University of Kentucky
Gatton College of Business and Economics
Department of Finance & Quantitative Methods

Chapter 8

Finance 300

David Moore

Cash Flows for Stockholders

- If you own a share of stock, you can receive cash in two ways
  - The company pays dividends
  - You sell your shares, either to another investor in the market or back to the company
- As with bonds, the price of the stock is the present value of these expected cash flows
  - Dividends → cash income
  - Selling → capital gains

One Period Example

- Suppose you are thinking of purchasing the stock of Richie Oil, Inc.
  - You expect it to pay a $2 dividend in one year
  - You believe you can sell the stock for $14 at that time.
  - You require a return of 20% on investments of this risk
  - What is the maximum you would be willing to pay?

One Period Example

- D_1 = \$2 dividend expected in one year
- R = 20%
- P_1 = \$14
- CF_1 = \$2 + \$14 = \$16
- Compute the PV of the expected cash flows

$$P_0 = \frac{(2+14)}{1.20} = \$13.33$$

Two Period Example

- What if you decide to hold the stock for two years? Assume the price and dividend grows at 5%.
  - $D_1 = \$2.00$
  - $D_2 = \$2.10$
  - $P_2 = \$14.70$

$$\left.\begin{array}{l} D_1 = \$2.00 \\ D_2 = \$2.10 \end{array}\right\} \begin{array}{l} CF_1 = \$2.00 \\ CF_2 = \$2.10 + \$14.70 = \$16.80 \end{array}$$

  - Now how much would you be willing to pay?

$$P_0 = \frac{2}{1.20} + \frac{(2.10 + 14.70)}{(1.20)^2} = \$13.33$$

Three Period Example

- What if you decide to hold the stock for three years?
  - $D_1 = \$2.00$ $\quad$ $CF_1 = \$2.00$
  - $D_2 = \$2.10$ $\quad$ $CF_2 = \$2.10$
  - $D_3 = \$2.205$
  - $P_3 = \$15.435$

  $\Big\}$ $CF_3 = \$2.205 + \$15.435 = \$17.640$
  - Now how much would you be willing to pay?

$$P_0 = \frac{2}{1.20} + \frac{2.10}{(1.20)^2} + \frac{(2.205 + 15.435)}{(1.20)^3} = \$13.33$$

Developing The Model

- You could continue to push back when you would sell the stock
- You would find that the price of the stock is really just the *present value of <u>all</u> expected future dividends*

Stock Value = PV of Dividends

$$\hat{P}_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{D_3}{(1+R)^3} + \ldots + \frac{D_\infty}{(1+R)^\infty}$$

$$\boxed{\hat{P}_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1+R)^t}}$$

How can we estimate all future dividend payments?

Estimating Dividends: 3 Special Cases

- Zero Growth
  - Firm will pay a constant dividend forever
  - Like preferred stock
  - Price is computed using the perpetuity formula
- Constant dividend growth
  - Firm will increase the dividend by a constant *percent* every period
- Nonconstant growth
  - Dividend growth is not consistent initially, but settles down to constant growth eventually

1. Zero Growth

- Dividends expected at regular intervals forever = perpetuity

  $P_0 = D / R$

- Suppose stock is expected to pay a $0.50 dividend every quarter and the required return is 10% with quarterly compounding. What is the price?

2. Constant Growth Stock

One whose dividends are expected to grow forever at a constant rate, g.

$$D_1 = D_0(1+g)^1$$

$$D_2 = D_0(1+g)^2$$

$$D_t = D_t(1+g)^t$$

D_0 = Dividend JUST PAID

$D_1 – D_t$ = Expected dividends

Projected Dividends

- D_0 = \$2.00 and constant g = 6%

- $D_1 = D_0(1+g) = 2(1.06)$ = \$2.12
- $D_2 = D_1(1+g) = 2.12(1.06)$ = \$2.2472
- $D_3 = D_2(1+g) = 2.2472(1.06)$ = \$2.3820

Dividend Growth Model

$$\hat{P}_0 = D_0 \sum_{t=1}^{\infty} \frac{(1+g)^t}{(1+R)^t}$$

$$\hat{P}_0 = \frac{D_0(1+g)}{R - g} = \frac{D_1}{R - g}$$

"Gordon Growth Model"

DGM – Example 1

- Suppose Big D, Inc. <u>just paid</u> a dividend of $.50. It is expected to increase its dividend by 2% per year. If the market requires a return of 15% on assets of this risk, how much should the stock be selling for?
- D_0= $0.50
- g = 2%
- R = 15%

DGM – Example 2

- Suppose TB Pirates, Inc. is expected to pay a $2 dividend in one year. If the dividend is expected to grow at 5% per year and the required return is 20%, what is the price?
  - D_1 = $2.00
  - g = 5%
  - r = 20%

Example 8.3

Gordon Growth Company - I

- Gordon Growth Company is expected to pay a dividend of $4 next period and dividends are expected to grow at 6% per year. The required return is 16%.
- What is the current price?

Example 8.3

Gordon Growth Company - II

- What is the price expected to be in year 4?

Example 8.3

Gordon Growth Company - II

- What is the implied return given the change in price during the four year period?

❖The price grows at the same rate as dividends

Constant Growth Model Conditions

1. Dividend expected to grow at *g* forever
2. Stock price expected to grow at *g* forever
3. Expected dividend yield is constant
4. Expected capital gains yield is constant and equal to *g*
5. Expected total return, R, must be > *g*
6. Expected total return (R):

   = expected dividend yield (DY)

   + expected growth rate (g)

   = dividend yield + *g*

Dividend Growth Model (DGM)

– The value of the stock depends on the *expected* dividend level, the discount rate (R), and the growth rate (g).

$$P_0 = \frac{D_0(1+g)}{R-g} = \frac{D_1}{R-g}$$

$$\boxed{R = \frac{D_1}{P_0} + g}$$

- Rearranging DGM,

  – Required (total) return on a stock has two parts: dividend yield and capital gains yield.
  – D_1 / P_0 is the dividend yield
  – Capital gains yield = expected growth rate of the stock price, which matches the dividend growth rate.

Example: Using DGM to Find R

- AcheE Corp.'s *last* dividend *was* $.65 per share. Its dividends are expected to grow at a rate of 4% and the current price per share is $11.25. What is the discount rate (i.e., cost of capital) implicit in its price?

- Answer:

3. Nonconstant Growth

- Suppose a firm is expected to increase dividends by 20% in one year and by 15% in two years. After that dividends will increase at a rate of 5% per year indefinitely. If the last dividend was $1 and the required return is 20%, what is the price of the stock?
- Remember that we have to find the PV of *all* expected future dividends.

Nonconstant Growth – Solution

- Compute the dividends until growth levels off
  - $D_1 = 1(1.2) = \$1.20$
  - $D_2 = 1.20(1.15) = \$1.38$
  - $D_3 = 1.38(1.05) = \$1.449$
- Find the expected future price at the beginning of the constant growth period:
  - $P_2 = D_3 / (R – g) = 1.449 / (.2 - .05) = 9.66$
- Find the present value of the expected future cash flows
  - $P_0 = 1.20 / (1.2) + (1.38 + 9.66) / (1.2)^2 = 8.67$

Nonconstant + Constant growth

Basic PV of all Future Dividends Formula

$$\hat{P}_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{D_3}{(1+R)^3} + \ldots + \frac{D_\infty}{(1+R)^\infty}$$

Dividend Growth Model

$$\hat{P}_t = \frac{D_{t+1}}{R - g}$$

Nonconstant + Constant growth

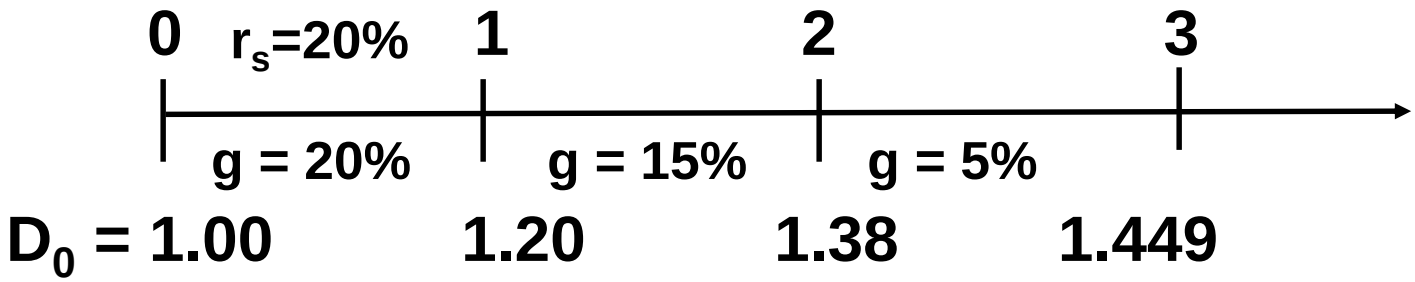
$$\hat{P}_0 = \boxed{\frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2}} + \boxed{\frac{P_2}{(1+R)^2}}$$

Because $P_2 = \sum_{t=3}^{\infty} \frac{D_t}{(1+R)^t}$

If g constant after $t = 2$, then

$$P_2 = \frac{D_3}{R - g}$$

Nonconstant growth followed by constant growth:



$$\hat{P}_2 = \frac{\$1.449}{0.20 - 0.05} = \$9.66$$

8.6667 = P_0

Practice Problems Ch. 8

1. The Pancake House pays a constant annual dividend of $1.25 per share. How much are you willing to pay for one share if you require a 15 percent rate of return?

2. Healthy Foods just paid its annual dividend of $1.45 a share. The firm recently announced that all future dividends will be increased by 2.8 percent annually. What is one share of this stock worth to you if you require a 14 percent rate of return?

Practice Problems Ch. 8

3. Atlas Home Supply has paid a constant annual dividend of $2.40 a share for the past 15 years. Yesterday, the firm announced the dividend will increase by 10 percent for the next three years, after which time the dividends will increase by 2 percent annually. The required return on this stock is 12 percent. What is the current value per share?

Growth and Payout

- Two conditions must exist if a company is to grow:
  - It must *not* pay out *all* of its earnings as dividends all the time, *and*
  - It must invest in *good* projects

- Why *don't* firms with no dividends have stock price of $0?
  - Such firms believe their earnings are better used to pursue growth opportunities; High growth firms tend to have <u>zero or low</u> payout.
  - Investors of a zero-dividend firm pay the stock price based on the expected growth rate.

Stock Valuation Using Multiples

- The **price-earnings (PE) ratio:** the current stock price divided by annual EPS:

$$\text{P/E ratio} = \frac{\text{Price per share}}{EPS}$$

- In practice, PE ratios are calculated using forecasted EPS or <u>trailing</u> (i.e., past) EPS.
  - Using forecasted EPS would lead to forward PE
- In addition to DGM, a common valuation approach is to multiply a benchmark PE ratio by earnings per share (EPS) to come up with a stock price:

$$P_t = \text{Benchmark PE ratio} * EPS_t$$

  - The benchmark PE ratio is often an <u>industry</u> average or based on a company's own historical values.

Stock Valuation Using Multiples: Example

- Suppose Eluveite Co. had earnings per share of $3 over the past year. The industry average PE ratio is 12. Can you use the information above to value Eluveite Co.'s stock price?
- What is the estimated price per share (today)?
- Answer:

Common Stock

Equity without priority for dividends or bankruptcy.

- Voting rights: generally "one share = one vote"

Types of voting:

1) Straight voting
2) Cumulative voting

Elections are typically staggered

Proxy voting: grant of authority by a shareholder allowing another individual to vote his or her shares

Proxy fight: When an "outside" group of shareholders attempt to remove directors/management.

Classes of stock

- Some firms have multiple classes of stock.
  - Remember Berkshire Hathaway A and B
  - Typically different share classes have different voting rights

Berkshire Hathaway Inc. has two classes of common stock designated Class A and Class B. **A share of Class B common stock has the rights of 1/1,500th of a share of Class A common stock except that a Class B share has 1/10,000th of the voting rights of a Class A share (rather than 1/1,500th of the vote).** Each share of a Class A common stock is convertible at any time, at the holder's option, into 1,500 shares of Class B common stock. This conversion privilege does not extend in the opposite direction. That is, holders of Class B shares are not able to convert them into Class A shares. Both Class A & B shareholders are entitled to attend the Berkshire Hathaway Annual Meeting which is held the first Saturday in May.

Features of Common Stock

- Other Rights
  - Share proportionally in declared dividends
  - Share proportionally in remaining assets during liquidation
  - Right to vote on matters of great importance i.e. merger
  - Preemptive right
    - Right of first refusal to buy new stock issue to maintain proportional ownership if desired

Preferred Stock

Stock with dividend priority over common stock

- Dividends
  - Must be paid before dividends can be paid to common stockholders
  - Not a liability of the firm
  - Can be deferred indefinitely
  - Most preferred dividends are cumulative
    - Missed preferred dividends have to be paid before common dividends can be paid
- Preferred stock generally does not carry voting rights

Stock Market (review)

- Last part of Chapter 8 reviews the stock market as discussed in Chapter 1
- Does introduce some new terms if you are curious about stock markets
- Will not be on Exam 4.

Practice again

- XYZ stock currently sells for $50 per share. The next expected annual dividend is $2, and the growth rate is 6%. What is the expected rate of return on this stock?

- If the required rate of return on this stock were 12%, what would the stock price be, and what would the dividend yield be?