Portfolio Management: Test II
Time: Thursday, 4 April 2013

Maximum points: 10
Calculator allowed.

ALL calculations and/or explanations in ALL questions must be shown! Just the final answer, even if it is correct, might yield zero points.

Question 2.1 [3 points.]

Mrs Jill Bomel, a stinking rich but risk averse investor, is considering investing in the domestic stock market, and the emerging Osrean stock market. Her domestic currency is the euro. The expected domestic and Osrean stock returns are 10 per cent and 20 per cent, respectively. The corresponding volatilities of the two stock markets are 15 per cent and 25 per cent. The expected return of the Osrean currency is 5 per cent with a volatility of 10 per cent. The correlation between the domestic stock market and the currency is −0.05, between the Osrean market and the currency 0.20, and between the two stock markets 0.30. Given that Ms Bomel will invest 40 per cent of her funds in the domestic risk-free asset with a return of 3 per cent, 45 per cent in the domestic stock market, and the rest in the Osrean stock market, what is the expected return and volatility of her portfolio?

Question 2.2 [3 points.]

Suppose the return generating process is given by

$$R_i = \alpha_i + \beta_{i,1} F_1 + \beta_{i,2} F_2 + \varepsilon_i,$$

where
F_1 = unexpected change in the industrial production index,
F_2 = unexpected inflation.

The following three portfolios are observed

Portfolio	Expected return	β_{i1}	β_{i2}
A	8.00 %	1	1.5
B	13.40 %	3	0.2
C	12.00 %	3	−0.5

a) Find the equation for the plane that must describe equilibrium returns.
b) Illustrate the arbitrage opportunity that would exist if there were another asset called D with the following properties: $E(R_D) = 8\%$, $b_{D1} = 2$, $b_{D2} = 0.50$.

The last question and some formulas are on the backside of the paper.

Question 2.3 [4 points.]

True or false? Answers without motivation/calculation/explanation yield no points.

a) The coefficient of relative risk aversion for Mr X is $A = 2$. The corresponding coefficient for Mrs Y is $A = 7$. Statement: Because of the higher coefficient of risk aversion, Mrs Y is willing to invest a larger amount of her wealth in risky assets than Mr X.

b) At the moment you own only some money on a bank account. However, you are planning to make an investment in one of three mutual funds. The Sharpe ratios are 1.5, 2.6, and 2.0, while the Treynor measures are 0.09, 0.15, and 0.16, respectively. Statement: You should make your additional investment into fund C.

c) There are two risky assets and a risk-free asset. We have computed that 25 per cent of the benchmark portfolio consists of the stock portfolio, and the rest of the bond portfolio. Ms Z with $A = 1.5$ should optimally invest 175 per cent of her wealth in the benchmark portfolio. Statement: This means that she should invest 131.25 per cent of her assets in the bond portfolio, and borrow 31.25 per cent.

d) Mr Market Timer is in the business of timing the market. By changing his timing techniques, he has been able to increase the correlation between his alpha forecasts and the alpha realisations from 0.25 to 0.40. Statement: This means, ceteris paribus, that he will allocate a larger portion of his wealth into the stock market than previously.

☺☺☺ *Dr Jan* says: Good luck! ☺☺☺

Please, do not cheat. The consequences of cheating are severe.

Some Formulas

You may need these – or then not.

$$U(E(R_p), \sigma_p^2) = E(R_p) - 0.5A\sigma_p^2$$

$$w^*_{\text{Risky}} = \frac{E(R_S) - R_f}{A\sigma_S^2}$$

$$w^*_S = \frac{\sigma_B^2 - \sigma_{BS}}{\sigma_S^2 + \sigma_B^2 - 2\sigma_{BS}} + \frac{E(R_S) - E(R_B)}{A \cdot (\sigma_S^2 + \sigma_B^2 - 2\sigma_{BS})}$$

$$w^*_S = \frac{\left(E(R_S) - R_f\right)\sigma_B^2 - \left(E(R_B) - R_f\right)\sigma_{B,S}}{\left(E(R_S) - R_f\right)\sigma_B^2 + \left(E(R_B) - R_f\right)\sigma_S^2 - \left[\left(E(R_S) - R_f\right) + \left(E(R_B) - R_f\right)\right]\sigma_{B,S}}$$

$$w^*_X = \frac{\alpha_X \sigma_M^2}{\alpha_X \sigma_M^2 (1 - \beta_X) + [E(R_M) - R_f]\sigma_{X\varepsilon}^2}$$

$$w^*_M = \beta^*_p = \frac{E(R_M) - R_f + a + b\alpha_M}{A(1 - \rho^2)\sigma_M^2}$$