

AFRICAN ECONOMIC RESEARCH CONSORTIUM
COLLABORATIVE MASTERS PROGRAMME IN ECONOMICS
(Except Nigeria and South Africa)

JOINT FACILITY FOR ELECTIVES
JULY – OCTOBER 2001

Econometrics Theory and Practice

Second Session: Final Examination

Time: 3 Hours

Tuesday, October 2, 2001

Instructions

The examination is divided into TWO sections, section A and B. Answer FOUR questions; TWO from each section.

SECTION A

1. (a) Find the mean, variance and autocovariances for each of the following stochastic processes: (5 points)

MA(1): $Y_t = \mu + \varepsilon_t + \theta \varepsilon_{t-1}$

AR(1): $Y_t = \mu + \phi Y_{t-1} + \varepsilon_t$

Where ε_t is a white noise process with mean zero and constant variance, σ^2 .

- (b) Explain the main steps in Box-Jenkins modelling. (3 points)
- (c) Explain how you would carry out a cointegration test using the Engle-Granger procedure. What are the main defects of the procedure? (7 points)
2. (a) Explain the concept of cointegration. (5 points)
- (b) The following equation is fundamental in testing for cointegration, using the Johansen procedure:

$$Y_t = \sum_{i=1}^{p-1} \pi_i \Delta Y_{t-i} + \pi Y_{t-p} + \varepsilon_t \text{-----} (J)$$

- (i) Derive equation (J) from the following VAR(p) process: (5 points)

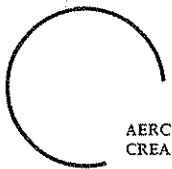
$$Y_t = A_1 Y_{t-1} + A_2 Y_{t-2} + \dots + A_p Y_{t-p} + \varepsilon_t$$

- (ii) Using the concepts of a rank and characteristic roots of matrix, explain how you would use matrix π in equation (J) to determine if the variables in the system are cointegrated, and the number of cointegrating vectors. (5 points)

3. (a) Distinguish between a Trend Stationary Process (TSP) and Difference Stationary Process (DSP). (5 points)
- (b) Explain how would you go about transforming data to achieve stationarity if a variable is trending. (5 points)
- (c) State the conditions for a stable Vector Autoregressive process. (2 points)
- (d) Show that the expressions (formulas) for the mean and variance of the AR(1) process do not make sense when the absolute value of the autoregressive coefficient is greater than one. (3 points)

SECTION B:

4. (a) Discuss the Sims' philosophy behind VAR modelling. (4 points)
- (b) Explain how you would determine the appropriate order of a VAR model. (4 points)
- (c) Explain how you would carry out structural analysis in a VAR model. (5 points)
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- (d) What are the major weaknesses of the VAR models? (2 points)
5. (a) What are the advantages of panel data models? (2 points)
- (b) What do you understand by heterogeneity bias in panel data models? (3 points)



(c) Explain how would you go about testing for homogeneity of parameters in panel data. (5 points)

(d) Distinguish between fixed effects and random effects models. (5 points)

6. (a) Explain the main weaknesses of the Linear Probability models. (5 points)

(b) Explain the two alternative ways of deriving logit and probit models. (4 points)

(c) Explain how do logit and probit models overcome the weaknesses of the Linear Probability Model. (4 points)

(d) Define the following concepts: (3 points)

- (i) Binary variables
- (ii) Ordinal variables
- (iii) Nominal variables.

The following is a list of the names of the persons who have been appointed to the various committees of the Board of Directors of the City of New York, for the year 1911.

Committee on the Administration of the City of New York

Chairman: Mr. John F. Johnson
Members: Mr. John F. Johnson, Mr. John F. Johnson, Mr. John F. Johnson

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Chairman: Mr. John F. Johnson
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