QP Code : 24/PT/11/XVIIIB

POST-GRADUATE DEGREE PROGRAMME
Term End Examination — December, 2024
ECONOMICS
Paper-XVIIIB : ADVANCED ECONOMETRICS - I

Time : 2 hours] [Full Marks : 50

Weightage of Marks : 80%

Special credit will be given accuracy and relevance in the answer. Marks will be deducted for spelling, untidy work and illegible handwriting. The weightage for each question has been indicated in the margin.

Use of scientific calculator is strictly prohibited.

1. Answer any *four* of the following questions : $2\frac{1}{2} \times 4 = 10$

   a) What is dummy variable trap ?

   b) What are the differences between finite and infinite distributed lag models ?

   c) What is the identification problem in simultaneous equation model ?

   d) Mention any three limitations of the Linear Probability Model (LPM).

   e) Explain the role of the standard normal distribution in the probit model.

   f) What is an odds ratio ? How do you calculate the odds ratio from a logistic regression coefficient ? 1 + 1½

2. Answer any *four* of the following questions : $5 \times 4 = 20$

   a) To assess the effect of the Fed's policy of deregulating interest rates beginning in July 1979, an economist estimated the following model for the quarterly period of 1975-III to 1983-II.

$$\hat{Y}_t = 8{\cdot}5871 - 0{\cdot}1328P_t - 0{\cdot}7102Un_t - 0{\cdot}239M_t + 0{\cdot}6592Y_{t-1} + 2{\cdot}5831Dum_t$$

Se (1·9563) (0·0992) (0·1909) (0·0727) (0·1036) (0·7549)

$$R^2 = 0{\cdot}9156$$

Where

Y = 3-month Treasury bill rate

P = Expected rate of inflation

U_n = Seasonally adjusted unemployment rate

M = Change in the monetary base.

Dum = dummy, taking value of 1 for observations beginning July 1, 1979.

i) Interpret these results

ii) What has been the effect of rate deregulation ? Does the result make economic sense ?

iii) The coefficients of P_t, Un_t and M_t are negative. Can you offer an economic rationale ? 1 + 2 + 2

b) What is distributed lag model ? Explain how to choose the appropriate lag length in a distributed lag model using the ad-hoc method. 2 + 3

c) What is logistic regression ? Briefly explain the advantages and disadvantages of logistic regression. 2 + 3

d) What problems arise while using ordinary least square (OLS) method to estimate a Linear Probability Model (LPM) ?

e) Consider the model

$Y_t = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta Y_{t-1} + V_t$

Suppose Y_{t-1} and V_t are correlated. To remove the correlation, suppose we use the following Instrumental Variable approach : First regress Y_t on X_{1t} and obtain the estimated $\hat{Y}_t$ from this regression. Then regress

$$Y_t = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 \hat{Y}_{t-1} + V_t$$

Where $\hat{Y}_{t-1}$ are estimated from the first-stage regression.

i) How does this procedure remove the correlation between Y_{t-1} and V_t in the original model ?

ii) What are the advantages of the recommended procedure ?

2½ + 2½

f) What is specification bias ? Do you face specification bias if you omit an interaction effect involving a dummy variable ? Give a justification.

1 + 4

3. Answer any *two* of the following questions : $10 \times 2 = 20$

a) What are the reasons for including lags in economic models ? Derive the Koyck transformation from an infinite distributed lag model. 4 + 6

b) Derive the Two-Stage Least squares (2SLS) estimator in the context of a simultaneous equation model.

c) What are the uses of dummy variables in regression models ?

Suppose that we have the college professors salary regression as follows :

$$Y_t = \alpha_1 + \alpha_2 D_{2t} + \alpha_3 D_{3t} + \alpha_4 (D_{2t}\ D_{3t}) + \beta X_t + U_t$$

Where Y_t = Annual salary of a college professor

X_t = Years of teaching experience

D_2 = 1 if male and 0 otherwise

D_3 = 1 if white and 0 otherwise.

i) The term $D_{2t}\, D_{3t}$ represents the interaction effect. What is meant by this expression ?

ii) What is the meaning of the coefficient α_4 ?

iii) Find $E(Y_t / D_2 = 1,\ D_3 = 1,\ X_t)$ and interpret it. 4 + 6

d) i) Explain the order and rank conditions for identification in simultaneous equation model.

ii) Find out the reduced form of the following National Income model :

$C_t = \alpha_0 + \alpha_1 (Y_1 - T_1) \ldots (1)$

$I_t = \beta_1 Y_{t-1} + \beta_2 R_t$ ..... (2) where the priori restrictions on the model are expressed by $0 < \alpha_1 < 1$, $\beta_1 > 0$, $\beta_2 < 0$

$Y_t = C_t + I_t + G_t$ ..... (3)

Where, C_t, I_t and Y_t represent consumption, investment, National income respectively and are current endogenous variables. T_t, R and G_T represent taxes on income, government regulator and government expenditure respectively as current exogenous variables and Y_{t-1} is classified as lagged endogenous variable. 3 + 7