Applied macroeconometrics

Summer 2025

Syllabus

Instructor:
Günter W. Beck

Office hours:
On appointment

Lectures and classes:
See unisono.

Website:
See unisono.

Content:
This course introduces students to important concepts and methods used in the empirical analysis of macroeconomic problems. The major focus will be on (stationary) time-series modelling techniques widely employed in (academic and non-academic) macroeconomic research. Moreover, an introduction into more and more often used machine-learning and data science techniques in the field of macroeconomics will be provided. During the course, students will have the opportunity to apply the learned techniques using Python. At the end of the course students are expected to replicate and present a research paper or own research work applying the techniques learned in class.
A detailed course outline is given below.

Course requirements:
Students will be graded upon the following:

- Midterm (50%)
- Presentation (50%)

Readings:

The main references for the course are:

Ghavami, Peter (2019). *Big data analytics methods*. de Gruyter.

Hastie, Trevor, Robert Tibshirani, and Jerome H. Friedman (2009). *The elements of statistical learning: data mining, inference, and prediction*. Vol. 2. Springer.

Hurn, Stan, Vance Martin, Peter C.B. Phillips, and Jun Yu (2021). *Financial Econometric Modeling*. Oxford University Press.

Martin, Vance, Stan Hurn, and David Harris (2013). *Econometric modelling with time series: specification, estimation and testing*. Cambridge University Press.

An introduction to Python is available here:
`http://www.python.org`.

Course overview:

1. **Maximum likelihood estimation**

- The maximum likelihood principle
- Hypothesis testing

2. **Stationary time series econometrics**

- Linear time series models (AR, VAR, MA, VMA models)
- Structural vector autoregressions (SVARs)
- Forecasting
- Latent factor models

3. **Introduction to big-data econometrics**

- Big data collection (via web scraping) and processing
- An introduction into statistical learning (penalized regression methods: lasso, ridge, and elastic net)
- Analyzing qualitative data: Natural language processing and sentiment analysis