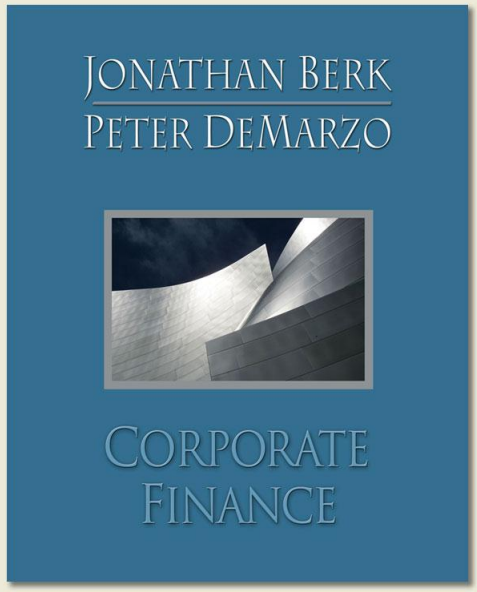


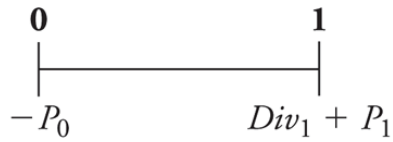
Chapter 6

Valuing Stocks

Chapter Outline

6.1 Stock Prices, Returns, and the Investment Horizon

- A One-Year Investor
  - Potential Cash Flows
    - Dividend + Sale of Stock
  - Time line for One-Year Investor



    - Since the cash flows are risky, we must discount them at the **equity cost of capital.**

6.1 Stock Prices, Returns, and the Investment Horizon (cont'd)

- A One-Year Investor

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

  - If the current stock price were less than this amount, expect investors to rush in and buy it, driving up the stock's price.
  - If the stock price exceeded this amount, selling it would cause the stock price to quickly fall.

Dividend Yields, Capital Gains, and Total Returns

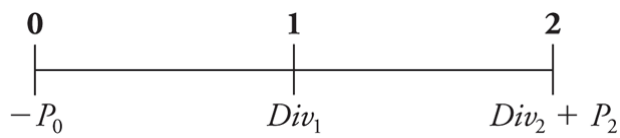
$$r_E = \frac{Div_1 + P_1}{P_0} - 1 = \underbrace{\frac{Div_1}{P_0}}_{\text{Dividend Yield}} + \underbrace{\frac{P_1 - P_0}{P_0}}_{\text{Capital Gain Rate}}$$

- Dividend Yield
- Capital Gain
  - Capital Gain Rate
- Total Return
  - Dividend Yield + Capital Gain Rate
    - *The expected total return of the stock should equal the expected return of other investments available in the market with equivalent risk.*

 6-5

A Multi-Year Investor

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



$$P_0 = \frac{Div_1}{1 + r_E} + \frac{Div_2 + P_2}{(1 + r_E)^2}$$

 6-6

A Multi-Year Investor (cont'd)

- 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.
    - Note that the above equation (9.4) holds for any horizon *N*. Thus all investors (with the same beliefs) will attach the same value to the stock, independent of their investment horizons.

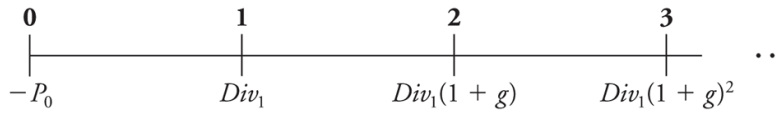
A Multi-Year Investor (cont'd)

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

- *The price of any stock is equal to the present value of the expected future dividends it will pay.*

6.2 The Discount-Dividend Model

- Constant Dividend Growth
  - The simplest forecast for the firm's future dividends states that they will grow at a constant rate, *g*, forever.



6.2 The Discount-Dividend Model (cont'd)

- Constant Dividend Growth Model

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

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

  - The value of the firm depends on the current dividend level, the cost of equity, and the growth rate.

Dividends Versus Investment and Growth (cont'd)

- A Simple Model of Growth

$$\text{Earnings Growth Rate} = \frac{\text{Change in Earnings}}{\text{Earnings}}$$
$$= \text{Retention Rate} \times \text{Return on New Investment}$$

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

  - If the firm keeps its retention rate constant, then the growth rate in dividends will equal the growth rate of earnings.

Dividends Versus Investment and Growth (cont'd)

- Profitable Growth
  - If a firm wants to increase its share price, should it cut its dividend and invest more, or should it cut investment and increase its dividend?
    - The answer will depend on the profitability of the firm's investments.
      - *Cutting the firm's dividend to increase investment will raise the stock price if, and only if, the new investments have a positive NPV.*

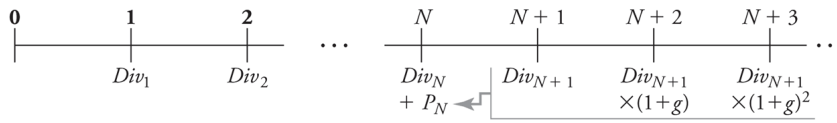
Changing Growth Rates

- We cannot use the constant dividend growth model to value a stock if the growth rate is not constant.
  - For example, young firms often have very high initial earnings growth rates. During this period of high growth, these firms often retain 100% of their earnings to exploit profitable investment opportunities. As they mature, their growth slows. At some point, their earnings exceed their investment needs and they begin to pay dividends.

Changing Growth Rates (cont'd)

- Although we cannot use the constant dividend growth model directly when growth is not constant, 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.

Changing Growth Rates (cont'd)



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

- Dividend-Discount Model with Constant Long-Term Growth

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

Limitations of the Dividend-Discount Model

- There is a tremendous amount of uncertainty associated with forecasting a firm's dividend growth rate and future dividends.
- Small changes in the assumed dividend growth rate can lead to large changes in the estimated stock price.

6.3 Total Payout and Free Cash Flow Valuation Models

- Share Repurchases and the Total Payout Model
  - Share Repurchase
    - When the firm uses excess cash to buy back its own stock
  - Implications for the Dividend-Discount Model
    - 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.

6.3 Total Payout and Free Cash Flow Valuation Models (cont'd)

- Share Repurchases and the Total Payout Model
  - Total Payout Model

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

    - Values all of the firm's equity, rather than a single share. 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.

The Discounted Free Cash Flow Model

- Discounted Free Cash Flow Model
  - Determines the value of the firm to all investors, including both equity and debt holders

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

  - The enterprise value can be interpreted as the net cost of acquiring the firm's equity, taking its cash, paying off all debt, and owning the unlevered business.

The Discounted Free Cash Flow Model (cont'd)

- Valuing the Enterprise

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

  - Free Cash Flow
    - Cash flow available to pay both debt holders and equity holders
  - Discounted Free Cash Flow Model

$$V_0 = PV(\text{Future Free Cash Flow of Firm})$$

$$P_0 = \frac{V_0 + \text{Cash}_0 - \text{Debt}_0}{\text{Shares Outstanding}_0}$$

The Discounted Free Cash Flow Model (cont'd)

- Implementing the Model
  - Since we are discounting cash flows to both equity holders and debt holders, the free cash flows should be discounted at the firm's weighted average cost of capital, r_{wacc}. If the firm has no debt, $r_{wacc} = r_E$.

The Discounted Free Cash Flow Model (cont'd)

- Implementing the Model

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

  - Often, the terminal value is estimated by assuming a constant long-run growth rate g_{FCF} for free cash flows beyond year N, so that:

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

The Discounted Free Cash Flow Model (cont'd)

- Connection to Capital Budgeting
  - The firm's free cash flow is equal to the sum of the free cash flows from the firm's current and future investments, so 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.
    - The NPV of any individual project represents its contribution to the firm's enterprise value. To maximize the firm's share price, we should accept projects that have a positive NPV.

Figure 9.1 A Comparison of Discounted Cash Flow Models of Stock Valuation

Present Value of ...	Determines the ...
Dividend Payments	Stock Price
Total Payouts (All Dividends and Repurchases)	Equity Value
Free Cash Flow (Cash available to pay all security holders)	Enterprise Value