

## Syllabus

### Frontiers in Econometrics

**GOAL:** This course is intended as an introduction into the methods and techniques used in a wide range of econometric modelling. Therefore, we will start with reviewing the classical linear regression model since quite a number of important results in other settings can be studied in that rather simple framework. We will generalize the linear model and also consider non-linear regression models. Other important estimation principles like Maximum Likelihood and GMM will be covered. A range of frequently used econometric approaches will be presented.

**ORGANIZATION:** The daily schedule will be

**9.00 - 10.30 :** 1st lecture

**10.30 - 10.45 :** Break

**10.45 - 12.15 :** 2nd lecture

**12.15 - 14.00 :** Lunch

**14.00 - 16.30 :** Problem Set and Reading

**16.30 - 17.00 :** Presentation

**17.00 - 18.00 :** Review Session

**TEXTS:** We mainly refer to two recent textbooks:

**(D)** Davidson, R. and J.G. MacKinnon, (2004), *Econometric Theory and Methods*, Oxford University Press.

**(V)** Verbeek, M., (2008), *A Guide to Modern Econometrics*, 3rd ed., John Wiley. (First or second edition of this text will also do.)

Other texts like Greene, W, (2008), *Econometric Analysis*, 6th ed., Prentice Hall are also suitable. However, some of the directed reading will refer to Verbeek. A manuscript covering the classroom presentation will be distributed shortly before the course.

## **Day 1: Linear and Non-linear Regression Models**

We review Least-squares estimation of regression models. The geometry of LS will be one main focus. Hypothesis testing, specification analysis, and extension to non-linear LS will also be discussed.

READINGS: (D) chap. 2, 3 (except 3.3), 4.1–4.4, 6.1, 6.3. (V) chap. 2, 3. Participants should be familiar with matrix algebra and fundamental statistical concepts laid out in (D) chap. 1 and (V) appendices A and B.

## **Day 2: Asymptotic Theory, GMM, ML**

The main principles in asymptotic theory enable us to relax some restrictive assumptions in the classical regression settings and still derive satisfying properties of estimators and tests. The asymptotic results prove helpful in also deriving general properties for ML and GMM estimators.

READINGS: (D) chap. 3.3., 4.5, 8, 9, 10. (V) chap. 5, 6.

## **Day 3: GLS, Panel Data, Systems of Equations**

General dependency structures for the residuals are studied in the linear regression model, in panel data models, seemingly unrelated regressions, and systems of equations.

READINGS: (D) chap. 7, 12 (V) chap. 4, 10.

## **Day 4: Discrete and Limited Dependent Variables**

In household and business surveys many variables are encountered as discrete or limited dependent variables. We therefore study binary choice models, ordinal probit, discrete choice, tobit, and duration models. We also discuss approaches dealing with selection bias.

READINGS: (D) chap. 11. (V) chap. 7.

## Day 5: Time Series Techniques

Analyzing macroeconomic data two important topics arise: testing for non-stationarity in data and model-building with nonstationary data. Specific topics to be covered include: integrated variables; testing for unit roots using Dickey-Fuller and Augmented Dickey-Fuller procedures; spurious regressions; cointegration.

READINGS: (D) chap. 14. (V) chap. 8 and 9.