



Financial Management

Stock Valuation

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Valuing Stocks

✦ Stock valuation is harder and less scientific than bond valuation

- much more difficult to estimate cash flows
- cash flows go on “forever”
- estimating discount rate is challenging

✦ Valuing equity

- Relative Valuation
 - Uses “multiples” of “comparable” companies
 - P/E, P/S, etc.
- DCF based models
 - dividend discount model
 - free cash flow method

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Dividend Discount Model

- A classic way to value stock is to look at the explicit cash flow that shareholders earn: dividends plus a future sale price
- Valuation with a finite or infinite horizon:
 - assume, for example, that the stock is sold right after the 4th dividend is received (at the end of the fourth year)
 - for stock valuation problems, assume annual compounding
 - the current value (price) of a stock can be written as

$$P_0 = \frac{D_1}{(1+r)} + \frac{D_2}{(1+r)^2} + \frac{D_3}{(1+r)^3} + \frac{D_4}{(1+r)^4} + \frac{P_4}{(1+r)^4}$$

- With an infinite horizon:

$$P_0 = D_1/(1+r) + D_2/(1+r)^2 + D_3/(1+r)^3 + \dots \text{ forever. .}$$

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Case 1: Zero Growth

- 💡 Assume that dividends will remain at the same level forever, i.e. $D_1 = D_2 = \dots = D_t$
- 💡 Since future cash flows are constant, the value of a zero growth stock is the present value of a perpetuity:

$$P_0 = D_1 / r$$

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Case 2: Constant Growth

☀ It may be reasonable to assume that the dividends of a mature company will grow at a constant rate, g , forever, i. e.,

$$D_1 = D_0 \times (1+g)$$

$$D_2 = D_1 \times (1+g), \text{ etc., etc.. and}$$

$$D_t = D_0 \times (1+g)^t$$

e.g., if dividend is \$2 today (D_0) and the expected growth rate is 5%, then $D_5 = D_0 \times (1.05)^5 = \$2 \times 1.276 = \$2.55$

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Growing Perpetuity

– If the cash flows grow at a constant rate forever, this is simply a growing perpetuity, and the value of a stock can be written as:

$$P_0 = \sum_{t=1}^{\infty} D_0 \frac{(1+g)^t}{(1+r)^t}$$

– As long as $g < r$, the present value at the rate r of dividends growing at the rate g is:

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

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Case 3: Differential Growth

- ☛ Assume that dividends will grow at different rates in the foreseeable future and then will grow at a constant rate thereafter
 - a mix of "supernormal" growth early on and then a constant, "normal" growth rate later (mature company)
- ☛ To value a Differential Growth Stock, we need to:
 - estimate future dividends in the foreseeable future
 - estimate the future stock price when the stock becomes a Constant Growth Stock (case 2)
 - compute the total present value of the estimated future dividends and stock price at the appropriate discount rate

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A Differential Growth Example

- ☛ $r = 12\%$ (investors' required return)
- ☛ $g_1 = g_2 = g_3 = 8\%$; $g_4 = g_5 = \dots = 4\%$
- ☛ $D_0 = \$2$
- ☛ $D_1 = \$2 \times 1.08 = \2.16 , $D_2 = \$2.33$, $D_3 = \$2.52$
- ☛ Use Case 2 (constant growth) to compute P_3
 - imagine that you are at $t=3$ looking forward
- ☛ $D_4 = \$2.52 \times 1.04 = \2.62
- ☛ $P_3 = \$2.62 / (.12 - .04) = \32.75

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Differential Growth Cash Flows

☀ Expected future cash flows of this stock:

0	1	2	3	
----- ----- -----				(r = 12%)
	D_1	D_2	$D_3 + P_3$	
	2.16	2.33	2.52 + 32.75	

☀ $P_0 = 2.16/1.12 + 2.33/1.12^2 + 35.27/1.12^3 = \28.89

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Another Example/Exercise

☀ A slight variation to the previous example

- During the next three years there will be very high growth in dividends, but not at an equal rate every year. The next three dividends for Fudgit Co. are expected to be \$0.50, \$1.00, and \$1.50.
- Starting in the fourth year, the dividends are expected to grow at a constant 5% forever (the dividend in the fourth year will be $1.50 * (1 + 5\%)$).
- If the required return on Fudgit is 10%, what is P_0 ?

Total Present Value = PV(Dividends) + PV(P_3)

where $P_3 = [D_3 * (1+g)] / (r - g) = 1.5(1.05) / (.10 - .05) = \$1.575 / .05 = \$31.50$

Stock price = $\$0.454 + \$0.826 + \$1.127 + \$23.67 = \$26.07$

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Price-Earnings Ratios

- ✦ Let's assume that the dividends paid on a stock are a constant fraction of the company's earnings, i.e. that there is a constant payout ratio p (where $D = p * E$).
- ✦ In the constant growth case, we can rewrite the valuation formula as $P_0 = p * E_1 / (r - g)$
- ✦ The "forward-looking" price-earnings ("PE") ratio of the company is thus $P_0 / E_1 = p / (r - g)$.
 - P_0 / E_0 is called the "trailing" PE ratio
- ✦ The PE ratio is high if the denominator is small:
 - if interest rates are low
 - if the company's risk is low (r will be smaller)
 - if the growth rate, g , is high
- ✦ The P/E ratio is the most frequently used "multiple"
 - If a firm's earnings are \$1.20 per year, and the average P/E ratio of "comparable" companies is 15, the stock price can be estimated as $1.20 * 15 = \$18$.

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DCF Analysis

- ✦ To value a stock (or company), the following are required:
 - Some cash flow estimates for the next few (5-10) years (dividends, earnings, free cash flow)
 - Growth rate in the stable growth (terminal) phase
 - Discount rate(s) - we will see how to estimate this later in the course (it will depend on the risk of the cash flows)
 - Since $P = D / (r - g)$, $r = D / P + g$ (see page 114) - this is of limited use
- ✦ EIC (Economy-Industry-Company) analysis
 - conduct in-depth research to estimate future growth rates in revenues and margins (for example)
 - this is the critical "non-finance" component of the analysis

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Intuition behind growth

- ✦ One way to grow a company is by issuing new debt or equity to finance acquisition of new “capital” that generates additional earnings. However, note that if the firm issues equity, the earnings per share (EPS) does not necessarily increase.
- ✦ “Sustainable growth” (growth that doesn’t require new financing) occurs if the company reinvests into its operations.
 - $g = \text{Retention Ratio} * \text{Returned on retained earning}$
 - Example: a company has \$100 in assets, and its operations return 10% a year on these assets, i.e., \$10 in the first year.
 - If the retention ratio is 80%, the firm will now invest \$108 (= \$100 original assets + \$8 in new assets).
 - Its earnings in the second year will be \$10.8 (= 10% * \$108). The growth rate in earnings of 8% equals the retention ratio of 80% times the return on assets of 10%.

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Valuing Growth Opportunities

- ✦ You may occasionally see (e.g. in the textbook), expressions such as $P = E/r + \text{NPVGO}$
 - NPVGO is the NPV of Growth Opportunities
 - For many companies, NPVGO accounts for more than half of the company’s value
- ✦ Valuing NPVGO is the major challenge in valuing stocks
 - New methods (e.g. Real Options Analysis) are being developed to improve the valuation of NPVGO

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Equity Valuation: Summary

- ✿ To be a successful equity analyst, you need to understand some basic financial valuation principles, as well as some of the subtleties involved in estimating cash flows and discount rates. However, you also have to have a very sound understanding of business in general - accounting, economics, strategy, marketing, management, and other related functional areas.
- ✿ If you are interested in learning more about equity valuation, you should:
 - go to www.damodaran.com (click on Valuation)
 - We will also add more as the course progresses.

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