

Non-Ignorable Attrition in Pairwise Randomized Experiments

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Abstract

The pairwise randomized experiments enable robust and efficient causal inference. What if outcomes of some units are missing? One way is to delete missing units and calculate difference-in-means (unitwise deletion estimator, UDE). Another method is to delete the other unit in the pair as well (pairwise deletion estimator, PDE). UDE is biased. Some scholars argue that PDE is unbiased, while opponents criticize that PDE is also biased if attrition is non-ignorable and PDE is less efficient than UDE. By using the potential outcome framework, this study formally shows that PDE can be biased but more efficient than UDE; the pairwise variance estimator of PDE is unbiased in the super-population. I argue that it is easier to interpret PDE as a causal effect than UDE. I also propose a new variance estimator. Finally, in order to show how PDE and UDE work, reanalysis of Angrist and Lavy (2009) is demonstrated. This paper recommends PDE.

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