# THE COOPERATIVE UNIVERSITY OF KENYA

## INTRODUCTION TO FINANCIAL ECONOMETRICS

## END OF SEMESTER EXAMS

**DATE :** **TIME: 2 HOURS**

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**INSTRUCTIONS**

1) **Answer question one and any other two questions**
2) **Question one is compulsory and carries 30 marks**
3) **All other questions carry 20 marks each**

**QUESTION ONE (30 MARKS)**

a) Given the following two functions $Y = \alpha + \beta X$ (deterministic) and $Y = \alpha + \beta X + u$ (stochastic), explain why a stochastic function is preferred to a deterministic function. (4 marks)

b) Explain four main reasons why it is important to include an error term in a regression model. (4 marks)

c) Clearly distinguish between a simple regression analysis and a multivariate regression analysis. (4 marks)

d) State and explain any six assumptions of ordinary least square. (6 marks)

e) Explain four main causes of heteroskedasticity. (4 marks)

f) Given the following information;

$$\sum X = 550,\ \sum Y = 90,\ \sum XY = 6{,}340,\ \sum X^2 = 38{,}500,\ \sum Y^2 = 1{,}054$$

obtain the OLS estimators $\hat{\beta}_0$ and $\hat{\beta}_1$. (8 marks)

**QUESTION TWO 20 (MARKS)**

i) Given the following data, regress Y on $X_1$ and $X_2$ and interpret your results (14 marks)

| | | | | | | |
|---|---|---|---|---|---|---|
| Y | 6 | 10 | 9 | 14 | 7 | 5 |
| $X_1$ | 1 | 3 | 2 | -2 | 3 | 5 |
| $X_2$ | 3 | -1 | 4 | 6 | 2 | 4 |

ii) Define multicollinearity and explain its main causes. (6 marks)

**QUESTION THREE 20 (MARKS)**

i) Consider a cobb-douglas production function of the form: $Q = AK^{\alpha}L^{\beta}\varepsilon$, where Q is output, K is capital input, L is Labor input, ε is a disturbance term, and α and β are the shares of K and L respectively in Q. Clearly explain how you can estimate this function using ordinary least square method. ( 6 marks)

ii) Clearly distinguish between correlation and regression. (8 marks)

iii) Calculate the standard error of the intercept parameter given $\hat{\sigma} = 1.10714$, $\sum X_i^2 = 38{,}500,\ n = 10\ \sum x^2 = 8{,}250.$ (6 marks)

**QUESTION FOUR 20 (MARKS)**

i) Briefly explain the following terms; (5 marks each)
   a) Time series data
   b) Cross section data
   c) Panel data

ii) Calculate the adjusted R squared given N=10, K=2 and $R^2$ =0.9598. (5marks)

**QUESTION FIVE 20 (MARKS)**

i) Clearly explain the Gauss-Markov Theorem. (7 marks)

ii) State three common approaches used in hypothesis testing. (3 marks)

iii) Explain any four methods used in detection of heteroskedasticity. (8 marks)

iv) Define autocorrelation. (3 marks)

# THE COOPERATIVE UNIVERSITY COLLEGE OF KENYA

# INTRODUCTION TO FINANCIAL ECONOMETRICS

## COURSE OUTLINE

## INTRODUCTION

Financial econometrics is the subject which involves the application of mathematical statistics and Economic theory to quantify economic relationships. Econometrics is heavily reliant on data, and analysis of economic relationships.

## OBJECTIVES

Financial econometrics is interested in establishing relationship between variables, to aid in estimations and forecasting. Estimations are done from samples and there is need to know how reliable the estimates are in estimating population parameters. At the end of the course, students should be able to model economic relationships, using various modeling techniques and estimate uni-variate and multivariate relationships.

## INTRODUCTION TO ECONOMETRICS

1.1 Meaning of Econometrics
1.2 The Methodology of Econometrics
1.3 Limitations of Relying on Economic Theory

## SIMPLE REGRESSION MODELS

2.1 Introduction
2.2 Correlation versus Regression
2.3 The Nature and Sources of Data for Economic Analysis
2.4 Two-variable regression analysis
2.5 The ordinary least squares estimators
2.6 Assumptions of the ordinary least squares
2.7 The variance of the error term
2.8 The standard error of the regression model
2.9 The standard error of the OLS coefficients
2.10 The t-student ratio
2.11 The complete regression model
2.12 The Adjusted R squared

2.13 Properties of the Least Squares Estimators

**MULTIVARIATE REGRESSION ANALYSIS**

3.1 Introduction to Multivariate Regression Models
3.2 Derivation of OLS estimator for Multivariate Regression Models
3.3 Finding the OLS estimators using deviation method
3.4 The coefficient of determination in Multiple Regression Analysis
3.5 Linearization of Non-linear functions

**VIOLATIONS OF THE OLS ASSUMPTIONS: CAUSES, TESTS, CONSEQUENCES AND SOLUTIONS FOR VIOLATIONS**

4.1 Recap of the basic assumptions of ordinary least squares
4.2 The violations of the OLS assumptions
    4.2.1 Heteroskedasticity
    4.2.2 Multicollinearity
    4.2.3 Autocorrelation