Department of Economics   Blaise Melly

Bern University

Econometrics II
Fall 2019

Lectures: Monday, 2 pm-4 pm, HS 205

Instructor: Blaise Melly

Email: Blaise.Melly@vwi.unibe.ch

Office: UniS A215 (Schanzeneckstrasse 1)

Office hours: Monday, 9am-11am.

Teaching assistant: Jonas Meier

Email: Jonas.Meier@vwi.unibe.ch

Exercices: Monday, 4 pm-5 pm, HS 205

Office: UniS A329 (Schanzeneckstrasse 1)

Office hours: Wednesday, 2pm-4pm.

Course objective

Econometrics is the application of statistical methods to the study of economic data and problems. It is used by economists to measure economic phenomena, estimate economic relationships, test the validity of competing economic theories, forecast economic variables, and evaluate government and business policies. Similar methods are used in other social sciences, business, engineering, medicine, etc.

Econometrics II is the mandatory course in econometrics to obtain a master in Economics. This course is designed to give the students a firm understanding of the theoretical aspects behind the commonly used techniques of inference in Economics.

Textbook

After a review of matrix algebra, probability and statistics, we will use the following textbook:

Fumio Hayashi, "Econometrics", Princeton University Press.

I recommend buying this book for more detailed explanations and additional exercises.

Course materials

All materials will be posted on ILIAS.

Recommended prerequisites

- One year of calculus: functions of several variables, partial derivatives, integrals.

- Probability theory: we will review the necessary results at the beginning a the semester.

- Matrix algebra: the necessary results will be reviewed during the exercises at the beginning of the semester.

- Introductory econometrics at the level of Ökonometrie I (that is at the level of the book written by Wooldridge "Introductory Econometrics").

Assessment

• Homework Assignments 20%: There will be 10 short homework assignments during the semester (almost every week). We will grade 5 randomly chosen problem sets. The worst problem set will not be taken into account. Problem sets must be turned in on time at the beginning of the exercises in order to receive credit. I will not accept late homework for any reason.

• Final Exam 80%: It is scheduled for Monday, December 16, from 2:15pm to 4:15pm. The exam is closed-book but a "cheating-sheet" will be made available and can be taken to the exam.

Tentative course outline

Probability theory: a review (1.5 weeks)

Econometric causality: a framework (2.5 weeks)

1. Defining the set of counterfactuals
2. Identifying the parameters of interest
3. Making inference in finite samples:
    a. Estimation: finding and evaluating estimators
    b. Hypothesis tests: definitions, finding and evaluating statistical tests
    c. Confidence intervals: definitions, finding and evaluating confidence intervals

Finite-sample properties of OLS (2 weeks, chapter 1 of the textbook)

1. The linear regression model
2. The OLS estimator
3. Finite sample properties of the OLS estimator
4. Inference under normality

Large-sample properties of OLS (3 weeks, chapter 2 of the textbook)

1. Introduction to asymptotic theory
2. Asymptotic properties of the OLS estimator
3. Asymptotic inference

Generalized method of moments (3 weeks, chapter 3 of the textbook)

1. Endogeneity: bias of OLS, IV solution, 2SLS
2. Definition of the generalized method of moments (GMM) estimator
3. Large sample properties of GMM
4. Inference

Maximum Likelihood Estimation (1 week, parts of chapters 7, 8 and 1.5 of the textbooks)

1. Definition of the maximum likelihood estimator (MLE)
2. Asymptotic properties of the MLE