March 24, 2019

ECON-GA 2101 – Econometrics II (PhD), Second Half

Spring 2019

Syllabus

1 Organization

Instructor:	Timothy Christensen	tmc8@nyu.edu
		19 W. 4th st, room 812
	office hours	by appointment
Teaching Assistant:	Ignacio Cigliutti	ic985@nyu.edu
	office hours	TBA
Lecture:	19 W. 4th st, room 517	Tuesday 12.30 PM - 2.30 PM
		Thursday 2.15 PM - 4.15 PM
Recitations:	19 W. 4th st, room 517	Friday 12.30 PM - 2.30 PM

2 Overview

2.1 Description

This course studies econometric methods used to estimate structural economic models. The estimation procedures covered are: M-estimation (including maximum likelihood), GMM, simulated method of moments, and minimum distance. We will discuss both theory (consistency, asymptotic distribution, inference methods) and implementation, including using the bootstrap and quasi-Bayes procedures. The methods are illustrated with several applications.

2.2 Prerequisites

Econometrics I (PhD)

3 Grading Policy

Course grades will be based on weekly problem sets (30 per cent) and the final (70 per cent). You may bring a handwritten page of notes (two-sided) to the exam.

3.1 Problem sets

Problem sets will be a combination of theoretical exercises and computational/simulation exercises which you can do with Matlab, R, Julia, Python, etc. Please submit the problem set at the beginning of the recitation. You are welcome to discuss the problem sets in small groups but you should write up the solutions independently.

4 Materials

I will provide comprehensive notes. Should you wish to get a textbook, the recommended text is:

- Hayashi, F. (2000). *Econometrics*, Princeton.

The notes will complement the text, but are more up to date and slightly more advanced. The text also doesn't cover the bootstrap or quasi-Bayes estimation.

Additional references:

- Cameron. A. C. and P. K. Trivedi (2005). *Microeconometrics: Methods and Applications*, Cambridge.

- Wooldridge, J. (2002). *Econometric Analysis of Cross Section and Panel Data*, MIT Press.

- Martin, V., S. Hurn and D. Harris (2012). *Econometric Modelling with Time Series: Specification, Estimation and Testing*, Cambridge.

- Newey W. K. and D. McFadden (1994). Chapter 36: Large sample estimation and hypothesis testing. Volume 4 of *Handbook of Econometrics*, pp. 2111-2245. Elsevier. available: `http://dx.doi.org/10.1016/S1573-4412(05)80005-4`

5 Outline

The following outline is tentative and may be slightly revised throughout the semester. Recommended (but optional) readings are indicated with an asterisk. The other readings is optional.

Topic 1: Introduction to nonlinear estimation. Maximum Likelihood/M-estimators, GMM, SMM and MD as extremum estimators.

- *Hayashi, Ch. 7.1

- Hansen, L. P. and K. J. Singleton (1982). Generalized Instrumental Variables Estimation of Nonlinear Rational Expectations Models. *Econometrica*, 50(5), 1269-1286

- Rust, J. (1987). Optimal Replacement of GMC Bus Engines: An Empirical Model of Harold Zurcher. *Econometrica*, 55(5), 999-1033.

- Benhabib, J., A. Bisin and M. Luo (2017). Wealth distribution and social mobility in the US: A quantitative approach. NBER working paper.

- Heckman, J. J. (2000). Causal Parameters and Policy Analysis in Economics: A Twentieth Century Retrospective. *The Quarterly Journal of Economics*, 115(1), 45–97

Topic 2: Identification. Consistency for correctly-specified models. Misspecification and consistency.

- *Hayashi, Ch. 7.2

- T. C. Koopmans and O. Reiersol (1950). The Identification of Structural Characteristics. *The Annals of Mathematical Statistics*, 21(2), 165–181

Topic 3: General approach to asymptotic normality.

- *Hayashi, Ch. 6.5, 6.6, 7.3

- Chapter 12 in Hansen, B. (2018). *Econometrics*, manuscript.
  available: http://www.ssc.wisc.edu/~bhansen/econometrics/Econometrics.pdf

- White, H. (1982). Maximum Likelihood Estimation of Misspecified Models. *Econometrica*, 50(1), 1-25

Topic 4: Inference. Hypothesis testing, specification testing, etc.

- *Hayashi, Ch. 7.4

- Hansen, L. P. (1982). Large Sample Properties of Generalized Method of Moments Estimators. *Econometrica*, 50(4), 1029-1054

- Chesher, A. (1984). Testing for Neglected Heterogeneity. *Econometrica*, 52(4), 865-872

Topic 5: Quasi-Bayesian implementation of extremum estimators. Uses for estimation and inference. Pitfalls. Bayesian Bootstrap.

- *Chernozhukov, V. and Hong, H. (2003). A MCMC approach to classical estimation. *Journal of Econometrics*, 115(2), pp. 293-346.

- Chen, X., Christensen, T. M. and Tamer, E. (2018). Monte Carlo confidence sets for identified sets. *Econometrica*, 88(6), 1965-2018.

- Rubin, D. (1981). The Bayesian Bootstrap. *Annals of Statistics*, 9(1), 130-134.

Topic 6: Bootstrap. Types of bootstrap. When to use and for what purpose. Pitfalls. Bootstrapping dependent data.

- *Chapter 13 in Hansen, B. (2018). *Econometrics*, manuscript.
  available: `http://www.ssc.wisc.edu/~bhansen/econometrics/Econometrics.pdf`

- Horowitz, J. L. (2001). Chapter 52: The Bootstrap. Volume 5 of *Handbook of Econometrics*, pp. 3159-3228. Elsevier.
  available: `http://dx.doi.org/10.1016/S1573-4412(01)05005-X`

- Andrews, D. W. K. (2000). Inconsistency of the Bootstrap when a Parameter is on the Boundary of the Parameter Space. *Econometrica*, 68(2), 399-405.

Topic 7 (if time permits): Sieve estimation.

- Chen, X. (2007). Chapter 76: Large Sample Sieve Estimation of Semi-Nonparametric Models. Volume 6B of *Handbook of Econometrics*, pp. 5549–5632. Elsevier.
  available: `http://dx.doi.org/10.1016/S1573-4412(07)06076-X`

- Hansen, Ch 15.
  available: `http://www.ssc.wisc.edu/~bhansen/econometrics/Econometrics.pdf`