

ECON 715
Advanced Topics in High-Dimensional, Panel Data and Network Econometrics

This course provides an up-to-date coverage of various econometric issues in the analysis of dynamic heterogeneous panels and their implications for the estimation of treatment effects using panel data. The course also considers the problem of variable selection in contexts of panels allowing for heterogeneity and parameter variations. It highlights the importance of allowing for unobserved heterogeneity, dynamics and cross-sectional dependence, including regional and global interconnections. The course also covers topics on econometrics of networks which is viewed as a type of interconnections. It is intended for those interested in getting acquainted with the econometric techniques needed to carry out forecasting and policy analyses using large panel data sets across countries, firms, regions, and/or industries. Consideration will be given to the different cases arising in practice where either the number of units (n) and/or the number of time periods (T) are reasonably large.

I shall also discuss applications from my ongoing research in the areas of regional house prices changes, estimation of factor strength and risk premia in finance, empirical analyses of the effects of quantitative easing using a large panel of firms, and the analysis of national and global shocks using GVARs.

Prerequisite: ECON 511 or equivalent

LECTURE TIMES: Mondays 9:00-12:00noon,
First lecture January 9, 2022 Last lecture April 24, 2023
**First lecture on January 9th will be via Zoom.

LOCATION: KAP 335 (**First lecture on January 9th will be via Zoom.)

OFFICE HOURS: By appointment through Akiko Matsukiyo amatsu@usc.edu

EXAMS: Term paper – deadline be announced. (University Final Exam period May 3 – May 10)

Readings : Books

Baltagi, B.H., (2008), *Econometric Analysis of Panel Data*, Fourth Edition, Wiley-Blackwell.

Hsiao, C., (2022), *Analysis of Panel Data*, Third Edition, Cambridge University Press. Fourth Edition.

Pesaran, M.H., (2015), *Time Series and Panel Data Econometrics*, Oxford University Press, Oxford.

Bühlmann P. van de Geer, S. (2011), *Statistics for High-Dimensional Data, Methods, Theory and Applications*, Springer <https://link.springer.com/book/10.1007/978-3-642-20192-9>

Rue, H., Held. L., (2005), *Gaussian Markov Random Fields, Theory and Applications*, Chapman and Hall/CRC, <https://www.taylorfrancis.com/books/mono/10.1201/9780203492024/gaussian-markov-random-fields-havard-rue-leonhard-held>

Topics:

1. An Overview of static and dynamic panels with short T (time dimension) and large N (cross section dimension)
2. Heterogeneous dynamic panels with large N and T
3. High dimensional techniques and their applications to panel data models. (Lasso and OCMT methods will be discussed and contrasted)
4. Cross- Sectional dependence in panels (strong and weak CD dependence)
5. Mixed strong-weak factor models. Measurement and estimation of factor strength. Application to estimation of risk premia in finance.
6. Production and financial networks and how to detect pervasive units (if any) in networks
7. Spatial panel econometrics, and econometric analysis of networks
8. Aggregation in large panel data models
9. Global vector autoregressions (GVAR) and their applications to modelling interdependence