

## EC501 Econometric Methods and Applications

**Module Description:** This module covers the basic methods of linear regression and hypothesis testing, including extensions to models with autocorrelated and heteroskedastic disturbances and to models with lagged dependent variables. The time series concepts of unit roots and co-integration are also introduced as are the fundamental ideas of simultaneous equation models and panel data models.

Upon successful completion of this module students will have acquired a mastery of econometric methods applicable to a wide variety of situations, ranging from the classical and generalised linear models through to nonstationary dynamic models, simultaneous equations models and panel data models. Students should demonstrate professional understanding of the methods of estimation and inference as applied in these models, and be able to conduct their own empirical research using them. In completing the weekly problem-sets, students will demonstrate their problem-solving, analytical, and deductive skills. Key employability skills delivered by the module include analytical reasoning, model building, mathematical operations, interpretation of mathematical models, econometrics and statistics, and data analysis.

**Learning & Teaching Methods:** In addition to the lectures, the module includes weekly classes and, in the second half of the term, supplementary computing sessions which provide training in the use of the econometrics computer software Stata.

**Assessment:** Details of assessment and submission deadlines are contained in the Postgraduate Economics Handbook, available from room 5B.206. Further information about the module is contained in the University's Module Directory, see: <http://www2.essex.ac.uk/courses/>.

**Textbooks:** The primary text for this module is:

W. H. Greene, *Econometric Analysis* (7th. Edition), Pearson, 2012.

This textbook covers all the material in the module and the same notation will be used in the lectures. It also contains much additional material.

Other very useful books include:

- A. S. Goldberger *A Course in Econometrics*, Harvard University Press, 1991 (perhaps too advanced, but gives solid foundations for what we will do; this is one of my all-time favourite books!).
- J.H. Stock and M.M. Watson, *Introduction to Econometrics*, 3rd edition, Pearson, 2012 (this is an excellent alternative to Greene's book).
- J. M. Wooldridge, *Introductory Econometrics: A Modern Approach* (4th. Edition), South Western College, 2009 (although perhaps less advanced, this is an excellent alternative to Greene as it provides deeper insights on many topics).

**Module materials:** Module materials (lecture notes, data sets, class exercises and solutions) will be made available online in the Course Materials Repository.

### Module Outline:

1. **The classical linear regression model (CLRM)** (University week 2)  
Model specification and matrix notation. Assumptions of the CLRM. The method of ordinary least squares (OLS).
2. **The CLRM (continued)** (University week 3)  
Properties of the OLS estimator.
3. **Inference in the CLRM** (University week 4)  
Standard errors and t-tests. Tests of multiple linear restrictions.
4. **Large sample methods** (University week 5)  
Convergence concepts. The method of maximum likelihood (ML). Tests of nonlinear restrictions.
5. **Large sample methods (continued)** (University week 6)  
OLS in large samples. Instrumental variables (IV) estimation.
6. **The generalised linear regression model; heteroskedasticity** (University week 7)  
Model specification. Generalised least squares (GLS). Heteroskedasticity.
7. **Serial correlation and dynamic models** (University week 8)  
Serial correlation. Testing for serial correlation. Dynamic regression models.
8. **Unit roots and cointegration** (University week 9)  
Stationary and nonstationary time series. Testing for unit roots. Cointegration and error correction.
9. **Simultaneous equations models** (University week 10)  
Linear models and identification. The method of two stage least squares (2SLS).
10. **Introduction to panel data** (University week 11)  
Panel data models. Fixed effects. Random effects.

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