B-DiD

Bayesian estimation of causal treatment effects in quasi-experimental settings

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Difference-in-differences estimation is a standard model for the identification of causal treatment effects in quasi-experimental settings. The cannonical version consists of two time periods and two groups, one of which receives a treatment between the first and the second period. The causal treatment effect is identified under the assumption that the average outcomes of the two groups would have evolved in parallel absent the treatment.

Recent literature has focused on two main extensions for the case of multiple available periods. First, the canonical model has been extended to time variation in the adoption of the treatment (referred to as "staggard adoption," Goodman-Bacon 2021; Callaway and Sant'Anna 2021; Sun and Abraham 2021, among others). Second, methodology to inidcate robustness of the treatment effects to violations of the parallel trend assumption has been developed (Rambachan and Roth 2023).

In this project I present a Bayesian extension of the "staggard adoption" difference-in-differences estimation based on Gaussian state-space models and show that it has multiple benefits. First, the lack of pre-treatment parallel trends violations can be shown naturally in a Bayesian framework (e.g., Wagenmakers et al. 2010) rather than arguing based on "large" p-values. Second, the robustness to a hypothesized violation in the parallel trends asumption of treatment effects can be easily assessed by shifting the posterior distribution of the treatment effects parameter. Finally, modern shrinkage priors (e.g., Cadonna, Frühwirth-Schnatter, and Knaus 2020) can be used to obtain confidence in the presence of treatment effects (or lack thereof) and their possible time variation.

References

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