University Examinations 2023/2024

THIRD YEAR SECOND SEMESTER EXAMINATION FOR THE DEGREE OF BACHELOR OF SCIENCE IN ECONOMICS

BEC 3352: ECONOMETRICS II

DATE: APRIL 2024   TIME: 2 HOURS

INSTRUCTIONS: *Answer question **one** and any other **two** questions*

QUESTION ONE (30 MARKS)

a) Explain how the Binomial Logit model overcomes the limitations of the linear probability model (LPM)   (6 marks)

b) Give that a model $Y = X\beta + \varepsilon$ where the model suffers from heteroscedasticity and autocorrelation $E(\varepsilon\varepsilon^{/}) = \sigma_{\varepsilon}^{2}\Omega$

Required;

i.   Demonstrate the steps through which the model can be transformed through generalized least squares (GLS) model   (6 marks)

ii.   Derive the GLS estimator for the model   (5 marks)

c)

i. Define stationarity and the two types of stationarity   (6 marks)

ii. What problems would arise if OLS regression is performed on variables which are nonstationary?   (4 marks)

d. State the three estimation techniques that can be used with panel/pooled data (3 marks)

QUESTION TWO (20 MARKS)

a) Consider the following model which shows teachers' salaries as a function of their location and government expenditure on schools:

$$Y_i = \beta_0 + \beta_1 D_{1i} + \beta_2 D_{2i} + \beta_3 X_i + u_i$$

Where

Y_i is salary of a teacher in a public school measured in US dollars,

D_{1i} is defined as: $D_{1i} = I$ if from the north, 0 otherwise

D_{2i} is defined as: $D_{2i} = I$ if from the south, 0 otherwise

X_i is government expenditure on public schools

Assuming that we collect cross-sectional data on all the variables above and run the regression equation, we could obtain the following regression equation:

$$Yi = 13,269.11 - 1,673.514 \ D_{1i} - 1,144.157 \ D_{2i} + 3.289 \ X_i$$

Required:

(i) Interpret the model   (10 marks)

(ii) Define an integrated series and the Characteristics of integrated series   (10 marks)

QUESTION THREE (20 MARKS)

a) Outline the six data generation processes in time series analysis   (6 marks)

b) Enunciate the advantages and disadvantages of the linear probability model (LPM)

(10 marks)

c) In some instances, the equation that is specified in multivariate regression analysis may not a linear equation, but a non-linear equation. Explain how such equations can be linearized

(4 marks)

QUESTION FOUR (20 MARKS)

a. Given the following data:

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

Required:

i. Compute the OLS estimators and   (6 marks)

ii. Specify the regression model and interpret.   (3 marks)

iii. Predict/forecast the value of Y when X=250   (1 mark)

b. Discuss the advantages of panel data over cross-sectional and time series data (10 marks)

QUESTION FIVE (20 MARKS)

a) What are the advantages of fixed effect model over the seemingly unrelated regression model (SUR)   (3 marks)

b) Outline the steps for testing stationarity using the ADF Test   (8 marks)

c) Given the model

$$\underset{nxl}{Y} = \underset{nxk}{X} \underset{kxl}{\beta} + \underset{nxl}{\varepsilon}$$

i.   Derive the OLS estimator $\hat{B}$ (3 marks)

ii.   Derive mean and variance of $\hat{B}$ (6 marks)