

APPLIED ECONOMICS I

Universidad Carlos III de Madrid
Master in Economic Analysis
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The goal of this course is to link econometric methods for estimation of causal effects to data. We will cover a number of theoretical topics that are important in applied research in labor economics, health economics, industrial organization and related fields.

The course will be organized in lectures to provide the economic framework and the econometric issues for each topic. The lectures will be complemented with problem sets, which include both theoretical and empirical exercises. Students ought to handle the Stata program on their own and read related papers.

Grading will be based on a midterm, class presentations and a final exam.

SYLLABUS

1. Empirical strategies for identification of causal effects

- 1.1. Aims of empirical research
- 1.2. Types of empirical research
- 1.3. Microeconomic data structures
- 1.4. The identification problem: potential outcomes and causality

2. Social experiments

- 2.1. Advantages of randomized experiments: The independence condition.
- 2.2. Internal and external validity
- 2.3. Examples

3. Selection on observables

- 3.1. Overview of Quasi-Experimental methods
- 3.2. Identification with observational data
- 3.3. Identifying assumptions
- 3.4. Regression and causality
- 3.5. Examples

4. Matching

- 4.1. Motivation
- 4.2. Matching estimation
- 4.3. Propensity score methods
- 4.4. Relation with regression
- 4.5. Validity of matching assumptions

5. Identification using external information: Instrumental Variables (IV)

- 5.1. Motivation
- 5.2. Identification: Homogenous effects
- 5.3. Identification: Heterogeneous effects (LATE and MTE)

6. Identification using external information: Control function (CF)

- 6.1. Introduction
- 6.2. Linear in parameters models: IV vs CF
- 6.3. Correlated random coefficient models
- 6.4. Non-linear models and limitations of the CF approach

7. Regression Discontinuity (RD) designs

- 7.1. Introduction and examples
- 7.2. The fundamental RD assumption
- 7.3. Sharp RD design
- 7.4. Fuzzy RD design

8. Differences in Differences (DD)

- 8.1. Differences in differences
- 8.2. Differences in differences in differences (DDD)
- 8.3. DD with panel data
- 8.4. Synthetic control methods
- 8.5. Non-linear models
- 8.6. Semiparametric approaches

9. Quantile methods

- 9.1. Introduction
- 9.2. Unconditional quantiles
- 9.3. Conditional quantiles
- 9.4. Quantile regression (QR) model
- 9.5. QR with censoring
- 9.6. IV estimation of quantile treatment effects

10. Structural estimation

- 1.1. Motivation
- 1.2. Structural estimation
- 1.3. Reduced form vs. structural models
- 1.4. Ingredients of structural estimation
- 1.5. Methods for structural estimation
- 1.6. Dynamic structural models

Bibliography

There is no required textbook for this course. Some books that may be useful for different parts of the course are:

Angrist, J.D. and J.-S. Pischke. *Mostly Harmless Econometrics: An Empiricists's Companion*. Princeton University Press, 2009.

Cameron, A.C., and P.K. Trivedi. *Microeconometrics: Methods and Applications*. Cambridge University Press, 2005.

Cameron, A.C., and P.K. Trivedi. *Microeconometrics Using Stata*. Stata Press, 2008.

Cunningham, S. *Causal Inference: The Mixtape*.
https://scunning.com/cunningham_mixtape.pdf. 2018.

Morgan, S.L. and C. Winship. *Counterfactuals and Causal Inference: Methods and Principles for Social Research*. Cambridge University Press, 2007.

Wooldridge, J. *Econometric Analysis of Cross Section and Panel Data (Second Edition)*. MIT Press, 2010.