Econometrics II: Causal Inference

Prof. Henkel

Summer Semester 2023

ECTS: 3

Language: English

Occurrence: Summer semester

Scheduling: Kick-off Friday April 21, 2023, 2:00 pm – 4:30 pm in person (room will be announced). The course will be taught as a series of seven half-day seminars in June and July, either in the morning or on the afternoon. Dates will be coordinated with participants. The course is planned to be held in person.

Registration: Until April 19, 2023, via Moodle.

Description of Achievement and Assessment Methods: Participants will be assessed based on their seminar presentation (60%), homework assignments (20%), and oral contributions to the course (20%).

- **Seminar presentations** will be held by groups of two. Each group will present one method of addressing the problem of causal inference (e.g., RDD). The presentation of 120 min to 150 min shall introduce and explain the respective method as well as applications. Presenters will suggest an article in which this method is applied. The group will bring a dataset with which participants will apply the respective method during the course. The lecturer will meet with each group beforehand to aid in the preparation.

- **Homework assignment.** For some of the methods that we discuss in the course participants will do a homework assignment that consists of applying the method to a dataset, presenting the results, and providing an interpretation (in writing).

- **Oral contributions.** It is expected that participants prepare the readings for each session and are able to reflect on them. In addition, they shall actively take part in the discussion of the seminar presentations. The course is pass/fail, not graded. In order to pass the course, participants must take part in all classes. In case of excused absence due to illness they need to hand in a written assignment about the content of the class they have missed.

Prerequisites: Participants need to have econometrics knowledge corresponding to an introductory Ph.D. level course in econometrics. They should have participated in such a course, e.g. in “Econometrics I: Research Design and Estimation Methods” by Professor Hottenrott. They should also have basic knowledge of STATA or R. Free self-study material for STATA and R can be found at [https://sites.google.com/site/econometricsacademy](https://sites.google.com/site/econometricsacademy), and for R specifically [here](https://sites.google.com/site/econometricsacademy) (introduction) and [here](https://sites.google.com/site/econometricsacademy) (regressions).

Content: Econometric analysis aims at uncovering economic mechanisms, their causes and effects. Understanding the mechanisms behind a phenomenon is indispensable if one is to give advice to managers or policy makers, or to build theory. Simple regressions on cross-sectional data show associations, but not causality, so we need more sophisticated methods. This course shall convey econometric methods that allow causal inference, or at least to come closer to uncovering causal effects. The focus will be on applicable knowledge, less on details of the theory. The course is part of a series of econometrics courses at TUM School of Management that also comprises “Econometrics I: Research Design and Estimation
Methods" by Professor Hottenrott and “Econometrics III: Advanced Econometrics and Machine Learning” by Professor Farbmacher.

Topics comprise various methods to address selection issues and come close to causality:
1. Randomized controlled trials and natural experiments
2. Matching
3. Regression discontinuity design
4. Instrumental variables
5. Panel data
6. Differences-in-Differences
7. Heckman selection models

**Intended learning outcomes:** Participants shall be able to select the appropriate econometric method given a certain problem and data set; to apply this method proficiently using STATA and/or R; to know the advantages and pitfalls of each method; and to judge if the econometric approach in published studies is correctly chosen and well executed.

**Teaching and learning methods:** Learning methods are a mix of seminar presentations by the participants, group discussions, application of econometrics software, lectures, and guest presentations. We will use STATA, though if you prefer you may use R instead. Participants are expected to prepare each session and in particular read the assigned material and run the regression examples provided by Cunningham such that we can have a discussion in class.

**Sessions and obligatory readings:**

We will use the textbook by Cunningham including the data examples, plus select papers on the respective method.


**PLEASE READ THE ASSIGNED MATERIAL AND RUN THE STATA OR R EXAMPLES BEFORE EACH SESSION.**

**Session 0 (Kick-off): Introduction**
- Cunningham, Chapter 1

**Session 1: Randomized controlled trials and natural experiments**
- Cunningham, Chapters 2 – 4. These chapters are not specific to the topic of Session 1, but of general interest for the course.

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1 I am grateful to my colleagues Oliver Alexy, Jens Förderer, Fabian Gäßler, Hanna Hottenrott, Hana Milanov, and Christoph Ungemach for suggesting additions to the reading list.
Session 2: Matching
- Cunningham, Chapter 5

Session 3: Regression discontinuity design
- Cunningham, Chapter 6

Session 4: Instrumental variables
- Cunningham, Chapter 7

Session 5: Panel data
- Cunningham, Chapter 8

Session 6: Differences-in-Differences
- Cunningham, Chapter 9

Session 7: Heckman selection models
Further suggested readings:

- Causal inference:

- General background on econometrics:

Responsible for module: Prof. Dr. Joachim Henkel (henkel@wi.tum.de).