

Portfolio Management: Test I

Time: Thursday, 26 March 2015 (retake)

Maximum points: 10

Calculator allowed.

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 [3 points.]

Consider the following information for five securities.

Correlation matrix	Security A	Security B	Security C	Security D	Security E
Security A	1.00000				
Security B	0.32115	1.00000			
Security C	0.35781	0.15024	1.00000		
Security D	0.33000	0.30308	-0.33750	1.00000	
Security E	0.32500	0.28846	0.42500	0.36000	1.00000
Expected return	10.00%	9.00%	6.00%	12.00%	5.00%
Volatility	40.00%	52.00%	16.00%	25.00%	20.00%

- a) You are about to construct a portfolio which consists of only *two* of the above securities. You want to have a portfolio variance that is as low as possible. There are ten (10) different alternatives to construct a two-security portfolio of the above five individual securities. Which two securities should you choose to minimize the portfolio variance. Why!
- b) Compute the Sharpe ratio of the minimum variance portfolio constructed of the two assets that yield the lowest possible portfolio variance. The risk-free rate of return is 2.00%.

Question 1.2 [3 points.]

A mutual fund offers a safe money market fund whose current rate is 1.50 per cent per annum. Assume the fund is risk-free even if that is not entirely true. The same company also offers an equity index fund which invests in individual securities using the same proportions as in the market index. Its expected return is 10 per cent per annum with a standard deviation of 25 per cent.

- a) Plot the capital market line. The graph should be clear such that a bad-eyed finance doctor understands it as well.
- b) What is the equation for the capital market line?
- c) What is the highest possible expected return you can get if you are willing to tolerate a volatility of 20 per cent?

Question 1.3 [4 points.]

Assume that CAPM is true (doh!). However, the information you have is incomplete. Calculate the gaps (1)–(5) in the table below, and make a clear summary of your results.

Asset	Expected re- turn	Standard devi- ation	Beta	Unsystematic risk (std.dev.)
A	(1)	(2)	1	0
B	0.08	0.17	0	(5)
C	0.13	0.35	(4)	0.27
D	0.17	(3)	0.75	0

☺☺☺ Dr Jan says: Good luck! ☺☺☺

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

Portfolio Management: Test II

Time: Thursday, 26 March 2015 (retake)

Maximum points: 10
Calculator allowed.

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Question 2.1 [4 points]

You are looking at historical data for the stock market, and three funds located in the country of Lunatic States, with a currency named Lunatic States Drachma (LSD). At the beginning of the period, the indirect foreign exchange rate quote from a European (euro) point of view was 1.5. In the end of the observation period, the indirect FX quote was 2.0. The risk-free rate is 4 per cent. The following table shows additional information.

	Initial price	End-of-period price	Standard deviation	Beta
Fund A	63.64 LSD	91.53 LSD	18%	1.40
Fund B	103.20 LSD	111.44 LSD	28%	1.20
Fund C	28.75 LSD	42.35 LSD	36%	1.10
Market	1.366.16	1.778.82	18%	

- Compute the realized Sharpe ratio, Treynor measure, and alpha for each risky asset, including the market. The calculations should be done from the point of view of a European investor.
- Which investment would you have chosen? Explain why.

Question 2.2 [4 points]

Portfolio manager Felix Carlson is an optimistic date. Therefore he has historically usually been overoptimistic in his forecasts of the market performance. His "forecast coefficients" are $a = -0.0075$ (-0.75%) and $b = 0.80$. The correlation of Mr. Carlson's past forecasts and past market forecasts has been 0.20. Now he forecasts a market return of +3% above the consensus forecast. The consensus expected return for the market is 12 % with a standard deviation of 25 per cent. The risk-free rate is 4 per cent.

a) Consider two investors. Mr. J. Daniels has a risk aversion coefficient of 4, while Mrs. J. Walker's corresponding coefficient is 8. How should the strategic asset positions for Mr. Daniels and Mrs. Walker be constructed? Investments are made in the stock market portfolio and in the risk-free asset, taking account of Mr. Carlson's market timing view and past performance.

- Compute the expected return and volatility of the optimal portfolios.
- Suppose we did not have any knowledge of portfolio manager Carlson or his coefficients. How would that have affected the answer in part a)? Discuss generally (no calculations are needed).

The last question along with some formulas are on the following page.

Question 2.3 [2 points.] Two unrelated statements.

True or false? Note: Answers without explanation in words or numerically yield no points.

- You invest 20% of your wealth in Finland and 80% in the USA. The expected Finnish return is 10%, the US return 12%, and the return on the currency 2%. The expected return on the portfolio is $E(R_p) = 0.2 \times 10 + 0.8 \times 12 + 0.8 \times 2 = 13.2\%$. Statement: This calculation cannot be correct since the sum of the weights is 160%, not 100%.
- A fund manager knows that her fund currently is well diversified and that it has a CAPM beta of 1.2. The risk-free rate is 6 per cent and the CAPM market risk premium is 5.2 per cent. She has been learning about APT measures of risk and knows that in an APT-world there are (at least) two factors, such that the expected return is given by

$$E(R) = 6 + 5b_{12} + 8b_{12}.$$

Statement: Given that her portfolio currently has a sensitivity to the first factor of $b_{12} = -0.5$, the sensitivity to the second factor will be 1.09250.

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Some Formulas

You may need these – or then not.

$$U(E(R_p), \sigma_p^2) = E(R_p) - \alpha_5 A\sigma_p^2$$

$$w_{Navy}^* = \frac{E(R_S) - R_f}{A\sigma_S^2}$$

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

$$w_S^* = \frac{(E(R_S) - R_f)\sigma_S^2 - (E(R_B) - R_f)\sigma_{BS}^2}{(E(R_S) - R_f)\sigma_S^2 + (E(R_B) - R_f)\sigma_{BS}^2 - [(E(R_S) - R_f)(E(R_B) - R_f)]\sigma_{BS}}$$

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

$$w_M^* = \beta_p^* = \frac{E(R_M) - R_f + \alpha + b\alpha_M}{A(1 - \rho^2)\sigma_M^2}$$