chapter 21

Hybrid Financing: Preferred Stock, Warrants, and Convertibles

The use of convertible securities—bonds or preferred stocks that can be exchanged for common stock of the issuing corporation—has soared during the last decade. Why do companies use convertibles so heavily? To answer this question, first 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 will be lower than if it financed with nonconvertible debt. But why would investors be willing to buy such a bond, given its lower interest payments? The answer lies in the conversion feature—if the price of the issuer's stock rises, the convertible bondholder can exchange it for stock and realize a capital gain.

A convertible bond's value is based partly on interest rates in the economy, partly on the issuing company's regular bond risk, and partly on the price of the stock into which it is convertible. In contrast, a nonconvertible bond's price is based entirely on interest rates and company risk. Therefore, convertibles' prices are much more volatile than regular bonds' prices, which make convertibles riskier than straight bonds. An article in *Forbes* reported that if a company's common stock increases in value, the returns on its convertibles also rise, but by only 70% of the stock's percentage increase. However, if the stock declines, the convertible will decline by only 50% of the stock's decline. Thus, while convertibles are more risky than straight bonds, they are less risky than common stocks.

To illustrate, consider Amazon.com, which in January 1999 issued $1.25 billion of convertible bonds, the largest such offering in history. Amazon's bonds had a par value of $1,000 and a 4.75% coupon rate. During 1999 Amazon's convertibles took their holders on a wild ride. Amazon's stock rose about 70% during the first four months, causing its convertibles to rise to $1,500. During the next four months, the stock lost more than 60% of its value, to a level 30% below where it had been trading when the convertibles were issued. This caused the convertibles' price to be cut in half, to $750. Three months later Amazon's stock rebounded, and its convertibles once again traded above $1,500. But they dropped once more, and by year-end 1999, the convertibles were back to their $1,000 issue price. Thus, someone holding the convertibles for the entire year would have ended up close to where he or she started, with a total return just shy of the 4.75% coupon rate, but probably also with a bad case of heartburn and a few gray hairs.

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

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

The textbook's Web site contains an *Excel* file that will guide you through the chapter's calculations. The file for this chapter is ***FM12 Ch 21 Tool Kit.xls,*** and we encourage you to open the file and follow along as you read the chapter.

21.1 Preferred Stock

Preferred stock is a hybrid—it is similar to bonds in some respects and to common stock in other ways. Accountants classify 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. Also, unlike interest on debt, preferred dividends are not deductible by the issuing corporation, so preferred stock has a higher cost of capital than debt. We first describe the basic features of preferred, after which we discuss the 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%, 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% after the issue date—as it did—then the market price of the preferred stock will go up or down. Currently, r_p for Klondike Paper's preferred is 9%, 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 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, 3 years, meaning that the cumulative feature ceases after 3 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, three out of ten—if the preferred dividend is passed (omitted). Some preferreds even entitle their holders to elect a majority of the board.

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

Where's the Dividend?

Suppose your company needs cash to finance a sure-winner expansion. However, its bond covenants forbid any additional borrowing, and these covenants also prohibit the payment of cash dividends, which rules out conventional preferred stock. To make matters worse, the company's stock price is trading near its 52-week low, so you don't want to issue new common stock. Is there any way you can raise the needed funds?

Two companies came up with innovative answers. Intermedia Communications Corp. issued $300 million of exchangeable preferred stock with a payment-in-kind (PIK) dividend. The 13.5% dividend is payable in additional shares of the preferred stock rather than in cash. Therefore, this instrument provided Intermedia with the cash it needed yet still complied with the bond covenants. In addition, the exchange feature allows Intermedia to convert the preferred stock into debt when its financial situation improves to the point where the debt covenants are no longer binding.

Similarly, Nextel Communications issued $150 million of another first-time-ever security, zero coupon convertible preferred stock. The stock had a 15-year maturity, a $98 maturity value per share, and a $26 per share issue price, giving it a yield of 9.25% at the time of issue. Because it isn't debt and it doesn't pay coupons, the security avoided the restrictions in Nextel's debt covenants. The preferred stock can also be converted into common stock, and the preferred stockholders will exercise this option if Nextel's stock enjoys a sharp increase.

Sources: Ian Springsteel, "Take Your PIK," *CFO*, December 1997, p. 30; and Joseph McCafferty, "Less or More than Zero," *CFO*, March 1999, p. 20.

bonds, and virtually impossible to sell more preferred or common stock except at rock bottom prices. However, having preferred stock outstanding does give a firm the chance to overcome its difficulties—if bonds had been used instead of preferred stock, a company could be 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.*

For updates, go to **http://finance.yahoo.com** and get quotes for DD-PA, Du Pont's 3.5% preferred stock. For an updated bond yield, use the bond screener and search for Du Pont bonds.

However, for an investor 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 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, since 70% of preferred dividends is exempt from corporate taxes, preferred stock is attractive to corporate investors. Indeed, high-grade preferred stock, on average, sells on a lower pre-tax yield basis than high-grade bonds. As an example, Du Pont's 3.5% dividend preferred stock in mid-2006 had a price of $67.52, for a market yield of about 5.18%. Du Pont's long-term bonds that mature in 2028 provided a yield of 5.54%, or 0.36 percentage points *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% annual dividend rate. The issue is mandatorily convertible into between approximately 254 million and 313 million shares. Convertibles are discussed at length in Section 21.3.

[1]The after-tax yield on a 5.54% bond to a corporate investor in the 34% marginal tax rate bracket is 5.54%(1 − T) = 3.66%. The after-tax yield on a 5.18% preferred stock is 5.18%(1 − Effective T) = 5.18%[1 − (0.30)(0.34)] = 4.65%. Also, note that tax law prohibits firms from issuing debt and then using the proceeds to purchase another firm's preferred stock. If debt is used for stock purchases, then the 70% 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.

MIPS, QUIPS, TOPrS, and QUIDS: A Tale of Two Perspectives

Wall Street's "financial engineers" are constantly trying to develop new securities that appeal to issuers and investors. In the mid-1990s Goldman Sachs created a special type of preferred stock whose dividends are deductible for the issuing company, just like interest is deductible. These securities trade under a variety of colorful names, including MIPS (Modified Income Preferred Securities), QUIPS (Quarterly Income Preferred Securities), TOPrS (Trust Originated Preferred Stock), 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) Because the parent company gets to take the deduction, 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 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 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 unimportant. (4) Due to the differential tax rates, the arrangement results in net tax savings. Competition in capital markets results in a sharing of the savings between investors and corporations.

In the mid-1990s the Treasury attempted unsuccessfully to do away with the deductibility on these instruments, arguing that they were more like equity than debt. For example, in 1993 Enron issued MIPS through a subsidiary, deducted the interest, but described them as preferred stock when reporting to shareholders. Enron's stated intention was to use these securities to decrease its debt/equity ratio and improve its credit rating, apparently by issuing what amounted to equity, but still deducting the payments. But how does issuing these securities really affect the company's risk? The debt is still an obligation of the parent company and so may increase the parent's risk, not decrease it. In fact, the credit rating agencies determined that Enron's MIPS increased its risk, like debt would, and warned that these shenanigans would not improve its credit rating.

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; John D. McKinnon and Greg Hitt, "Double Play: How Treasury Lost in Battle to Quash a Dubious Security—Instrument Issued by Enron and Others Can Be Used as Both Debt and Equity—Win for Flotilla of Lobbyists," *The Wall Street Journal*, February 4, 2002, p. A1.

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% 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]

[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.

Nonconvertible preferred stock is virtually all owned by corporations, which can take advantage of the 70% 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 get higher yields on safer bonds, so it is not logical for them to hold preferreds.[3] 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% 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% and the dividend yield on new preferred at 2% higher, or 12% in a no-tax world. However, when taxes are considered, a corporate buyer with a high tax rate, say, 40%, might be willing to buy the preferred stock if it has an 8% before-tax yield. This would produce an 8%(1 – 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%, its after-tax costs would be 10%(1 − T) = 10%(0.90) = 9% on the bonds and 8% 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.[4]

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. ARPs are issued mainly by utilities and large commercial banks. When ARPs were first developed, they were touted as nearly perfect short-term corporate investments since (1) only 30% 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 (1) to changes in the riskiness of the

[3]Some new preferreds are attractive to individual investors. See the box, "MIPS, QUIPS, TOPrS, and QUIDS: A Tale of Two Perspectives."

[4]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. For more on preferred stock, see Michael J. Alderson, Keith C. Brown, and Scott L. Lummer, "Dutch Auction Rate Preferred Stock," *Financial Management*, Summer 1987, pp. 68–73; Michael J. Alderson and Donald R. Fraser, "Financial Innovations and Excesses Revisited: The Case of Auction Rate Preferred Stock," *Financial Management*, Summer 1993, pp. 61–75; and Bernard J. Winger et al., "Adjustable Rate Preferred Stock," *Financial Management*, Spring 1986, pp. 48–57.

issues (some big banks that had issued ARPs, such as Continental Illinois, ran into serious loan default problems) and (2) to the fact that Treasury yields fluctuated 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% 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 7-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 7-week period as determined by the auction. From the holder's standpoint, market auction preferred is a low-risk, largely tax-exempt, 7-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 issuer's standpoint:

1. In contrast to bonds, the obligation to pay preferred dividends is not firm, 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. Since preferred stock sometimes has no maturity, and since 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 normally 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.

SELF-TEST

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?

A company's preferred stock has a pre-tax dividend yield of 7%. The company's debt has a pre-tax yield of 8%. If an investor is in the 34% marginal tax bracket, what are the after-tax yields of the preferred stock and debt? (6.29%; 5.28%)

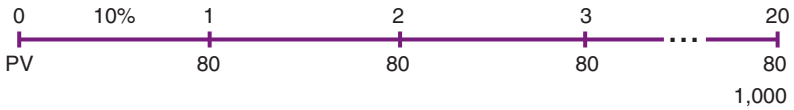
21.2 Warrants

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 issued along 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 2007, 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% 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% 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 a strike price (also called 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 2017 if they had not been exercised previously.

Why would investors be willing to buy Infomatics' bonds at a yield of only 8% in a 10% 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 since holders can buy the firm's common stock at the strike price regardless 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 9 for a 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% interest rate. However, with warrants attached, the bonds were sold to yield 8%. Someone buying the bonds at their $1,000 initial offering price would thus be receiving a package consisting of an 8%, 20-year bond plus 20 warrants. Because the going interest rate on bonds as risky as those of Infomatics was 10%, 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:

$$\begin{pmatrix}\text{Price paid for}\\ \text{bond with warrants}\end{pmatrix} = \begin{pmatrix}\text{Straight-debt}\\ \text{value of bond}\end{pmatrix} + \begin{pmatrix}\text{Value of}\\ \text{warrants}\end{pmatrix} \quad (21\text{-}1)$$

$$\$1{,}000 = \$830 + \$170.$$

Because investors receive 20 warrants with each bond, each warrant has an implied value of $170/20 = $8.50.

The key issue in setting the terms of a bond-with-warrants deal 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 9, 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 strike price on or before the expiration date. However, there are major differences between call options and warrants. When call options are exercised, the stock provided to the option holder comes from the secondary market, but when warrants are exercised, the stock provided to the warrant holders is either newly issued shares or treasury stock the company has previously purchased. 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. Also, call options typically have a life of just a few months, while warrants often have lives of 10 years or more. Finally, the Black-Scholes model assumes that the underlying stock pays no dividend, which is not unreasonable over a short period but is unreasonable for 5 or 10 years. Therefore, investment bankers cannot use the Black-Scholes model to determine the value of warrants.

Even though the Black-Scholes model cannot be used to determine a precise value for a warrant, there are more sophisticated models that work reasonably well. In addition, investment bankers can simply contact portfolio managers of mutual funds, pension funds, and other organizations that would be interested in buying the securities and get an indication of how many they would buy at different prices. In effect, the bankers hold a presale auction and determine the set of terms that will just clear the market. If they do this job properly, they will, in effect, be letting the market determine the value of the warrants.

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 such restrictions, 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. At the time, 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.[5]

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

[5]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 Bond value + 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.

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.

Virtually all warrants issued today are **detachable.** Thus, after a bond with attached warrants is sold, the warrants can be detached and traded separately from the bond. Further, even after the warrants have been exercised, the bond (with its low coupon rate) remains outstanding.

The strike price on warrants is generally set some 20% to 30% above the market price of the stock on the date the bond is issued. If the firm grows and prospers, causing its stock price to rise above the strike price at which shares may be purchased, warrant holders could exercise their warrants and buy stock at the stated price. However, without some incentive, warrants would never be exercised prior to maturity—their value in the open market would be greater than their value if exercised, so holders would sell warrants rather than exercise them. There are three conditions that cause holders to exercise their warrants: (1) Warrant holders will surely exercise and buy stock if the warrants are about to expire and the market price of the stock is above the exercise price. (2) Warrant holders will exercise voluntarily if the company raises the dividend on the common stock by a sufficient amount. No dividend is earned on the warrant, so it provides no current income. However, if the common stock pays a high dividend, it provides an attractive dividend yield but limits stock price growth. This induces warrant holders to exercise their option to buy the stock. (3) Warrants sometimes have **stepped-up exercise prices,** which prod owners into exercising them. For example, Williamson Scientific Company has warrants outstanding with an exercise price of $25 until December 31, 2011, at which time the exercise price rises to $30. If the price of the common stock is over $25 just before December 31, 2011, many warrant holders will exercise their options before the stepped-up price takes effect and the value of the warrants falls.

Another desirable feature of warrants is that they generally bring in funds only if funds are needed. If the company grows, it will probably need new equity capital. At the same time, growth will cause the price of the stock to rise and the warrants to be exercised; hence the firm will obtain the cash it needs. If the company is not successful, and it cannot profitably employ additional money, the price of its stock will probably not rise enough to induce exercise of the warrants.

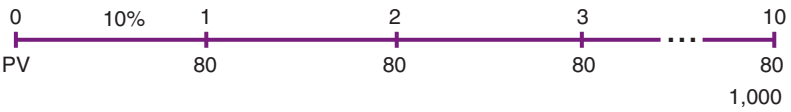
Wealth Effects and Dilution Due to Warrants When Exercised

e-resource

See ***FM12 Ch 21 Tool Kit.xls*** at the textbook's Web site for details.

Assume that the total value of Infomatics' operations and investments, which is $250 million immediately after issuing the bonds with warrants, is expected to grow, and does grow, at 9% per year. When the warrants are due to expire in 10 years, the total value of Infomatics is expected to be $250(1.09)^{10} = $591.841 million. How will this value be allocated among the original stockholders, the bondholders, and the warrant holders?

When the warrants expire, the bonds will have 10 years remaining until maturity, with a fixed coupon payment of $80. If the expected market interest rate is still 10%, then the time line of cash flows will be



Using a financial calculator, input N = 10, I/YR = 10, PMT = 80, and FV = 1000. Press the PV key to obtain the bond's value, $877.11. The total value of all of the bonds is 50,000($877.11) = $43.856 million.

The value remaining for the original stockholders and the warrant holders is equal to the remaining value of the firm, after deducting the amount owed to the bondholders. This remaining value is $591.841 − $43.856 = $547.985 million. If there had been no warrants, then the original stockholders would have been 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; see Table 21-1 for a summary of these calculations.

What would the earnings per share be if there were no warrants? Suppose the company has a basic earning power of 13.5% (recall that BEP = EBIT/Total assets) and total assets of $591.841 million.[6] This means that EBIT is 0.135($591.841) = $79.899 million; interest payments are $4 million ($80 coupon payment per bond × 50,000 bonds); and earnings before taxes are $79.899 − $4 = $75.899 million. With a tax rate of 40%, after-tax earnings are equal to $75.899(1 − 0.4) = $45.539 million, and earnings per share are $45.539/10 = $4.55.

To summarize, 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 a stock price much higher than the exercise price of $22, the warrant holders will exercise their warrants. Table 21-1 shows how the exercise will affect the stock price relative to the case of no warrants. Infomatics will receive $22 million when the 1 million warrants are exercised at a

Table 21-1 Dilution Effects of Warrants in 10 Years (Millions of Dollars, Except Per Share Data)

	If There Are No Warrants	If There Are Warrants and They Are Exercised
Expected value of operations and investments[a]	$591.841	$591.841
Plus new capital from exercise of warrants[b]		22.000
Total value of firm (and total capital)	$591.841	$613.841
Minus value of bonds	43.856	43.856
Value remaining for shareholders	$547.985	$569.985
Shares outstanding[c]	10	11
Price per share	$ 54.80	$ 51.82

[a]The value of operations and investments is expected to grow from its current $250 million at a rate of 9%; $250(1.09)^{10} = $591.841 million.
[b]The warrants will be exercised only if the stock price at expiration is above $22. If the stock price is less than $22, the warrants will expire worthless and there will be no new capital. Our calculations show that the expected stock price is greater than $22, so the warrants are expected to be exercised.
[c]Without warrants, there are 10 million shares of stock. If the warrants are exercised (see note b), then there will be 10 + 1 = 11 million shares outstanding.

[6]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.

price of $22 per warrant. This will make the total value of Infomatics equal to $613.841 million (the $591.841 million existing value 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 will be $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. Thus, the warrants dilute 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 sale of 1 million shares of stock at $22 per share. If the new funds had 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 would 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.

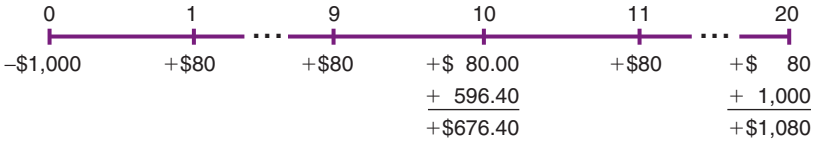
Has this wealth transfer harmed the original shareholders? The answer is yes and no. Yes, because the original shareholders clearly are worse off than they would have been if there had been no warrants. However, if there had been no warrants attached to the bonds, then the bonds would have had a 10% coupon rate instead of the 8% 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 would be getting 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 interest payments.

Note, too, that investors would recognize the situation, so the actual wealth transfer would occur gradually over time, not in one 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 in reported 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. Therefore, it too would be stable when the warrants were exercised. Thus, the effects of the warrants would be reflected in EPS and the stock price on a gradual basis over time.

The Component Cost of Bonds with Warrants

When Infomatics issued its bonds with warrants, the firm received $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% if no warrants had been attached, but each Infomatics bond had 20 warrants, each of which entitles its holder to buy one share of stock for $22. What is the percentage cost of the debt? As we shall see, the cost is well above the 8% coupon rate on the bonds.

As we demonstrated earlier, when the warrants expire 10 years from now and are exercised, the expected stock price is $51.82.[7] 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 strike price, $22. Thus, a purchaser of the bonds, if he or she holds the complete package, would expect to realize a profit in Year 10 of $51.82 − $22 = $29.82 for each common share issued.[8] Since each bond has 20 warrants attached, and each warrant entitles the holder to buy one share of common stock, investors would have a cash flow of 20($29.82) = $596.40 per bond at the end of Year 10. Here is a time line of the expected cash flow stream to an investor:



The IRR of this stream is 10.7%, which is the investor's overall expected pre-tax rate of return on the issue. This return is 70 basis points higher than the 10% return on straight debt. The higher return reflects the fact that the issue is riskier to investors than a straight-debt issue because much of the return is expected to come in the form of stock price appreciation, and that part of the return is more risky than interest income.

The expected rate of return to investors is the same as the before-tax cost to the company—this is true of common stocks, straight bonds, and preferred stocks, and it is also true of bonds sold with warrants.[9]

SELF-TEST

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.

Shanton Corporation could issue 15-year straight debt at a rate of 8%. Instead, Shanton issues 15-year debt with a coupon rate of 6%, but each bond has 25 warrants attached. The bonds can be issued at par ($1,000 per bond). Assuming annual interest payments, what is the implied value of each warrant? ($6.85)

[7]Given the expected growth rate in the value of the company, there is only a very small probability that value of the company will not increase sufficiently for the warrants to be exercised. Therefore, we assume a 100% probability that the warrants will be exercised.

[8]It is not strictly accurate to say that the expected profit from the warrant position is the expected stock price less the strike price: $29.82 = $51.82 − $22. This is because if the stock price drops below the strike price, in this case $22, then the warrant profit is $0, regardless of how low the stock price goes. Thus the expected payoff will be somewhat more than $29.82. Although this expectation can be calculated using options techniques similar to those in Chapter 9, it is beyond the scope of this chapter. However, if there is a very small probability that the stock price will drop below the exercise price, then $29.82 is very close to the true expected payoff.

[9]For more on warrant pricing, see Michael C. Ehrhardt and Ronald E. Shrieves, "The Impact of Warrants and Convertible Securities on the Systematic Risk of Common Equity," *Financial Review*, November 1995, pp. 843–856; Beni Lauterbach and Paul Schultz, "Pricing Warrants: An Empirical Study of the Black-Scholes Model and Its Alternatives," *Journal of Finance*, September 1990, pp. 1181–1209; David C. Leonard and Michael E. Solt, "On Using the Black-Scholes Model to Value Warrants," *Journal of Financial Research*, Summer 1990, pp. 81–92; and Katherine L. Phelps, William T. Moore, and Rodney L. Roenfeldt, "Equity Valuation Effects of Warrant-Debt Financing," *Journal of Financial Research*, Summer 1991, pp. 93–103.

21.3 Convertible Securities

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 new 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.

Conversion Ratio and Conversion Price

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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 Silicon Valley Software Company's convertible debentures issued at their $1,000 par value in July of 2007. At any time prior to maturity on July 15, 2027, a debenture holder can exchange a bond for 20 shares of common stock. Therefore, the conversion ratio, CR, is 20. The bond cost a purchaser $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:

$$\text{Conversion price} = P_c = \frac{\text{Par value of bond given up}}{\text{Shares received}} \tag{21-2}$$

$$= \frac{\$1{,}000}{CR} = \frac{\$1{,}000}{20} = \$50.$$

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

$$\text{Conversion ratio} = CR = \frac{\$1{,}000}{P_c} \tag{21-3}$$

$$= \frac{\$1{,}000}{\$50} = 20 \text{ shares.}$$

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 some 20% to 30% above the prevailing market price of the common stock on the issue date. 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 2007 convertible debentures for Breedon Industries are convertible into 12.5 shares until 2016; into 11.76 shares from 2017 until 2027; and into 11.11 shares

from 2027 until maturity in 2037. 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 2-for-1 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 $30 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 $30. 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. 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 2007, 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% 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% per year. Therefore, $\hat{r}_s = D_1/P_0 + g = \$2.80/\$35 + 8\% = 8\% + 8\% = 16\%$. If the bonds were not made convertible, they would have to provide a yield of 13%, given their risk 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%, management will probably call the bonds.[10]

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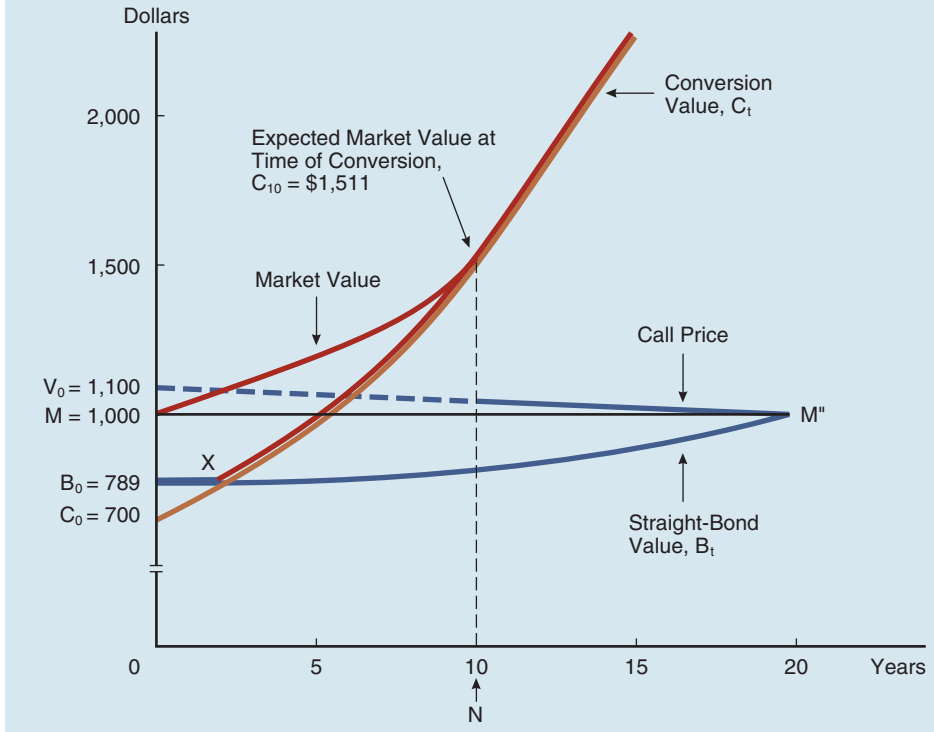
See ***FM12 Ch 21 Tool Kit.xls*** at the textbook's Web site for details.

Figure 21-1 shows the expectations of both an average investor and the company.[11]

[10]For a more detailed discussion of call strategies, see **Web Extension 21A** at the textbook's Web site.

[11]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 21-1 Silicon Valley Software: Convertible Bond Model



Year	Straight-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

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 a 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% coupon rate, and since the yield on a nonconvertible bond of similar risk is 13%, 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:

$$\text{Pure-debt value at time of issue} = B_0 = \sum_{t=1}^{N} \frac{\text{Coupon interest}}{(1 + r_d)^t} + \frac{\text{Maturity value}}{(1 + r_d)^N} \qquad (21\text{-}4)$$

$$= \sum_{t=1}^{20} \frac{\$100}{(1.13)^t} + \frac{\$1{,}000}{(1.13)^{20}} = \$789.$$

   Note, however, that the bond's straight-debt value must be $1,000 at 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 an investor would receive if the bonds were converted at t = 0, is $P_0(CR) = \$35(20 \text{ shares}) = \$700$. Since the stock price is expected to grow at an 8% rate, the conversion value should rise over time. For example, in Year 5 it should be $P_5(CR) = \$35(1.08)^5(20) = \$1{,}029$. The conversion value given the expected stock price over time is given by the line C_t in Figure 21-1.
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 of the bond value and conversion value curves in the graph represents a *floor price* for the bond. In Figure 21-1, the floor price is represented by the thicker shaded line B_0XC_t.
6. 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% bond with conversion possibilities is worth more than a 10% 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 exercise (or conversion) value. 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 converge with 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% growth rate, the

dividends after 10 years would be up to $120.90, but the interest would still be $100. Thus, rising dividends will 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 become callable), the market value of the bond is $1,600, the conversion value is $1,500, and the call price is $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 after the bond becomes callable. Therefore, in Figure 21-1, 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 $\$35(1.08)^{10} \times (20) = \$1{,}511$. 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 = IRR = 12.8%.[12]

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%, with 10% representing interest income and 2.8% 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

[12]As in the case with warrants, the expected conversion value is not precisely equal to the expected stock price multiplied by the conversion ratio. Here is the reason. If after 10 years the stock price happens to be low so that the conversion value is less than the call price, then the bondholders would not choose to convert—instead, they would surrender their bonds if the company called them. In this example, nonconversion occurs if the stock price after 10 years is less than $1,050/20 = $52.50. Since the company makes a call to force conversion, the company won't call the bonds if the stock price is less than $52.50. Therefore, when there is a low stock price, the bondholders will keep the bonds, whose value will depend primarily on interest rates at that time. Finding the expected value in this situation is a very difficult problem (and is beyond the scope of this text)! However, if the expected stock price is much greater than the conversion price when the bonds are called (in this case, $35[1.08]^{10} = \$75.56$ is much bigger than $52.50), the difference between the true expected conversion value and the conversion value that we calculated using the expected stock price will be very small. Therefore, we can estimate the component cost very accurately using the approach in the example.

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%, which is less than the 13% cost of straight debt. Therefore, the terms on the bond would have to be made more attractive to investors. Silicon Valley Software would have to increase the coupon interest rate on the convertible above 10%, 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 changes such that the resulting expected rate of return on the convertible is between 13% and 16%.[13]

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 giving bondholders 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 start-up 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% above the present market price of the stock, then 20% to 30% 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 thus 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

[13]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.

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 have been better off if it had used straight debt in spite of its 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 Agency Costs

A potential agency conflict between bondholders and stockholders is asset substitution, also known as "bait and switch." Suppose a company has been investing in low-risk projects, and because risk is low, bondholders charge a low interest rate. What happens if the company is considering a very risky but highly profitable venture, but potential lenders don't know about it? The company might decide to raise low-interest-rate debt without spelling out that the funds will be invested in the risky project. After the funds have been raised and the investment is made, the value of the debt should fall because its interest rate will be too low to compensate debtholders for the high risk they bear. This is a "heads I win, tails you lose" situation, and it results in a wealth transfer from bondholders to stockholders.

Let's use some numbers to illustrate this scenario. The value of a company, based on the present value of its future free cash flows, is $800 million. It has $300 million of debt, based on market value. Therefore, its equity is worth $800 − $300 = $500 million. The company now undertakes some very risky projects, with high but risky expected returns, and its expected NPV remains unchanged. In other words, the actual NPV will probably end up much higher or much lower than under the old situation, but the firm still has the same expected value. Even though its total value is still $800 million, the value of the debt falls because its risk has increased. Note that the debtholders don't benefit if the venture's value is higher than expected, because the most they can receive is the contracted coupon and the principal repayment. However, they will suffer if the value of the projects turns out to be lower than expected, since they might not receive the full value of their contracted payments. In other words, risk doesn't give them any upside potential, but it does expose them to downside losses, so the bondholders' expected value must decline.

With a constant total firm value, if the value of the debt falls from $300 to $200 million, then the value of equity must increase from $500 to $800 − $200 = $600 million. Thus, the bait-and-switch tactic causes a wealth transfer of $100 million from debtholders to stockholders.

If debtholders think that a company might employ the bait-and-switch tactic, they will charge a higher interest rate, and this higher interest rate is an agency cost. Debtholders will charge this higher rate even if the company has no intention of engaging in bait-and-switch behavior, since they don't know the company's true intentions. Therefore, they assume the worst and charge a higher interest rate.

Convertible securities are one way to mitigate this type of agency cost. Suppose the debt is convertible and the company does take on the high-risk project. If the value of the company turns out to be higher than expected, then bondholders can convert their debt to equity and benefit from the successful investment.

Therefore, bondholders are willing to charge a lower interest rate on convertibles, which serves to minimize the agency costs.

Note that if a company does not engage in bait-and-switch behavior by swapping low-risk projects for high-risk projects, the chance of hitting a home run is reduced. Because there is less chance of a home run, the convertible bond is less likely to be converted. In this situation the convertible bonds are actually similar to nonconvertible debt, except that they carry a lower interest rate.

Now consider a different agency cost, one due to asymmetric information between the managers and potential new stockholders. Suppose its managers know that a company's future prospects are not as good as the market believes, which means that the current stock price is too high. Acting in the interests of existing stockholders, managers can issue stock at the current high price. When the poor future prospects are eventually revealed, the stock price will fall, causing a transfer of wealth from the new shareholders to old shareholders.

To illustrate this, suppose the market estimates an $800 million present value of future free cash flows. For simplicity, assume that the firm has no nonoperating assets and no debt, so the total value of both the firm and the equity is $800 million. However, its managers know that the market has overestimated the future free cash flows, and the true value is only $700 million. When investors eventually discover this, the value of the company will drop to $700 million. But before this happens, suppose the company raises $200 million of new equity. The company uses this new cash to invest in projects with a present value of $200 million, which shouldn't be too hard, since these are projects with a zero NPV. Right after the new stock is sold, the company will have a market value of $800 + $200 = $1,000 million, based on the market's overly optimistic estimate of the company's future prospects. Note that the new shareholders own 20% of the company ($200/$1,000 = 0.20), and the original shareholders own 80%.

As time passes, the market will realize that the previously estimated value of $800 million for the company's original set of projects was too high, and that these projects are worth only $700 million. The new projects are still worth $200 million, so the total value of the company will fall to $700 + $200 = $900 million. The original shareholders' value is now 80% of $900 million, which is $720 million. Note that this is $20 million higher than it would have been if the company had issued no new stock. The new shareholders' value is now 0.20($900) = $180 million, which is $20 million less than their original investment. The net effect is a $20 million wealth transfer from the new shareholders to the original shareholders.

Because potential shareholders know this might occur, they interpret an issue of new stock as a signal of poor future prospects, which causes the stock price to fall. Note also that this will occur even for companies whose future prospects are actually quite good, because the market has no way of distinguishing between companies with good versus poor prospects.

A company with good future prospects might want to issue equity, but it knows the market will interpret this as a negative signal. One way to obtain equity and yet avoid this signaling effect is to issue convertible bonds. Because the company knows its true future prospects are better than the market anticipates, it knows that the bonds will likely end up being converted to equity. Thus, a company in this situation is issuing equity through the back door when it issues convertible debt.

In summary, convertibles are logical securities to use in at least two situations. First, if a company would like to finance with straight debt, but lenders are afraid the funds will be invested in a manner that increases the firm's risk profile, then convertibles are a good choice. Second, if a company wants to issue stock but

thinks such a move would cause investors to interpret a stock offering as a signal of tough times ahead, then again convertibles would be a good choice.[14]

SELF-TEST

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 agency costs?

A convertible bond has a par value of $1,000 and a conversion price of $25. The stock currently trades for $22 a share. What are the bond's conversion ratio and conversion value at t = 0? (40; $880)

21.4 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.[15] 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 convertibles 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 must wait until maturity for the warrants to generate new equity capital. Generally, maturities also differ between warrants and convertibles. Warrants typically have much 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 stock 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 in assessing the risk of small companies. If a start-up with a new, untested product seeks debt financing, it is very difficult for potential lenders to judge the riskiness of the venture; hence it is difficult to set a fair interest rate. Under these circumstances, many potential investors will be reluctant to invest,

[14]See Craig M. Lewis, Richard J. Rogalski, and James K. Seward, "Understanding the Design of Convertible Debt," *Journal of Applied Corporate Finance*, Vol. 11, no. 1 (Spring 1998), pp. 45–53. For more insights into convertible pricing and use, see Paul Asquith and David W. Mullins, Jr., "Convertible Debt: Corporate Call Policy and Voluntary Conversion," *Journal of Finance*, September 1991, pp. 1273–1289; Randall S. Billingsley and David M. Smith, "Why Do Firms Issue Convertible Debt?" *Financial Management*, Summer 1996, pp. 93–99; Douglas R. Emery, Mai E. Iskandor-Datta, and Jong-Chul Rhim, "Capital Structure Management as a Motivation for Calling Convertible Debt," *Journal of Financial Research*, Spring 1994, pp. 91–104; T. Harikumar, P. Kadapakkam, and Ronald F. Singer, "Convertible Debt and Investment Incentives," *Journal of Financial Research*, Spring 1994, pp. 15–29; Vahan Janjigian, "The Leverage Changing Consequences of Convertible Debt Financing," *Financial Management*, Autumn 1987, pp. 15–21; and V. Sivarama Krishnan and Ramesh P. Rao, "Financial Distress Costs and Delayed Calls of Convertible Bonds," *Financial Review*, November 1996, pp. 913–925.

[15]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.

making it necessary to set a very high interest rate 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 percentage points more than the flotation costs for convertibles. In general, bond-with-warrant financings have underwriting fees that approximate the weighted average of the fees associated with debt and equity issues, while underwriting costs for convertibles are more like those associated with straight debt.

SELF-TEST

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.

21.5 Reporting Earnings When Warrants or Convertibles Are Outstanding

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

1. *Basic EPS*, calculated as earnings available to common stockholders divided by the average number of shares actually outstanding during the period.
2. *Primary EPS*, calculated as earnings available 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 strike (or exercise) price with the actual market value of the 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.[16]

[16]As part of the FASB's short-term convergence project with the IASB to improve financial reporting in the United States while concurrently eliminating individual differences between U.S. GAAP and international financial reporting standards, the FASB is expected to issue a final statement making additional changes to FASB #128 (issued in February 1997), which is the basis for the discussion in this section.

SELF-TEST

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?

Summary

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, 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. The key concepts covered are listed below:

- **Preferred** stock is a hybrid—it is similar to bonds in some respects and to common stock in other ways.
- **Adjustable rate preferred stocks (ARPs)** are those whose dividends are tied to the rate on Treasury securities. **Market auction (money market) preferred** is a low-risk, largely tax-exempt, 7-week-maturity security that can be sold between auction dates at close to par.
- A **warrant** is a long-term call option issued along with a bond. Warrants are generally detachable from the bond, and they trade separately in the market. When warrants are exercised, the firm receives additional equity capital, and the original bonds remain outstanding.
- A **convertible** security is a bond or preferred stock that can be exchanged for common stock at the option of the holder. When a security is converted, debt or preferred stock is replaced with common stock, and no money changes hands.
- Warrant and convertible issues are generally structured so that the **strike (exercise) price** or **conversion price** is 20% to 30% above the stock's price at time of issue.
- Although both warrants and convertibles are option securities, there are several differences between the two, including **separability, impact when exercised, callability, maturity,** and **flotation costs.**
- Warrants and convertibles are **sweeteners** used to make the underlying debt or preferred stock issue more attractive to investors. Although the coupon rate or dividend yield is lower when options are part of the issue, the overall cost of the issue is higher than the cost of straight debt or preferred, because option-related securities are riskier.

Questions

(21-1) Define each of the following terms.
a. Preferred stock
b. Cumulative dividends; arrearages

c. Warrant; detachable warrant
d. Stepped-up price
e. Convertible security
f. Conversion ratio; conversion price; conversion value
g. Sweetener

(21-2) Is preferred stock more like bonds or common stock? Explain.

(21-3) What effect does the trend in stock prices (subsequent to issue) have on a firm's ability to raise funds through (a) convertibles and (b) warrants?

(21-4) If a firm expects to have additional financial requirements in the future, would you recommend that it use convertibles or bonds with warrants? What factors would influence your decision?

(21-5) How does a firm's dividend policy affect each of the following?
a. The value of its long-term warrants
b. The likelihood that its convertible bonds will be converted
c. The likelihood that its warrants will be exercised

(21-6) 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."

(21-7) Why do corporations often sell convertibles on a rights basis?

(21-8) Suppose a company simultaneously issues $50 million of convertible bonds with a coupon rate of 10% and $50 million of straight bonds with a coupon rate of 14%. 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 straight bond? Is the cost of capital lower on the convertible than on the straight bond? Explain.

Self-Test Problem Solution Appears in Appendix A

(ST-1) Warrants

Connor Company recently issued two types of bonds. The first issue consisted of 10-year straight debt with a 6% annual coupon. The second issue consisted of 10-year bonds with a 4.5% annual coupon and attached warrants. Both issues sold at their $1,000 par values. What is the implied value of the warrants attached to each bond?

Problems Answers Appear in Appendix B

Easy Problems 1–2

(21-1) Warrants

Gregg Company recently issued two types of bonds. The first issue consisted of 20-year straight debt with an 8% annual coupon. The second issue consisted of 20-year bonds with a 6% annual coupon and attached warrants. Both issues sold

at their $1,000 par values. What is the implied value of the warrants attached to each bond?

(21-2) Convertibles

Peterson Securities recently issued convertible bonds with a $1,000 par value. The bonds have a conversion price of $40 a share. What is the convertible issue's conversion ratio?

Intermediate Problems 3–4

(21-3) Warrants

Maese Industries Inc. has warrants outstanding that permit the holders to purchase 1 share of stock per warrant at a price of $25.

a. Calculate the exercise value of the firm's warrants if the common sells at each of the following prices: (1) $20, (2) $25, (3) $30, (4) $100. (Hint: A warrant's exercise value is the difference between the stock price and the purchase price specified by the warrant if the warrant were to be exercised.)
b. At what approximate price do you think the warrants would actually sell under each condition indicated above? What time value (price minus exercise value) is implied in your price? Your answer is a guess, but your prices and time values should bear reasonable relationships to one another.
c. How would each of the following factors affect your estimates of the warrants' prices and time values in part b?
   (1) The life of the warrant
   (2) Expected variability (σ_p) in the stock's price
   (3) The expected growth rate in the stock's EPS
   (4) The company announces a change in dividend policy: whereas it formerly paid no dividends, henceforth it will pay out all earnings as dividends.
d. Assume the firm's stock now sells for $20 per share. The company wants to sell some 20-year, annual interest, $1,000 par value bonds. Each bond will have attached 50 warrants, each exercisable into 1 share of stock at an exercise price of $25. The firm's straight bonds yield 12%. Regardless of your answer to part b, assume that each warrant will have a market value of $3 when the stock sells at $20. What coupon interest rate, and dollar coupon, must the company set on the bonds with warrants if they are to clear the market?

(21-4) Convertible Premiums

The Tsetsekos Company was planning to finance an expansion. The principal executives of the company all agreed that an industrial company such as theirs should finance growth by means of common stock rather than by debt. However, they felt that the price of the company's common stock did not reflect its true worth, so they decided to sell a convertible security. They considered a convertible debenture but feared the burden of fixed interest charges if the common stock did not rise in price to make conversion attractive. They decided on an issue of convertible preferred stock, which would pay a dividend of $2.10 per share.

The common stock was selling for $42 a share at the time. Management projected earnings for 2006 at $3 a share and expected a future growth rate of 10%. It was agreed by the investment bankers and the management that the common stock would sell at 14 times earnings, the current price/earnings ratio.

a. The conversion ratio 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 (and also the issue price) will be equal to the conversion price, which, in turn, will be determined as a premium (i.e., the percentage by which the conversion

price exceeds the stock price) over the current market price of the common stock. What will the conversion price be if it is set at a 10% premium? What will the conversion price be if it is set at a 30% premium?

b. Should the preferred stock include a call provision? Why?

Challenging Problems 5–7

(21-5) Convertible Bond Analysis

Fifteen years ago, Roop Industries sold $400 million of convertible bonds. The bonds had a 40-year maturity, a 5.75% coupon rate, and paid interest annually. They were sold at their $1,000 par value. The conversion price was set at $62.75; the common stock price was $55 per share. The bonds were subordinated debentures, and they were given an A rating; straight nonconvertible debentures of the same quality yielded about 8.75% at the time Roop's bonds were issued.

a. Calculate the premium on the bonds, that is, the percentage excess of the conversion price over the stock price at the time of issue.
b. What is Roop's annual before-tax interest savings on the convertible issue versus a straight-debt issue?
c. At the time the bonds were issued, what was the value per bond of the conversion feature?
d. Suppose the price of Roop's common stock fell from $55 on the day the bonds were issued to $32.75 now, 15 years after the issue date (also assume that the stock price never exceeded $62.75). Assume interest rates remained constant. What is the current price of the straight bond portion of the convertible bond? What is the current value if a bondholder converts a bond? Do you think it is likely that the bonds will be converted?
e. The bonds originally sold for $1,000. If interest rates on A-rated bonds had remained constant at 8.75% and the stock price had fallen to $32.75, what do you think would have happened to the price of the convertible bonds? (Assume no change in the standard deviation of stock returns.)
f. Now suppose the price of Roop's common stock had fallen from $55 on the day the bonds were issued to $32.75 at present, 15 years after the issue. Suppose also that the rate of interest had fallen from 8.75% to 5.75%. Under these conditions, what is the current price of the straight bond portion of the convertible bond? What is the current value if a bondholder converts a bond? What do you think would have happened to the price of the bonds?

(21-6) Warrant/Convertible Decisions

The Howland Carpet 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 $250,000, carrying an 8% interest rate. Howland has been 30 to 60 days late in paying trade creditors.

Discussions with an investment banker have resulted in the decision to raise $500,000 at this time. Investment bankers have assured the firm that the following alternatives are feasible (flotation costs will be ignored):

- *Alternative 1:* Sell common stock at $8.
- *Alternative 2:* Sell convertible bonds at an 8% coupon, convertible into 100 shares of common stock for each $1,000 bond (that is, the conversion price is $10 per share).
- *Alternative 3:* Sell debentures at an 8% coupon, each $1,000 bond carrying 100 warrants to buy common stock at $10.

John L. Howland, the president, owns 80% of the common stock and wishes to maintain control of the company. One hundred thousand shares are outstanding. The following are extracts of Howland's latest financial statements:

Balance Sheet

		Current liabilities	$400,000
		Common stock, par $1	100,000
		Retained earnings	50,000
Total assets	$550,000	Total claims	$550,000

Income Statement

Sales	$1,100,000
All costs except interest	990,000
EBIT	$ 110,000
Interest	20,000
EBT	$ 90,000
Taxes (40%)	36,000
Net income	$ 54,000
Shares outstanding	100,000
Earnings per share	$ 0.54
Price/earnings ratio	15.83×
Market price of stock	$ 8.55

a. Show the new balance sheet under each alternative. For Alternatives 2 and 3, show the balance sheet after conversion of the bonds or exercise of the warrants. Assume that half of the funds raised will be used to pay off the bank loan and half to increase total assets.
b. Show Mr. Howland's control position under each alternative, assuming that he does not purchase additional shares.
c. What is the effect on earnings per share of each alternative, if it is assumed that profits before interest and taxes will be 20% of total assets?
d. What will be the debt ratio (TL/TA) under each alternative?
e. Which of the three alternatives would you recommend to Howland, and why?

(21-7) Convertible Bond Analysis

Niendorf Incorporated needs to raise $25 million to construct production facilities for a new type of USB memory device. The firm's straight nonconvertible debentures currently yield 9%. Its stock sells for $23 per share and has an expected constant growth rate of 6%. Investment bankers have tentatively proposed that the firm raise the $25 million by issuing convertible debentures. These convertibles would have a $1,000 par value, carry a coupon rate of 8%, have a 20-year maturity, and be convertible into 35 shares of stock. Coupon payments would be made annually. 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. For simplicity, assume that the bonds may be called or converted only at the end of a year, immediately after the coupon and dividend payments. Assume that management would call eligible bonds if the conversion value exceeded 20% of par value (not 20% of call price).

a. At what year do you expect the bonds will be forced into conversion with a call? What is the bond's value in conversion when it is converted at this time? What is the cash flow to the bondholder when it is converted at this time? (Hint: The cash flow includes the conversion value and the coupon payment, because the conversion is immediately after the coupon is paid.)
b. What is the expected rate of return (i.e., before-tax component cost) on the proposed convertible issue?

Spreadsheet Problem

(21-8) Build a Model: Convertible Bond Analysis

FM e-resource

Start with the partial model in the file ***FM12 Ch 21 P08 Build a Model.xls*** from the textbook's Web site. Using the data from Problem 21-7, answer the following questions.

a. For each year, calculate (1) the anticipated stock price; (2) the anticipated conversion value; (3) the anticipated straight-bond price; and (4) the cash flow to the investor assuming conversion occurs. At what year do you expect the bonds will be forced into conversion with a call? What is the bond's value in conversion when it is converted at this time? What is the cash flow to the bondholder when it is converted at this time? (Hint: The cash flow includes the conversion value and the coupon payment, because the conversion is immediately after the coupon is paid.)
b. What is the expected rate of return (i.e., before-tax component cost) on the proposed convertible issue?
c. Assume that the convertible bondholders require a 12% rate of return. If the coupon rate is set at 8%, then what conversion ratio will give a bond price of $1,000? Given a conversion ratio of 35%, what coupon rate will give a bond price of $1,000?

Cyberproblem

FM e-resource

Please go to the textbook's Web site to access any Cyberproblems.

Mini Case

Paul Duncan, financial manager of EduSoft Inc., is facing a dilemma. The firm was founded 5 years ago to provide educational software for the rapidly expanding primary and secondary school markets. Although EduSoft has done well, the firm's founder believes that an industry shakeout is imminent. To survive, EduSoft must grab market share now, and this will require a large infusion of new capital.

Because he expects earnings to continue rising sharply and looks for the stock price to follow suit, Mr. Duncan does not think it would be wise to issue new common stock at this time. On the other hand, interest rates are currently high by

historical standards, and with the firm's B rating, the interest payments on a new debt issue would be prohibitive. Thus, he has narrowed his choice of financing alternatives to two securities: (1) bonds with warrants or (2) convertible bonds. As Duncan's assistant, you have been asked to help in the decision process by answering the following questions:

a. How does preferred stock differ from both common equity and debt? Is preferred stock more risky than common stock? What is floating rate preferred stock?

b. How can a knowledge of call options help a financial manager to better understand warrants and convertibles?

c. One of the firm's alternatives is to issue a bond with warrants attached. EduSoft's current stock price is $20, and its investment banker estimates that the cost of a 20-year, annual coupon bond without warrants would be 10%. The bankers suggest attaching 45 warrants, each with an exercise price of $25, to each $1,000 bond. It is estimated that each warrant, when detached and traded separately, would have a value of $3.
   (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 were issued and the warrants immediately traded on the open market for $5 each. What would this imply about the terms of the issue? Did the company "win" or "lose"?
   (3) When would you expect the warrants to be exercised? Assume they have a 10-year life; that is, they expire 10 years after issue.
   (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 issue, shouldn't all debt be issued with warrants? What is the expected return to the holders of the bond with warrants (or the expected cost to the company) if the warrants are expected to be exercised in 10 years? EduSoft's stock price is currently $20 per share and is expected to grow at 8% per year. 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?

d. As an alternative to the bond with warrants, Mr. Duncan is considering convertible bonds. The firm's investment bankers estimate that EduSoft could sell a 20-year, 8.5% annual coupon, callable convertible bond for its $1,000 par value, whereas a straight-debt issue would require a 10% coupon. The convertibles would be call protected for 5 years, the call price would be $1,100, and the company would probably call the bonds as soon as possible after their conversion value exceeds $1,200. Note, though, that the call must occur on an issue date anniversary. EduSoft's current stock price is $20, its last dividend was $1.00, and the dividend is expected to grow at a constant 8% rate. The convertible could be converted into 40 shares of EduSoft stock at the owner's option.
   (1) What conversion price is built into the bond?
   (2) What is the convertible's straight-debt value? What is the implied value of the convertibility feature?
   (3) What is the formula for the bond's expected conversion value in any year? What is its conversion value at Year 0? At Year 10?
   (4) What is meant by the "floor value" of a convertible? What is the convertible's expected floor value at Year 0? At Year 10?
   (5) Assume that EduSoft intends to force conversion by calling the bond as soon as possible after its conversion value exceeds 20% above its par value, or 1.2($1,000) = $1,200. When is the issue expected to be called?

(Hint: Recall that the call must be made on an anniversary date of the issue.)

(6) What is the expected cost of capital for the convertible to EduSoft? Does this cost appear to be consistent with the riskiness of the issue?

e. EduSoft's market value capital structure is as follows (in millions of dollars):

Debt	$ 50
Equity	50
	$100

If the company raises $20 million in additional capital by selling (1) convertibles or (2) bonds with warrants, what would its WACC be, and how would those figures compare with its current WACC? EduSoft's tax rate is 40%.

f. Mr. Duncan believes that the costs of both the bond with warrants and the convertible bond are close enough to one another to call them even, and also consistent with the risks involved. Thus, he will make his decision based on other factors. What are some of the factors that he should consider?

g. How do convertible bonds help reduce agency costs?

Selected Additional Cases

The following cases from Textchoice, *Thomson Learning's online library, cover many of the concepts discussed in this chapter and are available at* ***http://www.textchoice2.com.***

Klein-Brigham Series:
Case 27, "Virginia May Chocolate Company," which illustrates convertible bond valuation, and Case 98, "Levinger Organic Snack," which illustrates the use of convertibles warrants.