FN 201: Lecture Note 6
Bond and Common Stock Valuation

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Outline

Bond Valuation

- How bond prices
- Maturity and prices
- Term structure of interest rate and Yield To Maturity

Common Stock Valuation

- Expected rate of return on common stocks
- Valuing common stocks

Special Issues

- Preferred stocks

Bond Valuation

Bond

= A long-term debt instrument in which a borrower agrees to make payments of principal and interest, on specific dates, to the holders of the bond.

Key features of Bond

- Par value – face amount of the bond, which is paid at maturity.
- Coupon interest rate – stated interest rate (generally fixed) paid by the issuer.
- Maturity date – years until the bond must be repaid.
- Issue date – when the bond was issued.
- Yield to maturity - rate of return earned on a bond held until maturity.

Bond Price

$$PV = \frac{C_1}{(1+r)^1} + \frac{C_2}{(1+r)^2} + \ldots + \frac{Par + C_N}{(1+r)^N}$$

Example: If today is October 1, 2007, what is the value of the following bond? An IBM Bond pays $115 every September 30 for 5 years. In September 2012 it pays an additional $1000 and retires the bond. The bond is rated AAA (YTM is 7.5%)

$$PV = \frac{115}{1.075} + \frac{115}{(1.075)^2} + \frac{115}{(1.075)^3} + \frac{115}{(1.075)^4} + \frac{1{,}115}{(1.075)^5}$$

$$= \$1{,}161.84$$

Bond Price – Example

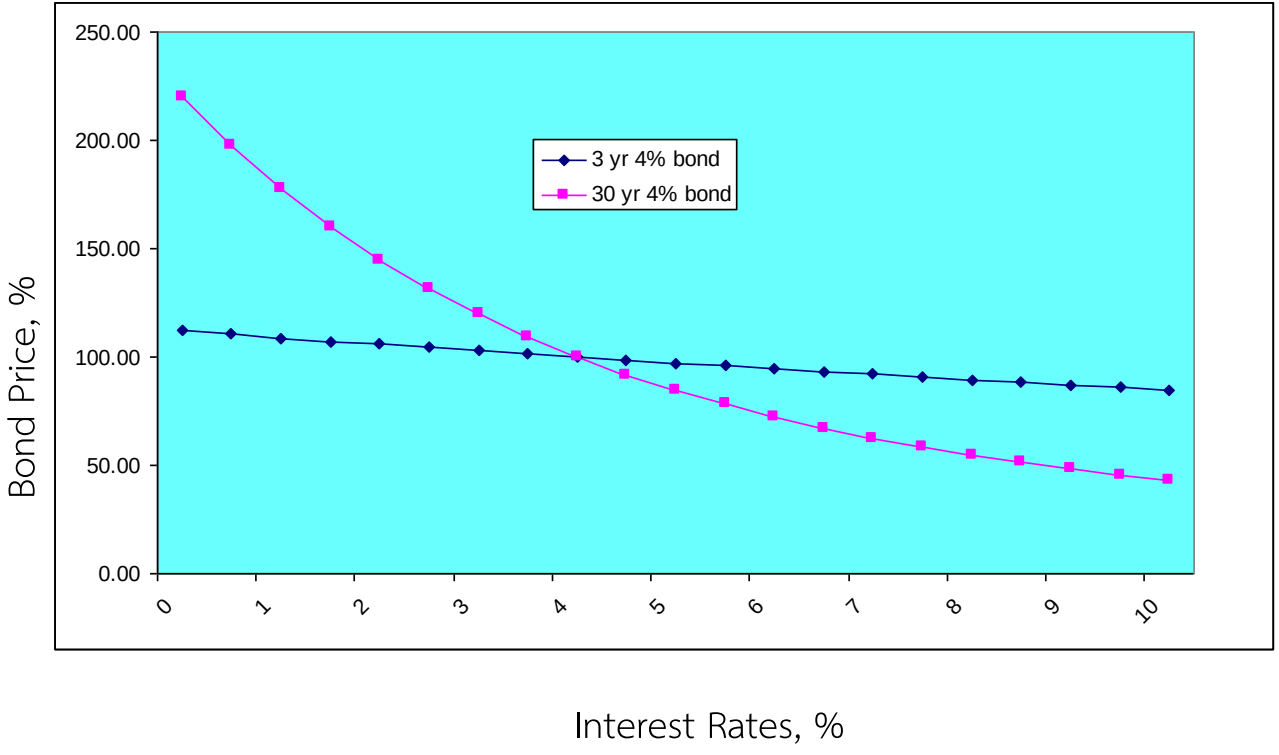
- In July 2006 you purchase 100 Euros of bonds in Germany which pay a 5% coupon every year. If the bond matures in 2012 and the YTM is 4%, what is the value of the bond?
- In July 2006 you purchase 200 Yen of bonds in Japan which pay a 8% coupon every year. If the bond matures in 2011 and the YTM is 5%, what is the value of the bond?
- In July 2006 you purchase a 3 year US Government bond. The bond has an annual coupon rate of 4%, paid semi-annually. If investors demand a 3% return on 6 month investments, what is the price of the bond?
- Take the same 3 year US Government bond. The bond has an annual coupon rate of 4%, paid semi-annually. If investors demand a 2% return on 6 month investments, what is the new price of the bond?

Maturity and Prices

A bond trader purchased each of the following bonds at a yield to maturity of 8%. Immediately after she purchased the bonds, interest rates fell to 7%. What is the percentage change in the price of each bond after the decline in interest rates? Fill in the following table:

	Price @ 8%	Price @ 7%	% change
5-year zero	680.583	712.986	**4.7**
15-year zero	315.24	362.45	**14.9**
5-year, 10% annual coupon	1079.85	1123.01	**4.07**
20-year, 10% annual coupon	1196.36	1317.82	**10.12**

Maturity and Prices



Yield To Maturity (YTM)

- All interest bearing instruments are priced to fit the term structure
- This is accomplished by modifying the asset price
- The modified price creates a New Yield, which fits the Term Structure
- The new yield is called the Yield To Maturity (YTM)

YTM = Current Yield + Capital gains yield

Yield to Maturity

Example

- A $1000 treasury bond expires in 5 years. It pays a coupon rate of 10.5%. If the market price of this bond is 1058.345, what is the YTM?

C0	C1	C2	C3	C4	C5
-1058.345	105	105	105	105	1105

Ans. Calculate IRR = 9%

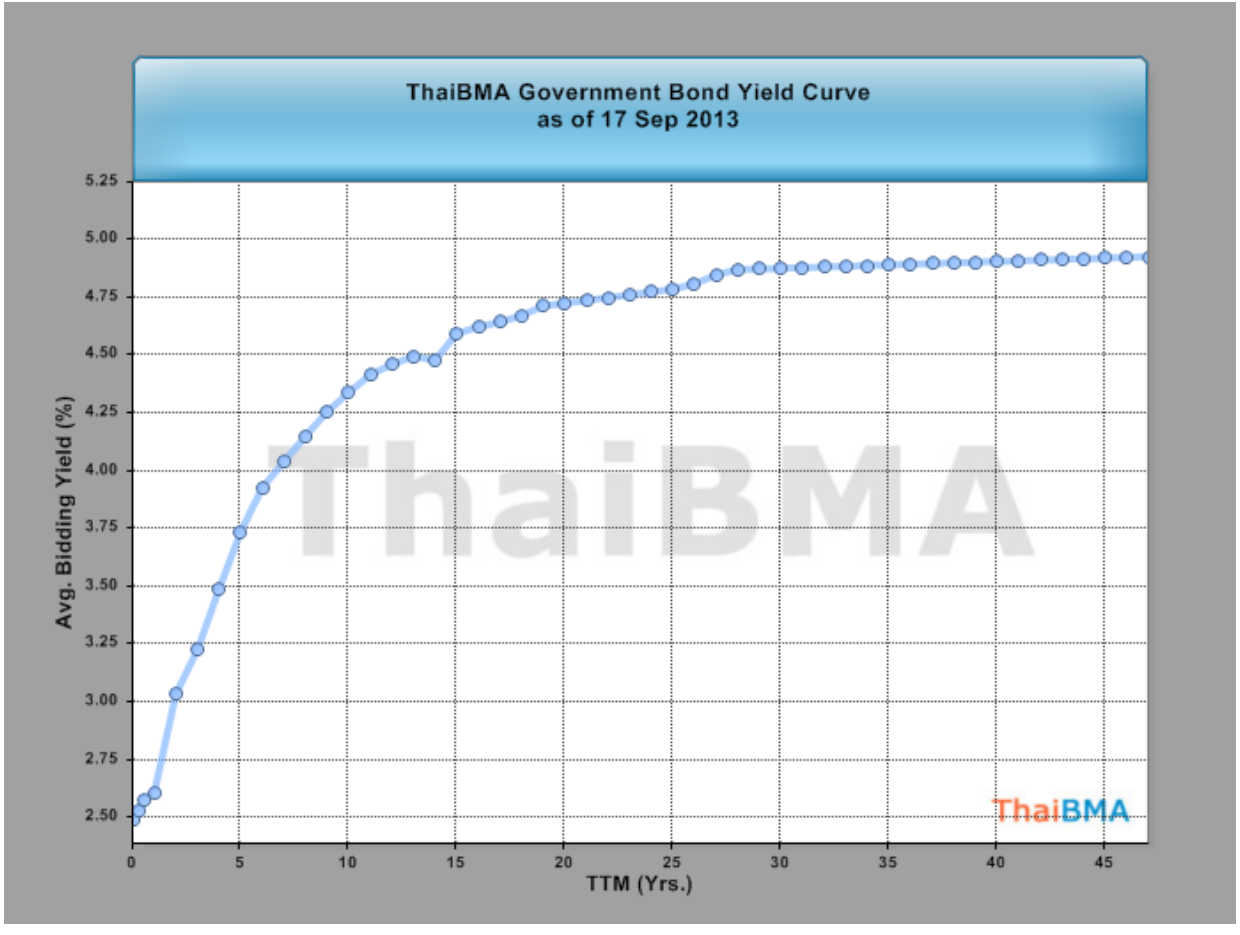
Yield to Maturity

- Wilson Wonders's bonds have 12 years remaining to maturity. Interest is paid annually, the bonds have a $1,000 par value, and the coupon interest rate is 10%. The bonds sell at a price of $850. What is their yield to maturity?
- The Brownstone Corporation's bonds have 5 years remaining to maturity. Interest is paid annually, the bonds have a $1,000 par value, and the coupon interest rate is 9%.

    a. What is the yield to maturity at a current market price of (1) $829 or (2) $1,104?

    b. Would you pay $829 for one of these bonds if you thought that the appropriate rate of interest was 12%—that is, if rd = 12%? Explain your answer.

Yield Curve


ThaiBMA Government Bond Yield Curve
as of 17 Sep 2013
Avg. Bidding Yield (%)
5.25
5.00
4.75
4.50
4.25
4.00
3.75
3.50
3.25
3.00
2.75
2.50
0
5
10
15
20
25
30
35
40
45
TTM (Yrs.)
ThaiBMA
ThaiBMA

Common Stock Valuation

Expected Return on Common Stocks

Expected Return - The percentage yield that an investor forecasts from a specific investment over a set period of time. Sometimes called the ***market capitalization rate***.

$$\text{Expected Return} = r = \frac{Div_1 + P_1 - P_0}{P_0}$$

The formula can be broken into two parts.

Dividend Yield + Capital Gain or Loss

$$\text{Expected Return} = r = \frac{Div_1}{P_0} + \frac{P_1 - P_0}{P_0}$$

Expected Return on Common Stocks

Example: If Fledgling Electronics is selling for $100 per share today and is expected to sell for $110 one year from now, what is the expected return if the dividend one year from now is forecasted to be $5.00?

$$\text{Expected Return} = \frac{5 + 110 - 100}{100} = .15$$

Example: You purchase an ownership share in the Indianapolis Colts for $50,000, who just won the Super Bowl. In one year you expect the Colts to repeat as Super Bowl champions and pay you a dividend of $3,000. You think you will be able to sell your share for $58,000 at that time. What is your expected return?

Valuing Common Stocks

- Dividend discounted model
- Constant growth model (Gordon Growth Model)
- Nonconstant growth model

Valuing Common Stocks - Dividend Discount Model

Computation of today's stock price which states that share value equals the present value of all expected future dividends.

$$P_0 = \frac{Div_1}{(1+r)^1} + \frac{Div_2}{(1+r)^2} + \ldots + \frac{Div_H + P_H}{(1+r)^H}$$

H - Time horizon for your investment.

Valuing Common Stocks - Dividend Discount Model

Example

Current forecasts are for XYZ Company to pay dividends of $3, $3.24, and $3.50 over the next three years, respectively. At the end of three years you anticipate selling your stock at a market price of $94.48. What is the price of the stock given a 12% expected return?

$$PV = \frac{3.00}{(1+.12)^1} + \frac{3.24}{(1+.12)^2} + \frac{3.50 + 94.48}{(1+.12)^3}$$

$$PV = \$75.00$$

Valuing Common Stocks - Dividend Discount Model

Example:

- Mary Czech is considering the purchase of stock X at the beginning of the year. The dividend at year-end is expected to be $3.25, and the market price by the end of the year is expected to be $25. If she requires a rate of return of 12 percent, what is the value of the stock?
- The Ohm Company paid a $2.50 dividend per share at the end of the year. The dividend is expected to grow by 10 percent each year for the next 3 years, and the stock's market price per share is expected to be $50 at the end of the third year. Investors require a rate of return of 14 percent. At what price per share should the Ohm stock sell?

Valuing Common Stocks - Dividend Discount Model

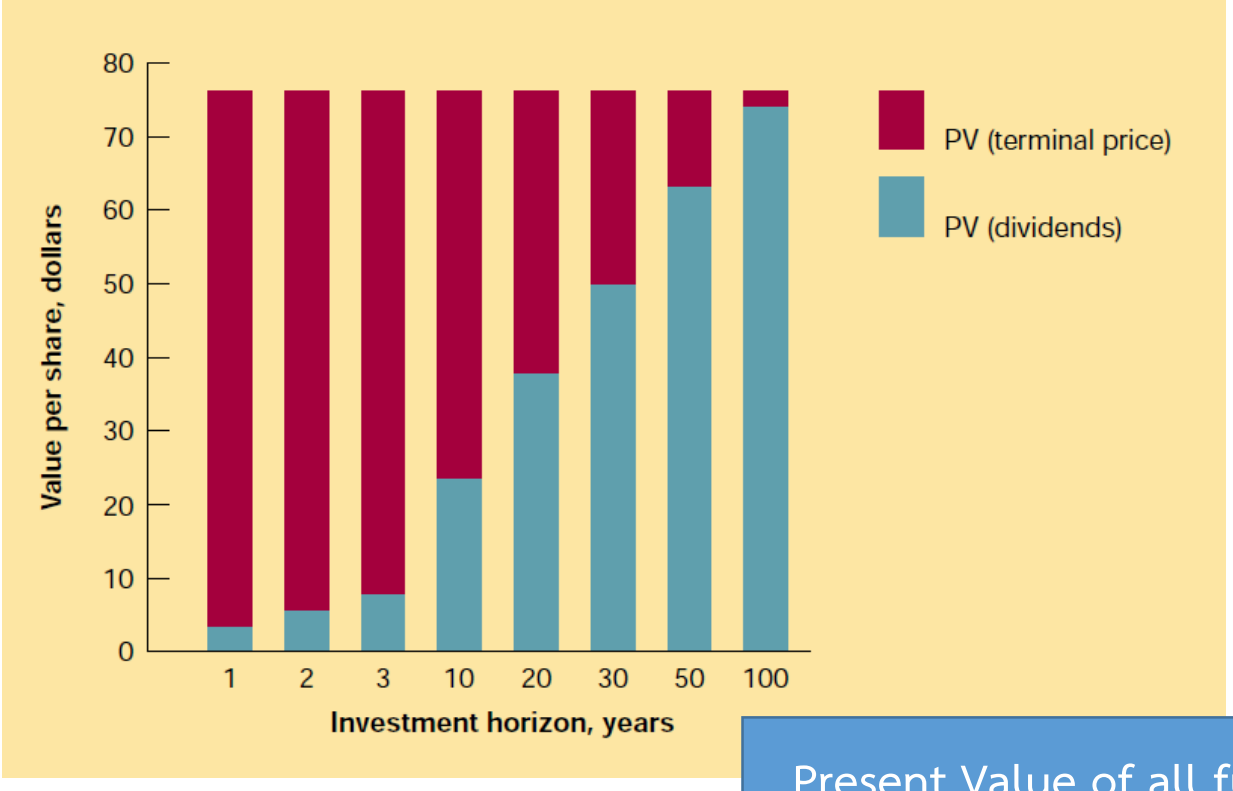
You buy a share of The Ludwig Corporation stock for $21.40. You expect it to pay dividends of $1.07, $1.1449, and $1.2250 in Years 1, 2, and 3, respectively, and you expect to sell it at a price of $26.22 at the end of 3 years.

a. Calculate the growth rate in dividends.

b. Calculate the expected dividend yield.

c. Assuming that the calculated growth rate is expected to continue, you can add the dividend yield to the expected growth rate to obtain the expected total rate of return. What is this stock's expected total rate of return?

Valuing Common Stocks - Dividend Discount Model



If H approaches infinity:

$$P_0 = \sum_{t=1}^{\infty} \frac{Div_t}{(1+r)^t}$$

Present Value of all future dividend per share

Valuing Common Stocks - Constant Growth DDM

Constant Growth DDM

A version of the dividend growth model in which dividends grow at a constant rate *(Gordon Growth Model)*.

$$
\begin{aligned}
P_0 &= \frac{Div_0(1+g)}{(1+r)^1} + \frac{Div_0(1+g)^2}{(1+r)^2} + \ldots + \frac{Div_0(1+g)^\infty}{(1+r)^\infty} \\
&= Div_0 \sum_{t=1}^{\infty} \frac{(1+g)^t}{(1+r)^t} \\
&= \frac{Div_0(1+g)}{r-g} \qquad = \frac{Div_1}{r-g}
\end{aligned}
$$

Valuing Common Stocks - Constant Growth DDM

- You believe that the Non-stick Gum Factory will pay a dividend of $2 on its common stock next year. Thereafter, you expect dividends to grow at a rate of 6 percent a year in perpetuity. If you require a return of 12 percent on your investment, how much should you be prepared to pay for the stock?
- Investors require a rate of return of 12 percent. At what price will the stock sell if the next expected dividend *D*1 is $1 per share and investors expect the dividends and earnings to grow (*a*) at 8 percent; (*b*) at 10 percent; (*c*) at 12 percent; and (*d*) at 14 percent?
- Arts and Crafts, Inc., will pay a dividend of $5 per share in 1 year. It sells at $50 a share, and firms in the same industry provide an expected rate of return of 14 percent. What must be the expected growth rate of the company's dividends?

Valuing Common Stocks - Constant Growth DDM

Example

If a stock is selling for $100 in the stock market with $3 dividend, what might the market be assuming about the growth in dividends?

$$\$100 = \frac{\$3.00}{.12 - g}$$

$$g = .09$$

Answer

The market is assuming the dividend will grow at 9% per year, indefinitely.

Valuing Common Stocks - Constant Growth DDM

Note for dividend growth (g):

g = return on equity x plowback ratio

= ROE x Retention ratio

Example: A stock sells for $40. The next dividend will be $4 per share. If the rate of return earned on reinvested funds is 15 percent and the company reinvests 40 percent of earnings in the firm, what must be the discount rate?

Valuing Common Stocks - Constant Growth DDM

Example: Here are data on two stocks, both of which have discount rates of 15 percent:

	Stock A	Stock B
Return on equity	15%	10%
Earnings per share	$2.00	$1.50
Dividends per share	$1.00	$1.00

a. What are the dividend payout ratios for each firm?

b. What are the expected dividend growth rates for each firm?

c. What is the proper stock price for each firm?

Valuing Common Stocks - Nonconstant Growth

The formula is:

$$P_0 = \frac{Div_1}{(1+r)^1} + \frac{Div_2}{(1+r)^2} + \ldots + \frac{Div_H}{(1+r)^H} + \frac{P_H}{(1+r)^H}$$

PV of dividends from Year 1 to horizon

PV of stock price at horizon

Valuing Common Stocks - Nonconstant Growth

The company's financial plan envisages rapid growth over the next 3 years but only moderate growth afterwards. Forecast earnings and dividends are as follows:

Year:	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Earnings per share	$2.45	3.11	3.78	5% growth thereafter				
Dividends per share	$1.00	1.20	1.44	5% growth thereafter				

If investor demands a return of 10%, what would be an appropriate price for the stock?

Valuing Common Stocks - Nonconstant Growth

- A company currently pays a dividend of $2 per share (D0 = $2). It is estimated that the company's dividend will grow at a rate of 20% per year for the next 2 years, then at a constant rate of 7% thereafter. If investors require rate of return 12%, what is your estimate of the stock's current price?
- Assume that the average firm in your company's industry is expected to grow at a constant rate of 6% and that its dividend yield is 7%. Your company is about as risky as the average firm in the industry, but it has just successfully completed some R&D work that leads you to expect that its earnings and dividends will grow at a rate of 50% [D1 = D0(1 + g) = D0(1.50)] this year and 25% the following year, after which growth should return to the 6% industry average. If the last dividend paid (D0) was $1, what is the value per share of your firm's stock?

Special Issues:

Preferred Stocks

Valuing Preferred Stocks

The formula is:

$$P_{ps} = \frac{Div}{r}$$

Example:

(1) What is the rate of return on a preferred stock with a $100 par value, a stated dividend of 8% of par, and a current market price of (a) $60, (b) $80, (c) $100, and (d) $140?

(2) Nick's Enchiladas Incorporated has preferred stock outstanding that pays a dividend of $5 at the end of each year. The preferred sells for $50 a share. What is the stock's required rate of return?

(3) Several years ago, Rolen Riders issued preferred stock with a stated annual dividend of 10% of its $100 par value. Preferred stock of this type currently yields 8%. Assume dividends are paid annually.

a. What is the value of Rolen's preferred stock?

b. Suppose interest rate levels have risen to the point where the preferred stock now yields 12%. What would be the new value of Rolen's preferred stock?

Question?