



FACULTAD DE CIENCIAS SOCIALES

DEPARTAMENTO DE ECONOMIA

# Microeconometrics

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The objective of this course is to deal with some important topics in the empirical analysis of micro data (households, firms). We will study issues in the specification, estimation and testing of different models with cross-sectional and with panel data. The emphasis of the course is both on the econometric techniques and in the economic applications.

## Program

### 1. Generalized Method of Moments Estimation and Other General Estimation Methods (MLE, Minimum Distance, Extremum)

The analogy principle. General formulation. Example: 2SLS. Asymptotic Properties. Specification tests. Optimal instruments. Extremum Methods, MLE, Minimum Distance.

### 2. Linear Models for Panel Data

Examples. Static models and control for unobserved heterogeneity. Within-groups, between-groups and GLS estimators. Specification tests. Dynamic models. Models with strictly exogenous and predetermined variables. The bias of the within-groups estimator. GMM estimation of dynamic panel data models. Specification tests.

### 3. Discrete Choice Models

Applications. Binary choice models for cross sectional data: linear probability models, probit and logit models. Interpretation. Maximum likelihood estimation.

Multiple choice models: multinomial probit and multinomial logit. Simulated method of moments estimation. Ordered probit.

Binary choice models for panel data: random effects and fixed effects models.

Structural Models: Models and Examples. Structural Models: Estimation Methods

### 4. Sample Selection Models

Applications. Truncated Regression Models. Tobit: Censored Regression Models. Sample selection models: maximum likelihood estimation and two-stage estimation. Switching regression models.

## 5. Duration models

The hazard function. Proportional hazard models. Unobserved heterogeneity *versus* state dependence. Discrete time duration models.

## 6. Policy Evaluation

*This year, this topic will only be introduced, since a specific course will be offered in the third term of this course.*

Potential Outcomes, Causality, and Social Experiments. Matching. Instrumental Variables. Dif-in-dif estimation. Regression Discontinuity.

## 7. Quantile Regression and Other Topics and Methods relevant in Microeconometrics (if time permits)

Medians and quantiles. LAD. Quantile regression. Asymptotic results. Endogenous quantiles and Quantile Treatment Effects.

Bootstrap and finite sample methods.

Introduction to Bayesian and Quasi-Bayesian Methods.

Bounds and Partial Identification.

## General Textbooks

Arellano, M. (2002), *Panel Data Econometrics*. Oxford University Press.

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

Cameron, C. and P. Trivedi, (2005) *Microeconometrics*, Cambridge University Press.

For doing applied work, it is also useful the companion book: Cameron, C. and P. Trivedi (2009), *Microeconometrics Using Stata*, Stata Press.

An additional Textbook, not specific to microeconometrics, with a GMM-centered approach is Hayashi, F. *Econometrics*. Princeton University Press, 2000.

## Further Readings for Generalized Method of Moments Estimation

### Books and chapters in books

- Amemiya, T. (1985), *Advanced econometrics*. Ch. 4. Harvard. University Press
- Newey, W. (1993), “Efficient Estimation of Models with Conditional Moment Restrictions”, in Maddala, Rao and Vinod (eds) *Handbook of Statistics*, IV, Ch. 11, Elsevier Science.
- Newey, W. and McFadden (1994), “Large Sample Estimation and Hypothesis Testing”, in Engle, R.F. and D.L. McFadden (eds) *Handbook of Econometrics*, IV, Ch. 36, North-Holland.

### Papers

#### **The Estimation of Economic Relationships using Instrumental Variables**

J. D. Sargan

*Econometrica*, Vol. 26, No. 3. (Jul., 1958), pp. 393-415.

#### **The Estimation of Relationships with Autocorrelated Residuals by the Use of Instrumental Variables**

J. D. Sargan

*Journal of the Royal Statistical Society. Series B (Methodological)*, Vol. 21, No. 1. (1959), pp. 91-105

#### **Large Sample Properties of Generalized Method of Moments Estimators**

Lars Peter Hansen

*Econometrica*, Vol. 50, No. 4. (Jul., 1982), pp. 1029-1054.

#### **Sargan's Instrumental Variable Estimation and GMM**

Manuel Arellano

CEMFI Working Paper no. 0110, 2001. Appeared in *Journal of Business & Economic Statistics*, 20, 2002.

## Further Readings for Linear Models for Panel Data

### Books and chapters in books

- Chamberlain, G. (1984), “Panel Data”, in Griliches, Z. and M.D. Intrilligator (eds) *Handbook of Econometrics*, II, Elsevier Science, Amsterdam.
- Arellano, M. And B. Honoré (2001), “Panel Data Models: Some Recent Developments”, in Heckman, J.J. and E. Leamer (eds) *Handbook of Econometrics*, V, Ch. 53, Elsevier Science, Amsterdam.

### Papers

#### **Pooling Cross Section and Time Series Data in the Estimation of a Dynamic Model: The Demand for Natural Gas**

Pietro Balestra; Marc Nerlove

*Econometrica*, Vol. 34, No. 3. (Jul., 1966), pp. 585-612.

#### **Specification Tests in Econometrics**

J. A. Hausman

*Econometrica*, Vol. 46, No. 6. (Nov., 1978), pp. 1251-1271

**Estimation of Dynamic Models with Error Components**

T. W. Anderson; Cheng Hsiao

*Journal of the American Statistical Association*, Vol. 76, No. 375. (Sep., 1981), pp. 598-606.

**Multivariate regression models for panel data**

Gary Chamberlain

*Journal of Econometrics*, Vol. 18, No. 1, January 1982, Pages 5-46

**Formulation and estimation of dynamic models using panel data**

T. W. Anderson, Cheng Hsiao

*Journal of Econometrics*, Vol. 18, No. 1, January 1982, Pages 47-82

**The Sensitivity of Consumption to Transitory Income: Estimates from Panel Data on Households**

Robert E. Hall; Frederic S. Mishkin

*Econometrica*, Vol. 50, No. 2. (Mar., 1982), pp. 461-482.

**Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations**

Manuel Arellano; Stephen Bond

*The Review of Economic Studies*, Vol. 58, No. 2. (Apr., 1991), pp. 277-297.

**An Empirical Analysis of Cigarette Addiction**

Gary S. Becker; Michael Grossman; Kevin M. Murphy

*The American Economic Review*, Vol. 84, No. 3. (Jun., 1994), pp. 396-418.

**Estimates of the Economic Return to Schooling from a New Sample of Twins**

Orley Ashenfelter; Alan Krueger

*The American Economic Review*, Vol. 84, No. 5. (Dec., 1994), pp. 1157-1173.

**Efficient estimation of models for dynamic panel data**

Seung C. Ahn and Peter Schmidt

*Journal of Econometrics*, Vol. 68, No. 1, July 1995, Pages 5-27

**Initial conditions and moment restrictions in dynamic panel data models**

Richard Blundell, Stephen Bond

*Journal of Econometrics*, 87 (1998), 115-143

## Further Readings for Discrete Choice Models

### Books

- Maddala, G.S. (1983), *Limited-dependent and qualitative variables in econometrics*. Cambridge University Press.
- Amemiya, T. (1985), *Advanced econometrics*. Harvard University Press
- Train, K.E. (2003), *Discrete Choice Methods with Simulation*, Cambridge University Press.

### Chapters in Books

- Chamberlain, G. (1984), “Panel Data”, in Griliches, Z. and M.D. Intriligator (eds) *Handbook of Econometrics*, II, Elsevier Science, Amsterdam.
- Arellano, M. And B. Honoré (2001), “Panel Data Models: Some Recent Developments”, in Heckman, J.J. and E. Leamer (eds) *Handbook of Econometrics*, V, Ch. 53, Elsevier Science, Amsterdam.
- Chamberlain, G. (1985), “Heterogeneity, Omitted Variable Bias, and Duration Dependence,” in *Longitudinal Analysis of Labor Market Data*, ed. J.J. Heckman and B. Singer. Cambridge: Cambridge University Press, 3–38.
- Hajivassiliou, V. and P. Ruud, (1994), "Classical estimation methods for LDV models using simulation", in R. Engle and D. McFadden, eds., *Handbook of Econometrics*, 1994, North-Holland, Amsterdam, pp. 2383–2441.
- Luce, D. (1959), *Individual Choice Behavior*, John Wiley and Sons, New York.
- McFadden, D. (1974), 'Conditional logit analysis of qualitative choice behavior', in P. Zarembka, ed., *Frontiers in Econometrics*, Academic Press, New York, pp. 105–142.
- McFadden, D. (1978), 'Modeling the choice of residential location', in A. Karlqvist, L. Lundqvist, F. Snickars, and J. Weibull, eds., *Spatial Interaction Theory and Planning Models*, North-Holland, Amsterdam, pp. 75–96.
- McFadden, D.L. (1984), 'Econometric Analysis of Qualitative Response Models,' in *Handbook of Econometrics*, Volume 2, ed. Z. Griliches and M.D. Intriligator. Amsterdam: North Holland, 1395–1457.
- Arellano, M and J. Hahn (2007): “Understanding Bias in Nonlinear Panel Models: Some Recent Developments.” in R. Blundell, W. Newey, and T. Persson (eds.): *Advances in Economics and Econometrics, Ninth World Congress*, Cambridge University Press.
- Browning, M. and J. Carro (2007): “Heterogeneity and Microeconometrics modelling.” in R. Blundell, W. Newey, and T. Persson (eds.): *Advances in Economics and Econometrics, Ninth World Congress*, Cambridge University Press.

## Papers

### **A conditional probit model for qualitative choice: Discrete decisions recognizing interdependence and heterogeneous preferences**

Hausman, J. and D. Wise

*Econometrica* 48 (1978), 403–429.

### **Analysis of Covariance with Qualitative Data**

Chamberlain, G.

*Review of Economic Studies*, 47(1) (1980), pages 225–38.

### **Specification tests for the multinomial logit model**

Hausman, J. and D. McFadden

*Econometrica* 52 (1984), 1219–1240.

### **A Method for Minimizing the Impact of Distributional Assumptions in Econometric Models for Duration Data**

Heckman, J.J., and B. Singer

*Econometrica* 52 (1984), 271–320.

### **Semiparametric Analysis of Random Effects Linear Models from Binary Panel Data**

Manski, C.F.

*Econometrica* 55 (1987), 357–362.

### **Discrete Choices with Panel Data**

Manuel Arellano

*Investigaciones Economicas* 27 (2003), 423-458.

### **Panel Data Discrete Choice Models with Lagged Dependent Variables**

Honore, B.E., and E.Kyriazidou  
*Econometrica* 68 (2000), 839 –874.

### **Binary choice panel data models with predetermined variables**

Manuel Arellano and Raquel Carrasco  
*Journal of Econometrics* 115 (1) (2003), pages 125-157.

### **Jackknife and Analytical Bias Reduction for Nonlinear Panel Models**

Jinyong Hahn and Whitney K. Newey.  
*Econometrica* 72 (2004), 1295-1319.

### **Estimating dynamic panel data discrete choice models with fixed effects**

Jesús M. Carro  
*Journal of Econometrics* 140 (2007), pages 503-528.

### **Dynamic discrete choice structural models: A survey**

Victor Aguirregabiria and Pedro Mira  
*Journal of Econometrics* 156 (2010), pages 38-67.

### **The Career Decisions of Young Men**

Michael P. Keane; Kenneth I. Wolpin  
*The Journal of Political Economy*, Vol. 105, No. 3. (Jun., 1997), pp. 473-522.

## **Further Readings for Quantile Regression and Other Topics and Methods**

### **Books and chapters in books**

- Lancaster, T. (1990): *The Econometric Analysis of Transition Data*, Cambridge.
- Van den Berg, G. (2001): “Duration Models: Specification, Identification and Multiple Durations”, in Heckman and Leamer (eds.), *Handbook of Econometrics*, Vol. 5, Ch. 55.

### **Papers**

#### **Econometric Models for the Duration of Unemployment**

T. Lancaster  
*Econometrica*, Vol. 47 (1979), pp. 939-956

#### **Unemployment Duration, Benefit Duration, and the Business Cycle**

O. Bover, M. Arellano, and S. Bentolila  
*The Economic Journal*, 112 (2002), 223-265.

#### **Unemployment Insurance and Unemployment Spells”**

B. Meyer  
*Econometrica*, 58 (1990), 757-782.

## Further Readings for Sample Selection Models

### Papers

#### **Estimation of Relationships for Limited Dependent Variables**

James Tobin

*Econometrica*, Vol. 26, No. 1. (Jan., 1958), pp. 24-36.

#### **Social Experimentation, Truncated Distributions, and Efficient Estimation**

Jerry A. Hausman; David A. Wise

*Econometrica*, Vol. 45, No. 4. (May, 1977), pp. 919-938.

#### **Sample Selection Bias as a Specification Error**

James J. Heckman

*Econometrica*, Vol. 47, No. 1. (Jan., 1979), pp. 153-162.

#### **Symmetrically Trimmed Least Squares Estimation for Tobit Models**

James L. Powell

*Econometrica*, Vol. 54, No. 6. (Nov., 1986), pp. 1435-1460.

#### **The Sensitivity of an Empirical Model of Married Women's Hours of Work to Economic and Statistical Assumptions**

Thomas A. Mroz

*Econometrica*, Vol. 55, No. 4. (Jul., 1987), pp. 765-799.

#### **Estimating Models with Sample Selection Bias: A Survey**

Francis Vella

*The Journal of Human Resources*, Vol. 33, No. 1. (Winter, 1998), pp. 127-169.

## Further Readings for Policy Evaluation

### Books

- Angrist; J. D. and J.S. Pischke (2008) , *Mostly Harmless Econometrics: An Empiricists Companion*, Princeton University Press.

### Papers

#### **Estimating causal effects of treatments in randomized and nonrandomized studies**

Rubin, D.B., (1974)

*Journal of Educational Psychology*, 66:688--701.

#### **The Central Role of the Propensity Score in Observational Studies for Causal Effects**

Paul R. Rosenbaum; Donald B. Rubin

*Biometrika*, Vol. 70, No. 1. (Apr., 1983), pp. 41-55.

#### **Evaluating the Econometric Evaluations of Training Programs with Experimental Data**

Robert J. LaLonde

*The American Economic Review*, Vol. 76, No. 4. (Sep., 1986), pp. 604-620.

#### **Lifetime Earnings and the Vietnam Era Draft Lottery: Evidence from Social Security Administrative Records**

Angrist, J.D. (1990)

*The American Economic Review*, Vol. 80:3, pp. 313-336.

**Identification and Estimation of Local Average Treatment Effects**

Guido W. Imbens; Joshua D. Angrist

*Econometrica*, Vol. 62, No. 2. (Mar., 1994), pp. 467-475.

**Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania**

David Card; Alan B. Krueger

*The American Economic Review*, Vol. 84, No. 4. (Sep., 1994), pp. 772-793.

**Identification of Causal Effects Using Instrumental Variables**

Angrist, J.D., Imbens, G. W., and D.B. Rubin (1996)

*Journal of the American Statistical Association*, 91:434, pp. 444-455.

**The Effect of Sample Selection and Initial Conditions in Duration Models: Evidence from Experimental Data on Training**

John C. Ham; Robert J. Lalonde

*Econometrica*, Vol. 64, No. 1. (Jan., 1996), pp. 175-205.

**Matching as an Econometric Evaluation Estimator: Evidence from Evaluating a Job Training Programme**

James J. Heckman; Hidehiko Ichimura; Petra E. Todd

*The Review of Economic Studies*, Vol. 64, No. 4, Special Issue: Evaluation of Training and Other Social Programmes. (Oct., 1997), pp. 605-654.

**Matching as an Econometric Evaluation Estimator**

James J. Heckman; Hidehiko Ichimura; Petra Todd

*The Review of Economic Studies*, Vol. 65, No. 2. (Apr., 1998), pp. 261-294.

**The interpretation of instrumental variables estimators in simultaneous equations models with an application to the demand for fish**

Joshua D Angrist; Kathryn Graddy; Guido W Imbens

*The Review of Economic Studies*; Jul 2000; 67, 232.

**Identification and Estimation of Treatment Effects with a Regression-Discontinuity Design**

Hahn, J, Todd, P., & W. Van der Klaauw (2001)

*Econometrica*, Vol. 69, No. 1. (Jan., 2001), pp. 201-209.

**The Role of Randomized Field Trials in Social Science Research: A Perspective from Evaluations of Reforms of Social Welfare Programs**

Moffitt, R.A. (2003)

*Cemmap Working Paper cwp23/02*, The Institute for Fiscal Studies, UCL.

**Large Sample Properties of Matching Estimators for Average Treatment Effects**

Abadie, A. and G. Imbens

*mimeo*, 2004.

**Nonparametric Estimation of Average Treatment Effects under Exogeneity: A Review**

Guido W. Imbens

*The Review of Economics and Statistics*, Vol. 86, Issue 1 - February 2004.

### **How Much Should We Trust Difference-in-Difference Estimates?**

Bertrand, M., Duflo, E. and S. Mullainathan, (2004)

*The Quarterly Journal of Economics*, Vol. 119 (1), 249-275.

### **Structural Equations, Treatment Effects, and Econometric Policy Evaluation**

Heckman, J.J., & E. Vytlacil, (2005)

*Econometrica*, Vol. 73(3), pages 669-738.

## **Further Readings for Quantile Regression and Other Topics and Methods**

### **Books and chapters in books**

- Angrist, J. D. and J.S. Pischke (2008) , *Mostly Harmless Econometrics: An Empiricists Companion*, Princeton University Press.
- Chamberlain, G. (1994): “Quantile Regression, Censoring, and the Structure of Wages”, in C.A. Sims (ed.), *Advances in Econometrics, Sixth World Congress*, vol. 1, Cambridge.
- Horowitz, Joel L. (2001). “The bootstrap”. In J.J. Heckman and E. Leamer, editors, *Handbook of Econometrics*, volume V, chapter 52, pages 3159.3228. Elsevier.
- Koenker, R. (2005): *Quantile Regression*, Cambridge University Press

### **Papers**

#### **Quantile regression.**

R. Koenker, and K. F. Hallock (2001)

*The Journal of Economic Perspectives*, 15(4):143.156.

#### **Changes in the U.S. wage structure 1963-1987: Application of quantile regression**

Moshe Buchinsky (1994)

*Econometrica*, 62(2):405.458.

#### **Least absolute deviations estimation for the censored regression model**

James L. Powell (1984)

*Journal of Econometrics*, 25(3):303.325

#### **Instrumental Quantile Regression Inference for Structural and Treatment Effect Models V.**

Chernozhukov and C. Hansen (2006)

*Journal of Econometrics*, 132, 491-525.

#### **Regression Quantiles**

Koenker, R. and G. Basset (1978)

*Econometrica*, 46, 33-50.

#### **An MCMC approach to Classical estimation**

Victor Chernozhukov and Han Hong (2003)

*Journal of Econometrics*, 115(2):293.346, August 2003