2022

ECONOMICS — HONOURS

Paper : DSE-A-1

(Applied Econometrics)

Full Marks : 50

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

Group - A

1. Answer ***any five*** questions : 2×5

(a) What is stationary time series data?

(b) For the same set of sample data, consider the following two models,

$\hat{X} = -201 + 3.05L \; r^2 = 0.92$

$\log \hat{X} = -5.48 + 2.08 \log L \; r^2 = 0.98.$

where X = index of GNP

L = labour input index.

On the basis of r^2 values, can you draw any conclusion on the comparative efficacy of the above models?

(c) What is a white-noise process?

(d) What are the consequences of omitting a relevant variable in the model?

(e) Distinguish between in-sample forecasting and out-of-sample forecasting.

(f) What is dummy variable trap?

(g) What is meant by Spurious regression?

(h) Establish the relation between R^2 and F in terms of a three variable linear regression model.

Group - B

2. Answer ***any two*** questions :

(a) The Cobb-Douglas production function is given by

(i) How can you estimate the following model by applying OLS?

$Y_i = A L_i^{\alpha} K_i^{\beta} u_i$

where, Y = Output, L = Labour, K = Capital, U = Stochastic term

(ii) What stand for α, β and $\alpha + \beta$ for the function? 3+2

(b) A demand equation has been estimated as

$\log Q_x = 10.5 + 0.79 \log p_x + 0.62 \log M - 0.15 \log p_y$.

where Q_x = quantity demanded of commodity x.

p_x = price of commodity x.

M = income

p_y = price of a substitute commodity Y.

Using your a-priori theoretical knowledge do you find the estimated equation acceptable? 5

(c) You are given the following regression result :

$\hat{Y}_i = 16.899 - 2972.5 X_i, R^2 = 0.6149$

t : (8.5152) (–4.7280)

Can you find out the sample size from this result? 5

(d) (i) Consider $y_t = \alpha + \beta t + u_t$

where u_t is a stationary series.

Obtain the de-trended series by the method of differencing.

(ii) Given that $X_t = X_{t-1} + \epsilon_t$

where $\{\epsilon_t\}$ is a purely random series with mean μ and variance σ^2. Given that $X_0 = 0$. Does X_t generate a stationary process? 3+2

Group - C

3. Answer ***any three*** questions :

(a) A production function is specified as

$Y_i = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + u_i$

where Y_i = log of output

X_{1i} = log of Labour input

X_{2i} = log of capital input

The data refer to a sample of 23 firms and observations are measured as deviation from sample mean :

$\sum x_{1i}^2 = 12, \sum x_{1i}x_{2i} = 8, \sum x_{2i}^2 = 12, \sum x_{1i}y_i = 10, \sum x_{2i}y_i = 8, \sum y_i^2 = 10$

(i) Estimate β_1, β_2 and their standard errors.

(ii) Find R^2 and $\bar{R}^2$

(iii) Test the hypothesis that $\beta_1 + \beta_2 = 1$. 6+2+2

(b) In estimating the total cost function, a researcher proposes the following linear function

$y_i = \lambda_1 + \lambda_2 X_i + u_i$

where y = total cost, X = total output

While another researcher decides on a cubic cost function.

Explain Ramsey's RESET to check whether the above model has really missed the non-linearities. 10

(c) From the data of 46 states in a country for a given year the following regression results are obtained :

$$\log C = 4.3 - 1.34 \log P + 0.17 \log Y$$

p-value : (0.91) (0.32) (0.20), $\bar{R}^2 = 0.27$

where, C = units of consumption

P = Real price per unit

Y = Per capita real disposable income

(i) What is the elasticity of demand with respect to price? Is it statistically significant? If so, is it statistically different from 1?

(ii) What is income elasitiy? Is it statistically significant?

(iii) How would you get R^2 from $\bar{R}^2$? 5+3+2

(d) Fit a linear trend to the following figures of production of a pen factory and estimate how much pen will be produced in the factory in the year 2025. 8+2

Year	2014	2015	2016	2017	2018	2019
Production (10000 tonnes)	80	87	98	115	125	135