Applied Econometrics I

Professor
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Schedule
Monday and Wednesday, 7:00 – 9:00 PM
Office Hours: Schedule your appointment on my website.

Course description
The purpose of this course is to provide the theoretical and practical tools necessary to make an empirical analysis of the relationship between two or more variables. This knowledge will be helpful to answer questions and verify hypothesis using data that describes characteristics, behaviors or decision of individuals, households, firms, markets, government, etc. In the follow up course, we will use these tools with methods which seek to estimate causal relations (i.e. experimental and quasi-experimental methods). There we seek to estimate the effect (or lack of effect) that a change in a variable has on another variable.

In each topic, I will first present the theoretical "support" and follow up with practical examples using data and research papers. In each method we will emphasize its pros and cons. To strengthen the understanding of some topics, students will need to solve problem sets with real data bases and a statistical software. The examples in class will employ R and Stata. The accompanying course (Workshop in Applied Econometrics) teaches students the use of some statistical packages, mainly R, Stata and Python.

At the end of the course, the students should be able to: use real data to prove hypotheses, recognize which statistical method is the most adequate to make different analyses, implement such methods in Stata and/or R, and understand the limitations that such methods have.

Grading

Global:
1/3 Workshop of Applied Econometrics
2/3 Econometrics Fundamentals

Grading of Econometrics Fundamentals:
40% Problem sets
25% 1st Midterm Exam
20% 2nd Midterm Exam
10% Data Challenge*
5% Podcasts and participation**

* The Data Challenge will be done in teams, but every member of the team should be able to answer questions about the work presented. The possibility of making the Data Challenge individually is always open.

** In some classes some students will be randomly selected to answer some questions about a podcast or a video. Students can be selected more than once in each semester. If a student is selected and he/she didn't attend that class his/her odds of being selected in the future increase.

Course Material:

The course material (class notes, problem sets, solutions, links to videos, etc.) will be available in *Canvas*.

References

(SW) Stock, James and Mark Watson (2011). "Introduction to Econometrics," 3rd. ed., Addison Wesley

(W) Wooldridge, Jeffrey M. (2012). "Introductory Econometrics. A Modern Approach," 5th ed., Southwestern Cengage Learning

Syllabus

1. **Statistics Review**
   Ref: (SW) Cap. 2 y 3; (W) Appendix B y C
   a. Hypotheses tests
   b. Law of Large Numbers and Central Limit Theorem

2. **Ordinary Least Squares**
   Ref: (SW) Cap. 4, 5, 6, 7, 8, 9; (W) Cap. 2, 3, 4, 6.2, 6.3, 7, 8, 9
   a. Estimation and coeffcient interpretation
   b. Hypotheses tests
   c. Functional forms
   d. Adding controls
   e. External and internal validity
   f. SE: homoskedasticity and heteroskedasticity
   g. SE: bootstrap, jackknife and delta method
   h. GLS
   i. Quantile regression

3. **Maximim likelihood estimators**
   Ref: (W) Cap. 17
   a. Probit and logit
   b. Probit and ordered logit
   c. Multinomial logit, conditional and nested
   d. Tobit
   e. Censored regressions

4. **Missing Data**
   a. Heckman
   b. IPW

5. **Kernel Estimation**
   a. Densities
   b. Regressions
   c. Cross-validation