Portfolio Management: Test I
Time: Thursday, 12 February 2015

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 [6 points.]

The current prices of securities A and B are 10.00 euro and 15.00 euro, respectively. Suppose there are three possible future states of nature. The table below gives the probability of each state, and the **prices** of the two securities in each state. The risk-free rate of return is 2%.

Future state	Probability	Price$_A$	Price$_B$
Oh shit	20%	4.00 euro	7.50 euro
Neutral	70%	11.00 euro	18.00 euro
Champagne	10%	18.00 euro	24.00 euro

Well, then, compute the Sharpe ratio of security A, security B, and of the minimum variance portfolio composed of securities A and B. Short-selling is allowed.

$$S_p = \frac{\bar{r}_p - r_f}{\sigma_p}$$

$$r_i - E(r_i)$$

$$\frac{\sigma_B^2 - \sigma_{AB}}{\sigma_A^2 + \sigma_B^2 - 2\sigma_{AB}}$$

Question 1.2 [4 points.]

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

a) An investor, Mr. Stupidas Persaukis, is following a derivatives trading strategy in which he every day can get either a +30% or a −25% arithmetic rate of return with equal probabilities. The value of the investment achieved after each day is reinvested the following day, i.e., the return is compounded over time. Compute the expected geometric return per day, given that Mr. Persaukis continues with his strategy day in and day out for a very (very!) long period of time. Hint. The answer is not 2.5%.

b) It can be shown that the variance of an equally-weighted portfolio is given by $\sigma_p^2 = \frac{1}{N}\overline{\sigma_i^2} + \frac{N-1}{N}\overline{\sigma_{ij}}$. Given that the average variance is 625%^{2}, and the average covariance 350%^{2}, how many assets is needed to create a portfolio with a 19% standard deviation?

c) The Capital Asset Pricing Model implies that, if you could find an investment with a negative beta, its expected return would be less than the risk-free rate. True or false? Only a correctly justified answer is accepted.

d) A security has a positive alpha with respect to the CAPM. Statement: The security is undervalued. True or false? Only a correctly justified answer is accepted.

☺☺☺ *Dr Jan* says: Good luck! ☺☺☺

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