Advanced Econometrics II - Syllabus

About & Motivation

This course introduces some more advanced / modern econometrics tools and methods not covered in previous courses. The focus will be more on methods and programming than on economic applications and interpretations. This course goes beyond using black-box commands. Instead you will learn how to write your own commands using the software R.

Why not another applied econometrics course? Programming skills are attractive for today's job market – in scientific research as well as in the private sector. Many econometric methods are not available in standard software packages. In order to be not restricted to such limitations, being able to write your own routines is a great advantage.

In the following we provide further informations in more detail. Please note that all information are preliminary. If there are any questions left, feel free to contact us (statec@hhu.de).

Lecture

The topics covered are:

- **1. Numerical Tools for Econometrics:**
  Numerical Optimization / ML, Monte-Carlo Simulation, Bootstrap, Numerical Integration
- **2. Advanced Nonlinear and Discrete Choice Models:**
  Nonlinear RE/CRE/FE/dynamic models, Multinomial Choice Models
- **3. Non- and Semiparametric Estimation:**
  Nonparametric Density Estimation & Regression, Semiparametric Models and Estimation
- **4. Machine Learning:**
  CART, Neural Networks, Support Vector Machines, Shrinkage Estimators (LASSO, Ridge regression, ...)

Computer Class

The first computer class introduces you to R-programming (i.e. how to write own commands). The following classes are dedicated to train your programming skills by implementing selected methods and estimators covered in the lecture.

You are asked to bring your own computer with a working installation of R and R-Studio. If you need to borrow one, please inform us at the beginning of the semester.

Prerequisites

The course builds upon the courses MV04/MS00 (Econometrics) and MW64 (Advanced Econometrics I). We recommend to have completed both courses before the beginning of this course. Further, we assume solid basic knowledge of the software R. You should at least be able to independently open a data set and run basic analyses, e.g. using the `lm()` function. If you don't have sufficient knowledge of the software R, please contact us early.

Examination & Grading

The examination is made up of three parts:

Type	Weighting
Midterm Exam*	30 %
Term Paper	50 %
Presentation	20 %

Examination registration: Master students need to register for the examination at the examination board (Prüfungsamt). The registration period for all examinations ends prior to the start of our course.

Midterm Exam:
There will be a computer-based midterm exam covering chapter 1. The date will be announced on HIS-LSF. The midterm exam will take place in a computer room at ZIM and will roughly take 60 minutes.
* Importantly, this midterm exam has to be passed in order to pass the entire course.

Term Paper:
Each student will prepare a term paper in which she/he will summarize and discuss a published research paper. Furthermore, simulation studies and/or empirical applications of the research paper will be replicated and/or extended.

Presentation:
Each student will present her/his term paper. The presentations will take place during the first regular examination period.

Course Registration

Please register at HIS-LSF during the official registration period. If you do not have a suitable ID for registration, please apply via email.

Literature

- R-Basics and standard Econometrics:
  Heiss: Using R for Introductory Econometrics. (http://www.urfie.net/read.html)
- R-Programming:
  Grolemund: Hands-On Programming with R: Write Your Own Functions and Simulations.
- Microeconometrics:
  Greene: Econometric analysis.
  Wooldridge: Econometric analysis of cross section and panel data.
- Non- and Semiparametrics:
  Henderson and Parmeter: Applied nonparametric econometrics.
- Machine Learning:
  James, et al.: An introduction to statistical learning.
  Friedman, et al.: The elements of statistical learning.