Econometrics II

MF2A (Lent Term)

Course leader: (Paul Kattuman)

Building on the basics of econometric analysis covered in Econometrics I, this module is intended to extend the capability of students in Micro-econometrics. This module will provide students with sufficient background for choosing and employing techniques suited both to the data-structures and to the research questions and specifications for their empirical research. The range of topics covered include identification strategies, discrete choice models, models for truncated and censored variables, sample selection models, generalized linear models for count data, panel data models and survival models. The emphasis is on identification, estimation and interpretation of results, using diagnostic tools carefully.

Aims & objectives

- To introduce useful micro-econometric models and estimation techniques to students' repertoire.
- To eanble students to judge the appropriateness of different micro-econometric methods
- To enable students to apply these econometric methods and draw conclusions with confidence.

Content

There will be two 90 minutes sessions each week – one focused on concepts and examples, and the other on applications, involving hands-on computing in *R*. *Stata* commands and programs will also be provided, so that students are able to use either or both for applied econometric analysis. You are encouraged to bring your laptops to class.

Week 1:

- Endogeneity and the problem of Identification of Causal effects.
- Identification with Difference-in-Differences estimation for Natural or Quasi-Experiments.
- Identification using Regression Discontinuity Design.

Applications:

Quiz

Week 2:

- Instrumental Variables estimation for Identification of causal effects under endogeneity. Two-stage least squares and Three-stage least squares
  Instruments, their exogeneity and Validity / Relevance.
- Properties of the IV estimator.
- Testing: Exogeneity of instruments; Relevance of instruments; Exogeneity of regressors.
- Identification using Simultaneous equations models.

Applications:

Quiz

Week 3:

- Panel Data models: Types of heterogeneity in panels.
- Fixed effects models: within-groups estimation
- Clustered standard errors.

- Random effects: Nature of serial correlation under random effects assumption, Feasible generalized least squares.
- Choice between Fixed and Random effects, Choice between Random effects and pooled OLS.
- Introduction to Dynamic Panel data models, GMM

Applications:

Quiz

Week 4:

- Introduction to Generalised Linear Models and Maximum Likelihood estimation.
- Models for Binary responses -- Probit and Logit probability models, Latent variable formulation.
- Estimation and interpretation of parameters.
- Marginal effects.
- Interpreting coefficients on interactions in binary response models.
- Predicting outcomes, and measuring fit of models, evaluation.

Applications:

Quiz

Mid-term review quiz.

Week 5:

- Extending Binary choice models. Multinomial models: Logit and Probit models - identification, estimation, interpretation of parameters
- Ordered choice: models, identification, estimation, interpretation of parameters.
- Extensions

Applications:

Quiz.

Week 6:

- Limited Dependent Variable models:
- Truncated samples: Modelling, iIdentification, estimation, interpretation of parameters.
- Censored samples: Modelling, identification, estimation, interpretation of parameters.
- Sample Selection: Modelling, identification, estimation (Heckman), interpretation of parameters.

Applications:

Quiz.

Week 7:

- Count data models:
- Poisson probability distribution and regression, Equidispersion vs. Overdispersion.
- Estimation using Quasi Maximum Likelihood and Generalized Linear Model.
- Negative Binomial Regression Model.
- Zero-Inflated count models.

- Zero-Truncated count models.
- Hurdle models
- Random-effects count models.

Applications:

Quiz.

Week 8:

- Survival Analysis: Introduction to modelling survival, Describing survival data.
- Regression models for survival, Model development, Assessing model adequacy.
- Parametric regression models: Exponential, Weibull and Proportional Hazard models.
- Interpretation of a fitted proportional hazards regression model. Test of proportional assumption.
- Extending proportional hazard model for time-varying covariates,

Applications:

Quiz.

Test: 3-hour open book test on ? March (tbc)

Teaching methods

Concepts Lectures and Applications; Weekly quizzes to aid student understanding through self-paced econometric analysis and interpretation.

Mark scheme

One 3-hour open book test after week 8 for 100 % of the total mark in the module.

Recommended texts

Stock, J. and Watson, M. (2019)	*Introduction to Econometrics.* 4th ed. Boston, Mass: Pearson	E-book via **iDiscover** 3rd ed. E-book via **iDiscover**
Wooldridge, J. M. (2020)	*Introductory Econometrics: A Modern Approach*. 7th ed. Boston, MA: Cengage	E-book via **iDiscover** 6th ed. E-book via **iDiscover**
Wooldridge, J. M. (2010)	*Econometric Analysis of Cross Section and Panel Data*. 2nd ed. Cambridge, MA: The MIT Press	E-book via **iDiscover**
Gábor Békés and Gábor Kézdi (2021)	*Data Analysis for Business, Economics, and Policy.* Cambridge University Press	

Cameron, A. C. and Trivedi, P. K. (2005)	*Microeconometrics: Methods and Applications.* Cambridge: Cambridge University Press *(Advanced: optional)*	E-book via **iDiscover**
Angrist, J. D. and Pischke, J. S. (2015)	*Mastering Metrics: The Path from Cause to Effect.* Princeton: Princeton University Press	No library e-book available
Angrist, J. D. and Pischke, J. S. (2009)	*Mostly Harmless Econometrics: An Empiricist's Companion.* Princeton, N.J: Princeton University Press *For Lecture 1 and 2 (Advanced: optional)*	E-book via **iDiscover**
Singer, J. D. and Willet, J. B. (2003)	*Applied Longitudinal Data Analysis: Modelling Change and Event Occurrence.* Oxford: Oxford University Press *(Optional)*	E-book via **iDiscover**
Long, J. S. and Freese, J. (2014)	*Regression Models for Categorical Dependent Variables Using Stata*. 3rd ed. College Station, Tex.: Stata Press	No library e-book available
Gelman, A. and Hill, J. (2007)	*Data Analysis Using Regression and Multilevel/Hierarchical Models.* Cambridge: Cambridge University Press *(Optional)*	E-book via **iDiscover**
Greene, W. H. (2012)	*Econometric Analysis.* 7th ed. Boston: Pearson *(Optional)*	E-book via **iDiscover**