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MASINDE MULIRO UNIVERSITY OF SCIENCE AND TECHNOLOGY

UNIVERSITY EXAMINATIONS

2023/2024 ACADEMIC YEAR

FIRST YEAR SECOND SEMESTER

MAIN EXAMINATION

FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN BUSINESS ADMINSTRATION

COURSE CODE: ECO 911 /PBF 922

COURSE TITLE: ECONOMETRICS /FINANCIAL ECONOMETRICS

DATE: WEDNESDAY 24TH APRIL 2024 TIME: 2.00-5.00 PM

INSTRUCTIONS TO CANDIDATES

ANSWER QUESTION ONE AND ANY OTHER THREE (3) QUESTIONS

TIME: 3 HOURS

MMUST observes ZERO tolerance to examination cheating

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

QUESTION ONE (40 MARKS)

a) What are the special features of (6 marks)
   i. Cross section data
   ii. Time series data
   iii. Panel data

b) State and explain the assumptions of ordinary least square OLS. (10 marks)

c) What is meant by weakly stationary. (2 marks)

d) The data on working men was used to estimate the following equation:

$$educ = 10.36 + 2.094\ sibs + 1.131\ meduc + 1.210\ feduc$$

$$n = 722,\ R^2 = 5.214,$$

where educ is years of schooling, sibs is number of siblings, meduc is mother's years of schooling, and feduc is father's years of schooling.

(i) What is the effect of sibs on education? Explain. Holding meduc and feduc fixed, by how much does sibs have to increase to reduce predicted years of education by one year? (3 marks)

(ii) Discuss the interpretation of the coefficient on meduc. (3 marks)

(iii) Suppose that Man A has no siblings, and his mother and father each have 12 years of education. Man B has no siblings, and his mother and father each have 16 years of education. What is the predicted difference in years of education between B and A (5 mark)

e) Suppose the true model is $Y = \beta_0 + \beta_1 X_1 + \mu$. But we add an irrelevant variable X_2 to the model. And the estimate $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + v$

i. Would R^2 and the adjusted R^2 for model 2be larger or equal or smaller than model 1? (4 marks)

ii. Are the estimates β_0 and β_1 obtained in model 2 unbiased? (3 marks)

iii. Does the inclusion of irrelevant variable X_2 affect the variances of estimates of β_0 and β_1 explain (4 marks)

QUESTION TWO (20 MARKS)

a) The production manager of XYZ Company is concerned about the apparent fluctuation in efficiency and wants to determine how labour costs (in Sh.) are related to volume. The following data presents results of the 10 most recent batches.

Batch no.	1	2	3	4	5	6	7	8	9	10
Units produced	15	12	20	17	12	25	22	9	18	30
Labour Costs	1800	1400	2300	1900	1600	3000	2700	1100	2400	3200

Required; Compute the Durbin Watson statistic, what is its significance, (10 marks)

b) State and explain any three assumptions regressions analysis (6 marks)

c) Suppose you are interested in estimating the effect of hours spent in a PBA 911 course (hours) on total PBA 911 score. The population is all PHD students for the year 2024. Consider the more realistic case where students choose how much time to spend in a preparation course, and you can only randomly sample PBA 911 and hours from the population. The population model is given as
PBA 911 score = $\beta_0 + \beta_1 X_1 + \mu$ Where, X_I is time in hours and as usual in a model with an intercept, we can assume $E(\mu) = 0$.

i. List at least two factors contained in μ. Are these likely to have positive or negative correlation with hours? (2 marks)

ii. In the equation above what should be the sign of β_1 if the preparation course is effective? (2 marks)

QUESTION THREE (20 MARKS)

a) The stata output below was obtained from a regression of earnings against cognitive test ASVABC and years of schooling S. the regression equation is represented below EARNINGS = $\beta_0 + \beta_1 S + \beta_2 ASVABC + \mu$

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. reg EARNINGS S ASVABC

  Source |       SS       df       MS              Number of obs =     570
---------+------------------------------           F(  2,   567) =   39.98
   Model |  4745.74965     2  2372.87483            Prob > F      =  0.0000
Residual |  33651.2874   567  59.3497133            R-squared     =  0.1236
---------+------------------------------           Adj R-squared =  0.1205
   Total |  38397.0371   569  67.4816117            Root MSE      =  7.7039

------------------------------------------------------------------------------
EARNINGS |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
---------+--------------------------------------------------------------------
       S |   .7390366   .1606216     4.601   0.000     .4235506    1.054523
  ASVABC |   .1545341   .0429486     3.598   0.000     .0701764    .2388918
   _cons |  -4.624749     2.0132    -2.297   0.022    -8.578989   -.6705095
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Give the value and the meaning of the following parameters R^2, Adjusted R squared, β_0 β_1 (8 marks)

b) Explain the role of the stochastic error term μ in regression analysis? (2 marks)

c) Highlight four functional forms of regression models that may be non-linear in variables and linear in parameters. (4 marks)

d) Empirical work based on time series data assumes that the underlying time series is stationary, to exemplify the problem of spurious or nonsense regression. Give any three tests for stationarity. (6 marks)

QUESTION FOUR (20 MARKS)

a) When using regression analysis certain assumptions have to be made, state and explain any four major assumptions which you will consider stating how you will measure stated assumptions. (12 marks)

b) Explain whether the following can cause OLS estimators to be biased?

(i) Heteroskedasticity. (1 marks)

(ii) Omitting an important variable. (2 marks)

(iii)A sample correlation coefficient of 0.95 between two independent variables both included in the model. (2 marks)

c) The following model is a simplified version of the multiple regression model used by Biddle and Hamermesh (1990) to study the tradeoff between time spent sleeping and working and to look at other factors affecting sleep.

Sleep = $\beta_0 + \beta_1$ totwrk $+\beta_2$ educ+ β_3 age + μ

where sleep and totwrk (total work) are measured in minutes per week and educ and age are measured in years.

i. If adults trade off sleep for work, what is the sign of β_1? (1 mark)

ii. What signs do you think β_2 and β_3 will have? Explain? (2 marks)

QUESTION FIVE (20 MARKS)

The following equation relates housing price (price) to the distance from a recently built garbage incinerator (dist):

log(price) = 9.40 +_ 0.312 log (dist) n= 135, $R^2 = 0.162$

i. Interpret the coefficient on log(dist). Is the sign of this estimate what you expect it to be? (5 marks)

ii. Do you think simple regression provides an unbiased estimator of the ceteris paribus elasticity of price with respect to dist? (Think about the city's decision on where to put the incinerator.) (7 marks)

iii. What other factors about a house affect its price? Might these be correlated with distance from the incinerator? Explain (8 marks)