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MACHAKOS UNIVERSITY

University Examinations for 2022/2023 Academic Year

SCHOOL OF BUSINESS, ECONOMICS AND HOSPITALITY AND TOURISM MANAGEMENT

DEPARTMENT OF ECONOMICS

FOURTH YEAR FIRST SEMESTER EXAMINATION FOR

BACHELOR OF ECONOMICS AND FINANCE

BACHELOR OF ECONOMICS AND STATISTICS

BACHELOR OF ECONOMICS

EES 401: FUNDAMENTALS OF ECONOMETRICS II

DATE: **TIME:**

INSTRUCTIONS

Answer Question **ONE** and any other **TWO** questions

QUESTION ONE (COMPULSORY) (30MARKS

a) A researcher estimated the determinants of female labour force participation. The following results were obtained

Dependent Variable: Dummy variable taking 1 if a female is employed 0 otherwise

VARIABLES	Marginal Effects
Marital Status	0.843***
	(0.070)
Education	0.254***
	(0.069)
Household head	0.710***
	(0.080)
disability	-0.344*
	(0.201)
Age	0.019***
	(0.002)
Constant	-3.731***
	(0.155)
Observations	15,154

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Where marital status is 1 if the female is married, 0 otherwise; education is years of female schooling, household head is 1 if the female is household head 0 otherwise, disability is 1 if female is disabled, 0 otherwise, age is years when the female is productive (15-60 years).

(i) Does the sign of coefficient of each explanatory variable conform to economic theory? Explain (5 marks)

(ii) Interpret the marginal effects results (5 marks)

b) A given firm in Machakos County has estimated the following sales relationship for its main product for the last five years using monthly data.

$$Y_t = 4.932 - 1.328P_t + 2.56M_{t-1} - 3.56Y_{t-1}$$

$$R^2 = 0.8738$$

Where Y is sales in units, P is price in Kshs., M is income in Kshs.
Using this information, conduct hypothesis test on the slope regression coefficients of the model at 5 % level of significance. (5 marks)

c) From the Kenya private sector housing starts (X) for the period 1982 to 2018, Peter Mills obtained the following regression results.

$$\Delta Xt = 31.03 - 0.188X_{t-1}$$

$$Se = (12.50) \quad (0.080)$$

$$(t=\tau) \quad (-2.35)$$

Note: The 5 percent critical τ value is −2.95 and the 10 percent critical τ value is −2.60.

d) On the basis of these results, is the housing starts time series stationary or nonstationary? Alternatively, is there a unit root in this time series? How do you know? (5 marks)

e) Distinguish clearly between order and rank conditions of identification (4 marks)

f) Explain three reasons why there may be lags in economics (6 marks)

QUESTION TWO (20 MARKS)

a) Distinguish clearly between distributive-lag and autoregressive models (2 marks)

b) The Chow test is useful tool to check for stability of regression parameters and thus structural change. Explain clearly the steps/mechanisms of the Chow test. (8 marks)

c) A student performed a regression using Kenyan Savings-Income data. The following results were obtained.

$$Y = -3004.959 + 25595.534D_t + 0.249X_t + 0.075(D_tX_t)$$

s.e (3303.149) (8678.305) (0.018 (0.022)

Where Y represents the savings, X represents income, D =0 for period 1990-2004 and D=1 for period 2005-2011.

(i) Holding income constant, what is the average savings in period 1982-1995? Is it statistically different from the period 1990-2004? How do you know? (5 marks)

(ii) Suppose the researcher estimated savings model without the variable D.X, what is the implication for the magnitude of average savings and MPS in 2005-2011? Show your working (5 marks)

QUESTION THREE (20 MARKS)

a) Despite presence of endogeneity, an econometrics student estimated a model using Ordinary Least Square. Critique this student's results. (4 marks)

b) What other option(s) to estimate the model could you have suggested? Justify each (6 marks)

c) Show the identification status of each of the following equations given in the simultaneous equation model below. Use the order condition of identification (6 marks)

$$Y_{it} = \beta_{12}Y_{2t} + \lambda_{11}X_{1t} + u_{1t} \quad \text{.....1}$$
$$Y_{2t} = \beta_{21}Y_{1t} + \beta_{23}Y_{3t} + \lambda_{11}X_{1t} + \lambda_{22}X_{2t} + u_{2t} \quad \text{.....2}$$
$$Y_{3t} = \beta_{32}Y_{2t} + \lambda_{31}X_{1t} + \lambda_{33}X_{3t} + u_{3t} \quad \text{.....3}$$

d) Why would you recommend the use of panel data over cross section and time series data (4 marks)

QUESTION FOUR (20 MARKS)

a) In simultaneous equations;

i. What problem is one likely to face when estimating simultaneous equation system using OLS? (2 marks)

ii. What alternative estimation methods should be used to overcome problems discussed in b (i) above? (3 marks)

b) Discuss clearly three main reasons why lags may occur in economic variables (6 marks)

c) Koyck assumes that coefficents of a distributed-lag model decline geometrically with the number of lags. A distributed-lag models results are found to be:

$$Y_t = 8.27 + 0.111X_t + 0.064X_{t-1} - 0.055X_{t-2}$$

(i) Illustrate that Koyck's assumption is true for $\lambda = 0.2$ and $0 \leqq K \leqq 5$ (3 marks)

(ii) Evaluate the mean and median lags for $\lambda = 0.2, 0.4, 0.6$ (6 marks)

QUESTION FIVE (20 MARKS)

a) A modeler estimated car ownership as a function logarithm of income. Car ownership was a binary variable, Y=1 if a household owns a car, zero otherwise.

The following estimated equation was obtained.

$$\hat{L}_i = -2.7231 + -0.347582 lnincome$$

t (-3.35) (4.05)

$$\chi^2(1\ df) = 16.81 \quad (p\ value) = 0.00)$$

Where $\hat{L}_i$ is estimated logit and $lnincome$ is log of income. The χ^2 measures the goodness of fit of the model.

(i) Interpret the estimated logit model (3 marks)

(ii) From the estimated logit model, how would you obtain the expression for the probability of car ownership? (2 marks)

(iii) What is the probability that a household with income of KES 20000 will own a car? (3 marks)

(iv) Comment on statistical significance of the estimated logit model. (2 marks)

b) Consider the linear regression model

$$wage = \beta_1 + \beta_2 EDUC + \beta_3 FEMALE + \mu$$

Where wage is hourly wage in US dollars, EDUC is years of education, FEMALE is a dummy variable that assumes the value 1 for observations on females and 0 for observations on non-females and μ is a random error term.

The model is estimated based on a random sample of 160 observations and the following results obtained:

$$wage = -2.841 + 2.456 EDUC - 5.021 FEMALE$$

Interpret the estimated coefficients on EDUC and FEMALE (6 marks)

c) When does non-stationary data not give rise to the problems of spurious regression? (4 marks)