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REDEEMER'S UNIVERSITY



EDE, OSUN STATE

COLLEGE OF MANAGEMENT AND SOCIAL SCIENCES

DEPARTMENT OF ECONOMICS AND BUSINESS STUDIES

COURSE CODE /TITLE ECO 410 - MAJOR TOPICS IN ECONOMETRICS

SECOND SEMESTER EXAMINATIONS

2017/2018 SESSION

INSTRUCTIONS ON CHOICE OF QUESTIONS TO BE ANSWERED: (1) ANSWER QUESTION 1 AND OTHER TWO QUESTIONS; (2) EACH QUESTIONS ATTEMPTED MUST BE ANSWERED

ALPHABETICALLY TIME ALLOWED 2 HOURS UNIT (2 UNITS)

1. The Ordinary Least Square (OLS) sample regression equation corresponding to actual equation is:

$$Y = \hat{\beta}_0 + \hat{\beta}_1 X_1 + \hat{\beta}_2 X_2 + \dots + \hat{\beta}_k X_k + e \dots \dots \dots (1)$$

Where $\hat{\beta}_0$ is the OLS estimator of the intercept parameter, β_0 ; $\hat{\beta}_i$ is the slope parameter for β_i ($i = 1, 2, \dots, k$)

- (a) Evaluate all the required assumptions of OLS technique for estimating equation (1) above.
- (b) Using the deviation approach, derive the OLS normal equations for the slope parameters.
- (c) Using matrix inversion method, obtain the expression for the vector of slope parameters.
- (d) How would you determine the relationship between Y and X_i 's? (20marks)

2. Given the time series data in the table below

n	Y	X	Z
1	10	10	10
2	5	5	9
3	7	12	8
4	12	11	7
5	15	15	6
6	20	18	5
7	9	20	4
8	4	25	3
9	1	8	2
10	25	15	1

- a) Estimate the relationship between the regressand (Y) and two regressors, X and Z. (Hint: use matrix inversion method).
- b) Is there any evidence of serial correlation? (20marks)

3. With appropriate examples explain the following concepts:

- a) Time Series Analysis
- b) Dummy Variables
- c) Granger Causality
- d) Multi-collinearity
- e) Dynamic Econometric Analysis

OK

(20marks)

4. a) In a study of the relationship between the weights, heights and ages of boys in a primary school, the following data have been derived:

$$\begin{array}{llll} \sum Y = 753 & \sum X_1 = 643 & \sum X_2 = 106 & \sum Y^2 = 48139 \\ \sum X_1^2 = 34843 & \sum X_2^2 = 976 & \sum X_1 Y = 40830 & \sum X_2 Y = 6796 \\ \sum X_1 X_2 = 5779 & n = 12 & & \end{array}$$

Where Y denotes weight in pounds, X_1 is height in inches and X_2 is age in years, determine the regression equation to predict weights of boys.

- b) Discuss the economic significance of the model estimated below for Nigerian economy between 1970 and 2001 and estimate the statistical criteria that you will use to assess the results.

$$\hat{C}_t = 18.72 + 0.224C_{t-1} + 0.467Y_t + 0.301N_t; \quad \sum u^2 = 224860; \quad \sum C^2 = 1278420$$

(7.65) (0.190) (0.108) (0.111)

Where C_t = aggregate consumption in year t, Y_t = Net National Product in year t and N_t = Population in year t and standard errors are contained in parentheses. (20marks)

5. You are conducting an empirical investigation into the median prices of houses in 506 communities of a large metropolitan area. The sample data consist of 506 observations on the following observable variables:

P_i = the median house price in community i, in Naira;

NOX_i = the level of nitrous oxide in the air of community i, in parts per 100 million;

$DIST_i$ = the weighted distance of community i from 5 employment centres, in miles;

$ROOMS_i$ = the average number of rooms per house in community i;

$STRAT_i$ = the average student-teacher ratio of schools in community i.

Your research assistant estimates the following model of median house prices on the sample of $N = 506$ observations.

$$\ln P_i = \beta_1 + \beta_2 \ln NOX_i + \beta_3 \ln DIST_i + \beta_4 ROOMS_i + \beta_5 STRAT_i + u_i \dots \dots \dots (1)$$

where the β_j ($j = 1, 2, 3, 4, 5$) are regression coefficients, \ln denotes the natural logarithm of variable and u represents the random error term. The OLS estimation results for the model are given below (with standard errors given in parentheses below coefficient estimates).

$$\begin{array}{lllll} \hat{\beta}_1 = 11.08 & \hat{\beta}_2 = -0.9535 & \hat{\beta}_3 = -0.1343 & \hat{\beta}_4 = 0.2545 & \hat{\beta}_5 = -0.0525 \\ (0.3181) & (0.1167) & (0.0431) & (0.0185) & (0.0059) \end{array}$$

$$RSS = \sum_{i=1}^N \hat{u}_i^2 = 35.1835 \quad TSS = \sum_{i=1}^N (\ln P_i - \overline{\ln P})^2 = 84.5522 \quad N = 506$$

where RSS is the Residual Sum-of-Squares and TSS is the Total Sum-of-Squares from OLS estimation of regression equation (1)

- Interpret each of the slope coefficient estimates in regression equation (1)
- Use the estimation results for regression equation (1) to test the *individual* significance of each of the slope coefficient estimates. Which of these slope coefficient estimates are individually significant at the 5 percent significance level?
- Perform a linearity test using 5% and 1% levels of significance

20marks)

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