University of the West of England

Applied Econometrics: Mock Exam 2005

Duration 2 hours

Answer 2 questions

Question 1.

The following model is to estimated on a balanced panel of five firms over 20 years:

$$I_{it} = \beta' \mathbf{x}_{it} + \varepsilon_{it} \qquad (1)$$

where the regressors in **x** are market value (*F*) and capital (*C*) and the dependent variable is investment (*I*).
Suppose that the true error structure of the model is:

$$\varepsilon_{it} = \alpha_i + \eta_{it} \qquad (2)$$

where α is uncorrelated with the regressors.

(i) If the model is estimated as a pooled OLS regression, what will be the statistical properties, in terms of efficiency and consistency, of the estimates?

(ii) If the model is estimated as a fixed effects model, what will be the statistical properties, in terms of efficiency and consistency, of the estimates?

(iii) The estimates for pooled OLS, fixed effects (using dummies) and random effects models are given in the table below. Use the statistics shown to decide whether the data support a fixed effects or random effects specification. Carefully explain your reasoning.

Dependent Variable is Investment

Estimation	Constant	Market Value	Capital
(a) OLS	-48.030 (-2.236)	0.10509 (9.236)	0.30537 (7.019)
(b) Fixed Effects (using Dummies)		0.10598 (6.669)	0.34666 (14.348)
(c) Random Effects	-61.575 -(0.775)	0.10549 (6.859)	0.34641 (14.350)

(t-ratios are shown in brackets)

Breush-Pagan LM test for random effects (1df): 453.82
Hausman test of fixed vs random effects (2 df): 1.27

(iv) Discuss how you might use a dynamic form of the model and the problems involved.

Question 2.

Deaton and Muellbauer (1980) estimate the following demand equation for clothing as the second part of an 8 commodity group Almost Ideal Demand System for the UK, 1954 - 74.

$$\underset{}{w_{1t}} = \underset{(-3.1)}{-0.48} + \underset{(1.8)}{0.03\, P_{1t}} + \underset{(1.0)}{0.02\, P_{2t}} - \underset{(-1.6)}{0.02\, P_{3t}} - \underset{(-1.5)}{0.03\, P_{4t}} - \underset{(-3.3)}{0.03\, P_{5t}}$$

$$+ \underset{(0.6)}{0.01\, P_{6t}} + \underset{(1.6)}{0.03\, P_{7t}} - \underset{(-2.2)}{0.05\, P_{8t}} + \underset{(3.7)}{0.09\, (\ln X_t - \ln P^*_t)}$$

$SE(x10^{-2}) = 0.106$ $R^2 = 0.984$ DW = 2.29 t ratios in brackets

where: P_{it} is the log of the price of the i^{th} commodity
w_{1t} is the expenditure share of food
X_t is total expenditure
$1n\, P^*_t$ $= \Sigma\ w_{1t} P_{it}$ which is the Stone price index.

a.

i) Interpret this regression and
ii) Explain what restrictions would be expected to hold for this equation and for the system as a whole.
iii) Explain how you would test homogeneity and symmetry on this system.

b. Critically evaluate the different approaches to providing a dynamic form of the Almost Ideal demand system. .

Question 3.

a) Explain the Law of proportionate effects and discuss how you might operationalise it and the econometric issues involved.

b) Discuss how Dunne and Hughes (1992) tested the ‘ law of proportionate effects’ for a sample of UK quoted companies and dealt with the econometric problems.

c) Explain in detail how possible 'sample selection bias' can be dealt with within this context.

Question 4

a. Briefly explain what a cointegrating VAR model is and how you might estimate it.

b. Birdi and Dunne (2001) consider a log linear relationship based upon a simple Cobb Douglas model:

$$q = a + \alpha\, k + \beta\, l + \gamma\, m$$

Where q is output, k is capital, l is labour and m is military spending, all in logs and all constant prices. Treating this within a VAR estimation framework within Microfit 4.0 (Pesaran and Pesaran, 1997) and starting from an order 4 VAR we get a VAR (2) as the optimal lag length. The order of the VAR is found to be 2 and unrestricted intercepts and no trends gives one cointegrating vector

$$\underset{}{qm} = \underset{(0.7)}{1.32\,k} - \underset{(2.1)}{1.53\,l} + \underset{(0.5)}{0.50\,m}$$

The underlying ECM model is:

$$\Delta qm_t = \underset{(1.7)}{1.96} + \underset{(3.6)}{0.55\,\Delta qm_{t-1}} + \underset{(2.0)}{1.23\,\Delta k_{t-1}} \underset{(1.6)}{-0.84\,\Delta l_{t-1}} - \underset{(1.3)}{0.08\,\Delta m_{t-1}} + \underset{(1.6)}{0.16\,ECM_{t-1}} \underset{(2.3)}{-0.04\,DS}$$

So in this case military spending has a negative short run effect on growth.

i. Explain what they have done.
ii. Why might this be an improvement over simply estimating the aggregate production function?
iii. Interpret and critically evaluate the results.

Question 5

a. Interpret the following production functions and derive their marginal productivity equations.

$$Q_t = AK_t^{\alpha}L_t^{\beta}$$

$$Q_t = \gamma\,[\,\delta K_t^{-\theta} + (1-\delta)\,L_t^{-\theta}\,]^{-\nu/\theta}$$

Under what conditions will they be identical.

b. Discuss how you would estimate these equations using time series data and cross section data and discuss the problems you would expect to encounter and how you would overcome them.