

## **SYLLABUS (updated 3/23/10)**

**Spring 2010**

**Economics 696: Topics in Econometrics**

**Instructor: Keisuke Hirano (hirano@u.arizona.edu)**

**Meeting Time: Mondays, 6:15-8:45 PM, McClelland 401KK**

**Office Hours: Tuesday 1-2 PM or by appointment.**

### **Course Description:**

This topics course will be focused on identification analysis. We will briefly review large sample results, estimation theory, and identification in linear simultaneous equations models. Then we will examine identification of causal effects in both experimental and nonexperimental settings, nonparametric identification of structural models, including auction models, and identification of social interaction models.

### **Course requirements:**

There will be a number of homework assignments involving both identification analysis and empirical work with data sets. In addition, you will be required to write a mini-paper. You may choose the topic for the mini-paper, in consultation with me.

**General References:** The following provide useful background and overviews for the course.

- Greene, W. H., 2008, *Econometric Analysis* (6th Ed.), Pearson Prentice Hall.
- Manski, C. F., 2007, *Identification for Prediction and Decision*, Harvard University Press.
- Manski, C. F., 1995, *Identification Problems in the Social Sciences*, Harvard University Press.
- van der Vaart, A. W., 1998, *Asymptotic Statistics*, Cambridge University Press.

### **Outline of Topics:**

1. Background: Examples, Identification Concepts, and Large Sample Theory
2. Classical Simultaneous Equations Models and Linear Instrumental Variables
3. Potential Outcomes and Heterogeneous Treatment Effects
4. Partial Identification and Weak Identification
5. Nonparametric Identification of Structural Equations Models
6. Identification of Panel Data Models
7. Risk Aversion and Utility Elicitation
8. Nonparametric Identification of Auction Models
9. Identification of Social Interactions

## Expanded Outline and Readings:

Note: this list may be revised and updated as the semester progresses.

1. Background: Examples, Identification Concepts, and Large Sample Theory  
Goldberger, A. S., 1991, *A Course in Econometrics*, Cambridge: Harvard University Press. Chapter 5.  
van der Vaart, A. W., 1998, *Asymptotic Statistics*, Cambridge University Press. Chapter 2.
2. Classical Simultaneous Equations Models and Linear Instrumental Variables  
Judge, G. G., W. E. Griffiths, R. C. Hill, H. Lutkepohl, and T. Lee, 1985, *The Theory and Practice of Econometrics*, 2nd ed., Wiley. Chapter 14.
3. Potential Outcomes and Heterogeneous Treatment Effects
  - (a) Potential Outcomes Model and Graphical Models  
Cox, D. R., 1992, "Causality: Some Statistical Aspects," *Journal of the Royal Statistical Society, Series A*, 155, 291-301.  
Holland, P. W., 1986, "Statistics and Causal Inference" (with discussion), *Journal of the American Statistical Association* 81, 945-970.  
Lewis, D., 1973, "Causation," *The Journal of Philosophy* 70, 556-567.  
Neyman, J., 1923, "On the Application of Probability Theory to Agricultural Experiments. Essay on Principles. Section 9," *Roczniki Nauk Rolniczych Tom X (Annals of Agricultural Sciences)*, 1-51. Translated and edited by D. M. Dabrowska and T. P. Speed, with introduction and discussion, in *Statistical Science*, 1990, Vol. 5, No. 4, 463-480.  
Pearl, J., 2000, "Epilogue: The Art and Science of Cause and Effect," in *Causality: Models, Reasoning, and Inference*, Cambridge: Cambridge University Press.  
Rubin, D.B., 1974, "Estimating Causal Effects of Treatments in Randomized and Non-randomized Studies," *Journal of Educational Psychology* 66, 688-701.
  - (b) Identification in Randomized Experiments  
Burtless, G., 1995, "The Case for Randomized Field Trials in Economic and Policy Research," *Journal of Economic Perspectives* 9: 63-84.  
Cox, D. R., 1958, *Planning of Experiments*, New York: Wiley. Chapters 1-3.  
Fisher, R. A., 1935, *The Design of Experiments*, Ch. 2.  
Heckman, J., 1992, "Randomization and Social Policy Evaluation," in *Evaluating Welfare and Training Programs*, ed. by C. Manski and I. Garfinkel, Cambridge: Harvard University Press.  
Heckman, J., Lalonde, R., and Smith, J., 1999, "The Economics and Econometrics of Active Labor Market Programs," in *Handbook of Labor Economics*, Vol. 3, ed. by A. Ashenfelter and D. Card, Amsterdam: Elsevier Science.  
Heckman, J., and Smith, J., 1995, "Assessing the Case for Social Experiments," *Journal of Economic Perspectives* 9: 85-110.  
Lalonde, R., 1986, "Evaluating the Econometric Evaluation of Training Programs," *American Economic Review* 76, 604-620.

Neyman, J., 1935, "Statistical Problems in Agricultural Experimentation," (with discussion), *Supplement to the Journal of the Royal Statistical Society*, Vol. II, No. 2, 107-180.

Rosenbaum, P.R., 2002, "Randomized Experiments," Chapter 2 of *Observational Studies*, 2nd ed., New York: Springer.

(c) Identification under Unconfounded Treatment Assignment

Barnow, B., Cain, G., and Goldberger, A., 1980, "Issues in the Analysis of Selectivity Bias," *Evaluation Studies*, Vol. 5, ed. by E. Stromsdorfer and G. Farkas, 42-59.

Imbens, G. W., (2004), "Nonparametric Estimation of Average Treatment Effects under Exogeneity: A Review," *Review of Economics and Statistics* 86(1): 4-29.

Rosenbaum, P. R., and Rubin, D. B., 1983, "The Central Role of the Propensity Score in Observational Studies for Causal Effects," *Biometrika* 70, 41-55.

Rubin, D. B., (1977), "Assignment to a Treatment Group on the Basis of a Covariate," *Journal of Educational Statistics* 2, 1-26.

(d) Causal Instrumental Variables

Angrist, J., D., Imbens, G. W., and Rubin, D. B., 1996, "Identification of causal effects using instrumental variables," *Journal of the American Statistical Association* 91: 444-455.

Chernozhukov, V., and Hansen, C., 2005, "An IV Model of Quantile Treatment Effects," *Econometrica* 73(1): 245-261.

Heckman, J., and Vytlacil, E., 1999, "Local Instrumental Variables and Latent Variable Models for Identifying and Bounding Treatment Effects," *Proceedings of the National Academy of Sciences*, April 13, 1999, 96:4730-4734.

Imbens, G. W., and Angrist, J. D., (1994), "Identification and Estimation of Local Average Treatment Effects," *Econometrica* 62, 467-475.

(e) Multivalued Treatments

Hirano, K., and Imbens, G.W., 2004, "The Propensity Score with Continuous Treatments," in *Applied Bayesian Modeling and Causal Inference from Incomplete-Data Perspectives*, ed. by A. Gelman and X. Meng, New York: Wiley.

Imai, K., and van Dyk, D.A., 2004, "Causal Inference With General Treatment Regimes: Generalizing the Propensity Score," *Journal of the American Statistical Association* 99, 854-866.

Imbens, G., 2000, "The Role of the Propensity Score in Estimating Dose-Response Functions," *Biometrika* 87(3), 706-710.

Robins, J.M., Hernan, M. and, Brumback, B., 2000, "Marginal structural models and causal inference in epidemiology," *Epidemiology* 11(5):550-560.

4. Partial Identification and Weak Identification

Balke, A., and Pearl, J., 1997, "Bounds on Treatment Effects from Studies with Imperfect Compliance," *Journal of the American Statistical Association* 92(439): 1171-1176.

Heckman, J., Smith, J., and Clements, N., 1997, "Making the Most Out of Programme Evaluations and Social Experiments: Accounting for Heterogeneity in Programme Impacts," *Review of Economic Studies* 64, 487-535.

- Horowitz, J., and Manski, C., 1995, "Identification and Robustness with Contaminated and Corrupted Data," *Econometrica* 63, 281-302.
- Imbens, G., and Manski, C., 2004, "Confidence Intervals for Partially Identified Parameters," *Econometrica* 72(6): 1845-1857.
- Manski, C., 1990, "Nonparametric Bounds on Treatment Effects," *American Economic Review Papers and Proceedings* 80, 319-323.
- Manski, C., 1997, "The Mixing Problem in Programme Evaluation," *Review of Economic Studies* 64, 537-553.
- Stoye, J., 2009, "More on Confidence Intervals for Partially Identified Parameters," *Econometrica* 77(4): 1299-1315.

## 5. Nonparametric Identification of Structural Equations Models

- Chesher, A., 2005, "Identification in Nonseparable Models," *Econometrica* 71(5): 1405-1441.
- Hahn, J., and Ridder, G., 2009, "Conditional Moment Restrictions and Triangular Simultaneous Equations," working paper, USC and UCLA.
- Imbens, G., and W. Newey, 2009, "Identification and Estimation of Triangular Simultaneous Equations Without Additivity," forthcoming, *Econometrica*.
- Matzkin, R. L. , 1994, "Restrictions of Economic Theory in Nonparametric Methods," in *Handbook of Econometrics*, Vol. IV, R.F. Engel and D.L. McFadden, eds, Amsterdam: Elsevier, Ch. 42.
- Matzkin, R., "Nonparametric Identification," in *Handbook of Econometrics*.
- Matzkin, R., "Identification in Nonparametric Simultaneous Equations Models," *Econometrica*
- Newey, W., and Powell, J., 2003, "Instrumental Variables Estimation of Nonparametric Models," *Econometrica* 71(5): 1565-1578.
- Roehrig, C. S., 1988, "Conditions for Identification in Nonparametric and Parametric Models," *Econometrica* 56(2): 433-447.

## 6. Identification in Panel Data

- Altonji, J., and Matzkin, 2005, "Cross Section and Panel Data Estimators for Nonseparable Models with Endogenous Regressors," *Econometrica* 73(4): 1053-1102.
- Anderson, T. W., and Hsiao, C., 1982, "Formulation and Estimation of Dynamic Models using Panel Data," *Journal of Econometrics* 18, 47-82.
- Chamberlain, G., 1984, "Panel Data," in *Handbook of Econometrics*, vol. II.
- Chernozhukov, V., Fernandez-Val, I., Hahn, J., and Newey, W., 2009, "Identification and Estimation of Marginal Effects in Nonlinear Panel Models," CEMMAP working paper CWP05/09.
- Hausman, J., and Taylor, W., 1981, "Panel Data and Unobservable Individual Effects," *Econometrica* 49(6): 1377-1398.
- Honore, B., and Tamer, E., 2006, "Bounds on Parameters in Panel Dynamic Discrete Choice Models," *Econometrica* 74(3): 611-629.
- Mundlak, Y., 1961, "Empirical Production Function Free of Management Bias," *Journal of Farm Economics* 43(1): 44-56.
- Mundlak, Y., 1978, "On the Pooling of Time Series and Cross Section Data," *Econometrica* 46(1): 69-85.

## 7. Risk Aversion and Utility Elicitation

Chiappori, P.-A., Gandhi, A., Salanie, B., and Salanie, F., 2008, "You are what you bet: eliciting risk attitudes from horse races," working paper, University of Wisconsin.

Chiappori, P.-A., Gandhi, A., Salanie, B., and Salanie, F., 2009, "Identifying Preferences under Risk from Discrete Choices," *American Economic Review: Papers & Proceedings* 99(2): 356-362.

Farquhar, P. 1984, "Utility Assessment Methods," *Management Science* 30(11): 1283-1300.

## 8. Nonparametric Identification of Auction Models

Athey, S., and P. Haile, 2002, "Identification of Standard Auction Models," *Econometrica* 70(6): 2107-2140.

Athey, S., and P. Haile, 2007, "Nonparametric Approaches to Auctions," in J. Heckman and E. Leamer, eds., *Handbook of Econometrics*, Vol. 6A, Elsevier, 2007, ch. 60, pp. 3847-3965.

Guerre, E., I. Perrigne, and Q. Vuong, 2000, "Optimal Nonparametric Estimation of First-Price Auctions," *Econometrica* 68(3): 525-574.

Guerre, E., I. Perrigne, and Q. Vuong, 2009, "Nonparametric Identification of Risk Aversion in First-Price Auctions under Exclusion Restrictions," *Econometrica* 77(4): 1193-1227.

Haile, P., and E. Tamer, 2003, "Inference with an Incomplete Model of English Auctions," *Journal of Political Economy* 111(1): 1-51.

## 9. Identification of Social Interactions

Bramoulle, Y., H. Djebbari, and B. Fortin, 2009, "Identification of Peer Effects through Social Networks," forthcoming, *Journal of Econometrics*.

Brock, W. and S. Durlauf, 2001, "Discrete Choice with Social Interactions," *Review of Economic Studies* 68, 235-260.

Graham, B., G. Imbens, and G. Ridder, 2009, "Complementarity and Aggregate Implications of Assortative Matching: A Nonparametric Analysis," National Bureau of Economic Research Working Paper W14860.

Lee, L. F., 2007, "Identification and Estimation of Econometric Models with Group Interactions, Contextual Factors and Fixed Effects," *Journal of Econometrics* 140(2), 333-374.

Manski, C. F., 1993, "Identification of Endogenous Social Effects: The Reflection Problem," *Review of Economic Studies* 60, 531-542.

Manski, C. F., 2009, "Identification of Treatment Response with Social Interactions," working paper.