



Financial Markets and Investments

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Answer directly on the exam sheet.

Duration: 1.5h

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Name:

.....
Number:

.....

GROUP I (30 points)

1. Explain Lintner's definition of portfolio and its connection with shortselling restrictions. Consider an arbitrary number of $n > 3$ risky assets and a risk-free asset that can be used for both lending and borrowing. Sketch in the plan (σ, \bar{R}) the investment opportunity set under 3 different scenarios: (i) shortselling fully allowed, (ii) limited shortselling *a la*, Lintner, and (iii) shortselling forbidden. [15p]

Answer:

2 Choose ONE of the following statements and discuss whether they are true or false. [15p]

- I. *To an investor who does not verify the Von-Neuman-Morgensten axioms, one should recommend safe portfolios according to criteria such as Roy, Kataoka or Telser.*
- II. *If some analysts believe in a two-factor APT equilibrium model and others in the classical CAPM equilibrium model, they will never agree about equilibrium returns.*

Comment:

GROUP II (20 points)

- 1. Characterize the risk profile of a *log-investor* with $U(W) = a + b \log(W)$, for $b > 0$ [10p]
- 2. Show that a portfolio that maximizes the geometric expected return is the optimal portfolio for a log-investor (for simplicity you may consider a discrete distribution of returns). [10p]

Answers:

GROUP III (50 points)

The efficient frontier in the market under analysis is given by

$$\bar{R}_p = 3\% + SR_T \sigma_p ,$$

where SR_T is the highest possible attainable Sharpe Ratio.

In addition, we know the portfolios under consideration are based upon 16 risky assets and that the only combination of *just risky assets* that is efficient happens to be the *homogeneous* portfolio with expected return of 12% and a volatility of 15%.

1. What can you conclude about: (i) the existence or not a riskless asset, (ii) de possibility of borrowing to invest in risky assets, (iii) the composition of the tangent portfolio, (iv) the value of SR_T . Explain. [10p]

Answer:

(i)

(ii)

(iii)

(iv)

2. Show that, for an average volatility of risky assets of 17.7%, the market implied average correlation is 0.7. [7.5p]

Solution:

3. Mr. Iseg has a risk profile well described by the indifference curves $\bar{R}_p = \sigma_p^2 + 0.3\sigma_p + K$, with $K \in \mathbb{R}$.

(a) Show the optimal investment volatility for Mr. Iseg is 15%.....[7.5p]

Solution:

(b) How should Mr. Iseg invest 250 000 euros, to reach that desired level of risk?[5p]

Solution:

(c) What would need to be the certain return, R_C , that would make Mr.Iseg indifferent to invest or not in his optimal portfolio? Explain your computations.[10p]

Solution:

4. In terms of (i) the market's efficient frontier and (ii) the optimal allocation for Mr. Iseg, what would change if:

(a) Shortselling is forbidden. [5p]

Solution:

(b) It is not possible to take a loan for investment in risky assets. [5p]

Solution:

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Extra space (if needed).