

MODULE SPECIFICATION • CORE

Microeconometrics and Panel Data Econometrics

The purpose of this course is to provide students with an in-depth understanding of panel data econometrics, presented from a microeconomic perspective. The course covers linear panel data models with unobserved heterogeneity, including discussions of the strengths and weaknesses of the various estimation methods. In addition to the basic methods, more advanced models — such as those with heterogeneous trends — are covered. The course also studies how to use panel data to evaluate interventions, including difference-in-difference and staggered designs. The powerful method of combining instrumental variables and panel data is covered in some detail, including applications to dynamic models and other situations where strict exogeneity fails.

20	25h	175h	200h
CREDITS	CONTACT HOURS	PRIVATE STUDY	TOTAL STUDY

COURSE CONVENOR

NAME Dr Malvina Marchese

OFFICE By appointment — please email to arrange a convenient time

COURSE STRUCTURE

Econ 7903 is a core 20-credit course and students are expected to input approximately 200 hours of study. The total number of contact hours is 25 hours, leaving 175 hours for private study. Delivery is by lectures — five days consisting of two-hour lectures twice a day — plus a one-hour tutorial each week for five weeks. Optional clinics run on the last day of the course.

During private study, balance the course material (the primary source) against the recommended textbooks: think critically about how these fit into the body of knowledge, perform the exercises, complete coursework and revise. You can expect to perform well only by working consistently through the year.

MODULE PROGRAMME

LECT.	TOPIC	SESSION CONTENT
01	Overview of Ordinary Least Squares with Cross-Sectional Data	— Motivation for OLS: applications of conditional means — Approximating properties of the linear projection — Asymptotic properties of OLS; inference — Practical issues in using OLS: functional form, goodness-of-fit

LECT.	TOPIC	SESSION CONTENT
02	Overview of Instrumental Variables with Cross-Sectional Data	— Motivation for instrumental variables — Asymptotic properties of Two Stage Least Squares (2SLS) — Specification tests; control function methods — Weak instruments and optimal instruments — Models nonlinear in endogenous explanatory variables
03	The Unobserved Effects Model and Basic Estimators	— The unobserved effects linear model — Assumptions for the linear model — Estimation methods: pooled OLS, random effects, fixed effects, first differencing
04	Specification Tests and Choosing among Estimators	— POLS versus RE and FE — Comparing RE and FE; correlated random effects — Comparing FE and FD
05	Heterogeneous Trends; Difference-in-Differences	— Heterogeneous trend models — Basic difference-in-differences — Adding pre-treatment periods — Many time periods — Staggered interventions
06	Unbalanced Panels; Large-T Panels; Cross-Sectional Dependence	— The nature of unbalanced panels — Properties of basic estimators with unbalanced panels — Tests of selection bias with unbalanced panels — Inference with large-T panels and cross-sectional correlation — Spatial correlation
07	Pooled 2SLS, RE 2SLS, and FE 2SLS	— Idiosyncratic endogeneity versus heterogeneity exogeneity — Definition and properties of the estimators — Specification tests: endogeneity and overidentification
08	First-Differencing IV Approaches	— The general FDIV approach — Estimation in models under sequential exogeneity: the Arellano-Bond approach — Adding extra moment conditions: Arellano-Bover / Blundell-Bond — Estimating dynamic models
09	Nonlinear Models under Strict Exogeneity	— Linear versus nonlinear models — Including heterogeneity in nonlinear models and estimation approaches — Quantities of interest: average partial effects — Binary response models — Fractional response models — Exponential models for panel data — Random effects Poisson estimation — Fixed effects Poisson estimation
10	Nonlinear Models under Endogenous Explanatory Variables	— Endogeneity in nonlinear models — Combining the CRE and control function approaches — A probit response function: binary and fractional outcomes — An exponential response function

KEY SKILLS

By the end of this course, students should have some knowledge and understanding of:

- Static panel models, random effects, fixed effects, first differencing estimators
- Instrumental variables estimation of models without strictly exogenous explanatory variables
- Dynamic panel models, Arellano–Bond and Arellano–Blundell–Bond estimators
- Estimation of linear models with heterogeneous trends and heterogeneous slopes
- Unbalanced panels, and how to test for sample selection and attrition bias

DESIRED OUTCOMES

By the end of this course, students should be able to:

- Engage in abstract thinking by extracting the essential features of complex systems to facilitate problem solving and decision-making
- Communicate and present complex arguments in oral and written form with clarity and succinctness
- Present, interpret and analyse information in numerical form
- Utilise effectively statistical and other packages
- Apply basic statistical techniques to analyse economic and financial datasets
- Work effectively both individually and within a team environment

ASSESSMENT

WEIGHTING	100% coursework
ISSUED	End of week 6
DUE	End of week 10 — four weeks for completion
FEEDBACK	Returned within 4 weeks of the deadline, as marker's notes appended to the PDF of your coursework

Marking criteria are set out on pages 20–21 of the Economics Undergraduate Handbook. An electronic copy can be found on the Econ Part 1 and Econ Part 2 Moodle pages.

COURSE TEXT & RECOMMENDED READING

Copies of the lecture slides are made available on the course web pages. You must print off the notes for each lecture prior to attending. Solutions to exercises, additional material and course announcements are also placed on this website.

- Wooldridge, J. M. (2010). *Econometric Analysis of Cross Section and Panel Data*, 2nd edition. The MIT Press — students should purchase a copy of this book
- Griffiths, W. E., Hill, R. C. and Lim, G. C. *Using Stata for Principles of Econometrics*, 5th edition. Wiley — presents the Stata commands required for the examples in *Principles of Econometrics*. Both books are available in the campus bookshop and on the library online resources
- Wooldridge, J. M. (2012). *Introductory Econometrics: A Modern Approach*, 5th edition. CENGAGE Learning Custom Publishing
- Wooldridge, J. M. (2011). *Econometrics: Panel Data Methods*, in *Complex Systems in Finance and Econometrics*, Roberts Meyers (ed.), 215–237. Springer