MCF 17

Advanced Courses

Portfolio Management

Final Exam

Time Allowed: 60 minutes

Family Name (Surname)	First Name	Student Number (Matr.)

Please answer all questions by choosing the most appropriate alternative and/or by writing your answers in the spaces provided. There is only one correct answer(s) for each of the multiple choice questions: each selected alternative that is correct will be awarded one point. Only answers explicitly reported **in the appropriate box** will be considered. No other answers or indications pointing to potential answers will be taken into consideration.

Question 1. With reference to a portfolio choice problem based on the maximization of the expectation of some utility function $U(W_{t+1})$, then:

☑ (A) The portfolio weights that maximize the expectation of $U(W_{t+1})$ are the same as those that maximize $U(W_{t+1})$ multiplied by 2 minus a constant equal to 3
☐ (B) The portfolio weights that maximize the expectation of $U(W_{t+1})$ are the same as those that maximize the value of $U(W_{t+1})$ multiplied by -2 (minus 2), plus a constant equal to 3
☐ (C) The portfolio weights that maximize the expectation of $U(W_{t+1})$ are the same as those that maximize the inverse of $U(W_{t+1})$ plus a constant equal to -1
☐ (D) The portfolio weights that minimize the expectation of $U(W_{t+1})$ are the same as those that maximize the natural logarithm of $U(W_{t+1})$ multiplied by 2 minus a constant equal to 3

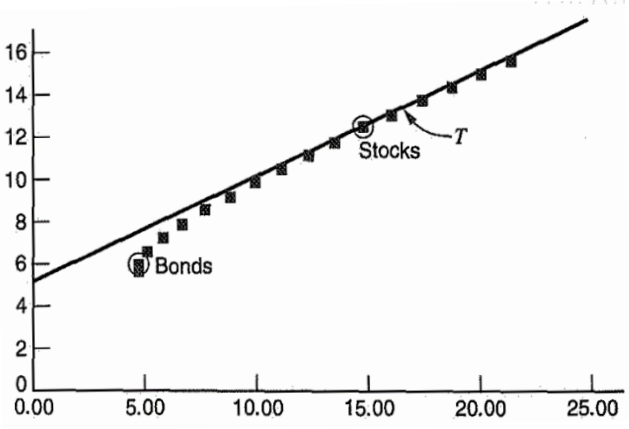
Question 2. The key problem of portfolio performance assessment is:

☐ (A) To distinguish skill from luck, given that skilled portfolio managers will try to hide behind high randomness invoking bad luck and that unskilled managers will instead carefully control the risk they take to avoid pooling with the poor performance of skilled managers
☐ (B) To distinguish tactical from passive managers
☐ (C) To distinguish skill from luck, given that unskilled portfolio managers will try to carefully control risk invoking good luck and that skilled managers will instead take massive risks to try and pool with the poor performance of unskilled managers
☑ (D) To distinguish skill from luck, given that unskilled portfolio managers will try to hide behind high randomness invoking bad luck and that skilled managers will instead carefully control the risk they take to avoid pooling with the poor performance of unskilled managers

Question 3. Mr. Samordor, a client of yours, has asked you to compute the weights to be assigned to each of 10 different stocks in order to build a portfolio lying on the efficient frontier and characterized by an 8% target expected return. In addition, he has specified that he does not want to short-sell any stocks. Which of the following claims is most likely?

☑ (A) You can use the Excel solver to find the weights of the portfolio requested by Mr. Samordor
☐ (B) You cannot use the solver to find the weights of the portfolio requested by Mr. Samordor because the solver cannot perform constrained optimization
☐ (C) You cannot use the solver to find the weights of the portfolio requested by Mr. Samordor because there are more than five stocks in the asset menu
☐ (D) Both answers B and C are correct

Question 4. In this plot referred to a US stock-bond diversification problem:



☐ (A) The tangency portfolio T implies a short position in stocks and a levered position in bonds
☑ (B) The tangency portfolio T implies a short position in bonds and a levered position in stocks
☐ (C) The tangency portfolio T implies a long position in both stocks and bonds
☐ (D) The tangency portfolio T implies a levered position in bonds and a short position in stocks

Question 5. Consider the certain prospects X and Y and assume the investor is indifferent between them. The *transitivity* axiom of choice under uncertainty:

☐ (A) Implies that the investor will always prefer X over Y if X occurs with probability *P* and Z with probability 1 - *P*
☐ (B) Implies that the investor will also be indifferent between X with probability 1 - *P* and Z with probability *P*, and Y with probability *P* and Z with probability 1 -*P*
☐ (C) Implies that the investor will have to prefer X to Z
☑ (D) None of the above

Question 6. Consider a fair gamble (i.e., with price identical to expected payoff) priced at 2 euros and with only two possible outcomes, a 1 euro *loss* and or a 2 euros *profit*, after the payment of the gamble. Your initial wealth is 2 euros. Then:

☐ (A) If you are risk averse and your utility function of the final wealth is continuous such that $U(4) = 8$ and $U(1) = 2$, then $U(2)$ must be any number greater than or equal to 4, $U(2) > 4$
☐ (B) If you are risk averse and your utility function of the final wealth is continuous such that $U(2) = 6$ and $U(-1) = 4$, then $U(0)$ must be any number equal to or in excess of 2, $U(0) > 2$
☐ (C) If you are a risk lover and your utility of the final wealth is continuous such that $U(1) = 6$ and $U(4) = 8$, then $U(2)$ must be any number equal to or less than 20/3, $U(2) < 20/3$
☑ (D) Both A and C

Question 7. The key drawback of using the Sharpe ratio to rank different funds or portfolio managers is that:

☐ (A) The Sharpe ratio carries the standard deviation of the portfolio excess returns at its denominator instead of the variance, which would be instead more sensible, given the presence of average excess returns in its numerator
☑ (B) The Sharpe ratio implicitly assumes that performance evaluation is applied by an investor who places of all her wealth in one only of the funds or investment vehicles that are being ranked and that these funds are alternative, well-diversified portfolios
☐ (C) The Sharpe ratio implicitly assumes that performance evaluation is applied by an investor who places any portion, including a modest one, of her wealth in any of the funds or investment vehicles that are being ranked and that these are not well-diversified portfolios
☐ (D) It may take negative values and these make no sense because variance cannot be negative

Question 8. In a single-index model:

☐ (A) Assuming all residual risk is purely systematic, the pairwise covariances of any pair of assets will only depend on their alphas
☑ (B) Assuming all residual risk is purely idiosyncratic, the pairwise covariances of any pair of assets will only depend on their betas
☐ (C) Assuming all residual risk is purely idiosyncratic, not only the variance of returns of each asset only depends on its beta on the index portfolio, but also the pairwise covariances of any pair of assets will only depend on their betas
☐ (D) None of the above

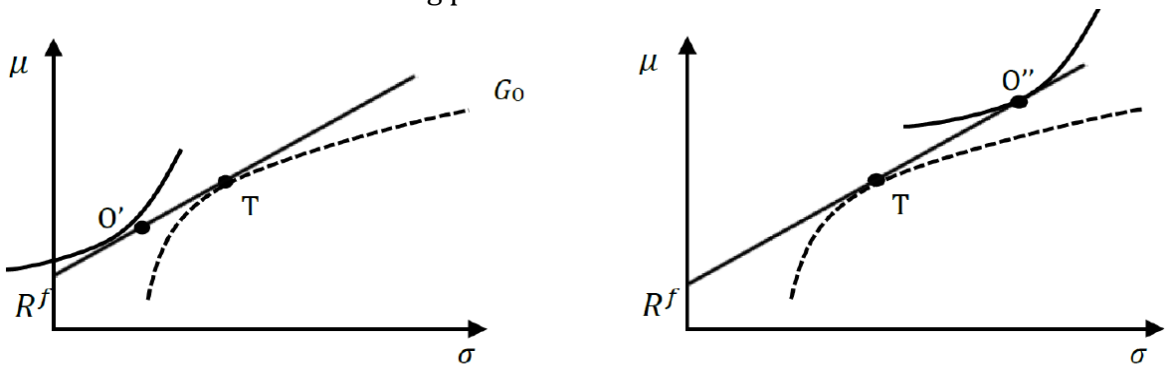
Question 9. While performing computations involving vectors and matrices in Excel one should never forget to press:

☐ (A) CTRL + ENTER
☐ (B) CTRL + SHIFT
☑ (C) CTRL + ALT + ENTER
☐ (D) None of the above

Question 10. With reference to multi-index, APT-style models used to derive the inputs of classical mean-variance analysis (i.e., expected returns, variances, and covariances), which of the following is most appropriate:

☐ (A) Besides the Fama-French factors (related to profitability, segmentation, besides the market portfolio), it is typical to use macroeconomic indices such as the price index, the quantity of money, and net exports, all measured in their levels, so to be non-stationary
☐ (B) Although the model features a number of variables on the right-hand-side, all the inputs that the model yields will coincide with those estimated from a single-index, CAPM model
☐ (C) Financial analysts will be the providers (sellers) of high-quality estimates of the beta exposures of the various stocks and assets vs. the list of indices appearing on the right-hand-side of the model
☑ (D) Besides the Fama-French factors (related to the size and value characteristics, besides the market portfolio), it is typical to use macroeconomic indices such as the inflation rate, the rate of growth of the economy, and real productivity, all measured in deviations from their expectations, so to represent true risk factors

Question 11. Consider the following pictures:



Which of the following claims is most appropriate:

☐ (A) The investor characterized by the optimum O'' is rather conservative and as such she invests a substantial fraction in the riskless asset, while the investor characterized by O' is aggressive and she leverages the tangency portfolio T'
☐ (B) The investor characterized by the optimum O' is rather conservative and as such she invests a substantial fraction in the tangency portfolio, while the investor characterized by O'' is aggressive and she invest a considerable weight in the riskless asset
☑ (C) The investor characterized by the optimum O' is rather conservative and as such she invests a substantial fraction in the riskless asset, while the investor characterized by O'' is aggressive and she leverages the tangency portfolio T
☐ (D) None of the claims above is appropriate

Question 12. If portfolio P is in the efficient set, then:

☐ (A) Not many portfolios with the same expected return as P will have a lower variance and not many portfolios with the same variance as P will have a higher expected return
☐ (B) It will be the tangency portfolio for at least one choice of the riskless rate above the expected return of portfolio P
☑ (C) No other portfolio with the same expected return as P will have a lower variance and no portfolio with the same variance as P will have a higher expected return
☐ (D) No other portfolio with the same variance as P will have a lower expected return and no portfolio with the same expected return as P will have a higher variance

Question 13. According to the separation theorem:

☐ (A) The decision concerning which stocks to buy is separate from the decision concerning how much of each stock should be purchased
☑ (B) Different risk-averse investors will demand identical risky portfolios (all coinciding with a unique tangency portfolio) but will hold heterogeneous overall portfolios in terms of the fraction invested in or borrowed at the riskless asset
☐ (C) Different risk-averse investors will demand identical portfolios, also in terms of the fraction invested in or borrowed at the riskless asset
☐ (D) None of the above

Question 14. The market portfolio pays an annualized risk premium of 5% and has an annualized volatility of 22.36%. You know that John is a mean-variance investor who invests 50% of his portfolio in the market portfolio and 50% in the risk-free asset. Therefore you can infer that:

☑ (A) John has a risk-aversion coefficient $\kappa \cong 2$
☐ (B) John has a risk-aversion coefficient $\kappa \cong 1$
☐ (C) John has a risk-aversion coefficient $\kappa \cong 1/2$
☐ (D) None of the above

Question 15. Thinking about the use of single- and multi-index models to reduce the number of inputs required in applications of the mean-variance framework, which of the following claims is most appropriate:

☐ (A) The single-index model implies a simplification of the problem when $3N + 2 < 1.5N^2 + 0.5N$, which is satisfied when the number of risky assets is 4 or more
☐ (B) The multi-index model implies a simplification of the problem when $(2 + N)K + 2N > 0.5N^2 + 1.5N$, which satisfied when the number of risky assets is 17 or more
☑ (C) The single-index model implies a simplification of the problem when $3N + 2 < 0.5N^2 + 1.5N$, which is satisfied when the number of risky assets is 5 or more
☐ (D) All of the above are appropriate

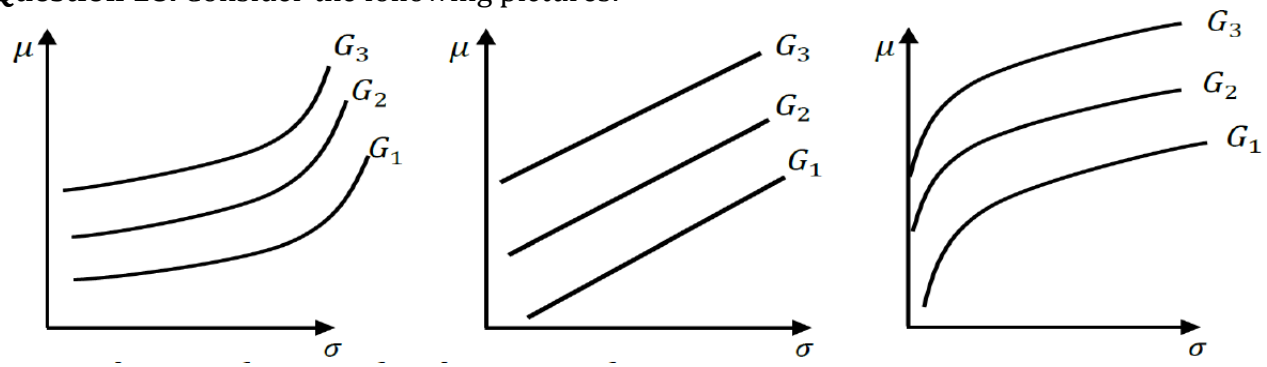
Question 16. The key advantage of a preference-based, expected utility approach to optimal portfolio selection is that:

☐ (A) It is a transitive criterion of choice
☑ (B) It is a complete criterion of choice
☐ (C) It is a criterion of choice that is independent of irrelevant alternatives
☐ (D) It is always based on logarithmic utility, which is a very plausible type of Von-Neumann Morgenstern utility function

Question 17. In a single-index model and when all residual risk is purely idiosyncratic and hence uncorrelated across pair of assets, when the beta of asset 1 halves but the beta of asset 2 doubles, leaving everything else constant, then:

☐ (A) Nothing can be said about what will occur to the covariance between assets 1 and 2
☐ (B) The covariance between assets 1 and 2 doubles
☑ (C) The covariance between assets 1 and 2 remains constant
☐ (D) The covariance between assets 1 and 2 halves

Question 18. Consider the following pictures:



Which of the following claims is most appropriate:

☐ (A) All plots represent "maps" of indifference curves of mean-variance, risk-averse investors
☐ (B) The first investor is characterized by a risk aversion that increases with the level of risk she faces; the second investor by a constant risk aversion that is not affected by the variance she faces; the third investor by a risk aversion that declines with the level of variance she faces
☐ (C) While the preferences in the first plot are compatible with a standard tangency-based, separation theorem portfolio result, the other two plots may imply portfolio implications that are problematic
☑ (D) A, B, and C are all appropriate

Question 19. An investor characterized by logarithmic utility is characterized by:

☑ (A) Unit, constant relative risk aversion
☐ (B) Unit, constant absolute risk aversion
☐ (C) An increasing relative risk aversion
☐ (D) A decreasing risk tolerance coefficients

Question 20. You have recently computed the optimal asset allocation between equities and bonds for two clients of yours, Ms. Bigturks and Mr. Greyhead. Both have a mean-variance utility function, but Mr. Greyhead has a coefficient of risk aversion "kappa" equal to 0.3 while Ms. Bigturks has a "kappa" equal to 0.7. If you know that equity is much more volatile than bonds are but the risk premium on stocks and bonds are approximately similar, which of the following is most likely?

☐ (A) Mr. Greyhead's optimal allocation is 70% equity and 30% bonds while Ms. Bigturks' optimal allocation is 90% equity and 10% bonds
☐ (B) Mr. Greyhead's optimal allocation is 50% equity and 50% bonds while Ms. Bigturks' optimal allocation is 90% equity and 10% bonds
☐ (C) Mr. Greyhead's optimal allocation is 20% equity and 80% bonds while Ms. Bigturks' optimal allocation is 50% equity and 50% bonds
☑ (D) Mr. Greyhead's optimal allocation is 70% equity and 30% bonds while Ms. Bigturks' optimal allocation is 20% equity and 80% bonds