VO

(University of Choice)

MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY (MMUST)

MAIN EXAMINATION

UNIVERSITY EXAMINATIONS
2023/2024 ACADEMIC YEAR

FIRST YEAR FIRST SEMESTER EXAMINATIONS

FOR THE DEGREE
OF
MASTER OF SCIENCE IN ECONOMICS

COURSE CODE: ECO 810

COURSE TITLE: ECONOMETRICS

DATE: WEDNESDAY,20-12-2023   **TIME: 2:00 -5:00**

INSTRUCTIONS TO CANDIDATES

ATTEMPT QUESTION **ONE** AND ANY OTHER **THREE**

TIME: 3 Hours

MMUST observes ZERO tolerance to examination cheating

This Paper Consists of 4 Printed Pages. Please Turn Over.

QUESTION ONE

a) As an economist you have been requested to study the behaviour of a given economic phenomenon, discuss the relevant econometric analysis processes that you will follow to aid in giving appropriate advice.

(8 marks)

b) Examine the role of structural and reduced form parameters in a simultaneous system of equations. **(6 marks)**

c) The following data refers to loan approval status, bank customers income and age.

Status	Declined	Approved	Declined	Approved	Declined	Approved	Declined
Income	12	14	13	5	15	7	4
Age	25	30	31	19	21	20	23

   i. Fit a logit regression line showing how income and age affects loan approval status assuming declined is coded 0 and approved 1.

(7 marks)

   ii. Compute the probability when income increases to 21 with customer's age being 40 and interpret your findings. **(4 marks)**

QUESTION TWO

a) The following data analyzed using Eviews to establish how taxation affects government expenditure.

   i. Fit the regression line, interpret your findings and predict expenditure when taxation is 100,000. **(5 marks)**

   ii. Isolate the econometric problem that is evident giving the justification and explain the causes of the problem. **(10 marks)**

Exp=C(1)+C(2)*Tax

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	-47165.57	19680.94	-2.396510	0.0198
C(2)	1.557418	0.043553	35.75921	0.0000

R-squared	0.956610	Mean dependent var	562005.4	
Adjusted R-squared	0.955862	S.D. dependent var	363379.3	
S.E. of regression	76342.39	Akaike info criterion	25.35661	

Sum squared resid	3.38E+11	Schwarz criterion	25.42642
Log likelihood	-758.6983	Hannan-Quinn criter.	25.38392
F-statistic	1278.721	Durbin-Watson stat	0.546008
Prob(F-statistic)	0.000000		

b) Determine the identification state of a system of simultaneous equations given by

$$Y_1 = b_0 + b_1 Y_{t-1} + \varepsilon_{1t}$$
$$Y_2 = a_0 + a_1 Y_{t-1} + a_2 Y_1 + \varepsilon_{2t}$$
$$Y_3 = c_0 + c_1 Y_{t-1} + c_2 Y_1 + c_3 Y_2 + \varepsilon_{3t}$$

Examine if the order condition is satisfied for the system. **(10 marks)**

QUESTION THREE

a) What do you understand by binary variables and why are they necessary in regression analysis? **(3 marks)**

b) As an analysis examine the relevance of econometrics as a subject for studying the behaviour of an economic phenomenon. **(6 marks)**

c) Using data in the Table where Q denotes the quantity supplied for flour and P denotes the price of flour per Kg, T denotes level of technology used in production.

Q	10	14	16	18	25
P	15	12	8	7	4
T	Archaic	Archaic	Advanced	Archaic	Advanced

Estimate the model assuming there is no interaction between the dummy variable and price and determine;

i. How price affects supply of flour. **(11 marks)**

ii. The mean quantity supplied when technology is advanced.

(2 marks)

iii. The mean quantity supplied when technology is not advanced (archaic). **(3 marks)**

QUESTION FOUR

a) Assume a model $Y = \beta_1 + \beta_2 X + \varepsilon$ where Y is dichotomous. After estimation of the model using LPM where; $Y = \begin{cases} 1 \\ 0 \end{cases}$, if 1 is Yes while if 0 is No

Explain what the following expressions represent based on LPM, LM and PM and compute the respective probabilities with respective interpretation. **(10 marks)**

(i) $\hat{\beta}_1 + \hat{\beta}_2 X$

(ii) $\hat{\beta}_1$

(iii) $\hat{\beta}_2$

b) An analyst estimated a model $Y = Xb + \varepsilon$ using OLS such that $\hat{b} = (X^T X)^{-1}(X^T Y)$. Show that the estimator $(\hat{b})$ has the minimum variance in relation to a second estimator $(\hat{b}^*)$. **(15 marks)**

QUESTION FIVE

a) Assuming a general linear regression model of your choice expressed in scalar and matrix notations examine the observations that can be made from the model. **(8 marks)**

b) Define a lag operator and solve $L^{-2}Y_t$ **(4 marks)**

c) Examine the relationship between a lag operator and a difference operator using a time series variable X_t and determine the first, second and third difference. **(13 marks)**