

# DEE Conference 2011

## Project-Based Learning of Modern Econometrics

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September 2011

# Project-based learning of modern econometrics

- Funding from the Economics Network 2010-11
- The intention
  - Develop, deliver and evaluate (DDE!) a new approach to the provision of econometrics at Swansea University
  - Learning by doing
  - Assessment by doing
  - Use of projects

- Recalling earlier days...
  - 'In those days, code was on punched cards. I once dropped my box off a bus and spent days sorting it out... The IBM 360/65 was at UCL, so I took buses to and from LSE. Once, when rounding the Aldwych, the bus cornered faster than I anticipated, and my box of cards went flying. The program could only be re-created because I had numbered every one of the cards.'
- Have things moved at a similar pace for the student?
- Examinations halls, papers asking for discussion of the DW statistic (1950,1951) or GQ test (1965) or Koyck transformation (1954)...
- What about improvements in computational power, data availability & software since the cards fell off the bus?

# The module: Applied Econometrics (EC-347)

- A module to pick up on the above developments
- Level-3, 30 credits, compulsory on all BSc programmes
- Year long, three sessions per week
- Flexible, rolling delivery of six topics which complement material covered on other modules
  - Lectures, tutorials
  - Lots of computer workshops
  - Student-led workshops
  - Surgery hours
- Assessed by doing- best five of six projects (one for each topic)
  - Entirely coursework (project) based !

## Not easy stuff, e.g. Johansen

- $\Delta \mathbf{z}_t = \mathbf{B}_1 \Delta \mathbf{z}_{t-1} + \dots + \mathbf{B}_{k-1} \Delta \mathbf{z}_{t-k+1} + \mathbf{B}_k \mathbf{z}_{t-k} + \varepsilon_t$
- We will consider the possibility of  $r \leq (n - 1)$  cointegrating relationships
- Ordered eigenvalues  $\hat{\lambda}_1 > \hat{\lambda}_2 > \dots > \hat{\lambda}_n$
- To examine the extent of cointegration ( $r$ ), can consider  $\hat{\lambda}_i$  individually or collectively
- Maximum eigenvalue test ( $\lambda_{\max}$ )
  - $-T \ln(1 - \hat{\lambda}_{i+1}) \quad i = 0, 1, \dots, n - 1$
- Trace test
  - $-T \sum_{j=i+1}^n \ln(1 - \hat{\lambda}_j) \quad i = 0, 1, \dots, n - 1$

# Assignments: Best five of six

- Varied but data-based (EViews) exercises are a large component
  - Replicating well known results
  - Current series: national and international
  - Simulated (clear cut) series
- Produce a report on empirical paper (Econ Letts!)
  - Can be critical
- Response to output
- 'Do it yourself' questions

## Detail on Assignments: An outline

- Denoting the augmented Dickey-Fuller (ADF) test statistic including an intercept and deterministic trend as  $\tau_\tau$ , and its degree of augmentation of the underlying testing equation as  $p$ , Nelson and Plosser (1982, *Journal of Monetary Economics*) obtained the following results for the data contained in the EViews workfile *Nel\_Plos.wf1*:

<b>Variable</b>	$\tau_\tau$	$p$
gnp	-2.99	1
indp	-2.53	5
deflat	-1.44	2
velo	-3.05	1

## Detail on Assignments: An example of tasks

- Provide a full and detailed account of the ADF test, illustrating your answer by replicating the results presented in Table One for the particular variable assigned to you.
- Provide results obtained from application of the ADF test under two differing methods of determining the degree of augmentation of the ADF testing equation, explaining whether these change the degree of augmentation of the testing equation and your subsequent results.
- Discuss the implications of the analyses of Perron (1989, *Econometrica*) and Leybourne, Mills and Newbold (1998, *Journal of Econometrics*) for the empirical analysis of the unit root hypothesis using the Dickey-Fuller test, explaining whether you feel these studies have relevance for the particular series you have examined.



## Summary of another question

- EViews file *gdp.wf1*... real per capita GDP for 10 economies.... Full account, demonstration, comparison (A)DF-GLS and KPSS tests...

Economy	EViews variable name	Allocation identifier
Austria	aus	0
Belgium	bel	1
Denmark	den	2
France	fra	3
Italy	ita	4
Netherlands	neth	5
Norway	nor	6
Spain	spa	7
Sweden	swe	8
Switzerland	swit	9

# It has been noticed that...

- Attendance
  - Excellent, especially for computer workshops
  - Computer workshop attendance near 100%
- Surgery hours
  - Exceptionally popular
  - Extended
- Student-led computer workshops
  - Popular
  - Highly interactive

# Feedback on the module

- Exceptionally well received
- Institution & 'own' questionnaires
- Economics Network Focus Group 16 Feb 2011
- Points noted:
  - Relevance of econometrics clearly demonstrated
  - Interaction, Engagement; Ownership
  - Development of subject-specific & transferable skills
  - Helps with other modules; projects allow easy incorporation of feedback
  - Avoidance of exam clustering

- Project completed, but this has involved an academic year...
- Student marks
  - 39 students this year
    - Average: 67.5%
    - A significant 9% difference
- Materials
  - Examples of assignments
  - Data sets
  - Full statistical analysis of impact of the module on marks
    - Within year
    - Across cohorts