

OLLSCOIL NA hEIREANN, GAILLIMH
NATIONAL UNIVERSITY OF IRELAND, GALWAY

Semester 2, 2001/2002

Econometrics (EC363)
B.A & B.Comm. Degree Examinations

Professor H. Dixon
Professor M.P. Cuddy
Mr. Eoghan Garvey

Time allowed: Two hours.

Instructions: Answer four questions only. Each question is worth 100 marks.

Q.1

- (i) Explain briefly what is meant by an unbiased, efficient and consistent estimator and explain intuitively the role of Monte Carlo studies for describing estimators. (60)
- (ii) Prove the Gauss Markov theorem with regard to the OLS slope estimator in the simple linear regression model. (40)

Q.2

- (i) Let $w = \frac{x_i^*}{\sum (x_i^*)^2}$, where the asterix signifies deviation from the mean. Using properties of w, show a) that $E[b_2] = \beta_2$, and b) that

$$\text{var}(b_2) = \frac{\sigma^2}{\sum_i (x_i^*)^2} \quad (40)$$
- (ii) Explain intuitively why the covariance between b_1 and b_2 must be negative, and why the variance of b_2 tends to fall the further on average the x values are from the mean of x. (20)
- (iii) Show how $\text{var } b_2 \left(\frac{\sigma^2}{\sum_i (x_i^*)^2} \right)$ is affected by the addition of one other x variable to the simple model. (20)
- (iv) State briefly the difference between forecasting expected Y for a given X [i.e. $E(Y|X_0)$] and forecasting a single Y for a given X. (20)

Q.3

- (i) With regard to a multivariate model, briefly discuss the 'problem' of multicollinearity in terms of its meaning, its effects and possible remedies. (25)
- (ii) Discuss briefly the difference between testing for the significance of two individual slope estimates and testing for their joint significance. (25)
- (iii) Explain how one may test for constant returns to scale in the two factor Cobb Douglas production function by using a t test. (25)
- (iv) Explain how one may test for structural breaks using dummy variables. (25)

Q.4

- (i) Compare the effects of heteroskedasticity and autocorrelation on the least squares estimators in a Simple Regression model. (25)
- (ii) Outline in detail one test you could use to test for heteroskedasticity and one test you could use to test for autocorrelation. (25)
- (iii) Describe the steps you would use in estimation if you find that the errors appear to follow an AR1 process. (50)

Q.5

- (i) In specifying the equation for an econometric model, compare the consequences of leaving out a relevant x variable and including an irrelevant one. (30)
- (ii) Compare briefly the probit model with the linear probability model. (70)

Q6.

- (i) Show how the augmented Dickey Fuller test is used to test (a) for stationarity in one 'time series variable' and (b) cointegration between 2 'time series variables'. (40)
- (ii) Describe briefly the role of correlelograms in time series analysis. (30)

(iii) Explain how the two slope coefficients α_1 and α_2 would normally be interpreted in the following error correction model:

$$\Delta Y_t = \alpha_0 + \alpha_1 \Delta X_t + \alpha_2 (Y_{t-1} - \beta_1 - \beta_2 X_{t-1}) + e_t \quad (30)$$