

## Chapter 8 Stock Valuation

### Chapter Organization

- 8.1 Common Stock Valuation
- 8.2 Common Stock Features
- 8.3 Preferred Stock Features
- 8.3 Stock Market Reporting
- 8.4 Summary and Conclusions

## T8.2 Common Stock Cash Flows and the Fundamental Theory of Valuation

- In 1938, John Burr Williams postulated what has become the fundamental theory of valuation:

The value *today* of any financial asset equals the present value of all of its *future* cash flows.

- For common stocks, this implies the following:

$$P_0 = \frac{D_1}{(1+R)^1} + \frac{P_1}{(1+R)^1} \quad \text{and} \quad P_1 = \frac{D_2}{(1+R)^1} + \frac{P_2}{(1+R)^1}$$

substituting for  $P_1$  gives

$$P_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{P_2}{(1+R)^2} \cdot \text{Continuing to substitute, we obtain}$$

$$P_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{D_3}{(1+R)^3} + \frac{D_4}{(1+R)^4} + \dots$$

## T8.3 Common Stock Valuation: The Zero Growth Case

- According to the fundamental theory of value, the value of a financial asset at any point in time equals the present value of all future dividends.
- If all future dividends are the same, the present value of the dividend stream constitutes a *perpetuity*.
- The present value of a perpetuity is equal to

$C/r$  or, in this case,  $D_1/R$ .

- Question: Cooper, Inc. common stock currently pays a \$1.00 dividend, which is expected to remain constant forever. If the required return on Cooper stock is 10%, what should the stock sell for today?
- Answer:  $P_0 = \$1/.10 = \$10$ .
- Question: Given no change in the variables, what will the stock be worth in one year?

## T8.3 Common Stock Valuation: The Zero Growth Case (concluded)

- Answer: One year from now, the value of the stock,  $P_1$ , must be equal to the present value of all remaining future dividends.

Since the dividend is constant,  $D_2 = D_1$ , and

$$P_1 = D_2/R = \$1/.10 = \$10.$$

In other words, in the absence of any changes in expected cash flows (and given a constant discount rate), *the price of a no-growth stock will never change.*

Put another way, *there is no reason to expect capital gains income* from this stock.

## T8.4 Common Stock Valuation: The Constant Growth Case

- In reality, investors generally expect the firm (and the dividends it pays) to grow over time. How do we value a stock when each dividend differs from the one preceding it?
- As long as the rate of change from one period to the next,  $g$ , is constant, we can apply the *growing perpetuity* model:

$$P_0 = \frac{D_1}{(1+R)^1} + \frac{D_2}{(1+R)^2} + \frac{D_3}{(1+R)^3} + \dots = \frac{D_0(1+g)^1}{(1+R)^1} + \frac{D_0(1+g)^2}{(1+R)^2} + \frac{D_0(1+g)^3}{(1+R)^3} + \dots$$

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

- Now assume that  $D_1 = \$1.00$ ,  $r = 10\%$ , but dividends are expected to increase by 5% annually. What should the stock sell for today?

## T8.4 Common Stock Valuation: The Constant Growth Case (concluded)

- Answer: The equilibrium value of this constant-growth stock is

$$\frac{D_1}{R - g} = \frac{\$1.00}{.10 - .05} = \$20$$

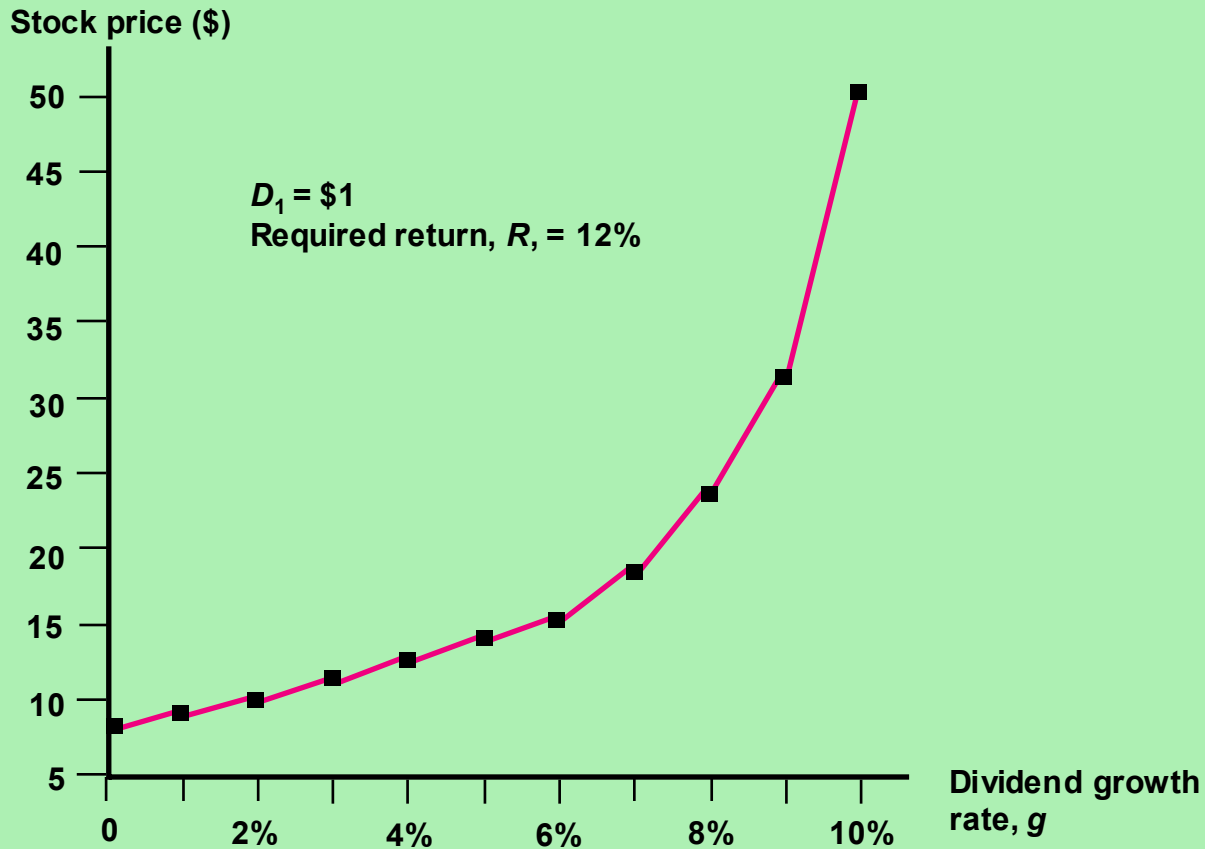
- Question: What would the value of the stock be if the growth rate were only 3%?

- Answer:

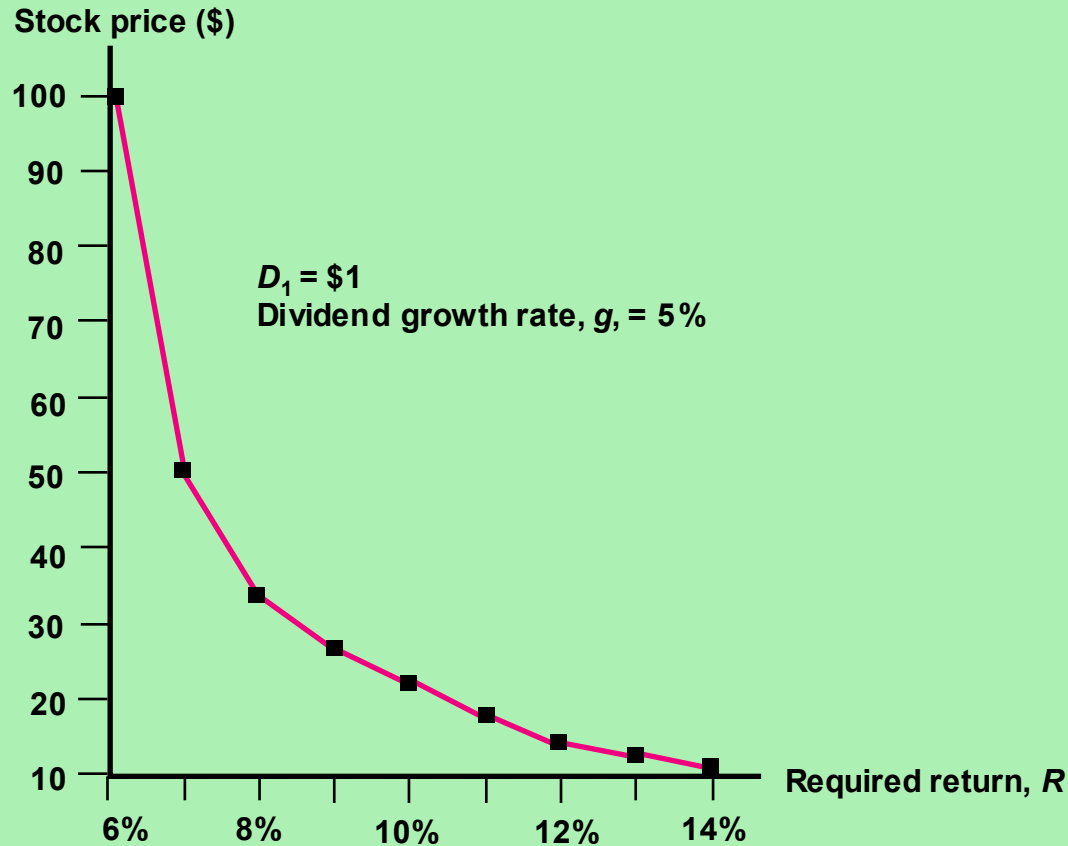
$$\frac{D_1}{R - g} = \frac{\$1.00}{.10 - .03} = \$14.29.$$

Why does a lower growth rate result in a lower value? Stay tuned.

## T8.5 Stock Price Sensitivity to Dividend Growth, $g$



## T8.6 Stock Price Sensitivity to Required Return, $r$



## T8.7 Common Stock Valuation - The Nonconstant Growth Case

- For many firms (especially those in new or high-tech industries), dividends are low but are expected to grow rapidly. As product markets mature, the dividend growth rate is then expected to slow to a “steady state” rate. How should stocks such as these be valued?
- Answer: We return to the fundamental theory of value - the value today equals the present value of all future cash flows.
- Put another way, the *nonconstant growth model* suggests that

$P_0$  = present value of dividends in the nonconstant growth period(s)  
+ present value of dividends in the “steady state” period.

## T8.8 Chapter 8 Quick Quiz -- Part 1 of 3

- Suppose a stock has just paid a \$5 per share dividend. The dividend is projected to grow at 5% per year indefinitely. If the required return is 9%, then the price today is \_\_\_\_\_ ?

$$\begin{aligned}P_0 &= D_1/(R - g) \\ &= \$5 \times ( \_\_\_\_ ) / ( \_\_\_\_ - \_\_\_\_ ) \\ &= \$5.25/.04 \\ &= \$\_\_\_\_ \text{ per share}\end{aligned}$$

- What will the price be in a year?

$$\begin{aligned}P_t &= D_{t+1}/(R - g) \\ P_1 &= D_{\_\_\_\_} / (R - g) = (\$ \_\_\_\_ \times 1.05) / (.09 - .05) = \$137.8125\end{aligned}$$

- By what percentage does  $P_1$  exceed  $P_0$ ? Why?

## T8.8 Chapter 8 Quick Quiz -- Part 1 of 3 (concluded)

- Suppose a stock has just paid a \$5 per share dividend. The dividend is projected to grow at 5% per year indefinitely. If the required return is 9%, then the price today is \_\_\_\_\_ ?

$$\begin{aligned}P_0 &= D_1/(R - g) \\ &= \$5 \times (1.05) / (.09 - .05) \\ &= \$5.25 / .04 \\ &= \$131.25 \text{ per share}\end{aligned}$$

- What will the price be in a year?

$$\begin{aligned}P_t &= D_{t+1}/(R - g) \\ P_1 &= D_2 / (R - g) = (\$5.25 \times 1.05) / (.09 - .05) = \$137.8125\end{aligned}$$

- By what percentage does  $P_1$  exceed  $P_0$ ? Why?

$P_1$  exceeds  $P_0$  by 5% -- *the capital gains yield.*

## T8.9 Chapter 8 Quick Quiz -- Part 2 of 3

- Find the required return:

Suppose a stock has just paid a \$5 per share dividend. The dividend is projected to grow at 5% per year indefinitely. If the stock sells today for \$65 <sup>5</sup>/<sub>8</sub>, what is the required return?

$$P_0 = D_1 / (R - g)$$

$$(R - g) = D_1 / P_0$$

$$R = D_1 / P_0 + g$$

$$= \$5.25 / \$65.625 + .05$$

$$= \text{dividend yield (_____)} + \text{capital gains yield (_____)}$$

$$= \underline{\hspace{2cm}}$$

## T8.9 Chapter 8 Quick Quiz -- Part 2 of 3

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$$P_0 = D_1 / (R - g)$$

$$(R - g) = D_1 / P_0$$

$$R = D_1 / P_0 + g$$

$$= \$5.25 / \$65.625 + .05$$

$$= \text{dividend yield (}.08\text{)} + \text{capital gains yield (}.05\text{)}$$

$$= .13 = 13\%$$

## T8.10 Summary of Stock Valuation (Table 8.1)

### 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:

$$P_0 = D_1 / (R - g)$$

This result is the *dividend growth model*.

## T8.10 Summary of Stock Valuation (Table 8.1) (concluded)

### 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

$$P_0 = \frac{D_{t+1} \times (1+g)}{(R-g)}$$

### 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).

## T8.11 Features of Common Stock

### ■ Features of Common Stock

*The right to vote - including major events like takeovers*

*The right to share proportionally in dividends paid*

*The right to share proportionally in assets remaining after liabilities have been paid, in event of a liquidation*

*The preemptive right*

### ■ Dividends

*Not a liability until declared by the Board of Directors*

*Unlike interest on debt, dividends are not tax deductible to the firm*

*However, shareholder receipt of dividends does have preferential tax treatment (See Chapter 2)*

## T8.11 Features of Common Stock

- Classes of Stock

*Dual Class shares are becoming more commonplace*

*Usually classes divide into voting and non-voting shares*

*“Coattail” provisionally invoked at the time of a takeover*

*Some dual class shares allow foreign investment without foreign control*

## T8.12 Features of Preferred Stock

- Features of Preferred Stock

*Preferences over common stock - dividends, liquidation*

*Dividend arrearages*

*Cumulative and non-cumulative*

*Stated/liquidating value*

*Is preferred stock really debt?*

*Preferred stock and taxes*

*Tax treatment differs from debt*

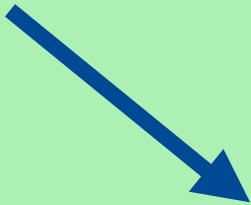
*Differential tax treatment suggests a preferred stock clientele*

## T8.13 Stock Market Reporting

- Primary vs. secondary markets
- Growth opportunities
  - ◆ Share price for a firm that pays in perpetuity all earnings as dividends but which has no growth opportunities
$$P = \text{EPS}/r = \text{Div}/r$$
  - ◆ Share price for the same firm with growth opportunities
$$P = \text{EPS}/r + \text{NPVGO}$$
  - ◆ We can relate this to the Price earnings ratio by dividing the equation by EPS:
$$P/E = 1/r + \text{NPVGO}/\text{EPS}$$

## T8.14 Sample Stock Quotation from *The National Post* (Figure 8.1)

Insert Figure 8.1



## T8.15 Chapter 8 Quick Quiz -- Part 3 of 3

- Suppose a stock has just paid a \$5 per share dividend. The dividend is projected to grow at 10% for the next two years, the 8% for one year, and then 6% indefinitely. The required return is 12%. What is the stock's value?

Time	Dividend	
0	\$ 5.00	
1	\$ _____	(10% growth)
2	\$ _____	(10% growth)
3	\$6.534	( ___% growth)
4	\$6.926	( ___% growth)

## T8.15 Chapter 8 Quick Quiz -- Part 3 of 3

- Suppose a stock has just paid a \$5 per share dividend. The dividend is projected to grow at 10% for the next two years, the 8% for one year, and then 6% indefinitely. The required return is 12%. What is the stock's value?

Time	Dividend	
0	\$ 5.00	
1	\$ 5.50	(10% growth)
2	\$ 6.05	(10% growth)
3	\$6.534	( 8% growth)
4	\$6.926	( 6% growth)

## T8.15 Chapter 8 Quick Quiz -- Part 3 of 3 (concluded)

- At time 3, the value of the stock will be:

$$P_3 = D_4/(R - g) = \$\_\_\_\_\_\_ / (.12 - .06) = \$115.434$$

- The value today of the stock is thus:

$$\begin{aligned} P_0 &= D_1/(1 + R) + D_2/(1 + R)^2 + D_3/(1 + R)^3 + P_3/(1 + R)^3 \\ &= \$5.5/1.12 + \$6.05/1.12^2 + \$6.534/1.12^3 + \$115.434/1.12^3 \\ &= \$96.55 \end{aligned}$$

## T8.15 Chapter 8 Quick Quiz -- Part 3 of 3 (concluded)

- At time 3, the value of the stock will be:

$$P_3 = D_4/(R - g) = \$6.926/(\.12 - .06) = \$115.434$$

- The value today of the stock is thus:

$$\begin{aligned} P_0 &= D_1/(1 + R) + D_2/(1 + R)^2 + D_3/(1 + R)^3 + P_3/(1 + R)^3 \\ &= \$5.5/1.12 + \$6.05/1.12^2 + \$6.534/1.12^3 + \$115.434/1.12^3 \\ &= \$96.55 \end{aligned}$$

## T8.16 Solution to Problem 8.1

- Green Mountain, Inc. just paid a dividend of \$2.00 per share on its stock. The dividends are expected to grow at a constant 5 percent per year indefinitely. If investors require a 12 percent return on Favre stock, what is the current price? What will the price be in 3 years? In 15 years?

- According to the constant growth model,

$$P_0 = D_1 / (R - g) = \$2.00(1.05) / (.12 - .05) = \$30.00$$

- If the constant growth model holds, the price of the stock will grow at  $g$  percent per year, so

$$P_3 = P_0 \times (1 + g)^3 = \$30.00 \times (1.05)^3 = \$34.73, \text{ and}$$

$$P_{15} = P_0 \times (1 + g)^{15} = \$30.00 \times (1.05)^{15} = \$62.37.$$

## T8.17 Solution to Problem 8.10

- Metallica Bearings, Inc. is a young start-up company. No dividends will be paid on the stock over the next 5 years. The company will pay a \$6 per share dividend in six years and will increase the dividend by 5% per year thereafter. If the required return on this stock is 21%, what is the current share price?
- The current market price of any financial asset is the present value of its future cash flows, discounted at the appropriate required return. In this case, we know that:

$$D_1 = D_2 = D_3 = D_4 = D_5 = 0$$

$$D_6 = \$6.00$$

$$D_7 = \$6.00(1.05) = \$6.30$$

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## T8.17 Solution to Problem 8.10 (concluded)

- This share of stock represents a stream of cash flows with two important features:

First, because they are expected to grow at a constant rate (once they begin), they are a *growing perpetuity*;

Second, since the first cash flow is at time 6, the perpetuity is a *deferred* cash flow stream.

- Therefore, the answer requires two steps:
  1. By the constant-growth model,  $D_6/(r - g) = P_5$ ;  
i.e.,  $P_5 = \$6.00/(\.21 - .05) = \$37.50$ .
  2. And,  $P_0 = P_5 \times 1/(1 + .21)^5 = \$37.50 \times .3855 = \$14.46$ .