UNIVERSITÄT DUISBURG ESSEN
Open-Minded

Syllabus Winter Term 2022/23

Econometrics for Socio-Economic Research

MA in Socioeconomics

Institute for Socio-Economics, University of Duisburg-Essen

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Lectures: Modays 10:15-12:00 LE 104

Course description

The course provides a comprehensive understanding of modern econometric methods in empirical economic research and other social science disciplines, such as sociology and political science. Students will be equipped with a solid econometric background to plan and execute independent research projects. The topics of the course include statistical inference; regression; ordinary and generalized least squares; cross-sectional, time series and panel data analyses, instrumental variables methods and synthetic control methods.

The course includes research seminars in selected topics, such as economic growth, income inequality, racial and gender disparities in economics and politics, or labour market and educational segmentation, and evaluation of government policies and programs, among other applied econometric topics.

This course emphasizes the theoretical aspects of statistical analysis to be applied to research questions. The goal is to walk students thought the necessary econometric background to independently design and apply econometric models suitable to socio-economic questions. Students will develop technical and computational skills to implement econometric methods and to critique and improve existing empirical studies in social sciences. Ultimately, the course encourages independent and critical thinking in the use of econometric and statistical methods.

Calendar

Date	Topic	Material
10th October	Intro to the course	
17th October	Introduction to Econometrics	
24th October	Regression Modelling	

7th November	Data Focus: Statistics for Inequality and Gender Statistics		
14th November	Multiple Regression Modelling		
21st November	Regression Inference		
28th November	Econometrics for Political Economy		
5th December	Discrete Choice Models		
12th December	Econometrics for Labour Economics and Gender Economics		
19th December	Panel Data Models		
9th January	Econometrics for Inequality		
16th January	Time Series	Students' Presentations I	
23rd January	Instrumental Variables	Student's Presentations II	
30th January	Invited scholar: Prof. Rocío Sanchez Mangas (Professor of Quantitative Economics, Universidad Autónoma de Madrid, UAM)		

Theoretical Contents

1. Introduction to Econometrics

- Econometrics and Economic Data: lecture topics
- Define econometrics, economic models, and econometric models
- Types of economic data (cross-sectional, time series, pooled cross sections, and panel data)
- Causation versus correlation: relationships in econometrics
- Types of Data Structures:
    - Cross-sectional data
    - Time series data
    - Pooled cross sections
    - Panel/longitudinal data

2. Regression Modelling

- Simple regression model
  - Equation model
  - Terms and concepts
  - Linear effects
  - Population regression function
- Derivation of OLS Estimates
- Fitted Values and Residuals
- OLS Properties
- Goodness of fit
- Non-linear modelling
- Interpretation
- Heteroskedasticity
- Causality, again

3. Cross-sectional Models

- Multiple regression model
  - Two independent variables
  - Models with k-independent variables
- OLS Estimates
- Controls
- Singles vs Multiple regression models
- Expected value of OLS Estimators
  - Random sampling
  - Collinearity
  - Zero conditional mean
  - Endogeneity issues
- Multicollinearity
- Proxying the unobserved

4. Time Series Models (OPTIONAL)

- Nature
- Static model
- OLS assumptions
- Trends and seasonally
- Stationary and weakly dependent time series
  - Stationarity and non-stationarity
  - Testing for serial correlation
  - Differencing and serial correlation
  - Heteroskedasticity
  - Introduction to different models: ARCH, ARMA, ARIMA

5. Panel Data Models

- Pooling cross-sectional models
- Chow test

- Policy analysis
- 2-time periods Panel Data Models
- Beyond 2-time periods Panel Data models
- Methods of Panel Data
  - Fixed-effects estimator
  - Fixed effects and first differences
  - Balanced and unbalanced panel data models
  - Random-effects estimator
  - Hausmann test

6. Binary and Discrete Choice Models (OPTIONAL)
   - Introduction
   - Models for Binary Outcomes
   - Estimation and inference of binary choice models
   - Beyond the binary: discrete choice models
   - Goodness of fit
   - Marginal Effects
   - Differences in Differences and regression discontinuity design
   - Applications and interpretations
7. Instrumental variables (OPTIONAL)
   - Motivation
   - IV Estimator
   - Properties
   - Application
   - IV in multiple regression models
   - 2 Step Least Squares

References

Angrist, J. D., & Pischke, J. S. (2008). Mostly harmless econometrics. Princeton university press.

Cameron, A. C., & Trivedi, P. K. (2005). Microeconometrics: methods and applications. Cambridge university press.

Cunningham, S. (2021). Causal inference. In Causal Inference. Yale University Press

Greene, W. H. (2003). Econometric analysis. Pearson Education India.

Verbeek, M. (2008). A guide to modern econometrics. John Wiley & Sons.

Wooldridge, J. M. (2010). Econometric analysis of cross section and panel data. MIT press.

Wooldridge, J. M. (2015). Introductory econometrics: A modern approach. Cengage learning

Hands-on training

The course combines hands-on training lectures. The first hands-on training session is related to the different types of data that researchers require to study inequality and gender economics. Further hands-on training will delve in detail with econometric contents. The topics are related at the same time with political economy, inequality, labour economics and gender economics.

Assignments

Studienleistung: Students should provide a short presentation (5/10 minutes) about a research question that interest to them, and an econometric analysis of that question. A short summary of such exercise can go with the presentation. Every student who presents their work is entitled to do the Prufungleistung, and of course, handle the summary.

This short summary should not be longer than 3 pages. This summary should:

- Present a research question and hypothesis to be tested using econometrics
- Data to be employed
- An econometric model that can be suitable to solve the question
- An interpretation of the potential result

The aim of this summary is not obtaining significant coefficients, nor it is providing a long explanation of the related literature. One paragraph should be enough to provide reasons to ask that question. The aim is to demonstrate that the student understands how to translate a research question into an econometric model.

Students should not provide neither the database nor the codes created for the summary. The results should not be provided in the form of snapshots from the software. Instead, results should be presented in edited, self-contained tables.

Work in teams is allowed, and diversity within teams is encouraged. Maximum 3 persons per team.

Studienleistung weights 30% of the final grade. Students can skip the summary, but this comes with the cost of getting zero points in that part. Thus, the maximum grade possible for such a student would be a “2”, provided that they do no mistake in the final exam (which counts 70% of the final grade).

Presentation: students are highly encouraged to attend and actively listening to other students’ presentations. Presentations can be done online if the situation of the student requires it (students should proof the reasons behind taking the presentation online).

Date: 16 January 2023 and 23 January 2023

Prüfungleistung: A final exam that will take approximately 2 hours. The exam is structured as follows:

- Multiple choice test: 5 questions with 4 possibilities to choose, wrong answers do not penalize (35% of the mark)

- Open-ended questions (meaning that the student must elaborate on their response): illegible handwriting is a must. A good response should go straight to the point. If the student has no clue about what they is being asked, they should leave the answer empty instead of writing nonsense things to try to disguise the fact that they has no clue. (35% of the mark).

Notice that three[1] of the questions in the exam will be directly derived from the presentations of the students.

Dates: 13 February 2023 and 13 March 2023

Marking system

Summary 30%

Final exam of 2 parts, 70% each (see above).

[1] This number can change in case the presentations touch upon the topics discussed in the core lessons.