

Portfolio Management: Test I Retake

Time: Wednesday, 28 March 2018

Maximum points: 10.

Hanken's calculator is to be used.

ALL calculations and/or explanations in ALL questions must be shown, unless explicitly stated otherwise! Just the final answer, even if it is correct, might yield zero points. Underline or otherwise highlight the most important parts of your answer.

Question 1.1 [4 points.]

The current stock **prices** of the companies Café Book and Headlands Ivory are USD160.00 and USD42.0, respectively. Suppose the stock prices of the two firms follow a joint bivariate distribution given in the table below.

Probability	End-of-period price (CB)	End-of-period price (HI)
10 %	180.00 \$	30.00 \$
65 %	150.00 \$	48.00 \$
25 %.	80.00 \$	72.00 \$

- a) Compute the expected returns and volatilities for the two securities, as well as the correlation between them. [3 points.]
- b) Suppose you are to construct a portfolio of the two stocks. Given the correlation coefficient you calculated in a), what can be said about diversification benefits? Explain why! [1 point.]

Question 1.2 [3 points.]

The following information on two securities, the market portfolio and the risk-free rate is offered:

	Expected return (%)	Correlation with market portfolio	Standard deviation (%)	
Security A	10.00	0.80	18.00	
Security B	9.50	0.60	30.00	
Market Portfolio	9.00	1.00	12.00	
Risk-free rate	4.00	0.00	0.00	

- a) Wait a minute! There is something fishy about the numbers, at least if you assume that the CAPM is true. Find the fish. Hint: Start by plotting the Security Market Line (SML) and inserting *all four* securities into the graph. [2 points.]
- b) Further, suppose that the expected inflation is 3%. Compute the real return for all assets, given the expected returns shown in the table.

Question 1.3 [3 points.]

True or false? Only answers with clear justifications will yield points.

- a) Consider a three-year, EUR0.9 million investment with annual cash flows of EUR 360,000. Statement: The internal rate of return is above 10 per cent.
- b) A stock was bought at 7.50 euro. Three days later, the stock was sold at 8.10 euro. Statement: The annualised return is less than 60,000 per cent.
- c) Consider the following portfolios: P1: $E(R) = 5\%$ and $\sigma = 10\%$; P2: $E(R) = 8\%$ and $\sigma = 7\%$; P3: $E(R) = 10\%$ and $\sigma = 10\%$; P4: $E(R) = 10\%$ and $\sigma = 15\%$. Statement: Portfolios 2 and 3 are efficient, while portfolios 1 and 4 are inefficient.

Turn page.

Portfolio Management: Test II Retake

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Question 2.1 [4 points.]

- The greatest stock picker of our time, Dr Nat Jallen, knows that the alpha of a stock is 1.42%, beta 0.90, and residual variance 0.09 (i.e., 900%). For the same time period, the expected market return is 9% with a standard deviation of 20%, and the risk-free rate of return 3%. Dr Jallen does not bother to do the boring calculations by himself, so he asks his assistant to do the calculations for him. However, his assistant isn't that qualified on this subject, which means you have to give some help.
- Given the above information, compute the expected return and volatility of a portfolio that consists of the market portfolio and the active asset.
 - There are two individuals, Mrs Lily Flower with a risk aversion coefficient equal to 3, and her brother, Mr Thorn Flower, with a risk aversion coefficient equal to 5. What is your investment advice for these two investors?
 - Given your investment advice in the previous part, compute the expected return, volatility, and Sharpe ratio of the two portfolios.

Question 2.2 [3 points.]

Suppose the return generating process is given by

$$R_i = \alpha_i + \beta_{i1}F_1 + \beta_{i2}F_2 + \varepsilon_i,$$

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	11.00 %	0.5	1
B	12.40 %	0.2	3
C	11.00 %	-0.5	3

a) Find the equation for the plane that must describe equilibrium returns.

- b) Illustrate the arbitrage opportunities that would exist if there were another asset called D with the following properties: $E(R_D) = 12$, $b_{D1} = 0$, $b_{D2} = 2$.

Question 2.3 [3 points.]

Three shorter ones. The questions are not related to each other.

- Let the expected stock return be 12% with a 25% volatility. Meanwhile, the expected return on gold is 8% with a volatility of 30%. Gold is both with respect to expected return and risk inferior to stocks. Why would anyone be willing to invest in gold? Draw a graph.
- Dr Mik Millennium is very, very angry. In test 2 a couple of weeks ago, he asked you to calculate the annualized Jensen's alpha as well as the alpha with respect to the Fama-French three-factor model on his investment portfolio. It turned out that $\alpha_{Jensen} = 1.42\%$ while $\alpha_{FF3} = -0.36\%$. Dr Millennium hates any negative outcome, and now furiously requires an explanation, how come one performance measure is positive and the other one is negative. Please give that explanation.
- DYQ, i.e., design your own question and answer it. The question must be relevant with respect to the instructions for test 2 ("In the spirit of exercise sessions 3 and 4, and exercises 19 till the end."). The question should not be related to any other question in this test. Both the question and the answer will be graded. The grading will be strict. Note that "in the spirit of does not necessarily mean "exactly equal to". I am in the first place not looking for questions you might have memorized, but new, innovative questions. Truly innovative questions might be rewarded by a bonus.

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

Some Formulas

You may need these – or then not.

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

$$w_{Risky}^* = \frac{E(R_s) - R_f}{A\sigma_s^2}$$

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

$$w_s^* = \frac{(E(R_s) - R_f)\sigma_B^2 - (E(R_B) - R_f)\sigma_{BS}}{(E(R_s) - R_f)\sigma_B^2 + (E(R_B) - R_f)\sigma_{BS} - [(E(R_s) - R_f) + (E(R_B) - R_f)]\sigma_{BS}}$$

$$w_X^* = \frac{\alpha_X\sigma_M^2}{\alpha_X\sigma_M^2(1-\beta_X) + [E(R_M) - R_f]\sigma_X^2}$$

$$w_M^* = \beta_p^* = \frac{\alpha_X\sigma_M^2}{A(1-\rho^2)\sigma_M^2}$$