PG Odd Semester (CBCS) Exam., December—2016

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) Goodness of fit

(ii) Analysis of variance (ANOVA)

(b) State the relation between regression slope and correlation coefficient.

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

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

$$r^2 \quad 0\ 4710;\ F(1,\ 238) \quad 211\ 895$$

d.f. 238 (figures in parentheses are standard errors). Now answer the following :

(i) Test the null hypothesis that the coefficient of X is greater than 1.

(ii) Is the intercept significantly greater than zero?

(iii) What does the value of r^2 imply?

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

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

(i) True model and estimated model

(ii) Parameter and estimate

(b) In case of a 2-variable linear regression show that an F-statistic is the square of a t-statistic ($F \quad t^2$).

(c) A sample of 12 observations corresponding to a two-variable linear model $Y_i \qquad X_i \quad u_i$ provided the following results :

$$X_i \quad 4200, \quad (X_i \quad \bar{X})^2 \quad 46509\ 96$$

$$Y_i \quad 3861, \quad (Y_i \quad \bar{Y})^2 \quad 40068\ 24$$

$$(X_i \quad \bar{X})(Y_i \quad \bar{Y}) \quad 43145\ 04$$

Using these results, estimate and along with their variances. Also obtain 95% confidence intervals for ˆ and ˆ.

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

UNIT—II

3. *(a)* Define the following :

(i) Adjusted R^2

(ii) Overall significance of an estimated multiple regression model

(b) From the data of 45 developed countries, the following regression results are obtained :

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

(Figures in parentheses are SEs) $\bar{R}^2$ 0 27.

Here C tobaco consumption (packets per year)

P real price of tobaco per packet

Y per capita real income

Now answer the following :

(i) Interpret the given results.

(ii) What is the elasticity of demand for tobaco with respect to price? Is it statistically significant?

(iii) How would you retrieve R^2 value from the value of $\bar{R}^2$?

(2+2)+(2+5+3)=14

4. *(a)* Define the following :

(i) Likelihood ratio test statistics

(ii) Likelihood function

(b) You are given the following regression results :

$$\hat{Y}_i \quad \underset{(8\ 5152)}{16899} \quad \underset{(\ 4\ 7280)}{2978\ 5\ X_{1i}}$$

$$R^2 \quad 0\ 6149$$

$$\hat{Y}_i \quad \underset{(3\ 3705)}{9734\ 2} \quad \underset{(\ 6\ 6070)}{3782\ 2\ X_{1i}} \quad \underset{(2\ 9712)}{2815\ X_{2i}}$$

$$R^2 \quad 0\ 7706$$

(Figures in parentheses are computed *t*-values). Now answer the following :

(i) Find out the sample size underlying these results.

(ii) Interpret these results.

(iii) Which model would you prefer and why? (2+2)+(3+3+4)=14

UNIT—III

5. *(a)* For the 2-variable model

$$Y_i \qquad X_i \quad u_i, \; u_i\text{'s}$$

are known to be heteroscedastic but non-autocorrelated with

$$\text{var}(u_i) \quad {}^2_u X_i^2, \quad {}^2_u$$

is a positive constant.

(i) Derive the variance of OLS and GLS estimators of .

(ii) You are given 6 observations of X as X_i 2, 3, 5, 7, 8, 9. Calculate the relative efficiency of the GLS estimator of over its OLS counterpart.

(b) Outline the Glejser test for detection of heteroscedasticity, clearly pointing out its advantages. (6+4)+4=14

6. *(a)* If the random disturbance u_t, in the model Y_t X_t u_t, follows $AR(1)$ scheme given by

u_t $u_{t\ 1}$ $_t$ ($_t$ is white noise) and | | 1

show that the autocorrelation coefficient at lag s is simply ^{s}. How would you plot the correlogram if 0 72? 5+2=7

(b) You are given a 2-variable linear model for time series data as Y_t X_t u_t, where u_t $u_{t\ 1}$ $_t$, u_t being the random disturbance and $_t$ being a white random noise. Moreover it is known a priori that x_t is autocorrelated and follows $AR(1)$ scheme given by

$$x_t \quad x_{t\ 1} \quad w_t$$

(x_t X_t $\overline{X}$ and w_t is a white noise). Show that variance of the OLS estimator is higher under autocorrelation than in the orthodox case. 7

UNIT—IV

7. *(a)* You are asked to estimate consumption functions for 'war time' and 'peace time'. Suppose your models are

Y_t $_1$ $_1X_t$ u_t ⋯ war time model

Y_t $_2$ $_2X_t$ u_t ⋯ peace time model

Now frame a single model that can generate both war time and peace time estimates of all parameters. Hence device a model that can simultaneously test H_{01} : $_2$ $_1$ 0 and H_{02} : $_2$ $_1$ 0. What would be the interpretations of the alternative hypotheses? 2+2=4

(b) How would you make use of independent dummy variables if you are asked to adjust for seasonal factors where you are estimating a consumption function on the basis of quarterly data? 4

(c) Explain how you can test for stability of regression coefficients in the following case : 6

Y_{1t} $_1$ $_1X_{1t}$ $_1Z_{1t}$ u_{1t} ⋯ for period 1

Y_{2t} $_2$ $_2X_{2t}$ $_2Z_{2t}$ u_{2t} ⋯ for period 2

8. *(a)* Point out the limitations of the linear probability model in case of dummy dependent variable (binary). Is the profit an improvement? Explain analytically. 3+5=8

(b) In case of limited dependent variable models, why is the conventional R^2 an improper goodness of fit measure? Present appropriate goodness of fit measures for such models. 6

UNIT—V

9. *(a)* Elaborate the use of 'Koyck scheme' in the context of regression with lagged regressors.

(b) Outline the direct estimation procedure under Koyck scheme, when *(i)* disturbances are well-behaved and *(ii)* disturbances are autocorrelated. 6+(4+4)=14

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

(a) Rational expectations

(b) Partial stock adjustment models

(c) Almon's scheme of polynomial lag

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