

M.PHIL./ PH. D. PROGRAMME IN ECONOMICS
Term End Examination, June 2014
REC-003: ECONOMETRIC METHODS

Time: 3 hours

Max. Marks: 100

Note: You are required to answer any two questions (each carrying 20 marks) from Section A and any five questions (each carrying 12 marks) from Section B.

Section A

1. Consider a regression model of relating Y (the dependent variable) to X (the independent variable) $Y_i = \beta_0 + \beta_1 X_i + \varepsilon_i$ where ε_i is the stochastic or error term. Suppose that the estimated regression equation is stated as $\hat{Y}_i = \hat{\beta}_0 + \hat{\beta}_1 X_i$ and e_i is the residual error term.
 - a) Define e_i . How is it related to ε_i ? (3)
 - b) Give four reasons why e_i should be added to the regression model? (4)
 - c) What is the difference between β_1 and $\hat{\beta}_1$? (2)
 - d) State and explain the assumptions under which Gauss-Markov theorem holds in the model. (4)
 - e) If $\text{var}(\varepsilon_i) = \sigma^2$ (a constant), what is an unbiased estimator for σ^2 ? (3)
 - f) What is meant by standard error? Write down the formula for $\text{se}(\hat{\beta}_1)$. (4)

2. Derive the steps of carrying D-W test in a regression model involving autocorrelation. What are the limitations of D-W test? What alternative procedures will you follow to overcome these limitations? (8+6+6)

3. What is panel data? Distinguish between fixed effect and random effect models for panel data. What test will you adopt to choose between fixed effect and random effect models? (4+8+8)

4. What is a random walk model? Is it a stationary process? What are the variations in the model? Outline the steps you will follow to carry out unit root test. (3+3+6+8)

Section B

5. What is Generalised Least Squared (GLS) method? When do you adopt it? Show that GLS estimators are BLUE. (4+3+5)

6. a) What is identification problem in a simultaneous equation model?
 b) Explain the identification status of each of the equations in the following macroeconomic model.

$$\begin{aligned} C_t &= \beta_1 + \beta_2 Y_t + u_1 \\ I_t &= \alpha_1 + \alpha_2 Y_t + \alpha_3 R_t + u_2 \\ Y_t &= C_t + I_t + G_t \end{aligned}$$

where C = Consumption, Y = Income, I = Investment, R = Rate of Interest, and G = govt. expenditure

- c) Suggest a method of estimating the consumption function in the above model. (3+4+5)

7. Consider the following model

where Y_t = actual rate of inflation (%) at time t , X_{2t} = unemployment rate (%) at time t , and X_{3t} = expected inflation rate (%) at time t . This model is known as the *expectations-augmented Phillips curve*.

As a test of this model, we obtained the data for 40 years and the OLS method gave the following results.

$$Y_t = 7.1933 - 1.3925 X_{2t} + 1.4700 X_{3t}$$

(2.32) (0.70) (0.39)

Figures in parentheses are standard errors. The $R^2 = 0.50$.

a) Formulate hypotheses for the model and test the hypotheses.

b) Interpret the results.

(6+6)

8. Multicollinearity is basically a data problem. Do you agree? Suggest methods of resolving multicollinearity in a dataset. (12)

9. Discuss how the instrumental variable method of estimation is different from the 2SLS method of estimation. Explain how you will estimate the parameters of the following two equations that are part of the simultaneous equations model.

$$Y_{1t} = \alpha_1 + \alpha_2 Y_{2t} + \alpha_3 Z_{1t} + u_{1t} \quad \dots(1)$$

$$Y_{2t} = \beta_1 + \beta_2 Y_{1t} + \beta_3 Z_{2t} + u_{2t} \quad \dots(2) \quad (12)$$

10. Consider the following equations system.

Supply Equation: $Q_t^s = \alpha_1 + \alpha_2 P_t + \alpha_3 Z_t + u_t$

Demand Equation: $Q_t^d = \beta_1 + \beta_2 P_t + u_t$

Equilibrium Condition: $Q_t^s = Q_t^d$

a) Specify the endogenous and exogenous variables in this model.

b) Find out the identification status of the supply and demand equations.

c) What will you do to make these equations exactly identified (if not exactly identified already)? (3+7+2)

11. Explain the process of Goldfeld–Quandt test of heteroscedasticity. Given the following data carry out the Goldfeld–Quandt test of heteroscedasticity at the 5 percent level of significance. RSS1 based on the first 30 observations = 55, df = 25; RSS2 based on the last 30 observations = 140, df = 25. (12)

12. Write short notes on the following:

a) Box-Jenkins approach

b) RESET test

(6+6)