

Dynamics, Heterogeneity, and Nonlinearity in Panel Data

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Goals of the Course

This course provides applied researchers and econometricians with tools to estimate dynamic models using panel data. Particular emphasis is placed on relaxing strict exogeneity assumptions, which are widely used in empirical work—including difference-in-differences designs and event studies—but are often economically and empirically restrictive.

We first review classic methods for estimating linear dynamic panel data models with sequentially exogenous covariates. We then turn to more recent approaches that extend these methods to settings with nonlinearities, coefficient heterogeneity, and network dynamics.

Topics

- Day 1** Conceptual foundations: strict exogeneity, sequential exogeneity, and feedback; bias in models with dynamic feedback; and implications for difference-in-differences and event-study designs.
- Day 2** Classic dynamic panel data methods. GMM estimation, and quasi-likelihood and large- T approaches.
- Day 3** Coefficient heterogeneity in models with dynamic feedback. Moment equalities and bounds approaches
- Day 4** Nonlinear models with dynamic feedback. Special models and general approaches to semi-parametric likelihood models
- Day 5** Dynamic models in networks, with a dynamic generalization of AKM.

Main References

- S. Bonhomme, “Back to Feedback: Dynamics and Heterogeneity in Panel Data” (arXiv:2512.17576).
- M. Arellano, *Panel Data Econometrics*. Oxford University Press, 2003.
- J.M. Wooldridge, *Econometric Analysis of Cross Section and Panel Data*, 2nd ed. MIT Press, 2010.
- Additional scientific articles, cited in the individual session notes.