CHAPTER 20

REVENUE MULTIPLES AND SECTOR-SPECIFIC MULTIPLES

Problem 1

A. Dividend Payout Ratio = $1.12/$2.45 = 0.4571
   Expected Growth Rate = 6%
   Cost of Equity = 7% + 0.9 (5.5%) = 11.95%
   Profit Margin = 2.45/122 = 2%
   P/S Ratio = .02 * 0.4571 * (1.06)/(.1195 - .06) = 0.16288
   Price Based on this Multiple = 0.16288 * 122 = $19.87

B. P/S Ratio Needed for a Price of $34 = $34/122 = 0.2787
   Profit Margin Needed for this P/S Ratio
   = 0.2787 * (.1195 - .06)/(0.4571 * 1.06)
   = 0.0342 or 3.42%

Problem 2

A. These are the two companies with high expected growth rates. These high growth rates may explain the high P/S ratios. In addition, the Bombay company has the highest profit margin of the group.

B.

Correlation between P/S ratio and profit margin = 0.8840
Correlation between P/S ratio and expected growth = 0.7694
Correlation between P/S ratio and beta = 0.2754
Correlation between P/S ratio and payout = -0.4390

C. One measure that might work is the ratio of Price/Sales (P/S) ratio to profit margin. On this basis, Bradlee's which has a P/S ratio of 0.09 and a profit margin of 1.04%, Caldor and Sears are most likely to be undervalued, whereas the Bombay company with P/S-Margin ratio of 0.56 is most likely to be overvalued.

<table>
<thead>
<tr>
<th>Company</th>
<th>Price</th>
<th>Sales</th>
<th>P/S</th>
<th>Profit</th>
<th>Exp.</th>
<th>Beta</th>
<th>Ratio Margin</th>
<th>Growth</th>
<th>Margin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bombay Co.</td>
<td>$38</td>
<td>$9.70</td>
<td>3.92</td>
<td>7.01%</td>
<td>29.00%</td>
<td>1.45</td>
<td>0.559</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bradlees</td>
<td>15</td>
<td>168.6</td>
<td>0.09</td>
<td>1.04%</td>
<td>12.00%</td>
<td>1.15</td>
<td>0.086</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Caldor</td>
<td>32</td>
<td>147.45</td>
<td>0.22</td>
<td>1.83%</td>
<td>12.50%</td>
<td>1.55</td>
<td>0.119</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Alternatively, a regression of P/S ratios against the fundamental variables could have been run and estimated P/S ratios can be obtained.

**Problem 3**

A. Profit Margin = \( \frac{221}{8298} = 2.66\% \)

\[
PS = 0.0266 * \left[ \frac{0.31 * (1.135)^{5} * \left( 1 - \frac{(1.135)^{5}}{(1.13325)^{5}} \right)}{(1.13325 - .135)} + \frac{0.60 * (1.135)^{5} * (1.06)}{(1.13325)(1.13325)^{5}} \right] 
\]

\[
= 0.275 
\]

B. P/S ratio for Stable Growth Firm with Same Margin

\[
= 0.0266 * 0.6 * 1.06 / (0.13325 - .06) = 0.231 
\]

P/S ratio attributable to High Growth = 0.275 - 0.231 = 0.044

**Problem 4**

A. PS = 0.1784 * \[ \frac{0.45 * (1.11)^{5} * \left( 1 - \frac{(1.11)^{5}}{(1.125)^{5}} \right)}{(1.125 - .11)} + \frac{0.60 * (1.11)^{5} * (1.06)}{(1.125-06) (1.125)^{5}} \]

\[
= 2.02 
\]

B. New Margin = \( \frac{100}{700} = 14.29\% \)

Old Growth Rate

\[
= \text{Old Profit Margin} * \text{Sales/Book Value} * (1 - \text{Payout ratio}) 
\]

\[
= 0.1784 * \text{Sales/Book Value} * (1 - 0.45) = 11\% 
\]

Sales/Book Value = 1.12
New Growth Rate (for high growth period)
\[ = 0.1429 \times 1.12 \times (1 - 0.45) = 8.81\% \]

Price / Sales Ratio
\[
= 0.1429 \times \left[ \frac{0.45 \times (1.0881) \times \left(1 - \frac{(1.0881)^5}{(1.125)^5}\right)}{(0.125 - 0.0881) + \frac{0.60 \times (1.0881)^5 \times (1.06)}{(0.125 - 0.06) (1.125)^5}} \right]
\]
\[ = 1.47 \]

**Problem 5**

A.

<table>
<thead>
<tr>
<th>Next 10 Years</th>
<th>After Year 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payout Ratio</td>
<td>33.00%</td>
</tr>
<tr>
<td>Sales/Book Value</td>
<td>2.50</td>
</tr>
<tr>
<td>Expected Growth Rate</td>
<td>16.75%</td>
</tr>
<tr>
<td>Cost of Equity</td>
<td>14.15%</td>
</tr>
<tr>
<td>Profit Margin</td>
<td>10.00%</td>
</tr>
</tbody>
</table>

P/S Ratio = 1.59991143
Price per share = $39.00

B.

<table>
<thead>
<tr>
<th>Next 10 Years</th>
<th>After Year 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Payout Ratio</td>
<td>33.00%</td>
</tr>
<tr>
<td>Sales/Book Value</td>
<td>3.00</td>
</tr>
<tr>
<td>Expected Growth Rate</td>
<td>16.08%</td>
</tr>
<tr>
<td>Cost of Equity</td>
<td>14.15%</td>
</tr>
<tr>
<td>Profit Margin</td>
<td>8.00%</td>
</tr>
</tbody>
</table>

P/S Ratio = 1.21549194
Price Per Share = $35.55

C. The status quo strategy is best, since it leads to a higher price per share.

D. Sales would have to drop 20%. (Sales/book value ratio would have to be 2.40 for the two strategies to be equivalent.)
**Problem 6**

A. The coefficients on this regression measure both the direction and the magnitude of the relationship between P/S ratios and independent variables. My concerns would be the same as for the peer group regression.

B.

<table>
<thead>
<tr>
<th>Company</th>
<th>P/S Ratio</th>
<th>Profit Margin</th>
<th>Payout</th>
<th>Exp. Growth</th>
<th>Beta</th>
<th>Predicted P/S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arbor Drugs</td>
<td>0.42</td>
<td>3.40%</td>
<td>18%</td>
<td>14.00%</td>
<td>1.05</td>
<td>0.39904</td>
</tr>
<tr>
<td>Big B Inc.</td>
<td>0.30</td>
<td>1.90%</td>
<td>14%</td>
<td>23.50%</td>
<td>0.70</td>
<td>0.48704</td>
</tr>
<tr>
<td>Drug Emporium</td>
<td>0.10</td>
<td>0.60%</td>
<td>0%</td>
<td>27.50%</td>
<td>0.90</td>
<td>0.28121</td>
</tr>
<tr>
<td>Fay's Inc.</td>
<td>0.15</td>
<td>1.30%</td>
<td>37%</td>
<td>11.50%</td>
<td>0.90</td>
<td>0.34188</td>
</tr>
<tr>
<td>Genovese</td>
<td>0.18</td>
<td>1.70%</td>
<td>26%</td>
<td>10.50%</td>
<td>0.80</td>
<td>0.37292</td>
</tr>
<tr>
<td>Longs Drug</td>
<td>0.30</td>
<td>2.00%</td>
<td>46%</td>
<td>6.00%</td>
<td>0.90</td>
<td>0.38680</td>
</tr>
<tr>
<td>Perry Drugs</td>
<td>0.12</td>
<td>1.30%</td>
<td>0%</td>
<td>12.50%</td>
<td>1.10</td>
<td>0.14108</td>
</tr>
<tr>
<td>Rite Aid</td>
<td>0.33</td>
<td>3.20%</td>
<td>37%</td>
<td>10.50%</td>
<td>0.90</td>
<td>0.48487</td>
</tr>
<tr>
<td>Walgreen</td>
<td>0.60</td>
<td>2.70%</td>
<td>31%</td>
<td>13.50%</td>
<td>1.15</td>
<td>0.33992</td>
</tr>
</tbody>
</table>

These predictions use the information in the entire cross-section, and should be more reliable.

C. \[ P/S = 0.42 + 0.33 \times 0 + 0.73 \times 0.20 - 0.43 \times 0.93 + 7.91 \times 0.06 \]
   \[ = 0.64 \]

The values in this regression are the values of the private firm being valued.

Market Value of Equity = Revenues \times Price/Sales Ratio
   = 250 \times 0.64 = $160 million

**Problem 7**

a. After-tax operating margin = 1.5/15 = 10%

Return on capital = After-tax Operating Margin \times Turnover ratio = 10\% \times 1.5 = 15%

Reinvestment rate = 5\% / 15\% = 33.33\%

Value to sales ratio = After-tax Margin \times (1 - Reinvestment rate) \times (1+g) / (Cost of capital – g)
   = .10 (1-.3333) (1.05)/(.10-.05) = 1.40

b. Reinvestment rate in first 5 years = g / ROC = 10/15 = 66.67\%
Value/Sales Ratio

\[
\frac{(1-.6667) \times (1.10) \times \left(1 - \frac{(1.10)^5}{(1.10)^5}\right)}{(1-.3333) \times (1.10)^5 * (1.05)} + \frac{(1-.3333) \times (1.10)^5 * (1.05)}{(10-.05) \times (1.10)^5}
\]

\[
= 0.10 \times \left(1.6667 \times 5 + \frac{(1-.3333) \times (1.10)^5 * (1.05)}{(10-.05) \times (1.10)^5}\right) = 1.57
\]

**Problem 8**

Value to sales ratio for Estee Lauder = 0.45 + 8.5 (.16) = 1.81

Value to sales ratio for GenCosmetics = 0.45 + 8.5 (.05) = 0.875

Value of brand name = (1.81 – 0.875) (500) = $467.5 million

**Problem 9**

a. Return on capital = Operating Margin * Sales/ Book

\[= (18/100) \times (100/90) = 20\%
\]

Reinvestment rate = g/ ROC = 5/20 = 25%

Value to Sales ratio = .18 (1-.25)/(1.05)/(.10-.05) = 2.835

b. Return on capital for generic firms = 10%

Reinvestment rate = 5/10 = 50%

Value to Sales ratio = .09 (1-.5)/(1.05)/(.10-.05) = 0.945

Brand name value = (2.835 – 0.945) (100) = $189 million