



Strathmore
UNIVERSITY

STRATHMORE UNIVERSITY
STRATHMORE INSTITUTE OF MATHEMATICAL SCIENCES
BBS FE, FENG AND ACT
SPECIAL EXAM
THEORY OF FINANCE

DATE: 6th May 2022

Time: 2 hours

Instructions

1. This examination consists of **FIVE** questions.
2. Answer **Question ONE (COMPULSORY)** and any other **TWO** questions.

Question One – (30 Marks)

a. *Explain* the following concepts as used in finance:

i. No Arbitrage

(2 marks)

ii. Complete Markets

(2 marks)

b. State the Expected Utility Theorem

(2 marks)

c. Briefly explain **FOUR** axioms of Consumer choice

(8 marks)

i. Consider an investor with the following utility function:

$$u(w) = -\exp(-\alpha w)$$

Explain the risk preferences for the investor when α is interpreted as the coefficient of risk aversion. Support your explanation with suitable workings.

(4 marks)

Consider then that a lottery pays either 50,000 or 10,000 with equal probability.

ii. Calculate the certainty equivalent for an investor with a utility function $\frac{1}{\gamma} w^\gamma$

when $\gamma = 0.25$.

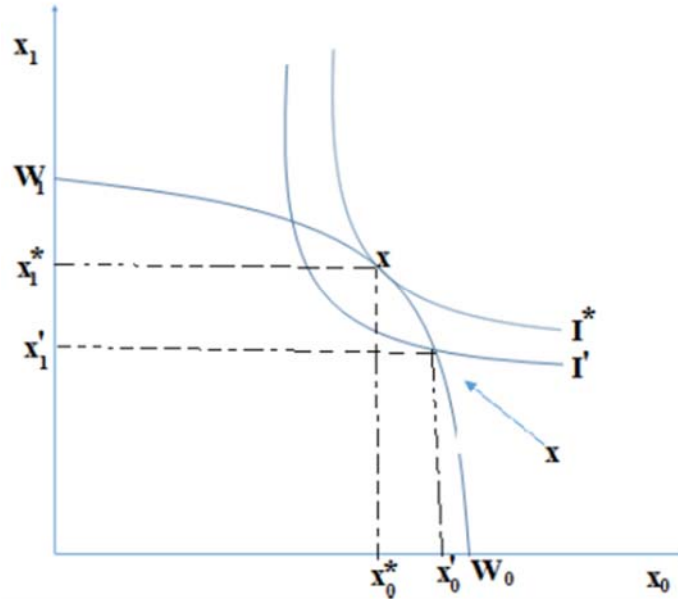
(3 marks)

- iii. Comment on the effect of changing the value of γ using the Arrow-Pratt Framework.

(5 marks)

- 8 Explain why a consumer will choose the bundle of good that occurs where the budget line is tangent to the indifference curve, at point x in the diagram below.

(4 marks)



Question Two – (20 marks)

a.

i. Define an efficient portfolio in the context of Mean-Variance Portfolio Theory
(2 marks)

ii. State three main assumption of Mean Variance Optimization
(3 marks)

iii. Three assets have the following features:

Asset i	Expected Return	Volatility – Standard Deviation
1	4%	6%
2	6%	12%
3	8%	18%

The correlation between assets 1 and 2 is 0.75; while the correlation between asset 3 and both of the other two was zero.

Calculate the expected return and the risk associated with the minimum variance portfolio.

(8 marks)

iv. Given risk-free borrowing and lending, efficient portfolios have no unsystematic risk. True or False? Explain.

(3 marks)

b. An investor is considering forming a portfolio of stock D and E. They notice that a portfolio with equal weights in the two stocks has the lowest variance of any portfolio of D and E. The two stocks have positive betas, and their returns are uncorrelated, but Stock D is more correlated with the market than Stock E. Explain which stock has the higher expected return.

(4 marks)

Question Three – (20 marks)

<i>State</i>	<i>Probability</i>	<i>Asset 2</i>	<i>Asset 3</i>	<i>Asset 4</i>
1	0.2	5%	5%	6%
2	0.3	5%	12%	5%
3	0.1	5%	3%	4%
4	0.4	5%	1%	7%
<i>Market Capitalization</i>		<i>10,000</i>	<i>17,546</i>	<i>82,454</i>

- a. Determine the market price of risk assuming CAPM holds. Define all the terms used.
(6 marks)
- b. What are the limitations of the CAPM model?
(4 marks)
- c. Distinguish between statistical and economic models. What are the advantages and limitations of either?
(4 marks)
- d. Define the following measures of risk (in words and mathematically). List their advantages and limitations:
(6 marks)
- i. Shortfall probability.
 - ii. Variance of return

Question Four – (20 marks)

- a. A securities market consists of the three securities A, B and C with the following features:

<i>Security i</i>	<i>price</i>	<i>Payoff in State 1</i>	<i>Payoff in State 2</i>
A	270	486	216
B	216	0	432
C	p	648	324

Further assume that the two states have equal probability of occurrence.

- i. Is this market complete? Explain. (2 marks)
 - ii. Calculate the equilibrium price for asset C, p. Justify your response (4 marks)
 - iii. Calculate the implicit risk-free rate and state probabilities. (6 marks)
- b. Consider the following three-factor model for security returns:

$$E[R_i] = \alpha_0 + \alpha_1 \beta_{i1} + \alpha_2 \beta_{i2} + \dots + \alpha_n \beta_{in}$$

- i. Define all the terms in this equation (2 marks)
- ii. Let r_f denote the risk-rate of interest.
Construct a risk-free portfolio to prove that $\alpha_0 = r_f$ (2 marks)
- iii. Assume then that $r_f = 0.075$. Consider a two-factor model, where $n=2$ and two well-diversified portfolios P1 and P2 with the following features

	<i>P1</i>	<i>P2</i>
$E[R_i]$	0.18	0.15
β_{i1}	1.5	0.5
β_{i2}	0.5	1.5

Determine the values of α_1 and α_2

(4 marks)

Question Five – (20 marks)

- a. According to the Efficient Market Hypothesis, what is an efficient market?
Why is it important to consider market efficiency in the context of asset pricing?
(4 marks)
- b. Briefly explain all three forms of market efficiency and their implications.
(6 marks)
- i. What are the difficulties encountered in testing the strong form and semi-strong forms of market efficiency?
(2 marks)
- c. Explain the Grossman-Stiglitz Paradox. In line with what the paradox posits, why is market inefficiency important?
(4 marks)
- d. Explain the implications of the Efficient market hypothesis in:
(4 marks)
- i. Corporate Finance:
- ii. Portfolio Management: