# CHAPTER 8

## STOCK VALUATION

# KEY CONCEPTS AND SKILLS

- Understand how stock prices depend on future dividends and dividend growth
- Be able to compute stock prices using the dividend growth model
- Understand how corporate directors are elected
- Understand how stock markets work
- Understand how stock prices are quoted

# CHAPTER OUTLINE

- Common Stock Valuation
- Some Features of Common and Preferred Stocks
- The Stock Markets

# CASH FLOWS FOR STOCKHOLDERS

- If you buy 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

# ONE-PERIOD EXAMPLE

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

  - Compute the PV of the expected cash flows
  - Price = (14 + 2) / (1.2) = $13.33
  - Or FV = 16; I/Y = 20; N = 1; CPT PV = -13.33

# TWO-PERIOD EXAMPLE

- Now, what if you decide to hold the stock for two years?
  - In addition to the dividend in one year, you expect a dividend of $2.10 in two years and a stock price of $14.70 at the end of year 2.
  - Now how much would you be willing to pay?
    - PV = 2 / (1.2) + (2.10 + 14.70) / $(1.2)^2$ = 13.33

# THREE-PERIOD EXAMPLE

- Finally, what if you decide to hold the stock for three years?
  - In addition to the dividends at the end of years 1 and 2, you expect to receive a dividend of $2.205 at the end of year 3 and the stock price is expected to be $15.435.
  - Now how much would you be willing to pay?
    - PV = $2 / 1.2 + 2.10 / (1.2)^2 + (2.205 + 15.435) / (1.2)^3 = 13.33$

# DEVELOPING THE MODEL

- You could continue to push back the year in which you will sell the stock
- You would find that the price of the stock is really just the *present value of all expected future dividends*
- So, how can we estimate all future dividend payments?

# ESTIMATING DIVIDENDS: SPECIAL CASES

- Constant dividend
  - The firm will pay a constant dividend forever
  - This is like preferred stock
  - The price is computed using the perpetuity formula
- Constant dividend growth
  - The firm will increase the dividend by a constant *percent* every period
  - The price is computed using the growing perpetuity model
- Supernormal growth
  - Dividend growth is not consistent initially, but settles down to constant growth eventually
  - The price is computed using a multistage model

# ZERO GROWTH

- If dividends are expected at regular intervals forever, then this is a perpetuity and the present value of expected future dividends can be found using the perpetuity formula
  - $P_0 = D / R$
- 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?
  - $P_0 = .50 / (.1 / 4) = \$20$

# DIVIDEND GROWTH MODEL

- Dividends are expected to grow at a constant percent per period.
  - $P_0 = D_1 /(1+R) + D_2 /(1+R)^2 + D_3 /(1+R)^3 + \ldots$
  - $P_0 = D_0(1+g)/(1+R) + D_0(1+g)^2/(1+R)^2 + D_0(1+g)^3/(1+R)^3 + \ldots$
- With a little algebra and some series work, this reduces to:

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

# DGM – EXAMPLE 1

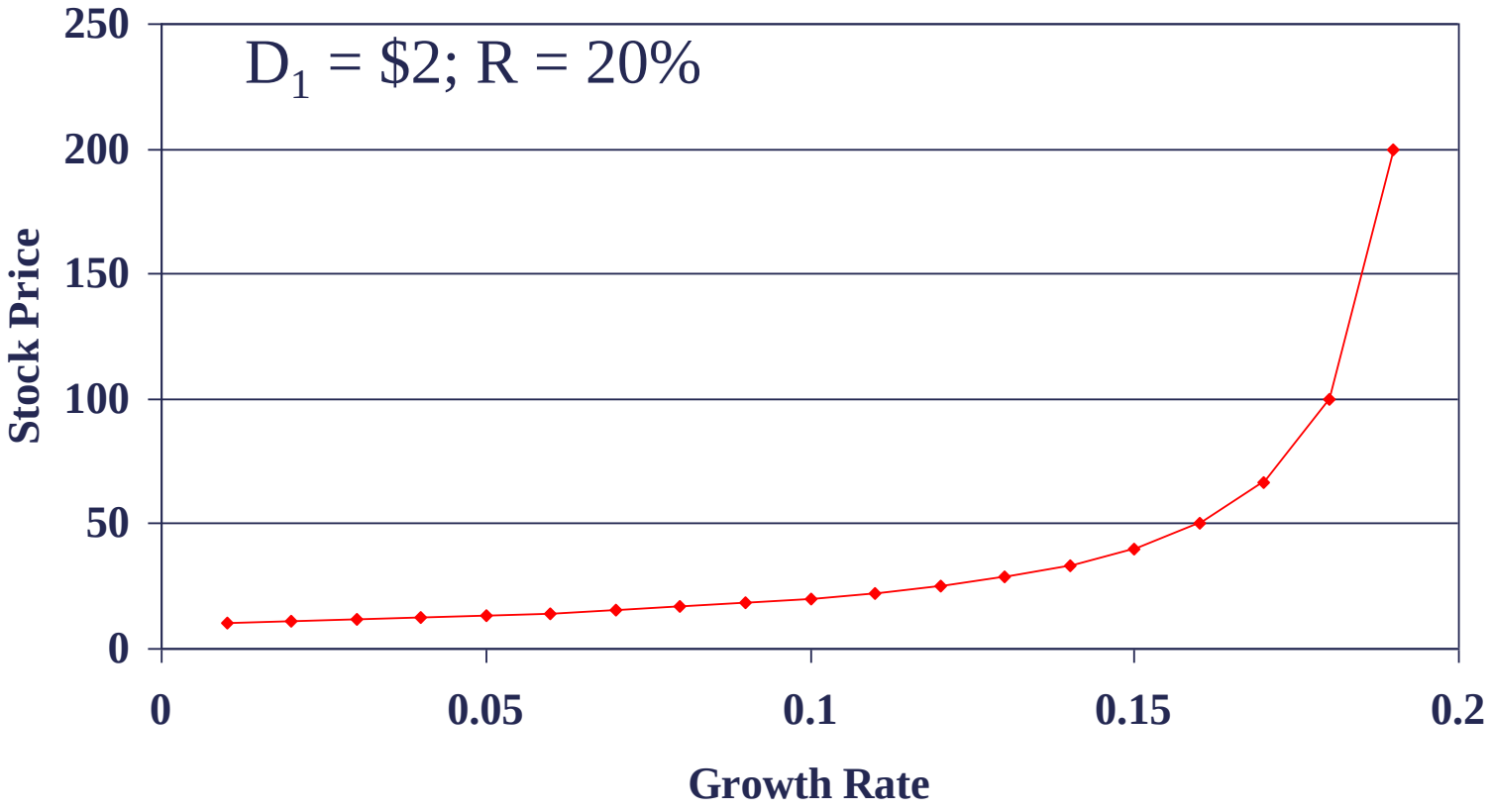
- Suppose Big D, Inc., just paid a dividend of $0.50 per share.
- It is expected to increase its dividend by 2% per year.
- If the market requires a return of 15% on assets of this risk, how much should the stock be selling for?

- $P_0 = .50(1+.02) / (.15 - .02) = \$3.92$

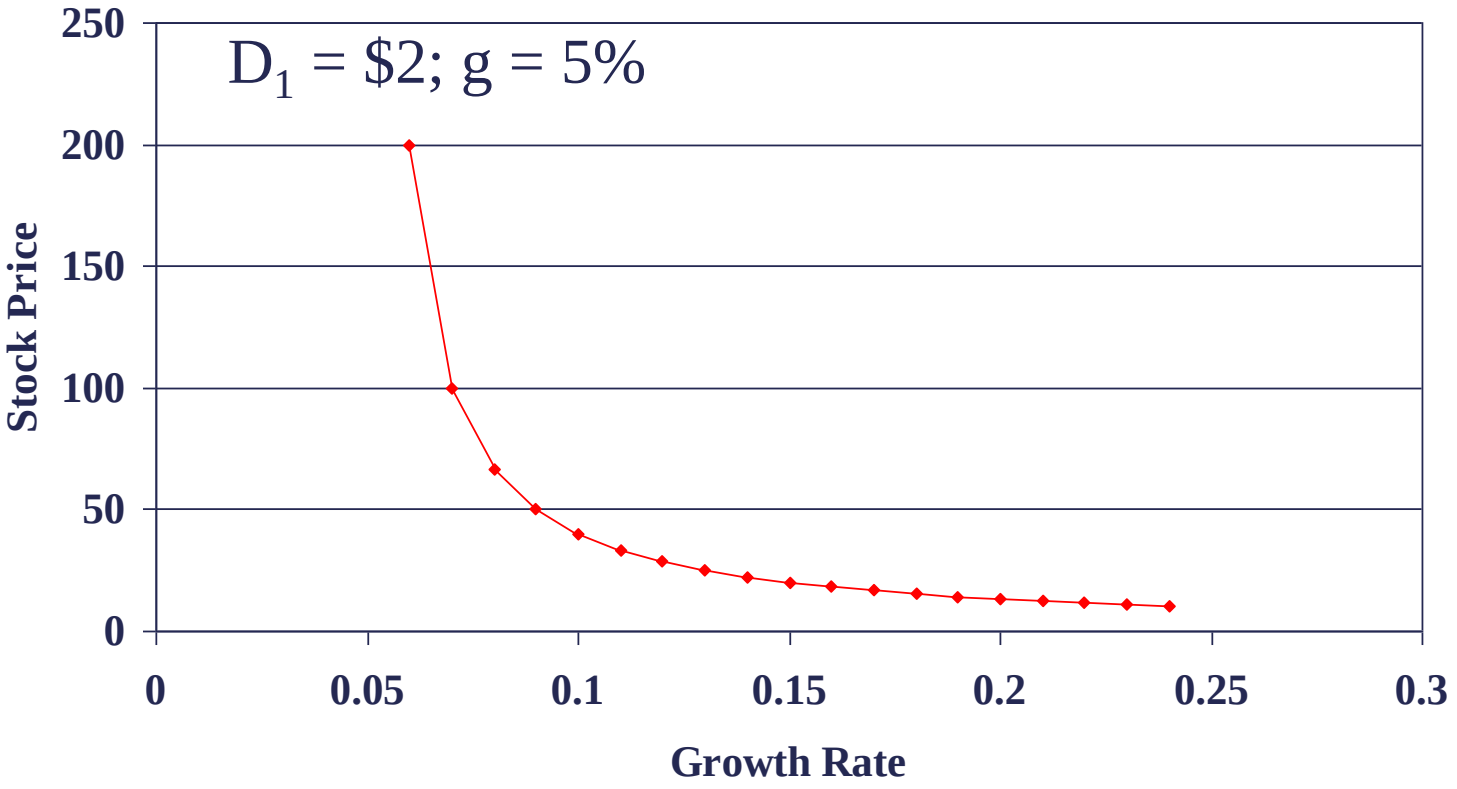
# DGM – EXAMPLE 2

- 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?
  - $P_0 = 2 / (.2 - .05) = \$13.33$
  - Why isn't the $2 in the numerator multiplied by (1.05) in this example?

# STOCK PRICE SENSITIVITY TO DIVIDEND GROWTH, G



# STOCK PRICE SENSITIVITY TO REQUIRED RETURN, R



# 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?
  - $P_0 = 4 / (.16 - .06) = \$40$
  - Remember that we already have the dividend expected next year, so we don't multiply the dividend by 1+g

# EXAMPLE 8.3 – GORDON GROWTH COMPANY - II

- What is the price expected to be in year 4?
  - $P_4 = D_4(1 + g) / (R – g) = D_5 / (R – g)$
  - $P_4 = 4(1+.06)^4 / (.16 - .06) = 50.50$
- What is the implied return given the change in price during the four year period?
  - $50.50 = 40(1+return)^4$; return = 6%
  - PV = -40; FV = 50.50; N = 4; CPT I/Y = 6%
- The price is assumed to grow at the same rate as the dividends

# NONCONSTANT GROWTH EXAMPLE - I

- 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 EXAMPLE - II

- 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
  - $P_2 = D_3 / (R - g) = 1.449 / (.2 - .05) = 9.66$
- Find the present value of the expected future cash flows
  - $P_0 = 1.20 / (1.2) + (1.38 + 9.66) / (1.2)^2 = 8.67$

# QUICK QUIZ – PART I

- What is the value of a stock that is expected to pay a constant dividend of $2 per year if the required return is 15%?
- What if the company starts increasing dividends by 3% per year, beginning with the next dividend? The required return stays at 15%.

# USING THE DGM TO FIND R

- Start with the DGM:

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

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

# EXAMPLE: FINDING THE REQUIRED RETURN

- Suppose a firm's stock is selling for $10.50. It just paid a $1 dividend, and dividends are expected to grow at 5% per year. What is the required return?
  - R = [1(1.05)/10.50] + .05 = 15%
- What is the dividend yield?
  - 1(1.05) / 10.50 = 10%
- What is the capital gains yield?
  - g = 5%

# STOCK VALUATION USING MULTIPLES

- Another common valuation approach is to multiply a benchmark PE ratio by earnings per share (EPS) to come up with a stock price
- $P_t$ = Benchmark PE ratio * $EPS_t$
- The benchmark PE ratio is often an industry average or based on a company's own historical values
- The price-sales ratio can also be used

# EXAMPLE: STOCK VALUATION USING MULTIPLES

- Suppose a company had earnings per share of $3 over the past year. The industry average PE ratio is 12.
- Use this information to value this company's stock price.

- $P_t$ = 12 x $3 = $36 per share

# TABLE 8.1 - STOCK VALUATION SUMMARY

**I. The General Case**

In general, the price today of a share of stock, $P_0$, is the present value of all of its future dividends, $D_1, D_2, D_3, \ldots$:

$$P_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{D_3}{(1+R)^3} + \cdots$$

where $R$ is the required return.

**II. Constant Growth Case**

If the dividend grows at a steady rate, $g$, then the price can be written as:

$$P_0 = \frac{D_1}{R-g}$$

This result is called the *dividend growth model*.

**III. Nonconstant Growth**

If the dividend grows steadily after $t$ periods, then the price can be written as:

$$P_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \cdots + \frac{D_t}{(1+R)^t} + \frac{P_t}{(1+R)^t}$$

where

$$P_t = \frac{D_t \times (1+g)}{(R-g)}$$

**IV. Two-Stage Growth**

If the dividend grows at rate $g_1$ for $t$ periods and then grows at rate $g_2$ thereafter, then the price can be written as:

$$P_0 = \frac{D_1}{R-g_1} \times \left[1 - \left(\frac{1+g_1}{1+R}\right)^t\right] + \frac{P_t}{(1+R)^t}$$

where

$$P_t = \frac{D_{t+1}}{R-g_2} = \frac{D_0 \times (1+g_1)^t \times (1+g_2)}{R-g_2}$$

**V. Valuation Using Multiples**

For stocks that don't pay dividends (or have erratic dividend growth rates), we can value them using the PE ratio and/or the price–sales ratio:

$P_t$ = Benchmark PE ratio $\times$ $EPS_t$

$P_t$ = Benchmark price–sales ratio $\times$ Sales per $share_t$

**VI. The Required Return**

The required return, $R$, can be written as the sum of two things:

$$R = D_1/P_0 + g$$

where $D_1/P_0$ is the *dividend yield* and $g$ is the *capital gains yield* (which is the same thing as the growth rate in dividends for the steady growth case).

# FEATURES OF COMMON STOCK

- Voting Rights
- Proxy voting
- Classes of stock
- Other Rights
  - Share proportionally in declared dividends
  - Share proportionally in remaining assets during liquidation
  - Preemptive right – first shot at new stock issue to maintain proportional ownership if desired

# DIVIDEND CHARACTERISTICS

- Dividends are not a liability of the firm until a dividend has been declared by the Board
- Consequently, a firm cannot go bankrupt for not declaring dividends
- Dividends and Taxes
  - Dividend payments are not considered a business expense; therefore, they are not tax deductible
  - The taxation of dividends received by individuals depends on the holding period
  - Dividends received by corporations have a minimum 70% exclusion from taxable income

# FEATURES OF PREFERRED STOCK

- Dividends
  - Stated dividend that must be paid before dividends can be paid to common stockholders
  - Dividends are not a liability of the firm, and preferred dividends can be deferred indefinitely
  - Most preferred dividends are cumulative – any missed preferred dividends have to be paid before common dividends can be paid
- Preferred stock generally does not carry voting rights

# STOCK MARKET

- Dealers vs. Brokers
- New York Stock Exchange (NYSE)
  - Largest stock market in the world
  - License holders (1,366)
    - Designated market makers (DMMs)
    - Floor brokers
    - Supplemental liquidity providers (SLPs)
  - Operations
  - Floor activity

# NASDAQ

- Not a physical exchange – computer-based quotation system
- Multiple market makers
- Electronic Communications Networks
- Three levels of information
  - Level 1 – median quotes, registered representatives
  - Level 2 – view quotes, brokers & dealers
  - Level 3 – view and update quotes, dealers only
- Large portion of technology stocks

# WORK THE WEB EXAMPLE

- Electronic Communications Networks provide trading in NASDAQ securities
- Click on the web surfer and visit Instinet

# READING STOCK QUOTES

**Costco Wholesale Corporation** (NasdaqGS: COST )

REAL-TIME 72.07 ↓ 0.55 (0.76%) 1:21PM EST

| | | | |
|---|---|---|---|
| Last Trade: | 72.05 | Day's Range: | 71.86 - 72.61 |
| Trade Time: | 1:07PM EST | 52wk Range: | 53.41 - 73.45 |
| Change: | ↓ 0.57 (0.78%) | Volume: | 1,360,720 |
| Prev Close: | 72.62 | Avg Vol (3m): | 3,049,930 |
| Open: | 72.51 | Market Cap: | 31.45B |
| Bid: | 72.05 x 800 | P/E (ttm): | 23.78 |
| Ask: | 72.06 x 2800 | EPS (ttm): | 3.03 |
| 1y Target Est: | 73.25 | Div & Yield: | 0.82 (1.10%) |


- What information is provided in the stock quote?
- Click on the web surfer to go to Bloomberg for current stock quotes.

# QUICK QUIZ – PART II

- You observe a stock price of $18.75. You expect a dividend growth rate of 5%, and the most recent dividend was $1.50. What is the required return?
- What are some of the major characteristics of common stock?
- What are some of the major characteristics of preferred stock?

# ETHICS ISSUES

- The status of pension funding (i.e., over- vs. under-funded) depends heavily on the choice of a discount rate. When actuaries are choosing the appropriate rate, should they give greater priority to future pension recipients, management, or shareholders?

- How has the increasing availability and use of the internet impacted the ability of stock traders to act unethically?

# COMPREHENSIVE PROBLEM

- 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?

# CHAPTER 8

## END OF CHAPTER