

## Causal Inference

### Master in Social Sciences

Academic Year: ( 2017 / 2018 )

Department of Statistics

Compulsory  
ECTS Credits : 6.0  
Year : 2  
Semester : 1

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#### STUDENTS ARE EXPECTED TO HAVE COMPLETED

Statistics I  
Statistics II

#### COMPETENCES AND SKILLS THAT WILL BE ACQUIRED AND LEARNING RESULTS

Basic competences:

1. Quantitative knowledge giving the opportunity of being original in the proposal and/or application of new studies in a research context.
2. Implementation of the techniques to solve problems in new or scarcely known environments in multidisciplinary contexts.
3. Ability to communicate to specialists and non-specialists, the conclusions using arguments about the instruments in which they are based.
4. Learning abilities to keep studying in an autonomous way.

Competencias Generales:

1. Evaluation and comparison of alternative contributions to the important debates of the Social Sciences from an empirical point of view.
2. Evaluation of the arguments in scientific publications, with special focus on the consistency between theory and empirical results.
3. Give scientific arguments with clarity and precision.
4. Use quantitative techniques in research projects.
5. Design of research projects for testing general hypothesis of interest.

Competencias Específicas:

1. Searching, analysis and understanding of the empirical properties of data associated with social phenomena.
2. Mastery of quantitative instruments to implement them in research.

Skills:

1. Mastering of quantitative methods to carry out research in Sociology, Political Science and Economic History.
2. Ability to carry out causal analysis.
3. Mastering of empirical analysis of microdata: households, companies or individuals using models and procedures appropriate for cross-sectional and panel data.
4. Ability to replicate results from scientific papers and to explain the details of the replications.
5. Carrying out empirical studies using the procedures in a critical and creative way.

#### DESCRIPTION OF CONTENTS: PROGRAMME

1. A brief review of asymptotic theory
  - 1.1. Convergence in probability and convergence in distribution
  - 1.2. Conditional expectation
  - 1.3. Limit theorems
2. Introduction
  - 2.1. Causal Relationships and ceteris paribus analysis
  - 2.2. Experimental ideal and the selection problem
  - 2.3. Regression and causality

3. Instrumental variables Estimation
  - 3.1. Instrumental variables (IV) y Two-Stage Least Squares (2SLS)
  - 3.2. General Treatment of Two-Stage Least Squares
  - 3.3. IV Solutions to the Omitted Variables and Measurement Error
4. Estimating Average Treatment Effects
  - 4.1. Introduction
  - 4.2. A Counterfactual Setting and the Self-Selection Problem
  - 4.3. Identification
  - 4.4. Regression Adjustment
  - 4.5. Differences-in-Differences
  - 4.6. Propensity Score Methods
  - 4.7. Matching Methods
  - 4.8. Instrumental Variables Methods
  - 4.9. Regression Discontinuity Designs
5. Introduction to Quantile regression
  - 5.1. Fundamentals of quantile regressions
  - 5.2. How does quantile regression work?
  - 5.3. Interpreting quantile regression

## LEARNING ACTIVITIES AND METHODOLOGY

Learning activities:

Theory and practice classes, tutorials and individual work of students.

Methodology:

The main ideas as well as the bibliography will be exposed in the classroom by the teacher with the help of informatic and audiovisual supports. The students will have to do readings of the material given during the lectures. They will also solve practical cases. The students will elaborate reports which then will be presented in the classroom.

## ASSESSMENT SYSTEM

Continuous evaluation: 40%

Final exam: 60%

% end-of-term-examination: 60

% of continuous assessment (assignments, laboratory, 40

## BASIC BIBLIOGRAPHY

- Angrist and Pischke Mostly Harmless Econometrics. An Empiricist's Companion, Princeton University Press, 2008
- Morgan and Winship Counterfactuals and causal inference. Methods and Principles for Social Research, Cambridge University Press, 2007
- Jeffrey M. Wooldridge Econometric Analysis of Cross Section and Panel Data, The MIT Press, 2010

## ADDITIONAL BIBLIOGRAPHY

- Imbens y Rubin Causal Inference for Statistics, Social, and Biomedical Sciences, Cambridge University Press, 2015

## Basic Electronic Resources

- Richard Blundell and Monica Costa Dias . Alternative Approaches to Evaluation in Empirical Microeconomics: <http://jhr.uwpress.org/content/44/3/565.short>
- Bas van der Klaauw, . From micro data to causality: Forty years of empirical labor economics: <http://www.sciencedirect.com/science/article/pii/S0927537114000827>