PG Odd Semester (CBCS) Exam., December—2018

ECONOMICS

(3rd Semester)

Course No. : ECOCC–304

(Advanced Econometrics—I)

Full Marks : 70
Pass Marks : 28

Time : 3 hours

The figures in the margin indicate full marks for the questions

Answer **five** questions, selecting **one** from each Unit

UNIT—I

1. *(a)* Define the following terms :

(i) Analysis of Variance (ANOVA)

(ii) Least Squares Criterion

(b) Prove that $\hat{}^2$ is an unbiased estimator of ^{2}, the variance of the random disturbance term. State the relationship between regression slope and regression coefficient.

(c) We have the following results from a regression exercise :

$$\hat{Y}_t \quad 0\ 7264 \quad 1\ 0598\ X_i$$
$$(0\ 3001) \quad (0\ 0728)$$

r^2 0 4710; $F_{1,\ 238}$ 211 895, df = 238

(figures in parenthesis are standard errors). Now answer the following :

(i) Is the intercept statistically greater than zero?

(ii) What does the value of r^2 imply? Is it statistically significant?

(2+2)+(3+2)+(2+3)=14

2. *(a)* Distinguish between the following :

(i) Standard error of an estimator and Standard error of regression

(ii) True model and Estimated model

(b) Point out the interrelation among likelihood ratio test, Wald test and Lagrange multiplier test in case of linear regression.

(c) When does the regression line of Y on X coincide with that of X on Y?

(d) You are given the following regression results :

$$\hat{Y}_i \quad 50 \quad 2978 \quad 5\, X_t$$
$$(629 \quad 3)$$

r^2 0 6149 (the figure in parenthesis in the standard error). Find out the sample size underlying this result.

(2+2)+3+3+4=14

UNIT—II

3. *(a)* Suppose we increase the number of explanatory variables in a multiple regression model. What will happen to the values of R^2 and $\bar{R}^2$?

(b) Define overall significance of an estimated multiple regression model.

(c) From data on 45 developed countries, the following regression results were obtained :

$$\widehat{\log C} \quad 4\ 30 \quad 1\ 34 \log P \quad 0\ 17 \log Y$$
$$(0\ 09) \quad (0\ 32) \qquad (0\ 20)$$

$\bar{R}^2$ 0 27 (standard errors are in parenthesis). Here C is per capita

consumption expenditure, P is real price and Y is per capita real income. Now answer the following :

(i) What is the elasticity of consumption with respect to price? Is it statistically significant? If so, is it statistically different from one.

(ii) How would you retrieve R^2 from the value of $\bar{R}^2$? 4+4+6=14

4. *(a)* Indicate whether the following statements are true, false or uncertain and provide brief explanations :

(i) The value of R^2 always rises with addition of explanatory variables in the model.

(ii) The value of $\bar{R}^2$ always rises with addition of explanatory variables in the model.

(iii) The value of R^2 for the restricted model is always greater than the value of R^2 for the unrestricted model.

(b) For a particular data set, you are given the following matrix where all variables are measured in deviation form :

$$X\,X = \begin{matrix} 1103111\ 33 & 16984\ 00 \\ 16984\ 00 & 210\ 00 \end{matrix}$$

$$Y\ Y = 57420003$$

$$X\ Y = \begin{matrix} 955099\ 33 \\ 14854\ 00 \end{matrix}$$

n 15; $\overline{Y}$ 1942 33 supposing the regression equation is

$$Y_i \quad {}_0 \quad {}_1X_{1i} \quad {}_2X_{2i} \quad u_i$$

(i) Estimate $\hat{}_1$ and $\hat{}_2$.

(ii) Find the variance of $\hat{}_1$.

(iii) Obtain R^2 and $\overline{R}^2$. (2×3)+(4+2+2)=14

UNIT—III

5. *(a)* What are the non-spherical disturbances? Explain in brief.

(b) Outline GLS transformation and application for the generalized pattern of heteroscedasticity given by

$$\text{var}(u_i) \quad \frac{^2}{i}$$

where ^{2} is a constant and $_i$'s are known quantities based on sample observations, i 1, 2, ⋯, n. How would you apply GLS when var(u_i) ^2X_i?

(c) Explain the Breusch-Pagan-Godfrey test for detection of heteroscedasticity in a stepwise manner. 3+6+5=14

6. *(a)* In case of a linear regression model with AR(1) disturbances given by u_t $u_{t\ 1}$ $_t$ with | | 1 is a constant and $_t$'s are independently and identically distributed as normal with zero mean and constant variance ^{2} (all symbols have their usual meanings), bring out the structure of the variance-covariance matrix of u_t, the random disturbance.

(b) Outline Kadiyala's first and second transformations for GLS application under AR(1) disturbances.

(c) Briefly explain the Von Neumann ratio test for detection of a first-order auto-correlated disturbance. 4+5+5=14

UNIT—IV

7. *(a)* Elaborate the use of seasonal dummy variables to bring out the seasonal effects on garment sales of n sellers across four seasons of a year. Illustrate the data matrix clearly.

(b) Suppose you are given yield per bigha data on the paddy crop for the same set of n farmers of a region across three cropping seasons. It is known that n_1 farmers cultivate HYV seeds while n_2 farmers cultivate traditional varieties (n n_1 n_2). Construct two linear regression models based on independent dummy variables where there is *(i)* no interaction across seasons and types of paddy and *(ii)* interaction between season and types of paddy. Outline the structure of the data matrix in each case. How do you calculate season effects and paddy-type effects? 6+8=14

8. *(a)* Why are OLS estimators inefficient in a linear probability model? Hence, explain feasible GLS estimation for a linear probability model.

(b) Elaborate the logit model for a dichotomous (binary) dependent variable and a vector of independent variables, explaining calculations of estimated probabilities and marginal effects of independent variables. 6+8=14

UNIT—V

9. *(a)* Explain the Koyck distributed lag model and a Koyck transformation. Hence, verify whether the transformed model violates CLRM requirements.

(b) Apply Nerlove's partial stock adjustment principle to a Cobb-Douglas demand function with lagged quantity terms as endogenous variables. How are short-run and long-run elasticities computed from such a demand function? 7+7=14

10. Write short notes on any *two* of the following : 7×2=14

(a) Cagan's adaptive expectations

(b) ARDL model

(c) Durbin's h-test

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