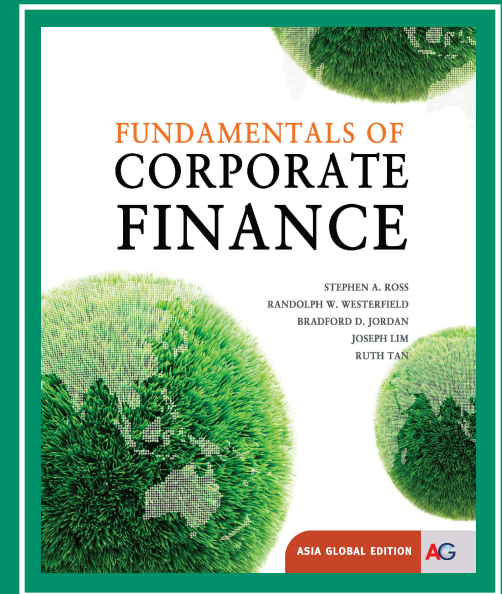


Chapter 8



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 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 = $(14 + 2) / (1.2) = \$13.33$
- Using financial calculator: 16 FV; 20 I/Y; 1 N; CPT PV = -13.33

One-Period Example: Using a Timeline

expect a \$2 dividend in 1 year and sell the stock for \$14

0

20%

1

2

3

$$D^1 = \$2$$

+

$$P^1 = 14$$

$$\$16$$

P_0

$PVIF^{20\%,1}$

Expect to sell stock at this price

Two-Period Example

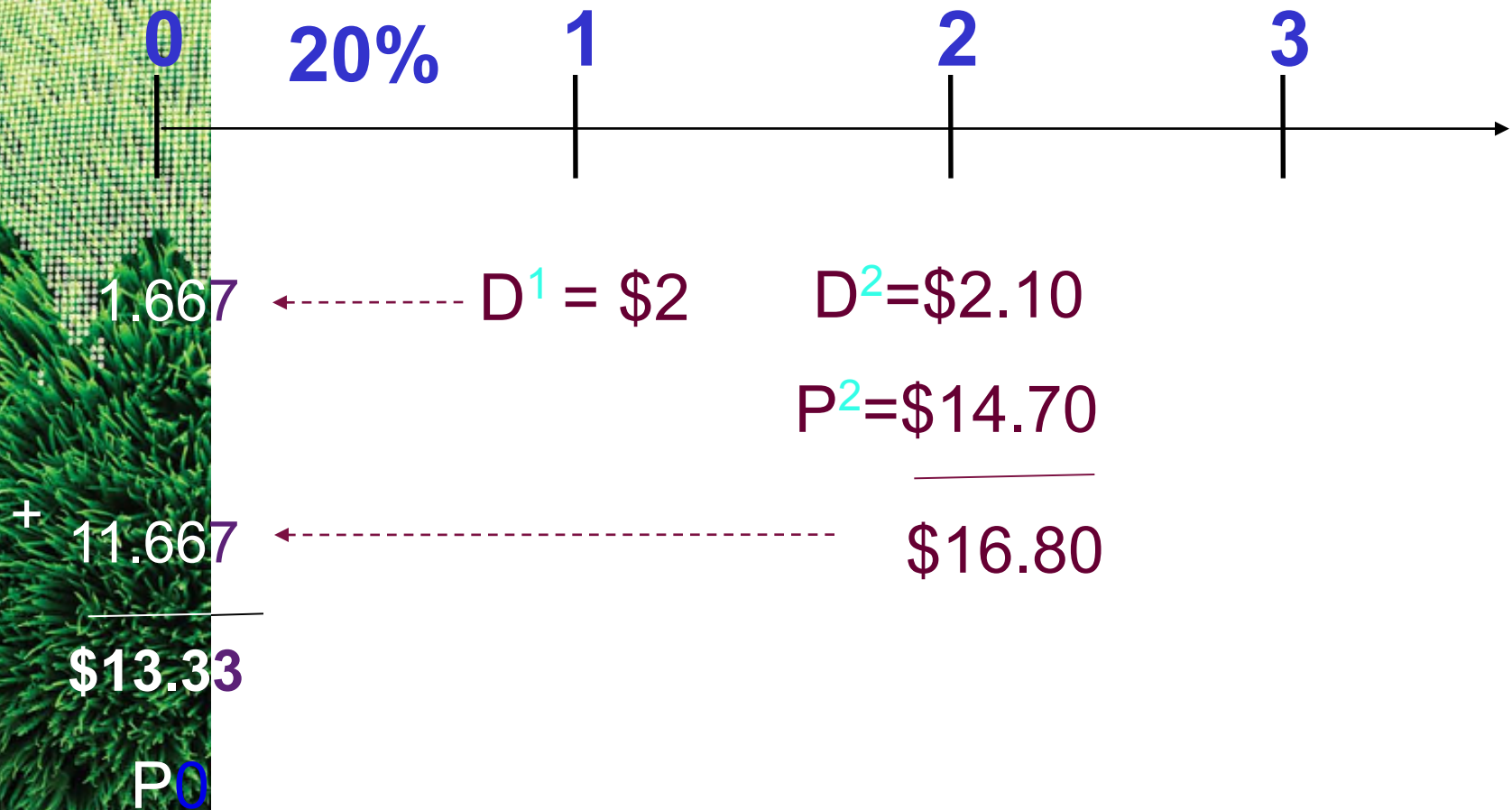
Now, what if you decide to hold the stock for two years? In addition to the dividend in one year, you expect a dividend of \$2.10 in two years and a stock price of \$14.70 at the end of year 2. Now how much would you be willing to pay?

Compute the PV of the expected cash flows

- Price = $2 / (1.2) + (2.10 + 14.70) / (1.2)^2 = 13.33$
- Using financial calculator: 0 CF₀; 2 CF₁; 16.80 CF₂; 20 I/Y; CPT NPV = 13.33

Two-Period Example: Using a Timeline

dividend of \$2 at yr 1
dividend of \$2.10 at yr 2
stock price of \$14.70 at yr 2



Three-Period Example

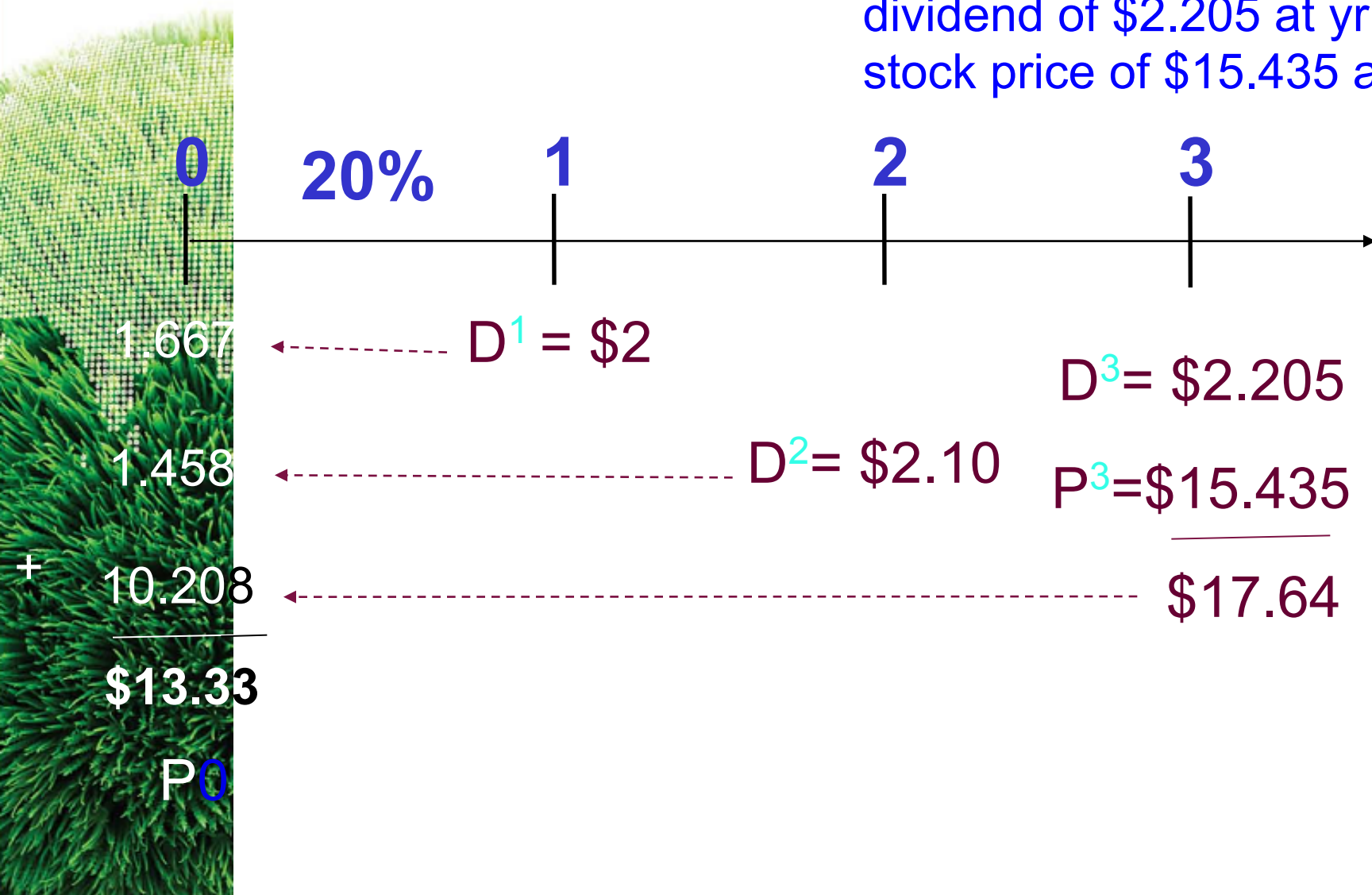
Finally, what if you decide to hold the stock for three years? In addition to the dividends at the end of years 1 and 2, you expect to receive a dividend of \$2.205 at the end of year 3 and the stock price is expected to be \$15.435. Now how much would you be willing to pay?

Compute the PV of the expected cash flows

- Price = $2 / (1.2) + 2.10 / (1.2)^2 + (2.205 + 15.435) / (1.2)^3 = 13.33$
- Using financial calculator: 0 CF₀; 2 CF₁; 2.10 CF₂; 17.635 CF₃; 20 I/Y; CPT NPV = 13.33

Three-Period Example: Using a Timeline

dividend of \$2 at yr 1
dividend of \$2.10 at yr 2
dividend of \$2.205 at yr 3
stock price of \$15.435 at yr 3



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*

$$P_t = \frac{D_{t+1}}{(1+r_s)^{t+1}} + \frac{D_{t+2}}{(1+r_s)^{t+2}} + \frac{D_{t+3}}{(1+r_s)^{t+3}} + \dots + \frac{D_\infty}{(1+r_s)^\infty}$$

- 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 / (0.1 / 4) = \20

Constant Dividend Growth Model

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

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

Constant Dividend Growth Model

– 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?

$$P_0 = \frac{D_0(1+g)}{R-g} = \frac{0.50(1.02)}{0.15-0.02} = 3.92$$

Constant Dividend Growth Model

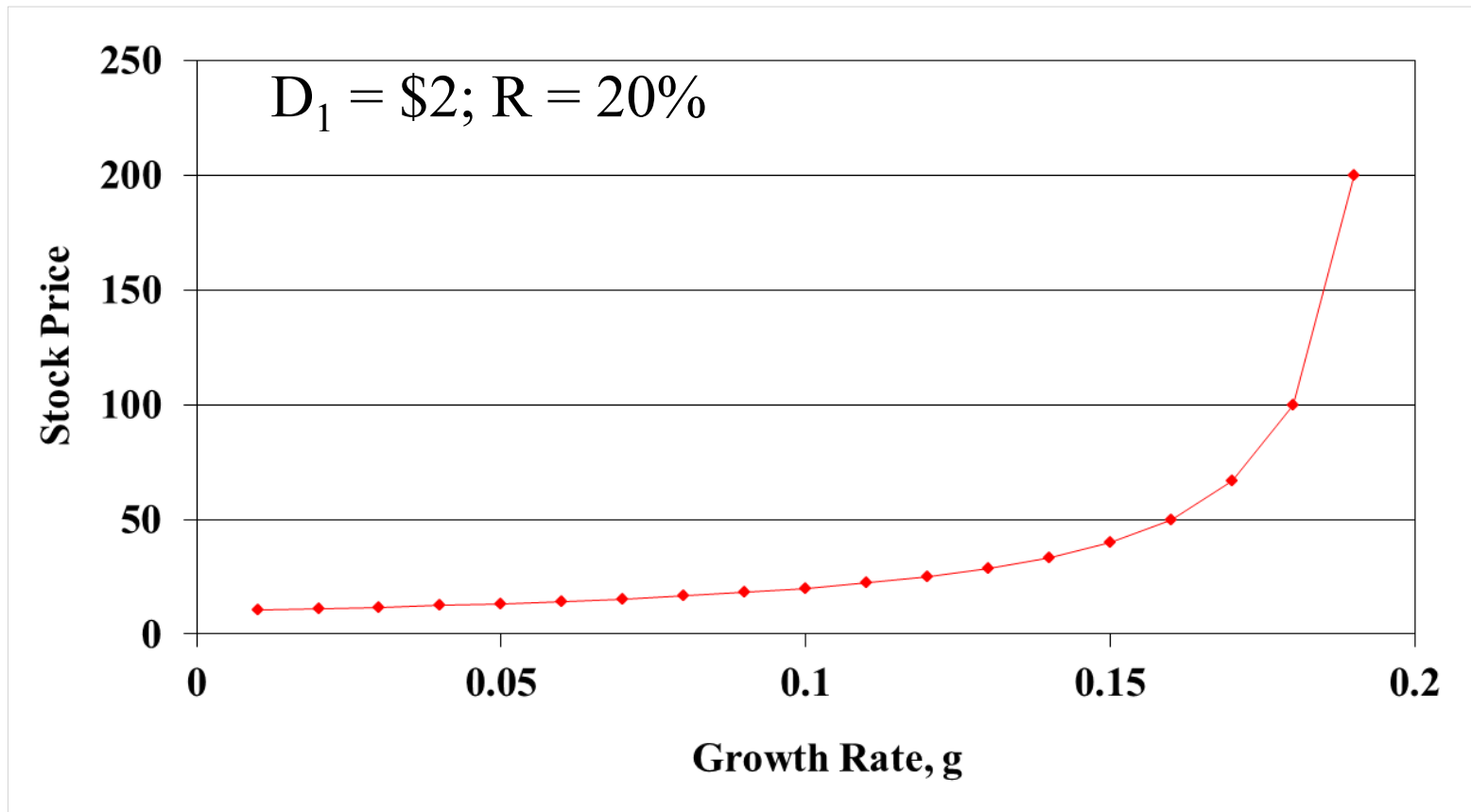
– Example 2

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?

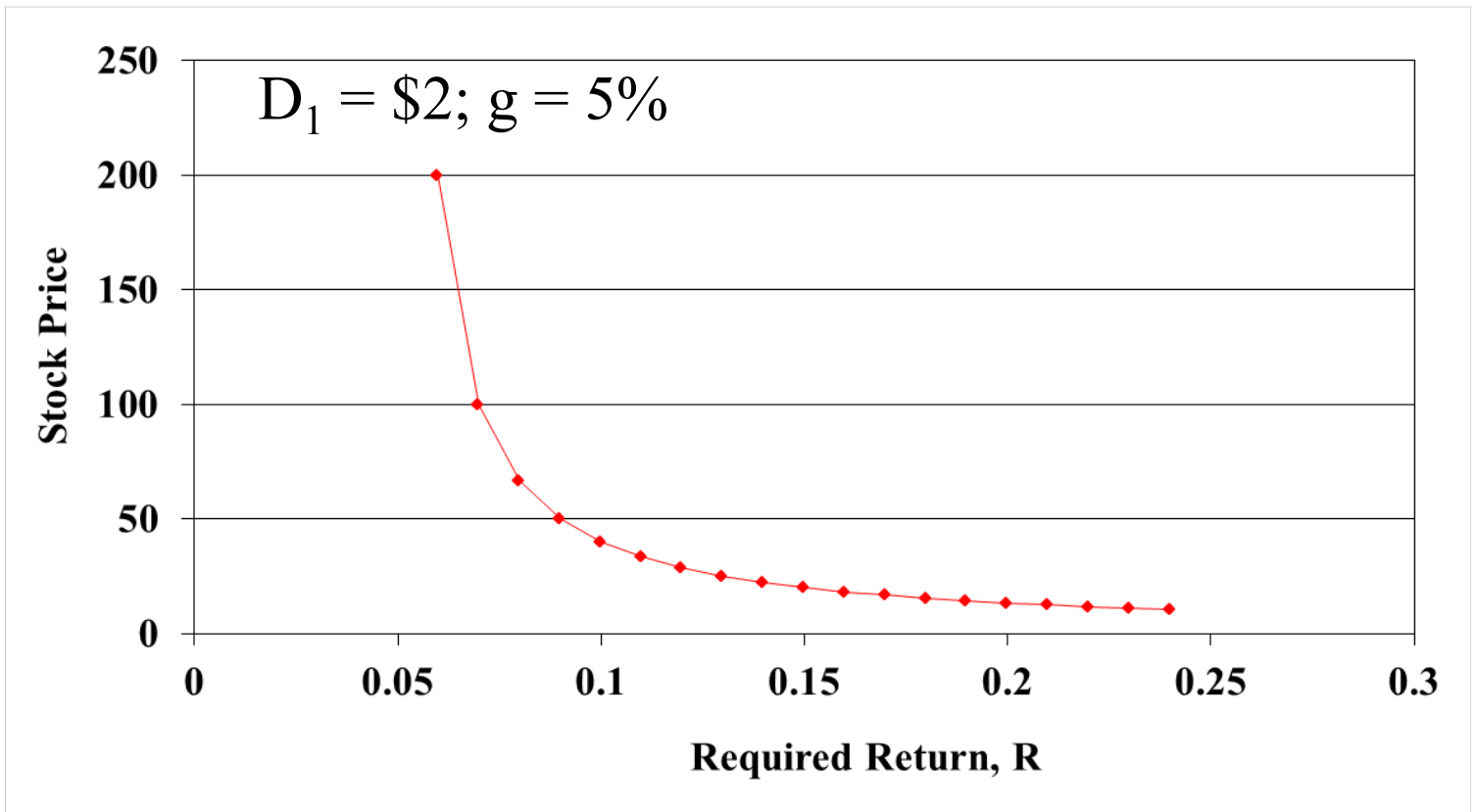
$$P_0 = \frac{D_0(1+g)}{R-g} = \frac{D_1}{R-g} = \frac{2}{0.2-0.05} = 13.33$$

- Why isn't the \$2 in the numerator multiplied by (1.05) in this example?

Stock Price Sensitivity to Dividend Growth Rate, g



Stock Price Sensitivity to Required Return, R



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?

$$P_0 = \frac{D_0(1+g)}{R-g} = \frac{D_1}{R-g} = \frac{4}{0.16-0.06} = 40$$

- Remember that we already have the dividend expected next year, so we don't multiply the dividend by $1+g$

Gordon Growth Company - II

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

$$P_4 = \frac{D_5}{R - g} = \frac{D_1(1 + g)^4}{R - g} = \frac{4(1 + 0.06)^4}{0.16 - 0.06} = 50.50$$

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

$$P_4 = P_0(1 + r)^4$$

$$50.50 = 40(1 + r)^4 \Rightarrow r = 0.06 = 6\%$$

- Using financial calculator: -40 PV; 50.50 FV; 4 N; CPT I/Y = 6%
- The price grows at the same rate as the dividends

Constant DGM: Price Grows at Same Rate as Dividends

$$P_t = \frac{D_0(1+g)^{t+1}}{r-g}$$

$$P_{t+1} = \frac{D_0(1+g)^{t+2}}{r-g}$$

$$\begin{aligned} \frac{P_{t+1}}{P_t} &= \frac{D_0(1+g)^{t+2}}{r-g} \div \frac{D_0(1+g)^{t+1}}{r-g} \\ &= 1+g \end{aligned}$$

⇒ the price grows at the same rate as the dividends

Nonconstant Growth Problem Statement

- Suppose a firm is expected to increase dividends by 20% for one year and then by 15% in the year following. After that, dividends will increase at a rate of 5% per year indefinitely. If the dividend at time 0, D_0 , 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 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
 - $P_2 = D_3 / (R - g) = 1.449 / (.2 - .05) = 9.66$
- Find the present value of the expected future cash flows

$$P_0 = \frac{D_1}{1+R} + \frac{D_2 + P_2}{(1+R)^2} = \frac{1.2}{1+0.2} + \frac{1.38 + 9.66}{(1+0.2)^2} = 8.67$$

- Using financial calculator: 0 CF_0 ; 1.2 CF_1 ; 11.04 CF_2 ; 20 I/Y; 1 P/Y; CPT NPV = 8.67

Quick Quiz – Part I

- A company has just paid a dividend of \$2. What is the value of its stock if it expects to maintain this level of dividend every year. Assume that 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 Constant DGM to Find Required Return, Dividend Yield, Capital Gains Yield

- Start with the Constant DGM:

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

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

Finding the Required Return, Dividend Yield, Capital Gains Yield - Example

Suppose a firm's stock is selling for \$10.50. It just paid a \$1 dividend, D_0 , and dividends are expected to grow at 5% per year.

- What is the required return?

$$R = \frac{D_0(1+g)}{P_0} + g = \frac{1(1+0.05)}{10.50} + 0.05 = 15\%$$

- What is the dividend yield, D_1/P_0 ?

$$\text{div yield} = \frac{D_1}{P_0} = \frac{D_0(1+g)}{P_0} = \frac{1(1+0.05)}{10.50} = 10\%$$

- What is the capital gains yield?

$$g = 5\%$$

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, \dots :

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

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. Supernormal Growth

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

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

where

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

IV. 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).

Other Stock Valuation Methods:

Market Multiple Method

- Also known as the peer comparison method.
- The value of a company is derived by applying a certain multiplier to the company's profitability parameter.
- Analysts often use the following multiples to value stocks.
 - P / E (Price-to-earnings) ratio
 - P / Sales
- Example: Based on comparable firms, estimate the appropriate P/E. Multiply this by expected earnings to obtain an estimate of the stock price.



Problems with Market Multiple Method

- Often hard to find comparable firms.
- The average ratio from a sample of comparable firms can have a wide range.
 - Example: The average P/E ratio of comparable firms is 20 but the range is from 10 to 50.



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 varies across countries

Features of Preferred Stock

- Dividends
 - Preferred dividend must be paid before dividends can be paid to common stockholders
 - Dividends are not a liability of the firm.
 - 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 do not carry voting rights

Preferred Stock – Example

If preferred stock with an annual dividend of \$5 sells for \$50, what is the preferred stock's expected return?

$$P_0 = \frac{D}{r}$$

$$r = \frac{D}{P_0} = \frac{5}{50} = 0.10 = 10\%$$

Stock Market

- Dealers vs. Brokers
- New York Stock Exchange (NYSE)
 - Largest stock market in the world
 - License holders (1,366)
 - Commission brokers
 - Specialists
 - Floor brokers
 - Floor traders
 - 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

The Singapore Exchange

- Visit www.sgx.com.sg
- Select “Prices” from the menu on the left
 - Click on the following stocks to find the buy and sell quotes for selected stocks
 - SGX
 - Wilma
 - DBS Bank



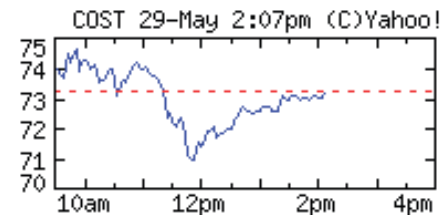
Reading Stock Quotes

- Sample Quote

COSTCO WHOLESALE C (NasdaqGS: COST)

NEW Real-time: 73.31 ↑ .07 (.10%) 2:28PM ET

Last Trade:	73.28	Day's Range:	70.67 - 74.75
Trade Time:	2:13PM ET	52wk Range:	54.85 - 75.23
Change:	↑ .04 (.05%)	Volume:	6,857,298
Prev Close:	73.24	Avg Vol (3m):	4,929,560
Open:	73.83	Market Cap:	31.75B
Bid:	73.27 x 100	P/E (ttm):	27.63
Ask:	73.28 x 100	EPS (ttm):	2.65
1y Target Est:	70.17	Div & Yield:	.64 (.90%)



1d 5d 3m 6m 1y 2y 5y max
[customize chart](#)

- [+ Add COST to Your Portfolio](#)
- [🔔 Set Alert for COST](#)
- [📄 Download Data](#)
- [📄 Download Annual Report](#)
- [+ Add Quotes to Your Web Site](#)

- What information is provided in the stock quote?

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?



End of Chapter