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Estimation of Average Treatment Effects with Panel Data: Asymptotic Theory and Implementation

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Abstract

Hsiao, Ching and Wan (HCW 2012) propose a novel method to estimate the average treatment effect using panel data. In this paper, we accomplish the following: (i) We relax some of the distributional assumptions made in HCW and show that the HCW method works for a much wider range of data generating processes; (ii) We derive the asymptotic distribution of HCW's average treatment effect estimator which facilitates inference; (iii) When there exists a large number of control units, we propose using the LASSO method to select control units. We show that the LASSO method is computationally more efficient compared to conventional model selection criteria. Moreover, the LASSO method leads to more accurate out-of-sample prediction results than many commonly adopted approaches such as BIC, AIC, AICC and the leave-many-out cross validation methods (Du and Zhang, 2015).

Key words: Average treatment effects; Asymptotic distribution; LASSO method.

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