Applied Econometrics

Bernd Hayo
Objectives

• Introduction to empirical research in economics using statistical methods.

• Presentation of important elements of standard multivariate regression analysis, time-series econometrics, and discrete choice, as well as a discussion of econometric methodology.

• Practical examples will aid in understanding the theoretical parts of the course.

• After attending the course, participants should be able to make educated comments on other people’s empirical work and undertake their own empirical research projects.
Time
• The course takes place 27 February to 2 March 2017
  – 28 February: lecture: 09.00–13.00, tutorial: 14.15-16.45
  – 1 March: lecture: 09.00–13.00, tutorial: 14.15-16.45
  – 2 March: lecture: 09.00–13.00

Location
• Philipps-Universität Marburg, School of Business & Economics, left-hand side computing room (U25IB) in the wooden building behind Universitätsstr. 25

Participants
• MAGKS doctoral students

Language
• Course language is English
**Target group**

- This course is targeted towards students interested in applying empirical methods as part of their research projects or as a solid preparation for an advanced technical course on econometrics.

- In the lecture part of the course, we *do* cover econometric theory, after all, this is a PhD level course, but typically based on intuition rather than rigour.

- During the tutorials you learn to apply many concepts discussed in the lecture to real-world data using an econometrics software program (Stata).

**Prerequisites**

- It will be very helpful to have a basic understanding of algebra, statistics and econometrics.
Structure of course

• The course provides a broad overview of key areas of econometrics as used in many economic applications.

• Thus, it covers many issues, which implies that, given the time constraint, speed of delivery will be high and depth of discussion on each individual issue has to be limited.

• However, there is always time for questions!

• The course combines lectures with practical applications based on real-world data.

• Typically, there will be intense hours of lecturing in the morning followed by practical applications in the afternoon.

• Since many issues cannot be discussed in (sufficient) depth, please consult the detailed lecture slides and/or follow up using the provided references if you are interested in a particular topic.
Contents

I. Introduction: Some Principles of Empirical Research

II. Bivariate and Multivariate Regression Models
   1. Desirable Characteristics of Estimators
   2. Method of Ordinary Least Squares
   3. Hypothesis Testing
   4. Multivariate Regression
   5. Diagnostic Testing
   6. Dummy Variables
   7. Hands-on Exercises

III. More General Methods
   1. Restriction Testing and Estimation
   2. Maximum-likelihood Estimation
   3. Instrumental Variable Estimation
   4. Alternative Test Principles (Wald, LM, LR-tests)
   5. Hands-on Exercises
IV. Time-Series Econometrics

1. Stationary Time Series
   1. Time-dependent Stochastic Processes
   2. Autoregressive Processes
   3. Moving Average Processes
   4. ARMA Processes
   5. ML Estimation of an ARMA process
   6. Evaluating Model Adequacy
   7. Model Selection
   8. Hands-on Exercises

2. Dynamic Econometric Models
   1. Autoregressive Distributed Lag Models
   2. Vector Autoregressive Models
   3. Granger-Causality
   4. Hands-on Exercises
3. Nonstationary Time Series
   1. The Random Walk and its Implications
   2. Discovering Nonstationarity
   3. Cointegration
   4. Error-correction Models
   5. Vector Error-correction Models
   6. Hands-on Exercises

V. Discrete Choice Models
   1. Introduction
   2. Probit/Logit Models
   3. Model Evaluation
   4. Ordinal Probit/Logit Model
   5. Hands-on Exercises
VI. Panel Data Models
1. Pooling Data
2. Fixed Effects Estimator
3. Random Effects Estimator
4. Hands-on Exercises

VII. Econometric Methodology
1. The ‘Classical’ Approach to Econometrics
2. Leamer’s Critique: Robust Bounds
3. Sims’ Critique: VAR
4. Hendry’s Critique: General-to-Specific Modelling
5. Angrist and Pischke’s Critique: Empirical Research Design
Planned time allocation

- Monday
  Chapters I and II

- Tuesday
  Chapters II, III and IV

- Wednesday
  Chapters IV and V

- Thursday
  Chapters VI and VII

- Note that this may change due to all sorts of reasons, notably bad time management by the lecturer…
Reading List

• Some remarks on the references:
  – There are lots of books on econometrics, in fact, there seems to be an almost infinite number of textbooks covering the basic methods.
  – Basically, most of these books contain the same contents and, hence, it is a matter of taste which one(s) you prefer.
  – Thus: Take a look at your library and choose a book YOU like.
  – Below is a list of books that I like and I tried to briefly indicate why.
  – This list may aid you in your search for a book that fits to your taste but it should not be seen as comprehensive in any way!
  – Please drop me a note if you find a book that you think is great and should be on the list!
Basic econometrics books

  • Practice-oriented introduction with Eviews, Microfit and Stata examples.

  • Good in explaining core concepts using intuition rather than maths.

  • Lucid introduction to many important econometric issues.

  • Perhaps not always outstanding, but I like some sections, e.g. referring to instrumental variable estimation.

  • Basic econometric theory and applications using Eviews.
More advanced general econometrics books

  • Bridges the gap between introductory and more advanced books.

  • More advanced but well-written with helpful geometric interpretations.

  • Broad coverage, wide use of matrix algebra, and rather rigorous presentation. The writing style is somewhat dry, though.

  • Rigorously develops standard estimators, such as OLS or ML, as special cases of GMM estimators.

  • Comprehensive treatment of the topic, with useful applications.
Time series econometrics

  • Very comprehensive with reference character. Difficult to read!

  • Very good textbook covering many issues, particularly strong on VARs and (co-) integrated time series.

Discrete choice models

  • Comprehensive book on microeconometrics.

  • Classic survey book on this issue but not quite up to date any longer.
Panel data econometrics

  • Well known, up to date, and comprehensive but perhaps not a compelling didactical approach.

  • Good treatment of estimation theory but lacking in practical applications.

More application-oriented books

  • Excellent text that combines the discussion of economic theory with empirical applications, focus rather on microeconomic applications.

  • Focus on macroeconomics/time series with many serious applications.
Econometric methodology

• Some important contributions

  • Supporters of meticulously crafted empirical research designs.

  • Collection of essays, extensive defence of general-to-specific modelling.

  • Powerful critique of conventional econometric practice from a Bayesian point of view, proposes extreme-bounds analysis as an alternative.

  • Criticises typical macroeconomic studies and provides an alternative in the form of vector autoregressions (VAR).

  • Not essential, just a summary of the methodological literature in German.