

Chapter Outline

Stock Valuation

Chapter Organization

- Common Stock Valuation
- Common Stock Features
- Preferred Stock Features
- Stock Market Reporting
- Summary and Conclusions

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 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

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

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

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?
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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.*

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 than 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?

Common Stock Valuation: The Constant Growth Case (concluded)

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

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

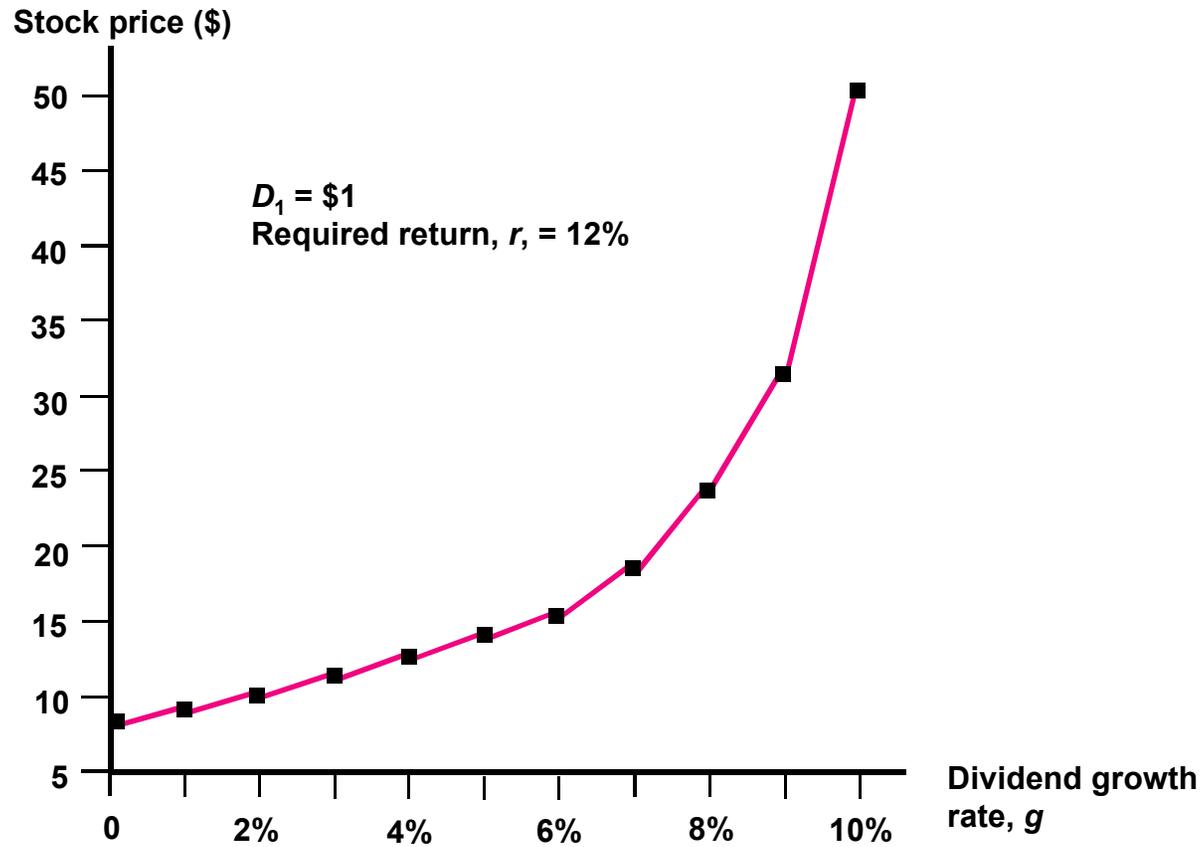
- **Question:** What would the value of the stock be if the growth rate were only 3%?

- **Answer:**

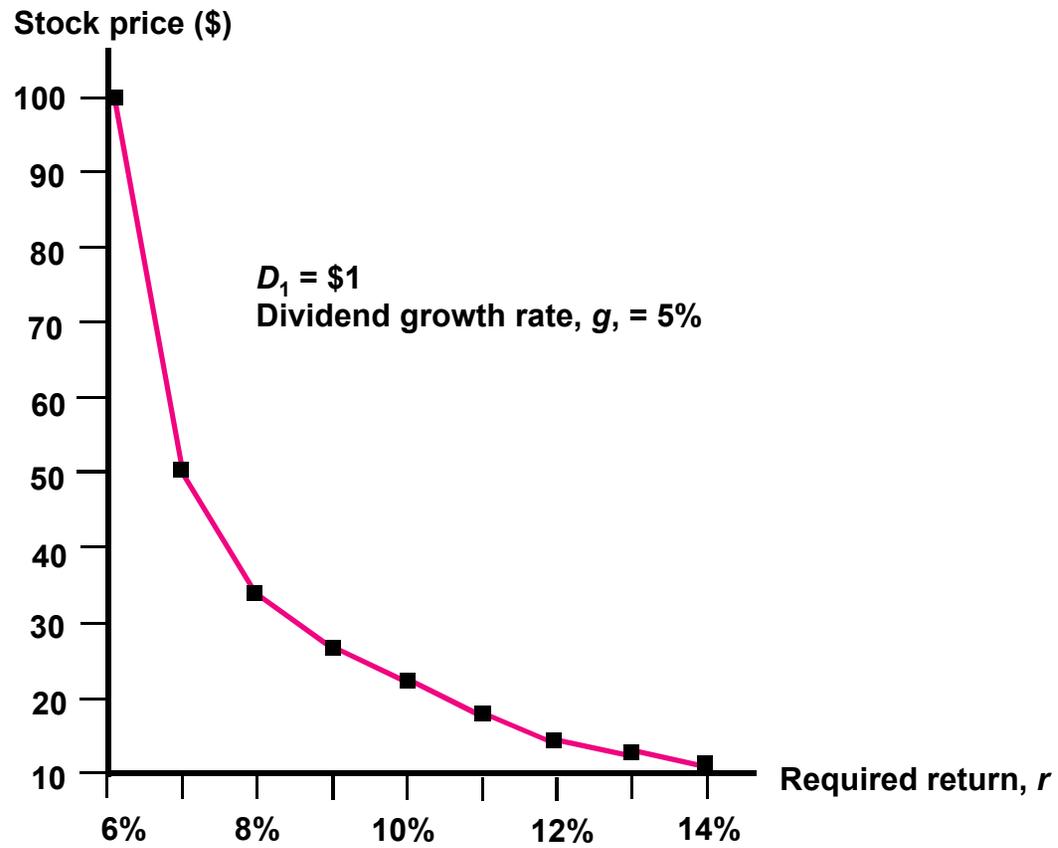
$$\frac{D_1}{r - g} = \frac{\$1.00}{.10 - .03} = \$14.29.$$

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

Stock Price Sensitivity to Dividend Growth, g



Stock Price Sensitivity to Required Return, r



Common Stock Valuation - The Nonconstant Growth Case

- For many firms (especially those in new or high-tech industries), dividends are low and expected to grow rapidly. As product markets mature, dividends are then expected to slow to some “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.

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 _____ ?

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

- What will the price be in a year?

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

- By what percentage does P_1 exceed P_0 ? Why?

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 ⁵/₈, what is the required return?

$$\begin{aligned} P_0 &= D_1 / (r - g) \\ (r - g) &= D_1 / P_0 \\ r &= D_1 / P_0 + g \\ &= \$5.25 / \$65.625 + .05 \\ &= \text{dividend yield (_____)} + \text{capital gain yield (_____)} \\ &= \underline{\hspace{2cm}} \end{aligned}$$

Summary of Stock Valuation (Table)

I. The General Case

In general, the price today of a share of stock, P_0 , is the present value of all 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*.

III. 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 gain yield*.

Sample Stock Quotation from *The Financial Post* (Excerpts from Figure)

The Financial Post, June 17, 1998, p.32
Toronto Quotations as of June 16, 1998

52 Weeks		Stock	Sym	Div	Yld %	PE	Vol 00s	Hi	Lo	Close	Net Chg.
Hi	Lo										
30.60	27.00	Bell10pf	BC	1.86	6.7	...	nt	29.00	27.30	27.90	...
3.60	0.61	Bellator	BEX	...	...	...	290	0.65	0.65	0.65	...
9.15	2.35	Bemagld	BGO	...	...	...	1085	2.70	2.60	2.65	+0.08
2.05	1.00	Benson	BEN	...	...	18.3	26	1.23	1.10	1.10	...
39.55	25.00	BombardrA	BBD	0.34	0.9	29.5	8	37.45	36.85	36.90	-.25

Source: Reprinted by permission of *The Financial Post*, June 17, 1998, p.32.

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)

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:

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

Solution to Problem

- **Green Mountain, Inc. just paid a dividend of \$3.00 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 MegaCapital stock, what is the current price? What will the price be in 3 years? In 15 years?**

- **According to the constant growth model,**

$$P_0 = D_1 / (r - g) = \$3(1.05) / (.12 - .05) = \$45$$

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

$$P_3 = P_0 \times (1 + g)^3 = \$45 \times (1.05)^3 = \$52.09, \text{ and}$$

$$P_{15} = P_0 \times (1 + g)^{15} = \$45 \times (1.05)^{15} = \$93.55.$$

Solution to Problem

- **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 then begin paying a \$6.00 dividend, and will increase the dividend by 5% per year thereafter. If the required return on this stock is 23%, 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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Solution to Problem (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., $P_5 = \$6.00/(\.23 - .05) = \$______.$

2. And, $P_0 = P_5 \cdot 1/(1 + .23)^5 = \$33.33 \cdot .3552 = \$11.84.$
