

Solution to Question Book for Lecture Note 10

Derivatives and Risk Management

- 16.1 Warrant Value.** A warrant for Ace Corporation stock enables the holder to purchase one share of common stock at \$30 a share. The stock has a market price of \$47 a share. What is the value of the warrant?

SOLUTION

$$\begin{aligned}\text{Warrant value} &= (\text{market price per share} - \text{exercise price}) \times \text{number of shares that may be purchased} \\ &= (\$47 - \$30) \times 1 = \$17\end{aligned}$$

- 16.2 Warrant Value.** Assume the same facts as in Problem 16.1, except that the holder can purchase four shares of common stock for each warrant. What is the value of the warrant?

SOLUTION

$$(\$47 - \$30) \times 4 = \$68$$

- 16.3 Warrant Value.** Assume the same facts as Problem 16.1, except that the stock has a market price of \$28 a share. What is the value of the warrant?

SOLUTION

$$(\$28 - \$30) \times 1 = -\$2$$

Since there can never be a negative value for a warrant, zero is the amount assigned to the warrant.

- 16.4 Premium.** The market price of Harris Corporation stock is \$45. Its exercise price is similarly \$45. Will the stock warrant sell at a premium?

SOLUTION

Yes. The warrant will sell at a premium, since there exists the possibility that the market price of the common stock will exceed \$45 prior to the expiration date of the warrant.

- 16.5 Bond to Common Shares.** The conversion price of common stock is \$20 a share. Into how many shares will a \$1,000 convertible bond be converted?

SOLUTION

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

- 16.6 Conversion Price.** A \$1,000 bond is convertible into 60 shares of stock. What is the conversion price?

SOLUTION

$$\frac{\$1,000}{60 \text{ shares}} = \$16.67$$

- 16.7 Conversion Ratio.** A \$1,000 convertible bond permits the holder to convert the bond into five shares of common stock (a) What is the conversion ratio? (b) What is the conversion price?

SOLUTION

(a) Five shares for each bond

(b)
$$\frac{\$1,000}{5 \text{ shares}} = \$200 \text{ per share}$$

16.8 Conversion Ratio. T Corporation issued a \$1,000 bond at par. The conversion price is \$20. What is the conversion ratio?

SOLUTION

$$\text{Conversion ratio} = \frac{\text{par value of convertible security}}{\text{conversion price}} = \frac{\$1,000}{\$20} = 50$$

16.9 Convertibility. Tristar Corporation issued a \$1,000 bond at par. The common stock has a market price of \$45. The conversion price is \$58. (a) Into how many shares can the bond be converted? (b) What is the conversion value of the bond? (c) What is the conversion premium?

SOLUTION

(a)
$$\frac{\$1,000}{\$58} = 17.24 \text{ shares}$$

(b)
$$\text{Conversion value} = (\text{common stock price}) \times (\text{conversion ratio}) = \$45 \times 17.25 = \$776$$

(c)
$$\$1,000 - \$776 = \$224$$

16.10 Percentage Conversion Premium. A \$1,000 bond is issued at par. The market price of the common stock at the issue date was \$20. The conversion price is \$25. (a) What is the conversion ratio? (b) What is the conversion value? (c) What is the percentage conversion premium?

SOLUTION

(a)
$$\frac{\$1,000}{\$25} = 40$$

(b)
$$\$20 \times 40 = \$800$$

(c)
$$\begin{aligned} \text{Percentage conversion premium} &= \frac{\text{market value} - \text{conversion value}}{\text{conversion value}} = \frac{\$1,000 - \$800}{\$800} \\ &= \frac{\$200}{\$800} = 25\% \end{aligned}$$

16.11 Conversion Ratio. What effect will a 2-for-1 stock split have on a conversion ratio?

SOLUTION

The conversion ratio will double.

16.12 Conversion Value. A \$1,000 bond is convertible into 25 shares of common stock having a market value of \$47 per share. What is the conversion value?

SOLUTION

$$\$47 \times 25 \text{ shares} = \$1,175$$

- 16.13 Conversion Ratio.** When a \$50,000 convertible bond is issued, the market price of the stock is \$25 a share. Each \$1,000 bond is convertible into 40 shares of stock. (a) What is the conversion ratio? (b) What is the conversion value? (c) Assuming the stock price is anticipated to grow at 8 percent annually, what is the conversion value at the end of the first year?

SOLUTION

$$(a) \quad \frac{\$50,000}{\$1,000} = 50 \text{ bonds} \times 40 \text{ shares} = 2,000 \text{ shares}$$

$$(b) \quad \$25 \times 2,000 \text{ shares} = \$50,000$$

$$(c) \quad \begin{array}{r} \text{Shares} \qquad \qquad \qquad 2000 \\ \text{Stock price } (\$25 \times 1.08) \qquad \times \$27 \\ \hline \underline{\underline{\$54,000}} \end{array}$$

- 16.14 Simple Interest Yield.** A \$30,000, 15 percent, 10-year bond is bought at 102. What is the simple interest yield?

SOLUTION

$$\frac{\text{Coupon interest}}{\text{Market price of bond}} = \frac{0.15 \times \$30,000}{\$30,600} = \frac{\$4,500}{\$30,600} = 14.7\%$$

- 16.15 Market Price of Stock.** For a \$1,000 convertible bond, the conversion price is \$50. The call price is \$1,200. (a) If the conversion value of the bond equals the call price, what should the market price of the stock be? (b) What is the approximate market price of common stock if the conversion value of the bond is 20 percent higher than the call price?

SOLUTION

$$(a) \quad \frac{\$1,200}{20} = \$60$$

$$(b) \quad \$60 \times 1.20 = \$72$$

- 16.16 Call Price.** Drake Corporation's convertible bond has a conversion price of \$90. The conversion ratio is 15. The market price of the stock is \$130. The call price is \$1,800. Would the bondholder rather convert to common stock or receive the call price?

SOLUTION

Market value of common stock received upon conversion is:

$$\$130 \times 15 = \$1,950$$

$$\text{Call price} = \$1,800$$

The bondholder would rather convert, since he or she receives a benefit of \$150.

- 16.17 Attractiveness of Convertible Debenture.** Great Northern Oil Shale Company is a company actively engaged in the oil services industry. The company provides replacement parts for drilling rigs and has just begun to test a device that measures shale oil content in certain rock formations. The company has an 8 percent convertible subordinated debenture outstanding due in the year 2001. The convertible is callable at 106 and has a conversion price of \$50. The common stock

is currently paying a dividend of \$1.40 on earnings per share of \$3. Consensus among analysts is that long-term interest rates will be stable to lower over the next year. The common stock is currently selling for \$30 and the convertible bond at 66. Nonconvertible bonds of companies in this industry having similar quality ratings (triple-B) are yielding 14 percent to maturity.

(a) Discuss four characteristics of the convertible debenture, and (b) explain whether you consider the convertible debenture or the common stock more attractive for purchase. (CFA, adapted.)

SOLUTION

- (a) Characteristics of this convertible industrial debenture include the following:
- (1) The quality of the bond is not high but average for most convertible bonds.
 - (2) The outlook for interest rates is stable to lower. This is a plus, as bond prices should be stable to rising.
 - (3) Minimum value as straight debt is around 60, or about 9 percent under current market of 66. This is well within reasonable limits of, say, 15 percent or below.
 - (4) The current price of the common is 10 percent below the bonds' conversion value. Conversion value is $[(1,000/50) \times \$30]$. This is within reasonable limits of, say, maximum of 20 percent or so.
 - (5) The current yield on the bond of 12.0 percent seems favorable at more than twice 4.7 percent on the common.
 - (6) The call risk is remote (call price of 106 versus market price of 66).
- (b) The convertible looks more attractive because of the modest premiums involved – upside leverage and downside cushion, compared to the common. The convertible also looks more attractive because of the higher income relative to the common, assuming that the common stock price has the potential to rise by a sizable amount from the current price of 33 to the 40-plus level.

16.18 Options. You can buy XZ Company stock at \$30 a share, or \$3,000 for 100 shares. You can acquire a \$33 3-month call for \$400. Thus, you could invest \$2,600 cash and have the opportunity to buy 100 shares at \$33 per share. Assume, however, that you decide to invest your \$2,600 in a 3-month CD earning 14 percent interest. The CD will return \$91 ($14\% \times \$2,600 \times 3/12$).

- (a) If the YZ Company stock goes to \$16, what is the option worth.
- (b) If the stock goes to \$43, would there be a gain or loss?

SOLUTION

- (a) The option will be worthless but the significant loss on the stock of \$14 a share did not occur. Instead, the loss is limited to \$309 ($\$400 - \91). However, note that by not buying a stock you may have forgone a dividend.
- (b) If the stock went up to \$43, the call would be exercised at \$33 resulting in a significant gain with little investment.