Causal Inference with Auxiliary Observations

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Abstract

Random assignment of treatment and concurrent data collection on treatment and control groups is often impossible in the evaluation of social programs. A standard method for assessing treatment effects in such infeasible situations is to estimate the local average treatment effect under exclusion restriction and monotonicity assumptions. Recently, several studies have proposed methods to estimate the average treatment effect by additionally assuming treatment effects homogeneity across principal strata or conditional independence of assignment and principal strata. However, these assumptions are often difficult to satisfy. We propose a new strategy for nonparametric identification of causal effects that relaxes these assumptions by using auxiliary observations that are readily available in a wide range of settings. Our strategy identifies the average treatment effect for compliers and average treatment effect on treated under only exclusion restrictions and the assumptions on auxiliary observations. The average treatment effect is then identified under relaxed treatment effects homogeneity. We propose sample analog estimators when the assignment is random and multiply robust estimators when the assignment is non-random. We then present details of the GMM estimation and testing methods which utilize overidentified restrictions. The proposed methods are illustrated by empirical examples which revisit the studies of key issues in economics.

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