

EC 709: Advanced Econometrics II

Fall 2009

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Overview: This course consists of two parts. The first part discusses some useful methods for estimation and inference, with an emphasis on their applications in macroeconomics and finance. The topics covered include GMM, simulated method of moments and the Bayesian approach. We will also discuss connections between the different methods (e.g., Bayesian and Non-Bayesian, likelihood versus methods of moments) to help students obtain a clearer view about econometrics. The second part focuses on microeconometrics and covers two broad topics: 1) the econometric tools and techniques for the analysis of panel data, and 2) an overview of recent developments in the analysis of treatment effects in econometrics. The prime goal of this course is to familiarize students with important econometric methods and to put them in a position to do their own empirical research.

Requirements: There will be five problem sets, a midterm exam, and a final exam. The first three problem sets contain only analytical problems, and the last two only empirical problems. The students are encouraged to collaborate on the problem sets but must turn in their own copy. The five problem sets account for 30% of the final grade. The midterm exam and the final exam each account for 35%.

Readings: We will use a set of lecture notes (The second part of the course uses lecture notes developed by Professor Daniele Paserman). I will hand out readings as they become relevant. The following books are useful references.

- Hayashi, F., *Econometrics*, Princeton University Press, 2000.
- Wooldridge, J.M., *Econometric Analysis of Panel Data*. Cambridge: MIT Press, 2002.
- Canova, F., *Methods for Applied Macroeconomic Research*, Princeton, 2007.
- Lancaster, T., *An Introduction to Modern Bayesian Econometrics*, Blackwell, 2005.
- William H. Greene. *Econometric Analysis*, 5th edition, Prentice Hall, 2003.

TOPICS

(Note: Students are required to read the material with "*" .)

Part I: Macroeconometrics

1 Generalized Method of Moments

Formulation of moment restrictions, choosing the number of moments, optimal instruments, inference and model diagnosis, small sample properties, and weak identification.

- *Eichenbaum, M.S., Hansen, L.P. and Singleton, K.J. (1988), "A Time Series Analysis of Representative Agent Model of Consumption and Leisure Choice under Uncertainty", *The Quarterly Journal of Economics*, 103, pp. 51-78. (general introduction)
- *Harvey, C.R. (1991), "The World Price of Covariance Risk", *The Journal of Finance*, 46, pp. 111-157. (general introduction)
- Hall, A. R. (2005), *Generalized Method of Moments*, Oxford Press. (Chapter 5, hypothesis testing; Chapter 7, moment selection)
- Burnside, C. and Eichenbaum, M. (1996), "Small-Sample Properties of GMM-Based Wald Tests", *Journal of Business and Economic Statistics*, 14, pp. 294-308. (small sample properties)
- Angrist, J.D. and Krueger, A.B. (1991), "Does Compulsory School Attendance Affect Schooling and Earnings?", *The Quarterly Journal of Economics*, 106, pp. 979-1014. (weak identification)
- *Bound, J., Jaeger, D.A. and Baker, R.M. (1995), "Problem with Instrumental Variables Estimation When the Correlation Between the Instruments and the Endogenous Explanatory Variable is Weak", *Journal of the American Statistical Association*, 90, pp. 443-450. (weak identification)
- Stock, J.H. and Wright, J.H. (2000), "GMM with Weak Identification", *Econometrica*, 68, 1055-1096. (weak identification)

2 Simulated GMM

- *Duffie, D., and Singleton, K. (1993), "Simulated Moments Estimation of Markov Models of Asset Prices," *Econometrica*, Vol. 61, 1993, 929-952.
- Gallant, A.R. and Tauchen, G. (2001), "Efficient Method of Moments," manuscript, Duke University.

- Mc Fadden, D. (1989). "A method of simulated moments of estimation for discrete response models without numerical integration," *Econometrica*, 57, 995-1026.
- Lee, B. and Ingram, B. (1991), "Simulation estimation of time series models," *Journal of Econometrics* 47, 197-205..
- Pakes, A. and Pollard, D. (1989). "Simulation and the asymptotics of optimization estimators," *Econometrica*, 57, 1027-1057.
- Smith, A.A. (1993), "Estimating Nonlinear Time Series Models Using Simulated Vector Autoregressions," *Journal of Applied Econometrics* 8, S63-S84

3 Bayesian Inference

Basic concepts. Computation.

- Lancaster: Chapter 1-4.

4 DSGE Models

Different approaches to estimating DSGE models: MLE, GMM and Bayesian approach.

- Canova: Chapter 5 and 6.

Part II: Microeconometrics

5 Discrete Response Models

- *Wooldridge: Chapter 15.

6 Censored Regression Models

- *Wooldridge: Chapter 16.

7 Panel Data: Introduction

Pooled OLS, Fixed Effects, First Differences and Random Effects.

- *Wooldridge, Chapter 10
- *Chamberlain, Gary. "Panel Data." Chapter 22 in *Handbook of Econometrics*, Volume 2, 1984.
- Griliches, Zvi and Mairesse, Jacques. "Production Functions: the Search for Identification." NBER Working Paper, March 1995.

- Y. Mundlak, "Empirical Production Function Free of Management Bias," *Journal of Farm Economics*, 1961, 44-56.
- Bertrand, Marianne; Duflo, Esther and Mullainathan, Sendhil. "How Much Should We Trust Differences-in-Differences Estimates." *Quarterly Journal of Economics*, 2004.
- Ashenfelter, Orley and Krueger, Alan B. "Estimates of the Economic Returns to Schooling from a New Sample of Twins." *American Economic Review*, 1994.
- Levitt, Steven D. "Using Electoral Cycles in Police Hiring to Estimate the Effect of Police on Crime." *American Economic Review*, 1997.
- McCrary, Justin. "Using Electoral Cycles in Police Hiring to Estimate the Effect of Police on Crime: Comment" *American Economic Review*, 2002.

8 Panel Data: Dynamic Models

Strict exogeneity, sequential exogeneity, GMM estimation and the Arellano-Bond estimator.

- *Wooldridge, Chapter 11
- *Arellano, Manuel and S.R. Bond. "Some Specification Tests for Panel Data: Monte Carlo Evidence and an Application to Employment Equations." *Review of Economic Studies*, 1991.
- Anderson, T.W. and C. Hsiao. "Formulation and Estimation of Dynamic Models Using Panel Data." *Journal of Econometrics*, 1982.
- Blundell, Richard and Bond, S. "Initial conditions and Moment Restrictions in Dynamic Panel Data Models." *Journal of Econometrics*, 1998.

9 Panel Data: Nonlinear Models

The logit model: conditional maximum likelihood. Panel probit: random effects, correlated random effects. Dynamic unobserved effects models with discrete dependent variables.

- *Wooldridge, Chapter 15.8
- *Chay, Kenneth and Hyslop, Dean. "Identification and Estimation of Dynamic Binary Response Panel Data Models: Empirical Evidence Using Alternative Approaches," 2001. Forthcoming, *Journal of Econometrics*.
- Altonji, Joseph and Matzkin, Rosa. "Cross Section and Panel Data Estimators for Nonseparable Models with Endogenous Regressors." *Econometrica*, 2005.
- Honoré, Bo and Kyriazidou, Ekaterini. "Panel Data Discrete Choice Models with Lagged Dependent Variables." *Econometrica*, 2000.

- Chamberlain, Gary. “Panel Data.” Chapter 22 in Handbook of Econometrics, Volume 2, 1984.

10 Causal Effects: Introduction

The fundamental problem of causal inference in econometrics. Random assignment. Experiments and natural experiments.

- *Wooldridge: Chapter 18.1-18.2
- *Rubin, Donald B. “Estimating Causal Effects of Treatments in Randomized and Nonrandomized Studies.” Journal of Educational Psychology, 1974.
- *Robert J. LaLonde, “Evaluating the Econometric Evaluations of Training Programs with Experimental Data,” American Economic Review, vol 76: 604-20 (1986).
- James J. Heckman and Jeffrey Andrew Smith, Assessing the Case for Social Experiments, Journal of Economic Perspectives, 1995, vol. 9, issue 2, pages 85-110.
- Heckman, James J. and Robb, R. “Alternative Methods for Evaluating the Impact of Interventions,” in Heckman and Singer (eds.) Longitudinal Analysis of Labor Market Data, Cambridge: Cambridge University Press, 1985.
- Heckman, James J. and Hotz, J. “Alternative Methods for Evaluating the Impact of Training Programs,” (with discussion). Journal of the American Statistical Association, 1989.
- Eric D. Gould, Victor Lavy and M. Daniele Paserman, “Immigrating to Opportunity: Estimating the Effect of School Quality Using A Natural Experiment on Ethiopians in Israel”, The Quarterly Journal of Economics, May 2004.

11 Estimation of Average Treatment Effects under Ignorability of Treatment (unconfoundedness)

Unconfoundedness (ignorability of treatment, selection on observables, conditional random assignment). Matching estimators. Propensity score methods. The differences in differences estimator under a different light.

- *Wooldridge: Chapter 18.3.
- *Rosenbaum Paul, and Rubin, Donald B. “The Central Role of the Propensity Score in Observational Studies for Causal Effects.” Biometrika, 1983.
- *Rajeev H. Dehejia, Sadek Wahba. ”Causal Effects in Nonexperimental Studies: Reevaluating the Evaluation of Training Programs.” Journal of the American Statistical Association, Vol. 94, No. 448 (Dec., 1999), pp. 1053-1062

- Heckman, James J.; Ichimura, H. and Todd, Petra. "Matching as an Econometric Evaluation Estimator." *Review of Economic Studies*, 1998.
- Gould, Eric D., Lavy, Victor and Paserman, M. Daniele, "Does Immigration Affect the Long-Term Educational Outcomes of Natives? Quasi-Experimental Evidence" (December 2005). IZA Discussion Paper No. 1883
- Guido W. Imbens, Donald B. Rubin, Bruce I. Sacerdote, "Estimating the Effects of Unearned Income on Labor Supply, Earnings, Savings, and
- Consumption: Evidence from a Survey of Lottery Players." *The American Economic Review*, Vol. 91, No. 4 (Sep., 2001), pp. 778-794
- Hahn, Jinyong. "On the Role of the Propensity Score in Efficient Semiparametric Estimation of Average Treatment Effects." *Econometrica*, 1998.
- Abadie, Alberto and Imbens, Guido. "Large Sample Properties of Matching Estimators for Average Treatment Effects." *Econometrica*, 2006.

12 Treatment Effects: Instrumental Variables

Linear instrumental variables with constant coefficients. Treatment effect heterogeneity. Local average treatment effect. Weak instruments.

- *Wooldridge, Chapter 18.4
- *Imbens, Guido and Angrist, Joshua D. "Identification and Estimation of Local Average Treatment Effects." *Econometrica*, 1994.
- *Angrist, Joshua D.; Imbens, Guido W. and Rubin, Donald B. "Identification of Causal Effects Using Instrumental Variables." *Journal of the American Statistical Association*, 1996.
- Angrist, Joshua D. and Krueger, Alan B. "Does Compulsory School Attendance Affect Schooling and Earnings?" *Quarterly Journal of Economics*, 1991.
- Angrist Joshua D. "Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records." *American Economic Review*, 1990.
- Bound, John; Jaeger, David A. and Baker, Regina M. "Problems with Instrumental Variables Estimation when the Correlation Between the Instruments and the Endogenous Explanatory Variable is Weak." *Journal of the American Statistical Association*, 90(430), June 1995, pp. 443-450.

13 Treatment Effects: Regression Discontinuity (if time permits)

Sharp design. Fuzzy design. Relationship to IV. Graphical analysis. Estimation: local linear regression. Applications.

- *Angrist, Joshua D. and Pischke, Victor. “Using Maimonides’ Rule to Estimate the Effect of Class Size on Scholastic Achievement.” *Quarterly Journal of Economics*, May 1999, 114(2), pages 533-575.
- Van der Klaauw, Wilbert. “Estimating the Effect of Financial Aid Offers on College Enrollment: a Regression Discontinuity Approach.” *International Economic Review*, 2002.
- McCrary, Justin and Royer, Heather. “The Effect of Female Education on Fertility and Infant Health: Evidence From School Entry Policies Using Exact Date of Birth.” Mimeo., University of Michigan, 2006.
- *Hahn, Jinyong, Todd, Petra and van der Klaauw, Wilbert. “Identification and Estimation of Treatment Effects with a Regression Discontinuity Design.” *Econometrica*, 2001.
- Black, Sandra. “Do Better Schools Matter? Parental Evaluation of Elementary Education.” *Quarterly Journal of Economics*, 1999.

CLASS SCHEDULE

WEEK	DATE	TOPIC	REFERENCE
Week 1:	Sep. 3	GMM: basic concepts	Lecture notes
Week 2:	Sep. 8	GMM: general	Eichenbaum, Hansen, and Singleton (1988)
	Sep. 10	GMM: general	Harvey (1991)
Week 3:	Sep. 15	GMM: inference, model diagnosis, moment selection	Hall (2005)
	Sep. 17	GMM: small sample properties	Burnside and Eichenbaum (1996)
Week 4:	Sep. 22	GMM: weak identification	Stock and Wright (2000)
	Sep. 24	Simulated Method of Moments	Duffie and Singleton (1993)
Week 5:	Sep. 29	Bayesian Approach: I	Lancaster (2005)
	Oct. 1	Bayesian Approach: II	Lancaster (2005)
Week 6:	Oct. 6	DSGE models: I	Lecture notes, Ireland (2004)
	Oct. 8	DSGE models: II	Lecture notes
Week 7:	Oct. 13	NO CLASS	
	Oct. 15	MIDTERM EXAM	

Week 8:	Oct. 20	Discrete Response Models: I	Lecture notes
	Oct. 22	Discrete Response Models: II	Lecture notes
Week 9:	Oct. 27	Censored Regressions	Lecture notes
	Oct. 29	Panel data, linear models	Lecture notes
Week 10:	Nov. 3	Panel data, linear models	Lecture notes
	Nov. 5	Panel data, linear models	Lecture notes
Week 11:	Nov. 10	Panel data, dynamic models	Lecture notes
	Nov. 12	Panel data, dynamic models	Lecture notes
Week 12:	Nov. 17	Panel data, non-linear models	Lecture notes
	Nov. 19	Causal effects – introduction	Lecture notes
Week 13	Nov. 24	Causal effects – introduction	Lecture notes
	Nov. 26	NO class	
Week 14	Dec. 1	Estimation under unconfoundedness	Lecture notes
	Dec. 3	Estimation under unconfoundedness	Lecture notes
Week 15	Dec. 8	Instrumental Variables	Lecture notes
	Dec. 10	Instrumental Variables	Lecture notes