

Applied Econometrics Exam 2006

2 hours

Answer 2 questions

Question 1

Consider the model:

$$y_{it} = x_{it}'\beta + \varepsilon_{it}$$

where the index i refers to the industry and t to time, with:

$$\varepsilon_{it} = \alpha_i + \eta_{it}$$

where α is an industry specific error term and $\text{cov}(\eta, x) = 0$ for all i, t .

- Explain the problems of estimating this model as OLS. (20%)
- Consider the assumptions that α is uncorrelated with the regressors and that α is an industry-specific stochastic disturbance, independent of time, and assumed to be uncorrelated across industries, or with the η term. What models do these imply and what are their statistical properties? (20%)
- The following results are for a growth model estimated using panel data for the 45 industries in South Africa, where the dependent variable is the growth of value added in production for each industry. A dummy variable for the twelve defence related industries was also employed to capture the differences between military and non-military government spending effects.

Panel Data Estimation Results

Period	1973-93	
	Coeff	t ratio
Employment growth	0.56	13.4
K stock growth	0.10	2.7
Govt growth * (G/Y)	0.13	1.9
Govt growth	-0.00	0.5
Defence related dummy	0.01	0.6
Constant	0.14	30.8
R squared	0.25	
Chi-squared (5)	310.4	

These results are for the random effects model. Explain how they would have been estimated and briefly discuss what the results tell you. (20%)

- d) Explain how you would test the random effects model against the fixed effects. (20%)
- e) Briefly explain why random effects models are usually estimated using a feasible GLS procedure. (20%)

Question 2.

Consider the following model:

$$y_{it} = \alpha_i + \beta_i' x_{it} + \lambda_i y_{it-1} + \varepsilon_{it}$$

with $t = 1, \dots, T$ and $i = 1, \dots, N$

- a) Discuss the estimation of both the long run and the short run coefficients of this model using a simple fixed effects procedure. (40%)
- b) Discuss how you might estimate this model if T is small and N is large. (30%)
- c) Discuss possible heterogeneity bias and how you might estimate the model to deal with it if T is large and N is large. (30%)

Question 3.

- a) Explain the Law of proportionate effects and discuss how you might operationalise it and the econometric issues involved. (40%)
- 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. (30%)
- d) Explain in detail how possible 'sample selection bias' can be dealt with within this context. (30%)

Question 4

- a. Briefly explain what a cointegrating VAR model is and how you might estimate it. (50%)
- 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 proces. Treating this within a VAR estimation framework within Microfit 4.1 (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

$$qm = 1.32 k - 1.53 l + 0.50 m$$

(0.7) (2.1) (0.5)

The underlying ECM model is:

$$\Delta qm_t = 1.96 + 0.55 \Delta qm_{t-1} + 1.23 \Delta k_{t-1} - 0.84 \Delta l_{t-1} - 0.08 \Delta m_{t-1} + 0.16 ECM_{t-1} - 0.04 DS$$

(1.7) (3.6) (2.0) (1.6) (1.3) (1.6) (2.3)

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

- i. Explain what they have done and why this approach might be an improvement over simply estimating the aggregate production function? (30%)
- ii. Interpret and critically evaluate the results. (20%)

Question 5.

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.

$$w_{1t} = -0.48 + 0.03 P_{1t} + 0.02 P_{2t} - 0.02 P_{3t} - 0.03 P_{4t} - 0.03 P_{5t}$$

(-3.1) (1.8) (1.0) (-1.6) (-1.5) (-3.3)

$$+ 0.01 P_{6t} + 0.03 P_{7t} - 0.05 P_{8t} + 0.09 (\ln X_t - \ln P^*_t)$$

(0.6) (1.6) (-2.2) (3.7)

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

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
 $\ln P^*_t = \sum w_{1t} P_{it}$ which is the Stone price index.

- a.
 - i) Interpret this regression. (20%)
 - ii) Explain what restrictions would be expected to hold for this equation and for the system as a whole. (20%)
 - iii) Explain how you would test homogeneity and symmetry on this system. (20%)
- b. Critically evaluate the different approaches used by Anderson and Blundell (1982) and Dunne, Smith and Pashardes (1984) to provide a dynamic form of the Almost Ideal demand system. (40%)