

# APPLIED ECONOMICS I

Universidad Carlos III de Madrid  
Master in Economic Analysis  
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Instructors:

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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, that 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 and a final exam.

## **SYLLABUS**

### **1. Empirical strategies for identification of causal effects**

- 1.1. Aims and methods of empirical research
- 1.2. Microeconomic data structures
- 1.3. Causal relationships of interest
- 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. Identification with observational data
- 3.2. Conditional independence
- 3.3. Conditional mean-independence
- 3.4. Regression and causality

### **4. Matching**

- 4.1. Introduction
- 4.2. Matching methods and assumptions
- 4.3. Propensity score
- 4.4. Relation with regression

### **5. Identification using external information**

- 5.1. Natural experiments and instrumental variables (IV)

- 5.2. Identification using IV. The Wald estimator
- 5.3. Local average treatment effects (LATE)
- 5.4. Control function approach
  
- 6. Regression Discontinuity (RD) designs**
  - 6.1. Discontinuities in assignment rules
  - 6.2. Sharp and fuzzy RD designs
  
- 7. Differences in Differences (DD)**
  - 7.1. Natural experiments and DD
  - 7.2. The fundamental identification assumption
  - 7.3. Differences in differences in differences (DDD)
  - 7.4. Synthetic control methods
  - 7.5. DD with panel data
  
- 8. Quantile methods**
  - 8.1. Unconditional and conditional quantiles
  - 8.2. Quantile regression (QR). Interpretation
  - 8.3. Extensions
  
- 9. Structural estimation**
  - 9.1. Policy parameters
  - 9.2. Computational problems
  - 9.3. Methods of estimation
  - 9.4. Applications

## **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.

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.