CHAPTER 13
Equity Valuation

13.1 VALUATION BY COMPARABLES

Fundamental Stock Analysis: Models of Equity Valuation

- Basic Types of Models
  - Balance Sheet Models
  - Dividend Discount Models
  - Price/Earnings Models

- Estimating Growth Rates and Opportunities

Models of Equity Valuation

- Valuation models use comparables
  - Look at the relationship between price and various determinants of value for similar firms
- The internet provides a convenient way to access firm data. Some examples are:
  - EDGAR
  - Finance.yahoo.com

Table 13.1 Microsoft Corporation Financial Highlights

<table>
<thead>
<tr>
<th>Valuation Method</th>
<th>January 1, 2006</th>
<th>Industry Avg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Book value</td>
<td>53.6</td>
<td>32.7</td>
</tr>
<tr>
<td>Market value</td>
<td>99.9</td>
<td>72.7</td>
</tr>
<tr>
<td>Liquidation value</td>
<td>33.3</td>
<td>23.3</td>
</tr>
<tr>
<td>Replacement cost</td>
<td>56.6</td>
<td>34.4</td>
</tr>
</tbody>
</table>

13.2 INTRINSIC VALUE VERSUS MARKET PRICE

Expected Holding Period Return
- The return on a stock investment comprises cash dividends and capital gains or losses.
  - Assuming a one-year holding period:

\[
\text{Expected HPR} = E(r_t) = \frac{E(D_t) + [E(P_t) - P_0]}{P_0}
\]

Required Return
- CAPM gave us required return:
  \[k = r_f + \beta \left( E(r_{kt}) - r_f \right)\]

- If the stock is priced correctly
  - Required return should equal expected return

Intrinsic Value and Market Price
- Market Price
  - Consensus value of all potential traders
  - Current market price will reflect intrinsic value estimates
  - This consensus value of the required rate of return, \(k\), is the market capitalization rate

- Trading Signal
  - \(IV > MP\) Buy
  - \(IV < MP\) Sell or Short Sell
  - \(IV = MP\) Hold or Fairly Priced

13.3 DIVIDEND DISCOUNT MODELS

General Model
\[
V_0 = \sum_{t=1}^{\infty} \frac{D_t}{(1 + k)^t}
\]
- \(V_0\) = Value of Stock
- \(D_t\) = Dividend
- \(k\) = required return
No Growth Model

\[ V_0 = \frac{D}{k} \]

- Stocks that have earnings and dividends that are expected to remain constant
  - Preferred Stock

No Growth Model: Example

\[ V_0 = \frac{D}{k} \]

\[ E_1 = D_1 = \$5.00 \]
\[ k = .15 \]
\[ V_0 = \$5.00 / .15 = \$33.33 \]

Constant Growth Model

\[ V_0 = \frac{D_1 (1 + g)}{k - g} \]

- \( g \) = constant perpetual growth rate

Constant Growth Model: Example

\[ V_0 = \frac{D_1 (1 + g)}{k - g} \]

\[ E_1 = \$5.00 \quad b = 40\% \quad k = 15\% \]
\[ (1-b) = 60\% \quad D_1 = \$3.00 \quad g = 8\% \]
\[ V_0 = 3.00 / (.15 - .08) = \$42.86 \]

Stock Prices and Investment Opportunities

\[ g = ROE \times b \]

- \( g \) = growth rate in dividends
- \( ROE \) = Return on Equity for the firm
- \( b \) = plowback or retention percentage rate
  - \((1-\text{dividend payout percentage rate})\)

Figure 13.1 Dividend Growth for Two Earnings Reinvestment Policies
Present Value of Growth Opportunities

- If the stock price equals its IV, growth rate is sustained, the stock should sell at:
  \[ P_0 = \frac{D_1}{k-g} \]

- If all earnings paid out as dividends, price should be lower (assuming growth opportunities exist)

Present Value of Growth Opportunities (cont.)

- Price = No-growth value per share + PVGO (present value of growth opportunities)
  \[ P_0 = \frac{D_1}{k} + PVGO \]

- Where:
  \[ E_1 = \text{Earnings Per Share for period 1} \]
  \[ PVGO = \frac{D_1(1+g)}{(k-g)} - \frac{E_1}{k} \]

Partitioning Value: Example

- ROE = 20%  d = 60%  b = 40%
- \[ E_1 = \$5.00 \]  \[ D_1 = \$3.00 \]  \[ k = 15\% \]
- \[ g = .20 \times .40 = .08 \text{ or } 8\% \]

Partitioning Value: Example (cont.)

- \[ P_o = \frac{3}{(1.15 - .08)} = \$42.86 \]
- \[ NGV_o = \frac{5}{.15} = \$33.33 \]
- \[ PVGO = \$42.86 - \$33.33 = \$9.52 \]
- \[ P_o = \text{price with growth} \]
- \[ NGV_o = \text{no growth component value} \]
- \[ PVGO = \text{Present Value of Growth Opportunities} \]

Life Cycles and Multistage Growth Models

- \[ P_o = D_0 \sum_{i=1}^{T} \frac{(1+g_1)^i}{(1+k)^i} + \frac{D_T(1+g_2)}{(k-g_2)(1+k)^T} \]

  - \[ g_1 = \text{first growth rate} \]
  - \[ g_2 = \text{second growth rate} \]
  - \[ T = \text{number of periods of growth at } g_1 \]

Multistage Growth Rate Model: Example

- \[ D_0 = \$2.00 \]  \[ g_1 = 20\% \]  \[ g_2 = 5\% \]
- \[ k = 15\% \]  \[ T = 3 \]  \[ D_1 = 2.40 \]
- \[ D_2 = 2.88 \]  \[ D_3 = 3.46 \]  \[ D_4 = 3.63 \]
- \[ V_0 = D_0/(1.15) + D_2/(1.15)^2 + D_4/(1.15)^3 + D_4 / (.15 - .05) (.15)^3 \]
- \[ V_0 = 2.09 + 2.18 + 2.27 + 23.86 = \$30.40 \]
13.4 PRICE-EARNINGS RATIOS

P/E Ratio and Growth Opportunities
- P/E Ratios are a function of two factors
  - Required Rates of Return (k)
  - Expected growth in Dividends
- Uses
  - Relative valuation
  - Extensive use in industry

P/E Ratio: No expected growth

\[ P_0 = \frac{E_1}{k} \]
\[ \frac{P_0}{E_1} = \frac{1}{k} \]

- \( E_1 \) - expected earnings for next year
- \( E_1 \) is equal to \( D_1 \) under no growth
- \( k \) - required rate of return

P/E Ratio: Constant Growth

\[ P_0 = \frac{D_1}{k-g} = \frac{E_1(1-b)}{k-(b \times ROE)} \]
\[ P_0 = \frac{1-b}{E_1} \frac{1}{k-(b \times ROE)} \]

- \( b \) = retention ratio
- \( ROE \) = Return on Equity

Numerical Example: No Growth

\( E_0 = $2.50 \quad g = 0 \quad k = 12.5\% \)
\( P_0 = D/k = \frac{$2.50}{.125} = $20.00 \)
\( P/E = 1/k = 1/.125 = 8 \)

Numerical Example with Growth

\( b = 60\% \quad ROE = 15\% \quad (1-b) = 40\% \)
\( E_1 = $2.50 \times (1 + (.6)\times(.15)) = $2.73 \)
\( D_1 = $2.73 \times (.1-6) = $1.09 \)
\( k = 12.5\% \quad g = 9\% \)
\( P_0 = \frac{1.09/(.125-.09)}{11.4} = $31.14 \)
\( P/E = \frac{1 - .60}{.125 - .09} = 11.4 \)
P/E Ratios and Stock Risk

- Riskier stocks will have lower P/E multiples
- Riskier firms will have higher required rates of return (higher values of $k$)

$$\frac{P}{E} = \frac{1 - b}{k - g}$$

Pitfalls in Using P/E Ratios

- Flexibility in reporting makes choice of earnings difficult.
- Pro forma earnings may give a better measure of operating earnings.
- Problem of too much flexibility.
Other Comparative Valuation Ratios
- Price-to-book
- Price-to-cash flow
- Price-to-sales
- Be creative

13.5 FREE CASH FLOW VALUATION APPROACHES

Free Cash Flow
- One approach is to discount the free cash flow for the firm (FCFF) at the weighted-average cost of capital
  - Subtract existing value of debt
  - FCFF = EBIT (1 - \( t_c \)) + Depreciation - Capital expenditures - Increase in NWC
    where:
    - EBIT = earnings before interest and taxes
    - \( t_c \) = the corporate tax rate
    - NWC = net working capital

Free Cash Flow (cont.)
- Another approach focuses on the free cash flow to the equity holders (FCFE) and discounts the cash flows directly at the cost of equity
  - FCFE = FCFF - Interest expense (1 - \( t_c \)) + Increases in net debt

Comparing the Valuation Models
- Free cash flow approach should provide same estimate of IV as the dividend growth model
- In practice the two approaches may differ substantially
  - Simplifying assumptions are used
13.6 THE AGGREGATE STOCK MARKET

Earnings Multiplier Approach

- Forecast corporate profits for the coming period
- Derive an estimate for the aggregate P/E ratio using long-term interest rates
- Product of the two forecasts is the estimate of the end-of-period level of the market

Figure 13.8 Earnings Yield of the S&P 500 Versus 10-year Treasury Bond Yield

Table 13.4 S&P 500 Index Forecasts

<table>
<thead>
<tr>
<th>S&amp;P 500 Index Forecast under Various Scenarios</th>
<th>Most Likely Scenario</th>
<th>Pessimistic Scenario</th>
<th>Optimistic Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Treasury bond yield</td>
<td>4.8%</td>
<td>5.3%</td>
<td>4.3%</td>
</tr>
<tr>
<td>Earnings yield</td>
<td>5.8%</td>
<td>6.3%</td>
<td>5.3%</td>
</tr>
<tr>
<td>Earnings-per-share ratio</td>
<td>17.2</td>
<td>15.9</td>
<td>18.9</td>
</tr>
<tr>
<td>EPS forecast</td>
<td>86</td>
<td>86</td>
<td>86</td>
</tr>
<tr>
<td>Forecast for S&amp;P 500</td>
<td>1,483</td>
<td>1,383</td>
<td>1,623</td>
</tr>
</tbody>
</table>

Note: The forecast for the earnings yield on the S&P 500 implies the Treasury bond yield plus 3%. The P/E ratio is the reciprocal of the forecasted earnings yield.