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Professor Luigi Bocola
Professor Liran Einav
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Economics 272: Econometrics III

Spring 2020

Instruction Through Zoom Canvas Tool

MWF 1:30-3:20pm and Other Scheduled Times

Course Description: This is a basic course in econometrics designed to provide students with the tools required to evaluate and to conduct empirical research. Students will acquire (i) the ability to analyze applied and theoretical econometric problems, and (ii) experience in analyzing economic data. Specific topics include simultaneous equation models, nonlinear estimation and testing, time series analysis, and additional topics in econometrics.

The course is divided into three parts: (1) Prof MaCurdy teaches in April covering the first of these topics, (2) Prof Bocola teaches the first half of May covering time series, and (3) Profs Einav and Pistaferri teach the second half of May covering selected additional econometric topics.

Course Web Site: Econ 272 on https://canvas.stanford.edu/courses/115112

Prerequisite: Economics 271 or its equivalent.

Texts: There is no required textbook for this course. Students have found a number of the textbooks listed below useful. Reading from these textbooks, listed in the outline below, provide alternative presentations of the material covered in class. Handouts on important topics covered in the course will be distributed through Canvas.

William H. Greene, *Econometric Analysis* (7th Edition), Prentice Hall, 2012. (Other editions of Greene can substitute.)

Arthur S. Goldberger, *A Course in Econometrics*, Harvard University Press, 1991.

Takeshi Amemiya, *Advanced Econometrics*, Harvard University Press, 1985.

Paul A. Rudd, *An Introduction to Classical Econometric Theory*, Oxford University Press, New York, 2000.

Hansen, Bruce, *Econometrics*, available at https://www.ssc.wisc.edu/~bhansen/econometrics/

James D. Hamilton, *Time Series Analysis*, Princeton University Press, New Jersey, 1994.

J. Durbin and S. J. Koopman, *Time Series Analysis by State Space Methods*, Oxford University Press, 2001

Course Requirements: The course grade will be based on 2-5 empirical exercises, 4-6 problem sets, and 1-2 projects, all done off-line on students' own time with submission through Canvas. Grading will S/NC (pass/fail), which has been mandated by Stanford Administration for the spring quarter.

Course Organization and Reading List

Part 1: Simultaneous equations and nonlinear estimation/testing methods (3-4 weeks, MaCurdy)

Lectures, in this part of the course, will be written/recorded prior to scheduled Zoom Canvas "classes" and made available on the Econ 272 Canvas website. Students are expected to study these lectures carefully before their coverage during scheduled Zoom classes/meetings. The primary purpose of these Zoom meetings will be to answer questions about the lecture material, and not to reiterate distributed materials. Zoom classes will be scheduled within the MWF 1:30-3:20pm time slots. Additional Zoom meetings may be scheduled with smaller groups of students to cover particular questions/issues.

TA sessions will also occur within the MWF 1:30-3:20pm time slots. The purpose of these meetings will be to prepare students for undertaking empirical exercises, and to present and discuss answers to problem sets and empirical exercises. Additional Zoom meetings may be scheduled for TA office hours.

The following outline lists the topics covered in *Part 1*, along with textbook readings beyond the lectures covering these topics.

1. Simultaneous Equation Models

   Readings: Greene, Chapter 8
   Amemiya, Chapters 7 and 8
   Goldberger, Chapters 31-34
   Rudd, Chapters 20 and 26
   Hansen, Chapter 12

   .

2. General Theory of Estimation and Testing

   Readings: Greene, Chapters 7, 12, 13, 14, Appendices C, D, and E
   Amemiya, Chapters 4 and 8
   Goldberger, Chapters 12 and 29
   Rudd, Chapters 15, 16, 17, 18, 20, 21, and 22
   Hansen, Chapters 6, 7, 8, 9, 13, and 21

3. Systems of Equations

   Readings: Greene, Chapters 10 and 11
   Amemiya, Chapters 4 and 8
   Goldberger, Chapters 30 and 34
   Rudd, Chapter 26
   Hansen, Chapters 11, 12 and 17

Part 2: Time series analysis with applications (2-3 weeks, Bocola)

This part of the course provides an overview of basic concepts in time series analysis, with an emphasis on the tools used in the applied literature to estimate and evaluate macroeconomic models. The lectures are designed to give a broad account of these tools and to provide interested students with a set of resources to independently study them in greater detail during the summer or in their second year. There will be 5 lectures (via zoom) and 1 problem set. I plan to cover the following topics:

1. Covariance-stationary stochastic processes

   Readings: Hamilton, Chapters 1-3 and 10-11

2. Linear Gaussian state space models and the Kalman filter

   Readings: Durbin and Koopman, Chapters 3-4

3. Estimation of Dynamics Stochastic General Equilibrium models

   Readings: Ed Herbst and Frank Schorfheide, *Bayesian Estimation of DSGE Models*, Princeton University Press, 2015. Chapter 2.1, 2.2 and 3

Part 3: Additional topics in econometrics (2.5 weeks, Einav and Pistaferri)

The last part of the class will provide an overview and class discussion of selected topics in applied econometrics that received little coverage during the first-year sequence. The lectures will aim to primarily highlight the topics and the key issues, so that interested students can further explore them independently or in subsequent second-year classes. We will assign reading prior to each class.

1. May 18: Complementarities and tradeoffs between structural econometric models and more descriptive "reduced form" analyses

2. May 20: "identification" in structural econometric models (Matt Gentzkow guest lecture)

3. May 27: "Big data" in empirical economics

4. June 1: "Structural and Descriptive Modeling and the Fallacy of Reduced Form Analysis" (Frank Wolak guest lecture)

5. June 3: Machine learning and econometrics