New York University **Spring 2026**
Department of Economics

Econometrics II (Panel Data)

Syllabus: December 2025

Instructor:	Martín Almuzara, *martin.almuzara@ny.frb.org*
TA:	Rafael Lincoln, *rafael.lincoln@nyu.edu*
Lectures:	Tue / Thu
Office hours:	By appointment

Description. The course presents econometric concepts, models and methods for panel data, and their application to economics. We will study linear and non-linear panel models from fixed effects and random effects perspectives. We will also cover methods for matched employer-employee data and for problems that combine macro and micro data.

Material. Handouts will be made available before class. There is no required textbook for the course. If you find it useful to have a reference book, we suggest the following:

Arellano, M. (2003): *Panel Data Econometrics*. Oxford University Press.

Wooldridge, J. (2010): *Econometric Analysis of Cross Section and Panel Data*. MIT Press.

Optional readings that are useful for a deeper understanding of the material are listed below.

Homework. Problem sets will be assigned. Students are encouraged to collaborate, but answers and computer code must be typed up independently. Problem sets will be graded coarsely, i.e., a full score will be given as long as the work demonstrates dedication and thoughtfulness. We reserve the right to subtract points for sloppy exposition or unreadable code. If you find a grading error, resubmit your problem set along with a one-paragraph explanation. We reserve the right to re-grade the entire problem set.

Project presentation. Instead of a midterm and final exam, students will present a project in the final week of the course. Students may choose to collaborate in groups of two. The project may be original work, an in-depth critical assessment of an existing paper from the literature, or somewhere in between. Students should receive prior approval from the instructor of their choice of project topic.

Grading. Final grade will be increasing in the average of (i) the average problem set score (50% weight) and (ii) the project presentation score (50% weight).

Important dates. Preliminary. Changes will be announced via course email.

Mar 12	First class
Mar 17 and Mar 19	No class due to Spring Break
May 5	Last class
	Problem sets become available
	Final presentation due

Course outline. Preliminary. Outline may change without warning.

1) Introduction.
   (a) Why panel data? The role of heterogeneity.
   (b) Refresher: GMM, optimal instruments, large-sample approximations.
   (c) Simulated method of moments and indirect inference.
2) Linear panel data models.
   (a) Static models: fixed effects vs random effects.
   (b) Random coefficients.
   (c) Dynamic models: fixed-T biases.
3) Nonlinear panel data models.
   (a) Fixed-T: logits, mixtures and quantiles.
   (b) Large-T: incidental parameters and bias reduction.
   (c) Grouped/discretized heterogeneity.
4) Beyond panel data.
   (a) Bipartite networks and matched datasets.
   (b) Combining macro and micro data.

Optional reading list

Abowd, J. M., F. Kramarz, and D. N. Margolis (1999): "High wage workers and high wage firms," *Econometrica*, 67, 251–333.

Abowd, J. M., K. L. McKinney, and I. M. Schmutte (2019): "Modeling endogenous mobility in earnings determination," *Journal of Business & Economic Statistics*, 37, 405–418.

Ando, T. and J. Bai (2016): "Panel data models with grouped factor structure under unknown group membership," *Journal of Applied Econometrics*, 31, 163–191.

Andrews, M. J., L. Gill, T. Schank, and R. Upward (2008): "High wage workers and low wage firms: negative assortative matching or limited mobility bias?" *Journal of the Royal Statistical Society: Series A (Statistics in Society)*, 171, 673–697.

Arellano, M., R. Blundell, and S. Bonhomme (2017): "Earnings and consumption dynamics: a nonlinear panel data framework," *Econometrica*, 85, 693–734.

Arellano, M. and S. Bond (1991): "Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations," *The Review of Economic Studies*, 58, 277–297.

Arellano, M. and S. Bonhomme (2009): "Robust priors in nonlinear panel data models," *Econometrica*, 77, 489–536.

——— (2011): "Nonlinear panel data analysis," *Annu. Rev. Econ.*, 3, 395–424.

Belloni, A., V. Chernozhukov, D. Chetverikov, and I. Fernández-Val (2019): "Conditional quantile processes based on series or many regressors," *Journal of Econometrics*, 213, 4–29.

Belloni, A., V. Chernozhukov, C. Hansen, and D. Kozbur (2016): "Inference in high-dimensional panel models with an application to gun control," *Journal of Business & Economic Statistics*, 34, 590–605.

Bonhomme, S. (2012): "Functional differencing," *Econometrica*, 80, 1337–1385.

——— (2020): "Econometric analysis of bipartite networks," in *The Econometric Analysis of Network Data*, Elsevier, 83–121.

Bonhomme, S., T. Lamadon, and E. Manresa (2019): "A distributional framework for matched employer employee data," *Econometrica*, 87, 699–739.

——— (2022): "Discretizing unobserved heterogeneity," *Econometrica*, 90, 625–643.

Bonhomme, S. and E. Manresa (2015): "Grouped patterns of heterogeneity in panel data," *Econometrica*, 83, 1147–1184.

Browning, M., M. Ejrnaes, and J. Alvarez (2010): "Modelling income processes with lots of heterogeneity," *The Review of Economic Studies*, 77, 1353–1381.

Chamberlain, G. (1984): "Panel data," *Handbook of econometrics*, 2, 1247–1318.

——— (2010): "Binary response models for panel data: Identification and information," *Econometrica*, 78, 159–168.

Doraszelski, U. and J. Jaumandreu (2013): "R&D and productivity: Estimating endogenous productivity," *Review of Economic Studies*, 80, 1338–1383.

Fernández-Val, I. and J. Lee (2013): "Panel data models with nonadditive unobserved heterogeneity: Estimation and inference," *Quantitative Economics*, 4, 453–481.

Fernández-Val, I. and M. Weidner (2016): "Individual and time effects in nonlinear panel models with large N, T," *Journal of Econometrics*, 192, 291–312.

——— (2018): "Fixed effects estimation of large-T panel data models," *Annual Review of Economics*, 10, 109–138.

Finkelstein, A., M. Gentzkow, and H. Williams (2016): "Sources of geographic variation in health care: Evidence from patient migration," *The quarterly journal of economics*, 131, 1681–1726.

Freyaldenhoven, S., C. Hansen, and J. M. Shapiro (2019): "Pre-event trends in the panel event-study design," *American Economic Review*, 109, 3307–38.

Gao, C., Y. Lu, and H. H. Zhou (2015): "Rate-optimal graphon estimation," *The Annals of Statistics*, 43, 2624–2652.

Gourieroux, Phillips, and Yu (2010): "Indirect inference for dynamic panel models," *Journal of Econometrics*, 157, 68–77.

Gu, J. and S. Volgushev (2019): "Panel data quantile regression with grouped fixed effects," *Journal of Econometrics*, 213, 68–91, annals: In Honor of Roger Koenker.

Hahn, J. and G. Kuersteiner (2002): "Asymptotically unbiased inference for a dynamic panel model with fixed effects when both n and T are large," *Econometrica*, 70, 1639–1657.

Hahn, J. and H. R. Moon (2010): "Panel data models with finite number of multiple equilibria," *Econometric Theory*, 26, 863–881.

Hahn, J. and W. Newey (2004): "Jackknife and analytical bias reduction for nonlinear panel models," *Econometrica*, 72, 1295–1319.

Hansen, C. B. (2007): "Asymptotic properties of a robust variance matrix estimator for panel data when T is large," *Journal of Econometrics*, 141, 597–620.

Honoré, B. E. and E. Kyriazidou (2000): "Panel data discrete choice models with lagged dependent variables," *Econometrica*, 68, 839–874.

Honoré, B. E. and A. Lewbel (2002): "Semiparametric binary choice panel data models without strictly exogeneous regressors," *Econometrica*, 70, 2053–2063.

Hu, Y. and M. Shum (2012): "Nonparametric identification of dynamic models with unobserved state variables," *Journal of Econometrics*, 171, 32–44.

Jochmans, K. and M. Weidner (2019): "Fixed-Effect Regressions on Network Data," *Econometrica*, 87, 1543–1560.

Kline, P., R. Saggio, and M. Sølvsten (2020): "Leave-out estimation of variance components," *Econometrica*, 88, 1859–1898.

Kranton, R. E. and D. F. Minehart (2001): "A theory of buyer-seller networks," *American economic review*, 91, 485–508.

Lachowska, M., A. Mas, R. Saggio, and S. A. Woodbury (2022): "Do firm effects drift? Evidence from Washington administrative data," *Journal of Econometrics*.

Lei, J. and A. Rinaldo (2015): "Consistency of spectral clustering in stochastic block models," *The Annals of Statistics*, 43, 215–237.

Levinsohn, J. and A. Petrin (2003): "Estimating production functions using inputs to control for unobservables," *The review of economic studies*, 70, 317–341.

Moon, H. R. and M. Weidner (2015): "Linear regression for panel with unknown number of factors as interactive fixed effects," *Econometrica*, 83, 1543–1579.

Pollard, D. (1982): "A central limit theorem for k-means clustering," *The Annals of Probability*, 10, 919–926.

Rambachan, A. and J. Roth (2019): "An honest approach to parallel trends," *Unpublished manuscript, Harvard University.*

Su, L., Z. Shi, and P. C. B. Phillips (????): "Identifying Latent Structures in Panel Data," *Econometrica*, 84, 2215–2264.

Vogt, M. and O. Linton (2020): "Multiscale clustering of nonparametric regression curves," *Journal of Econometrics*, 216, 305–325.

Woodcock, S. D. (2008): "Wage differentials in the presence of unobserved worker, firm, and match heterogeneity," *Labour Economics*, 15, 771–793.