MACHAKOS UNIVERSITY

University Examinations for 2018/2019 Academic Year

SCHOOL OF BUSINESS AND ECONOMICS

DEPARTMENT OF ECONOMICS

FOURTH YEAR SECOND SEMESTER EXAMINATION FOR

BACHELOR OF ECONOMICS & STATISTICS

BACHELOR OF ECONOMICS

EES 401: FUNDAMENTALS OF ECONOMETRICS II

DATE: 29/4/2019 **TIME: 11.00-1.00 PM**

INSTRUCTIONS TO CANDIDATES

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

QUESTION ONE (COMPULSORY) (30 MARKS)

a) Consider the linear regression model

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

Where WAGE is hourly wage in US dollars, EDUC is years of education, EXPER is years of experience, and μ is a random error term.

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

$$\widehat{wage} = -2.13 + 1.844EDUC + 0.071EXPER + \mu$$

$$var(\hat{\beta}) = \begin{bmatrix} 19.0961 & -1.37595 & -0.130936 \\ -1.37595 & 0.118261 & 0.00317733 \\ -0.130936 & 0.00317733 & 0.00370563 \end{bmatrix}$$

RSS=16277.72; R^2= 0.155356, TSS=19271.7

Test the following

i) $H_0: \beta_3 \geq 0.05$
$H_a: \beta_3 < 0.05$

(4 marks)

ii) $H_0: -0.4\beta_2 = -0.6\beta_3$
$H_a: -0.4\beta_2 \neq -0.6\beta_3$

(5 marks)

iii) Test the overall significance of the regression model (6 marks)

b) Distinguish clearly between order and rank conditions of identification (4 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) (0.080)

(t=)τ (−2.35)

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

i) 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? (6 marks)

ii) If you were to use the usual t test, is the observed t value statistically significant? On this basis, would you have concluded that this time series is stationary? (5 marks)

QUESTION TWO (20 MARKS)

a) Distinguish clearly between distributive-lag and autoegressive models (4 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) The total cost of production (Y) is estimated t be a function of output in kilowatt hours (X), price of labour input(P1), price of capital input(P2), price of fuel(P3). The cost function takes the form $= AX^{\beta}P_1^{\alpha 1}P_2^{\alpha 2}P_3^{\alpha 3}$. Theoretically, the sum of the price elasticities is expected to be unity, i.e $(\alpha 1 + \alpha 2 + \alpha 3) = 1$. Using data on 29 manufacturing firms and assuming a logarithmic relationship, the following regression results are obtained for the unrestricted and restricted models respectively:

$$lnYi = -4.93 + 0.94lnX + 0.31lnP_1 - 0.26lnP_2 + 0.44lnP_3$$

Se (1.96) (0.11) (0.23) (0.29) (0.07) RSS=0.336

$$ln\frac{Y}{P_3} = -6.55 + 0.911lnX + 0.51ln\frac{P_1}{P_3} - 0.09ln\frac{P_2}{P_3}P_3$$

Se (0.16) (0.11) (0.19) (0.16) RSS=0.364

Test whether the restriction $(\alpha 1 + \alpha 2 + \alpha 3) = 1$ is valid (8 marks)

QUESTION THREE (20 MARKS)

a) Discuss clearly why it is important to be cautious when incorporating dummy variables in regression models. (10 marks)

b) Consider the following demand and supply model for money

Money demand: $M_t^d = \beta_0 + \beta_1 Y_t + \beta_2 R_t + \beta_3 P_t + \mu_{1t}$

Money Supply: $M_t^s = \alpha_0 + \alpha_1 Y_t + \mu_{2t}$

Where M=money, Y= Income, R= rate of interest, P=price, μ =error terms. Assume R and P are exogenous and M and Y are endogenous.

i) Obtain the reduced form equations for M and Y (4 marks)

ii) Test for identifiability of the demand and supply functions (6 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 $0 \leq K \leq 5$ (3 marks)

(ii) Evaluate the mean and median lags for $\lambda = 0.2, 0.4, 0.6, 0.8$ (7 marks)

QUESTION FIVE (20 MARKS)

a) You are given the following linear regression models

$$lnwage = \beta_1 + \beta_2 EDUC + \beta_3 EXPER + \mu$$

$$lnwage = \beta_1 + \beta_2 lnEDUC + \beta_3 lnEXPER + \mu$$

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

$$lnwage = \beta_1 + \beta_2 lnEDUC + \beta_3 lnEXPER + \mu$$

Where WAGE is hourly wage in US dollars, EDUC is years of education, EXPER is years of experience, and μ is a random error term. Classify each of the models as either linear in variables, log-linear, log-lin or lin-log. (4 marks)

b) The models in (a) above are estimated based on a random sample of 50 observations and the following results obtained:

$$lnwage = 1.696 + 0.086EDUC + 0.008EXPER$$

$$lnwage = -0.211 + 0.965lnEDUC + 0.244lnEXPER$$

$$wage = -2.9 + 1.87EDUC + 0.079EXPER$$

$$lnwage = -38.422 + 20.624lnEDUC + 0.951lnEXPER$$

Interpret the effect of experience on wages in each of the estimated models. (12 marks)

c) 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:

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

Interpret the estimated coefficients on EDUC and FEMALE (4 marks)