Syllabus

TAX 620: Applied Empirical Research: Methods and Practical Implementation

Fall 2021

Lecturers: Philipp Doerrenberg (pd), Richard Winter (rw)

ECTS: 8

Regular Class Times:

Monday: 12.00-13.30; on-site, physical room O 133

Tuesday: 15.30-17.00; remote, Zoom room and login tba

Additional Information:

- Video "Introduction and Organization": All information about this class – summary of course content, broad introduction to the topic, grading and organizational aspects – are summarized in a video recorded by Professor Doerrenberg. This video is uploaded on the ILIAS class site.
- Classes run from Sept. 07 to Dec. 07.
- Subject to the applicable rules and the respective current pandemic situation, the class organization will be as follows:
    - Monday lectures will be on-site in the classroom.
    - Please comply with the Covid security rules that apply to all in-person teaching activities at the University. You will need a classroom pass (*Hörsaalpass*) to sit in the classroom lectures. Please consult the information provided online: https://www.uni-mannheim.de/en/about/map-and-directions/safety-on-campus/coronavirus-current-measures-and-recommendations/class-room-pass/
    - We will provide recorded lecture videos for students who do not attend the Monday lectures on-site.
    - Note that there will be no live streaming of the in-person lectures. (Students who are not able to attend the on-site lectures can watch the provided lecture videos.)
    - Practical exercise sessions on Tuesday will be held remotely via Zoom.
    - We will switch to a full virtual format (using Zoom software) if required by the pandemic situation.
- All communication regarding this class will be through ILIAS. Class materials will also be provided through ILIAS. Please join the ILIAS group for this course if you would like to take the class.

Contents:

Most practical managerial decisions as well as discussions in the business sciences evolve around questions such as "*What happens to Y if we change X?*", "*Is the new business strategy X the reason for increases in revenue Y?*", or "*Is the change that we see in Y caused by changes in X or is the change in Y driven by coincidence or some other factor?*". In other words, both practical decision-making and academic research on business decisions require knowledge about cause and effect. However, identifying causalities is usually not straightforward. For example, if a manager implements some new

tax-planning strategy and the firm's profit increases in the subsequent year, it is not clear if the new strategy was the cause for increased profits or if profits would have increased even in the absence of the new strategy. That is, the correlation between the new strategy and subsequent profits does not necessarily reflect a causal effect. A serious evaluation of the new business strategy will, however, need to identify if the change in profits was indeed caused by the new strategy.

Such an analysis of causal effects requires knowledge of both practical data analysis (using statistical software) and methods and strategies to identify causal effects. This course equips students with the skills related to both these components: it provides i) an introduction to causality and an overview of the most important methods and approaches for causal inference, and ii) a hands-on practical introduction to data analysis.

Overall, students learn how to apply the most important methods and how to use statistical software (including the handling of "big data" and common business data bases) in the context of empirical work and causal inference. In general, these skills are very valuable for work both in industry and academia.

The course is generally suited for students with and without prior knowledge of, or particular interest in, taxation: Examples will be from taxation, but the taught methods and empirical applications generalize beyond tax topics.

In line with the objectives of the class, one part of the course focuses on hands-on empirical applications and students learn how to conduct their own empirical analysis. For this purpose, students are introduced to the usage of a statistical software package (*R*) and to the access and analysis of large data sets (in particular firm databases sets such as Amadeus or Compustat). The introduction to software *R* starts from scratch and no prior knowledge is necessary. This part of the class will mostly be taught in the Tuesday meetings.

The other part of the course teaches the concept of causality and the most important methods to estimate causal effects. These include randomized experiments, linear regression, difference(s)-in-difference(s), instrumental variables, regression discontinuity design and bunching. The focus is on understanding the advantages and disadvantages of the available methods and less on a highly technical presentation. This part of the class will mostly be taught in the Monday meetings.

Guest Lecture:

Date tba

Mark Dinko Orlic, Partner at PWC: "Evolution of the Tax Advisor and Analytics in Practice"

Mark will talk about tax planning and tax consultancy in a big-4 accounting company. The lecture provides insights on the latest developments in tax advisory work in practice. He will have a focus on the impact of Covid-19 on the profession.

This guest lecture is part of class TAX 660 (it is therefore held outside the regular class times of this class). However, Mark's focus is on data analytics and the guest lecture might therefore be interesting for you as well.

Grading:

To receive a grade, students conduct an empirical analysis using a statistical software package and 'real-world' archival data. This empirical project will comprise either the replication of an existing

research paper or the analysis of an independently developed research question. This applied data project reflects the objective of the class that students learn to conduct their own empirical analysis.

Depending on the size of the class, empirical project and presentations will be prepared in groups or individually. We will randomly draw group compositions if projects are prepared in groups.

We will provide a selection of research papers which we have identified to be replicable and for which data access is available. Students/groups can choose the paper they wish to replicate from that list (with raffle if several students/groups have preference for the same project). The data bases that are used in these papers are presented (by students, see below) in the Monday session of term week 4. The final assignment of research projects to students/groups should be finalized by week 5 of the term. We encourage all students to start working on their projects as early as possible. We will provide feedback on the progress of your project throughout the entire term.

Students are asked to present the results of their empirical project/replication in class (20 minutes presentation). These presentations will be held throughout the last two or three weeks of the term. In addition, students write a short report about the project (8-10 pages, excluding Tables, Figures, References). The report is due by December 23, 2021 at midnight.

In addition to the presentation and write-up of the empirical project, students are asked to prepare a 15 minutes presentation about one of the databases that will be used in the empirical projects (these for example include Eikon, Compustat, CRSP, I/B/E/S, Orbis, EDGAR). These presentations serve the purpose of familiarizing students with the databases used in the empirical projects. These presentations will be prepared in groups. We will assign the databases to be presented in the Monday session of term week 2. The presentations take place in the Monday class of week 4.

The weighting for the final grade is as follows: Presentation of databases: 15%, Presentation of Empirical Project: 45%, Report about Empirical Project: 40%.

Literature:

Main textbook for methods lectures:

> Joshua D. Angrist and Jörn-Steffen Pischke, Mastering Metrics: The Path from Cause to Effect. Princeton University Press

Main references for statistical software:

> Hadley Wickham and Garret Grolemund, R for Data Science, O'Reilly UK Ltd.
>
> Scott Cunningham, Causal Inference: The Mixtape, Yale University Press

Further literature:

> Ulrich Kohler and Frauke Kreuter, Data Analysis Using Stata, Stata Press
>
> Michelle Hanlon and Shane Heitzman, A Review of Tax Research, Journal of Accounting and Economics, 50(2–3), 2010, pages 127-178.

Class Materials:

Slides, manuscript to learn Statistical Software and other class materials will be uploaded on ILIAS. Please join the ILIAS group for this class if you take the class.

Time Schedule:

Week 1

Monday: No live class. This class is replaced by the video “Introduction and Class Organization” that will be uploaded to the ILIAS class website.

Tuesday: Introduction to Statistical Software *R* – I (rw)

Week 2

Monday: Assignment database presentations (pd)

Causality and Causal Identification (pd)

Tuesday: Introduction to Statistical Software *R* – II (rw)

Week 3

Monday: The Randomization “Gold Standard” – I (pd)

Tuesday: Introduction to Statistical Software *R* – III (rw)

Week 4

Monday: Student presentations of databases (pd/rw)

Tuesday: Introduction to Statistical Software *R* – IV (rw)

Week 5

Monday: Final Assignment of Research Projects (pd/rw)

The Randomization “Gold Standard” – II (pd)

Tuesday: Introduction to Statistical Software *R* – V (rw)

Week 6

Monday: Regression (pd)

Tuesday: Introduction to Statistical Software *R* – VI (rw)

Week 7

Monday: Difference in Differences (pd)

Tuesday: Introduction to Statistical Software *R* – VII (rw)

Week 8

Monday: Individual Discussion/Feedback on Research Projects (pd, rw)

Tuesday: Introduction to Statistical Software *R* – VIII (rw)

Week 9

Monday: Instrumental Variables (pd)

Tuesday: Individual Discussion/Feedback on Research Projects (rw)

Week 10

Monday: Regression Discontinuity Design (pd)

Tuesday: Individual preparation of the applied empirical project (individual office hour on request)

Week 11

Monday: Bunching (pd)

Tuesday: Individual Discussion/Feedback on Research Projects (rw)

Week 12

Monday: Individual preparation for the empirical project and presentation (office hour on request)

Tuesday: Individual Discussion/Feedback of Research Projects (rw)

Week 13

Monday: Student Presentations: Empirical Project (pd, rw)

Tuesday: Student Presentations: Empirical Project (pd, rw)

Week 14

Monday: Student Presentations: Empirical Project (pd, rw)

Tuesday: Student Presentations: Empirical Project (pd, rw)