

Semi- and Non-Parametric Econometric Methods
CEMMAP Masterclass
28-29 May, 2009

Prof. James L. Powell
University of California, Berkeley

Abstract

This short course will provide a survey of the econometrics literature on semiparametric and nonparametric models and estimation methods. After a review of asymptotic theory for estimation (including maximum likelihood and generalized method of moments estimation), the course will cover the basic large sample properties of nonparametric (kernel) estimators of density and regression functions, and then cover semiparametric assumptions and estimation methods for several limited dependent variable models, including binary response, censored regression, and sample selection models. The course will conclude with discussions of more recent literature on semi- and nonparametric models for panel data and endogenous regressors.

Program and Reference List

1. Overview of semiparametric and nonparametric estimation

References:

Powell, J.L. (1994), "Estimation of Semiparametric Models," in Engle, R.F. and D.L. McFadden, eds., *Handbook of Econometrics, Vol. 4* (North Holland), Sec. 1.1, 1.2.

*Pagan, A.P. and A. Ullah (1999), *Nonparametric Econometrics* (Cambridge University Press), Ch. 1.

*Manski, C.F. (1988), *Analog Estimation Methods in Econometrics* (Chapman-Hall), Ch. 1, 2, 6.

2. Review of asymptotic theory

References:

Powell, J.L., "Elements of Asymptotic Theory," "Notes on Method of Moments Estimation," and "Notes on Quantile Regression," lecture notes.

Powell, J.L., "Estimation of Semiparametric Models," Sec. 1.3.

*Pagan and Ullah, *Nonparametric Econometrics*, Appendix A.

3. Kernel density and regression estimation

References:

Powell, J.L., "Notes on Nonparametric Density Estimation," and "Notes on Nonparametric Regression Estimation," lecture notes.

*Pagan and Ullah, *Nonparametric Econometrics*, Ch. 2, 3.

4. Semiparametric binary response models

References:

Powell, James L. (2008), "Semiparametric Estimation," in S.N. Durlauf and L.E. Blume, eds., *The New Palgrave Dictionary of Economics*, Second Edition, Palgrave Macmillan.

Powell, J.L., "Estimation of Semiparametric Models," Sec. 3.1.

*Pagan and Ullah, *Nonparametric Econometrics*, Sec. 7.1-7.3, Sec. 7.5.1-7.5.4.

*Manski, C.F. (1985), "Semiparametric Analysis of Discrete Response, Asymptotic Properties of the Maximum Score Estimator," *Journal of Econometrics*, 27, 205-228.

*Horowitz, J.L. (1992), "A Smoothed Maximum Score Estimator for the Binary Response Model," *Econometrica*, 60, 505-531.

*Han, A.K. (1987a), "Non-Parametric Analysis of a Generalized Regression Model: The Maximum Rank Correlation Estimator," *Journal of Econometrics*, 35, 303-316.

*Cosslett, S.R. (1983), "Distribution-Free Maximum Likelihood Estimator of the Binary Choice Model," *Econometrica*, 51, 765-782.

5. Single index regression models

References:

Powell, J.L., "Estimation of Semiparametric Models," Sec. 3.2.

*Pagan and Ullah, *Nonparametric Econometrics*, Sec. 7.4, 7.5.6.

*Stoker, T.M. (1986), "Consistent Estimation of Scaled Coefficients," *Econometrica*, 54, 1461-1481.

*Powell, J.L., J.H. Stock and T.M. Stoker (1989), "Semiparametric Estimation of Weighted Average Derivatives," *Econometrica*, 57, 1403-1430.

*Hardle, W. and T.M. Stoker (1989) "Investigating Smooth Multiple Regression by the Method of Average Derivatives," *Journal of the American Statistical Association*, 84, 986-995.

*Klein, R.W. and R.H. Spady (1993), "An Efficient Semiparametric Estimator for Discrete Choice Models," *Econometrica*, 61, 387-421.

*Ichimura, H. (1993), "Semiparametric Least Squares (SLS) and Weighted SLS Estimation of Single Index Models," *Journal of Econometrics*, 58, 71-120.

6. Semiparametric censored and truncated regression models

References:

Chay, K.Y. and J.L. Powell (2001), "Semiparametric Censored Regression Models," *Journal of Economic Perspectives*, 15, 29-42.

Powell, J.L., "Estimation of Semiparametric Models," Sec. 3.3.

*Pagan and Ullah, *Nonparametric Econometrics*, Sec. 9.5-9.7.

*Powell, J.L. (1984), "Least Absolute Deviations Estimation for the Censored Regression Model," *Journal of Econometrics*, 25, 303-325.

*Powell, J.L. (1986), "Symmetrically Trimmed Least Squares Estimation of Tobit Models," *Econometrica*, 54, 1435-1460.

*Horowitz, J.L. (1986), "A Distribution-Free Least Squares Estimator for Censored Linear Regression Models," *Journal of Econometrics*, 32, 59-84.

*Buchinsky, M. and J. Hahn (1998), "An Alternative Estimator for the Censored Quantile Regression Model," *Econometrica*, 66, 653-672.

7. Semilinear regression and semiparametric selection models

References:

Powell, J.L., "Estimation of Semiparametric Models," Sec. 3.4.

*Pagan and Ullah, *Nonparametric Econometrics*, Sec. 5.1-5.2, 8.1-8.3.

*Robinson, P. (1988b), "Root-N-Consistent Semiparametric Regression," *Econometrica*, 56, 931-954.

*Cosslett, S.R. (1991), "Distribution-Free Estimator of a Regression Model with Sample Selectivity," in Barnett, W.A., J.L. Powell, and G. Tauchen, eds., *Nonparametric and Semiparametric Methods in Econometrics and Statistics* (Cambridge University Press).

*Ahn, H. and J.L. Powell (1993), "Semiparametric Estimation of Censored Selection Models with a Nonparametric Selection Mechanism," *Journal of Econometrics*, 58, 3-29.

8. Semiparametric panel data models

References:

Powell, J.L., "Estimation of Semiparametric Models," Sec. 3.5.

*Manski, C.F. (1987), "Semiparametric Analysis of Random Effects Linear Models from Binary Panel Data," *Econometrica*, 55, 357-362.

*Honoré, B.E. (1992), "Trimmed LAD and Least Squares Estimation of Truncated and Censored Regression Models with Fixed Effects," *Econometrica*, 60, 533-565.

*Kyriazidou, E. (1997), "Estimation of a Panel Data Sample Selection Model," *Econometrica*, 65, 1335-1364.

*Graham, B.S. and J.L. Powell (2008), "Identification and Estimation of Correlated Random Coefficient Models," manuscript, Dept. of Economics, U.C. Berkeley.

9. Nonparametric and semiparametric models with endogeneity

References:

Blundell R. and J.L. Powell (2003), "Endogeneity in Nonparametric and Semiparametric Regression Models," in Dewatripont, M., L.P. Hansen, and S.J. Turnovsky, eds., *Advances in Economics and Econometrics: Theory and Applications, Eighth World Congress, Vol. II* (Cambridge University Press).

*Pagan and Ullah, *Nonparametric Econometrics*, section 6.5.

*Newey, W.K. and J.L. Powell (2003), "Instrumental Variables Estimation for Nonparametric Models," *Econometrica*, 71: 1565-1578.

*Ai, C. and X. Chen (2003), "Efficient Estimation of Models with Conditional Moment Restrictions Containing Unknown Functions," *Econometrica*, 71: 1795-1843.

*Newey, W.K., J.L. Powell, and F. Vella (1999), "Nonparametric Estimation of Triangular Simultaneous Equations Models," *Econometrica*, 67, 565-604.

*Das, M., W.K. Newey, and F. Vella (2003), "Nonparametric Estimation of Sample Selection Models," *Review of Economic Studies*, 70, 33-58.

*Blundell, R. and J.L. Powell (2004), "Endogeneity in Semiparametric Binary Response Models," *Review of Economic Studies*, 71, 581-913.

*Imbens, G.W. and W.K. Newey (2002), "Nonparametric Identification of Triangular Simultaneous Equation Models Without Additivity," NBER Technical Working Papers No, 0285.

*Chesher, A. (2008), "Identification of Nonadditive Structural Functions", in R. Blundell, W. Newey and T. Persson, eds., *Advances in Economics and Econometrics, Theory and Applications, 9th World Congress*. Cambridge: Cambridge University Press.

*Blundell, R. and J.L. Powell (2007), "Censored Quantile Regression with Endogenous Regressors," *Journal of Econometrics*, 141. 65-83.