UNIVERSITY OF TEXAS AT AUSTIN

Quiz # 19

More on diversification. More on the CAPM.

Please, provide your **final answers only** to the following problems:

Problem 19.1. (2 points) *Source: Course 2, May 2003, Problem #11.*
The variability of an investment portfolio that is balanced evenly between two stocks is lower than the average variability of the two individual stocks. *True or false?*

Solution: TRUE

Problem 19.2. (2 points) *Source: Course 2, May 2003, Problem #11.*
Full diversification of an investment portfolio eliminates market risk. *True or false?*

Solution: FALSE

Problem 19.3. (2 points) Under the **CAPM**, the expected return and the required return of the market portfolio are equal. *True or false?*

Solution: TRUE

Problem 19.4. (5 points) *Source: Course 2, November 2002, Problem #36.*
Jack has an equally weighted portfolio of stocks X and Y. The beta of his portfolio is 0.9. Jill has an equally weighted portfolio of stocks X, Y, and Z. The beta of stock Z is 1.2, the Treasury bill rate of return is 6%, and the expected return on the market portfolio is 14.4%. What is the expected risk premium on Jill's portfolio?

(a) 6.0%
(b) 7.6%
(c) 8.4%
(d) 8.8%
(e) 10.1%

Solution: (c)
The β of Jack's portfolio is

$$\beta_1 = \frac{1}{2}(\beta_X + \beta_Y) = 0.9 \quad \Rightarrow \quad \beta_X + \beta_Y = 1.8$$

The β of Jill's portfolio equals

$$\beta_2 = \frac{1}{3}(\beta_X + \beta_Y + \beta_Z) = \frac{1}{3}(1.8 + 1.2) = 1.$$

Note that the β of Jill's portfolio equals the β of the market portfolio. So, her expected risk premium is

$$0.144 - 0.06 = 0.084.$$

Problem 19.5. (5 points) For a certain stock, you are given that its expected return equals 0.12 and that its β equals 1.2. For another stock, you are given that its expected return equals 0.07 and that its β equals 0.4. Both stocks lie on the **Security Market Line (SML)**. What is the risk-free interest rate r_f?

(a) 0.04
(b) 0.045
(c) 0.0625
(d) 0.1075

(e) None of the above.

Solution: (b)
Denote the expected return of the market portfolio by r_m. Then,

$$0.12 = r_f + 1.2(r_m - r_f),$$
$$0.07 = r_f + 0.4(r_m - r_f).$$

Subtracting the second equation from the first one, we get

$$0.05 = 0.8(r_m - r_f) \quad \Rightarrow \quad r_m - r_f = \frac{0.05}{0.8} = 0.0625.$$

Substituting the obtained risk premium of the market portfolio into the first equation above, we obtain

$$r_f = 0.12 - 1.2(0.0625) = 0.045.$$