

BOND AND STOCK VALUATION

CHAPTER 7

WHY CORPORATIONS CARE ABOUT PRICING MODELS

The goal is to maximize stockholder wealth, i.e. stock price

- management needs to know what determines stock value, then management can make decisions to maximize stock value

Management also uses marketable debt to help finance its assets



BOND PRICING - TERMINOLOGY

Par value (face value)

Coupon rate

Coupon payment

Maturity date

Current Yield

Yield to Maturity (YTM)

Call Provisions



BOND VALUATION MODEL

V_B = present value of coupon + present value of par

V_B = present value of annuity + present value of lump sum

$$V_B = \sum_{i=1}^n \frac{cpn}{(1+k)^i} + \frac{par}{(1+k)^n}$$

where: V_B = bond price

cpn = coupon payment per period

n = number of coupon payments

k = period yield or yield to maturity

par = par value or face value of bond

EXAMPLE: ANNUAL COUPONS

Suppose you are looking at a bond that has a 10% annual coupon rate and a face value of \$1000. There are 20 years to maturity. Bonds of similar risk and maturity are yielding 8%.

What should you pay for the bond?

- What is the coupon payment per period?
- How many coupon payments are there?
- What is the yield per period?
- Compute the bond price = 1196.36

EXAMPLE: SEMIANNUAL COUPONS

What is the price of a 30-year bond that has a 1000 par value and a 9% coupon rate with coupons paid semiannually, if the market rate is 10%

- What is the coupon payment per period?
- How many coupon payments are there?
- What is the yield per period?
- Compute the bond price = 905.35

RELATIONSHIP BETWEEN COUPON AND YIELD

If $YTM > \text{coupon rate}$, then bond price $<$ par value

- Selling at a discount

If $YTM < \text{coupon rate}$, then bond price $>$ par value

- Selling at a premium

IF $YTM = \text{coupon rate}$, then bond price $=$ par value



ILLUSTRATIVE EXAMPLE

Consider a bond with a \$1000 face value, 20 years to maturity and an annual coupon rate of 10%. What is the bond price in each of the following cases?

- YTM = 11%; price = 920.37
- YTM = 10%; price = 1000.00
- YTM = 9%; price = 1091.29

COMPUTING YTM

Management and investors are both interested in the yield-to-maturity on a bond

- it is the return to the investor in the market and an indication of the cost of debt to the firm

Solve for YTM given N , PMT , PV and FV where

- PMT = periodic coupon payment
- PV = current market price of bond
- FV = Face or Par Value of Bond
- N = Number of periods until the bond's maturity

Requires trial and error if you don't have a financial calculator



EXAMPLE: YTM WITH ANNUAL COUPON

If a bond is selling for 938.55, it has a \$1000 par value and it pays a \$90 annual coupon. If there are 10 years until its maturity, what is its YTM?

- Without calculations, will the YTM will more or less than 9%?
- Signs matter since we are solving for I/Y
- 10 n; -938.55 PV; 1000 FV; 90 PMT
- compute I/Y = 10%

Current Yield and its relationship to YTM

EXAMPLE: YTM WITH SEMIANNUAL COUPONS

If a bond with a 10% coupon rate, with coupons paid semi-annually, has a face value of \$1000, 20 years to maturity and is selling for 1197.93. What is the YTM?

- Without doing calculations, is the YTM more or less than the annual coupon rate?
- $n = 40$; $PMT = 50$; $FV = 1000$; $PV = -1197.93$
- compute $I/Y = 8\%$

Holding Period Yield



BOND RISK

Interest Rate Risk

- change in price due to changes in interest rates
- long-term bonds have more interest rate risk than short-term bonds
- See Slide #9

Reinvestment Rate Risk

- uncertainty concerning rates cash flows can be reinvested at
- short-term bonds have more reinvestment rate risk than long-term bonds

