Session 10a: Post class test solutions

1. **b. 1.50:** First, unlever the average beta in the sector, using the average debt to equity ratio. Second, correct for the cash holdings of firms in the sector.
   - Unlevered beta = $1.38/(1 + (1-.4)(.25)) = 1.20$
   - Unlevered beta of business = $1.20/(1-.2) = 1.50$

2. **c. 1.33.** First, estimate the values of the two businesses, using the revenues from each business and the EV/Sales averages for the sectors. Then, use these values to get weights for the businesses and an unlevered beta for the company.

<table>
<thead>
<tr>
<th></th>
<th>Unlevered Beta</th>
<th>EV/Sales</th>
<th>Revenues</th>
<th>Estimated value</th>
<th>Weights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>0.8</td>
<td>1.25</td>
<td>100</td>
<td>125</td>
<td>0.625</td>
</tr>
<tr>
<td>Chemicals</td>
<td>1.2</td>
<td>1.5</td>
<td>50</td>
<td>75</td>
<td>0.375</td>
</tr>
<tr>
<td>Company</td>
<td>0.95</td>
<td></td>
<td></td>
<td></td>
<td>200</td>
</tr>
</tbody>
</table>

Levered beta = $0.95 \times (1+(1-.4)\times.6667) = 1.33$

3. **c. 0.85.** The current beta (which is also the unlevered beta, because the firm has no debt) is a weighted average of the betas of the two businesses the firm is in:
   - Beta of movies $(2/3) \times 1.00 \times (1/3) = 0.90$
   - Beta of movies = $(0.90 \times (1/3))/ (2/3) = 0.85$

4. **e. None of the above.** The unlevered beta for the company after the expansion will be a weighted average of two businesses, its current business with a value of $50 million and an unlevered beta of 0.75 and its new business with a value of $25 million and an unlevered beta of 1.20:
   - Unlevered beta = $0.75 \times (50/75) + 1.2 (25/75) = 0.90$
   - The debt to equity ratio after the transaction will be 33.33% ($25 million in new debt on top of $50 million in existing equity).
   - Levered beta = $0.90 \times (1+(1-.4)\times(50/150)) = 1.17$

5. **d. 1.512.** The first step is to estimate the unlevered beta of the business that the company currently is in. To do this, you first unlever the beta:
   - Unlevered beta of company = $1.17/(1+(1-.40)\times(50/100)) = 0.90$
   - Then, you take out the effect of cash ($25 million out of firm value of $150 million).
   - Unlevered beta of business = $0.90 \times (1-25/150) = 1.08$
   - After the cash is used to buy back stock, the value of equity will go down to $75 and the debt to equity ratio will rise to 66.67% (50/75): Levered beta = $1.08 \times (1+(1-.4)\times(50/75)) = 1.512$