Econ 870
Advanced Econometrics
Fall 2018

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Office Hours: Wednesday 11:30 am – 1:30 pm, and by appointment in Gardner 302

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Recitation: F 11:15 am - 12:05 pm in Gardner 309

Prerequisite:
The pre-requisites are Econ 770 and Econ 771. BOTH are required.

Course objectives and description:
The aim of this course is to give students a firm understanding of statistical methods for identification and inference of nonlinear econometric models. The lecture broadly consists of three parts: classical estimation methods for nonlinear parametric models, nonparametric identification in economic models, and modern inference techniques such as simulation methods and nonparmetric estimation. We will discuss the practical issues such as how to implement using softwares as well as the theoretical aspects of each method.

Textbook:
There is no required textbook for this course. The following two books, however, are encouraged to read:
(CT) "Microeconometrics" by Colin Cameron and Pravin Trivedi.
(W) "Econometric Analysis of Cross Section and Panel Data" by Jeffrey Wooldridge

Recommended supplemental reading:

(A) "Advanced Econometrics" by Amemiya (Harvard University Press 1985)
(AAI) "Instrumental Variables Estimates of the Effect of Subsidized Training on the Quantiles of Trainee Earnings" by Abadie, Angrist and Imbens, Econometrica, 2002.
(Aba) "Bootstrap Tests for Distributional Treatment Effects in Instrumental Variable Models" by Abadie, Journal of the American Statistical Association, 2002.
(CH) "An IV Model OF Quantile Treatment Effects" by Chernozhukov and Hansen, Econometrica 2005
(DH) "Bootstrap Methods and Their Application" (Cambridge Series in Statistical and Probabilistic Mathematics) by A. C. Davison and D. V. Hinkley.

(FMP) “Econometric Modeling and Inference” by Florens, Marimoutou and Peguin-Feissolle. (Translated by: J. Perktold and M. Carrasco)
(Ha) "Econometrics" by B. Hansen (draft graduate textbook), http://www.ssc.wisc.edu/~bhansen/econometrics/
(HIR) "Efficient Estimation of Average Treatment Effects Using the Estimated Propensity Score" by Hirano, Imbens, and Ridder, Econometrica, 2003.
(Ho) “The Bootstrap in Econometrics”, by J. Horowitz, in Handbook of Econometrics, Vol. 5, ch. 52, J.J. Heckman and E.E. Leamer, eds., Elsevier Science. and James MacKinnon, same title, Economic Record, or available as http://www.econ.queensu.ca/working_papers/papers/qed_wp_1028.pdf
(IA) "Identification and Estimation of Local Average Treatment Effects" by Imbens and Angrist, Econometrica, 1994.
(LR) "Nonparametric Econometrics: Theory and Practice" by Li, Racine, (Princeton University Press 2006)
(Man) "Identication for Prediction and Decision," by Manski (Harvard University Press 2007)
(Mat) Matzkin, R. "Nonparametric Identification in Structural Economics Models," Annual Review of Economics, http://www.econ.ucla.edu/people/papers/Matzkin/Matzkin616.pdf
(NM) Newey, W. K. and McFadden, D. “Large Sample Estimation and Hypothesis Testing,” Handbook of Econometrics, Volume 4, 1994.

Grading:
Your final grade will be based on: three midterm exams (13+13+14=40%), final exam (40%), and problem sets (20%). The exams may include some oral and programming (matlab, R, or python) tests.

Exam dates and formats:
Midterm 1: September 17 (Monday)
Midterm 2: October 22 (Monday)
Midterm 3: November 12 (Monday)
Final: December 8 (Friday)

The exam format will be similar to that of the problem set questions. You should bring your UNC ID with you to each exam.

Missed exams:
There are no make-up midterm examinations. You are forewarned well in advance to properly schedule your time and make proper arrangements for other potential conflicts. If you must miss a midterm exam, say due to illness, you may be permitted to transfer the missed credit to the final examination. To qualify for a transfer of credit, you must contact me before the start of the missed midterm examination and provide me with an acceptable explanation. You are required to support your explanation with documentation within 2 business days of the exam. For example, if you miss an exam on a Thursday, then you will have until Monday to provide your documentation

Problem sets:
Problem sets will be assigned weekly during the semester. My expectations and requirements will be explicitly stated when the assignments are distributed.

Electronic device policy:
Students may not use laptops, tablets, phones, or similar devices during the lecture, except when I specifically permit it. First, it disrupts your classmates. Second, it interferes with your learning (see http://www.newyorker.com/tech/elements/the-case-for-banning-laptops-in-the-classroom). The first time you violate the restriction, you will be warned. For each subsequent time a 2%-point penalty will be applied to your final grade. If you are expecting an important phone call (job interview, family illness, etc.), please notify me before class then sit in the back of the room near the exit.

Academic integrity:
All students are expected to adhere to the Honor Code (http://instrument.unc.edu). Any violation will result in an F for the course, and other sanctions may apply.

Contact information and email policy:
Students are encouraged to visit me on a first-come, first-serve basis during my scheduled office hours or ask any brief questions immediately before/after class. If you are unable to make my scheduled office hours, then feel free to email me and request an appointment. You can expect to receive a response within one business day as long as you 1) include a specific reason for your meeting request; 2) include all times in which you are available to meet; and 3) put "ECON 870" on the subject line. Please use proper email etiquette (see http://www.usm.edu/chemistry-biochemistry/e-mail-etiquette-adapted-academia for details).

Course outline
(Class contents may change during the course of the semester. However, exam dates will not change)

1. Review of Linear and Nonlinear Models
Reading: (Ha: Ch 2,3,4,7)
- Projection theory
- Linear model
- Nonlinear model

2. Elementary Asymptotic Theory (3 lectures)
Lecture notes

3. Extremum Estimators (8 lectures)
Reading: (W: Ch. 12-14), (H, Ch. 7-8), (NM)
- Review of GMM, NLLS, and MLE
- Consistency
- Asymptotic normality
- Testing

- Two-step estimation
- Quantile regressions

4. Identification
Reading: (Man), (Mat), (HIR), (IA), (Aba), (AAI), (CH), and many other papers announced in class

4.1. Parametric Identification
- Without endogenous regressors
- With endogenous regressors

4.2. Nonparametric Identification
- Additively separable models
- Nonseparable models

4.3. Identification in Program Evaluation
- Randomized experiment and selection on observables
- Instrumental variables approach: Local treatment effects, control function, rank similarity
- Heckman's marginal treatment effects
- Partial Identification of treatment effects

5. Bootstrap (3 lectures)
Reading: (DH), (Ho), (Ha: Ch. 10)
- Inference using the bootstrap
- Failure of the bootstrap

6. Nonparametric Estimation (3 lectures)
Reading: (LR: Ch. 1), (Ha: Ch. 11)
- Kernel density estimation
- Nonparametric regression (including local polynomial regression)