

Labor Economics and Causal Machine Learning using R

for Master Students

CONTENT

The course covers empirical labor economics and modern econometrics. It is organized as flipped classroom. You are supposed to watch learning videos before the lecture. The lecture depends on your questions and offers R sessions via Screensharing. Students should install RStudio and Mentimeter (App) as a Classroom Response System before the first session.

- Topics covered are:
- Modern approach to Econometrics
 - Fundamental evaluation problem
 - Potential outcome approach
 - Methods: RCT, IV, BAE, DiD, RDD
 - Introduction to Causal Machine Learning (LASSO and Random Forests)
 - Labor Market and Education

LECTURE

ZOOM Live Sessions

Zoom-Link via mail to signed-in participants (Ilias)

Friday, 4-5:30 pm (Live Sessions)

22 October 2021

29 October 2021

12 November 2021

19 November 2021

26 November 2021

3 December 2021

10 December 2021

17 December 2021

14 January 2022

21 January 2022

28 January 2022

4 February 2022

EXAMINATION MODALITIES

Credit points	4 ECTS
Examination:	Final Exam (60 minutes)
Area of Study	<u>M.Sc. Economics:</u>
	E&P: Elective Courses
	Finance: Elective Courses
	ISNE: Elective Courses
	<u>VWL-Master, PO 2014:</u>
	Spezialisierungsbereich: Empirical Economics Labor, Human Resource Management & Organization
	<u>VWL-Master, PO 2014:</u>
	Wahlpflichtbereich II: VWL Quantitative Methoden

LITERATURE

Main references:

- Angrist, J.D., & Pischke, J. (2015): Mastering 'Metrics, The Path from Cause to Effect, Princeton University Press.
- Boeri, T., & Van Ours, J. (2013). The economics of imperfect labor markets. 2nd edition. Princeton University Press.
- Heiss, F. (2016): Using R for Introductory Econometrics, Düsseldorf.
- James, G. et al. (2017): An Introduction to Statistical Learning, Springer, New York.
- Klinkhammer, D., & Spermann, A. (2020): Eine Einführung in die empirische Kausalanalyse und Machine Learning mit R, UTB-Lehrbuch, wbv, Gütersloh.
- Taddy, M. (2019): Business Data Science, Mc GrawHill, New York.
- Wooldridge, J. (2018): Introductory Econometrics, A Modern Approach, 7th edition, Cengage Learning.

Randomized Controlled Trials (RCTs)

Angrist, J., & Pischke, J.-S. (2017): Undergraduate Econometrics Instruction: Through Our Classes, Darkly, *Journal of Economic Perspectives*, 31, 125-144.

Athey, S., & Imbens, G.W. (2017): The State of Applied Econometrics: Causality and Policy Evaluation, *Journal of Economic Perspectives*, 31, 3-32.

Athey, S., & Luca, M. (2019): Economists (and Economics) in Tech Companies, *Journal of Economic Perspectives*, 33, 209-230.

Brodeur, A., & Cook, N., & Heyes, A. (2020): Methods Matter: p-Hacking and Publication Bias in Causal Analysis in Economics, *American Economic Review*, , 110(11), 3634-3660.

Fryer, R. (2014): Injecting Charter School Best Practices into Traditional Public Schools: Evidence from Field Experiments, *Quarterly Journal of Economics*, 1355-1407.

Lübke, K., & Gehrke, M., & Horst, J. & Szepannek, G. (2020): Why We should teach Causal Inference: Examples in Linear Regression with Simulated Data, *Journal of Statistics Education*, 28:2, 133-139.

Imbens, G.W. (2020): Potential Outcome and Directed Acyclic Graph Approaches to Causality: Relevance for Empirical Practice in Economics, *Journal of Economic Literature*, 58(4), 1129–1179.

Klinkhammer, D., & Spermann, A. (2020): Eine Einführung in die empirische Kausalanalyse und Machine Learning mit R, UTB-Lehrbuch, wbv, Gütersloh, R codes on Github.

Wooldridge, J. (2018): *Introductory Econometrics, A Modern Approach*, 7th edition, Cengage Learning, Chapters 2.7, 3.7, 4.7.

Regression Discontinuity Design (RDD)

Abdulkadiroglu, A., & Angrist, J.D., & Narita, Y., & Pathak, P.A., & Zirate, R.A. (2017): Regression Discontinuity in Serial Dictatorship: Achievement Effects at Chicago's Exam Schools, *American Economic Review*, P.P., 107(5), 240-245.

Angrist, J.D., & Lavy, V., & Leder-Luis, J. & Shany, A. (2019): Maimonides' Rule Redux, *AER: Insights*, 1(3), 309-324.

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Roth, A. (2018): Marketplaces, Markets, and Market Design, *American Economic Review*, 108(7), 1609-1658.

Difference-in-Differences (DiD)

Abadie, A. (2021): Using Synthetic Controls: Feasibility, Data Requirements, and Methodological Aspects, *Journal of Economic Literature*, *Journal of Economic Literature* 2021, 59(2), 391–425.

Angrist, J.D., & Pischke, J.-S. (2009): *Mostly harmless econometrics*, Princeton University Press.

Klinkhammer, D., & Spermann, A. (2020): *Eine Einführung in die empirische Kausalanalyse und Machine Learning mit R*, UTB-Lehrbuch, wbv, Gütersloh, R codes on Github.

Wooldridge, J. (2018): *Introductory Econometrics, A Modern Approach*, 7th edition, Cengage Learning, Chapters 13.2.

IV, LATE and Introduction to Machine Learning

Angrist, J.D., & Pischke, J.-S. (2009): *Mostly harmless econometrics*, Princeton University Press.

James, G. et al. (2017): *An Introduction to Statistical Learning*, Springer, New York, Chapter 5 & 6.

Goller, D. et al. (2019): Does the Estimation of the Propensity Score by Machine Learning Improve Matching Estimation? The Case of Germany's Programmes for Long Term Unemployed
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Klinkhammer, D., & Spermann, A. (2020): *Eine Einführung in die empirische Kausalanalyse und Machine Learning mit R*, UTB-Lehrbuch, wbv, Gütersloh, R codes on Github.

Propensity Score Matching (PSM) and Introduction to Machine Learning

James, G. et al. (2017): *An Introduction to Statistical Learning*, Springer, New York, Chapter 5 & 6.

Goller, D. et al. (2019): Does the Estimation of the Propensity Score by Machine Learning Improve Matching Estimation? The Case of Germany's Programmes for Long Term Unemployed
IZA Discussion Papers, No. 12526

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Causal Machine Learning

Athey, S., & Imbens, G.W. (2019): Machine Learning Methods Economists should know about, *Annual Review of Economics*, 11, 685-725.

James, G. et al. (2017): *An Introduction to Statistical Learning*, Springer, New York.

Taddy, M. (2019): *Business Data Science*, Mc GrawHill, New York.

4 February 2022

Preparation to the exam