



# Applied Panel Data Analysis

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Instructor: Junior Professor Dr Volker Ludwig, TU Kaiserslautern

## Course outline

The workshop covers basic and advanced methods of panel data analysis for social research from an applied perspective. The focus is on individual data from panel surveys (large N, small T).

Panel data offer important advantages over cross-sectional data, in particular, the identification of causal effects with relatively weak assumptions and the analysis of individual life-course trajectories. Special methods for panel data analysis are however needed to make use of these advantages. The workshop gives an applied overview. The starting point is the linear fixed effects (FE) regression model and its advantages compared to alternative models (random effects). The course furthermore covers the modelling of impact functions and growth curves with practical advice for researchers. Finally, useful extensions will be presented, notably the linear FE model with Individual Slopes (FEIS) and the FE logistic regression model (FE Logit). In the workshop, the structure of regression models is explained. The application of statistical models is demonstrated with Stata and real data examples.

## Prerequisites

Knowledge of cross-sectional linear and logistic regression is assumed. Knowledge of Stata is an advantage.

## **Time Schedule and Topics covered**

Monday 27.03.2023: Basics of Panel Data Analysis

- Structure of Panel data, Fixed and Random Effects models

Tuesday 28.03.2023: Estimation of Impact Functions

- Time-constant and time-varying treatment effects

Wednesday 29.03.2023: Growth Curve Models

- Age-Period-Cohort Problem, Group-specific growth curves

Thursday 30.03.2023: Further Linear Panel Models

- Fixed Effects Individual Slopes (FEIS) and Random Slopes (RS) models

Friday 31.03.2023: Nonlinear Panel Models

- Fixed Effects Logit (FE Logit) model, Event History Analysis with repeated Events

## Literature

### Basics

Brüderl, J. & V. Ludwig (2015) Fixed-Effects Panel Regression. In: H. Best and C. Wolf (eds.) Regression Analysis and Causal Inference. London: Sage, 327-357.

(Basics of the course are contained here.)

Allison, P.D. (2009) Fixed Effects Regression Models. Thousand Oaks: Sage.

(Applied textbook, covering main linear and nonlinear models. Short and sweet.)

Wooldridge, J. (2010<sup>2</sup>) Econometric Analysis of Cross Section and Panel Data. Cambridge: MIT.  
(The econometric standard textbook for regression analysis. Very detailed, very concise.)

### Further reading

Ludwig, V. & J. Brüderl (2021) [What You Need to Know When Estimating Impact Functions with Panel Data for Demographic Research](https://doi.org/10.12765/CPoS-2021-16). Comparative Population Studies 46: 453-486. <https://doi.org/10.12765/CPoS-2021-16>.

Rüttenauer, T. & V. Ludwig (2020). Fixed Effects Individual Slopes: Accounting and Testing for Heterogeneous Effects in Panel Data or Other Multilevel Models, Sociological Methods and Research (Online First). <https://osf.io/preprints/socarxiv/k4rnu/>

## About the trainer

Volker Ludwig is Assistant Professor for Applied Sociology at the Technische Universität Kaiserslautern since October 2016. From 2008 to 2012, he was a research assistant at the Chair of Statistics and Social Science Methodology in Mannheim and worked in the DFG long-term project of the German Family Panel (pairfam), which was based at the Mannheim Centre for European Social Research (MZES). From 2012 to 2016, he was a research assistant at the Chair of Sociology at the Ludwig Maximilian University of Munich. In 2021, Volker Ludwig also worked as a substitute professor for sociology, in particular quantitative methods of empirical social research at the University of Bremen. His research interests include family research, labor market research and social research methods, in particular survey methods and statistical analysis of longitudinal data.