long-term goals free of shareholder pressure.

At the moment, however, privately held firms may have only up to 499 shareholders. This limits their ability to raise large amounts of capital from a wide base of investors. Thus, almost all of the largest companies in the U.S. are public corporations.

When private firms wish to raise funds, they sell shares directly to a small number of institutional or wealthy investors in a **private placement.** Rule 144A of the SEC allows them to make these placements without preparing the extensive and costly registration statements required of a public company. While this is attractive, shares in privately held firms do not trade in secondary markets such as a stock exchange, and this greatly reduces their liquidity and presumably reduces the prices that investors will pay for them. *Liquidity* has many specific meanings, but generally speaking, it refers to the ability to buy or sell an asset at a fair price on short notice. Investors demand price concessions to buy illiquid securities.

As firms increasingly chafe against the informational requirements of going public, federal regulators have come under pressure to loosen the constraints entailed by private ownership, and they are currently reconsidering some of the restrictions on private companies. They may raise beyond 499 the number of shareholders that private firms can have before they are required to disclose financial information, and they may make it easier to publicize share offerings.

Trading in private corporations also has evolved in recent years. To get around the 499-investor restriction, middlemen have formed partnerships to buy shares in private companies; the partnership counts as only one investor, even though many individuals may participate in it.

Very recently, some firms have set up computer networks to enable holders of private-company stock to trade among themselves. However, unlike the public stock markets regulated by the SEC, these networks require little disclosure of financial information and provide correspondingly little oversight of the operations of the market. For example, in the run-up to its 2012 IPO, Facebook enjoyed huge valuations in these markets, but skeptics worried that investors in these markets could not obtain a clear view of the firm, the interest among other investors in the firm, or the process by which trades in the firm's shares were executed.

## Publicly Traded Companies

When a private firm decides that it wishes to raise capital from a wide range of investors, it may decide to *go public.* This means that it will sell its securities to the general public and allow those investors to freely trade those shares in established securities

markets. The first issue of shares to the general public is called the firm's **initial public offering,** or **IPO.** Later, the firm may go back to the public and issue additional shares. A *seasoned equity offering* is the sale of additional shares in firms that already are publicly traded. For example, a sale by Apple of new shares of stock would be considered a seasoned new issue.

Public offerings of both stocks and bonds typically are marketed by investment bankers who in this role are called **underwriters.** More than one investment banker usually markets the securities. A lead firm forms an underwriting syndicate of other investment bankers to share the responsibility for the stock issue.

Investment bankers advise the firm regarding the terms on which it should attempt to sell the securities. A preliminary registration statement must be filed with the Securities and Exchange Commission (SEC), describing the issue and the prospects of the company. When the statement is in final form and accepted by the SEC, it is called the **prospectus.** At this point, the price at which the securities will be offered to the public is announced.

In a typical underwriting arrangement, the investment bankers purchase the securities from the issuing company and then resell them to the public. The issuing firm sells the securities to the underwriting syndicate for the public offering price less a spread that serves as compensation to the underwriters. This procedure is called a *firm commitment.* In addition to the spread, the investment banker also may receive shares of common stock or other securities of the firm. Figure 3.1 depicts the relationships among the firm issuing the security, the lead underwriter, the underwriting syndicate, and the public.

## Shelf Registration

An important innovation in the issuing of securities was introduced in 1982 when the SEC approved Rule 415, which allows firms to register securities and gradually sell them to the public for 2 years following the initial registration. Because the securities are already registered, they can be sold on short notice, with little additional paperwork. Moreover, they can be sold in small amounts without incurring substantial flotation costs. The securities are "on the shelf," ready to be issued, which has given rise to the term *shelf registration.*

**CONCEPT CHECK 3.1**

Why does it make sense for shelf registration to be limited in time?

## Initial Public Offerings

Investment bankers manage the issuance of new securities to the public. Once the SEC has commented on the registration statement and a preliminary prospectus has been distributed to interested investors, the investment bankers organize *road shows* in which they travel around the country to publicize

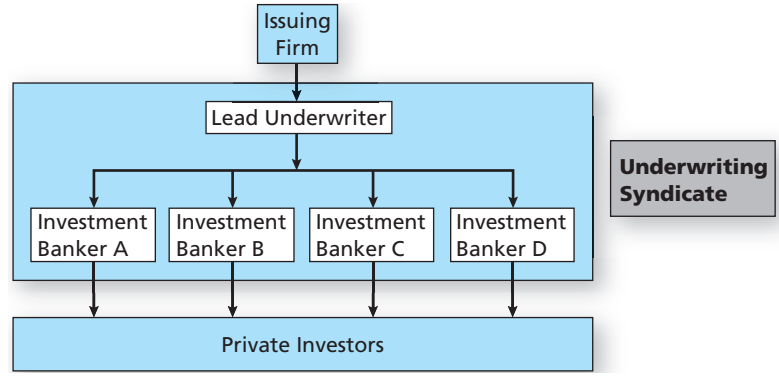


**Figure 3.1** Relationships among a firm issuing securities, the underwriters, and the public

the imminent offering. These road shows serve two purposes. First, they generate interest among potential investors and provide information about the offering. Second, they provide information to the issuing firm and its underwriters about the price at which they will be able to market the securities. Large investors communicate their interest in purchasing shares of the IPO to the underwriters; these indications of interest are called a *book* and the process of polling potential investors is called *bookbuilding*. The book provides valuable information to the issuing firm because institutional investors often will have useful insights about the market demand for the security as well as the prospects of the firm and its competitors. Investment bankers frequently revise both their initial estimates of the offering price of a security and the number of shares offered based on feedback from the investing community.

Why do investors truthfully reveal their interest in an offering to the investment banker? Might they be better off expressing little interest, in the hope that this will drive down the offering price? Truth is the better policy in this case because truth telling is rewarded. Shares of IPOs are allocated across investors in part based on the strength of each investor's expressed interest in the offering. If a firm wishes to get a large allocation when it is optimistic about the security, it needs to reveal its optimism. In turn, the underwriter needs to offer the security at a bargain price to these investors to induce them to participate in book-building and share their information. Thus, IPOs commonly are underpriced compared to the price at which they could be marketed. Such underpricing is reflected in price jumps that occur on the date when the shares are first traded in public security markets. The November 2011 IPO of Groupon was a typical example of underpricing. The company issued about 35 million shares to the public at a price of $20. The stock price closed that day at $26.11, a bit more than 30% above the offering price.

While the explicit costs of an IPO tend to be around 7% of the funds raised, such underpricing should be viewed as another cost of the issue. For example, if Groupon had sold its shares for the $26.11 that investors obviously were willing to pay for them, its IPO would have raised 30% more money than it actually did. The money "left on the table" in this case far exceeded the explicit cost of the stock issue. Nevertheless, underpricing seems to be a universal phenomenon. Figure 3.2 presents average first-day returns on IPOs of stocks across the world. The results consistently indicate that IPOs are marketed to investors at attractive prices.

Pricing of IPOs is not trivial and not all IPOs turn out to be underpriced. Some do poorly after issue. Facebook's 2012 IPO was a notable disappointment. Within a week of its IPO, Facebook's share price was 15% below the $38 offer price, and five months later, its shares were selling at about half the offer price.

Interestingly, despite their typically attractive first-day returns, IPOs have been poor long-term investments. Ritter calculates the returns to a hypothetical investor who bought equal amounts of each U.S. IPO between 1980 and 2009 at the close of trading on the first day the stock was listed and held each position for three years. That portfolio would have underperformed the broad U.S. stock market on average by 19.8% for three-year holding periods and underperformed "style-matched" portfolios of firms with comparable size and ratio of book value to market value by 7.3%.[1] Other IPOs cannot even be fully sold to the market. Underwriters left with unmarketable securities are forced to sell them at a loss on the secondary market. Therefore, the investment banker bears price risk for an underwritten issue.

[1]Professor Jay Ritter's Web site contains a wealth of information and data about IPOs: **http://bear.warrington.ufl.edu/ritter/ipodata.htm.**

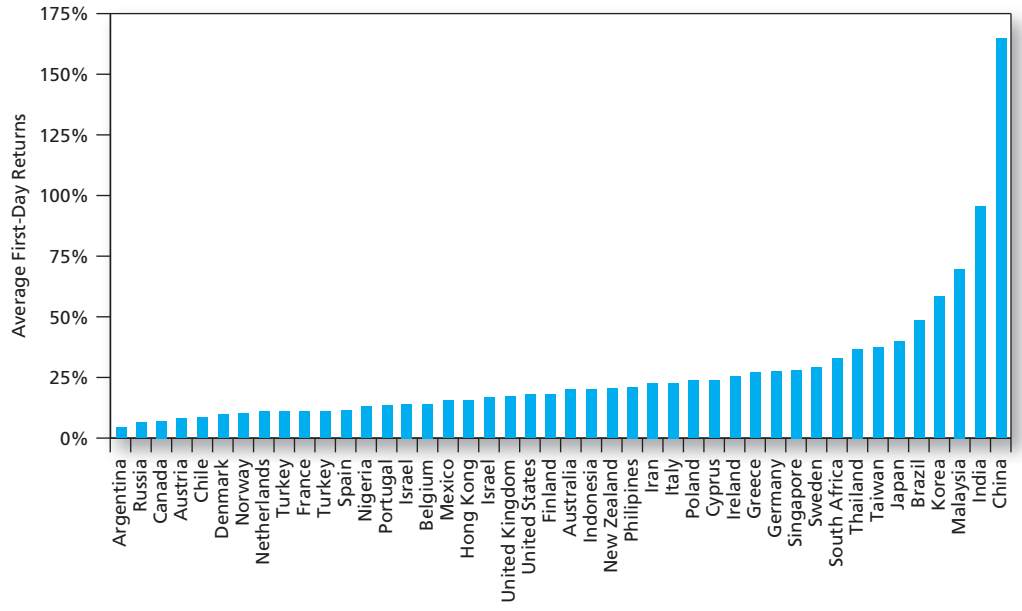


**Figure 3.2** Average first-day returns on IPOs from around the world

Source: Provided by Professor J. Ritter of the University of Florida, 2008. This is an updated version of the information contained in T. Loughran, J. Ritter, and K. Rydqvist, "Initial Public Offerings," *Pacific-Basin Finance Journal* 2 (1994), pp. 165–199. Copyright 1994 with permission from Elsevier Science.

## 3.2 How Securities Are Traded

Financial markets develop to meet the needs of particular traders. Consider what would happen if organized markets did not exist. Any household wishing to invest in some type of financial asset would have to find others wishing to sell. Soon, venues where interested traders could meet would become popular. Eventually, financial markets would emerge from these meeting places. Thus, a pub in old London called Lloyd's launched the maritime insurance industry. A Manhattan curb on Wall Street became synonymous with the financial world.

### Types of Markets

We can differentiate four types of markets: direct search markets, brokered markets, dealer markets, and auction markets.

**Direct Search Markets** A *direct search market* is the least organized market. Buyers and sellers must seek each other out directly. An example of a transaction in such a market is the sale of a used refrigerator where the seller advertises for buyers in a local newspaper or on Craigslist. Such markets are characterized by sporadic participation and low-priced and nonstandard goods. Firms would find it difficult to profit by specializing in such an environment.

**Brokered Markets** The next level of organization is a *brokered market.* In markets where trading in a good is active, brokers find it profitable to offer search services to buyers and sellers. A good example is the real estate market, where economies of scale in searches for available homes and for prospective buyers make it worthwhile for participants to pay brokers to help them conduct the searches. Brokers in particular markets develop specialized knowledge on valuing assets traded in that market.

Notice that the *primary market,* where new issues of securities are offered to the public, is an example of a brokered market. In the primary market, investment bankers who market a firm's securities to the public act as brokers; they seek investors to purchase securities directly from the issuing corporation.

**Dealer Markets** When trading activity in a particular type of asset increases, **dealer markets** arise. Dealers specialize in various assets, purchase these assets for their own accounts, and later sell them for a profit from their inventory. The spreads between dealers' buy (or "bid") prices and sell (or "ask") prices are a source of profit. Dealer markets save traders on search costs because market participants can easily look up the prices at which they can buy from or sell to dealers. A fair amount of market activity is required before dealing in a market is an attractive source of income. Most bonds trade in over-the-counter dealer markets.

**Auction Markets** The most integrated market is an **auction market,** in which all traders converge at one place (either physically or "electronically") to buy or sell an asset. The New York Stock Exchange (NYSE) is an example of an auction market. An advantage of auction markets over dealer markets is that one need not search across dealers to find the best price for a good. If all participants converge, they can arrive at mutually agreeable prices and save the bid–ask spread.

Notice that both over-the-counter dealer markets and stock exchanges are secondary markets. They are organized for investors to trade existing securities among themselves.

**CONCEPT CHECK 3.2**

Many assets trade in more than one type of market. What types of markets do the following trade in?

*a.* Used cars
*b.* Paintings
*c.* Rare coins

## Types of Orders

Before comparing alternative trading practices and competing security markets, it is helpful to begin with an overview of the types of trades an investor might wish to have executed in these markets. Broadly speaking, there are two types of orders: market orders and orders contingent on price.

**Market Orders** Market orders are buy or sell orders that are to be executed immediately at current market prices. For example, our investor might call her broker and ask for the market price of FedEx. The broker might report back that the best **bid price** is $90 and the best **ask price** is $90.05, meaning that the investor would need to pay $90.05 to purchase a share, and could receive $90 a share if she wished to sell some of her own holdings of FedEx. The **bid–ask spread** in this case is $.05. So an order to buy 100 shares "at market" would result in purchase at $90.05, and an order to "sell at market" would be executed at $90.

This simple scenario is subject to a few potential complications. First, the posted price quotes actually represent commitments to trade up to a specified number of shares. If the market order is for more than this number of shares, the order may be filled at multiple prices. For example, if the asked price is good for orders up to 1,000 shares, and the investor wishes to purchase 1,500 shares, it may be necessary to pay a slightly higher price for the last 500 shares. Figure 3.3 shows the average *depth* of the markets for shares of stock (i.e., the total

number of shares offered for trading at the best bid and ask prices). Notice that depth is considerably higher for the large stocks in the S&P 500 than for the smaller stocks that constitute the Russell 2000 index. Depth is considered another component of liquidity. Second, another trader may beat our investor to the quote, meaning that her order would then be executed at a worse price. Finally, the best price quote may change before her order arrives, again causing execution at a price different from the one at the moment of the order.

**Price-Contingent Orders** Investors also may place orders specifying prices at which they are willing to buy or sell a security. A limit buy order may instruct the broker to buy some number of shares if and when FedEx may be obtained *at or below* a stipulated price. Conversely, a limit sell instructs the broker to sell if and when the stock price rises *above* a specified limit. A collection of **limit orders** waiting to be executed is called a *limit order book.*

Figure 3.4 is a portion of the limit order book for shares in FedEx taken from the

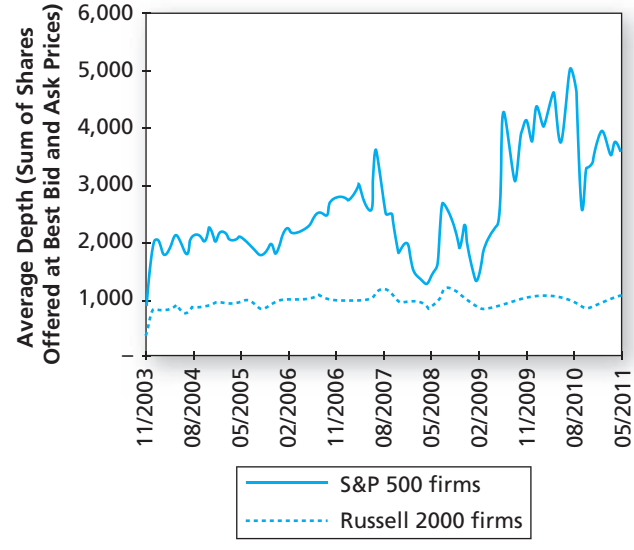


**Figure 3.3** Average market depth for large (S&P 500) and small (Russell 2000) firms

Source: James J. Angel, Lawrence E. Harris, and Chester Spatt, "Equity Trading in the 21st Century," *Quarterly Journal of Finance* 1 (2011), pp. 1–53; Knight Capital Group.

FDX FedEx Corporation

NYSE Arca. FDX Go>>

| Bid | | | | Ask | | | |
|---|---|---|---|---|---|---|---|
| ID | Price | Size | Time | ID | Price | Size | Time |
| ARCA | 90.04 | 100 | 14:05:22 | ARCA | 90.05 | 400 | 14:05:21 |
| ARCA | 90.03 | 302 | 14:05:25 | ARCA | 90.06 | 104 | 14:05:21 |
| ARCA | 90.02 | 204 | 14:05:25 | ARCA | 90.07 | 303 | 14:05:21 |
| ARCA | 90.01 | 1604 | 14:05:17 | ARCA | 90.08 | 303 | 14:05:18 |
| ARCA | 90.00 | 302 | 14:05:18 | ARCA | 90.09 | 303 | 14:05:18 |
| ARCA | 89.99 | 403 | 14:05:21 | ARCA | 90.10 | 404 | 14:04:55 |
| ARCA | 89.98 | 1003 | 14:05:14 | ARCA | 90.11 | 404 | 14:04:00 |
| ARCA | 89.97 | 1103 | 14:05:20 | ARCA | 90.12 | 802 | 14:05:23 |

**Figure 3.4** The limit order book for FedEx on the NYSE Arca market

Source: New York Stock Exchange Euronext, **www.nyse.com**, June 22, 2012.

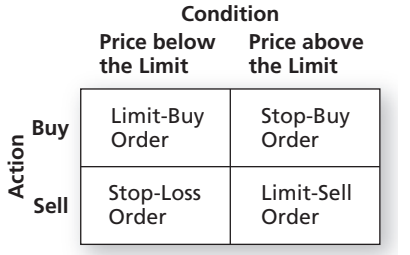


**Figure 3.5** Price-contingent orders

NYSE Arca exchange (one of several electronic exchanges; more on these shortly). Notice that the best orders are at the top of the list: the offers to buy at the highest price and to sell at the lowest price. The buy and sell orders at the top of the list—$90.04 and $90.05—are called the *inside quotes;* they are the highest buy and lowest sell orders. For FedEx, the inside spread at this time was only 1 cent. Note, however, that order sizes at the inside quotes can be fairly small. Therefore, investors interested in larger trades face an *effective* spread greater than the nominal one because they cannot execute their entire trades at the inside price quotes.

**Stop orders** are similar to limit orders in that the trade is not to be executed unless the stock hits a price limit. For *stop-loss orders,* the stock is to be *sold* if its price falls *below* a stipulated level. As the name suggests, the order lets the stock be sold to stop further losses from accumulating. Similarly, *stop-buy orders* specify that a stock should be bought when its price rises above a limit. These trades often accompany *short sales* (sales of securities you don't own but have borrowed from your broker) and are used to limit potential losses from the short position. Short sales are discussed in greater detail later in this chapter. Figure 3.5 organizes these types of trades in a convenient matrix.

CONCEPT CHECK **3.3**

What type of trading order might you give to your broker in each of the following circumstances?

*a.* You want to buy shares of FedEx, to diversify your portfolio. You believe the share price is approximately at the "fair" value, and you want the trade done quickly and cheaply.

*b.* You want to buy shares of FedEx, but believe that the current stock price is too high given the firm's prospects. If the shares could be obtained at a price 5% lower than the current value, you would like to purchase shares for your portfolio.

*c.* You plan to purchase a condominium sometime in the next month or so and will sell your shares of Intel to provide the funds for your down payment. While you believe that the Intel share price is going to rise over the next few weeks, if you are wrong and the share price drops suddenly, you will not be able to afford the purchase. Therefore, you want to hold on to the shares for as long as possible, but still protect yourself against the risk of a big loss.

## Trading Mechanisms

An investor who wishes to buy or sell shares will place an order with a brokerage firm. The broker charges a commission for arranging the trade on the client's behalf. Brokers have several avenues by which they can execute that trade, that is, find a buyer or seller and arrange for the shares to be exchanged.

Broadly speaking, there are three trading systems employed in the United States: over-the-counter dealer markets, electronic communication networks, and specialist markets. The best-known markets such as NASDAQ or the New York Stock Exchange actually use a variety of trading procedures, so before you delve into specific markets, it is useful to understand the basic operation of each type of trading system.

**Dealer Markets** Roughly 35,000 securities trade on the **over-the-counter or OTC market.** Thousands of brokers register with the SEC as security dealers. Dealers quote prices at which they are willing to buy or sell securities. A broker then executes a trade by contacting a dealer listing an attractive quote.

Before 1971, all OTC quotations were recorded manually and published daily on so-called pink sheets. In 1971, the National Association of Securities Dealers introduced its Automatic Quotations System, or NASDAQ, to link brokers and dealers in a computer network where price quotes could be displayed and revised. Dealers could use the network to display the bid price at which they were willing to purchase a security and the ask price at which they were willing to sell. The difference in these prices, the bid–ask spread, was the source of the dealer's profit. Brokers representing clients could examine quotes over the computer network, contact the dealer with the best quote, and execute a trade.

As originally organized, NASDAQ was more of a price-quotation system than a trading system. While brokers could survey bid and ask prices across the network of dealers in the search for the best trading opportunity, actual trades required direct negotiation (often over the phone) between the investor's broker and the dealer in the security. However, as we will see, NASDAQ is no longer a mere price quotation system. While dealers still post bid and ask prices over the network, what is now called the **NASDAQ stock market** allows for electronic execution of trades, and the vast majority of trades are executed electronically.

**Electronic Communication Networks (ECNs)** **Electronic communication networks** allow participants to post market and limit orders over computer networks. The limit-order book is available to all participants. An example of such an order book from NYSE Arca, one of the leading ECNs, appears in Figure 3.4. Orders that can be "crossed," that is, matched against another order, are done automatically without requiring the intervention of a broker. For example, an order to buy a share at a price of $50 or lower will be immediately executed if there is an outstanding asked price of $50. Therefore, ECNs are true trading systems, not merely price-quotation systems.

ECNs offer several attractions. Direct crossing of trades without using a broker-dealer system eliminates the bid–ask spread that otherwise would be incurred. Instead, trades are automatically crossed at a modest cost, typically less than a penny per share. ECNs are attractive as well because of the speed with which a trade can be executed. Finally, these systems offer investors considerable anonymity in their trades.

**Specialist Markets** Specialist systems have been largely replaced by electronic communication networks, but as recently as a decade ago, they were still a dominant form of market organization for trading in stocks. In these systems, exchanges such as the NYSE assign responsibility for managing the trading in each security to a **specialist.** Brokers wishing to buy or sell shares for their clients direct the trade to the specialist's post on the floor of the exchange. While each security is assigned to only one specialist, each specialist firm makes a market in many securities. The specialist maintains the limit order book of all outstanding unexecuted limit orders. When orders can be executed at market prices, the specialist executes, or "crosses," the trade. The highest outstanding bid price and the lowest outstanding ask price "win" the trade.

Specialists are also mandated to maintain a "fair and orderly" market when the book of limit buy and sell orders is so thin that the spread between the highest bid price and lowest ask price becomes too wide. In this case, the specialist firm would be expected to offer to buy and sell shares from its own inventory at a narrower bid-ask spread. In this role, the specialist serves as a dealer in the stock and provides liquidity to other traders. In this context, liquidity providers are those who stand willing to buy securities from or sell securities to other traders.

## 3.3 The Rise of Electronic Trading

When first established, NASDAQ was primarily an over-the-counter dealer market and the NYSE was a specialist market. But today both are primarily electronic markets. These changes were driven by an interaction of new technologies and new regulations. New regulations allowed brokers to compete for business, broke the hold that dealers once had on information about best-available bid and ask prices, forced integration of markets, and allowed securities to trade in ever-smaller price increments (called *tick sizes*). Technology made it possible for traders to rapidly compare prices across markets and direct their trades to the markets with the best prices. The resulting competition drove down the cost of trade execution to a tiny fraction of its value just a few decades ago.

In 1975, fixed commissions on the NYSE were eliminated, which freed brokers to compete for business by lowering their fees. In that year also, Congress amended the Securities Exchange Act to create the National Market System to at least partially centralize trading across exchanges and enhance competition among different market makers. The idea was to implement centralized reporting of transactions as well as a centralized price quotation system to give traders a broader view of trading opportunities across markets.

The aftermath of a 1994 scandal at NASDAQ turned out to be a major impetus in the further evolution and integration of markets. NASDAQ dealers were found to be colluding to maintain wide bid-ask spreads. For example, if a stock was listed at \$30 bid—\$30 1/2 ask, a retail client who wished to buy shares from a dealer would pay \$30 1/2 while a client who wished to sell shares would receive only \$30. The dealer would pocket the 1/2-point spread as profit. Other traders may have been willing to step in with better prices (e.g., they may have been willing to buy shares for \$30 1/8 or sell them for \$30 3/8), but those better quotes were not made available to the public, enabling dealers to profit from artificially wide spreads at the public's expense. When these practices came to light, an antitrust lawsuit was brought against NASDAQ.

In response to the scandal, the SEC instituted new order-handling rules. Published dealer quotes now had to reflect limit orders of customers, allowing them to effectively compete with dealers to capture trades. As part of the antitrust settlement, NASDAQ agreed to integrate quotes from ECNs into its public display, enabling the electronic exchanges to also compete for trades. Shortly after this settlement, the SEC adopted Regulation ATS (Alternative Trading Systems), giving ECNs the right to register as stock exchanges. Not surprisingly, they captured an ever-larger market share, and in the wake of this new competition, bid–ask spreads narrowed.

Even more dramatic narrowing of trading costs came in 1997, when the SEC allowed the minimum tick size to fall from one-eighth of a dollar to one-sixteenth. Not long after, in 2001, "decimalization" allowed the tick size to fall to 1 cent. Bid–ask spreads again fell dramatically. Figure 3.6 shows estimates of the "effective spread" (the cost of a transaction) during three distinct time periods defined by the minimum tick size. Notice how dramatically effective spread falls along with the minimum tick size.

Technology was also changing trading practices. The first ECN, Instinet, was established in 1969. By the 1990s, exchanges around the world were rapidly adopting fully electronic trading systems. Europe led the way in this evolution, but eventually American exchanges followed suit. The National Association of Securities Dealers (NASD) spun off the NASDAQ Stock Market as a separate entity in 2000, which quickly evolved into a centralized limit-order matching system—effectively a large ECN. The NYSE acquired the electronic Archipelago Exchange in 2006 and renamed it NYSE Arca.

In 2005, the SEC adopted Regulation NMS (for National Market System), which was fully implemented in 2007. The goal was to link exchanges electronically, thereby creating,

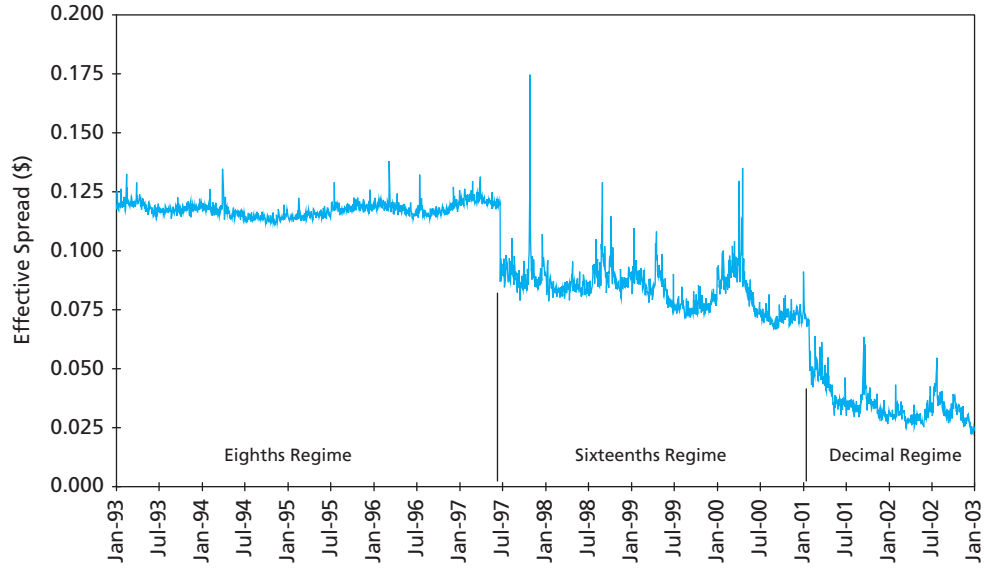


**Figure 3.6** The effective spread (measured in dollars per share) fell dramatically as the minimum tick size fell (Value-weighted average of NYSE-listed shares)

Source: Tarun Chordia, Richard Roll, and Avanidhar Subrahmanyam, "Liquidity and Market Efficiency, *Journal of Financial Economics* 87 (2008), 249–268. Copyright © February 2008, with permission from Elsevier.

in effect, one integrated electronic market. The regulation required exchanges to honor quotes of other exchanges when they could be executed automatically. An exchange that could not handle a quote electronically would be labeled a "slow market" under Reg NMS and could be ignored by other market participants. The NYSE, which was still devoted to the specialist system, was particularly at risk of being passed over, and in response to this pressure, it moved aggressively toward automated execution of trades. Electronic trading networks and the integration of markets in the wake of Reg NMS made it much easier for exchanges around the world to compete; the NYSE lost its effective monopoly in the trading of its own listed stocks, and by the end of the decade, its share in the trading of NYSE-listed stocks fell from about 75% to 25%.

While specialists still exist, trading today is overwhelmingly electronic, at least for stocks. Bonds are still traded in more traditional dealer markets. In the U.S., the share of electronic trading in equities rose from about 16% in 2000 to over 80% by the end of the decade. In the rest of the world, the dominance of electronic trading is even greater.

## 3.4 U.S. Markets

The NYSE and the NASDAQ Stock Market remain the two largest U.S. stock markets. But electronic communication networks have steadily increased their market share. Figure 3.7 shows the comparative trading volume of NYSE-listed shares on the NYSE and NASDAQ as well as on the major ECNs, namely, BATS, NYSE Arca, and Direct Edge. The "Other" category, which recently has risen above 30%, includes so-called dark pools, which we will discuss shortly.

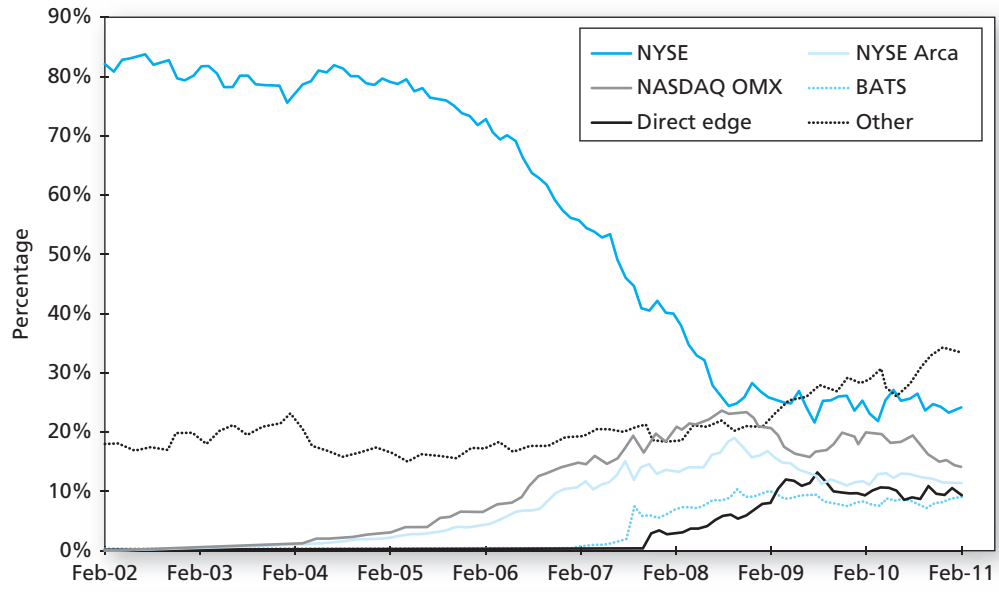


**Figure 3.7** Market share of trading in NYSE-listed shares

Source: James J. Angel, Lawrence E. Harris, and Chester Spatt, "Equity Trading in the 21st Century," *Quarterly Journal of Finance* 1 (2011), 1–53.

## NASDAQ

The NASDAQ Stock Market lists around 3,000 firms. It has steadily introduced ever-more sophisticated trading platforms, which today handle the great majority of its trades. The current version, called the NASDAQ Market Center, consolidates NASDAQ's previous electronic markets into one integrated system. NASDAQ merged in 2008 with OMX, a Swedish-Finnish company that controls seven Nordic and Baltic stock exchanges to form NASDAQ OMX Group. In addition to maintaining the NASDAQ Stock Market, it also maintains several stock markets in Europe as well as an options and futures exchange in the U.S.

NASDAQ has three levels of subscribers. The highest, level 3 subscribers, are registered market makers. These are firms that make a market in securities, maintain inventories of securities, and post bid and ask prices at which they are willing to buy or sell shares. Level 3 subscribers can enter and change bid–ask quotes continually and have the fastest execution of trades. They profit from the spread between bid and ask prices.

Level 2 subscribers receive all bid and ask quotes but cannot enter their own quotes. They can see which market makers are offering the best prices. These subscribers tend to be brokerage firms that execute trades for clients but do not actively deal in stocks for their own account.

Level 1 subscribers receive only inside quotes (i.e., the best bid and ask prices), but do not see how many shares are being offered. These subscribers tend to be investors who are not actively buying or selling but want information on current prices.

### The New York Stock Exchange

The NYSE is the largest U.S. **stock exchange** as measured by the value of the stocks listed on the exchange. Daily trading volume on the NYSE is about a billion shares. In 2006, the NYSE merged with the Archipelago Exchange to form a publicly held company called the NYSE Group, and then in 2007, it merged with the European exchange Euronext to form NYSE Euronext. The firm acquired the American Stock Exchange in 2008, which has since been renamed NYSE Amex and focuses on small firms. NYSE Arca is the firm's electronic communications network, and this is where the bulk of exchange-traded funds trade. In 2012, NYSE Euronext agreed to be purchased by InternationalExchange (ICE), whose main business to date has been energy-futures trading. ICE plans to retain the NYSE Euronext name as well as the fabled trading floor on Wall Street.

The NYSE was long committed to its specialist trading system, which relied heavily on human participation in trade execution. It began its transition to electronic trading for smaller trades in 1976 with the introduction of its DOT (Designated Order Turnaround), and later SuperDOT systems, which could route orders directly to the specialist. In 2000, the exchange launched Direct+, which could automatically cross smaller trades (up to 1,099 shares) without human intervention, and in 2004, it began eliminating the size restrictions on Direct+ trades. The change of emphasis dramatically accelerated in 2006 with the introduction of the NYSE Hybrid Market, which allowed brokers to send orders either for immediate electronic execution or to the specialist, who could seek price improvement from another trader. The Hybrid system allowed the NYSE to qualify as a fast market for the purposes of Regulation NMS, but still offer the advantages of human intervention for more complicated trades. In contrast, NYSE's Arca marketplace is fully electronic.

### ECNs

Over time, more fully automated markets have gained market share at the expense of less automated ones, in particular, the NYSE. Some of the biggest ECNs today are Direct Edge, BATS, and NYSE Arca. Brokers that have an affiliation with an ECN have computer access and can enter orders in the limit order book. As orders are received, the system determines whether there is a matching order, and if so, the trade is immediately crossed.

Originally, ECNs were open only to other traders using the same system. But following the implementation of Reg NMS, ECNs began listing limit orders on other networks. Traders could use their computer systems to sift through the limit order books of many ECNs and instantaneously route orders to the market with the best prices. Those cross-market links have become the impetus for one of the more popular strategies of so-called high-frequency traders, which seek to profit from even small, transitory discrepancies in prices across markets. Speed is obviously of the essence here, and ECNs compete in terms of the speed they can offer. **Latency** refers to the time it takes to accept, process, and deliver a trading order. BATS, for example, advertises latency times of around 200 microseconds, i.e., .0002 second.

## 3.5 New Trading Strategies

The marriage of electronic trading mechanisms with computer technology has had far-ranging impacts on trading strategies and tools. *Algorithmic trading* delegates trading decisions to computer programs. *High frequency trading* is a special class of algorithmic trading in which computer programs initiate orders in tiny fractions of a second, far faster than any human could process the information driving the trade. Much of the

market liquidity that once was provided by brokers making a market in a security has been displaced by these high-frequency traders. But when high-frequency traders abandon the market, as in the so-called flash crash of 2010, liquidity can likewise evaporate in a flash. *Dark pools* are trading venues that preserve anonymity, but also affect market liquidity. We will address these emerging issues later in this section.

## Algorithmic Trading

**Algorithmic trading** is the use of computer programs to make trading decisions. Well more than half of all equity volume in the U.S. is believed to be initiated by computer algorithms. Many of these trades exploit very small discrepancies in security prices and entail numerous and rapid cross-market price comparisons that are well suited to computer analysis. These strategies would not have been feasible before decimalization of the minimum tick size.

Some algorithmic trades attempt to exploit very short-term trends (as short as a few seconds) as new information about a firm becomes reflected in its stock price. Others use versions of *pairs trading* in which normal price relations between pairs (or larger groups) of stocks seem temporarily disrupted and offer small profit opportunities as they move back into alignment. Still others attempt to exploit discrepancies between stock prices and prices of stock-index futures contracts.

Some algorithmic trading involves activities akin to traditional market making. The traders seek to profit from the bid-ask spread by buying a stock at the bid price and rapidly selling it at the ask price before the price can change. While this mimics the role of a market maker who provides liquidity to other traders in the stock, these algorithmic traders are not registered market makers and so do not have an affirmative obligation to maintain both bid and ask quotes. If they abandon a market during a period of turbulence, the shock to market liquidity can be disruptive. This seems to have been a problem during the flash crash of May 6, 2010, when the stock market encountered extreme volatility, with the Dow Jones average falling by 1,000 points before recovering around 600 points in intraday trading. The nearby box discusses this amazing and troubling episode.

## High-Frequency Trading

It is easy to see that many algorithmic trading strategies require extremely rapid trade initiation and execution. **High-frequency trading** is a subset of algorithmic trading that relies on computer programs to make extremely rapid decisions. High-frequency traders compete for trades that offer very small profits. But if those opportunities are numerous enough, they can accumulate to big money.

We pointed out that one high-frequency strategy entails a sort of market making, attempting to profit from the bid–ask spread. Another relies on cross-market arbitrage, in which even tiny price discrepancies across markets allow the firm to buy a security at one price and simultaneously sell it at a slightly higher price. The competitive advantage in these strategies lies with the firms that are quickest to identify and execute these profit opportunities. There is a tremendous premium on being the first to "hit" a bid or ask price.

Trade execution times for high-frequency traders are now measured in milliseconds, even microseconds. This has induced trading firms to "co-locate" their trading centers next to the computer systems of the electronic exchanges. When execution or latency periods are less than a millisecond, the extra time it takes for a trade order to travel from a remote location to a New York exchange would be enough to make it nearly impossible to win the trade.

To understand why co-location has become a key issue, consider this calculation. Even light can travel only 186 miles in 1 millisecond, so an order originating in Chicago transmitted at the speed of light would take almost 5 milliseconds to reach New York. But ECNs today claim latency periods considerably less than 1 millisecond, so an order from Chicago could not possibly compete with one launched from a co-located facility.

In some ways, co-location is a new version of an old phenomenon. Think about why, even before the advent of the telephone, so many brokerage firms originally located their headquarters in New York: they were "co-locating" with the NYSE so that their brokers could bring trades to the exchange quickly and efficiently. Today, trades are transmitted electronically, but competition among traders for fast execution means that the need to be near the market (now embodied in computer servers) remains.

## Dark Pools

Many large traders seek anonymity. They fear that if others see them executing a large buy or sell program, their intentions will become public and prices will move against them. Very large trades (called **blocks,** usually defined as a trade of more than 10,000 shares) traditionally were brought to "block houses," brokerage firms specializing in matching block buyers and sellers. Part of the expertise of block brokers is in identifying traders who might be interested in a large purchase or sale if given an offer. These brokers discreetly arrange large trades out of the public eye, and so avoid moving prices against their clients.

Block trading today has been displaced to a great extent by **dark pools,** trading systems in which participants can buy or sell large blocks of securities without showing their hand. Not only are buyers and sellers in dark pools hidden from the public, but even trades may not be reported, or if they are reported, they may be lumped with other trades to obscure information about particular participants.

Dark pools are somewhat controversial because they contribute to the fragmentation of markets. When many orders are removed from the consolidated limit order book, there are fewer orders left to absorb fluctuations in demand for the security, and the public price may no longer be "fair" in the sense that it reflects all the potentially available information about security demand.

Another approach to dealing with large trades is to split them into many small trades, each of which can be executed on electronic markets, attempting to hide the fact that the total number of shares ultimately to be bought or sold is large. This trend has led to rapid decline in average trade size, which today is less than 300 shares.

## Bond Trading

In 2006, the NYSE obtained regulatory approval to expand its bond-trading system to include the debt issues of any NYSE-listed firm. Until then, each bond needed to be registered before listing, and such a requirement was too onerous to justify listing most bonds. In conjunction with these new listings, the NYSE has expanded its electronic bond-trading platform, which is now called NYSE Bonds and is the largest centralized bond market of any U.S. exchange.

Nevertheless, the vast majority of bond trading occurs in the OTC market among bond dealers, even for bonds that are actually listed on the NYSE. This market is a network of bond dealers such as Merrill Lynch (now part of Bank of America), Salomon Smith Barney (a division of Citigroup), and Goldman Sachs that is linked by a computer quotation

WORDS FROM THE STREET

## The Flash Crash of May 2010

At 2:42 New York time on May 6, 2010, the Dow Jones Industrial Average was already down about 300 points for the day. The market was demonstrating concerns about the European debt crisis, and nerves were already on edge. Then, in the next 5 minutes, the Dow dropped an *additional* 600 points. And only 20 minutes after that, it had recovered most of those 600 points. Besides the staggering intra-day volatility of the broad market, trading in individual shares and ETFs was even more disrupted. The iShares Russell 1000 Value fund temporarily fell from $59 a share to 8 cents. Shares in the large consulting company Accenture, which had just sold for $38, traded at 1 cent only a minute or two later. At the other extreme, share prices of Apple and Hewlett-Packard momentarily increased to over $100,000. These markets were clearly broken.

The causes of the flash crash are still debated. An SEC report issued after the trade points to a $4 billion sale of market index futures contracts by a mutual fund. As market prices began to tumble, many algorithmic trading programs withdrew from the markets, and those that remained became net sellers, further pushing down equity prices. As more and more of these algorithmic traders shut down, liquidity in these markets evaporated: Buyers for many stocks simply disappeared.

Finally, trading was halted for a short period. When it resumed, buyers decided to take advantage of many severely depressed stock prices, and the market rebounded almost as quickly as it had crashed. Given the intra-day turbulence and the clearly distorted prices at which some trades had been executed, the NYSE and NASDAQ decided to cancel all trades that were executed more than 60% away from a "reference price" close to the opening price of the day. Almost 70% of those canceled trades involved ETFs.

The SEC has since approved experimentation with new circuit breakers to halt trading for 5 minutes in large stocks that rise or fall by more than 10% in a 5-minute period. The idea is to prevent trading algorithms from moving share prices quickly before human traders have a chance to determine whether those prices are moving in response to fundamental information.

The flash crash highlighted the fragility of markets in the face of huge variation in trading volume created by algorithmic traders. The potential for these high-frequency traders to withdraw from markets in periods of turbulence remains a concern, and many observers are not convinced that we are protected from future flash crashes.

system. However, because these dealers do not carry extensive inventories of the wide range of bonds that have been issued to the public, they cannot necessarily offer to sell bonds from their inventory to clients or even buy bonds for their own inventory. They may instead work to locate an investor who wishes to take the opposite side of a trade. In practice, however, the corporate bond market often is quite "thin," in that there may be few investors interested in trading a specific bond at any particular time. As a result, the bond market is subject to a type of liquidity risk, for it can be difficult to sell one's holdings quickly if the need arises.

## 3.6 Globalization of Stock Markets

Figure 3.8 shows that NYSE-Euronext is by far the largest equity market as measured by the total market value of listed firms. All major stock markets today are effectively electronic. Securities markets have come under increasing pressure in recent years to make international alliances or mergers. Much of this pressure is due to the impact of electronic trading. To a growing extent, traders view stock markets as computer networks that link them to other traders, and there are increasingly fewer limits on the securities around the world that they can trade. Against this background, it becomes more important for exchanges to provide the cheapest and most efficient mechanism by which trades can be executed and cleared. This argues for global alliances that can facilitate the nuts and bolts of cross-border trading and can benefit from economies of scale. Exchanges feel that they

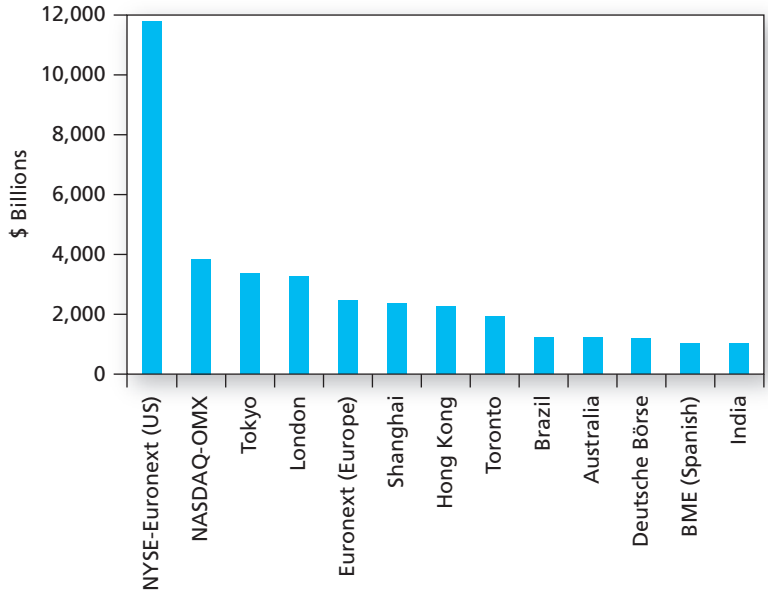


**Figure 3.8** The biggest stock markets in the world by domestic market capitalization in 2012

Source: World Federation of Exchanges, 2012.

eventually need to offer 24-hour global markets and platforms that allow trading of different security types, for example, both stocks and derivatives. Finally, companies want to be able to go beyond national borders when they wish to raise capital.

These pressures have resulted in a broad trend toward market consolidation. In the last decade, most of the mergers were "local," that is, involving exchanges operating on the same continent. In the U.S., the NYSE merged with the Archipelago ECN in 2006, and in 2008 acquired the American Stock Exchange. NASDAQ acquired Instinet (which operated another major ECN, INET) in 2005 and the Boston Stock Exchange in 2007. In the derivatives market, the Chicago Mercantile Exchange acquired the Chicago Board of Trade in 2007 and the New York Mercantile Exchange in 2008, thus moving almost all futures trading in the U.S. onto one exchange. In Europe, Euronext was formed by the merger of the Paris, Brussels, Lisbon, and Amsterdam exchanges and shortly thereafter purchased Liffe, the derivatives exchange based in London. The LSE merged in 2007 with Borsa Italiana, which operates the Milan exchange.

There has also been a wave of intercontinental consolidation. The NYSE Group and Euronext merged in 2007. Germany's Deutsche Börse and the NYSE Euronext agreed to merge in late 2011. The merged firm would be able to support trading in virtually every type of investment. However, in early 2012, the proposed merger ran aground when European Union antitrust regulators recommended that the combination be blocked. Still, the attempt at the merger indicates the thrust of market pressures, and other combinations

continue to develop. The NYSE and the Tokyo stock exchange have announced their intention to link their networks to give customers of each access to both markets. In 2007, the NASDAQ stock market merged with OMX, which operates seven Nordic and Baltic stock exchanges, to form NASDAQ OMX Group. In 2008, Eurex took over International Securities Exchange (ISE), to form a major options exchange.

## 3.7 Trading Costs

Part of the cost of trading a security is obvious and explicit. Your broker must be paid a commission. Individuals may choose from two kinds of brokers: full-service or discount brokers. Full-service brokers who provide a variety of services often are referred to as account executives or financial consultants.

Besides carrying out the basic services of executing orders, holding securities for safekeeping, extending margin loans, and facilitating short sales, brokers routinely provide information and advice relating to investment alternatives.

Full-service brokers usually depend on a research staff that prepares analyses and forecasts of general economic as well as industry and company conditions and often makes specific buy or sell recommendations. Some customers take the ultimate leap of faith and allow a full-service broker to make buy and sell decisions for them by establishing a *discretionary account.* In this account, the broker can buy and sell prespecified securities whenever deemed fit. (The broker cannot withdraw any funds, though.) This action requires an unusual degree of trust on the part of the customer, for an unscrupulous broker can "churn" an account, that is, trade securities excessively with the sole purpose of generating commissions.

Discount brokers, on the other hand, provide "no-frills" services. They buy and sell securities, hold them for safekeeping, offer margin loans, facilitate short sales, and that is all. The only information they provide about the securities they handle is price quotations. Discount brokerage services have become increasingly available in recent years. Many banks, thrift institutions, and mutual fund management companies now offer such services to the investing public as part of a general trend toward the creation of one-stop "financial supermarkets." Stock trading fees have fallen steadily over the last decade, and discount brokerage firms such as Schwab, E*Trade, or TD Ameritrade now offer commissions below $10.

In addition to the explicit part of trading costs—the broker's commission—there is an implicit part—the dealer's bid–ask spread. Sometimes the broker is also a dealer in the security being traded and charges no commission but instead collects the fee entirely in the form of the bid–ask spread. Another implicit cost of trading that some observers would distinguish is the price concession an investor may be forced to make for trading in quantities greater than those associated with the posted bid or asked price.

## 3.8 Buying on Margin

When purchasing securities, investors have easy access to a source of debt financing called *broker's call loans.* The act of taking advantage of broker's call loans is called *buying on margin.*

Purchasing stocks on margin means the investor borrows part of the purchase price of the stock from a broker. The **margin** in the account is the portion of the purchase price

contributed by the investor; the remainder is borrowed from the broker. The brokers in turn borrow money from banks at the call money rate to finance these purchases; they then charge their clients that rate (defined in Chapter 2), plus a service charge for the loan. All securities purchased on margin must be maintained with the brokerage firm in street name, for the securities are collateral for the loan.

The Board of Governors of the Federal Reserve System limits the extent to which stock purchases can be financed using margin loans. The current initial margin requirement is 50%, meaning that at least 50% of the purchase price must be paid for in cash, with the rest borrowed.

## Example 3.1 Margin

The percentage margin is defined as the ratio of the net worth, or the "equity value," of the account to the market value of the securities. To demonstrate, suppose an investor initially pays $6,000 toward the purchase of $10,000 worth of stock (100 shares at $100 per share), borrowing the remaining $4,000 from a broker. The initial balance sheet looks like this:

| Assets | | Liabilities and Owners' Equity | |
|---|---|---|---|
| Value of stock | $10,000 | Loan from broker | $4,000 |
| | | Equity | $6,000 |

The initial percentage margin is

$$\text{Margin} = \frac{\text{Equity in account}}{\text{Value of stock}} = \frac{\$6{,}000}{\$10{,}000} = .60, \text{ or } 60\%$$

If the price declines to $70 per share, the account balance becomes:

| Assets | | Liabilities and Owners' Equity | |
|---|---|---|---|
| Value of stock | $7,000 | Loan from broker | $4,000 |
| | | Equity | $3,000 |

The assets in the account fall by the full decrease in the stock value, as does the equity. The percentage margin is now

$$\text{Margin} = \frac{\text{Equity in account}}{\text{Value of stock}} = \frac{\$3{,}000}{\$7{,}000} = .43, \text{ or } 43\%$$

If the stock value in Example 3.1 were to fall below $4,000, owners' equity would become negative, meaning the value of the stock is no longer sufficient collateral to cover the loan from the broker. To guard against this possibility, the broker sets a *maintenance margin.* If the percentage margin falls below the maintenance level, the broker will issue a *margin call,* which requires the investor to add new cash or securities to the margin account. If the investor does not act, the broker may sell securities from the account to pay off enough of the loan to restore the percentage margin to an acceptable level.

# eXcel APPLICATIONS: Buying on Margin

The Online Learning Center (**www.mhhe.com/bkm**) contains the Excel spreadsheet model below, which makes it easy to analyze the impacts of different margin levels and the volatility of stock prices. It also allows you to compare return on investment for a margin trade with a trade using no borrowed funds.

### Excel Questions

1. Suppose you buy 100 shares share of stock initially selling for $50, borrowing 25% of the necessary funds from your broker, i.e, the initial margin on your purchase is 25%. You pay an interest rate of 8% on margin loans.
   a. How much of your own money do you invest? How much do you borrow from your broker?
   b. What will be your rate of return for the following stock prices at the end of a 1-year holding period? (1) $40, (2) $50, (3) $60.
2. Repeat Question 1 assuming your initial margin was 50%. How does margin affect the risk and return of your position?

| | A | B | C | D | E | F | G | H |
|---|---|---|---|---|---|---|---|---|
| 1 | | | | | | | | |
| 2 | | | Action or Formula | Ending | Return on | | Ending | Return with |
| 3 | | | for Column B | St Price | Investment | | St Price | No Margin |
| 4 | Initial Equity Investment | $10,000.00 | Enter data | | –41.60% | | | –18.80% |
| 5 | Amount Borrowed | $10,000.00 | (B4/B10)–B4 | $20.00 | –121.60% | | $20.00 | –58.80% |
| 6 | Initial Stock Price | $50.00 | Enter data | 25.00 | –101.60% | | 25.00 | –48.80% |
| 7 | Shares Purchased | 400 | (B4/B10)/B6 | 30.00 | –81.60% | | 30.00 | –38.80% |
| 8 | Ending Stock Price | $40.00 | Enter data | 35.00 | –61.60% | | 35.00 | –28.80% |
| 9 | Cash Dividends During Hold Per. | $0.60 | Enter data | 40.00 | –41.60% | | 40.00 | –18.80% |
| 10 | Initial Margin Percentage | 50.00% | Enter data | 45.00 | –21.60% | | 45.00 | –8.80% |
| 11 | Maintenance Margin Percentage | 30.00% | Enter data | 50.00 | –1.60% | | 50.00 | 1.20% |
| 12 | | | | 55.00 | 18.40% | | 55.00 | 11.20% |
| 13 | Rate on Margin Loan | 8.00% | Enter data | 60.00 | 38.40% | | 60.00 | 21.20% |
| 14 | Holding Period in Months | 6 | Enter data | 65.00 | 58.40% | | 65.00 | 31.20% |
| 15 | | | | 70.00 | 78.40% | | 70.00 | 41.20% |
| 16 | Return on Investment | | | 75.00 | 98.40% | | 75.00 | 51.20% |
| 17 | Capital Gain on Stock | –$4,000.00 | B7*(B8–B6) | 80.00 | 118.40% | | 80.00 | 61.20% |
| 18 | Dividends | $240.00 | B7*B9 | | | | | |
| 19 | Interest on Margin Loan | $400.00 | B5*(B14/12)*B13 | | | | | |
| 20 | Net Income | –$4,160.00 | B17+B18–B19 | | | LEGEND: | | |
| 21 | Initial Investment | $10,000.00 | B4 | | | Enter data | | |
| 22 | Return on Investment | –41.60% | B20/B21 | | | Value calculated | | |

## Example 3.2 Maintenance Margin

Suppose the maintenance margin is 30%. How far could the stock price fall before the investor would get a margin call?

Let $P$ be the price of the stock. The value of the investor's 100 shares is then $100P$, and the equity in the account is $100P - \$4{,}000$. The percentage margin is $(100P - \$4{,}000)/100P$. The price at which the percentage margin equals the maintenance margin of .3 is found by solving the equation

$$\frac{100P - 4{,}000}{100\,P} = .3$$

which implies that $P = \$57.14$. If the price of the stock were to fall below $57.14 per share, the investor would get a margin call.

## CONCEPT CHECK 3.4

Suppose the maintenance margin in Example 3.2 is 40%. How far can the stock price fall before the investor gets a margin call?

**Table 3.1**

Illustration of buying stock on margin

| Change in Stock Price | End-of-Year Value of Shares | Repayment of Principal and Interest* | Investor's Rate of Return |
|---|---|---|---|
| 30% increase | $26,000 | $10,900 | 51% |
| No change | 20,000 | 10,900 | −9 |
| 30% decrease | 14,000 | 10,900 | −69 |

* Assuming the investor buys $20,000 worth of stock, borrowing $10,000 of the purchase price at an interest rate of 9% per year.

Why do investors buy securities on margin? They do so when they wish to invest an amount greater than their own money allows. Thus, they can achieve greater upside potential, but they also expose themselves to greater downside risk.

To see how, let's suppose an investor is bullish on FinCorp stock, which is selling for $100 per share. An investor with $10,000 to invest expects FinCorp to go up in price by 30% during the next year. Ignoring any dividends, the expected rate of return would be 30% if the investor invested $10,000 to buy 100 shares.

But now assume the investor borrows another $10,000 from the broker and invests it in FinCorp, too. The total investment in FinCorp would be $20,000 (for 200 shares). Assuming an interest rate on the margin loan of 9% per year, what will the investor's rate of return be now (again ignoring dividends) if FinCorp stock goes up 30% by year's end?

The 200 shares will be worth $26,000. Paying off $10,900 of principal and interest on the margin loan leaves $15,100 (i.e., $26,000 − $10,900). The rate of return in this case will be

$$\frac{\$15{,}000 - \$10{,}000}{\$10{,}000} = 51\%$$

The investor has parlayed a 30% rise in the stock's price into a 51% rate of return on the $10,000 investment.

Doing so, however, magnifies the downside risk. Suppose that, instead of going up by 30%, the price of FinCorp stock goes down by 30% to $70 per share. In that case, the 200 shares will be worth $14,000, and the investor is left with $3,100 after paying off the $10,900 of principal and interest on the loan. The result is a disastrous return of

$$\frac{\$3{,}100 - \$10{,}000}{\$10{,}000} = -69\%$$

Table 3.1 summarizes the possible results of these hypothetical transactions. If there is no change in FinCorp's stock price, the investor loses 9%, the cost of the loan.

**CONCEPT CHECK 3.5**

Suppose that in this margin example, the investor borrows only $5,000 at the same interest rate of 9% per year. What will the rate of return be if the price of FinCorp goes up by 30%? If it goes down by 30%? If it remains unchanged?

# eXcel APPLICATIONS: Short Sale

The Online Learning Center (**www.mhhe.com/bkm**) contains this Excel spreadsheet model, built using the text example for Dot Bomb. The model allows you to analyze the effects of returns, margin calls, and different levels of initial and maintenance margins. The model also includes a sensitivity analysis for ending stock price and return on investment.

### Excel Questions

1. Suppose you sell short 100 shares of stock initially selling for $100 a share. Your initial margin requirement is 50% of the value of the stock sold. You receive no interest on the funds placed in your margin account.
   a. How much do you need to contribute to your margin account?
   b. What will be your rate of return for the following stock prices at the end of a 1-year holding period? Assume the stock pays no dividends. (1) $90, (2) $100, (3) $110.
2. Repeat Question 1 (b) but now assume that the stock pays dividends of $2 per share at year-end. What is the relationship between the total rate of return on the stock and the return to your short position?

| | A | B | C | D | E |
|---|---|---|---|---|---|
| 1 | | | | | |
| 2 | | | Action or Formula | Ending | Return on |
| 3 | | | for Column B | St Price | Investment |
| 4 | Initial Investment | $50,000.00 | Enter data | | 60.00% |
| 5 | Initial Stock Price | $100.00 | Enter data | $170.00 | –140.00% |
| 6 | Number of Shares Sold Short | 1,000 | (B4/B9)/B5 | 160.00 | –120.00% |
| 7 | Ending Stock Price | $70.00 | Enter data | 150.00 | –100.00% |
| 8 | Cash Dividends Per Share | $0.00 | Enter data | 140.00 | –80.00% |
| 9 | Initial Margin Percentage | 50.00% | Enter data | 130.00 | –60.00% |
| 10 | Maintenance Margin Percentage | 30.00% | Enter data | 120.00 | –40.00% |
| 11 | | | | 110.00 | –20.00% |
| 12 | **Return on Short Sale** | | | 100.00 | 0.00% |
| 13 | Capital Gain on Stock | $30,000.00 | B6*(B5−B7) | 90.00 | 20.00% |
| 14 | Dividends Paid | $0.00 | B8*B6 | 80.00 | 40.00% |
| 15 | Net Income | $30,000.00 | B13−B14 | 70.00 | 60.00% |
| 16 | Initial Investment | $50,000.00 | B4 | 60.00 | 80.00% |
| 17 | Return on Investment | 60.00% | B15/B16 | 50.00 | 100.00% |
| 18 | | | | 40.00 | 120.00% |
| 19 | **Margin Positions** | | | 30.00 | 140.00% |
| 20 | Margin Based on Ending Price | 114.29% | (B4+(B5*B6)−B14−(B6*B7))/(B6*B7) | 20.00 | 160.00% |
| 21 | | | | 10.00 | 180.00% |
| 22 | Price for Margin Call | $115.38 | (B4+(B5*B6)−B14)/(B6*(1+B10)) | | |
| 23 | | | | LEGEND: | |
| 24 | | | | Enter data | |
| 25 | | | | Value calculated | |

## 3.9 Short Sales

Normally, an investor would first buy a stock and later sell it. With a short sale, the order is reversed. First, you sell and then you buy the shares. In both cases, you begin and end with no shares.

A **short sale** allows investors to profit from a decline in a security's price. An investor borrows a share of stock from a broker and sells it. Later, the short-seller must purchase a share of the same stock in order to replace the share that was borrowed. This is called *covering the short position.* Table 3.2 compares stock purchases to short sales.[2]

The short-seller anticipates the stock price will fall, so that the share can be purchased later at a lower price than it initially sold for; if so, the short-seller will reap a profit. Short-sellers must not only replace the shares but also pay the lender of the security any dividends paid during the short sale.

In practice, the shares loaned out for a short sale are typically provided by the short-seller's brokerage firm, which holds a wide variety of securities of its other investors in

[2]*Naked short-selling* is a variant on conventional short-selling. In a naked short, a trader sells shares that have not yet been borrowed, assuming that the shares can be acquired in time to meet any delivery deadline. While naked short-selling is prohibited, enforcement has been spotty, as many firms have engaged in it based on their "reasonable belief" that they will be able to acquire the stock by the time delivery is required. Now the SEC is requiring that short-sellers have made firm arrangements for delivery before engaging in the sale.

**Table 3.2**

Cash flows from purchasing versus short-selling shares of stock

| Purchase of Stock | | |
|---|---|---|
| **Time** | **Action** | **Cash Flow*** |
| 0 | Buy share | − Initial price |
| 1 | Receive dividend, sell share | Ending price + Dividend |
| Profit = (Ending price + Dividend) − Initial price | | |
| **Short Sale of Stock** | | |
| **Time** | **Action** | **Cash Flow*** |
| 0 | Borrow share; sell it | + Initial price |
| 1 | Repay dividend and buy share to replace the share originally borrowed | − (Ending price + Dividend) |
| Profit = Initial price − (Ending price + Dividend) | | |

*A negative cash flow implies a cash *outflow.*

street name (i.e., the broker holds the shares registered in its own name on behalf of the client). The owner of the shares need not know that the shares have been lent to the short-seller. If the owner wishes to sell the shares, the brokerage firm will simply borrow shares from another investor. Therefore, the short sale may have an indefinite term. However, if the brokerage firm cannot locate new shares to replace the ones sold, the short-seller will need to repay the loan immediately by purchasing shares in the market and turning them over to the brokerage house to close out the loan.

Finally, exchange rules require that proceeds from a short sale must be kept on account with the broker. The short-seller cannot invest these funds to generate income, although large or institutional investors typically will receive some income from the proceeds of a short sale being held with the broker. Short-sellers also are required to post margin (cash or collateral) with the broker to cover losses should the stock price rise during the short sale.

## Example 3.3 Short Sales

To illustrate the mechanics of short-selling, suppose you are bearish (pessimistic) on Dot Bomb stock, and its market price is $100 per share. You tell your broker to sell short 1,000 shares. The broker borrows 1,000 shares either from another customer's account or from another broker.

The $100,000 cash proceeds from the short sale are credited to your account. Suppose the broker has a 50% margin requirement on short sales. This means you must have other cash or securities in your account worth at least $50,000 that can serve as margin on the short sale. Let's say that you have $50,000 in Treasury bills. Your account with the broker after the short sale will then be:

| Assets | | Liabilities and Owners' Equity | |
|---|---|---|---|
| Cash | $100,000 | Short position in Dot Bomb stock (1,000 shares owed) | $100,000 |
| T-bills | 50,000 | Equity | 50,000 |

Your initial percentage margin is the ratio of the equity in the account, $50,000, to the current value of the shares you have borrowed and eventually must return, $100,000:

$$\text{Percentage margin} = \frac{\text{Equity}}{\text{Value of stock owed}} = \frac{\$50{,}000}{\$100{,}000} = .50$$

Suppose you are right and Dot Bomb falls to $70 per share. You can now close out your position at a profit. To cover the short sale, you buy 1,000 shares to replace the ones you borrowed. Because the shares now sell for $70, the purchase costs only $70,000.[3] Because your account was credited for $100,000 when the shares were borrowed and sold, your profit is $30,000: The profit equals the decline in the share price times the number of shares sold short.

Like investors who purchase stock on margin, a short-seller must be concerned about margin calls. If the stock price rises, the margin in the account will fall; if margin falls to the maintenance level, the short-seller will receive a margin call.

## Example 3.4 Margin Calls on Short Positions

Suppose the broker has a maintenance margin of 30% on short sales. This means the equity in your account must be at least 30% of the value of your short position at all times. How much can the price of Dot Bomb stock rise before you get a margin call?

Let $P$ be the price of Dot Bomb stock. Then the value of the shares you must pay back is $1{,}000P$ and the equity in your account is $\$150{,}000 - 1{,}000P$. Your short position margin ratio is equity/value of stock $= (150{,}000 - 1{,}000P)/1{,}000P$. The critical value of $P$ is thus

$$\frac{\text{Equity}}{\text{Value of shares owed}} = \frac{15{,}000 - 1{,}000P}{1{,}000P} = .3$$

which implies that $P = \$115.38$ per share. If Dot Bomb stock should *rise* above $115.38 per share, you will get a margin call, and you will either have to put up additional cash or cover your short position by buying shares to replace the ones borrowed.

## CONCEPT CHECK 3.6

*a.* Construct the balance sheet if Dot Bomb in Example 3.4 goes up to $110.

*b.* If the short position maintenance margin in the Dot Bomb example is 40%, how far can the stock price rise before the investor gets a margin call?

You can see now why stop-buy orders often accompany short sales. Imagine that you short-sell Dot Bomb when it is selling at $100 per share. If the share price falls, you will profit from the short sale. On the other hand, if the share price rises, let's say to $130, you will lose $30 per share. But suppose that when you initiate the short sale, you also enter a

[3]Notice that when buying on margin, you borrow a given amount of dollars from your broker, so the amount of the loan is independent of the share price. In contrast, when short-selling you borrow a given number of *shares,* which must be returned. Therefore, when the price of the shares changes, the value of the loan also changes.

stop-buy order at $120. The stop-buy will be executed if the share price surpasses $120, thereby limiting your losses to $20 per share. (If the stock price drops, the stop-buy will never be executed.) The stop-buy order thus provides protection to the short-seller if the share price moves up.

Short-selling periodically comes under attack, particularly during times of financial stress when share prices fall. The last few years have been no exception to this rule. For example, following the 2008 financial crisis, the SEC voted to restrict short sales in stocks that decline by at least 10% on a given day. Those stocks may now be shorted on that day and the next only at a price greater than the highest bid price across national stock markets. The nearby box examines the controversy surrounding short sales in greater detail.

## 3.10 Regulation of Securities Markets

Trading in securities markets in the United States is regulated by a myriad of laws. The major governing legislation includes the Securities Act of 1933 and the Securities Exchange Act of 1934. The 1933 act requires full disclosure of relevant information relating to the issue of new securities. This is the act that requires registration of new securities and issuance of a prospectus that details the financial prospects of the firm. SEC approval of a prospectus or financial report is not an endorsement of the security as a good investment. The SEC cares only that the relevant facts are disclosed; investors must make their own evaluation of the security's value.

The 1934 act established the Securities and Exchange Commission to administer the provisions of the 1933 act. It also extended the disclosure principle of the 1933 act by requiring periodic disclosure of relevant financial information by firms with already-issued securities on secondary exchanges.

The 1934 act also empowers the SEC to register and regulate securities exchanges, OTC trading, brokers, and dealers. While the SEC is the administrative agency responsible for broad oversight of the securities markets, it shares responsibility with other regulatory agencies. The Commodity Futures Trading Commission (CFTC) regulates trading in futures markets, while the Federal Reserve has broad responsibility for the health of the U.S. financial system. In this role, the Fed sets margin requirements on stocks and stock options and regulates bank lending to security market participants.

The Securities Investor Protection Act of 1970 established the Securities Investor Protection Corporation (SIPC) to protect investors from losses if their brokerage firms fail. Just as the Federal Deposit Insurance Corporation provides depositors with federal protection against bank failure, the SIPC ensures that investors will receive securities held for their account in street name by a failed brokerage firm up to a limit of $500,000 per customer. The SIPC is financed by levying an "insurance premium" on its participating, or member, brokerage firms.

In addition to federal regulations, security trading is subject to state laws, known generally as *blue sky laws* because they are intended to give investors a clearer view of investment prospects. Varying state laws were somewhat unified when many states adopted portions of the Uniform Securities Act, which was enacted in 1956.

The 2008 financial crisis also led to regulatory changes, some of which we detailed in Chapter 1. The Financial Stability Oversight Council (FSOC) was established by the Dodd-Frank Wall Street Reform and Consumer Protection Act to monitor the stability of the U.S. financial system. It is largely concerned with risks arising from potential failures of large, interconnected banks, but its voting members are the chairpersons of the main U.S. regulatory agencies, and therefore the FSOC serves a broader role to connect and coordinate key financial regulators.

WORDS FROM THE STREET

## Short-Selling Comes Under Fire—Again

Short-selling has long been viewed with suspicion, if not outright hostility. England banned short sales for a good part of the 18th century. Napoleon called short-sellers enemies of the state. In the U.S., short-selling was widely viewed as contributing to the market crash of 1929, and in 2008, short-sellers were blamed for the collapse of the investment banks Bear Stearns and Lehman Brothers. With share prices of other financial firms tumbling in September 2008, the SEC instituted a temporary ban on short-selling of nearly 1,000 of those firms. Similarly, the Financial Services Authority, the financial regulator in the U.K., prohibited short sales on about 30 financial companies, and Australia banned shorting altogether.

The rationale for these bans is that short sales put downward pressure on share prices that in some cases may be unwarranted: rumors abound of investors who first put on a short sale and then spread negative rumors about the firm to drive down its price. More often, however, shorting is a legitimate bet that a share price is too high and is due to fall. Nevertheless, during the market stresses of late 2008, the widespread feeling was that even if short positions were legitimate, regulators should do what they could to prop up the affected institutions.

Hostility to short-selling may well stem from confusion between bad news and the bearer of that news. Short-selling allows investors whose analysis indicates a firm is overpriced to take action on that belief—and to profit if they are correct. Rather than *causing* the stock price to fall, shorts may be *anticipating* a decline in the stock price. Their sales simply force the market to reflect the deteriorating prospects of troubled firms sooner than it might have otherwise. In other words, short-selling is part of the process by which the full range of information and opinion—pessimistic as well as optimistic—is brought to bear on stock prices.

For example, short-sellers took large (negative) positions in firms such as WorldCom, Enron, and Tyco even before these firms were exposed by regulators. In fact, one might argue that these emerging short positions helped regulators identify the previously undetected scandals. And in the end, Lehman and Bear Stearns were brought down by their very real losses on their mortgage-related investments—not by unfounded rumors.

Academic research supports the conjecture that short sales contribute to efficient "price discovery." For example, the greater the demand for shorting a stock, the lower its future returns tend to be; moreover, firms that attack short-sellers with threats of legal action or bad publicity tend to have especially poor future returns.[1] Short-sale bans may in the end be nothing more than an understandable, but nevertheless misguided, impulse to "shoot the messenger."

[1]See, for example, C. Jones and O.A. Lamont, "Short Sale Constraints and Stock Returns," *Journal of Financial Economics,* November 2002, pp. 207–39, or O.A. Lamont, "Go Down Fighting: Short Sellers vs. Firms," *Yale ICF Working Paper No. 04–20,* July 2004.

### Self-Regulation

In addition to government regulation, the securities market exercises considerable self-regulation. The most important overseer in this regard is the Financial Industry Regulatory Authority (FINRA), which is the largest nongovernmental regulator of all securities firms in the United States. FINRA was formed in 2007 through the consolidation of the National Association of Securities Dealers (NASD) with the self-regulatory arm of the New York Stock Exchange. It describes its broad mission as the fostering of investor protection and market integrity. It examines securities firms, writes and enforces rules concerning trading practices, and administers a dispute-resolution forum for investors and registered firms.

In addition to being governed by exchange regulation, there is also self-regulation among the community of investment professionals. For example, the CFA Institute has developed standards of professional conduct that govern the behavior of members with the Chartered Financial Analysts designation, commonly referred to as CFAs. The nearby box presents a brief outline of those principles.

### The Sarbanes-Oxley Act

The scandals of 2000–2002 centered largely on three broad practices: allocations of shares in initial public offerings, tainted securities research and recommendations put out to the

## Excerpts from CFA Institute Standards of Professional Conduct

I. Professionalism
- Knowledge of law. Members must understand, have knowledge of, and comply with all applicable laws, rules, and regulations including the Code of Ethics and Standards of Professional Conduct.
- Independence and objectivity. Members shall maintain independence and objectivity in their professional activities.
- Misrepresentation. Members must not knowingly misrepresent investment analysis, recommendations, or other professional activities.

II. Integrity of Capital Markets
- Non-public information. Members must not exploit material non-public information.
- Market manipulation. Members shall not attempt to distort prices or trading volume with the intent to mislead market participants.

III. Duties to Clients
- Loyalty, prudence, and care. Members must place their clients' interests before their own and act with reasonable care on their behalf.
- Fair dealing. Members shall deal fairly and objectively with clients when making investment recommendations or taking actions.
- Suitability. Members shall make a reasonable inquiry into a client's financial situation, investment experience, and investment objectives prior to making appropriate investment recommendations.
- Performance presentation. Members shall attempt to ensure that investment performance is presented fairly, accurately, and completely.
- Confidentiality. Members must keep information about clients confidential unless the client permits disclosure.

IV. Duties to Employers
- Loyalty. Members must act for the benefit of their employer.
- Compensation. Members must not accept compensation from sources that would create a conflict of interest with their employer's interests without written consent from all involved parties.
- Supervisors. Members must make reasonable efforts to detect and prevent violation of applicable laws and regulations by anyone subject to their supervision.

V. Investment Analysis and Recommendations
- Diligence. Members must exercise diligence and have reasonable basis for investment analysis, recommendations, or actions.
- Communication. Members must distinguish fact from opinion in their presentation of analysis and disclose general principles of investment processes used in analysis.

VI. Conflicts of Interest
- Disclosure of conflicts. Members must disclose all matters that reasonably could be expected to impair their objectivity or interfere with their other duties.
- Priority of transactions. Transactions for clients and employers must have priority over transactions for the benefit of a member.

VII. Responsibilities as Member of CFA Institute
- Conduct. Members must not engage in conduct that compromises the reputation or integrity of the CFA Institute or CFA designation.

**Source:** Summary of *the Code of Ethics and Standards of Professional Conduct* of the CFA Institute. Copyright 2005, CFA Institute. Reproduced with permission from the CFA Institute. All rights reserved. **www.cfainstitute.org/centre/codes/ethics**

public, and, probably most important, misleading financial statements and accounting practices. The Sarbanes-Oxley Act was passed by Congress in 2002 in response to these problems. Among the key reforms are:

- Creation of the Public Company Accounting Oversight Board to oversee the auditing of public companies.
- Rules requiring independent financial experts to serve on audit committees of a firm's board of directors.
- CEOs and CFOs must now personally certify that their firms' financial reports "fairly represent, in all material respects, the operations and financial condition of the company," and are subject to personal penalties if those reports turn out to be misleading. Following the letter of the rules may still be necessary, but it is no longer sufficient accounting practice.

- Auditors may no longer provide several other services to their clients. This is intended to prevent potential profits on consulting work from influencing the quality of their audit.
- The Board of Directors must be composed of independent directors and hold regular meetings of directors in which company management is not present (and therefore cannot impede or influence the discussion).

More recently, there has been a fair amount of pushback on Sarbanes-Oxley. Many observers believe that the compliance costs associated with the law are too onerous, especially for smaller firms, and that heavy-handed regulatory oversight is giving foreign locales an undue advantage over the United States when firms decide where to list their securities. Moreover, the efficacy of single-country regulation is being tested in the face of increasing globalization and the ease with which funds can move across national borders.

## Insider Trading

Regulations also prohibit insider trading. It is illegal for anyone to transact in securities to profit from **inside information,** that is, private information held by officers, directors, or major stockholders that has not yet been divulged to the public. But the definition of insiders can be ambiguous. While it is obvious that the chief financial officer of a firm is an insider, it is less clear whether the firm's biggest supplier can be considered an insider. Yet a supplier may deduce the firm's near-term prospects from significant changes in orders. This gives the supplier a unique form of private information, yet the supplier is not technically an insider. These ambiguities plague security analysts, whose job is to uncover as much information as possible concerning the firm's expected prospects. The dividing line between legal private information and illegal inside information can be fuzzy.

The SEC requires officers, directors, and major stockholders to report all transactions in their firm's stock. A compendium of insider trades is published monthly in the SEC's *Official Summary of Securities Transactions and Holdings.* The idea is to inform the public of any implicit vote of confidence or no confidence made by insiders.

Insiders *do* exploit their knowledge. Three forms of evidence support this conclusion. First, there have been well-publicized convictions of principals in insider trading schemes.

Second, there is considerable evidence of "leakage" of useful information to some traders before any public announcement of that information. For example, share prices of firms announcing dividend increases (which the market interprets as good news concerning the firm's prospects) commonly increase in value a few days *before* the public announcement of the increase. Clearly, some investors are acting on the good news before it is released to the public. Share prices still rise substantially on the day of the public release of good news, however, indicating that insiders, or their associates, have not fully bid up the price of the stock to the level commensurate with the news.

A third form of evidence on insider trading has to do with returns earned on trades by insiders. Researchers have examined the SEC's summary of insider trading to measure the performance of insiders. In one of the best known of these studies, Jaffee[4] examined the abnormal return of stocks over the months following purchases or sales by insiders. For months in which insider purchasers of a stock exceeded insider sellers of the stock by three or more, the stock had an abnormal return in the following 8 months of about 5%. Moreover, when insider sellers exceeded insider buyers, the stock tended to perform poorly.

[4]Jeffrey E. Jaffee, "Special Information and Insider Trading," *Journal of Business* 47 (July 1974).

## SUMMARY

1. Firms issue securities to raise the capital necessary to finance their investments. Investment bankers market these securities to the public on the primary market. Investment bankers generally act as underwriters who purchase the securities from the firm and resell them to the public at a markup. Before the securities may be sold to the public, the firm must publish an SEC-accepted prospectus that provides information on the firm's prospects.
2. Already-issued securities are traded on the secondary market, that is, on organized stock markets; on the over-the-counter market; and occasionally for very large trades, through direct negotiation. Only license holders of exchanges may trade on the exchange. Brokerage firms holding licenses to trade on the exchange sell their services to individuals, charging commissions for executing trades on their behalf.
3. Trading may take place in dealer markets, via electronic communication networks, or in specialist markets. In dealer markets, security dealers post bid and ask prices at which they are willing to trade. Brokers for individuals execute trades at the best available prices. In electronic markets, the existing book of limit orders provides the terms at which trades can be executed. Mutually agreeable offers to buy or sell securities are automatically crossed by the computer system operating the market. In specialist markets, the specialist acts to maintain an orderly market with price continuity. Specialists maintain a limit-order book, but also sell from or buy for their own inventories of stock.
4. NASDAQ was traditionally a dealer market in which a network of dealers negotiated directly over sales of securities. The NYSE was traditionally a specialist market. In recent years, however, both exchanges have dramatically increased their commitment to electronic and automated trading. Trading activity today is overwhelmingly electronic.
5. Buying on margin means borrowing money from a broker to buy more securities than can be purchased with one's own money alone. By buying securities on a margin, an investor magnifies both the upside potential and the downside risk. If the equity in a margin account falls below the required maintenance level, the investor will get a margin call from the broker.
6. Short-selling is the practice of selling securities that the seller does not own. The short-seller borrows the securities sold through a broker and may be required to cover the short position at any time on demand. The cash proceeds of a short sale are kept in escrow by the broker, and the broker usually requires that the short-seller deposit additional cash or securities to serve as margin (collateral).
7. Securities trading is regulated by the Securities and Exchange Commission, by other government agencies, and through self-regulation of the exchanges. Many of the important regulations have to do with full disclosure of relevant information concerning the securities in question. Insider trading rules also prohibit traders from attempting to profit from inside information.

Related Web sites for this chapter are available at **www.mhhe.com/bkm**

## KEY TERMS

primary market
secondary market
private placement
initial public offerings (IPOs)
underwriters
prospectus
dealer markets
auction market
bid price
ask price
bid–ask spread
limit order
stop orders
over-the-counter (OTC) market
NASDAQ stock market
electronic communication networks (ECNs)
specialist
stock exchanges
latency
algorithmic trading
high-frequency trading
blocks
dark pools
margin
short sale
inside information

## PROBLEM SETS

### Basic

1. What are the differences between a stop-loss order, a limit sell order, and a market order?
2. Why have average trade sizes declined in recent years?
3. How do margin trades magnify both the upside potential and the downside risk of an investment position?

4. A market order has:
   *a.* Price uncertainty but not execution uncertainty.
   *b.* Both price uncertainty and execution uncertainty.
   *c.* Execution uncertainty but not price uncertainty.



5. Where would an illiquid security in a developing country *most likely* trade?
   *a.* Broker markets.
   *b.* Electronic crossing networks.
   *c.* Electronic limit-order markets.

Intermediate

6. Dée Trader opens a brokerage account and purchases 300 shares of Internet Dreams at $40 per share. She borrows $4,000 from her broker to help pay for the purchase. The interest rate on the loan is 8%.
   *a.* What is the margin in Dée's account when she first purchases the stock?
   *b.* If the share price falls to $30 per share by the end of the year, what is the remaining margin in her account? If the maintenance margin requirement is 30%, will she receive a margin call?
   *c.* What is the rate of return on her investment?

7. Old Economy Traders opened an account to short sell 1,000 shares of Internet Dreams from the previous problem. The initial margin requirement was 50%. (The margin account pays no interest.) A year later, the price of Internet Dreams has risen from $40 to $50, and the stock has paid a dividend of $2 per share.
   *a.* What is the remaining margin in the account?
   *b.* If the maintenance margin requirement is 30%, will Old Economy receive a margin call?
   *c.* What is the rate of return on the investment?

8. Consider the following limit-order book for a share of stock. The last trade in the stock occurred at a price of $50.

| Limit Buy Orders | | Limit Sell Orders | |
|---|---|---|---|
| **Price** | **Shares** | **Price** | **Shares** |
| $49.75 | 500 | $50.25 | 100 |
| 49.50 | 800 | 51.50 | 100 |
| 49.25 | 500 | 54.75 | 300 |
| 49.00 | 200 | 58.25 | 100 |
| 48.50 | 600 | | |

   *a.* If a market buy order for 100 shares comes in, at what price will it be filled?
   *b.* At what price would the next market buy order be filled?
   *c.* If you were a security dealer, would you want to increase or decrease your inventory of this stock?



9. You are bullish on Telecom stock. The current market price is $50 per share, and you have $5,000 of your own to invest. You borrow an additional $5,000 from your broker at an interest rate of 8% per year and invest $10,000 in the stock.
   *a.* What will be your rate of return if the price of Telecom stock goes up by 10% during the next year? The stock currently pays no dividends.
   *b.* How far does the price of Telecom stock have to fall for you to get a margin call if the maintenance margin is 30%? Assume the price fall happens immediately.



10. You are bearish on Telecom and decide to sell short 100 shares at the current market price of $50 per share.
    *a.* How much in cash or securities must you put into your brokerage account if the broker's initial margin requirement is 50% of the value of the short position?
    *b.* How high can the price of the stock go before you get a margin call if the maintenance margin is 30% of the value of the short position?

11. Suppose that Intel currently is selling at $20 per share. You buy 1,000 shares using $15,000 of your own money, borrowing the remainder of the purchase price from your broker. The rate on the margin loan is 8%.

    *a.* What is the percentage increase in the net worth of your brokerage account if the price of Intel *immediately* changes to: (i) $22; (ii) $20; (iii) $18? What is the relationship between your percentage return and the percentage change in the price of Intel?
    *b.* If the maintenance margin is 25%, how low can Intel's price fall before you get a margin call?
    *c.* How would your answer to (*b*) change if you had financed the initial purchase with only $10,000 of your own money?
    *d.* What is the rate of return on your margined position (assuming again that you invest $15,000 of your own money) if Intel is selling *after 1 year* at: (i) $22; (ii) $20; (iii) $18? What is the relationship between your percentage return and the percentage change in the price of Intel? Assume that Intel pays no dividends.
    *e.* Continue to assume that a year has passed. How low can Intel's price fall before you get a margin call?

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12. Suppose that you sell short 1,000 shares of Intel, currently selling for $20 per share, and give your broker $15,000 to establish your margin account.

    *a.* If you earn no interest on the funds in your margin account, what will be your rate of return after 1 year if Intel stock is selling at: (i) $22; (ii) $20; (iii) $18? Assume that Intel pays no dividends.
    *b.* If the maintenance margin is 25%, how high can Intel's price rise before you get a margin call?
    *c.* Redo parts (*a*) and (*b*), but now assume that Intel also has paid a year-end dividend of $1 per share. The prices in part (*a*) should be interpreted as ex-dividend, that is, prices after the dividend has been paid.

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13. Here is some price information on Marriott:

| | Bid | Asked |
|---|---|---|
| Marriott | 39.95 | 40.05 |

    You have placed a stop-loss order to sell at $40. What are you telling your broker? Given market prices, will your order be executed?

14. Here is some price information on Fincorp stock. Suppose that Fincorp trades in a dealer market.

| Bid | Asked |
|---|---|
| 55.25 | 55.50 |

    *a.* Suppose you have submitted an order to your broker to buy at market. At what price will your trade be executed?
    *b.* Suppose you have submitted an order to sell at market. At what price will your trade be executed?
    *c.* Suppose you have submitted a limit order to sell at $55.62. What will happen?
    *d.* Suppose you have submitted a limit order to buy at $55.37. What will happen?

15. You've borrowed $20,000 on margin to buy shares in Disney, which is now selling at $40 per share. Your account starts at the initial margin requirement of 50%. The maintenance margin is 35%. Two days later, the stock price falls to $35 per share.

    *a.* Will you receive a margin call?
    *b.* How low can the price of Disney shares fall before you receive a margin call?

16. On January 1, you sold short one round lot (that is, 100 shares) of Four Sisters stock at $21 per share. On March 1, a dividend of $2 per share was paid. On April 1, you covered the short sale by buying the stock at a price of $15 per share. You paid 50 cents per share in commissions for each transaction. What is the value of your account on April 1?

CFA® PROBLEMS

1. FBN, Inc., has just sold 100,000 shares in an initial public offering. The underwriter's explicit fees were $70,000. The offering price for the shares was $50, but immediately upon issue, the share price jumped to $53.
   *a.* What is your best guess as to the total cost to FBN of the equity issue?
   *b.* Is the entire cost of the underwriting a source of profit to the underwriters?
2. If you place a stop-loss order to sell 100 shares of stock at $55 when the current price is $62, how much will you receive for each share if the price drops to $50?
   *a.* $50.
   *b.* $55.
   *c.* $54.87.
   *d.* Cannot tell from the information given.
3. Specialists on the New York Stock Exchange do all of the following *except:*
   *a.* Act as dealers for their own accounts.
   *b.* Execute limit orders.
   *c.* Help provide liquidity to the marketplace.
   *d.* Act as odd-lot dealers.

### E-INVESTMENTS EXERCISES

When you are choosing which brokerage firm(s) to use to execute your trades, you should consider several factors. Also, wide range of services claim to objectively recommend brokerage firms. However, many are actually sponsored by the brokerage firms themselves.

Go to the Web site **www.consumersearch.com/online-brokers/reviews** and read the information provided under "Our Sources." Then follow the link for the Barron's ratings. Here you can read the Barron's annual broker survey and download the "How the Brokers Stack Up" report, which contains a list of fees. Suppose that you have $3,000 to invest and want to put it in a non-IRA account.

1. Are all of the brokerage firms suitable if you want to open a cash account? Are they all suitable if you want a margin account?
2. Choose two of the firms listed. Assume that you want to buy 200 shares of LLY stock using a market order. If the order is filled at $42 per share, how much will the commission be for the two firms if you place an online order?
3. Are there any maintenance fees associated with the account at either brokerage firm?
4. Now assume that you have a margin account and the balance is $3,000. Calculate the interest rate you would pay if you borrowed money to buy stock.

## SOLUTIONS TO CONCEPT CHECKS

1. Limited-time shelf registration was introduced because its cost savings outweighed the disadvantage of slightly less up-to-date disclosures. Allowing unlimited shelf registration would circumvent "blue sky" laws that ensure proper disclosure as the financial circumstances of the firm change over time.
2. *a.* Used cars trade in dealer markets (used-car lots or auto dealerships) and in direct search markets when individuals advertise in local newspapers or on the Web.
   *b.* Paintings trade in broker markets when clients commission brokers to buy or sell art for them, in dealer markets at art galleries, and in auction markets.
   *c.* Rare coins trade mostly in dealer markets in coin shops, but they also trade in auctions and in direct search markets when individuals advertise they want to buy or sell coins.

3. *a.* You should give your broker a market order. It will be executed immediately and is the cheapest type of order in terms of brokerage fees.

   *b.* You should give your broker a limit-buy order, which will be executed only if the shares can be obtained at a price about 5% below the current price.

   *c.* You should give your broker a stop-loss order, which will be executed if the share price starts falling. The limit or stop price should be close to the current price to avoid the possibility of large losses.

4. Solving

$$\frac{100P - \$4{,}000}{100P} = .4$$

   yields $P = \$66.67$ per share.

5. The investor will purchase 150 shares, with a rate of return as follows:

| Year-End Change in Price | Year-End Value of Shares | Repayment of Principal and Interest | Investor's Rate of Return |
|---|---|---|---|
| 30% | $19,500 | $5,450 | 40.5% |
| No change | 15,000 | 5,450 | −4.5 |
| −30% | 10,500 | 5,450 | −49.5 |

6. *a.* Once Dot Bomb stock goes up to $110, your balance sheet will be:

| Assets | | Liabilities and Owner's Equity | |
|---|---|---|---|
| Cash | $100,000 | Short position in Dot Bomb | $110,000 |
| T-bills | 50,000 | Equity | 40,000 |

   *b.* Solving

$$\frac{\$150{,}000 - 1{,}000P}{1{,}000P} = .4$$

   yields $P = \$107.14$ per share.