Using Covariates to Improve Inference in the Preference-Incorporating Choice and Assignment (PICA) Design for Randomized Controlled Trials

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Abstract

A key challenge in randomized controlled trials (RCTs) is to ensure external validity so that findings from a study can inform real-world policy decisions, where individual decision-makers may self-select into different treatments based on their own preferences about the treatment options. If the effects of treatments depend on subjects' treatment preferences, the average treatment effects (ATEs) estimated in a standard RCT will be biased for the conditional ATEs among those who actually prefer to take the treatment. Knox et al. (2019) proposed a new experimental design, later coined the preference-incorporating choice and assignment (PICA) design (de Benedictis-Kessner et al., 2019), which employs double randomization to estimate the ATE conditional on treatment choice. In this paper, we extend the PICA design to incorporate subjects' pre-treatment characteristics which might confound effect heterogeneity even after conditioning on their stated preferences. This extension not only relaxes the key identification assumption in the original design to address possible bias but also potentially improves precision in the estimates. After establishing nonparametric identification results, we propose both frequentist and Bayesian approaches for inference and study their finite-sample performance via Monte Carlo simulations. We illustrate the proposed method with empirical application to media exposure experiments.

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