



A Three-Day Advanced Training Course Casual inference based on non-experimental data

Prof. Michael Gebel, University of Bamberg, Germany

14th to 16th of June 2023

TLU Centre of Excellence in Interdisciplinary Lifecourse Studies

Course description

Estimating causal effects is one of the central concerns of quantitative empirical social research. In research practice, often only non-experimental data are available, making causal inferences difficult due to non-random selection. In current empirical social science research, methods of modern causal analysis are increasingly applied to non-experimental data, which are based on a clear understanding of causality and explicitly address non-random selection. This workshop introduces these methods. According to theory-driven empirical social research, the idea of causal hypotheses is explained as a starting point, and the goal of causal inference is distinguished from the alternative goals of descriptive and predictive inference. Then, as a theoretical basis for all procedures, the counterfactual model of causality and the theory of causal graphs (DAGs - Directed Acyclic Graphs) are introduced and practiced with practical examples. The implications for regression analysis are explained, such as selection of control variables, causal model construction, and regression adjustment procedures. Based on this, the methods (propensity score) matching, entropy balancing, inverse probability weighting, instrument variable estimators and difference-of-differences estimators are introduced in an application-oriented introduction. The methods will be practiced on a PC using the statistical program Stata. Cross-sectional and longitudinal social science data will be used for the practical examples.

14 th of June – Room M-649	
09:00 – 10:30	Causal hypotheses, counterfactual model of causality, causal graphs (DAGs)
10:30 – 10:45	Coffee Break
10:45 – 12:15	Causal hypotheses, counterfactual model of causality, causal graphs (DAGs)
12:15 – 13:00	Lunch break/coffee break
13:00 – 14:30	A new look at regression analysis from the perspective of modern causal analysis: selection of control variables, model building, and regression adjustment
14:30 – 14:45	Break
14:45 – 16:15	(Propensity score) matching, entropy balancing and inverse probability weighting

15 th of June – Room M-649	
09:00 – 10:30	(Propensity score) matching, entropy balancing and inverse probability weighting
10:30 – 10:45	Coffee Break



10:45 – 12:15	(Propensity score) matching, entropy balancing and inverse probability weighting
12:15 – 13:00	Lunch break/coffee break
13:00 – 15:00	Instrumental variable (IV) estimators: classical IV estimator, conditional IV estimator, modern LATE interpretation
15:00 – 16:00	Break
16:00 – 17:30	Public lecture (room M-649): “The effect of temporary contracts on wages: Evidence from comparative analyses”

16 th of June – Room M-649	
09:00 – 10:30	Difference-of-differences (DID) estimator: before-after estimator, DID with individual and aggregate data; DID combined with matching
10:30 – 10:45	Coffee Break
10:45 – 12:15	Difference-of-differences (DID) estimator: before-after estimator, DID with individual and aggregate data; DID combined with matching
12:15 – 13:00	Lunch Break/coffee break
13:00 – 14:30	Individual consultations

Learning outcomes:

By the end of this course, students will be able to:

- explain basic concepts and assumptions of modern causal analysis
- select appropriate methods of modern causal analysis and specify models according to the respective research question
- perform methods of modern causal analysis independently with Stata
- understand and interpret the results of the analyses (output of Stata).

Target group: Researchers and PhD students from social sciences

Group size: max. 20 persons

About the instructor

Michael Gebel is Full Professor of Methods of Empirical Social Research at the University of Bamberg. He graduated in economics and social sciences, and earned his doctoral degree in sociology at the University of Mannheim. He held a European Research Council (ERC) Starting Grant in 2018-23. He is board member of the European Consortium of Sociological Research (ECSR) and associate editor of the journal European Sociological Review (ESR). His research interests include life course research, multilevel analysis of international comparative microdata and methods of modern causal analysis.



Course readings

- Cinelli, C., Forney, A. and J. Pearl (2022). A crash course in good and bad controls. Forthcoming in *Sociological Methods and Research*
- Elwert, F. and C. Winship. (2014). Endogenous selection bias: The problem of conditioning on a collider variable, *Annual Review of Sociology*, 40:31–53.
- Gangl, M. (2010). Causal inference in sociological research. *Annual Review of Sociology* 36:21-47.
- Gangl, M. (2014). Matching estimators for treatment effects. In Best, H. and C. Wolf (Eds) *The SAGE Handbook of regression analysis and causal inference*. London: Sage Publications, pp. 251-276.
- Hernán, M. (2018). The c-word: Scientific euphemisms do not improve causal inference from observational data. *American Journal of Public Health* 108(5): 616-619.
- Keele L., Stevenson R. T. and Elwert F. (2020) The causal interpretation of estimated associations in regression models. *Political Science Research and Methods* 8(1): 1–13.
- Lechner, M. (2011). *The estimation of causal effects by difference-in-difference methods. Foundations and Trends in Econometrics*, 4(3), 165-224.
- Muller, C., Winship, C. and S. Morgan (2014). Instrumental variables regression. In Best, H. and C. Wolf (Eds) *The SAGE Handbook of regression analysis and causal inference*. London: Sage Publications, pp. 277-299.

Instructions for preparatory reading (incl. the respective papers) are provided in Dropbox:

<https://www.dropbox.com/sh/m6k3d6n70c2jr0k/AAB6M5dpUw6Vn3D-XFV6vMAOa?dl=0>

A detailed reading list will be provided in Dropbox.

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