ALLAMA IQBAL OPEN UNIVERSITY, ISLAMABAD

(Department of Economics)

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Course: Applied Econometrics (2703) **Semester: Autumn, 2013**
Level: M. Phil Economics **Total Marks: 100**
Pass Marks: 50

ASSIGNMENT No. 1

(Units: 1–4)

Q. 1 Describe the ordinary least square principle of estimation. Also prove mathematically their assumptions and properties. **(20)**

Q. 2 In studying the movement in the production workers share in the value added (i.e. labour's share), the following models are considered by Gujarati. **(20)**

Model A: $Y_t = b_o + b_1 t + u_2$

Model B: $Yt = a_o + a_1 t + a_2 t^2 + u_t$

Where Y = labour's share and t = time. Based on the annual data for 1949-1964, the following results were obtained for the primary metal industry:

Model A: $Y_t = 0.4529 - 0.0041\,t \qquad R^2 = 0.5284 \qquad d = 0.8252$

(-3.9608)

Model B: $Y_t = 0.4786 - 0.0127\,t + 0.0005\,t^2$

$(-3.2724) \quad (2.7777)$

$R^2 = 0.6629 \quad d = 1.82$

Where the figures in parentheses are t ratios.

a) Is there serial correlation in model A? and in B?
b) What accounts for the serial correlations?
c) How would you distinguish between 'pure' autocorrelation and specification bias?

Q. 3 In their article, "A Model of the Distribution of Branded Personal Products in Jamaica, John U. Farley and Harold J. Levitt developed the following model (the personal products considered were shaving cream. Skin cream, sanitary napkins, and toothpaste) **(20)**

$Y_{1i} = \alpha_{1+} \beta_1 Y_{2i} + \beta_2 Y_{3i} + \beta_3 Y_{4i}$

$$Y_{2i} = \alpha_{2+} \beta_4 Y_{1i} + \beta_5 Y_{5i} + y_1 X_{1i} + y_2 X_{2i} + u_{2i}$$

$$Y_{3i} = \alpha_{3+} \beta_6 Y_{2i} + y_3 X_{3i} + u_{3i}$$

$$Y_{4i} = \alpha_{4+} \beta_7 Y_{2i} + y_4 X_{4i} + u_{4i}$$

$$Y_{5i} = \alpha_{5+} \beta_8 Y_{2i} + \beta_9 Y_{3i} + \beta_{10} Y_{4i} + u_{5i}$$

Where Y_1 = Percent of stores stocking the product
Y_2 = sales in units per month
Y_3 = index of direct contact with importer and manufacturer for the product
Y_4 = index of wholesale activity in the area
Y_5 = index of depth of brand stocking for the product (i.e., average number of brands of the product stocked by stores carrying the product).
X_1= target population for the product
X_2 = income per capita in the parish where the area is
X_3 = distance from the population center of gravity to Kingston
X_4 = distance from population center to nearest wholesale town

a) Can you identify the endogenous and exogenous variables in the preceding model?

b) Can one or more equations in the model be estimated by the method of least squares? Why or why not?

Q. 4 Table below is a model in five equations with five endogenous variables Y,s and four exogenous variables X,s: **(20)**

Coefficients of the Variables

Equation No.	Y_1	Y_2	Y_3	Y_4	Y_5	X_1	X_2	X_3	X_4
1	1	β_{12}	0	β_{14}	0	y_{11}	0	0	y_{14}
2	0	1	β_{23}	β_{24}	0	0	y_{23}	y_{24}	0
3	β_{31}	0	1	β_{34}	β_{35}	0	0	y_{33}	y_{34}
4	0	β_{42}	0	1	0	y_{41}	0	y_{43}	0
5	β_{51}	0	0	β_{54}	1	0	y_{52}	y_{53}	0

Determine the identifiability of each equation with the aid of the order and rank conditions of identifications.

Q. 5 To assess the effect of the Fed's policy of deregulating interest rates beginning in July 1979, a student estimated the following model for the quarterly period 1975 – III to 1983 – II. **(20)**

$$Y_t = 8.5871 - 0.1328P_t - 0.7102Un_t - 0.2389M_t$$

sc (1.9563) (0.0992) (0.1909) (0.0727)

$$+ 0.6592Y_{t-1} + 2.5831Dum_t \quad R^2 = 0.9156$$

(0.1036) (0.7549)

where Y = 3-month Treasury bill rate
P = expected rate of inflation
Un = seasonally adjusted unemployment rate
M = changes in the monetary base
Dum = dummy, taking value from 1 for observations beginning from July 1, 1979.

a) Interpret these results.
b) What has been the effect of rate deregulation? Do the results make economic sense?
c) The coefficients of P_t, Unt, and Mt are negative. Can you offer an economic rationale?

ASSIGNMENT No. 2

(Units: 5–9)

Total Marks: 100 **Pass Marks: 50**

Q. 1 Consider the model; **(20)**

$Y_t = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 Y_{t-1} + v_t$

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 X_{2t} and obtain the estimated Y_t from this regression. Then regress

$Y_t = \alpha + \beta_1 X_{1t} + \beta_2 X_{2t} + \beta_3 Y_{t-1} + v_t$

Where Y_{t-1} are estimated from the first-stage regression.

a) How does this procedure remove the correlation between Y_{t-1} and v_t in the original model?
b) What are the advantages of the recommended procedure.

Q. 2 (a) Since the error term in the Cobb-Douglas production function can be entered multiplicatively or additively, how would you decide between the two? **(20)**
(b) What is the difference between OLS and nonlinear least-squares (NLLS) estimation?
(c) The relationship between pressure and temperature in saturated steam can be expressed as:

$Y = \beta_1 (10)^{\beta 2t/(y+t)} + u_t$

Where Y = pressure and t = temperature. Using the method of nonlinear least squares (NLLS), obtain the normal equations for this model.

Q. 3 Which one of these models you will prefer for estimation of lag models and why?**(20)**
(a) Method of Instrumental variable
(b) Almon Polynomial Distributed Lag Model

Q. 4 Write notes on the followings; **(20)**
(a) Interpolation
(b) Data Filtering

(c) Data Mining
(d) Aggregation

Q. 5 The following table shows the value of imports (Y), the level of Gross National Product (X_1) measured in arbitrary units, and the price index of imported goods (X_2), over the twelve-year period 1960-71 for a certain country. **(20)**

	1960	**1961**	**1962**	**1963**	**1964**	**1965**	**1966**	**1967**	**1968**	**1969**	**1970**	**1971**
Y	57	43	73	37	64	48	56	50	39	43	69	60
X_1	220	215	250	241	305	258	354	321	370	375	385	385
X_2	125	147	118	160	128	149	145	150	140	115	155	152

(a) Estimate the import function $Y= b_o + b_1 X_1 + b_2 X_2 + u$.
(b) What is the economic meaning of your estimates?
(c) Conduct tests of significance for the regression estimates at 5 per cent and 1 per cent levels of significance.
(d) Compute the coefficient of multiple determination.

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