

Estimation of Average Treatment Effects Using Panel Data with Fixed Effects

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January 22, 2015

Abstract

This paper proposes two new approaches to identify and estimate the average treatment effects (ATEs) using panel data when the treatment assignment is ignorable only after conditioning on unobservable time-invariant characteristics (i.e., fixed effects). We allow the fixed effects to affect the potential outcome under treatment and that under control differently. Note that the popularly used fixed effects estimator can be used only when the fixed effects have the same influences on each of these potential outcomes. Furthermore, we allow the ATEs to vary over time. The first of our proposed methods is called the “Substituting Fixed Effects (SFE)” estimation and requires the data on pretreatment periods in which none of individuals receives the treatment. We estimate the fixed effects using the pretreatment data and then use the estimated fixed effects as a covariate to estimate the ATEs. Instrumental variables are used to deal with the estimation error in the estimated fixed effects. The second method is called the “Potential Outcome Long Difference (POLD)” estimation. It can estimate the ATE for a subpopulation in which each unit is under control in the initial period in the data and also receives the treatment in the end of the time periods in the data. We derive the asymptotic properties of these estimators and investigate their finite sample properties in a simulation study. As an empirical illustration, we study the effect of marriage on men’s wage.

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