Matching Points: Supplementing Instruments with Covariates to Identify and Estimate Nonparametric Triangular Models

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Abstract

We develop a novel approach to nonparametrically identify models with (a) a discrete endogenous variable and (b) an IV possibly taking on fewer values. When the order condition fails, we show how covariates can supplement the IV and restore identification. This is the first approach that achieves nonparametric identification with (a) and (b). Critical to it are the *matching points*; shifting the covariates from a fixed value to them offsets the effect of the IV on selection. We show the matching points can be obtained under a general class of selection models. Given identification, we construct consistent and asymptotic normal estimators. Monte Carlo simulations are conducted and two empirical applications illustrate the usefulness of the approach.

Keywords: Nonseparable models, instrumental variables, endogeneity, generalized propensity scores, sieve estimation.

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