Identifiability and Estimation of Semiparametric Nonlinear Errors-in-Variables Models

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Abstract: This paper deals with a nonlinear errors-in-variables model where distributions of the unobserved predictor variables and random errors are nonparametric. It is assumed that instrumental variables exist which are related to the unobserved predictor variables through a prediction equation. A rank condition for model identifiability is derived using the method of moments and Fourier deconvolution. This condition is practical and easy to check. Consistent estimators for the unknown parameters in the regression function and a kernel-type nonparametric estimator for the density of the random error in the prediction equation are constructed. Under the additional assumption that the distribution of the random error in the prediction equation has a parametric form, minimum distance estimators are proposed for the unknown parameters in this distribution and in the regression function. Under fairly general regularity conditions, these estimators are consistent and asymptotically normally distributed. To overcome the possible computational difficulty of minimizing an objective function which involves multiple integrals, simulation-based estimators are proposed that are consistent and asymptotically normally distributed under the same regularity conditions. The estimation methods extend those of Wang (2003, 2004).

References

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