Causal Inference with Noncompliance and Unknown Interference

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Abstract

This paper studies a treatment effect model in which individuals interact in a social network and they may not comply with the assigned treatment. We introduce a new concept of exposure mapping, which summarizes spillover effects into a fixed dimensional statistic of instrumental variables, and we call this mapping the instrumental exposure mapping (IEM). We investigate identification conditions for the intention-to-treat effect and the average causal effect for compliers, while explicitly considering the possibility of misspecification of IEM. Based on our identification results, we develop nonparametric estimation procedures for the treatment parameters and investigate their asymptotic properties including consistency and asymptotic normality based on the approximate neighborhood interference framework by Leung (2020). Statistical inference methods using a network HAC estimator are also proposed.

Keywords: exposure mapping; instrumental variables; local average treatment effect; network interference; spillover effects.

JEL Classification: C14, C31, C51.

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