To practice for the midterm, you can try Ch 9 Qu 1,4,9,21. Solutions are below.

CHAPTER 9: THE CAPITAL ASSET PRICING MODEL

1. $E(r_P) = r_f + \beta_P \times [E(r_M) - r_f]$

$.18 = .06 + \beta_P \times [.14 - .06] \rightarrow \beta_P = \dfrac{.12}{.08} = 1.5$

4. The expected return is the return predicted by the CAPM for a given level of systematic risk.

$$E(r_i) = r_f + \beta_i \times [E(r_M) - r_f]$$
$$E(r_{\$1\ Discount}) = .04 + 1.5 \times (.10 - .04) = .13 = 13\%$$
$$E(r_{Everything\ \$5}) = .04 + 1.0 \times (.10 - .04) = .10 = 10\%$$

9. a. Call the aggressive stock A and the defensive stock D. Beta is the sensitivity of the stock's return to the market return, i.e., the change in the stock return per unit change in the market return. Therefore, we compute each stock's beta by calculating the difference in its return across the two scenarios divided by the difference in the market return:

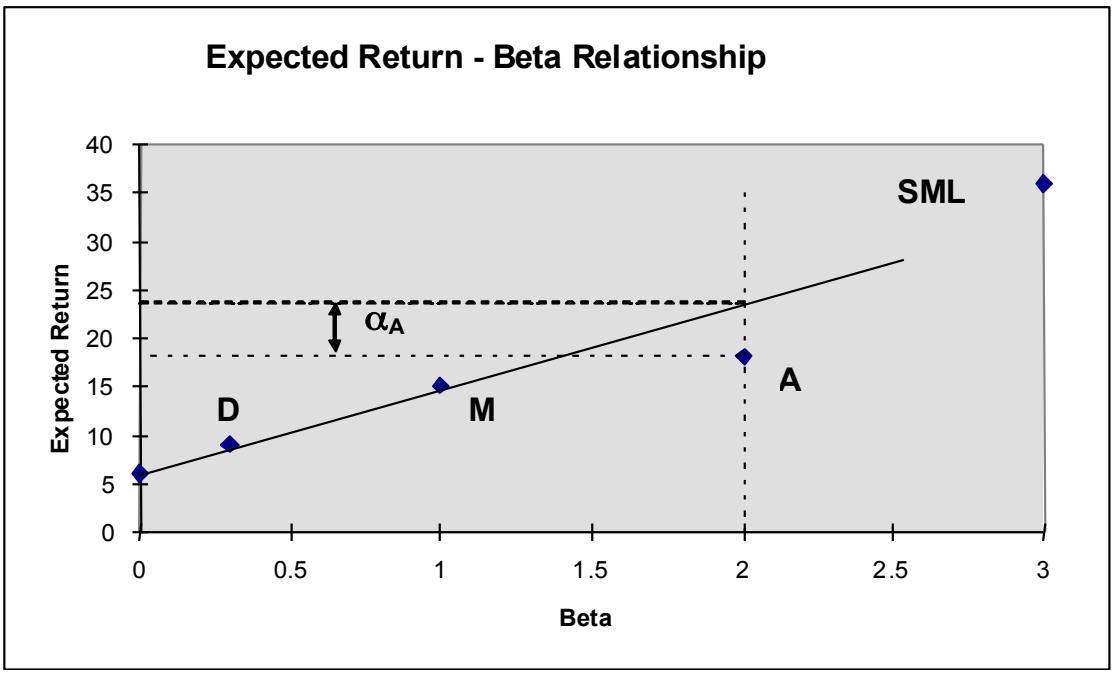
$$\beta_A = \frac{-.02 - .38}{.05 - .25} = 2.00 \qquad \beta_D = \frac{.06 - .12}{.05 - .25} = 0.30$$

b. With the two scenarios equally likely, the expected return is an average of the two possible outcomes:

$E(r_A) = 0.5 \times (-.02 + .38) = .18 = 18\%$

$E(r_D) = 0.5 \times (.06 + .12) = .09 = 9\%$

c. The SML is determined by the market expected return of $[0.5 \times (.25 + .05)] = 15\%$, with $\beta_M = 1$, and $r_f = 6\%$ (which has $\beta_f = 0$). See the following graph:



The equation for the security market line is:

$$E(r) = .06 + \beta \times (.15 - .06)$$

d. Based on its risk, the aggressive stock has a required expected return of:

$$E(r_A) = .06 + 2.0 \times (.15 - .06) = .24 = 24\%$$

The analyst's forecast of expected return is only 18%. Thus the stock's alpha is:

α_A = actually expected return – required return (given risk)

$= 18\% - 24\% = -6\%$

Similarly, the required return for the defensive stock is:

$$E(r_D) = .06 + 0.3 \times (.15 - .06) = 8.7\%$$

The analyst's forecast of expected return for D is 9%, and hence, the stock has a positive alpha:

21. a. Since the market portfolio, by definition, has a beta of 1, its expected rate of return is 12%.

b. $\beta = 0$ means no systematic risk. Hence, the stock's expected rate of return in market equilibrium is the risk-free rate, 5%.

c. Using the SML, the *fair* expected rate of return for a stock with $\beta = -0.5$ is:

$$E(r) = 0.05 + [(-0.5) \times (0.12 - 0.05)] = 1.5\%$$

The *actually* expected rate of return, using the expected price and dividend for

next year is:

$$E(r) = \frac{\$41 + \$3}{\$40} - 1 = 0.10 = 10\%$$

Because the actually expected return exceeds the fair return, the stock is underpriced.

α_D = actually expected return – required return (given risk)

= .09 – .087 = +0.003 = +0.3%