



## Finance for Cultural Organisations

### Lecture 6. Stock Valuation

# Lecture 6: Stock Valuation

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- 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

## Reading

- RWJ Ch8, HBP Ch5,6.

# Cash Flows for Stockholders

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- 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

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- Suppose you are thinking of purchasing the stock of Moore Oil, Inc. and 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
  - $\text{Price} = (14 + 2) / (1.2) = \$13.33$
  - Or  $\text{FV} = 16; \text{I/Y} = 20; \text{N} = 1; \text{CPT PV} = -13.33$

# Two-Period Example

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- 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

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- 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

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- 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

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- 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
- Supernormal growth
  - Dividend growth is not consistent initially, but settles down to constant growth eventually





# Zero Growth

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- 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

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- 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:

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



# DGM – Example 1

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- Suppose Big D, Inc. just paid 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?
- $P_0 = .50(1+.02) / (.15 - .02) = \$3.92$

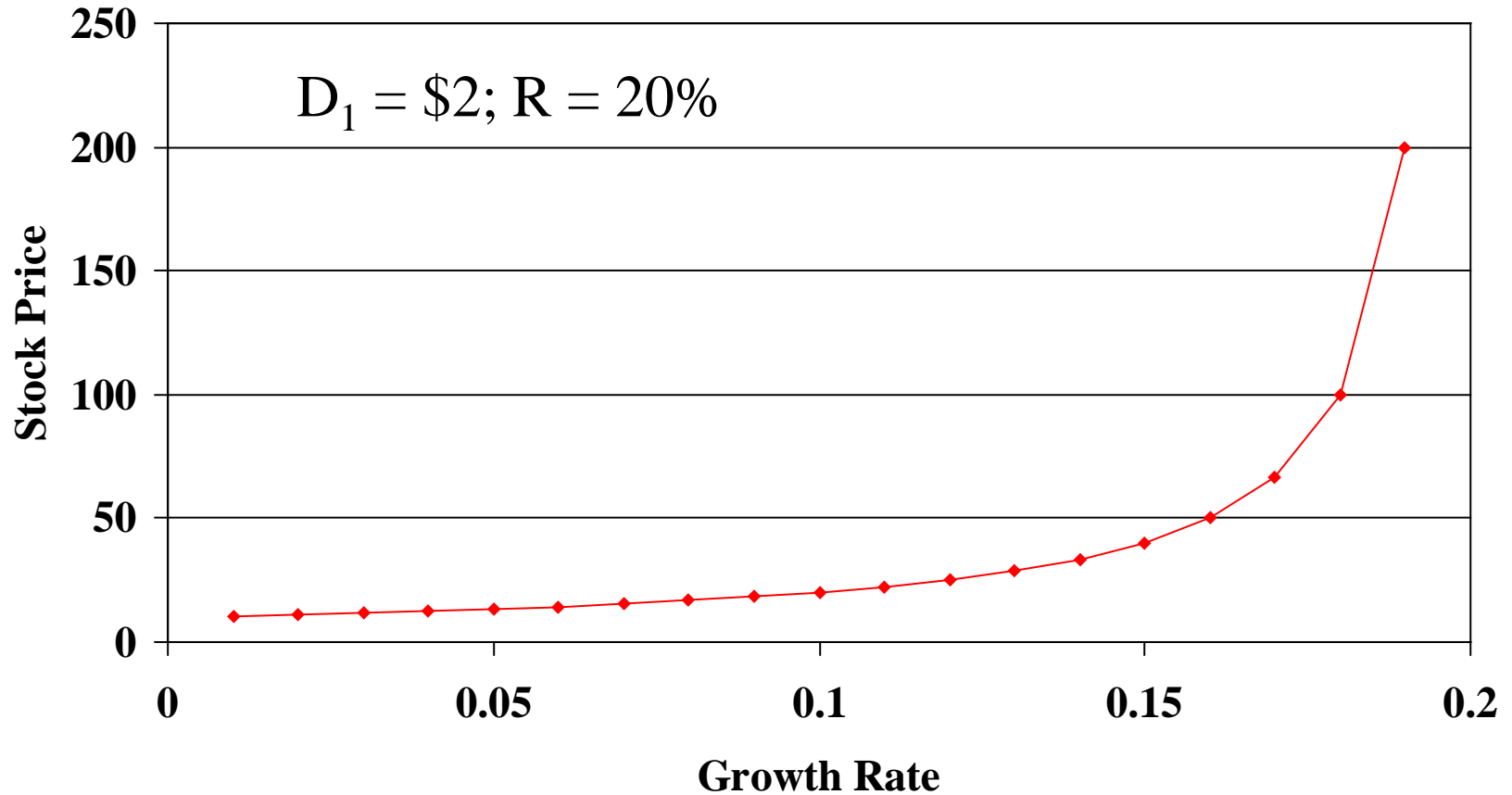


## DGM – Example 2

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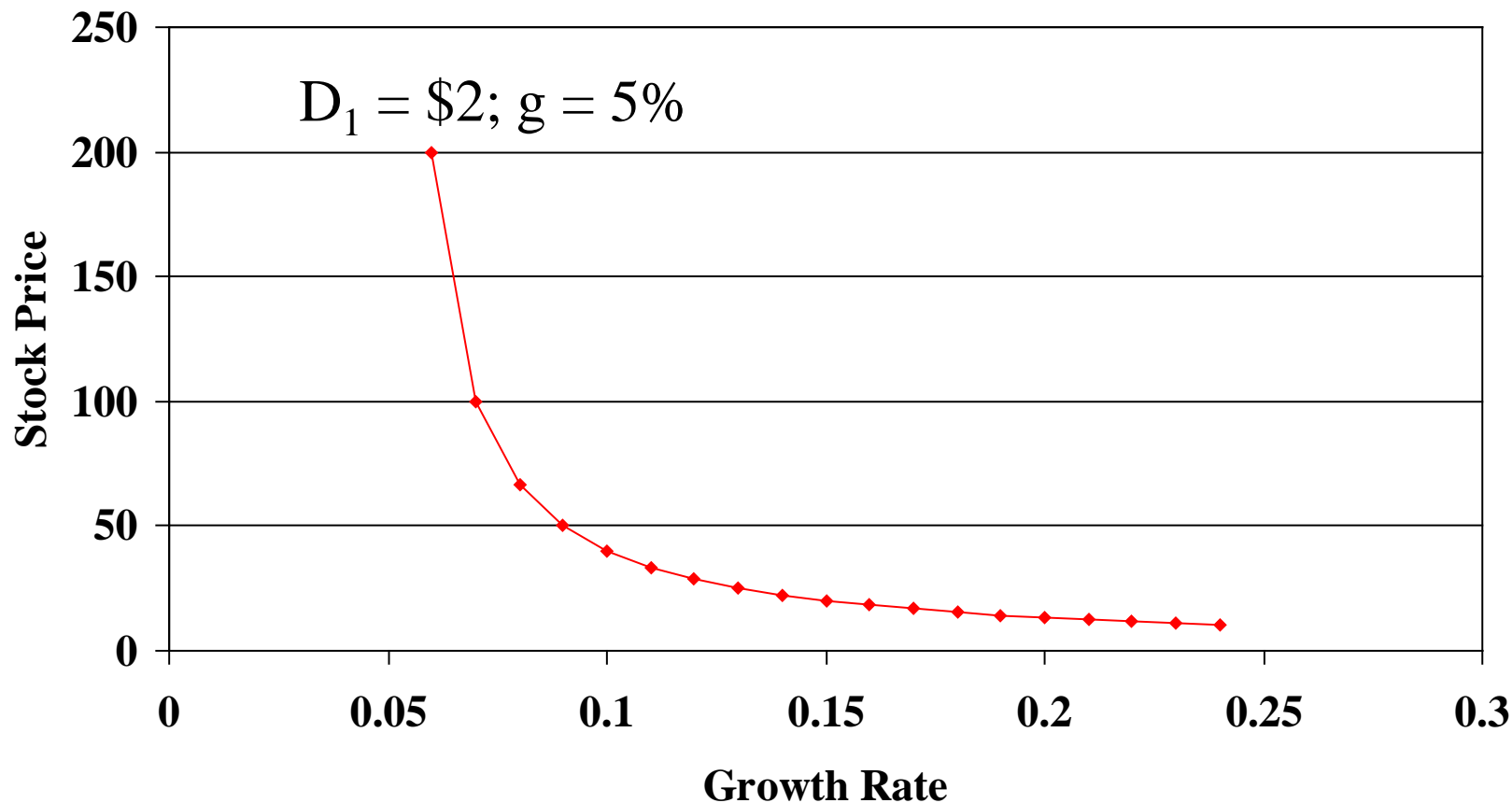
- Suppose TB Pirates, Inc. is expected to pay a \$2 dividend in one year. If the dividend is expected to grow at 5% per year and the required return is 20%, what is the price?
  - $P_0 = 2 / (.2 - .05) = \$13.33$
  - Why isn't the \$2 in the numerator multiplied by (1.05) in this example?

# Stock Price Sensitivity to Dividend Growth, $g$





# Stock Price Sensitivity to Required Return, R





# Example Gordon Growth Company - I

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- 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 Gordon Growth Company - II

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- 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?
  - $50.50 = 40(1+\text{return})^4$ ; return = 6%
  - PV = -40; FV = 50.50; N = 4; CPT I/Y = 6%
- The price grows at the same rate as the dividends



# Nonconstant Growth Problem Statement

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- 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 Solution

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- 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

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- 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

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- Start with the DGM:

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

rearrange and solve for R

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



# Finding the Required Return - Example

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- Suppose a firm's stock is selling for \$10.50. They 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?
  - $g = 5\%$

## 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).

# Summary of Stock Valuation

# Features of Common Stock

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- 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

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- 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

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- 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

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- Dealers vs. Brokers
- New York Stock Exchange (NYSE)
  - Largest stock market in the world
  - Members
    - Own seats on the exchange
    - Commission brokers
    - Specialists
    - Floor brokers
    - Floor traders
  - Operations
  - Floor activity



# NASDAQ

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- 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

## Quick Quiz – Part II

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- 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?



# Comprehensive Problem

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- 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?