Barcelona School of Economics

COURSE SYLLABUS **21PD04**

Advanced Econometric Methods II

6 ECTS **TERM 2** **MANDATORY**

Professors

Prof. Christian Brownlees and Kirill Evdokimov

Prerequisites to enroll

Students need to have taken and passed the Advanced Econometric Methods I course of the first term and be accepted into the MRes program of UPF. The participants of this course should have advanced knowledge of the key concepts of statistics and econometrics that are usually covered in an undergraduate degree in economics.

Overview and objectives

The course covers a number of advanced topics in econometrics and statistics.

The first part of the course covers extremum estimators (including maximum likelihood and generalized method of moments estimation), nonlinear models (binary choice, ordered choice and truncated and censored regressions models) and linear panel data models. The objective of the course is for students to become acquainted with the econometric and statistical theory underlying the various topics covered in the course.

The second part of the course will cover a number of microeconometric methods frequently used in applied economic research.

This course is the second in a sequence of three, designed for students that intend to pursue a PhD in Economics. It is assumed that the students have an advanced knowledge of linear algebra, probability, and undergraduate econometrics.

Course outline

Part 1 – Christian Brownlees

- Extremum Estimators
  - Nonlinear Models and Extremum Estimation
  - Examples
  - Consistency
  - Asymptotic Normality
  - Hypothesis Testing: The Trinity of Tests
  - Numerical Optimization
- Nonlinear Models
  - Binary Choice: Probit and Logit
  - Ordered Choice
  - Truncated and Censored Data Models
- Linear Panel Data models
  - Fixed and Random Effects Panel Data Models

Part 2 – Kirill Evdokimov

- Multinomial Choice Models
- Quantile Regression
- Estimation of Causal Effects:
  - Potential Outcomes, Causality, Heterogeneity, Parameters of Interest
  - RCT
  - Bounds (briefly)
  - Unconfoundedness/Selection on Observables/Matching
    - Regression Discontinuity Design

    - Differences-in-Differences
  - Instrumental Variables, Local Average Treatment Effects
  - Selection Model (briefly)
- Nonparametric Estimation
  - Kernel Density Estimation
  - Kernel Regression Estimation
  - Series (Sieve) Estimation

Required activities

There will be 6-7 problem sets overall.

Evaluation

Grades will be based on: final exam, 70%, problem sets, 30%.

Materials

- The main reading material will be the lecture notes.
- The following references contain useful information on the course material.
- Davidson, R. & MacKinnon, J. G. (2004), Econometric Theory and Methods, Oxford University Press, New York
- Greene, W. (2005), Econometric Analysis, 5th edition, Prentice-Hall International, Chapter 22.5 (Brief discussion within a standard econometrics textbook)
- Hansen, B. (2014), Econometrics, available from

- http://www.ssc.wisc.edu/~bhansen/econometrics/Econometrics.pdf
- Hayashi, F. (2000): Econometrics. Princeton University Press.
- White, H. (2001), Asymptotic Theory for Econometricians: Revised Edition, Academic Press, New York.
- Wooldridge, J. M. (2002), Econometric Analysis of Cross Section and Panel Data, MIT Press, Cambridge MA.

Competencies

- ☐ Capacity of utilization of the theoretical instruments of the to analyze situations of coherent form.
- ☐ Ability to use the appropriate (statistical and numerical) techniques.
- ☐ Ability to make independent judgments and defend them dialectically.
- ☐ Acquire a solid knowledge base for the study of quantitative issues.
- ☐ Ability to Recognize and know how to use the principles of econometrics and statistics.
- ☐ Ability to work with microeconomic analysis tools and their empirical and theoretical applications.

Learning outcomes

- ☐ Students should get an overview of economic and financial theory.
- ☐ Students must be able to recognize theories and present arguments with precise examples.

- ☐ Students will acquire the technical tools that will allow them to perform the advanced analytics required in the second module as econometric methods.
- ☐ Students will know what the appropriate inference for each situation is.