Empirical Processes with Applications to Semiparametric Econometrics  
Department of Economics, Universidad Carlos III de Madrid  
MAY 2014

- **Instructor:** Juan Carlos Escanciano, email: jescanci@indiana.edu.
- **Time and Location:** 15:00-17:00, May 20, 21, 22, 23, 26, 27, 28 and 30. Place TBA.
- **Office Hours:** Time and place to be announced.
- **Basic Reference:** Lecture Notes in Class

**Papers:**

**Supplementary References:**
Course Objectives

This course consists of three parts. In the first part we motivate the theoretical results with many econometric applications. These applications include inference in single-index models, semiparametric treatment effect models, sample selection models, semiparametric models with endogeneity, current status data, semiparametric mixtures, nonparametric instrumental variable models, and nonparametric structural estimation of Euler equations. In the second part we review basic concepts of stochastic processes and give an introduction to the modern empirical process theory. This theory will be very useful in analyzing the previous example applications. We cover concepts such as uniform stochastic equicontinuity, bracketing and covering numbers, Glivenko-Cantelli and Donsker theorems, the continuous mapping theorem and the functional delta method. In the third part, we apply these theoretical results to inference problems in nonparametric and semiparametric econometrics. Practical issues such as how to implement semiparametric inference with the statistical software R will be also discussed. The course is targeted predominantly to second- and third-year graduate students in economics, statistics, and finance departments, especially those interested in econometrics and its applications. Good knowledge of basic probability theory is an absolute prerequisite for this course.

Outline

PART I: Motivation and Example Applications (Reading: Powell 1994)


3. Continuous Mapping Theorem and Functional Delta Method
4. Bootstrap

PART III: Applications to Semiparametric Econometrics

5. Introduction to Nonparametric Estimation. (Reading: Horowitz’s Appendix)
7. Examples revisited.
8. Implementation in R. (Readings: Racine, Nonparametric and semiparametric methods in R)

Schedule of classes

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<th>Date</th>
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<td>May 20, 2014</td>
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<td>May 21, 2014</td>
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• Grading: Grading will be based on problems that you can find in the lecture notes, and that you will complete as the class progresses.