Applied Econometrics: an introduction

This version: February 2021

General information

Instructor: **Prof. Dr. Hanna Hottenrott**
Location: online (Zoom)
Course time: 5 days: **23.3., 24.3., 26.3., 29.3., 31.3.2021 (approx. 9.30am - 4pm)**

Course content

What this course is
This doctoral course aims at giving doctoral students an overview of essentials quantitative methods. We will not focus on the econometrics, but aim at developing the students' understanding of what the methods are all about and how they work in practice. The course is taught over 5 days. We expect all students to read all the required readings and be prepared to discuss as the class will be interactive. Attendance is mandatory! We have combined lectures that provide an overview of the different concepts as well as more applied exercises that employ the techniques we will discuss. All examples will be illustrated using STATA. If you do not have a license, please make sure you can access a network license from the School of Management.

What this course is not
- A fully-fledged theoretical econometrics class – we do cover some of the basics, however, we will speak very little about the maths (only as much as is necessary to get the gist).
- A fully-fledged applied econometrics class – we only cover some of the most basic techniques used in empirical analysis; for more advanced techniques, including the analysis of panel data, you will need to take an additional class for which, however, you should find this course to be an excellent starting point.
- A quantitative research course – again, we will cover key issues, but your training should not stop here.

Course objectives

Knowledge Objectives
In this course, we strive to familiarize you with key building blocks of applied econometrics: where data comes from and how it can be analyzed. We will do so in an applied fashion, using actual data and software tools.

Skills Objectives
- Improve diagnostic and analytical skills
- Enhance verbal skills via class and group discussions
- Build up critical thinking and interpretation skills
- Build up quantitative reviewing and research design skills

Learning Objectives

At the end of this course, students will be able to demonstrate understanding, critical assessment and application of the following:

- Generic design of a quantitative research question or PhD proposal
- Their own, as well as others' quantitative research method and design choice
- Fundamentals of econometrics so as to be able to join more advanced econometrics courses
- Ability to execute standard econometric analyses using statistical software

Course Procedures

Have Fun

Our challenge is to make sure that you learn about the fundamental importance of econometrics—even if you do not intend to engage in quantitative research! While this topic may seem dusty you need to have at least some understanding of it to do good research. To illustrate this point to you, we will do our best to make this course as applied as possible and to design it in a way that can show direct benefits for your PhD. Thus, our goal is to enlarge your toolset and sharpen the tools that you have as a researcher in your own projects as well as a reviewer of others' work. Having these skills will make it easier for you to join any academic debate, in particular those outside your area of specialization – who does not like talking about other people's work? And of course, knowing that you have the skills to tackle a research topic and making it 'yours' is great fun!

Prepare and Participate Actively

To make this class a success for everyone, we need you to prepare for class and participate in class. There is a lot of material that we want to cover, and this material is (1) ordered consecutively (so you need the early sessions to really get the later ones) and (2) the very foundation of any empirical-quantitative work you may do in your PhD. Thus, in order to get the most out of this course, we ask you to prepare for each class, so that you will be capable of discussing the assigned readings, which we will discuss in class. If for some reason you are not prepared let me know before the start of class to save us both the embarrassment of my calling on you.

Assessment

There will be no mandatory written assessment. Nonetheless, note that attendance and participation are mandatory, and regular unexcused absence will lead you to being banned from the course. In order to receive a certificate, you can miss a maximum of 1 session.

There will be a mandatory presentation at the end of the course (session 2, day 5) in which every participant will present an own research idea/project and relate course content to this idea/project.

In addition, there exists the **option for voluntary assessment** (i.e., everyone who may need a grade should choose this option)**.**

Course Assignments (70% of the course grade)

1. **Progress Report: Current status** (2-3 pages, typed, double-spaced). Sketch your PhD research question, and how you intend to study it quantitatively – that includes both the data and the methods you intend to use. **Due before Session 1. 10% of course grade**
2. **In-class presentation**. Give a *short* (10 minutes max.) presentation in class about your current research, data, and the methods you are applying, or intending to apply. **Due the day before Session 10. 30% of course grade**
3. **Data and methods section** (5-7 pages, typed, double-spaced). Incorporating the feedback you received in your presentation, write a fully-fledged data and methods section building on your in-class presentation. **Due two weeks after Session 10. 30% of course grade**

Participation (30% of the course grade)

It is important to appreciate that every member of the class is a co-producer of the class discussion, listen carefully to one another and attempt to build on or constructively critique prior comments. An effective participant:

- Is a good listener
- Makes points relevant to the ongoing discussion
- Makes comments that add to our understanding of the reading or article
- Is willing to challenge ideas that are being expressed
- Integrates material from past classes, other courses

If you need to receive a grade for this course, I will ask each of the other students to submit a one-page evaluation and grade out of 20, based on these five criteria, for you. These scores will be averaged with one assigned by me to determine your 30% participation grade.

Preliminary course outline

The first session in a day will start at 9:15am and last to about 11:45am, after a short lunch break it will continue from about 12:45pm to 2:30pm. The second session in a day will last from 2:45pm to about 4pm.

Required readings

- Angrist, J. and Pischke, J.-S. 2008. Mostly Harmless Econometrics, Princeton University Press. Chapters 1 and 2.
- Verbeek, M. (2004), A guide to Modern Econometrics, Wiley. Chapters 2 to 6.

Day 1:

Session 1: Introducing the core concepts

Topics covered:

- What you can address with quantitative studies versus other types of methods
- Types of variables
- Different models
- Collecting data using different techniques
- Hypothesis formulation – what is a good hypothesis?
- How to find help online

Session 2: How to work with datasets

Topics covered:

- Importing and exporting data
- Cleaning data
- Dealing with strings
- Reshaping, merging, appending, collapsing, duplicates
- Exporting results
- Do-files and logs
- Loops

Day 2:

Session 1: Survey design

Topics covered:

- Research paradigm
- Sampling techniques

- Survey methods
- Questionnaire and question design
- Response analysis

Voluntary readings:
- Krosnick, John A. 1999. Survey Research. ***Annual Reviews of Psychology***, 50: 537-567.
- Berk, Richard A. 1983. An Introduction to Sample Selection Bias in Sociological Data. ***American Sociological Review***, 48: 386-398.
- Schaeffer, N.C., & Presser, S. 2003. The science of asking questions. ***Annual Review of Sociology***, 29: 65-88.

Session 3: Problems arising with survey data and alternative data sources
Topics covered:
- Internal and external validity
- Reliability
- Common method biases
- Secondary data
- Limitations to secondary data

Voluntary readings:
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. 2003. Common method biases in behavioral research: A critical review of the literature and recommended remedies. ***Journal of Applied Psychology***, 88(5): 879-903.

Day 3:

Session 1: OLS and hypothesis testing
Topics covered:
- Review of basic concepts
- OLS regressions
- Omitted variable bias
- Significance of parameters
- Goodness of fit

Required readings:
- Verbeek, M. (2004), A guide to Modern Econometrics, Wiley. Chapters 2 and 3.

Session 3: Dummy variables and interaction effects
Topics covered:
- Assumptions
- How to specify the models
- Interpretation of coefficients
- Illustrating interaction effects

Day 4:

Session 1: Logit/Probit and Ordered Models
Topics covered:
- Assumptions, Interpretation of coefficients, interaction effects, and measure of model fit for the following models:
- Logit/probit

- Ordered logit/probit

Session 2: Multinomial, Censored and Count-data Models
Topics covered:
- Multinomial Model
- Tobit models
- Negative Binomial & Poisson

Day 5:

Session 1: Resolving some common problems in quantitative studies
Topics covered:
- Multicollinearity
- Endogeneity
- Reverse causality
- Selection bias
- Instrumental variable models
- Non and semi-parametric methods (propensity score matching, difference-in-differences)

Required readings:
- Verbeek, M. 2004. A Guide to Modern Econometrics, Wiley. Chapter 5.
- Angrist, J. and Pischke, J.-S. 2008. Mostly Harmless Econometrics, Princeton University Press. Chapters 4 and 5.

Session 2: Student presentations
Please see "Assessment" for more information.