

ESTIMATE

Early Summer Tutorial In Modern Applied Tools of Econometrics

Instructors: Jeff Wooldridge (Michigan State University), Tim Vogelsang (Michigan State University)

Dates: June 10-12, 2022, 8:30 am to 5:30 pm, Eastern Daylight Time (EDT)
Bonus Stata Session: June 13, 8:30-12:30 EDT

Description: This course covers econometric methods that are commonly used in empirical research in a variety of data settings. The course begins with a review of ordinary least squares with cross-sectional data, with emphasis on the approximating properties of linear regression. Issues of inference in settings with finite populations and clustering will be covered. Properties of OLS and suitable inference methods for time series data are also covered on the first day. Several commonly used nonlinear models in causal inference – logit, probit, the fractional versions of these, and Poisson regression – round out the first day.

The second day begins with treatment effect estimation assuming either random or unconfounded assignment, using the methods covered on day one. Linear panel data models, from both the small- T and large- T perspectives, are also covered on day two. Pooled OLS, random effects, fixed effects, and first differencing are covered in some detail. These methods are applied to provide a modern treatment of difference-in-differences methods with panel data.

Day three covers instrumental variables estimation in both cross-sectional and panel data settings. In the latter case, we discuss how to combine fixed effects and differencing methods with instrumental variables. Nonlinear panel data models, with emphasis on binary, fractional, and nonnegative responses, are also covered on day three. The practically useful correlated random effects approach and the Poisson fixed effects estimator are the focus.

All methods will be illustrated using the software package Stata. The bonus session on Monday, June 13 shows how to use Stata for estimation in staggered difference-in-differences designs, including both linear and nonlinear models. Endogenous switching regressions to estimate treatment effects will be covered as time permits.

Participants will get the most of the course if they have had a first-year econometrics sequence at the advanced undergraduate or master's levels – at the level of Wooldridge, *Introductory Econometrics: A Modern Approach*, 7e, Cengage, 2020. The Wooldridge book *Econometric Analysis of Cross Section and Panel Data*, 2e, MIT Press, 2010, covers much of the material but at a higher level than in the lectures.

The lectures and the Q&A sessions will be recorded and the recordings will be made available to participants.

Course Timetable (Times are Eastern Daylight Time)

DAY 1, Friday June 10

Session 1: 8:30-10:00

Linear approximations and average partial effects. Ordinary Least Squares (OLS) on cross-sectional data. Functional form and selection of regressors.

Q&A/Break: 10:00-10:30

Session 2: 10:30-12:00

Design-based inference. Calculating standard errors with finite populations. Inference with cluster sampling and/or clustered assignment.

Q&A/Lunch Break: 12:00-13:30

Session 3: 13:30-15:00

OLS with time series data. Trends and seasonality. Newey-West standard errors. Fixed- b asymptotics.

Q&A/Break: 15:00-15:30

Session 4: 15:30-17:00

Logit, probit, and hetprobit for binary responses. Fractional response models. Exponential models for count and other nonnegative outcomes. Poisson regression.

Q&A: 17:00-17:30

DAY 2, Saturday June 11

Session 5: 8:30-10:00

Potential outcomes and average treatment effects. Estimation assuming unconfoundedness. Regression adjustment, propensity score methods, doubly robust estimation.

Q&A/Break: 10:00-10:30

Session 6: 10:30-12:00

Microeconomic analysis of linear panel data models under strict exogeneity. Fixed effects, random effects, first differencing. Cluster-robust inference. Specification testing.

Q&A/Lunch Break: 12:00-13:30

Session 7: 13:30-15:00

Large- T panel data analysis. Fixed effects estimation. Driscoll-Kraay standard errors. Estimation with heterogeneous trends.

Q&A/Break: 15:00-15:30

Session 8: 15:30-17:00

Difference-in-differences with panel data. Pooled OLS and fixed effects estimation with staggered interventions and covariates. Violation of parallel trends.

Q&A: 17:00-17:30

DAY 3, Sunday June 12

Session 9: 8:30-10:00

Instrumental variables and two-stage least squares estimation with cross-sectional data. Weak instruments. Specification testing. Models nonlinear in explanatory variables.

Q&A/Break: 10:00-10:30

Session 10: 10:30-12:00

Combining panel data methods with instrumental variables. Fixed effects 2SLS. First-differencing strategies and generalized method of moments estimation.

Q&A/Lunch Break: 12:00-13:30

Session 11: 13:30-15:00

Nonlinear panel data models with strictly exogenous explanatory variables. Application of correlated random effects to binary and fractional responses. Fixed effects Poisson estimation with an exponential mean. Cluster-robust inference.

Q&A/Break: 15:00-15:30

Session 12: 15:30-17:00

Endogeneity in nonlinear models. Control function methods for binary and fractional response. Exponential models. Panel data extensions.

Q&A: 17:00-17:30

DAY 4 (Bonus Stata Sessions), Monday June 13

Session 13: 8:30-10:00

Using regress, xtreg, logit, probit, glm, fracreg, xtpoisson in staggered DiD designs.

Q&A/Break: 10:00-10:30

Session 14: 10:30-12:00

Using probit and regress with bootstrapping to implement flexible control function estimation of endogenous switching models of treatment effects.

Q&A: 12:00-12:30