

Labor Economics and Causal Machine Learning using R

for Master Students

CONTENT

The course covers empirical labor economics and modern econometrics. It will combine lecture style and practical exercises using R in class. Complementary learning videos are available on my YouTube-Channel. Students should install RStudio and Mentimeter (App) as a Classroom Response System before the first session. All sessions will be available as videos on a weekly basis.

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

LECTURE

Time & Location: Weekly upload of videos/ZOOM Live Sessions

16 April 2021: Videos on Google drive

23 April 2021

30 April 2021

7 May 2021

14 May 2021 (Zoom Session)

21 May 2021

4 June 2021

11 June 2021

18 June 2021

25 June 2021

2 July 2021

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.

19 April and 23 April and 30 April and 7 May and 14 May:

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.

21 May: 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.

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

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

4 June: Difference-in-Differences (DiD)

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.

11 June: 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 IZA Discussion Papers, No. 12526

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

18 June

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

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

25 June

Simulation-based Inference (SBI): Bootstrapping and Shuffling

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

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

2 July

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.