



TRAINING COURSE | ONLINE

LINEAR PANEL DATA MODELS IN STATA

10-11, 13-14 March 2025

Panel data analysis is increasingly used in econometrics, financial analysis, public health, political and social sciences, since it enable researchers to allow for different types of latent heterogeneity between observations. Allowing researchers for example, to control for variables that cannot be directly observed or measured, such as cultural factors or differences in business practices across companies. The use of Panel Data in empirical studies also tends to result in a considerable improvement in the accuracy of the obtained estimates, since panel data sets usually contain more sample variability and higher degrees of freedom. Finally, panel data allows for the estimation of dynamic models, with causal relationships which may not arise instantaneously, but over a period of time.

This introductory course offers participants the opportunity to acquire the necessary theoretical background and the applied skills to enable them to: i) independently employ micro panel data techniques to their own research topics, and ii) to understand and evaluate micro panel data analyses published in the academic literature.

This course focuses on the linear model techniques adopted for the analysis of a typical micro panel-data set with a large number of individuals and a small number of time periods. Such techniques include: fixed and random effects models; robust inference and instrumental-variables estimators.

In common with TStat's training philosophy, each individual session is composed of both a theoretical component (in which the techniques and underlying principles behind them are explained), and an applied (hands-on) segment, during which participants have the opportunity to implement the techniques using real data under the watchful eye of the course tutor. Throughout the course, theoretical sessions are reinforced by case study examples, in which the course tutor discusses and highlights potential pitfalls and the advantages of individual techniques. The intuition behind the choice and implementation of a specific technique is of the utmost importance. In this manner, the course leader is able to bridge the "often difficult" gap between abstract theoretical methodologies, and the practical issues one encounters when dealing with real data. At the end of the course, participants are expected to be able to autonomously implement the theories and methodologies discussed during the course.

TARGET AUDIENCE

The panel data training course is of particular interest to Master and Ph.D. Students, Researchers in public and private research centres and Professionals working in the following fields: Agricultural Economics, Economics, Finance, Management, Public Health, and the Political and Social Sciences seeking to acquire the "introductory" applied and theoretical toolset to enable them to undertake independent empirical research using panel data.

COURSE CODE

D-EF10-A-OL

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PREREQUISITES

Participants are required to have a good working knowledge of:

- the classical linear regression model: Model Assumptions, Estimation and Inference; and
- the statistical software *Stata*: including familiarity with *Stata* variable creation commands and *Stata do files*.

Those needing to refresh these concepts are referred to:

- Cameron, A. C. & Trivedi, P. K. (2022). *Microeconometrics Using Stata, Volume I: Cross-Sectional and Panel Regression Methods*. Second Edition. Stata Press. Chapters: 1-9.

PROGRAM

SESSION I: INTRODUCTION

1. Panel data: benefits for estimation and inference
2. Preliminary commands: *xtset*, *xtdescribe*

SESSION II: LINEAR PANEL DATA MODELS WITH EXOGENOUS VARIABLES

1. One-way and two-way fixed effect estimators: *xtreg*, *fe*
2. Random Effects Estimators: *xtreg*, *re*, *xtmixed*

SESSION III: LINEAR PANEL DATA MODELS WITH EXOGENOUS VARIABLES: ROBUST INFERENCE

1. Robust covariance estimators
2. The first-difference estimator
3. Testing for non *i.i.d.* errors
4. Testing Random Effects against Fixed Effects:
 - non-robust approach using *Hausman*
 - robust approach using Mundlak auxiliary regression

SESSION IV: LINEAR PANEL DATA MODELS WITH ENDOGENOUS VARIABLES

1. Fixed and Random Effect IV Estimators: *xtivreg*
2. Hausman and Taylor's estimator: *xthtaylor*

SUGGESTED READINGS

- Cameron, A. C. & Trivedi, P. K. (2022). *Microeconometrics Using Stata, Volume I: Cross-Sectional and Panel Regression Methods*. Second Edition. Stata Press.
- Cameron, A. C. & Trivedi, P. K. (2022). *Microeconometrics Using Stata, Volume II: Nonlinear Models and Casual Inference Methods*. Second Edition. Stata Press.
- Woodridge, J. (2010). *Econometric Analysis of Cross Section and Panel Data*. MIT Press.



