

MGT 890
Corporate Finance and Options
Fall 2000
Homework Set #5 -- ANSWERS

Question 1

(a) We are interested in identifying the stock whose total returns are most closely related to the market return. This can be accomplished using R^2 , which measures the proportion of the total variance in a stock's returns that can be explained by market movements. In this case, Glaxo Wellcome's stock has a higher R^2 value (.38).

Using the R^2 value, we are able to determine that for Glaxo Wellcome, 38% of its stock risk was market risk, and $(1-.38) = 62\%$ was unique risk.

(b) The variance of Glaxo Wellcome is equal to the standard deviation squared and equals 3.24%.

The unique variance is equal to the total variance multiplied by the proportion of the total variance that *cannot* be explained by the market movements. $3.24\% * (1 - R^2) = 2.01\%$.

(c) The t-statistic for BP's beta is $(0.98 / .14) = 7.0$ which is significant beyond the 1% level.

(d) $r_{GW} = r_f + \beta_{GW} (r_m - r_f) = 5\% + 0.90 (10\% - 5\%) = 9.5\%$

(e) $r_{GW} = r_f + \beta_{GW} (r_m - r_f) = 5\% + 0.90 (0\% - 5\%) = 0.5\%$

Question 2 (Note: Food percentage of firm value = 40%)

(a) With risk free debt, $\beta_{Asset} = (EQUITY/(DEBT + EQUITY))\beta_{Equity}$. Therefore:

$$\beta_{Food} = .7 (0.9) = 0.63$$

$$\beta_{Elec} = .8 (1.5) = 1.2$$

$$\beta_{Chem} = .6 (1.4) = 0.84$$

(b) $\beta_{Asset} = (0.4)\beta_{Food} + (0.35)\beta_{Elec} + (0.25)\beta_{Chem}$
 $\beta_{Asset} = (0.4)(0.63) + (0.35)(1.2) + (0.25)(0.84) = 0.882$

Still assuming risk-free debt:

$$\beta_{Asset} = (EQUITY/(DEBT + EQUITY))\beta_{Equity}$$

$$0.882 = (0.6)\beta_{Equity}$$

$$\beta_{Equity} = 1.47$$

(c) Using the Security Market Line, $r_{\text{asset}} = r_f + \beta_{\text{asset}} (r_m - r_f)$ and with $r_f = 5\%$, $r_m = 15\%$

$$r_{\text{Food}} = 5\% + 0.63 (15\% - 5\%) = 11.3\%$$

$$r_{\text{Elec}} = 5\% + 1.2 (15\% - 5\%) = 17.0\%$$

$$r_{\text{Chem}} = 5\% + 0.84 (15\% - 5\%) = 13.4\%$$

(d) With risky debt,

$$\beta_{\text{Asset}} = (\text{DEBT}/(\text{DEBT} + \text{EQUITY}))\beta_{\text{Debt}} + (\text{EQUITY}/(\text{DEBT} + \text{EQUITY}))\beta_{\text{Equity}}$$

Calculate returns using same method as part (c)

$$\beta_{\text{Food}} = (.3)(.2) + (.7)(.9) = 0.69$$

$$r_{\text{Food}} = 11.9\%$$

$$\beta_{\text{Elec}} = (.2)(.2) + (.8)(1.5) = 1.24$$

$$r_{\text{Elec}} = 17.4\%$$

$$\beta_{\text{Chem}} = (.4)(.2) + (.6)(1.4) = 0.92$$

$$r_{\text{Chem}} = 14.2\%$$

Question 3

(a) The threat of a coup d'etat means that the *expected cash flow* is less than \$500,000. The threat could also increase the discount rate, but only if it increases market risk.

(b) The expected cash flow is equal to $(.3)(0) + (.7)(500,000) = 350,000$. Assuming that the cash flow is about as risky as the rest of the company's business:

$$PV = 350,000 / 1.15 = 304,347.80$$

Question 4

i) $\beta_{\text{Asset}} = (\text{DEBT}/(\text{DEBT} + \text{EQUITY}))\beta_{\text{Debt}} + (\text{EQUITY}/(\text{DEBT} + \text{EQUITY}))\beta_{\text{Equity}}$

ii) Since $\beta_{\text{Debt}} = 0$; $\beta_{\text{Asset}} = (\text{EQUITY}/(\text{DEBT} + \text{EQUITY}))\beta_{\text{Equity}}$

iii) Therefore $\beta_{\text{Equity}} = \beta_{\text{Asset}} / (\text{EQUITY}/(\text{DEBT} + \text{EQUITY}))$

Both "Indiana Standard" and "Sohio" have identical business risk, and as a result they will have identical β_{Asset} . We also know the D/E ratio, and can therefore calculate the E/V ratio for each firm.

For "Indiana Standard", $D/E = 0.1/1.0$. Therefore $V = 0.1 + 1.0 = 1.1$, and $E/V = 1.0/1.1$ or 0.909. For "Sohio", $D/E = 0.4/1.0$. Therefore $V = 0.4 + 1.0 = 1.4$, and $E/V = 1.0/1.4$ or 0.7143.

Therefore if we set the two β_{Asset} equations equal to each other, we find:

$$(0.7143) \beta_{\text{EquitySohio}} = (0.909) \beta_{\text{EquityIndiana}}$$

$$(0.7143) \beta_{\text{EquitySohio}} = (0.909)(.8)$$

$$\beta_{\text{EquitySohio}} = 1.018$$

Question 5

(a) Expected / Forecasted Annual Cash Revenues:

Expected Daily Production per well = $(.2)(0) + (.8)[(.45)(2000) + (.55)(5000)] = 2920$ barrels.

Expected annual revenues = $2920 \text{ barrels per day} * 365 \text{ days} * \$20 \text{ per barrel} = \$21,316,000$.

(b) This proposal does not make sense. The possibility of a dry hole is a diversifiable risk and should not affect the discount rate. The possibility of a dry hole was already accounted for in expected / forecasted cash flows in part (a).