

EC996: Econometrics (Doctoral II)

Module Description: This module starts with the study of linear estimation methods, including ordinary least squares, systems of regression equations, simultaneous equations, models for cointegrated data and panel data models. Next, the module proceeds to cover general procedures for estimation and inference, focusing on maximum likelihood and generalized method of moments. Other inference tools are also covered, including semi-parametric and non-parametric estimation methods, quantile regression and bootstrap. The module concludes with the treatment of a number of specific non-linear estimation methods for discrete choice and limited dependent variable models.

On satisfactory completion of this module, students will have gained a mastery of a number of sophisticated econometric methods of inference which are of use in advanced empirical research. Students will be equipped with knowledge and understanding to grasp the methods of inference used in complex and up-to-date empirical research and will be able to creatively use these methods in their own research or professional work. 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, conceptualization, critical evaluation, model building, mathematical operations, interpretation of mathematical models, econometrics and statistics, data analysis, independent inquiry, handling of information, and use of the World Wide Web and data analysis software.

Learning & Teaching Methods: In addition to the lectures, the module includes weekly classes 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: Readings that are useful for this module include:

- Cameron, A.C. and P.K. Trivedi (2005) *Microeconometrics: Methods and Applications*, CUP.
- Cameron, A.C. and P.K. Trivedi (2009) *Microeconometrics using Stata*, Stata Press.
- Davidson, R. and J. MacKinnon (2004) *Econometric Theory and Methods*, OUP.
- Goldberger, A.S. (1991) *A Course in Econometrics*, Harvard University Press.
- Greene, W.H. (2012) *Econometric Analysis* (7th edition), Pearson.
- Lee, M.-j. (2010) *Micro-Econometrics 2nd ed*, Springer.
- Wooldridge, J.M. (2010) *Econometric Analysis of Cross Section and Panel Data*, 2nd ed, MIT Press.

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

Module Outline:

1. **Regression Equations and Systems of Regression Equations** (University week: 2):
Mean regression and ordinary least squares; Seemingly unrelated regressions; Singular systems.
2. **Panel Data** (University week: 3):
Nature of panel data; Fixed and random effects; Hausman test; Hausman and Taylor estimation; Dynamic panel data models.
3. **Simultaneous-Equations Models** (University week: 4):
Fundamental issues in simultaneous-equations models; Limited information methods; System estimation methods; Specification tests; Weak Instruments.
4. **Cointegrated Processes** (University week: 5):
Nonstationary processes and unit roots; Cointegration; Determining cointegrating rank; Estimation; Nonstationary panel data.
5. **Maximum Likelihood Estimation** (University week: 6):
Likelihood function and the ML principle; Properties of ML estimators; Notes on the maximization of $\ln L(\theta)$; Pseudo-maximum likelihood and robust covariance matrix estimation; Hypothesis testing.
6. **Generalized Method of Moments (GMM)** (University week: 7):
Method of moments estimation; GMM; Optimal GMM; Hypothesis testing; Testing over-identification.

7. **Semi-parametric and Non-parametric Estimation** (University week: 8):
Semiparametric estimation; Nonparametric estimators; Quantile Regression; Bootstrapping.
8. **Discrete Choice Models** (University week: 9):
Binary choice models; Logit and probit; Extensions of binary choice models; Multinomial logit and probit.
9. **Ordered Data and Count Data Models** (University week: 10):
Ordered data; The Poisson Regression Model; Heterogeneity and the Negative Binomial Regression Model; Models for Panel Data; Hurdle and Zero-Altered Poisson Models.
10. **Limited Dependent Variable Models** (University week: 11):
Truncated data; Censored data; Sample selection; Corner solutions.
