



KENYATTA UNIVERSITY
UNIVERSITY EXAMINATIONS 2019/2020
SECOND SEMESTER EXAMINATION FOR THE DEGREE OF MASTER
OF ECONOMICS
EAE 813: THEORY OF FINANCE

30th March, 2020

Time: 3 hours

MSB entered
Externally Moderated
04/02/2020

Instructions

Answer ALL the questions. Each question carries 15 marks.

Question 1

Consider an individual who lives in a world with a complete and perfect capital market. His expected utility of end of the period wealth is $\sum \pi_s U(Q_s)$ where Q_s is the number of pure securities paying KES1 if state s occurs that he buys. If his initial wealth is W_0 and consumption (which is numeraire) is C :

- (a) Formulate this individual's utility maximization problem {3 marks}
- (b) Solve and interpret the first order conditions from the maximization in (a) above {4 marks}
- (c) Solve for C , Q_1 and Q_2 if the utility function is logarithmic and $W_0 = \text{KES}10,000$ assuming a one period two state state world where pure securities prices are KES0.4 and KES0.6 and the state probabilities are $\frac{1}{3}$ and $\frac{2}{3}$ {8 marks}

[15 marks]

Question 2

An individual has a logarithmic utility of wealth, W , given by $U(W) = \ln(W)$ and is faced by the gamble $G(\text{KES}5, \text{KES}30; 0.8)$ Required:

- (a) Find the actuarial valuation of this gamble {2 marks}
- (b) Find the utility of the expected wealth $U[E(W)]$ {2 marks}
- (c) Find the expected utility of wealth $E[U(W)]$ from the gamble {2 marks}
- (d) Find this individual's attitude towards risk. {2 marks}
- (e) Establish whether this individual would be willing to pay any premiums to avoid the gamble and if so the maximum amount of premiums he would be willing to pay if his current wealth is KES10 {4 marks}

- (f) Establish the restrictions that should be placed on any other utility function to ensure that the attitudes towards risk established in (d) above hold {3 marks}

[15 marks]

Question 3

- (a) Stock XYZ has an expected return of 12% and risk of $\beta = 1$. Stock ABC has expected return of 13% and $\beta = 1.5$. The market's expected return is 11%, and $r_f = 5\%$.
- According to the CAPM, which stock is a better buy? {2 marks}
 - What is the alpha of each stock? Plot the SML and each stock's risk-return point on one graph. Show the alphas graphically. {4 marks}
- (b) The risk-free rate is 8% and the expected return on the market portfolio is 16%. A firm considers a project that is expected to have a beta of 1.3
- What is the required rate of return on the project? {2 marks}
 - If the expected IRR of the project is 19%, should it be accepted? {1 mark}
- (c) Table 1 shows the returns of security X (x) and Y (y).

Table 1: The returns of security X and Y

State	$x\%$	$y\%$
1	11	-3
2	9	15
3	25	2
4	7	20
5	-2	6

Given that the states are equally likely, test whether diversification is possible and if so the optimal holdings of security X and Y {3 marks}

[15 marks]

Question 4

- (a) Are the following portfolios well diversified?
- A portfolio invested in a very large number of shares (n is large). However, one-half of the portfolio is invested in stock 1, and the rest of the portfolio is equally divided among the other $n - 1$ shares. {1 mark}
 - A portfolio invested in the same n shares, where n is very large. Instead of equally weighting with portfolio weights of $\frac{1}{n}$ in each stock, the weights in half the securities are $\frac{1.5}{n}$ while the weights in the other shares are $\frac{.5}{n}$. {1 mark}
- (b) Suppose a stock now sells at $S_0 = \text{KES}100$, its price will either increase by a factor of $u = 1.20$ to KES120 (u stands for up) or fall by a factor of $d = .9$ to KES90 (d stands for down) by year-end. Consider a call option written on the stock with a strike price of KES110 and a time expiration of one year, if the risk free rate is 10% find
- The replicating portfolio for the call option {3 marks}

- (ii) The price of the call option {2 marks}
- (c) The yield to maturity of a bond with one year to maturity is 5%, that of two years to maturity is 6%, that of three years to maturity is 7% and that of four years to maturity is 8%. Use this information to calculate the price to maturity of a 3-year bond with a coupon rate of 4% making annual coupon payments. {3 marks}
- (d) Discuss the two competing theories of the term structure and explain how they shape the conclusions about the premiums necessary to induce investors to hold bonds of different maturities from their investment horizons? {5 marks}

[15 marks]