### Spring 1996

**Problem 1**

Price/BV for AlumCare = 4  
P/BV ratio for HealthSoft = 2  

If AlumCare's Price is thrice that of HealthSoft,  

Let MV of Equity for AlumCare = $100.00  
Then MV of Equity for HealthSoft = $33.33  
BV of Equity for AlumCare = $25.00  
BV of Equity for HealthSoft = $16.67  
P/BV of Equity after merger = (100+33.33)/(25+16.67) = 3.20

**Problem 2**

Expected Growth = Net Margin * Sales/BV of Equity * Retention Ratio  
.06 = Net Margin * 3* .40  
Net Margin = 0.05  
Price/Sales Ratio = .05 * (1.06)*.6/(.12 - .06) = 0.53

**Problem 3**

Unlevered Beta (using last 5 years) = 0.9/(1+(1-.4)(.2)) = 0.80  
Unlevered Beta of Non-cash assets = 0.80/(1-.15) = 0.94  
Levered Beta for Non-cash assets = 0.94 (1+0.6(.5)) = 1.222  
Cost of Equity for Non-cash Assets = 6% + 1.22(5.5%) = 12.71%  
Cost of Capital for Non-cash Assets = 12.71%(.667)+.07*.6*(.333)= 9.88%

Estimated FCFF next year from non-cash assets = (450-50)(1-.4)(1.05)-90 = $162  
Estimated Value of Non-cash Assets = 162/(.0988-.05) = $3,320  
Cash Balance = 500  
Estimated Value of the Firm = $3,820  
- Value of Debt Outstanding = 800  
Value of Equity = $3,020

### Fall 1996

**Problem 1**
After-tax Operating Margin = 0.18
WACC = 13.55% (.6) + 6% (.4) = 0.11
Value/Sales Ratio = 0.18 (1.05) / (.1053-.05) = 3.42
Value/Sales Ratio of Generic Brand = 3.42 * 0.5 = 1.71
Value of Brand Name = 342 - 171 = 171 million

**Part II**

a. True; if firms have different risk levels, they will have different PE/g ratios.
   (Some of you also pointed out that the growth periods have to be the same. That is true too.

b. Firm B will have the higher Value/EBITDA multiple.
   Everything else about the two firms is identical.

c. Price/BV ratio will drop by more than half.

d. P/BV = 2.5
   Value of Equity will drop by 30% after special dividend.
   Value of Book Value will drop by same dollar amount.
   Net Effect = (2.5 * .7) / (1 - .75) = 7

**Spring 1997**

**Problem 1**

Expected PE/g ratio for GenieSoft = 2.75 - 0.50 (2) = 1.75
Expected PE/g ratio for AutoPred = 2.75 - 0.50 (1) = 2.25
Actual PE/g ratio for GenieSoft = 50/40 = 1.25
Actual PE/g ratio for AutoPred = 20/10 = 2.00
Both GenieSoft and AutoPred are undervalued relative to the market.

**Problem 2**

<table>
<thead>
<tr>
<th>EBITDA</th>
<th>$ 550</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depreciation</td>
<td>$ 150</td>
</tr>
<tr>
<td>EBIT</td>
<td>$ 400</td>
</tr>
<tr>
<td>EBIT (1-t)</td>
<td>$ 240</td>
</tr>
</tbody>
</table>

Next Year
EBITDA $ 578
EBIT $ 420
EBIT (1-t) $ 252
- Reinvestment $ 84
FCFF $ 168

Firm Value $ 4,200

Value/FCFF 25.00
Value/EBIT 10.00
Value/EBITDA 7.27

**Problem 3**
I would use a higher Value/EBITDA multiple because the comparable firms have a lower return on capital.

**Spring 1998**

**Problem 1**
Current PBV = (ROE - g) / (COE - g)
1.5 = (ROE - 5%)/(12%-5%): Solving for ROE = 15.5%
If you add 3% to ROE, (I also gave full credit if you used 15.5% (1.03))
PBV = (.185-.05)/(.12-.05) = 1.93 \[ 1.9286 \]
This assumes that the growth stays the same, but payout ratio goes up
If you had assumed that the payout ratio would remain the same, but growth would change:
Current Payout Ratio = 5/15.5 = 32.26%
New Growth Rate = 0.32 * 18.5% = 5.92%
New PBV = (.185-.0592)/(.12-.0592) = 2.07

**Problem 2**
Predicted V/S Ratio for Estee Lauder = 0.45 + 8.5 (.16) = 1.81
Predicted V/S Ratio for Generic Company = 0.45 + 8.5 (.0 \[ 0.875 \]
Difference in V/S Ratios = 0.935
Value of Estee Lauder Brand Name = 0.935 (500) = $ 467.50

**Problem 3**
Value of Straight Debt portion of Convertible = 12.5 (PVA, 10%, 10 years) $ 173.19
Fall 1998

Problem 1
Value of Equity in Common Stock = 50 * $ 20 = $ 1,000.00
Value of Equity in Management Options = 10 * $ 15 = $ 150.00
Value of Conversion Option = 140 - 100 = $ 40.00
Value of Equity = $ 1,190.00

Fall 1998
Problem 3
a. Value/FCFF = (1+g)/(WACC - g) = 1.05/(.10-.05) = 21 ! Answer is 20 if you look at Value/FCFF1
(If you assume that the multiple is Value/Current FCFF, this will become (1+g)/(WACC - g) which would yield 21.
b. If the ROC is 12.5%, the reinvestment rate = g/ROC = .05/.125 = 0.40
FCFF = EBIT (1-tax rate) ( 1 - Reinvestment Rate) = EBIT (1-.4)(1-.3)
Value /EBIT = 21 (1-.4) (1-.3) = 8.82 ! Answer is 8.40 if you look at Value/EBIT1
Problem 1
FCFF on non-cash assets = $200 million (1-.4) (1 - 4/10) = 72! Reinvestment rate = g/ ROC = 4/10
Unlevered Beta for non-cash assets = 1.20/.9 = 1.3333333! Reflects the fact that the average firm has 10% debt
Levered Beta for non-cash assets = 1.33 (1 + 0.6(15/85)) = 1.47082353
Cost of Equity for non-cash assets = 6% + 1.47 (5.5%) = 14.09%
Cost of capital for non-cash assets = 14.09% (.85) + 10% (1-.4) (.15) = 12.88%
Value of non-cash assets = 72 (1.04)/(.1288 - .04) = $843.24
Value of cash = 250
Value of firm = $1,093.24

Problem 2
PE = Payout ratio (1+g)/(r - g)
Payout ratio = PE (r -g)/(1+g)
r = Cost of Equity = 6% + 0.9*5.5% = 10.95%
g = 5%
PE = 10.59
Payout ratio = 10.59(.1095 -.05)/(1.05) = 0.60
g = (1-Payout ratio) (ROE)
.05 = (1 -.6) ROE
ROE = 12.5%

Problem 3
Firm Value = 5000 + 1500 + 1000 = 7500
Firm Value net of cash = 7500 - 1750 = 5750
Taxable Income = 250/(1-.4) = 416.6666667! Net income includes interest income
Taxable Income before interest income = 291.6666667
EBIT = 291.67 + 100 + 80 = 471.67
EBITDA = 721.67
Non-cash Value/EBITDA = 5750/722 = 7.96! If numerator is non-cash, denominator cannot include interest income
Alternatively,
Firm Value = 5000 + 1500 + 1000 = 7500
EBITDA + Interest Income = 846.67
Value/EBITDA = 7500/847 = 8.85478158
Spring 2000

Problem 1

EBIT at Reliable without auto parts subsidiary = 500 - 200 = 300
EBIT at Chemical products subsidiary = 250
EBIT at Auto Parts Subsidiary = 200

Tax rate = 40%
Reinvestment Rate = (Growth/ROC) = 6%/12% = 50%
Cost of Capital = 10%

Value of Reliable (stand-alone) = 300 (1-.4) (1-.5)(1.06)/(.10-.06) = $2,385
Value of Chemical subsidiary = 250 (1-.4)(1-.5)(1.06)/(.10-.06) = $1,988
Value of Auto Parts subsidiary = 200 (1-.4)(1-.5)(1.06)/(.10-.06) = $1,590

Value of Reliable (with subsidiaries) = 2385 + 0.1 (1988) + 0.5 (1590) = $3,379
Value per share = $33.79

Problem 2
a. will become more sensitive to changes in expected growth rates. (The value of growth is a present
b. Firm A will have the higher PEG ratio, because it has the lower expected growth rate.
c. Low tax rate, high return on capital, low reinvestment rate: Best possible combination
d. The price to book value ratio will drop. The simplest way to do this is to use the following equation:
PBV = (ROE - growth rate)/(Cost of equity - growth rate)
Incidentally, this is true only if the price to book value ratio is greater than 1, which it is in this case.
e. Enterprise Value = (Market Value of Equity + Market Value of Debt - Cash and Marketable Securities
   = (150 *10 + 1000-500)/(250+100) = 5.71