Chapter 9
Valuing Stocks

9-1.  

   a.  \[ P(0) = \frac{2.80}{1.10} + \frac{(3.00 + 52.00)}{1.10^2} = $48.00 \]
   b.  \[ P(1) = \frac{(3.00 + 52.00)}{1.10} = $50.00 \]
   c.  \[ P(0) = \frac{(2.80 + 50.00)}{1.10} = $48.00 \]

9-2.  

   Dividend Yield = \frac{0.88}{22.00} = 4\%
   Capital gain rate = \frac{(23.54 – 22.00)}{22.00} = 7\%
   Total expected return = \( r_E \) = 4\% + 7\% = 11\%

9-3.  

   \[ P = \frac{0.50}{0.15} = $3.33 \]

9-4.  

   \[ P = \frac{1.50}{(11\% - 6\%)} = $30 \]

9-5.  

   a.  Eq 9.7 implies \( r_E = \text{Div Yld} + g \), so 8\% – 1.5\% = g = 6.5\%
   b.  With constant dividend growth, share price is also expected to grow at rate g = 6.5\% (or we can solve this from Eq 9.2)

9-6.  

   a.  Eq 9.12:  \( g = \text{retention rate} \times \text{return on new invest} = \frac{2}{5} \times 15\% = 6\% \)
   b.  \[ P = \frac{3}{(12\% - 6\%)} = $50 \]
   c.  \( g = \frac{1}{5} \times 15\% = 3\%, \ P = \frac{4}{(12\% - 3\%)} = $44.44 \). No, projects are positive NPV (return exceeds cost of capital), so don’t raise dividend.

9-7.  

   Estimate \( r_E \):  \( r_E = \text{Div Yield} + g = \frac{4}{50} + 3\% = 11\% \)
   New Price:  \[ P = \frac{2.50/(11\% - 5\%)} = $41.67 \]

   In this case, cutting the dividend to expand is not positive NPV.
9-8. Value if the first 5 dividend payments

\[
PV_{1-5} = \frac{0.65}{(0.08 - 0.12)} \left( 1 - \left( \frac{1.12}{1.08} \right)^5 \right) = 3.24
\]

Value on date 5 of the rest of the dividend payments

\[
PV_5 = \frac{0.65(1.12)^4 1.02}{0.08 - 0.02} = 17.39
\]

Discounting this value to the present gives

\[
PV_0 = \frac{17.39}{(1.08)^5} = 11.83
\]

So the value of Gillette is: \( P = PV_{1-5} + PV_0 = 3.24 + 11.83 = 15.07 \)

9-9. PV of the first 5 dividends

\[
PV_{\text{first 5}} = \frac{0.96 (1.11)}{0.085 - 0.11} \left( 1 - \left( \frac{1.11}{1.085} \right)^5 \right) = 5.14217
\]

PV of the remaining dividends in year 5

\[
PV_{\text{remaining in year 5}} = \frac{0.96 (1.11)^5 (1.052)}{0.085 - 0.052} = 51.5689
\]

Discounting back to the present

\[
PV_{\text{remaining}} = \frac{51.5689}{(1.085)^5} = 34.2957
\]

Thus the price of Colgate is

\[
P = PV_{\text{first 5}} + PV_{\text{remaining}} = 39.4378
\]

9-10. \( n \)-year, constant growth annuity

\[
P_0 = \frac{\text{Div}_1}{r - g_1} \left( 1 - \left( \frac{1 + g_1}{1 + r} \right)^n \right) + \frac{\text{Div}_1}{r - g_2} \left( \frac{1 + g_1}{1 + r} \right)^n \frac{\text{Div}_1}{r - g_2}
\]

\[
= \frac{\text{Div}_1}{r - g_1} + \frac{\text{Div}_1}{1 + r} \left( \frac{1 + g_1}{r - g_2} - \frac{\text{Div}_1}{r - g_1} \right)
\]

\( n \)-year, constant growth perpetuity

\( n \)-year, present value of difference of perpetuities in year \( n \)
9-11. See the spreadsheet for Halliford’s dividend forecast:

<table>
<thead>
<tr>
<th>Year</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EPS Growth Rate (vs. prior yr)</td>
<td>25%</td>
<td>25%</td>
<td>12.5%</td>
<td>12.5%</td>
<td>5%</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>EPS</td>
<td>$3.00</td>
<td>$3.75</td>
<td>$4.69</td>
<td>$5.27</td>
<td>$5.93</td>
<td>$6.23</td>
</tr>
<tr>
<td>3</td>
<td>Retention Ratio</td>
<td>100%</td>
<td>100%</td>
<td>50%</td>
<td>50%</td>
<td>20%</td>
<td>20%</td>
</tr>
<tr>
<td>4</td>
<td>Dividend Payout Ratio</td>
<td>0%</td>
<td>0%</td>
<td>50%</td>
<td>50%</td>
<td>80%</td>
<td>80%</td>
</tr>
<tr>
<td>5</td>
<td>Div (2 x 4)</td>
<td>—</td>
<td>—</td>
<td>$2.34</td>
<td>$2.64</td>
<td>$4.75</td>
<td>$4.98</td>
</tr>
</tbody>
</table>

From year 5 on, dividends grow at constant rate of 5%. Therefore,

\[
P(4) = \frac{4.75}{(10\% - 5\%)} = 95.
\]

Then: \( P(0) = \frac{2.34}{1.10^3} + \frac{2.64 + 95}{1.10^4} = 68.45 \)

9-12. Total payout next year = 5 billion \times 1.08 = $5.4 billion

Equity Value = 5.4 / (12\% - 8\%) = $135 billion

Share price = 135 / 6 = $22.50


a. Earnings growth = EPS growth = dividend growth = 4\%. Thus, \( P = \frac{3}{(10\% - 4\%)} = 50 \)

b. Using the total payout model, \( P = \frac{3}{(10\% - 4\%)} = 50 \)

c. \( g = r_E - \text{Div Yield} = 10\% - 1/50 = 8\% \)

9-14.

a. \( V(4) = \frac{82}{(14\% - 4\%)} = 820 \)

\[ V(0) = \frac{53}{1.14} + \frac{68/1.14^2 + 78}{1.14^3} + (75 + 820) / 1.14^4 = 681 \]

b. \( P = (681 + 0 - 300) / 40 = 9.53 \)

9-15.

a. \( V(3) = \frac{33.3}{(10\% - 5\%)} = 666 \)

\[ V(0) = \frac{25.3}{1.10} + \frac{24.6}{1.10^2} + (30.8 + 666) / 1.103 = 567 \]

\[ P(0) = (567 + 40 - 120) / 60 = 8.11 \]
b. Free cash flows change as follows:

\[
\begin{array}{cccccc}
 \text{Year} & 0 & 1 & 2 & 3 & 4 & 5 \\
\hline
\text{Earnings Forecast ($000s)} & & & & & & \\
1 \text{ Sales} & 433.00 & 468.00 & 516.00 & 546.96 & 574.31 & 603.02 \\
2 \text{ Cost of Goods Sold} & (313.56) & (345.72) & (366.46) & (384.79) & (404.03) & \\
3 \text{ Gross Profit} & 154.44 & 170.28 & 180.50 & 189.52 & 199.00 & \\
4 \text{ Selling, General \& Admin.} & (74.88) & (82.56) & (87.51) & (91.89) & (96.48) & \\
5 \text{ Depreciation} & (7.00) & (7.50) & (9.00) & (9.45) & (9.92) & \\
6 \text{ EBIT} & 72.56 & 80.22 & 83.98 & 88.18 & 92.59 & \\
7 \text{ Income tax at 40\%} & (29.02) & (32.09) & (33.59) & (35.27) & (37.04) & \\
8 \text{ Unlevered Net Income} & 43.54 & 48.13 & 50.39 & 52.91 & 55.55 & \\
\hline
\text{Free Cash Flow ($000s)} & & & & & & \\
10 \text{ Plus: Depreciation} & 7.00 & 7.50 & 9.00 & 9.45 & 9.92 & \\
11 \text{ Less: Capital Expenditures} & (7.70) & (10.00) & (9.90) & (10.40) & (10.91) & \\
12 \text{ Less: Increases in NWC} & (6.30) & (8.64) & (5.57) & (4.92) & (5.17) & \\
13 \text{ Free Cash Flow} & 16.88 & 15.32 & 20.94 & 22.92 & 24.07 & \\
\end{array}
\]

Hence \(V(3) = 458\), and \(V(0) = 388\). Thus, \(P(0) = $5.13\)

c. New FCF:

\[
\begin{array}{cccccc}
 \text{Year} & 0 & 1 & 2 & 3 & 4 & 5 \\
\hline
\text{Earnings Forecast ($000s)} & & & & & & \\
1 \text{ Sales} & 433.00 & 468.00 & 516.00 & 546.96 & 574.31 & 603.02 \\
2 \text{ Cost of Goods Sold} & (327.60) & (361.20) & (382.87) & (402.02) & (422.12) & \\
3 \text{ Gross Profit} & 140.40 & 154.80 & 164.09 & 172.29 & 180.91 & \\
4 \text{ Selling, General \& Admin.} & (93.60) & (103.20) & (109.39) & (114.86) & (120.60) & \\
5 \text{ Depreciation} & (7.00) & (7.50) & (9.00) & (9.45) & (9.92) & \\
6 \text{ EBIT} & 39.80 & 44.10 & 45.70 & 47.98 & 50.38 & \\
7 \text{ Income tax at 40\%} & (15.92) & (17.64) & (18.28) & (19.19) & (20.15) & \\
8 \text{ Unlevered Net Income} & 23.88 & 26.46 & 27.42 & 28.79 & 30.23 & \\
\hline
\text{Free Cash Flow ($000s)} & & & & & & \\
10 \text{ Plus: Depreciation} & 7.00 & 7.50 & 9.00 & 9.45 & 9.92 & \\
11 \text{ Less: Capital Expenditures} & (7.70) & (10.00) & (9.90) & (10.40) & (10.91) & \\
12 \text{ Less: Increases in NWC} & (6.30) & (8.64) & (5.57) & (4.92) & (5.17) & \\
13 \text{ Free Cash Flow} & 16.88 & 15.32 & 20.94 & 22.92 & 24.07 & \\
\end{array}
\]

Now \(V(3) = 941\), \(V(0) = 804\), \(P(0) = $12.07\)
d. Inc. in NWC in yr1 = 12% Sales(1) – 18% Sales(0)
   Inc in NWC in later years = 12% × change in sales

New FCF:

<table>
<thead>
<tr>
<th>Year</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sales</td>
<td>433.00</td>
<td>468.00</td>
<td>516.00</td>
<td>546.96</td>
<td>574.31</td>
<td>603.02</td>
</tr>
<tr>
<td>2. Cost of Goods Sold</td>
<td>(313.56)</td>
<td>(345.72)</td>
<td>(366.46)</td>
<td>(384.79)</td>
<td>(404.03)</td>
<td></td>
</tr>
<tr>
<td>3. Gross Profit</td>
<td>154.44</td>
<td>170.28</td>
<td>180.50</td>
<td>189.52</td>
<td>199.00</td>
<td></td>
</tr>
<tr>
<td>4. Selling, General &amp; Admin.</td>
<td>(93.60)</td>
<td>(103.20)</td>
<td>(109.39)</td>
<td>(114.86)</td>
<td>(120.60)</td>
<td></td>
</tr>
<tr>
<td>5. Depreciation</td>
<td>(7.00)</td>
<td>(7.50)</td>
<td>(9.00)</td>
<td>(9.45)</td>
<td>(9.92)</td>
<td></td>
</tr>
<tr>
<td>6. EBIT</td>
<td>53.84</td>
<td>59.58</td>
<td>62.10</td>
<td>65.21</td>
<td>68.47</td>
<td></td>
</tr>
<tr>
<td>7. Income tax at 40%</td>
<td>(21.54)</td>
<td>(23.83)</td>
<td>(24.84)</td>
<td>(26.08)</td>
<td>(27.39)</td>
<td></td>
</tr>
<tr>
<td>8. Unlevered Net Income</td>
<td>32.30</td>
<td>35.75</td>
<td>37.26</td>
<td>39.13</td>
<td>41.08</td>
<td></td>
</tr>
<tr>
<td>9. Plus: Depreciation</td>
<td>7.00</td>
<td>7.50</td>
<td>9.00</td>
<td>9.45</td>
<td>9.92</td>
<td></td>
</tr>
<tr>
<td>10. Less: Capital Expenditures</td>
<td>(7.70)</td>
<td>(10.00)</td>
<td>(9.90)</td>
<td>(10.40)</td>
<td>(10.91)</td>
<td></td>
</tr>
<tr>
<td>11. Less: Increases in NWC</td>
<td>21.78</td>
<td>(5.76)</td>
<td>(3.72)</td>
<td>(3.28)</td>
<td>(3.45)</td>
<td></td>
</tr>
<tr>
<td>12. Free Cash Flow</td>
<td>53.38</td>
<td>27.49</td>
<td>32.65</td>
<td>34.90</td>
<td>36.64</td>
<td></td>
</tr>
</tbody>
</table>

Now V(3) = 698, V(0) = 620, P(0) = $9.00

9-16.
   a. $25.38
   b. $23.76 – $29.02
   c. $28.09 – $23.60
   d. By changing parameters you get prices from 20.56 to 32.19.

9-17.
   a. $24.77
   b. $15.18 – $37.32
   c. $34.22
   d. $13.50 – $97.73

9-18.
   a. $30.89
   b. $16.25 – $58.73
   c. $27.09
   d. $22.24 – $33.08
9-19.

a. Using EV/EBITDA: \( \text{EV} = 55.6 \times 9.73 = 541 \text{ million} \), \( \text{P} = \frac{(541 + 100 - 3)}{21} = $30.38 \)

Using P/E: \( \text{P} = 1.65 \times 18.4 = $30.36 \)

Thus, KCP appears to be trading at a “discount” relative to Fossil.

b. Using EV/EBITDA: \( \text{EV} = 55.6 \times 7.19 = 400 \text{ million} \), \( \text{P} = \frac{(400 + 100 - 3)}{21} = $23.67 \)

Using P/E: \( \text{P} = 1.65 \times 17.2 = $28.38 \)

Thus, KCP appears to be trading at a “premium” relative to Tommy Hilfiger using EV/EBITDA, but at a slight discount using P/E.

9-20. All the multiples show a great deal of variation, suggesting that profitability and growth varies widely across firms. This makes the use of multiples problematic. In particular, for several firms, earnings and EBIT are negative, and for Nissan, book value is negative, making these ratios meaningless.

In this case, EV/Sales is probably the most useful multiple. The one big outlier is GM, but this is probably because its EV is over-estimated, since the debt component is based on book value of debt, and the market value of GM’s debt has dropped substantially recently (GM’s debt was downgraded to junk in 2005).

9-21.

a. \( \text{P} = \frac{1.24}{(8\% - 7\%)} = $124 \)

b. Based on the market price, our growth forecast is probably to high. Growth rate consistent with market price is \( g = r_E - \text{div yield} = 8\% - \frac{1.24}{43}= 5.12\% \), which is more reasonable.

9-22.

a. \( \text{PV(change in FCF)} = -180 / 1.13 - 60 / 1.13^2 = -206 \)

Change in \( V = -206 \), so if debt value does not change, P drops by \( 206 / 35 =$5.89 \) per share.

b. If this is public information, in an efficient market share price will drop immediately to reflect the news, and no trading profit is possible.

9-23.

a. Market seems to assess a somewhat greater than 50% chance of success

b. Yes, if they have better information than other investors

c. Market may be illiquid – no one wants to trade if they know Kliner has better info. Kliner’s trades will move prices significantly, limiting profits.