Partial Identification: Theory and Applications

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This advanced topic challenges current practice in applied econometrics while preserving most of the common reasoning. The importance of the standard notion of point identification as it is exposed in standard econometric textbooks has indeed been questioned for the last twenty years by Manski and co-authors (2003, see reference list below) and many other scholars. The general reasoning that leads to partial identification is the notion of incompleteness of data or models. First, the data may be incomplete because of censorship mechanisms, the use of two different databases or the existence of two exclusive states of treatment for instance. Structural models can be incomplete if they do not specify unambiguous solutions. Data analysis can still be conducted by examining all acceptable assumptions that lead to complete the data and model and by constructing the identified set of all values of identified parameters to which each of these assumptions lead.

The acceptability of an hypothesis depend on the applications and these assumptions refer to sets (e.g. a probability of equilibrium selection belongs to the interval [0,1], or censored values are bounded) or are functional (monotonicity, concavity etc.). The identifying power of different assumptions may be compared in terms of the size of the set which is identified. This requires developing new techniques for identification, estimation, and inference.

We will present landmark articles and discuss their backbones so as to understand the deep logic and attractiveness of the methods.

Part I: Presentation

1. Incompleteness of models or data
2. Interval censoring: a simple example
3. Entry games

Part II: Estimation and inference

1. Uniformity and point or set coverage
2. Convexity arguments
3. General estimation methods

Part III: Applications

1. Selection models
2. Structural models
3. Treatment effects

Recommended Surveys:

- Bontemps, C., and T. Magnac, 2017, “Set Identification and Moment Restrictions”, *Annual Reviews in Economics,* 9(1).
- Ho, K,. and A. Rosen, 2015, "Partial Identification in Applied Research: Benefits and Challenges", CEMMAP Working paper 64/15.

- Manski, C.F., 2003, *Partial Identification of Probability Distributions*, Springer-Verlag: Berlin.
- Molchanov, I., & Molinari, F., 2015, "Applications of random set theory in econometrics", *Annual Reviews in Economics*, 6(1), 229-251.
- Tamer, E., 2010, "Partial Identification in Econometrics", *Annual Reviews in Economics*, 2:167—95

Other references

Identification: Seminal papers

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

Horowitz, J.L., and C.F. Manski, 1995, "Identification and Robustness with Contaminated and Corrupted Data", Econometrica, 63:281-302.

Leamer, E.E., 1987, "Errors in Variables in Linear Systems", Econometrica, 55(4): 893-909.

Manski, C.F., 1989, "Anatomy of the Selection Problem", Journal of Human Resources, 24:343-60.

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Identification: Recent papers

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Chesher, A., 2010, "Instrumental variable models for discrete outcomes", Econometrica, 78:575-601.

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Magnac, T., and E. Maurin, 2008, "Partial Identification in Monotone Binary Models: Discrete Regressors and Interval Data", Review of Economic Studies, 75:835-864.

Ridder, G. E., and R. Moffitt, 2007, "The econometrics of data combination", in J. J.Heckman and E. E. Leamer (Eds.), Handbook of Econometrics, Volume 6, North-Holland, Amsterdam.

Estimation using convex arguments

Beresteanu, A., and F. Molinari, 2008, "Asymptotic Properties for a Class of Partially Identified Models", Econometrica, 76:763-814.

Bontemps, C., T. Magnac and E. Maurin, 2012, "Set Identified Linear Models", Econometrica, 80:1129-1155.

Imbens, G., and C.F. Manski, 2004, "Confidence Intervals for Partially Identified Parameters", Econometrica, 72:1845-1859.

Kaido, H., and A. Santos, 2014, "Asymptotically efficient estimation of models defined by convex moment inequalities", Econometrica, 82(1), 387-413.

Estimation: general methods

Chernozhukov, V., H. Hong, and E. Tamer, 2007, "Inference on Parameter Sets in Econometric Models", Econometrica, 75:1243-1284.

Andrews, D.W.K., and P.J. Barwick, 2012, "Inference for Parameters defined by Moment Inequalities: A recommended moment selection procedure", Econometrica, 80:2805-2826.

Andrews, D.W.K., and G. Soares, 2011, "Inference for Parameters Defined by Moment Inequalities Using Generalized Moment Selection", Econometrica, 78:119-157

Andrews, D.W.K., and X. Shi, 2013, "Inference Based on Conditional Moment Inequalities", Econometrica, 81:609-666.

Chernozhukov, V., S. Lee, and A.M. Rosen, 2013, "Intersection Bounds: Estimation and Inference", Econometrica, 81: 667-737.

Romano, J.P., A.M. Shaikh, and M. Wolf, 2014, "A Practical Two-Step Method for Testing Moment Inequalities", Econometrica, 82(5), 1979-2002.

Applications

Blundell, R., A. Gosling, H. Ichimura, and C. Meghir, 2007, "Changes in the Distribution of Male and Female Wages Accounting for Employment Composition Using Bounds", Econometrica, 75:323-363.

Ciliberto, F., and E. Tamer, 2009, "Market Structure and Multiple Equilibria in Airline Markets", Econometrica, 77:1791-1828.

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Honoré, B., and A. Lleras-Muney, 2004, "Bounds in Competing Risks Models and the War on Cancer", Econometrica 74: 1675-1698.

Lee, D.S., 2009, "Training, Wages, and Sample Selection: Estimating Sharp Bounds on Treatment Effects", Review of Economic Studies, 76(3):1071-1102.

Manski, C.F., and J.V. Pepper, 2013, "Deterrence and the Death Penalty: Partial Identification Analysis Using Repeated Cross Sections", Journal of Quantitative Criminology, 29(1), 123-141.

Pakes, A., J. Porter, K. Ho and J. Ishii, 2015, "Moment Inequalities and their Applications", Econometrica, 83(1), 315-334.