

Intro into Causal Panel Data Methods

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Plan: The goal of this short (4 lectures) course is to introduce students to causal analysis with panel data, focusing on old and new methods such as difference in differences (DID), factor models, synthetic control (SC), and matrix completion. Most of the course will be focused on algorithms. We will start by developing some intuition about balancing estimators for linear models, then will discuss interactive fixed effects models, introduce synthetic control and synthetic DID. The final part of the course will be a short discussion of identification assumptions one has to make to get to causality.

What do you need to know: I expect basic knowledge of the standard causal framework (potential outcomes), familiarity with ordinary least squares (OLS), singular value decomposition (SVD). Basic probability tools will be needed (CLT, conditional expectations, the law of large numbers, etc.). There is a list of papers below, I do not expect you to read them, but the course will be loosely based on them.

References

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- Dmitry Arkhangelsky and Guido Imbens. The role of the propensity score in fixed effect models. Technical report, National Bureau of Economic Research, 2018.
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- Jushan Bai. Panel data models with interactive fixed effects. Econometrica, 77(4):1229–1279, 2009.
- Eli Ben-Michael, Avi Feller, and Jesse Rothstein. The augmented synthetic control method. arXiv preprint arXiv:1811.04170, 2018.
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