ECONOMICS 154-762
Econometrics -Asymptotics and Finite Sample Theory

Fall 2019

V.Zinde-Walsh   Class hours: Tue, Thurs 4:00-5:30
                       Office hours: Tue, Thurs 2–3 in L 512, or
make an appointment

The course has three parts to it. The first part of the course will cover standard statistical asymptotic theory for estimators and test statistics; the emphasis will be on methods suited to econometric models. The second part will deal with non-parametric estimation and inference; we shall work out the asymptotics for nonparametrric kernel estimators and discuss other estimators, such as series estimators. The third (shorter) part will be a discussion of parametric and non-parametric methodology.

References.

Lecture notes.
(L) Some lecture notes (brief outline of content for the different topics) will be posted.
Books.
(A) Amemiya, T. Advanced econometrics, Harvard University Press, 1985.
Billingsley, P. Probability and measure, Wiley, 1979 (and subsequent editions).
Bierens, H. Topics in Advanced Econometrics, Campbridge University Press, 1994.
Davidson, J. Stochastic Limit Theory: an introduction for econometricians, Oxford University Press, 1994.
Davidson, J. Econometric Theory, Blackwell, 2000.
Ferguson, T.S., A course in Large Sample Theory, 1996, Chapman and Hall, new editions in Taylor and Francis CRC Press.
(N&McF) Newey, W. and D. McFadden, Large Sample Estimation and Hypothesis Testing, Handbook of Econometrics, V.VI, ed. R.Engle and D.McFadden, Elsevier Science, 1994.

(P&P) Pötscher, B. and I. Prucha, Basic Elements of Asymptotic The-
ory, Ch.10 in A Companion to Theoretical Econometrics, ed. B.Baltagi,
Blackwell, 2001.

(W) White, H. Asymptotic Theory for Econometricians, Academic Press,
1984 (2d edition, 1999).

Course notes: Nonlinear Econometrics, V.Chernozhukov, W. Newey http://ocw.mit.edu/courses
385-nonlinear-econometric-analysis-fall-2007/

(PU) Pagan,A and A. Ullah Nonparametric Econometrics, Cambridge
University Press, 1999

(LR) Qi Li and J. Racine, Nonparametric Econometrics: theory and prac-
tice, Princeton University Press, 2007.

Topics
Part 1. Standard asymptotic statistical theory and applications in econometric models.

1. Introduction.

The nature of exact results.

Asymptotic results. Overview.

2. Review of deterministic convergence, continuity.

3. Convergence in probability, a.s.: defintions, examples, relation; con-
tinuous mapping theorem; corollaries.

4. Convergence in r-th mean; inequalities: general, Chebyshev, Markov,
Jensen. Relations between L_p convergence.

Consistency and asymptotic unbiasedness of estimators.

W, ch II; P&P, 2.1-2.

5. Laws of large numbers.

6. Consistency of regression estimators.

W. Ch. III; P&P, 3.1,3.2.

7. Uniform integrability. WLLN for indep UI sequence. Khinchin WLLN.

8. Stochastic orders of magnitude. Rates of convergence of estimators.

P&P, 2.4.

9. Convergence in distribution, characteristic functions and central limit
theorems. Asymptotic normality of OLS and hypothesis testing.

Definitions, examples, characteristic function. Relation to convergence in
probability. Continuous mapping theorem. Cramer-Wold.

W.IV.1; P&P 2.3-2.3.

Central limit theory. Asymptotic distributions of estimators and test statistics.

Triangular array, theorem. LL, LF; conditions: Lindeberg, Lyapounov. Multiple regression. Trending regressors. Autocorrelation. Hypotheses testing.

W.IV-V, P&P, 4.

10. Asymptotic theory for M-estimators. Uniform convergence, stochastic equicontinuity, consistency, asymptotic normality.

Amemiya, 4.1; N&McF2.1-2.3.

11. Asymptotics of MLE. NLS. Local and global. Info matrix equality. CR lower bound. Covariance matrix, computation. A. 4.2.

Part 2. Nonparametric and semiparametric methods and asymptotic theory.

12. Kernel estimation of density.

LR, 1.1-1.3, 16.-1.9, 1.11

13. Kernel estimation of conditional expectation (the regression function).

LR 2.1, 2.2, 2.4

14. Semiparametric estimation in index models.

LR 7.1, 8.3

15. Testing parametric form of a regression function.

LR 12.1.

Part 3. Discussion of methodology

Selected papers.

Several assignments will be given in the course. Each student will be required to give a short presentation on an assigned topic.

Assessment.

The mark will be based on the final exam grade (70%) and on the mark for the presentation (30%).

McGill University values academic integrity. Therefore all students must understand the meaning and consequences of cheating, plagiarism and other academic offences under the Code of Student Conduct and Disciplinary Procedures (see www.mcgill.ca/integrity for more information).