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Robust and efficient estimation for the treatment effect in causal inference and missing data problems*

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Abstract

The Mann-Whitney statistic based on complete data only might be invalid if the outcome variables are missing due to certain covariates. In this paper, we used the probabilistic index modelling (Thas et al, 2012) to obtain a new Mann-Whitney statistic when missingness occurs in the outcomes but multiple explanatory variables are observable. Our method combined the efficiency of the model-based approach and the robustness of the nonparametric approach. It requires few model assumptions and is shown to be efficient if all specifications are correct, and doubly robust if some part is misspecified. Results from simulation studies and a real data analysis of consumer phone loans are presented to demonstrate the advantages of the proposed method over others.

JEL classification: C14 C18

Key words and phrases: Dimension reduction; Kernel smoothing; Missing outcomes; Robust; Semi-parametrically efficient; Mann-Whitney statistics.

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