



MACHAKOS UNIVERSITY

University Examinations for 2016/2017 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

**FOURTH YEAR FIRST SEMESTER EXAMINATION FOR
BACHELOR OF ECONOMICS AND FINANCE**

EAE 414: THEORY OF FINANCE

DATE: 2/8/2017

TIME: 2:00 – 4:00 PM

INSTRUCTIONS

Answer Question One and Any Other Two Questions

QUESTION ONE (COMPULSORY) (30 MARKS)

- (a) Define the following terms as used in financial economics
- (i) Bid-ask spreads (2 marks)
 - (ii) Increasing utility functions (3 marks)
 - (iii) Strictly increasing utility functions (3 marks)
 - (iv) Short-selling of securities (2 marks)
- (b)
- (i) Define the term Complete Security Markets (2 marks)
 - (ii) An investor in the Abu Dhabi Securities Exchange (ADX) experiences three states of the world (inflation, deflation, normalcy) if she invests in 3 securities (Fujairah National Insurance Co.-AFNIC-, Abu Dhabi Islamic Bank-ADIB-, and ALDAR Properties PJSC-ALDAR). The state-contingent payoff matrix is given in the table below.

		State of the world		
		Inflation	Deflation	Normalcy
Securities	AFNIC	2	2	2
	ADIB	1	0	0
	ALDAR	0	1	1

Use the Gauss-Jordan row reduced echelon form to advise her whether the market is complete or not.

(c) Let there be three states and two securities. Security 1 is risk free and has a payoff $x_1(1,1,1)$. Security 2 is risky with payoff $x_2(1,2,2)$. Construct the payoff matrix X and show that the state- contingent returns would be $x_1(1.25,1.25,1.25)$ for Security 1 and $r_2(0.8,1.6,1.6)$ if the respective prices are given by $P_1 = 0.8$ and $P_2 = 1.25$

(6 marks)

QUESTION TWO (20 MARKS)

(a) Differentiate between arbitrage and strong arbitrage

(4 marks)

You are given that there are 3 securities and 3 states with respective payoffs as $x_1 = (2 \ 1 \ 1)$, $x_2 = (2 \ 3 \ 1)$, and $x_3 = (1 \ 0 \ 2)$ and that the prices $p_1 = p_2 = p_3 = 1$. If the portfolio h is given by $(-2 \ 3 \ 2)$. Determine whether there exists a strong arbitrage or simply an arbitrage.

(7 marks)

(b) The security price is given by the formula $p = X\psi$ where ψ_s the state price is and x is the payoff of a given security. Suppose there are two securities and two states of the economy where Security 1 pays off 2 in State 1 and 0 in State 2 and Security 2 pays 3 in State 1 and 2 in State 2. Suppose also that the prices for the two securities are 1 for all states, that is, $p_1 = p_2 = 1$. We can thus express this as:

$$P = \begin{bmatrix} 1 \\ 1 \end{bmatrix} = \begin{bmatrix} 2 & 0 \\ 3 & 1 \end{bmatrix} \begin{bmatrix} \psi_1 \\ \psi_2 \end{bmatrix}$$

Solve for the unique vector of prices ψ_1 and ψ_2

(9 marks)

QUESTION THREE (20 MARKS)

The consumption choice problem for a consumer is given as:

$$\text{Maximize } U(c_0, c_1) = c_0^\alpha c_1^{(1-\alpha)}$$

Subject to:

$$c_0 \leq w_0 - ph$$

$$c_1 \leq w_1 + hX$$

Where:

c_i is the consumption choices for the periods 1 and 2 $\forall i = 1, 2$, w_i is the endowment of the consumer for the respective periods $\forall i = 1, 2$, p is the security price, h is the portfolio, and X the vector of payoffs.

- (a) Give a statement of the first and second constraints (4 marks)
- (b) Find the marginal utility of consumption at date 0 and at date 1 (4 marks)
- (c) Demonstrate that the security price is given as: $p = X \frac{(1-\alpha)c_0^\alpha c_1^{-\alpha}}{\alpha c_0^{(\alpha-1)} c_1^{(1-\alpha)}}$ (9 marks)
- (d) State any three assumption underlying consumer portfolio choice problem (3 marks)

QUESTION FOUR (20 MARKS)

- (a) Suppose that the date 0 price for Agthia Group shares is USD 0.25 and that empirically determined end-of-period per share prices in USD are given in the Table below.

Probability P_i	End-of-period price per share in USD
0.12	0.2
0.18	0.225
0.25	0.25
0.23	0.30
0.22	0.40

Calculate the expected return and variance of the security (use 4 decimal places for larger values) (8 marks)

- (b) A two-asset portfolio comprising assets X and Y has the following state-contingent returns with the respective probabilities.

Probability	$x_i\%$	$y_i\%$
0.30	11.0%	-3.0%
0.14	9.0%	15.0%
0.20	25.0%	2.0%
0.18	7.0%	20.0%
0.18	-2.0%	-6.0%

Compute

- (i) Expected value of x, $E(x)$
- (ii) Expected value of y, $E(y)$
- (iii) Variance of x, $Var(x)$
- (iv) Variance of y, $Var(y)$
- (v) Covariance of x and y, $cov(x, y)$

(7 marks)

- (vi) Calculate the portfolio variances given the following weights

Percentage in X	Percentage in Y
100	0
75	25
50	50
25	75
0	100

(5 marks)

QUESTION FIVE (20 MARKS)

- (a) With the aid of well-labeled diagram distinguish between first and second order stochastic dominance. (9 marks)
- (b) Distinguish between weak and k-fund separability (6 marks)