

CHAPTER 20

HYBRID FINANCING: PREFERRED STOCK, LEASING, WARRANTS, AND CONVERTIBLES

Taking a Wild Ride with Amazon's Convertible Debt

Amazon.com

The use of convertible securities—generally bonds or preferred stocks that can be exchanged for common stock of the issuing corporation—has soared during the last decade. In recent years there have been instances where the capital raised through convertible securities has exceeded the amount of capital raised through common stock.

Why do companies use convertibles so heavily? To answer this question, recognize that convertibles virtually always have coupon rates that are lower than would be required on straight, nonconvertible bonds or preferred stocks. Therefore, if a company raises \$100 million by issuing convertible bonds, its interest expense is lower than if it financed with nonconvertible debt. But why would investors be willing to buy convertibles, given their lower cash payments? The answer lies in the conversion feature—if the price of the issuer's stock rises, the holder of the convertible can exchange it for stock and realize a capital gain. So, convertibles hold down the cash costs of financing by giving investors an opportunity for capital gains. A convertible bond's value is tied to the price of the stock into which it is convertible, whereas a nonconvertible bond's price is based on its fixed-income payments. Therefore, convertibles' prices rise and fall much more than regular bonds' prices; hence, convertibles are relatively risky. A 1999 article in *Forbes* estimated that if a company's common stock increases in value, the returns on its convertibles also rise, but by only 70 percent of the stock's percentage increase. However, if the stock declines, the convertible will decline by only 50 percent of the stock's decline. Thus, while convertibles are more risky than straight bonds, they are less risky than stock.

To illustrate all this, consider Amazon.com. In early 1999 Amazon issued \$1.25 billion of 10-year convertible bonds. Amazon's bonds were issued at a par

value of \$1,000 and a 4.75 percent coupon rate. The bonds also had a conversion price of \$78.0275, which meant that investors who purchased the bonds could at any time convert their bond to roughly 12.8 shares of Amazon common stock. Consequently, because they can be converted to Amazon common stock, changes in the stock price will have a profound effect on the convertibles' value.

During 1999 Amazon's convertibles took their holders on a wild ride. During the first four months Amazon's stock rose about 70 percent, to more than \$100 per share, causing its convertibles to rise by 50 percent, to \$1,500. During the next four months, the stock lost more than 60 percent of its value. This caused the convertibles' price to drop to \$750. Three months later Amazon's stock had rebounded, and its convertibles were once again trading above \$1,500, only to decline sharply one month later. By year-end 1999, the convertibles were about back to their \$1,000 issue price.

In the two subsequent years, Amazon, like most other "tech" companies, witnessed a sharp decline in its stock price—Amazon dropped from its 1999 high of more than \$100 to a low of \$5.51 in 2001, or by about 95 percent. The convertibles also declined, but only to \$376, or by about 75 percent, bad but not as bad as the stock. The convertibles held up better for two reasons. First, they paid \$47.50 per year interest, whereas the common paid nothing, and second, if Amazon was forced into bankruptcy, which was a real possibility in 2001, the convertibles would have a claim on their \$1,000 par value ahead of stockholders' claims. After the 2001 trough, Amazon's fortunes improved. Rumors of impending bankruptcy were dispelled, and by mid-2005, the stock stood around \$46 a share, and the convertibles were once again trading around par.

Amazon's experience with convertibles is not unusual. The convertible bonds rose in price with the common, but not as rapidly, and the bonds also declined with the stock, but again the losses were less pronounced. Thus, convertibles offer investors a bit of protection against losses, but also opportunities for capital gains. Not surprisingly, convertibles are used by companies, whose futures are highly uncertain, to attract investors who are not willing to bear the risks inherent in their common stocks.

When you finish this chapter, you should have a good understanding of what convertibles are, how they are valued, and why a firm might choose to issue a convertible bond rather than either straight debt or common stock.

Source: John Gorham, "Chicken Little Stocks," *Forbes*, December 27, 1999, p. 200.

Putting Things In Perspective

In previous chapters we examined common stocks and the various types of long-term debt. In this chapter, we examine four other types of long-term capital: (1) *preferred stock*, which is a hybrid security that represents a cross between debt and common equity; (2) *leasing*, which is used by financial managers as an alternative to borrowing to finance fixed assets; (3) *warrants*, which are derivative securities issued by firms to facilitate the issuance of some other type of security; and (4) *convertibles*, which combine the features of debt (or preferred stock) and warrants.

20.1 PREFERRED STOCK

Preferred stock is a hybrid—it is similar to bonds in some respects and to common stock in other ways. Accountants classify perpetual preferred stock as equity, hence show it on the balance sheet as an equity account. However, from a finance perspective preferred stock lies somewhere between debt and common equity—it imposes a fixed charge and thus increases the firm's financial leverage, yet omitting the preferred dividend does not force a company into bankruptcy. We first describe the basic features of preferred, after which we discuss other types of preferred stock and the advantages and disadvantages of preferred stock.

Basic Features

Preferred stock has a par (or liquidating) value, often either \$25 or \$100. The dividend is stated as either a percentage of par, as so many dollars per share, or both ways. For example, several years ago Klondike Paper Company sold 150,000 shares of \$100 par value perpetual preferred stock for a total of \$15 million. This preferred had a stated annual dividend of \$12 per share, so the preferred dividend yield was $\$12/\$100 = 0.12$, or 12 percent, at the time of issue. The dividend was set when the stock was issued; it will not be changed in the future. Therefore, if the required rate of return on preferred, r_p , changes from 12 percent after the issue date—as it did—then the market price of the preferred stock will increase or decrease. Currently, r_p for Klondike Paper's preferred is 9 percent, and the price of the preferred has risen from \$100 to $\$12/0.09 = \133.33 .

If the preferred dividend is not earned, the company does not have to pay it. However, most preferred issues are **cumulative**, meaning that the cumulative total of all unpaid preferred dividends must be paid before dividends can be paid on the common stock. Unpaid preferred dividends are called **arrearages**. Dividends in arrears do not earn interest; thus, arrearages do not grow in a compound interest sense—they only grow from additional nonpayments of the preferred dividend. Also, many preferred stocks accrue arrearages for only a limited number of years, say, three years, meaning that the cumulative feature ceases after three years. However, the dividends in arrears continue in force until they are paid.

Preferred stock normally has no voting rights. However, most preferred issues stipulate that the preferred stockholders can elect a minority of the directors—say, 3 out of 10—if the preferred dividend is passed (omitted). Jersey Central Power & Light, one of the companies that owned a share of the Three Mile Island (TMI) nuclear plant, had preferred stock outstanding that could elect a *majority* of the directors if the preferred dividend was passed for four successive quarters. Jersey Central kept paying its preferred dividends even during the dark days following the TMI accident. Had the preferred not been entitled to elect a majority of the directors, the dividend would probably have been passed.

Although nonpayment of preferred dividends will not bankrupt a company, corporations issue preferred with every intention of paying the dividend. Even if passing the dividend does not give the preferred stockholders control of the company, failure to pay a preferred dividend precludes payment of common dividends. In addition, passing the dividend makes it difficult to raise capital by selling bonds, and virtually impossible to sell more preferred or common stock. However, having preferred stock outstanding does give a firm the chance to overcome its difficulties—if bonds had been used instead of preferred stock, Jersey Central would have been in danger of being forced into bankruptcy before it could straighten out its problems. *Thus, from the viewpoint of the issuing corporation, preferred stock is less risky than bonds.*

However, for investors preferred stock is riskier than bonds: (1) Preferred stockholders' claims are subordinated to those of bondholders in the event of liquidation, and (2) bondholders are more likely to continue receiving income

Cumulative

A protective feature on preferred stock that requires preferred dividends previously not paid to be paid before any common dividends can be paid.

Arrearages

Unpaid preferred dividends.

during hard times than are preferred stockholders. Accordingly, investors require a higher after-tax rate of return on a given firm's preferred stock than on its bonds. However, because 70 percent of preferred dividends is exempt from corporate taxes, preferred stock is attractive to corporate investors. In recent years, high-grade preferred stock, on average, has sold on a lower pre-tax yield basis than have high-grade bonds. As an example, Bear Sterns preferred G stock recently had a market yield of about 5.4 percent, whereas its bonds provided a yield of 5.9 percent, or 0.5 percentage point *more* than its preferred. The tax treatment accounted for this differential; the *after-tax yield* to corporate investors was greater on the preferred stock than on the bonds.¹

About half of all preferred stock issued in recent years has been convertible into common stock. For example, on July 31, 2002, Corning Incorporated issued \$500 million of mandatory convertible preferred stock with a 7 percent annual dividend rate. The issue is mandatorily convertible into between approximately 254 million and 313 million shares. Convertibles are discussed at length in Section 20.4.

Some preferred stocks are similar to perpetual bonds in that they have no maturity date, but most new issues now have specified maturities. For example, many preferred shares have a sinking fund provision that calls for the retirement of 2 percent of the issue each year, meaning that the issue will "mature" in a maximum of 50 years. Also, many preferred issues are callable by the issuing corporation, which can also limit the life of the preferred.²

Nonconvertible preferred stock is virtually all owned by corporations, which can take advantage of the 70 percent dividend exclusion to obtain a higher after-tax yield on preferred stock than on bonds. Individuals should not own preferred stocks (except convertible preferreds)—they can obtain higher yields on safer bonds, so it is not logical for them to hold preferreds. As a result of this ownership pattern, the volume of preferred stock financing is geared to the supply of money in the hands of corporate investors. When the supply of such money is plentiful, the prices of preferred stocks are bid up, their yields fall, and investment bankers suggest that companies that need financing consider issuing preferred stock.

For issuers, preferred stock has a tax *disadvantage* relative to debt—interest expense is deductible, but preferred dividends are not. Still, firms with low tax rates may have an incentive to issue preferred stock that can be bought by corporate investors with high tax rates, who can take advantage of the 70 percent dividend exclusion. If a firm has a lower tax rate than potential corporate buyers, the firm might be better off issuing preferred stock than debt. The key here is that the tax advantage to a high-tax-rate corporation is greater than the tax disadvantage to a low-tax-rate issuer. To illustrate, assume that risk differentials between debt and preferred would require an issuer to set the interest rate on new debt at 10 percent and the dividend yield on new preferred at 12 percent in a no-tax world. However, when taxes are considered, a corporate buyer with a high tax rate, say, 40 percent, might be willing to buy the preferred stock if it has an 8

¹ The after-tax yield on a 5.9 percent bond to a corporate investor in the 35 percent marginal tax rate bracket is $5.9\%(1 - T) = 5.9\%(0.65) = 3.84\%$. The after-tax yield on a 5.4 percent preferred stock is $5.4\%(1 - \text{Effective } T) = 5.4\%[1 - (0.30)(0.35)] = 5.4\%(0.895) = 4.83\%$. Also, note that tax law prohibits firms from issuing debt and then using the proceeds to purchase another firm's preferred or common stock. If debt is used for stock purchases, then the 70 percent dividend exclusion is voided. This provision is designed to prevent a firm from engaging in "tax arbitrage," using tax-deductible debt to purchase largely tax-exempt preferred stock.

² Prior to the late 1970s, virtually all preferred stock was perpetual, and almost no issues had sinking funds or call provisions. Then, insurance company regulators, worried about the unrealized losses the companies had been incurring on preferred holdings as a result of rising interest rates, put into effect some regulatory changes that essentially mandated that insurance companies buy only limited-life preferreds. From that time on, virtually no new preferred has been perpetual. This example illustrates the way securities change as a result of changes in the economic environment.

percent before-tax yield. This would produce an $8\%(1 - \text{Effective T}) = 8\%[1 - 0.30(0.40)] = 7.04\%$ after-tax return on the preferred versus $10\%(1 - 0.40) = 6.0\%$ on the debt. If the issuer has a low tax rate, say, 10 percent, its after-tax costs would be $10\%(1 - T) = 10\%(0.90) = 9\%$ on the bonds and 8 percent on the preferred. Thus, the security with lower risk to the issuer, preferred stock, also has a lower cost. Such situations can make preferred stock a logical financing choice.³

Other Types of Preferred Stock

In addition to the “plain vanilla” variety of preferred stocks, several variations are also used. Two of these, floating rate and market auction preferred, are discussed in the following sections.

Adjustable Rate Preferred Stock

Instead of paying fixed dividends, **adjustable rate preferred stocks (ARPs)** have their dividends tied to the rate on Treasury securities. The ARPs, which are issued mainly by utilities and large commercial banks, were touted as nearly perfect short-term corporate investments because (1) only 30 percent of the dividends are taxable to corporations, and (2) the floating-rate feature was supposed to keep the issue trading at near par. The new security proved to be so popular as a short-term investment for firms with idle cash that mutual funds designed just to invest in them sprouted like weeds (shares of the funds, in turn, were purchased by corporations). However, the ARPs still had some price volatility due to (1) changes in the riskiness of the issues (some big banks that had issued ARPs, such as Continental Illinois, ran into serious loan default problems) and (2) fluctuations in Treasury yields between dividend rate adjustments dates. Thus, the ARPs had too much price instability to be held in the liquid asset portfolios of many corporate investors.

Market Auction Preferred Stock

In 1984, investment bankers introduced **money market, or market auction, preferred**. Here the underwriter conducts an auction on the issue every seven weeks (to get the 70 percent exclusion from taxable income, buyers must hold the stock at least 46 days). Holders who want to sell their shares can put them up for auction at par value. Buyers then submit bids in the form of the yields they are willing to accept over the next seven-week period. The yield set on the issue for the coming period is the lowest yield sufficient to sell all the shares being offered at that auction. The buyers pay the sellers the par value; hence, holders are virtually assured that their shares can be sold at par. The issuer then must pay a dividend rate over the next seven-week period as determined by the auction. From the holder’s standpoint, market auction preferred is a low-risk, largely tax-exempt, seven-week-maturity security that can be sold between auction dates at close to par. However, if there are not enough buyers to match the sellers (in spite of the high yield), then the auction can fail, which has occurred on occasion.

Advantages and Disadvantages of Preferred Stock

There are both advantages and disadvantages to financing with preferred stock. Here are the major advantages from the issuers’ standpoint:

Adjustable Rate Preferred Stocks (ARPs)

Preferred stocks whose dividends are tied to the rate on Treasury securities.

Market Auction (Money Market) Preferred

A low-risk, largely tax-exempt, seven-week-maturity security that can be sold between auction dates at close to par.

³ For a more rigorous treatment of the tax hypothesis of preferred stock, see Iraj Fooladi and Gordon S. Roberts, “On Preferred Stock,” *Journal of Financial Research*, Winter 1986, pp. 319–324. For an example of an empirical test of the hypothesis, see Arthur L. Houston, Jr., and Carol Olson Houston, “Financing with Preferred Stock,” *Financial Management*, Autumn 1990, pp. 42–54.

1. In contrast to bonds, the obligation to pay preferred dividends is not contractual, and passing a preferred dividend cannot force a firm into bankruptcy.
2. By issuing preferred stock, the firm avoids the dilution of common equity that occurs when common stock is sold.
3. Because preferred stock sometimes has no maturity, and because preferred sinking fund payments, if present, are typically spread over a long period, preferred issues reduce the cash flow drain from repayment of principal that occurs with debt issues.

There are two major disadvantages:

1. Preferred stock dividends are not deductible to the issuer, hence the after-tax cost of preferred is typically higher than the after-tax cost of debt. However, the tax advantage of preferreds to corporate purchasers lowers its pre-tax cost and thus its effective cost.
2. Although preferred dividends can be passed, investors expect them to be paid, and firms intend to pay the dividends if conditions permit. Thus, preferred dividends are considered to be a fixed cost. Therefore, their use, like that of debt, increases financial risk and thus the cost of common equity.



Should preferred stock be considered as equity or debt? Explain.

Who are the major purchasers of nonconvertible preferred stock? Why?

Briefly explain the mechanics of adjustable rate and market auction preferred stock.

What are the advantages and disadvantages of preferred stock to the issuer?

20.2 LEASING

Firms generally own fixed assets and report them on their balance sheets, but it is the *use* of buildings and equipment that is important, not their ownership per se. One way of obtaining the use of assets is to buy them, but an alternative is to lease them. Prior to the 1950s, leasing was generally associated with real estate—land and buildings. Today, however, it is possible to lease virtually any kind of fixed asset.⁴

Types of Leases

Leasing takes three different forms: (1) *sale-and-leaseback* arrangements, (2) *operating leases*, and (3) straight *financial*, or *capital*, leases.

Sale and Leaseback

Under a **sale and leaseback**, a firm that owns land, buildings, or equipment sells the property and simultaneously executes an agreement to lease the property back for a specified period under specific terms. The purchaser could be an insurance company, a commercial bank, a specialized leasing company, or even an individual investor. The sale-and-leaseback plan is an alternative to taking out a mortgage loan.

Sale and Leaseback

An arrangement whereby a firm sells land, buildings, or equipment and simultaneously leases the property back for a specified period under specific terms.

⁴ For a detailed treatment of leasing, see James S. Schallheim, *Lease or Buy? Principles for Sound Decision Making* (Boston: Harvard Business School Press, 1994).

Funny-Named Preferred-Like Securities

Wall Street's "financial engineers" are constantly trying to develop new securities with appeal to issuers and investors. One such new security is a special type of preferred stock created by Goldman Sachs in the mid-1990s. These securities trade under a variety of colorful names, including MIPS (modified income preferred securities), QUIPS (quarterly income preferred securities), and QUIDS (quarterly income debt securities). The corporation that wants to raise capital (the "parent") establishes a trust, which issues fixed-dividend preferred stock. The parent then issues bonds (or debt of some type) to the trust, and the trust pays for the bonds with the cash raised from the sale of preferred. At that point, the parent has the cash it needs, the trust holds debt issued by the parent, and the investing public holds preferred stock issued by the trust. The parent then makes interest payments to the trust, and the trust uses that income to make the preferred

dividend payments. Because the parent company has issued debt, its interest payments are tax deductible.

If the dividends could be excluded from taxable income by corporate investors, this preferred would really be a great deal—the issuer could deduct the interest, corporate investors could exclude most of the dividends, and the IRS would be the loser. The corporate parent does get to deduct the interest paid to the trust, but IRS regulations do not allow the dividends on these securities to be excluded.

Because there is only one deduction, why are these new securities attractive? The answer is as follows: (1) The parent company gets to take the deduction, thus its cost of funds from the preferred is $r_p(1 - T)$, just as it would be if it used debt. (2) The parent generates a tax savings, and it can thus afford to pay a relatively high rate on trust-related preferred; that is, it can pass on some of its tax savings to investors to

Lessee

The party that uses, rather than the one who owns, the leased property.

Lessor

The owner of the leased property.

The firm that is selling the property, or the **lessee**, immediately receives the purchase price put up by the buyer, or the **lessor**.⁵ At the same time, the seller-lessee firm retains the use of the property just as if it had borrowed and mortgaged the property to secure the loan. Note that under a mortgage loan arrangement, the financial institution would normally receive a series of equal payments just sufficient to amortize the loan while providing a specified rate of return to the lender on the outstanding balance. Under a sale-and-leaseback arrangement, the lease payments are set up in exactly the same way; the payments are set so as to return the purchase price to the investor-lessor while providing a specified rate of return on the lessor's outstanding investment.

Operating Leases

Operating Lease

A lease under which the lessor maintains and finances the property; also called a service lease.

Operating leases, sometimes called *service leases*, provide for both *financing* and *maintenance*. IBM is one of the pioneers of the operating lease contract, and computers and office copying machines, together with automobiles and trucks, are the primary types of equipment involved. Ordinarily, these leases call for the lessor to maintain and service the leased equipment, and the cost of providing maintenance is built into the lease payments.

Another important characteristic of operating leases is the fact that they are frequently *not fully amortized*; in other words, the payments required under the lease contract are not sufficient to recover the full cost of the equipment. However, the lease contract is written for a period considerably shorter than the expected economic life of the leased equipment, and the lessor expects to recover all investment costs through subsequent renewal payments, through subsequent leases to other lessees, or by selling the leased equipment.

⁵ The term *lessee* is pronounced "less-ee," not "lease-ee," and *lessor* is pronounced "less-or."

induce them to buy the new securities. (3) The primary purchasers of the preferred are low-tax-bracket individuals and tax-exempt institutions such as pension funds. For such purchasers, not being able to exclude the dividend from taxable income is not important. (4) Due to the differential tax rates, the arrangement results in a net tax savings. Competition in capital markets results in a sharing of the savings between investors and corporations.

A 1999 *SmartMoney Online* article argued that these hybrid securities are a good deal for individual investors for the reason set forth above and also because they are sold in small increments—often as small as \$25. However, these securities are relatively complex, which increases their risk and makes them hard to value.

If this isn't confusing enough, recent tax law changes have made things even more complicated.

As we discussed in our chapter on dividends, in 2003 Congress passed legislation that reduced the individual tax rates on dividends. It turns out that these lower tax rates do not apply to these types of preferred securities where the issuing company is allowed to deduct the interest paid to the trusts. As a result, some analysts speculate that some companies may once again start issuing more traditional preferred securities.

Sources: Kerry Capell, "High Yields, Low Cost, Funny Names," *BusinessWeek*, September 9, 1996, p. 122; Leslie Haggin, "SmartMoney Online: MIPS, QUIDS, and QUIPS," *SmartMoney Interactive*, April 6, 1999; Kathleen Pender, "Taxing Dividends on Preferred Stock Quite a Mind-Bender," *The San Francisco Chronicle*, June 1, 2003, p. 11; and Jane J. Kim, "Getting Personal: Tax Law May Create New Preferred Stocks," *Dow Jones Newswires*, August 6, 2003.

A final feature of operating leases is that they frequently contain a *cancellation clause*, which gives the lessee the right to cancel the lease before the expiration of the basic agreement. This is an important consideration for the lessee, for it means that the equipment can be returned if it is rendered obsolete by technological developments or if it is no longer needed because of a decline in the lessee's business.

Financial, or Capital, Leases

Financial leases, sometimes called *capital leases*, are differentiated from operating leases in three respects: (1) they do *not* provide for maintenance services, (2) they are *not* cancelable, and (3) they *are* fully amortized (that is, the lessor receives rental payments that are equal to the full price of the leased equipment plus a return on the investment). In a typical financial lease arrangement, the firm that will use the equipment (the lessee) selects the specific items it requires and negotiates the price and delivery terms with the manufacturer. The user firm then negotiates terms with a leasing company and, once the lease terms are set, arranges to have the lessor buy the equipment from the manufacturer or the distributor. When the equipment is purchased, the user firm simultaneously executes the lease agreement.

Financial leases are similar to sale-and-leaseback arrangements, the major difference being that the leased equipment is new and the lessor buys it from a manufacturer or a distributor instead of from the user-lessee. A sale and leaseback may thus be thought of as a special type of financial lease, and both sale and leasebacks and financial leases are analyzed in the same manner.⁶

Financial Lease

A lease that does not provide for maintenance services, is not cancelable, and is fully amortized over its life; also called a capital lease.

⁶ For a lease transaction to qualify as a lease for *tax purposes*, and thus for the lessee to be able to deduct the lease payments, the life of the lease must not exceed 80 percent of the expected life of the asset, and the lessee cannot be permitted to buy the asset at a nominal value. These conditions are IRS requirements, and they should not be confused with the FASB requirements discussed later in the chapter concerning the capitalization of leases. It is important to consult lawyers and accountants to ascertain whether or not a prospective lease meets current IRS regulations.

Financial Statement Effects

Lease payments are shown as operating expenses on a firm's income statement, but under certain conditions, neither the leased assets nor the liabilities under the lease contract appear on the firm's balance sheet. For this reason, leasing is often called **off balance sheet financing**. This point is illustrated in Table 20-1 by the balance sheets of two hypothetical firms, B (for Buy) and L (for Lease). Initially, the balance sheets of both firms are identical, and both have debt ratios of 50 percent. Each firm then decides to acquire fixed assets that cost \$100. Firm B borrows \$100 to make the purchase, so both an asset and a liability are recorded on its balance sheet, and its debt ratio is increased to 75 percent. Firm L leases the equipment, so its balance sheet is unchanged. The lease may call for fixed charges as high as or even higher than those on the loan, and the obligations assumed under the lease may be equally or more dangerous from the standpoint of financial safety, but the firm's debt ratio remains at 50 percent.

To correct this problem, the Financial Accounting Standards Board issued **FASB #13**, which requires that for an unqualified audit report, firms that enter into financial (or capital) leases must restate their balance sheets to report (1) leased assets as fixed assets and (2) the present value of future lease payments as a liability. This process is called *capitalizing the lease*, and its net effect is to cause Firms B and L to have similar balance sheets, both of which will resemble the one shown for Firm B after the asset increase.⁷

The logic behind FASB #13 is as follows. If a firm signs a lease contract, its obligation to make lease payments is just as binding as if it had signed a loan agreement. The failure to make lease payments can bankrupt a firm just as surely as can the failure to make principal and interest payments on a loan. Therefore, for all intents and purposes, a financial lease is identical to a loan.⁸

Off Balance Sheet Financing

Financing in which the assets and liabilities involved do not appear on the firm's balance sheet.

FASB #13

The statement of the Financial Accounting Standards Board that details the conditions and procedures for capitalizing leases.

TABLE 20-1 Balance Sheet Effects of Leasing

BEFORE ASSET INCREASE				AFTER ASSET INCREASE							
Firms B and L				Firm B, Which Borrows and Buys			Firm L, Which Leases				
Current assets	\$ 50	Debt	\$ 50	Current assets	\$ 50	Debt	\$150	Current assets	\$ 50	Debt	\$ 50
Fixed assets	50	Equity	50	Fixed assets	150	Equity	50	Fixed assets	50	Equity	50
Total	<u>\$100</u>		<u>\$100</u>	Total	<u>\$200</u>		<u>\$200</u>	Total	<u>\$100</u>		<u>\$100</u>
		Debt ratio: 50%				Debt ratio: 75%				Debt ratio: 50%	

⁷ FASB #13, "Accounting for Leases," November 1976, spells out in detail the conditions under which leases must be capitalized, and the procedures for doing so. Also, see Schallheim, *Lease or Buy?*, Chapter 4, for more on the accounting treatment of leases. The FASB has recently added leasing to the scope of its Fair Value Measurement project, and a final statement had not yet been issued at the time we were writing this chapter (August 2005).

⁸ There are, however, certain legal differences between loans and leases. In a bankruptcy liquidation, the lessor is entitled to take possession of the leased asset, and, if the value of the asset is less than the required payments under the lease, the lessor can enter a claim (as a general creditor) for one year's lease payments. In a bankruptcy reorganization, the lessor receives the asset plus three year's lease payments, if needed, to bring the value of the asset up to the remaining investment in the lease. Under a secured loan arrangement, on the other hand, the lender has a security interest in the asset, meaning that if it is sold, the lender will receive the proceeds, and the full unsatisfied portion of the lender's claim will be treated as a general creditor obligation (see Web Appendix 7B). It is not possible to state as a general rule whether a supplier of capital is in a stronger position as a secured creditor or as a lessor. Since one position is usually regarded as being about as good as the other at the time the financial arrangements are being made, a lease is about as risky as a secured term loan from both the lessor-lender's and the lessee-borrower's viewpoints.

This being the case, when a firm signs a lease agreement, it has, in effect, raised its “true” debt ratio and thereby has changed its “true” capital structure. Accordingly, if the firm had previously established a target capital structure, and if there is no reason to think that the optimal capital structure has changed, then using lease financing requires additional equity just as does debt financing.

If a disclosure of the lease in the Table 20-1 example were not made, then investors could be deceived into thinking that Firm L’s financial position is stronger than it actually is. Even if the lease were disclosed in a footnote, investors might not fully recognize its impact and might not see that Firms B and L are in essentially the same financial position. If this were the case, Firm L would have increased its true amount of debt through a lease arrangement, but its required return on debt, r_d , its required return on equity, r_s , and consequently its weighted average cost of capital, would not have increased as much as those of Firm B, which borrowed directly. Thus, investors would be willing to accept a lower return from Firm L because they would mistakenly view it as being in a stronger financial position than Firm B. These benefits of leasing would accrue to stockholders at the expense of new investors, who were, in effect, being deceived by the fact that the firm’s balance sheet did not fully reflect its true liability situation. This is why FASB #13 was issued.

A lease must be classified as a capital lease, and hence be capitalized and shown directly on the balance sheet, if any one of the following conditions exists:

1. Under the terms of the lease, ownership of the property is effectively transferred from the lessor to the lessee.
2. The lessee can purchase the property or renew the lease at less than a fair market price when the lease expires.
3. The lease runs for a period equal to or greater than 75 percent of the asset’s life.
4. The present value of the lease payments is equal to or greater than 90 percent of the initial value of the asset.⁹

These rules, together with strong footnote disclosures for operating leases, are sufficient to ensure that no one will be fooled by lease financing. Thus, leases are recognized to be essentially the same as debt, and they have the same effects as debt on the firm’s required rate of return. Therefore, leasing will not generally permit a firm to use more financial leverage than could be obtained with conventional debt.

Evaluation by the Lessee

Any prospective lease must be evaluated by both the lessee and the lessor. The lessee must determine whether leasing an asset will be less costly than buying it, and the lessor must decide whether or not the lease will provide a reasonable rate of return. Since our focus in this book is primarily on financial management as opposed to investments, we restrict our analysis to that conducted by the lessee.¹⁰

⁹ The discount rate used to calculate the present value of the lease payments must be the lower of (1) the rate used by the lessor to establish the lease payments or (2) the interest rate that the lessee would have paid for new debt with a maturity equal to that of the lease.

¹⁰ The lessee is typically offered a set of lease terms by the lessor, which is generally a bank, a finance company such as General Electric Capital (the largest U.S. lessor), or some other institutional lender. The lessee can accept or reject the lease, or shop around for a better deal. In this chapter, we take the lease terms as given for purposes of our analysis. See Chapter 18 of Eugene F. Brigham and Phillip R. Daves, *Intermediate Financial Management*, 8th ed. (Mason, OH: Thomson/South-Western, 2004), for a discussion of lease analysis from the lessor’s standpoint, including a discussion of how a potential lessee can use such an analysis in bargaining for better terms.

In the typical case, the events leading to a lease arrangement follow the sequence described in the following list. We should note that a great deal of theoretical literature exists about the correct way to evaluate lease-versus-purchase decisions, and some very complex decision models have been developed to aid in the analysis. The analysis given here, however, leads to the correct decision in every case we have ever encountered.

1. The firm decides to acquire a particular building or piece of equipment. This decision is based on regular capital budgeting procedures, and the decision to acquire the asset is a “done deal” before the lease analysis begins. Therefore, in a lease analysis we are concerned simply with whether to finance the machine by a lease or by a loan.
2. Once the firm has decided to acquire the asset, the next question is how to finance it. Well-run businesses do not have excess cash lying around, so new assets must be financed in some manner.
3. Funds to purchase the asset could be obtained by borrowing, by retaining earnings, or by issuing new stock. Alternatively, the asset could be leased. Because of the FASB #13 capitalization/disclosure provision for leases, a lease would have the same capital structure effect as a loan.

As indicated earlier, a lease is comparable to a loan in the sense that the firm is required to make a specified series of payments, and a failure to make these payments can result in bankruptcy. Thus, it is most appropriate to compare the cost of leasing with that of debt financing.¹¹ The lease-versus-borrow-and-purchase analysis is illustrated with data on the Mitchell Electronics Company. The following conditions are assumed:

1. Mitchell plans to acquire equipment with a five-year life that has a cost of \$10,000,000, delivered and installed.
2. Mitchell can borrow the required \$10 million, using a 10 percent loan to be amortized over five years. Therefore, the loan will call for payments of \$2,637,974.81 per year, found with a financial calculator as follows: input $N = 5$, $I/YR = 10$, $PV = -10000000$, and $FV = 0$, and then press PMT to find the payment, \$2,637,974.81.
3. Alternatively, Mitchell can lease the equipment for five years at a rental charge of \$2,800,000 per year, payable at the end of the year. The lessor will own the asset at the expiration of the lease.¹² The lease payment schedule is established by the potential lessor, and Mitchell can accept it, reject it, or negotiate.
4. The equipment will definitely be used for five years, at which time its estimated net salvage value will be \$715,000. Mitchell plans to continue using the equipment beyond Year 5, so (a) if it purchases the equipment, the company will keep it, and (b) if it leases the equipment, the company will exercise an option to buy it at its estimated salvage value, \$715,000.
5. The lease contract stipulates that the lessor will maintain the equipment. However, if Mitchell borrows and buys, it will have to bear the cost of maintenance. This service will be performed by the equipment manufacturer at a fixed contract rate of \$500,000 per year, payable at year-end.

¹¹ The analysis should compare the cost of leasing to the cost of debt financing *regardless* of how the asset is actually financed. The asset may actually be purchased with available cash if it is not leased, but because leasing is a substitute for debt financing, a comparison between the two is still appropriate.

¹² Lease payments can occur at the beginning of the year or at the end of the year. In this example, we assume end-of-year payments, but we demonstrate beginning-of-year payments in Self-Test Problem ST-2.

6. The equipment falls in the MACRS 5-year class life, and Mitchell's effective federal-plus-state tax rate is 40 percent. Also, the depreciable basis is the original cost of \$10,000,000. The MACRS depreciation rates are 20, 32, 19, 12, 11, and 6 percent.

NPV Analysis

Table 20-2 shows the cash flows that would be incurred each year under the two financing plans. The table is set up to produce two time lines of cash flows, one for owning as shown on Line 5 and one for leasing as shown on Line 10. All cash flows occur at the end of the year.

TABLE 20-2 Mitchell Electronics Company: NPV Lease Analysis
(Thousands of Dollars)

	YEAR					
	0	1	2	3	4	5
I. COST OF OWNING						
1. Net purchase price	(\$10,000)					
2. Maintenance cost		(\$ 500)	(\$ 500)	(\$ 500)	(\$ 500)	(\$ 500)
3. Tax savings from maintenance		200	200	200	200	200
4. Tax savings from depreciation		800	1,280	760	480	440
5. Net cash flow	<u>(\$10,000)</u>	<u>\$ 500</u>	<u>\$ 980</u>	<u>\$ 460</u>	<u>\$ 180</u>	<u>\$ 140</u>
6. PV cost of owning at 6%	<u>(\$ 8,023)</u>					
II. COST OF LEASING						
7. Lease payment		(\$2,800)	(\$2,800)	(\$2,800)	(\$2,800)	(\$2,800)
8. Tax savings from lease payment		1,120	1,120	1,120	1,120	1,120
9. Cost to exercise option						(715)
10. Net cash flow	<u>\$ 0</u>	<u>(\$1,680)</u>	<u>(\$1,680)</u>	<u>(\$1,680)</u>	<u>(\$1,680)</u>	<u>(\$2,395)</u>
11. PV cost of owning at 6%	<u>(\$ 7,611)</u>					
III. COST COMPARISON						
12. Net advantage to leasing = NAL						
						= PV cost of owning – PV cost of leasing
						= \$8,023 – \$7,611 = \$412 = \$412,000

Note: A line-by-line explanation of the table follows:

- If Mitchell buys the equipment, it will have to spend \$10,000,000 at $t = 0$.
- If the equipment is owned, Mitchell must pay \$500,000 at the end of each year for maintenance.
- The \$500,000 maintenance expense is tax deductible, so it will produce an annual tax savings of $(\text{Tax rate})(\text{Maintenance expense}) = 0.4(\$500,000) = \$200,000$.
- If Mitchell buys the equipment, it can depreciate it for tax purposes and thus lower taxable income and taxes. The tax savings in each year is equal to $(\text{Tax rate})(\text{Depreciation expense}) = 0.4(\text{Depreciation expense})$. As shown in Appendix 12A, the MACRS rates for 5-year property are 20, 32, 19, 12, and 11 percent in Years 1–5, respectively. To illustrate the calculation of the depreciation tax savings, consider Year 2. The depreciation expense is $0.32(\$10,000,000) = \$3,200,000$, and the tax savings is $0.4(\$3,200,000) = \$1,280,000$.
- The net cash flows associated with owning are found by summing Lines 1 through 4.
- The PV (in thousands) of the Line 5 cash flows, when discounted at 6 percent, is $-\$8,023$.
- The annual end-of-year lease payment is \$2,800,000.
- Because the lease payment is tax deductible, a tax savings of $(\text{Tax rate})(\text{Lease payment}) = 0.4(\$2,800,000) = \$1,120,000$ results.
- Because Mitchell plans to continue to use the equipment after the lease expires, it must exercise the purchase option for \$715,000 at the end of Year 5 if it leases.
- The net cash flows associated with leasing are found by summing Lines 7 through 9.
- The PV (in thousands) of the Line 10 cash flows, when discounted at 6 percent, is $-\$7,611$.
- The net advantage to leasing is merely the difference between the PV cost of owning (in thousands) and the PV cost of leasing (in thousands) = $\$8,023 - \$7,611 = \$412$. Since the NAL is positive, leasing is favored over borrowing and buying.

The top section of the table (Lines 1 through 6) is devoted to the cost of owning (borrowing and buying). Lines 1 through 4 show the individual cash flow items. Line 5 is a time line that summarizes the annual net cash flows that Mitchell will incur if it finances the equipment with a loan. The present values of these cash flows are summed to find the *present value of the cost of owning*, which is shown on Line 6 in the Year 0 column. (Note that with a financial calculator, we would input the cash flows as shown on Line 5 into the cash flow register, input the interest rate, $I/YR = 6$, and then press the NPV key to obtain the PV of owning the equipment.)

Section II of the table calculates the present value cost of leasing. The lease payments are \$2,800,000 per year; this rate, which in this example (but not in all cases) includes maintenance, was established by the prospective lessor and then offered to Mitchell Electronics. If Mitchell accepts the lease, the full \$2,800,000 will be a deductible expense, so the tax savings is $(\text{Tax rate})(\text{Lease payment}) = (0.4)(\$2,800,000) = \$1,120,000$. These amounts are shown on Lines 7 and 8.

Line 9 in the lease section shows the \$715,000 that Mitchell expects to pay in Year 5 to purchase the equipment. We include this amount as a cost of leasing because Mitchell will almost certainly want to continue the operation and thus will be forced to purchase the equipment from the lessor. If we had assumed that the operation would not be continued, then no entry would have appeared on this line. However, in that case, we would have included the \$715,000, minus applicable taxes, as a Year 5 inflow in the cost of owning analysis, because if the asset were purchased originally, it would be sold after five years. Line 10 shows the net cash flows associated with leasing for each year, and Line 11 shows the PV cost of leasing. (As indicated earlier in the cost of owning analysis, using a financial calculator, we would input the cash flows as shown on Line 10 into the cash flow register, input the interest rate, $I/YR = 6$, and then press the NPV key to obtain the PV cost of leasing the equipment.)

The rate used to discount the cash flows is a critical issue. In Chapter 8, we saw that the riskier a cash flow, the higher the discount rate used to find its present value. This same principle was observed in capital budgeting, and it also applies in lease analysis. Just how risky are the cash flows under consideration here? Most of them are relatively certain, at least when compared with the types of cash flow estimates that were developed in capital budgeting. For example, the maintenance payments are set by contract, as is the lease payment schedule. The depreciation expenses are also established by law and are not subject to change. The tax savings are somewhat uncertain because tax rates may change, although tax rates do not change very often. The residual value is the least certain of the cash flows, but even here the \$715,000 cost is set, and Mitchell's management is fairly confident that it will want to acquire the property.

Since the cash flows under both the lease and the borrow-and-purchase alternatives are all reasonably certain, they should be discounted at a relatively low rate. Most analysts recommend that the company's cost of debt be used, and this rate seems reasonable in our example. Further, since all the cash flows are on an after-tax basis, *the after-tax cost of debt, which is 6 percent, should be used*. Accordingly, in Table 20-2, we used a 6 percent discount rate to obtain the present values of the costs of owning and leasing. The financing method that results in the smaller present value of costs is the one that should be selected. The example shown in Table 20-2 indicates that leasing has a net advantage over buying: the present value of the cost of leasing is \$412,000 less than that of buying. Therefore, it is to Mitchell's advantage to lease.

Factors That Affect Leasing Decisions

The basic method of analysis set forth in Table 20-2 is sufficient to handle most situations. However, two factors warrant additional comments.

Estimated Residual Value

It is important to note that the lessor will own the property upon the expiration of the lease. The estimated end-of-lease value of the property is called the **residual value**. Superficially, it would appear that if residual values are expected to be large, owning would have an advantage over leasing. However, if expected residual values are large—as they may be under inflation for certain types of equipment as well as if real property is involved—then competition among leasing companies will force leasing rates down to the point where potential residual values will be fully recognized in the lease contract rates. Thus, the existence of large residual values on equipment is not likely to bias the decision against leasing.

Residual Value

The value of leased property at the end of the lease term.

Increase Credit Availability

As noted earlier, leasing is sometimes said to have an advantage for firms that are seeking the maximum degree of financial leverage. First, it is sometimes argued that a firm can obtain more money, and for a longer period, under a lease arrangement than under a loan secured by the asset. Second, because some leases do not appear on the balance sheet, lease financing has been said to give the firm a stronger appearance in a superficial credit analysis, thus permitting it to use more leverage than it could if it did not lease. There may be some truth to these claims for smaller firms. However, now that larger firms are required to capitalize major leases and to report them on their balance sheets, this point is of questionable validity.



Define each of these terms: (1) sale-and-leaseback arrangements, (2) operating leases, and (3) financial, or capital, leases.

What is off balance sheet financing, what is FASB #13, and how are the two related?

List the sequence of events, for the lessee, leading to a lease arrangement.

Why is it appropriate to compare the cost of lease financing with that of debt financing? Why does the comparison not depend on how the asset will actually be financed if it is not leased?

20.3 WARRANTS

A **warrant** is a certificate issued by a company that gives the holder the right to buy a stated number of shares of the company's stock at a specified price for some specified length of time. Generally, warrants are distributed with debt, and they are used to induce investors to buy long-term debt with a lower coupon rate than would otherwise be required. For example, when Infomatics Corporation, a rapidly growing high-tech company, wanted to sell \$50 million of 20-year bonds in 2005, the company's investment bankers informed the financial vice president that the bonds would be difficult to sell, and that a coupon rate of 10 percent would be required. However, as an alternative the bankers suggested that investors might be willing to buy the bonds with a coupon rate of only 8 percent if the company would offer 20 warrants with each \$1,000 bond, each warrant entitling the holder to buy one share of common stock at an exercise price of \$22 per share. The stock was selling for \$20 per share at the time, and the warrants would expire in the year 2015 if they had not been exercised previously.

Why would investors be willing to buy Infomatics' bonds at a yield of only 8 percent in a 10 percent market just because warrants were also offered as part of the package? It is because the warrants are long-term *call options* that have value because holders can buy the firm's common stock at the exercise price regardless

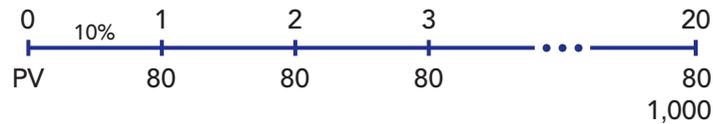
Warrant

A long-term option to buy a stated number of shares of common stock at a specified price.

of how high the market price climbs. This option offsets the low interest rate on the bonds and makes the package of low-yield bonds plus warrants attractive to investors. (See Chapter 18 for a more complete discussion of options.)

Initial Market Price of a Bond with Warrants

The Infomatics bonds, if they had been issued as straight debt, would have carried a 10 percent interest rate. However, with warrants attached, the bonds were sold to yield 8 percent. Someone buying the bonds at their \$1,000 initial offering price would thus be receiving a package consisting of an 8 percent, 20-year bond plus 20 warrants. Since the going interest rate on bonds as risky as those of Infomatics was 10 percent, we can find the straight-debt value of the bonds, assuming an annual coupon for ease of illustration, as follows:



Using a financial calculator, input $N = 20$, $I/YR = 10$, $PMT = 80$, and $FV = 1000$. Then, press the PV key to obtain the bond's value, \$829.73, or approximately \$830. Thus, a person buying the bonds in the initial underwriting would pay \$1,000 and receive in exchange a straight bond worth about \$830 plus 20 warrants presumably worth about $\$1,000 - \$830 = \$170$:

$$\begin{aligned} \text{Price paid for} &= \text{Straight-debt} + \text{Value of} \\ \text{bond with warrants} &= \text{value of bond} + \text{warrants} & (20-1) \\ \$1,000 &= \$830 + \$170 \end{aligned}$$

Investors receive 20 warrants with each bond, so each warrant has an implied value of $\$170/20 = \8.50 .

The key issue in setting the terms of a bond with warrants is valuing the warrants. The straight-debt value can be estimated quite accurately, as was done above. However, it is more difficult to estimate the value of the warrants. The Black-Scholes Option Pricing Model (OPM), which we discussed in Chapter 18, can be used to find the value of a call option. There is a temptation to use this model to find the value of a warrant, since call options are similar to warrants in many respects: Both give the investor the right to buy a share of stock at a fixed exercise price on or before the expiration date. However, there is a major difference between call options and warrants: When call options are exercised, the stock provided to the optionholder comes from the secondary market, but when warrants are exercised, the stock provided to the warrant holders are newly issued shares. This means that the exercise of warrants dilutes the value of the original equity, which could cause the value of the original warrant to differ from the value of a similar call option. Therefore, investment bankers cannot use the Black-Scholes model to determine the value of warrants.

It is extremely important to assign the correct value to the warrants. If, when the issue is originally priced, the value assigned to the warrants is greater than their true market value, then the coupon rate on the bonds will be set too low, and it will be impossible to sell the bond-with-warrants package at its par value. In this case, Infomatics will not be able to raise the full \$50 million that it needs to fund its growth.

Conversely, if the value of the warrants is underestimated, then the coupon rate will be set too high. This means that the true value of the bonds with warrants will be greater than the issue price. Suppose this happens, and the true value of the bonds with warrants is \$60 million. Investors will eagerly buy all of

the bonds with warrants at the issue price, and Infomatics will receive the full \$50 million that it needs. But this is not good news for the existing shareholders.

To see this, think of the total value of Infomatics as being analogous to a pie. The size of the pie is equal to the present value of all the future cash flows expected to be generated by Infomatics' operations and investments. Pieces of the pie belong to different groups of investors, such as debtholders and holders of bonds with warrants. Shareholders come last and get the remaining piece of the pie, after the other investors have received their fair share.

At the time of the bond offering, Infomatics had 10 million shares of common stock outstanding and no other debt or preferred stock. The stock price was \$20 per share, so the total market value of Infomatics was $10 \text{ million} \times \$20 = \$200$ million. The offering itself will raise \$50 million in cash, which will subsequently be invested in projects. Therefore, immediately after the offering the total value of Infomatics is \$250 million (\$200 million in stock plus \$50 million in cash).¹³ If investors in the bonds with warrants pay only \$50 million for a piece of pie that is worth \$60 million, then the piece of pie remaining for the original shareholders is only worth \$190 million (\$250 million – \$60 million). The result is a \$10 million transfer of wealth from the original shareholders to the investors in the bonds with warrants. Therefore, it is extremely important for Infomatics to correctly estimate the value of the warrants at the time the bonds with warrants are issued.

Use of Warrants in Financing

Warrants generally are used by small, rapidly growing firms as “sweeteners” when they sell debt or preferred stock. Such firms frequently are regarded by investors as being highly risky, so their bonds can be sold only at extremely high coupon rates and with very restrictive indenture provisions. To avoid this, firms such as Infomatics often offer warrants along with the bonds. However, some years ago, AT&T raised \$1.57 billion by selling bonds with warrants. This was the largest financing of any type ever undertaken by a business firm, and it marked the first use ever of warrants by a large, strong corporation.¹⁴

Getting warrants along with bonds enables investors to share in the company's growth, assuming it does in fact grow and prosper. Therefore, investors are willing to accept a lower interest rate and less restrictive indenture provisions. A bond with warrants has some characteristics of debt and some characteristics of equity. It is a hybrid security that provides the financial manager with an opportunity to expand the firm's mix of securities and thus to appeal to a broader group of investors.

¹³ We assume that the average expected net present value of these projects is zero. If $NPV > 0$, then the total value of Infomatics will be greater than \$250 million. In this case, there will be little change in the price of the bonds, since bondholders receive the fixed coupon payment no matter how well the company does. However, the stock price and the value of the warrants will increase, since the total value of the company has increased without a commensurate increase in the value committed to the bondholders. The reverse would occur if $NPV < 0$.

¹⁴ It is interesting to note that before the AT&T issue, the New York Stock Exchange's stated policy was that warrants could not be listed because they were “speculative” instruments rather than “investment” securities. When AT&T issued warrants, however, the Exchange changed its policy, agreeing to list warrants that met certain requirements. Many other warrants have since been listed.

It is also interesting to note that, prior to the sale, AT&T's treasury staff, working with Morgan Stanley analysts, estimated the value of the warrants as a part of the underwriting decision. The package was supposed to sell for a total price in the neighborhood of \$1,000. The bond value could be determined accurately, so the trick was to estimate the equilibrium value of the warrant under different possible exercise prices and years to expiration, and then to use an exercise price and life that would cause $\text{Bond value} + \text{Warrant value} = \$1,000$. Using a warrant pricing model, the AT&T/Morgan Stanley analysts set terms that caused the warrant to sell on the open market at a price that was only 35¢ off from the estimated price.

entitled to all of this remaining value. Recall that there are 10 million shares of stock, so the price per share would be $\$547.985/10 = \54.80 . Suppose the company has a basic earning power of 13.5 percent (recall that $BEP = EBIT/\text{Total Assets}$) and total assets of \$591.841 million.¹⁵ This means that EBIT is $0.135(\$591.841) = \79.899 million; interest payments are \$4 million (\$80 coupon payment per bond \times 50,000 bonds); and earnings before taxes are $\$79.899 - \$4 = \$75.899$ million. With a tax rate of 40 percent, after-tax earnings are equal to $\$75.899(1 - 0.4) = \45.539 million, and earnings per share are $\$45.539/10 = \4.55 . Therefore, if Infomatics had no warrants, the stock price would be \$54.80 per share, and the earnings per share would be \$4.55.

But Infomatics *does* have warrants, and with the stock price over \$50 the warrant holders surely will choose to exercise their warrants. Infomatics will receive \$22 million when the 1 million warrants are exercised at a price of \$22 per warrant. This makes the total value \$613.841 million (the \$591.841 million total value of the firm plus the \$22 million raised by the exercise of the warrants). The total value remaining for stockholders is now \$569.985 million (\$613.841 million less the \$43.856 million allocated to bondholders). There are now 11 million shares of stock (the original 10 million plus the new 1 million due to the exercise of the warrants), so the stock price is $\$569.985/11 = \51.82 per share. Note that this is lower than the \$54.80 price per share that Infomatics would have had if there had been no warrants. In other words, the warrants have diluted the value of the stock.

A similar dilution occurs with earnings per share. After exercise, the asset base would increase from \$591.841 million to \$613.841 million, with the additional \$22 million coming from the purchase of 1 million shares of stock at \$22 per share. If the new funds have the same basic earning power as the existing funds, then the new EBIT would be $0.135(\$613.841) = \82.869 million. Interest payments would still be \$4 million, so earnings before taxes would be $\$82.869 - \$4 = \$78.869$ million, and after-tax earnings will be $\$78.869(1 - 0.4) = \47.321 million. With $10 + 1 = 11$ million shares now outstanding, EPS would be $\$47.321/11 = \4.30 , down from \$4.55. Therefore, exercising the warrants would dilute EPS.

Has this wealth transfer harmed the original shareholders? The answer is yes and no. Yes, because the original shareholders clearly are worse off than they would have been if there had been no warrants. However, if there had been no warrants attached to the bonds, then the bonds would have had a 10 percent coupon rate instead of the 8 percent coupon rate. Also, if the value of the company had not increased as expected, then it might not have been profitable for the warrant holders to exercise their warrants. In other words, the original shareholders were willing to trade off the potential dilution for the lower coupon rate. In this example, the original stockholders and the investors in the bonds with warrants got what they expected. Therefore, the answer is no, the wealth transfer at the time of exercise did not harm the original shareholders, because they expected an eventual transfer and were fairly compensated by the lower coupon payments.

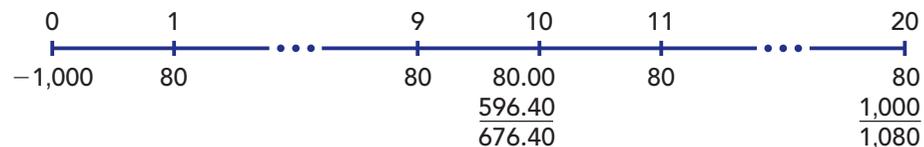
Note too that investors would recognize the situation, so the actual wealth transfer would occur gradually over time, not in a fell swoop when the warrants were exercised. First, EPS would have been reported on a diluted basis over the years, and on that basis, there would be no decline whatever in EPS. (We discuss this in a later section of this chapter.) Also, investors would know what was happening, so the stock price, over time, would reflect the likely future dilution, so it too would be stable when the warrants were exercised. So, whereas our calculations show the effects of the warrants, those effects would actually be reflected in EPS and the stock price on a gradual basis over time.

¹⁵ In this case, the total market value equals the book value of assets, but the same calculations would follow even if market and book values were not equal.

The Component Cost of Bonds with Warrants

When Infomatics issued its debt with warrants, the firm received \$50 million, or \$1,000 for each bond. Simultaneously, the company assumed an obligation to pay \$80 interest for 20 years plus \$1,000 at the end of 20 years. The pre-tax cost of the money would have been 10 percent if no warrants had been attached, but each Infomatics bond had 20 warrants, each of which entitles its holder to buy one share of Infomatics stock for \$22. What is the percentage cost of the \$50 million? As we shall see, the cost is well above the 8 percent coupon rate on the bonds.

As we demonstrated earlier, when the warrants expire 10 years from now, the expected stock price is \$51.82. The company would then have to issue one share of stock worth \$51.82 for each warrant exercised and, in return, Infomatics would receive the exercise price, \$22. Thus, a purchaser of the bonds, if he or she holds the complete package, would realize a profit in Year 10 of $\$51.82 - \$22 = \$29.82$ for each common share issued. Since each bond has 20 warrants attached, and each warrant entitles the holder to buy one share of common stock, investors would have a gain of $20(\$29.82) = \596.40 per bond at the end of Year 10. Here is a time line of the cash flow stream to an investor:



The IRR of this stream is 10.7 percent, which is the investor's overall pre-tax rate of return on the issue. This return is 70 basis points higher than the return on straight debt. This reflects the fact that the issue is riskier to investors than a straight-debt issue because some of the return is expected to come in the form of stock price appreciation, and that part of the return is relatively risky.

The expected rate of return to investors is the before-tax cost to the company—this was true of common stocks, straight bonds, and preferred stocks, and it is also true of bonds sold with warrants.

Problems with Warrant Issues

Although warrants are bought by investors with the expectation of receiving a total return commensurate with the overall riskiness of the package of securities being purchased, things do not always work out as expected. For example, in 1989 Sony paid \$3.4 billion for Columbia Pictures, a U.S. movie studio. To help finance the deal, in 1990 Sony sold \$470 million of four-year bonds with warrants at an incredibly low 0.3 percent coupon interest rate. The rate was so low because the warrants, which also had a maturity of four years, allowed investors to purchase Sony stock at 7,670 yen per share, only 2.5 percent above the share price at the time the bonds with warrants were issued.

Investors snapped up the issue, and many of the warrants were "peeled off" and sold separately on the open market. The warrant buyers obviously believed that Sony's stock would climb well above the exercise price. From Sony's point of view, the bond-with-warrants package provided a very low-cost "bridge loan" (the bonds) that would be replaced with equity financing when the warrants were exercised, presumably in four years when the bonds became due. This very low cost capital encouraged Japanese firms to acquire foreign companies and to invest huge amounts in new plant and equipment.

However, the willingness of investors to buy Japanese warrants suffered a severe blow when the Japanese stock market fell by 40 percent. By 1994, when the warrants expired, Sony's stock sold for only 5,950 yen versus the 7,670 yen exercise price, so the warrants were not exercised. Thus, Sony's planned infusion

of equity capital never materialized, and it had to refinance the four-year bond issue at much higher rates.

Both Sony and its investors lost on the deal. The investors lost because they did not get the return they expected on the issue. Sony lost because it had to alter its financing plans because the warrants were not exercised. In spite of presumably good planning by both the company and investors, this bond-with-warrants issue, and many like it, did not work out as anticipated.



What is a warrant?

Describe how a new bond issue with warrants is valued.

How are warrants used in corporate financing?

The use of warrants lowers the coupon rate on the corresponding debt issue. Does this mean that the component cost of a debt-plus-warrants package is less than the cost of straight debt? Explain.

A company recently issued bonds with attached warrants. The bond-plus-warrants package sells at a price equal to its \$1,000 face value. The bonds mature in 10 years and have a 6 percent annual coupon. The company also has 10-year straight debt (with no warrants attached) outstanding. The straight debt has a yield to maturity of 8 percent. What is the straight-debt value of the bonds? What is the value of the warrants? (\$865.80; \$134.20)

20.4 CONVERTIBLES

Convertible securities are bonds or preferred stocks that, under specified terms and conditions, can be exchanged for (that is, converted into) common stock at the option of the holder. Unlike the exercise of warrants, which brings in additional funds to the firm, conversion does not provide capital: debt (or preferred stock) is simply replaced on the balance sheet by common stock. Of course, reducing the debt or preferred stock will improve the firm's financial strength and make it easier to raise additional capital, but that requires a separate action.

Convertible Security

A security, usually a bond or preferred stock, that is exchangeable at the option of the holder for the common stock of the issuing firm.

Conversion Ratio and Conversion Price

One of the most important provisions of a convertible security is the **conversion ratio, CR**, defined as the number of shares of stock a bondholder will receive upon conversion. Related to the conversion ratio is the **conversion price, P_c** , which is the effective price investors pay for the common stock when conversion occurs. The relationship between the conversion ratio and the conversion price can be illustrated by the Silicon Valley Software Company's convertible debentures issued at their \$1,000 par value in August 2005. At any time prior to maturity on August 15, 2025, a debenture holder can exchange a bond for 20 shares of common stock; therefore, the conversion ratio, CR, is 20. The bond cost purchasers \$1,000, the par value, when it was issued. Dividing the \$1,000 par value by the 20 shares received gives a conversion price of \$50 a share.

Conversion Ratio, CR

The number of shares of common stock that are obtained by converting a convertible bond or share of convertible preferred stock.

Conversion Price, P_c

The effective price paid for common stock obtained by converting a convertible security.

$$\begin{aligned} \text{Conversion price} = P_c &= \frac{\text{Par value of bond given up}}{\text{Shares received}} && (20-2) \\ &= \frac{\$1,000}{\text{CR}} = \frac{\$1,000}{20} = \$50 \end{aligned}$$

Conversely, by solving for CR, we obtain the conversion ratio.

$$\begin{aligned}\text{Conversion ratio} = \text{CR} &= \frac{\$1,000}{P_c} && (20-3) \\ &= \frac{\$1,000}{\$50} = 20 \text{ shares}\end{aligned}$$

Once CR is set, the value of P_c is established, and vice versa.

Like a warrant's exercise price, the conversion price is typically set at from 20 to 30 percent above the prevailing market price of the common stock at the time the convertible issue is sold. Exactly how the conversion price is established can best be understood after examining some of the reasons firms use convertibles.

Generally, the conversion price and conversion ratio are fixed for the life of the bond, although sometimes a stepped-up conversion price is used. For example, the 2005 convertible debentures for Breedon Industries are convertible into 12.5 shares until 2015; into 11.76 shares from 2015 until 2025; and into 11.11 shares from 2025 until maturity in 2035. The conversion price thus starts at \$80, rises to \$85, and then goes to \$90. Breedon's convertibles, like most, have a 10-year call protection period.

Another factor that may cause a change in the conversion price and ratio is a standard feature of almost all convertibles—the clause protecting the convertible against dilution from stock splits, stock dividends, and the sale of common stock at prices below the conversion price. The typical provision states that if common stock is sold at a price below the conversion price, then the conversion price must be lowered (and the conversion ratio raised) to the price at which the new stock was issued. Also, if the stock is split, or if a stock dividend is declared, the conversion price must be lowered by the percentage amount of the stock dividend or split. For example, if Breedon Industries were to have a two-for-one stock split during the first 10 years of its convertible's life, the conversion ratio would automatically be adjusted from 12.5 to 25, and the conversion price lowered from \$80 to \$40. If this protection were not contained in the contract, a company could completely thwart conversion by the use of stock splits and stock dividends. Warrants are similarly protected against dilution.

The standard protection against dilution from selling new stock at prices below the conversion price can, however, get a company into trouble. For example, assume that Breedon's stock was selling for \$65 per share at the time the convertible was issued. Further, suppose the market went sour, and Breedon's stock price dropped to \$50 per share. If Breedon needed new equity to support operations, a new common stock sale would require the company to lower the conversion price on the convertible debentures from \$80 to \$50. That would raise the value of the convertibles and, in effect, transfer wealth from current shareholders to the convertible holders. This transfer would, de facto, amount to an additional flotation cost on the new common stock issue. Potential problems such as this must be kept in mind by firms considering the use of convertibles or bonds with warrants.

The Component Cost of Convertibles

In the spring of 2005, Silicon Valley Software was evaluating the use of the convertible bond issue described earlier. The issue would consist of 20-year convertible bonds that would sell at a price of \$1,000 per bond; this \$1,000 would also

be the bond's par (and maturity) value. The bonds would pay a 10 percent annual coupon interest rate, or \$100 per year. Each bond would be convertible into 20 shares of stock, so the conversion price would be $\$1,000/20 = \50 . The stock was expected to pay a dividend of \$2.80 during the coming year, and it sold at \$35 per share. Further, the stock price was expected to grow at a constant rate of 8 percent per year. Therefore, $r_s = \hat{r}_s = D_1/P_0 + g = \$2.80/\$35 + 8\% = 8\% + 8\% = 16\%$. If the bonds were not made convertible, they would have to offer a yield of 13 percent, given their riskiness and the general level of interest rates. The convertible bonds would not be callable for 10 years, after which they could be called at a price of \$1,050, with this price declining by \$5 per year thereafter. If, after 10 years, the conversion value exceeds the call price by at least 20 percent, management would probably call the bonds.

Figure 20-1 shows the expectations of both an average investor and the company.¹⁶

1. The horizontal line at $M = \$1,000$ represents the par (and maturity) value. Also, \$1,000 is the price at which the bond is initially offered to the public.
2. The bond is protected against call for 10 years. It is initially callable at a price of \$1,050, and the call price declines thereafter by \$5 per year. Thus, the call price is represented by the solid section of the line V_0M'' .
3. Since the convertible has a 10 percent coupon rate, and since the yield on a nonconvertible bond of similar risk was stated to be 13 percent, the expected "straight-bond" value of the convertible, B_t , must be less than par. At the time of issue, assuming an annual coupon, B_0 is \$789:

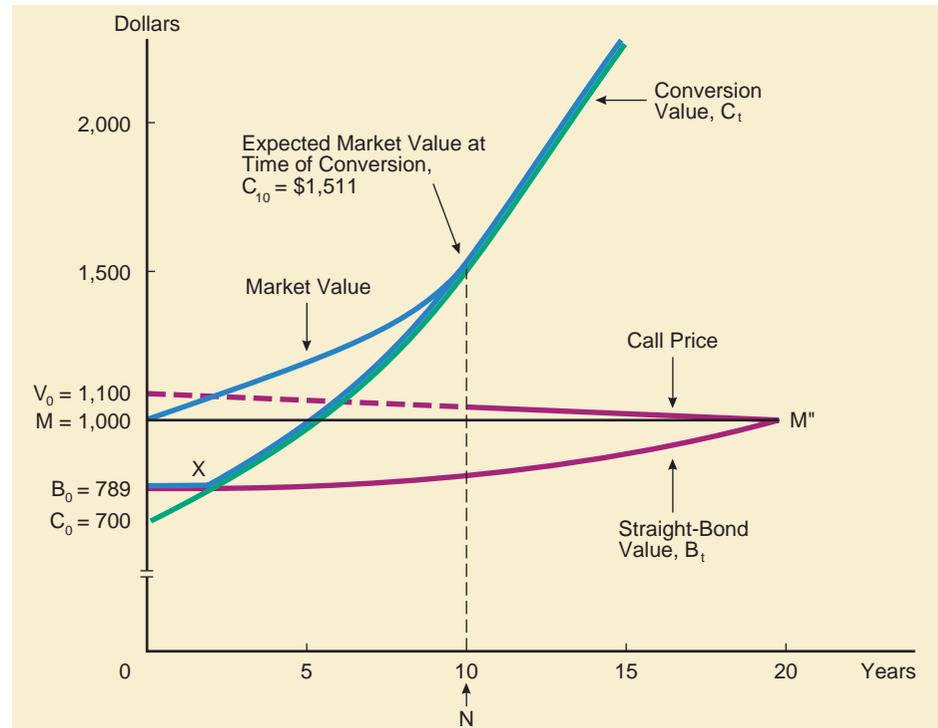
$$\begin{aligned} \text{Pure-debt value} &= B_0 = \sum_{t=1}^N \frac{\text{Coupon interest}}{(1 + r_d)^t} + \frac{\text{Maturity value}}{(1 + r_d)^N} & (20-4) \\ \text{at time of issue} &= \sum_{t=1}^{20} \frac{\$100}{(1.13)^t} + \frac{\$1,000}{(1.13)^{20}} = \$789 \end{aligned}$$

Note, however, that the bond's straight-debt value must be \$1,000 just prior to maturity, so the straight-debt value rises over time. B_t follows the line B_0M'' in the graph.

4. The bond's initial **conversion value, C_t** , or the value of the stock the investor would receive if the bonds were converted at $t = 0$, is \$700. The bond's conversion value is $P_t(\text{CR})$, so at $t = 0$, Conversion value = $P_0(\text{CR}) = \$35(20 \text{ shares}) = \700 . Since the stock price is expected to grow at an 8 percent rate, the conversion value should rise over time. For example, in Year 5 it should be $P_5(\text{CR}) = \$35(1.08)^5(20) = \$1,029$. The expected conversion value over time is given by the line C_t in Figure 20-1.
5. The actual market price of the bond can never fall below the higher of its straight-debt value or its conversion value. If the market price dropped below the straight-bond value, those who wanted bonds would recognize the bargain and buy the convertible as a bond. Similarly, if the market price dropped below the conversion value, people would buy the convertibles, exercise them to get stock, and then sell the stock at a profit. Therefore, the higher

Conversion Value, C_t
The value of common stock obtained by converting a convertible security.

¹⁶ For a more complete discussion of how the terms of a convertible offering are determined, see M. Wayne Marr and G. Rodney Thompson, "The Pricing of New Convertible Bond Issues," *Financial Management*, Summer 1984, pp. 31–37.

FIGURE 20-1 Silicon Valley Software: Convertible Bond Model


Year	Pure-Bond Value, B_t	Conversion Value, C_t	Maturity Value, M	Market Value	Floor Value	Premium
0	\$ 789	\$ 700	\$1,000	\$1,000	\$ 789	\$211
1	792	756	1,000	1,023	792	231
2	795	816	1,000	1,071	816	255
3	798	882	1,000	1,147	882	265
4	802	952	1,000	1,192	952	240
5	806	1,029	1,000	1,241	1,029	212
6	811	1,111	1,000	1,293	1,111	182
7	816	1,200	1,000	1,344	1,200	144
8	822	1,296	1,000	1,398	1,296	102
9	829	1,399	1,000	1,453	1,399	54
10	837	1,511	1,000	1,511	1,511	0
11	846	1,632	1,000	1,632	1,632	0
.
.
.
20	1,000	3,263	1,000	3,263	3,263	0

of the bond value and conversion value curves in the graph represents a *floor price* for the bond. In Figure 20-1, the floor price is represented by the thicker shaded line B_0XC_t .

- The bond's market value will typically exceed its floor value. It will exceed the straight-bond value because the option to convert is worth something—a 10 percent bond with conversion possibilities is worth more than a 10 percent bond without this option. The convertible's price will also exceed its conversion value because holding the convertible is equivalent to holding a call option, and, prior to expiration, the option's true value is higher than its

expiration (or conversion) value. Without using a sophisticated pricing model, we cannot say exactly where the market value line will lie, but as a rule it will be at or above the floor set by the straight-bond and conversion value lines.

7. At some point, the market value line will touch the conversion value line. This convergence will occur for two reasons. First, the stock should pay higher and higher dividends as the years go by, but the interest payments on the convertible are fixed. For example, Silicon's convertibles would pay \$100 in interest annually, while the dividends on the 20 shares received upon conversion would initially be $20(\$2.80) = \56 . However, at an 8 percent growth rate, the dividends after ten years would be up to \$120.90, while the interest would still be \$100. Thus, at some point, rising dividends could be expected to push against the fixed interest payments, causing the premium to disappear and investors to convert voluntarily. Second, once the bond becomes callable, its market value cannot exceed the higher of the conversion value and the call price without exposing investors to the danger of a call. For example, suppose that 10 years after issue (when the bonds were callable), the market value of the bond was \$1,600, the conversion value was \$1,500, and the call price was \$1,050. If the company called the bonds the day after you bought 10 bonds for \$16,000, you would be forced to convert into stock worth only \$15,000, so you would suffer a loss of \$100 per bond, or \$1,000, in one day. Recognizing this danger, you and other investors would simply not pay a premium over the higher of the call price or the conversion value once the bond becomes callable. Therefore, in Figure 20-1, we assume that the market value line hits the conversion value line in Year 10, when the bond becomes callable.
8. Let N represent the year when investors expect conversion to occur, either voluntarily because of rising dividends or because the company calls the convertibles to strengthen its balance sheet by substituting equity for debt. In our example, we assume that $N = 10$, the first call date.
9. Since $N = 10$, the expected market value at Year 10 is $\$35(1.08)^{10}(20) = \$1,511$. An investor can find the expected rate of return on the convertible bond, r_c , by finding the IRR of the following cash flow stream:



The solution is $r_c = \text{IRR} = 12.8\%$.

10. The return on a convertible is expected to come partly from interest income and partly from capital gains; in this case, the total expected return is 12.8 percent, with 10 percent representing interest income and 2.8 percent representing the expected capital gain. The interest component is relatively assured, while the capital gain component is more risky. Therefore, a convertible's expected return is more risky than that of a straight bond. This leads us to conclude that r_c should be larger than the cost of straight debt, r_d . Thus, it would seem that the expected rate of return on Silicon's convertibles, r_c , should lie between its cost of straight debt, $r_d = 13\%$, and its cost of common stock, $r_s = 16\%$.
11. Investment bankers use the type of model described here, plus a knowledge of the market, to set the terms on convertibles (the conversion ratio, coupon interest rate, and years of call protection) such that the security will just

“clear the market” at its \$1,000 offering price. In our example, the required conditions do not hold—the calculated rate of return on the convertible is only 12.8 percent, which is less than the 13 percent cost of straight debt. Therefore, the terms on the bond must be made more attractive to investors. Silicon Valley Software would have to increase the coupon interest rate on the convertible above 10 percent, raise the conversion ratio above 20 (and thereby lower the conversion price from \$50 to a level closer to the current \$35 market price of the stock), lengthen the call-protected period, or use a combination of these three such that the expected return on the convertible ends up between 13 and 16 percent.¹⁷

Use of Convertibles in Financing

Convertibles have two important advantages from the issuer’s standpoint: (1) Convertibles, like bonds with warrants, offer a company the chance to sell debt with a low interest rate in exchange for a chance to participate in the company’s success if it does well. (2) In a sense, convertibles provide a way to sell common stock at prices higher than those currently prevailing. Some companies actually want to sell common stock, not debt, but feel that the price of their stock is temporarily depressed. Management may know, for example, that earnings are depressed because of startup costs associated with a new project, but they expect earnings to rise sharply during the next year or so, pulling the price of the stock up with them. Thus, if the company sold stock now, it would be giving up more shares than necessary to raise a given amount of capital. However, if it set the conversion price 20 to 30 percent above the present market price of the stock, then 20 to 30 percent fewer shares would be given up when the bonds were converted than if stock were sold directly at the current time. Note, however, that management is counting on the stock’s price to rise above the conversion price to make the bonds attractive in conversion. If earnings do not rise and pull the stock price up, hence conversion does not occur, then the company will be saddled with debt in the face of low earnings, which could be disastrous.

How can the company be sure that conversion will occur if the price of the stock rises above the conversion price? Typically, convertibles contain a call provision that enables the issuing firm to force holders to convert. Suppose the conversion price is \$50, the conversion ratio is 20, the market price of the common stock has risen to \$60, and the call price on a convertible bond is \$1,050. If the company calls the bond, bondholders can either convert into common stock with a market value of $20(\$60) = \$1,200$ or allow the company to redeem the bond for \$1,050. Naturally, bondholders prefer \$1,200 to \$1,050, so conversion would occur. The call provision gives the company a way to force conversion, provided the market price of the stock is greater than the conversion price. Note, however, that most convertibles have a fairly long period of call protection—10 years is typical. Therefore, if the company wants to be able to force conversion fairly early, then it will have to set a short call-protection period. This will, in turn, require that it set a higher coupon rate or a lower conversion price.

From the standpoint of the issuer, convertibles have three important disadvantages: (1) Although the use of a convertible bond may give the company the opportunity to sell stock at a price higher than the price at which it could be sold currently, if the stock greatly increases in price, the firm would probably find that it would have been better off if it had used straight debt in spite of its

¹⁷ In this discussion, we ignore the tax advantages to investors associated with capital gains. In some situations, tax effects could result in r_c being less than r_d .

higher cost and then later sold common stock and refunded the debt. (2) Convertibles typically have a low coupon interest rate, and the advantage of this low-cost debt will be lost when conversion occurs. (3) If the company truly wants to raise equity capital, and if the price of the stock does not rise sufficiently after the bond is issued, then the company will be stuck with debt.

Convertibles and Conflicts of Interest

A potential conflict of interest between bondholders and stockholders is asset substitution. Stockholders have an “option-related” incentive to take on projects with high upside potential even though they increase the risk of the firm. When such an action is taken, there is potential for a wealth transfer between bondholders and stockholders. However, when convertible debt is issued, actions that increase the risk of the company may also increase the value of the convertible debt. Thus, some of the gains to shareholders from taking on high-risk projects have to be shared with convertible bondholders. This sharing of benefits reduces conflicts of interest between bondholders and stockholders. The same general logic applies to convertible preferred and to warrants.



What is a conversion ratio? A conversion price? A straight-bond value?

What is meant by a convertible’s floor value?

What are the advantages and disadvantages of convertibles to issuers? To investors?

How do convertibles reduce possible conflicts of interest between bondholders and stockholders?

A convertible bond has a par value of \$1,000 and a conversion price of \$40. The stock currently trades for \$30 a share. What are the bond’s conversion value and conversion ratio at $t = 0$? [CR = 25; $P_0(\text{CR}) = \$30 \times \$25 = \$750$]

20.5 A FINAL COMPARISON OF WARRANTS AND CONVERTIBLES

Convertible debt can be thought of as straight debt with nondetachable warrants. Thus, at first blush, it might appear that debt with warrants and convertible debt are more or less interchangeable. However, a closer look reveals one major and several minor differences between these two securities.¹⁸ First, as we discussed previously, the exercise of warrants brings in new equity capital, while the conversion of convertibles results only in an accounting transfer.

A second difference involves flexibility. Most convertible issues contain a call provision that allows the issuer either to refund the debt or to force conversion, depending on the relationship between the conversion value and call price. However, most warrants are not callable, so firms generally must wait until maturity for the warrants to generate new equity capital. Generally, maturities also differ between warrants and convertibles. Warrants typically have much

¹⁸ For a more detailed comparison of warrants and convertibles, see Michael S. Long and Stephen F. Sefcik, “Participation Financing: A Comparison of the Characteristics of Convertible Debt and Straight Bonds Issued in Conjunction with Warrants,” *Financial Management*, Autumn 1990, pp. 23–34.

shorter maturities than convertibles, and warrants typically expire before their accompanying debt matures. Further, warrants provide for fewer future common shares than do convertibles because with convertibles all of the debt is converted to common whereas debt remains outstanding when warrants are exercised. Together, these facts suggest that debt-plus-warrant issuers are actually more interested in selling debt than in selling equity.

In general, firms that issue debt with warrants are smaller and riskier than those that issue convertibles. One possible rationale for the use of option securities, especially the use of debt with warrants by small firms, is the difficulty investors have assessing the risk of small companies. If a startup with a new, untested product seeks debt financing, it is very difficult for potential lenders to judge the risk of the venture, hence it is difficult to set a fair interest rate. Under these circumstances, many potential investors will be reluctant to invest, making it necessary to set very high interest rates to attract debt capital. By issuing debt with warrants, investors obtain a package that offers upside potential to offset the risks of loss.

Finally, there is a significant difference in issuance costs between debt with warrants and convertible debt. Bonds with warrants typically require issuance costs that are about 1.2 percent more than the flotation costs for convertibles. In general, bond-with-warrant financings have underwriting fees that closely reflect the weighted average of the fees associated with debt and equity issues, while underwriting costs for convertibles are substantially lower.



What are some differences between debt-with-warrant financing and convertible debt?

Explain how bonds with warrants might help small, risky firms sell debt securities.

20.6 REPORTING EARNINGS WHEN WARRANTS OR CONVERTIBLES ARE OUTSTANDING¹⁹

If warrants or convertibles are outstanding, a firm could theoretically report earnings per share in one of three ways:

1. *Basic EPS*, where earnings available to common stockholders are divided by the average number of shares actually outstanding during the period.
2. *Primary EPS*, where earnings available are divided by the average number of shares that would have been outstanding if warrants and convertibles “likely to be converted in the near future” had actually been exercised or converted. In calculating primary EPS, earnings are first adjusted by “backing out” the interest on the convertibles, after which the adjusted earnings are divided by the adjusted number of shares. Accountants have a formula that basically compares the conversion or exercise price with the actual market value of the

¹⁹ As part of the FASB’s short-term convergence project with the IASB, to improve financial reporting in the U.S. while concurrently eliminating individual differences between U.S. GAAP and international financial reporting standards, the FASB expects to issue a final statement in the first quarter of 2006 that will make additional changes to FASB #128 (issued in February 1997), which is discussed in this section.

stock to determine the likelihood of conversion when deciding on the need to use this adjustment procedure.

3. *Diluted EPS*, which is similar to primary EPS except that *all* warrants and convertibles are assumed to be exercised or converted, regardless of the likelihood of exercise or conversion.

Under SEC rules, firms are required to report both basic and diluted EPS. For firms with large amounts of option securities outstanding, there can be a substantial difference between the basic and diluted EPS figures. For financial statement purposes, firms reported diluted EPS until 1997, when the Financial Accounting Standards Board (FASB) changed to basic EPS. According to FASB, the change was made to give investors a simpler picture of a company's underlying performance. Also, the change makes it easier for investors to compare the performance of U.S. firms with their foreign counterparts, which tend to use basic EPS.



What are the three possible methods for reporting EPS when warrants and convertibles are outstanding?

Which methods are most used in practice?

Why should investors be concerned about a firm's outstanding warrants and convertibles?

Tying It All Together

While common stock and long-term debt provide most of the capital used by corporations, companies also use several forms of "hybrid securities." The hybrids include preferred stock, leasing, convertibles, and warrants, and they generally have some characteristics of debt and some of equity. We discussed the pros and cons of the hybrids from the standpoints of both issuers and investors, how to determine when to use them, and the factors that affect their values. The basic rationale for these securities, and the procedures used to evaluate them, are based on concepts developed in earlier chapters.

SELF-TEST QUESTIONS AND PROBLEMS (Solutions Appear in Appendix A)

- ST-1** **Key terms** Define each of the following terms:
- a. Cumulative dividends; adjustable rate preferred stock
 - b. Arrearages; market auction preferred
 - c. Lessee; lessor
 - d. Sale and leaseback; operating lease; financial lease
 - e. Off balance sheet financing; FASB #13
 - f. Residual value
 - g. Warrant; detachable warrant; stepped-up exercise price

- h. Convertible security; conversion ratio, CR; conversion price, P_c ; conversion value, C_c
- i. Basic EPS; primary EPS; diluted EPS

- ST-2 Lease analysis** The Olsen Company has decided to acquire a new truck. One alternative is to lease the truck on a 4-year contract for a lease payment of \$10,000 per year, with payments to be made at the beginning of each year. The lease would include maintenance. Alternatively, Olsen could purchase the truck outright for \$40,000, financing with a bank loan for the net purchase price, amortized over a 4-year period at an interest rate of 10 percent per year, payments to be made at the end of each year. Under the borrow-to-purchase arrangement, Olsen would have to maintain the truck at a cost of \$1,000 per year, payable at year-end. The truck falls into the MACRS 3-year class. The applicable MACRS depreciation rates are 33, 45, 15, and 7 percent. It has a salvage value of \$10,000, which is the expected market value after 4 years, at which time Olsen plans to replace the truck irrespective of whether it leases or buys. Olsen has a federal-plus-state tax rate of 40 percent.
- a. What is Olsen's PV cost of leasing?
 - b. What is Olsen's PV cost of owning? Should the truck be leased or purchased?
 - c. The appropriate discount rate for use in Olsen's analysis is the firm's after-tax cost of debt. Why?
 - d. The salvage value is the least certain cash flow in the analysis. How might Olsen incorporate the higher riskiness of this cash flow into the analysis?

QUESTIONS

- 20-1** For purposes of measuring a firm's leverage, should preferred stock be classified as debt or equity? Does it matter if the classification is being made (a) by the firm's management, (b) by creditors, or (c) by equity investors?
- 20-2** You are told that one corporation just issued \$100 million of preferred stock and another purchased \$100 million of preferred stock as an investment. You are also told that one firm has an effective tax rate of 20 percent, whereas the other is in the 35 percent bracket. Which firm is more likely to have bought the preferred? Explain.
- 20-3** A company's bonds are often found to have a higher yield than its preferred stock, even though the bonds are considered to be less risky than the preferred to an investor. What causes this yield differential?
- 20-4** Why would a company choose to issue floating-rate as opposed to fixed-rate preferred stock?
- 20-5** Distinguish between operating leases and financial leases. Would a firm be more likely to finance a fleet of trucks or a manufacturing plant with an operating lease?
- 20-6** One alleged advantage of leasing voiced in the past was that it kept liabilities off the balance sheet, thus making it possible for a firm to obtain more leverage than it otherwise could have. This raised the question of whether or not both the lease obligation and the asset involved should be capitalized and shown on the balance sheet. Discuss the pros and cons of capitalizing leases and related assets.
- 20-7** Suppose there were no IRS restrictions on what constitutes a valid lease. Explain in a manner that a legislator might understand why some restrictions should be imposed.
- 20-8** Suppose Congress changed the tax laws in a way that (a) permitted equipment to be depreciated over a shorter period, (b) lowered corporate tax rates, and (c) reinstated the investment tax credit. Discuss how each of these changes would affect the relative use of leasing versus conventional debt in the U.S. economy.
- 20-9** What effect does the expected growth rate of a firm's stock price (subsequent to issue) have on its ability to raise additional funds through (a) convertibles and (b) warrants?
- 20-10**
 - a. How would a firm's decision to pay out a higher percentage of its earnings as dividends affect each of the following?
 - (1) The value of its long-term warrants.
 - (2) The likelihood that its convertible bonds will be converted.
 - (3) The likelihood that its warrants will be exercised.
 - b. If you owned the warrants or convertibles of a company, would you be pleased or displeased if it raised its payout rate from 20 to 80 percent? Why?

- 20-11** Evaluate the following statement: "Issuing convertible securities represents a means by which a firm can sell common stock at a price above the existing market price."
- 20-12** Suppose a company simultaneously issues \$50 million of convertible bonds with a coupon rate of 9 percent and \$50 million of pure bonds with a coupon rate of 12 percent. Both bonds have the same maturity. Does the fact that the convertible issue has the lower coupon rate suggest that it is less risky than the pure bond? Would you regard the cost of capital as being lower on the convertible than on the pure bond? Explain. (Hint: Although it might appear at first glance that the convertible's cost of capital is lower, this is not necessarily the case because the interest rate on the convertible understates its cost. Think about this.)

PROBLEMS

Easy
Problems 1–3

- 20-1 Leasing** Connors Construction needs a piece of equipment that can either be leased or purchased. The equipment costs \$100. One option is to borrow \$100 from the local bank and use the money to buy the equipment. The other option is to lease the equipment. If Connors chooses to lease the equipment, it *would not* capitalize the lease on the balance sheet. Below is the company's balance sheet *prior* to the purchase or leasing of the equipment:

Current assets	\$300	Debt	\$400
Fixed assets	<u>500</u>	Equity	<u>400</u>
Total assets	<u>\$800</u>	Total liabilities and equity	<u>\$800</u>

What would be the company's debt ratio if it chose to purchase the equipment? What would be the company's debt ratio if it chose to lease the equipment? Would the company's financial risk be different depending on whether the equipment was leased or purchased?

- 20-2 Warrants** Gregg Company recently issued two types of bonds. The first issue consisted of 20-year straight (no warrants attached) bonds with an 8 percent annual coupon. The second issue consisted of 20-year bonds with a 6 percent annual coupon with warrants attached. Both bonds were issued at par (\$1,000). What is the value of the warrants that were attached to the second issue?

- 20-3 Convertibles** Petersen Securities recently issued convertible bonds with a \$1,000 par value. The bonds have a conversion price of \$40 a share. What is the bonds' conversion ratio, CR?

Intermediate
Problems 4–7

- 20-4 Balance sheet effects of leasing** Two textile companies, McDaniel-Edwards Manufacturing and Jordan-Hocking Mills, began operations with identical balance sheets. A year later, both required additional manufacturing capacity at a cost of \$200,000. McDaniel-Edwards obtained a 5-year, \$200,000 loan at an 8 percent interest rate from its bank. Jordan-Hocking, on the other hand, decided to lease the required \$200,000 capacity from National Leasing for 5 years; an 8 percent return was built into the lease. The balance sheet for each company, before the asset increases, is as follows:

		Debt	\$200,000
		Equity	<u>200,000</u>
Total assets	<u>\$400,000</u>	Total liabilities and equity	<u>\$400,000</u>

- Show the balance sheet of each firm after the asset increase, and calculate each firm's new debt ratio. (Assume Jordan-Hocking's lease is kept off the balance sheet.)
 - Show how Jordan-Hocking's balance sheet would have looked immediately after the financing if it had capitalized the lease.
 - Would the rate of return (1) on assets and (2) on equity be affected by the choice of financing? How?
- 20-5 Lease versus buy** Morris-Meyer Mining Company must install \$1.5 million of new machinery in its Nevada mine. It can obtain a bank loan for 100 percent of the required amount. Alternatively, a Nevada investment banking firm that represents a group of investors believes that it can arrange for a lease financing plan. Assume that the following facts apply:
- The equipment falls in the MACRS 3-year class. The applicable MACRS rates are 33, 45, 15, and 7 percent.

- (2) Estimated maintenance expenses are \$75,000 per year.
- (3) Morris-Meyer's federal-plus-state tax rate is 40 percent.
- (4) If the money is borrowed, the bank loan will be at a rate of 15 percent, amortized in 4 equal installments to be paid at the end of each year.
- (5) The tentative lease terms call for end-of-year payments of \$400,000 per year for 4 years.
- (6) Under the proposed lease terms, the lessee must pay for insurance, property taxes, and maintenance.
- (7) Morris-Meyer must use the equipment if it is to continue in business, so it will almost certainly want to acquire the property at the end of the lease. If it does, then under the lease terms, it can purchase the machinery at its fair market value at that time. The best estimate of this market value is the \$250,000 salvage value, but it could be much higher or lower under certain circumstances.

To assist management in making the proper lease-versus-buy decision, you are asked to answer the following questions.

- a. Assuming that the lease can be arranged, should Morris-Meyer lease, or should it borrow and buy the equipment? Explain.
- b. Consider the \$250,000 estimated salvage value. Is it appropriate to discount it at the same rate as the other cash flows? What about the other cash flows—are they all equally risky? (Hint: Riskier cash flows are normally discounted at higher rates, but when the cash flows are *costs* rather than *inflows*, the normal procedure must be reversed.)

20-6 Warrants Pogue Industries Inc. has warrants outstanding that permit its holders to purchase 1 share of stock per warrant at a price of \$21. (Refer to Chapter 18 for parts a, b, and c.)

- a. Calculate the exercise value of Pogue's warrants if the common stock sells at each of the following prices: \$18, \$21, \$25, and \$70.
- b. At what approximate price do you think the warrants would actually sell under each condition indicated in part a? What premium is implied in your price? Your answer will be a guess, but your prices and premiums should bear reasonable relationships to each other.
- c. How would each of the following factors affect your estimates of the warrants' prices and premiums in part b?
 - (1) The life of the warrant is lengthened.
 - (2) The expected variability (σ_p) in the stock's price decreases.
 - (3) The expected growth rate in the stock's EPS increases.
 - (4) The company announces the following change in dividend policy: whereas it formerly paid no dividends, henceforth it will pay out *all* earnings as dividends.
- d. Assume Pogue's stock now sells for \$18 per share. The company wants to sell some 20-year, annual interest, \$1,000 par value bonds. Each bond will have 50 warrants, each exercisable into 1 share of stock at an exercise price of \$21. Pogue's pure bonds yield 10 percent. Regardless of your answer to part b, assume that the warrants will have a market value of \$1.50 when the stock sells at \$18. What annual coupon interest rate and annual dollar coupon must the company set on the bonds with warrants if they are to clear the market? Round to the nearest dollar or percentage point.

20-7 Convertibles The Hadaway Company was planning to finance an expansion in the summer of 2005 with a convertible security. They considered a convertible debenture but feared the burden of fixed interest charges if the common stock did not rise enough to make conversion attractive. They decided on an issue of convertible preferred stock, which would pay a dividend of \$1.05 per share.

The common stock was selling for \$21 a share at the time. Management projected earnings for 2005 at \$1.50 a share and expected a future growth rate of 10 percent a year in 2006 and beyond. It was agreed by the investment bankers and management that the common stock would continue to sell at 14 times earnings, the current price/earnings ratio.

- a. What conversion price should be set by the issuer? The conversion rate will be 1.0; that is, each share of convertible preferred can be converted into 1 share of common. Therefore, the convertible's par value (as well as the issue price) will be equal to the conversion price, which, in turn, will be determined as a percentage over the current market price of the common. Your answer will be a guess, but make it a reasonable one.
- b. Should the preferred stock include a call provision? Why or why not?

20-8 Lease analysis As part of its overall plant modernization and cost reduction program, the management of Tanner-Woods Textile Mills has decided to install a new automated

weaving loom. In the capital budgeting analysis of this equipment, the IRR of the project was found to be 20 percent versus a project required return of 12 percent.

The loom has an invoice price of \$250,000, including delivery and installation charges. The funds needed could be borrowed from the bank through a 4-year amortized loan at a 10 percent interest rate, with payments to be made at the end of each year. In the event that the loom is purchased, the manufacturer will contract to maintain and service it for a fee of \$20,000 per year paid at the end of each year. The loom falls in the MACRS 5-year class, and Tanner-Woods's marginal federal-plus-state tax rate is 40 percent. The applicable MACRS rates are 20, 32, 19, 12, 11, and 6 percent.

United Automation Inc., maker of the loom, has offered to lease the loom to Tanner-Woods for \$70,000 upon delivery and installation (at $t = 0$) plus 4 additional annual lease payments of \$70,000 to be made at the end of Years 1 through 4. (Note that there are 5 lease payments in total.) The lease agreement includes maintenance and servicing. Actually, the loom has an expected life of 8 years, at which time its expected salvage value is zero; however, after 4 years, its market value is expected to equal its book value of \$42,500. Tanner-Woods plans to build an entirely new plant in 4 years, so it has no interest in either leasing or owning the proposed loom for more than that period.

- Should the loom be leased or purchased?
- The salvage value is clearly the most uncertain cash flow in the analysis. Assume that the appropriate salvage value pre-tax discount rate is 15 percent. What would be the effect of a salvage value risk adjustment on the decision?
- The original analysis assumed that Tanner-Woods would not need the loom after 4 years. Now assume that the firm will continue to use it after the lease expires. Thus, if it leased, Tanner-Woods would have to buy the asset after 4 years at the then existing market value, which is assumed to equal the book value. What effect would this requirement have on the basic analysis? (No numerical analysis is required; just verbalize.)

20-9 Financing alternatives The Howe Computer Company has grown rapidly during the past 5 years. Recently, its commercial bank urged the company to consider increasing its permanent financing. Its bank loan under a line of credit has risen to \$150,000, carrying a 10 percent interest rate, and Howe has been 30 to 60 days late in paying trade creditors.

Discussions with an investment banker have resulted in the decision to raise \$250,000 at this time. Investment bankers have assured Howe that the following alternatives are feasible (flotation costs will be ignored):

- Alternative 1:* Sell common stock at \$10 per share.
- Alternative 2:* Sell convertible bonds at a 10 percent coupon, convertible into 80 shares of common stock for each \$1,000 bond (that is, the conversion price is \$12.50 per share).
- Alternative 3:* Sell debentures with a 10 percent coupon; each \$1,000 bond will have 80 warrants to buy 1 share of common stock at \$12.50.

Keith Howe, the president, owns 80 percent of Howe's common stock and wishes to maintain control of the company; 50,000 shares are outstanding. The following are summaries of Howe's latest financial statements:

Balance Sheet

		Current liabilities	\$200,000
		Common stock, \$1 par	50,000
		Retained earnings	25,000
Total assets	<u>\$275,000</u>	Total liabilities and equity	<u>\$275,000</u>

Income Statement

Sales	\$550,000
All costs except interest	495,000
EBIT	\$ 55,000
Interest	15,000
EBT	\$ 40,000
Taxes (40%)	16,000
Net income	<u>\$ 24,000</u>
Shares outstanding	50,000
Earnings per share	\$0.48
Price/earnings ratio	18×
Market price of stock	\$8.64

- Show the new balance sheet under each alternative. For Alternatives 2 and 3, show the balance sheet after conversion of the debentures or exercise of the warrants. Assume that \$150,000 of the funds raised will be used to pay off the bank loan and the rest to increase total assets.
- Show Howe's control position under each alternative, assuming that he does not purchase additional shares.
- What is the effect on earnings per share of each alternative if it is assumed that earnings before interest and taxes will be 20 percent of total assets?
- What will be the debt ratio under each alternative?
- Which of the three alternatives would you recommend to Howe, and why?

20-10 Convertibles O'Brien Computers Inc. needs to raise \$35 million to begin producing a new microcomputer. O'Brien's straight, nonconvertible debentures currently yield 12 percent. Its stock sells for \$38 per share, the last dividend was \$2.46, and the expected growth rate is a constant 8 percent. Investment bankers have tentatively proposed that O'Brien raise the \$35 million by issuing convertible debentures. These convertibles would have a \$1,000 par value, carry an annual coupon rate of 10 percent, have a 20-year maturity, and be convertible into 20 shares of stock. The bonds would be noncallable for 5 years, after which they would be callable at a price of \$1,075; this call price would decline by \$5 per year in Year 6 and each year thereafter. Management has called convertibles in the past (and presumably will call them again in the future), once they were eligible for call, as soon as their conversion value was about 20 percent above their par value (not their call price).

- Draw an accurate graph similar to Figure 20-1 representing the expectations set forth in the problem.
- Suppose the previously outlined projects work out on schedule for 2 years, but then O'Brien begins to experience extremely strong competition from Japanese firms. As a result, O'Brien's expected growth rate drops from 8 percent to zero. Assume that the dividend at the time of the drop is \$2.87. The company's credit strength is not impaired, and its value of r_s is also unchanged. What would happen (1) to the stock price and (2) to the convertible bond's price? Be as precise as you can.

COMPREHENSIVE/SPREADSHEET PROBLEMS

20-11 Lease analysis Use the spreadsheet model to rework parts a and b of Problem 20-8. Then, answer the following question.

- Accepting that the corporate WACC should be used equally to discount all anticipated cash flows, at what cost of capital would the firm be indifferent between leasing and buying?

20-12 Warrants Storm Software wants to issue \$100 million in new capital to fund new opportunities. If Storm were to raise the \$100 million of new capital in a straight-debt 20-year bond offering, Storm would have to offer an annual coupon rate of 12 percent. However, Storm's advisors have suggested a 20-year bond offering with warrants. According to the advisors, Storm could issue 9 percent annual coupon-bearing debt with 20 warrants per \$1,000 face value bond. Storm has 10 million shares of stock outstanding at a current price of \$25. The warrants can be exercised in 10 years (on December 31, 2015) at an exercise price of \$30. Each warrant entitles its holder to buy 1 share of Storm Software stock. After issuing the bonds with warrants, Storm's operations and investments are expected to grow at a constant rate of 10 percent per year.

- If investors pay \$1,000 for each bond, what is the value of each warrant attached to the bond issue?
- What is the expected total value of Storm Software in 10 years?
- If there were no warrants, what would be Storm's price per share in 10 years? What would be the price with the warrants?
- What is the component cost of these bonds with warrants? What is the premium associated with the warrants?

Integrated Case

Fish & Chips, Inc., Part I

20-13 Lease analysis Martha Millon, financial manager for Fish & Chips Inc., has been asked to perform a lease-versus-buy analysis on a new computer system. The computer costs \$1,200,000, and, if it is purchased, Fish & Chips could obtain a term loan for the full amount at a 10 percent cost. The loan would be amortized over the 4-year life of the computer, with payments made at the end of each year. The computer is classified as special purpose, and hence it falls into the MACRS 3-year class. The applicable MACRS rates are 33, 45, 15, and 7 percent. If the computer is purchased, a maintenance contract must be obtained at a cost of \$25,000, payable at the beginning of each year.

After 4 years, the computer will be sold, and Millon's best estimate of its residual value at that time is \$125,000. Because technology is changing rapidly, however, the residual value is very uncertain.

As an alternative, National Leasing is willing to write a 4-year lease on the computer, including maintenance, for payments of \$340,000 at the beginning of each year. Fish & Chips' marginal federal-plus-state tax rate is 40 percent. Help Millon conduct her analysis by answering the following questions.

- a. (1) Why is leasing sometimes referred to as "off balance sheet" financing?
(2) What is the difference between a capital lease and an operating lease?
(3) What effect does leasing have on a firm's capital structure?
- b. (1) What is Fish & Chips' present value cost of owning the computer? (Hint: Set up a table whose bottom line is a "time line" that shows the net cash flows over the period $t = 0$ to $t = 4$, and then find the PV of these net cash flows, or the PV cost of owning.)
(2) Explain the rationale for the discount rate you used to find the PV.
- c. (1) What is Fish & Chips' present value cost of leasing the computer? (Hint: Again, construct a time line.)
(2) What is the net advantage to leasing? Does your analysis indicate that the firm should buy or lease the computer? Explain.
- d. Now assume that Millon believes the computer's residual value could be as low as \$0 or as high as \$250,000, but she stands by \$125,000 as her expected value. She concludes that the residual value is riskier than the other cash flows in the analysis, and she wants to incorporate this differential risk into her analysis. Describe how this could be accomplished. What effect would it have on the lease decision?
- e. Millon knows that her firm has been considering moving its headquarters to a new location for some time, and she is concerned that these plans may come to fruition prior to the expiration of the lease. If the move occurs, the company would obtain completely new computers, and hence Millon would like to include a cancellation clause in the lease contract. What effect would a cancellation clause have on the riskiness of the lease?

Fish & Chips, Inc., Part II

20-14 Preferred stock, warrants, and convertibles Martha Millon, financial manager of Fish & Chips Inc., is facing a dilemma. The firm was founded 5 years ago to develop a new fast-food concept, and although Fish & Chips has done well, the firm's founder and chairman believes that an industry shake-out is imminent. To survive, the firm must capture market share now, and this requires a large infusion of new capital.

Because the stock price may rise rapidly, Millon does not want to issue new common stock. On the other hand, interest rates are currently very high by historical standards, and, with the firm's B rating, the interest payments on a new debt issue would be too much to handle if sales took a downturn. Thus, Millon has narrowed her choice to bonds with warrants or convertible bonds. She has asked you to help in the decision process by answering the following questions.

- a. How does preferred stock differ from common equity and debt?
- b. What is floating-rate preferred?
- c. How can a knowledge of call options provide an understanding of warrants and convertibles?
- d. One of Millon's alternatives is to issue a bond with warrants attached. Fish & Chips' current stock price is \$10, and its cost of 20-year, annual coupon debt without warrants is estimated by its investment bankers to be 12 percent. The bankers suggest attaching 50 warrants to each bond, with each warrant having an exercise price of \$12.50. It is estimated that each warrant, when detached and traded separately, will have a value of \$1.50.
 - (1) What coupon rate should be set on the bond with warrants if the total package is to sell for \$1,000?

- (2) Suppose the bonds are issued and the warrants immediately trade for \$2.50 each. What does this imply about the terms of the issue? Did the company “win” or “lose”?
- (3) When would you expect the warrants to be exercised?
- (4) Will the warrants bring in additional capital when exercised? If so, how much and what type of capital?
- (5) Because warrants lower the cost of the accompanying debt, shouldn't all debt be issued with warrants? What is the expected cost of the bond with warrants if the warrants are expected to be exercised in 5 years, when Fish & Chips' stock price is expected to be \$17.50? How would you expect the cost of the bond with warrants to compare with the cost of straight debt? With the cost of common stock?
- e. As an alternative to the bond with warrants, Millon is considering convertible bonds. The firm's investment bankers estimate that Fish & Chips could sell a 20-year, 10 percent annual coupon, callable convertible bond for its \$1,000 par value, whereas a straight-debt issue would require a 12 percent coupon. Fish & Chips' current stock price is \$10, its last dividend was \$0.74, and the dividend is expected to grow at a constant rate of 8 percent. The convertible could be converted into 80 shares of Fish & Chips stock at the owner's option.
- (1) What conversion price, P_c , is implied in the convertible's terms?
- (2) What is the straight-debt value of the convertible? What is the implied value of the convertibility feature?
- (3) What is the formula for the bond's conversion value in any year? Its value at Year 0? At Year 10?
- (4) What is meant by the term “floor value” of a convertible? What is the convertible's expected floor value in Year 0? In Year 10?
- (5) Assume that Fish & Chips intends to force conversion by calling the bond when its conversion value is 20 percent above its par value, or at $1.2(\$1,000) = \$1,200$. When is the issue expected to be called? Answer to the closest year.
- (6) What is the expected cost of the convertible to Fish & Chips? Does this cost appear consistent with the riskiness of the issue? Assume conversion in Year 5 at a conversion value of \$1,200.
- f. Millon believes that the costs of both the bond with warrants and the convertible bond are essentially equal, so her decision must be based on other factors. What are some of the factors that she should consider in making her decision?



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