LISBON SCHOOL OF ECONOMICS & MANAGEMENT
UNIVERSIDADE DE LISBOA

Financial Markets and Investments

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Duration: 45min

Name: **Number:**

Computer Exam

GROUP IV (60 points)

You must hand-in your **EXCEL file** (*20190111_FMI_StudentNumber_code.xlsx*).

In the Excel file highlight final answers and briefly reproduce them below (using the available space).

Suppose you can invest in three risky assets A, B, C and deposit without risk at an interest rate of 3% or borrow at a rate of 7%. In addition we have the following estimates about the risky assets: $\bar{R}_A = 15\%, \bar{R}_B = 10\%$, $\bar{R}_C = 20\%$, $\sigma_A = 10\%$, $\sigma_B = 6\%$, $\sigma_C = 15\%$, $\rho_{AB} = 0.5, \rho_{BC} = 0.25$, and $\rho_{AC} = 0$.

1. Consider the above described market conditions. Represent in the mean-variance space $(\sigma, \bar{R})$:
   (a) The basic assets and determine the mean-variance inputs. ..... [5p]

   (b) The investment opportunity set (IOS) and the efficiency frontier (EF) for the scenarios:
      (i) when we consider just combinations of the three risky assets. ..... [7.5p]
      (ii) when we consider combinations of the three risky assets with deposit and borrowing rates. ..... [7.5p]

   (c) Conclude about the efficiency of assets A, B and C? ..... [2.5p]

2. Suppose the returns of A, B, C are normally distributed.

   (a) For the risky asset A, compute $\Pr(R_A \leq 0\%)$. ..... [5p]

   (b) Consider combinations of the three risky assets with deposit and borrowing rates. Determine and represent in the mean-variance space $(\sigma, \bar{R})$ (same graph as Question 1):

      (i) All portfolios for which $\Pr(R_p \leq 0\%) \leq \Pr(R_A \leq 0\%)$. ..... [7.5p]

      (ii) Identify the so-called Telser portfolio that satisfies the above restriction. ..... [5p]

3. Suppose you would like to apply a constant correlation model (CCM) for in the described setup.

   (a) Determine the constant correlation parameter ρ and the mean-variance inputs under the CCM assumption. ..... [5p]

   (b) Find out the new tangent portfolios – $T1$ (CCM) and $T2$ (CCM) – under the model assumption. ..... [5p]

   (c) Represent the true envelop hyperbola of Question 1 and the CCM model implied envelop hyperbola and explain to which kind of investor would model risk be bigger? ..... [10p]