Equity Financing: Valuing Stocks

Gestão Financeira II

Undergraduate Courses

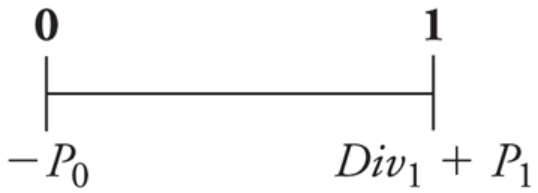
2011-2012

Outline

- The Dividend Discount Model
  - Applying the DDM;
- The Total Payout Model;
- Free Cash Flow Valuation Models;
- Valuation based on Comparable Firms.

The Dividend Discount Model

- Start with a one-year investor (buy now, sell in after 1 year).
  - The timeline with associated cash flows would be:



  - Since the cash flows are risky, we must discount them at the **equity cost of capital (r_E).** Price would be:

$$P_0 = \left(\frac{Div_1 + P_1}{1 + r_E} \right)$$

  - Total Equity Return is due to:

$$r_E = \frac{Div_1 + P_1}{P_0} - 1 = \underbrace{\frac{Div_1}{P_0}}_{\text{Dividend Yield}} + \underbrace{\frac{P_1 - P_0}{P_0}}_{\text{Capital Gain Rate}}$$

The Dividend Discount Model (cont.)

- **Example:**
  - 3M (MMM) is expected to pay dividends of $1.92 per share in the coming year.
  - You expect the stock price to be $85 per share at the end of the year.
  - Investments with equivalent risk have an expected return of 11%.
    - **What is the most you would pay today for 3M stock?**
    - **What dividend yield and capital gain rate would you expect at this price?**

$$P_0 = \frac{Div_1 + P_1}{(1 + r_E)} = \frac{\$1.92 + \$85}{(1.11)} = \$78.31$$

$$\text{Dividend Yield} = \frac{Div_1}{P_0} = \frac{\$1.92}{\$78.31} = 2.45\%$$

$$\text{Capital Gains Yield} = \frac{P_1 - P_0}{P_0} = \frac{\$85.00 - \$78.31}{\$78.31} = 8.54\%$$

  - Total Return = 2.45% + 8.54% = 10.99% ≈ 11%

The Dividend Discount Model: with Constant Growth Rate

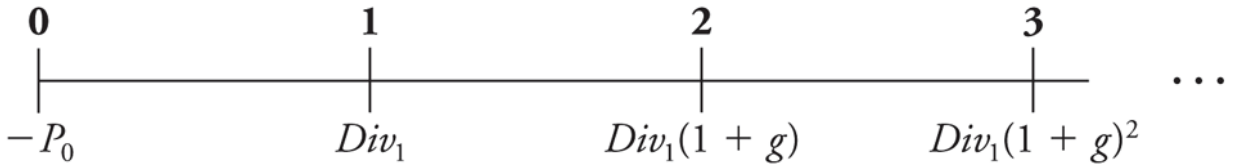
- What is the price if we plan on holding the stock for N years?

$$P_0 = \frac{Div_1}{1 + r_E} + \frac{Div_2}{(1 + r_E)^2} + \cdots + \frac{Div_N}{(1 + r_E)^N} + \frac{P_N}{(1 + r_E)^N}$$

  - This is known as the Dividend Discount Model. Therefore:

$$P_0 = \frac{Div_1}{1 + r_E} + \frac{Div_2}{(1 + r_E)^2} + \frac{Div_3}{(1 + r_E)^3} + \cdots = \sum_{n=1}^{\infty} \frac{Div_n}{(1 + r_E)^n}$$

- How to Apply the Dividend Discount Model?
  - One possibility is assuming Constant Dividend Growth, at a constant rate, *g*, forever.



The Dividend Discount Model: with Constant Growth Rate (cont.)

- With the Constant Dividend Growth Model we have:

$$P_0 = \frac{Div_1}{r_E - g} \qquad r_E = \frac{Div_1}{P_0} + g$$

  - **Example**:
    - AT&T plans to pay $1.44 per share in dividends in the coming year.
    - Its equity cost of capital is 8%.
    - Dividends are expected to grow by 4% per year in the future.
    - **Estimate the value of AT&T's stock.**

$$P_0 = \frac{Div_1}{r_E - g} = \frac{\$1.44}{.08 - .04} = \$36.00$$

The Dividend Discount Model: with Constant Growth Rate (cont.)

Where does the growth rate *g* come from? A simple model assumes:

$$r_E = \frac{Div_1}{P_0} + g$$

$$Div_t = \underbrace{\frac{\text{Earnings}_t}{\text{Shares Outstanding}_t}}_{EPS_t} \times \text{Dividend Payout Rate}_t$$

Dividend Payout Rate: the percentage of earnings distributed as dividends.

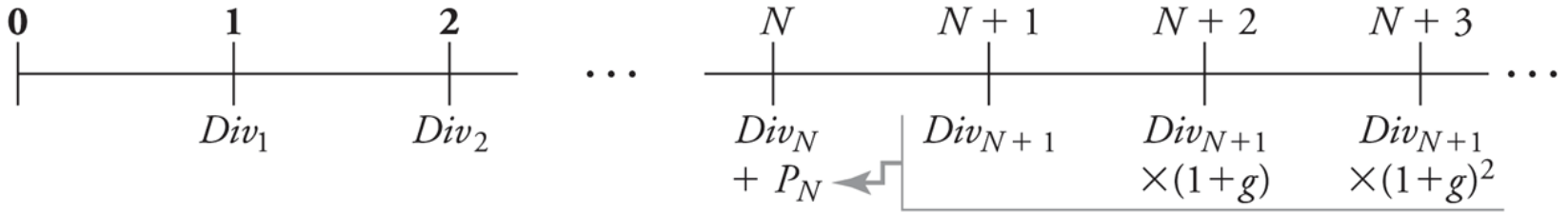
$$g = \text{Retention Rate} \times \text{Return on New Investment}$$

Retention Rate: the fraction of earnings that the firm reinvests

– **Note: if a firm keeps its Retention Rate constant, the growth rate in dividends will equal the growth rate in earnings.**

The Dividend Discount Model: With Changing Growth rates

- We cannot use the constant dividend growth model to value a stock if the growth rate is not constant.
- But we can use the general form of the model to value a firm by applying the constant growth model to calculate the future share price of the stock once the expected growth rate stabilizes. Timeline would be:



- With constant growth from year N+1 onwards:

$$P_N = \frac{Div_{N+1}}{r_E - g}$$

The Dividend Discount Model: With Changing Growth rates (cont.)

- Finally, the Dividend-Discount Model with Constant Long-Term Growth gives us:

$$P_0 = \frac{Div_1}{1 + r_E} + \frac{Div_2}{(1 + r_E)^2} + \cdots + \frac{Div_N}{(1 + r_E)^N} + \frac{1}{(1 + r_E)^N}\left(\frac{Div_{N+1}}{r_E - g}\right)$$

- Example: Small Fry, Inc. invented an extremely innovative potato chip.
  - It considers reinvesting all of its earnings to expand operations. Earnings were $2 per share in the past year and are expected to grow at 20% per year until the end of year 4.
  - After that point, investment will be cut, 60% of earnings will be paid out as dividends, and growth will slow to a long-run rate of 4%.
  - Given Small Fry's equity cost of capital of 8%.
  - **What's the value of a share today?**

The Dividend Discount Model: With Changing Growth rates (cont.)

- Example (cont.):
  - Forecast EPS and Dividends:

Year	0	1	2	3	4	5	6
EPS growth rate (versus previous year)		20%	20%	20%	20%	4%	4%
EPS	$ 2,00	$ 2,40	$ 2,88	$ 3,46	$ 4,15	$ 4,31	$ 4,49
Dividend Payout Rate		0%	0%	0%	60%	60%	60%
Div		$ -	$ -	$ -	$ 2,49	$ 2,59	$ 2,69

Compute Price in perpetuity: ____ _____

Compute Price today:

_____ _____+_____ _____+_____ ____ ____ 49.42

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The Total Payout Model

- With a Stock Repurchase the firm uses excess cash to buy back its own stock.
- If a firm uses Stock Repurchases as a method of paying out, the DDM is restrictive:
  - The more cash the firm uses to repurchase shares, the less it has available to pay dividends.
  - By repurchasing, the firm decreases the number of shares outstanding, which increases its earnings per and dividends per share.
- With Share Repurchases we may use the Total Payout Model.

The Total Payout Model (cont.)

$$PV_0 = \frac{PV(\text{Future Total Dividends and Repurchases})}{\text{Shares Outstanding}_0}$$

- The Total Payout Model starts by valuing total equity of the firm.
  - You discount total dividends and share repurchases and use the growth rate of earnings (rather than earnings per share) when forecasting the growth of the firm's total payouts.
  - Lastly you divide total equity by the number of shares outstanding.

The Total Payout Model (cont.)

- **Example**:
  - Titan Industries has 217 million shares outstanding, and expects earnings of $860 million at the end of this year. The equity cost of capital is 10%.
  - Titan plans to pay out 50% of its earnings, paying 30% as a dividend and using 20% to repurchase shares. The payout rates are expected to remain constant.
  - Titan's earnings are expected to grow by 7.5% per year.
- What's the expected share price of Titan Industries?
  - Total Payout Year 1= 50%x$860 million = $430 million
  - PV(Future Total Dividends and Repurchases)= $\frac{430}{0.1-0.075} = \$17.2 \text{ billion}$
  - Price per share = Po = 17.2 billion/217 million shares = $79.26

The Discounted Free Cash Flow Model

- The Discounted Free Cash Flow Model determines the value of the firm to all investors, including both equity and debt holders (Enterprise Value):

$$\text{Enterprise Value} = \text{Market Value of Equity} + \text{Debt} - \text{Cash}$$

- The model starts by forecasting the Free Cash Flows for the whole company (in total, for equity-holders and debt-holders):

$$\text{Free Cash Flow} = \overbrace{EBIT \times (1 - \tau_c)}^{\text{Unlevered Net Income}} + \text{Depreciation} - \text{Capital Expenditures} - \text{Increases in Net Working Capital}$$

- This could be re-written as:

$$FCF = \overbrace{EBIT(-Tc)}^{} - \text{Net Investment in Fixed Assets} - \text{Increases in NWC}$$

The Discounted Free Cash Flow Model (cont.)

- After estimating the FCFs of the firm they will be discounted at a rate that reflects both the cost of equity (r_E) and the cost of debt.
  - The rate most widely used is the Weighted Average Cost of Capital, r_{wacc}
  - The Enterprise Value is computed as:

$$V_0 = \frac{FCF_1}{1 + r_{\text{wacc}}} + \frac{FCF_2}{(1 + r_{\text{wacc}})^2} + \cdots + \frac{FCF_N}{(1 + r_{\text{wacc}})^N} + \frac{V_N}{(1 + r_{\text{wacc}})^N}$$

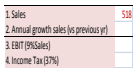
  - with the Terminal Value V_N estimated by assuming a constant long-run growth rate g_{FCF} for free cash flows beyond year N, so that:

$$V_N = \frac{FCF_{N+1}}{r_{wacc} - g_{FCF}} = \frac{FCF_N \times (1 + g_{FCF})}{r_{wacc} - g_{FCF}}$$

The Discounted Free Cash Flow Model (cont.)

- Example: Assume we are at the end of year 2005. Consider the following forecasted FCFs for company KCP. The long-run growth rate for the FCF is 4%, from 2011 onwards. The cost of capital (r_{wacc}) is 11%.

Year	2005	2006	2007	2008	2009	2010	2011
1. Sales	518	564,6	609,8	652,5	691,6	726,2	755,3
2. Annual growth sales (vs previous yr)		9%	8%	7%	6%	5%	4%
3. EBIT (9%Sales)		50,82	54,88	58,72	62,25	65,36	67,97
4. Income Tax (37%)		18,8	20,31	21,73	23,03	24,18	25,15
5. Net Investment (8% Change in Sales)		3,73	3,614	3,415	3,132	2,766	2,324
6. Increases in NWC (10% Change Sales)		4,662	4,517	4,269	3,915	3,458	2,905
7. Free Cash Flow (3-4-5-6)		**23,62**	**26,44**	**29,31**	**32,17**	**34,95**	**37,59**



- To compute the Terminal Value: $V_{2011} = \frac{37.6 \times (+0.04)}{0.11 - 0.04} = \$558.6 \text{million}$
- Enterprise Value is:

$$V_0 = V_{2005} = \frac{23.6}{1.11} + \frac{26.4}{1.11^2} + \frac{29.3}{1.11^3} + \frac{32.2}{1.11^4} + \frac{35.0}{1.11^5} + \frac{37.6 + 558.6}{1.11^6} = \$424.8 \text{million}$$

- Assuming Total Debt of $100 million, $3 million of cash, and a total number of shares outstanding of 21 million, the share price should be:

$$P_{2005} = \frac{424.8 - 100 + 3}{21} = \$24.85$$

The Discounted Free Cash Flow Model (cont.)

- It's absolutely crucial to perform sensitivity analysis!
- Connection to Capital Budgeting:
  - The firm's FCFs is equal to the sum of the FCFs from the firm's current and future investments.
  - We can interpret the firm's enterprise value as the total NPV that the firm will earn from continuing its existing projects and initiating new ones.
  - To maximize the firm's share price, we should accept projects that have a positive NPV.

The Method of Comparables (Comps)

- With the Method of Valuation based on Comparable Firms we estimate the value of the firm based on the value of other, comparable firms or investments that we expect will generate very similar cash flows in the future.
- For chosen comparable firms we compute ratios (multiples) of their market valuations to some performance indicators.
- We then apply those multiples to our firm.

The Method of Comparables (cont.)

- **Valuation Multiples**: A ratio of firm's value to some measure of the firm's scale or cash flow.
  - The Price-Earnings Ratio: P/E Ratio
    - Share price divided by current earnings per share
  - Other versions:
    - Trailing P/E:
      - Trailing Earnings (Earnings over the last 12 months)
    - Forward P/E:
      - Forward Earnings (Expected earnings over the next 12 months)

The Method of Comparables (cont.)

- Example:
  - Best Buy Co. Inc. (BBY) has earnings per share of $2.22.
  - The average P/E of comparable companies' stocks is 19.7.
  - **Estimate a value for Best Buy using the P/E as a valuation multiple.**

  The share price for Best Buy is estimated by multiplying its earnings per share by the P/E of comparable firms.

  $$P_0 = \$2.22 \quad 19.7 = \$43.73$$

The Method of Comparables (cont.)

- Enterprise Value Multiples, such as: $\frac{\text{Enterprise Value}_0}{EBITDA_1}$
- Example:
  - Best Buy Co. Inc. (BBY) has EBITDA of $2,766,000,000 and 410 million shares outstanding.
  - Best Buy also has $1,963,000,000 in debt and $509,000,000 in cash.
  - **If Best Buy has an enterprise value to EBITDA multiple of 7.7, estimate the value for a share of Best Buy stock.**

$$\text{Enterprise Value} = 7.7 \times \$2{,}766{,}000{,}000 = \$21{,}298{,}200{,}000$$

$$P_0 = \frac{21{,}298{,}200{,}000 - 1{,}963{,}000{,}000 + 509{,}000{,}000}{410{,}000{,}000} = \$48.40$$

The Method of Comparables (cont.)

- Examples of Other Multiples
  - Multiple of sales
  - Price to book value of equity per share
  - Enterprise value per subscriber
    - Used in cable TV industry

Comparing the Valuation Methods

- The Dividend Discount Models are hard to implement because it's difficult to estimate dividends – estimating a value for the share price requires detailed knowlegde of financing an payout policies.
- The Method of Comparables is based only on the performance of other firms in the industry. Does not help if our firm has different expectations, or if there is mispricing in the industry.
- **The Discounted Free Cash Flow Method is the most reliable:** based on estimating the fundamentals of the firm, determining total Enterprise Value. Financing choices and payout policy can be taken into account separately.

Lessons for Investors and Corporate Managers

- The Efficient Markets Hypothesis implies that securities will be fairly priced, based on their future cash flows, given all information that is available to investors.

- If stocks are fairly priced, then investors who buy stocks can expect to receive future cash flows that fairly compensate them for the risk of their investment.

- If our estimate of stock price differs strongly from the market price, we must go back and revise the assumptions of our valuation model. We need to know more than other investors in order to disagree with the market valuation