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Causal inference has become increasingly important in the social sciences with the widespread use of quasi-experimental designs (Schmidheiny and Siegloch, 2023). A widely used approach for answering this question is the event-study difference-in-differences method, which compares outcomes before and after a policy change between affected and unaffected groups (see e.g. Callaway and Sant’Anna (2021), Sun and Abraham (2021)). While recent developments have addressed heterogeneity in treatment timing, they provide limited insight into whether treatment effects themselves are homogeneous or heterogeneous. This research develops a new approach that separates the overall policy effect from differences in effects across treated individuals, helping researchers better understand treatment effect heterogeneity.

This study develops a multilevel framework for the difference-in-differences design and shows that the ATT can be recovered from nested random-intercept models. The proposed approach decomposes treatment effects into a homogeneous component and a component driven by systematic differences across treated units. I also demonstrate that conventional pre-trend tests may produce misleading conclusions when treatment-effect heterogeneity is ignored. In addition, my method aggregates the ATT using parameters from the post-treatment period rather than averaging estimated treatment effects across periods, thereby avoiding a potential source of bias. The framework is illustrated by revisiting two well-known applications: the effects of minimum wages on teenage unemployment and the consequences of hospitalization.

In this presentation, I will introduce the proposed multilevel framework, explain how it identifies and decomposes heterogeneous treatment effects, discuss its implications for pre-trend testing and ATT aggregation, and demonstrate its performance using empirical applications. Attendees will gain practical insights into how multilevel modelling can strengthen causal inference in difference-in-differences studies.

Keywords

heterogeneous treatment effects, difference-in-differences, decomposition

References

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