

Time Series II
Fall 2020

Lectures: Thursday, 10:15 am-12:00 pm, UniS A -122

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

Exercises: Friday, 12:15 pm-13:00 pm, UniS A322

Office: UniS A329 (Schanzeneckstrasse 1)

Office hours: by appointment.

Course objective

This course provides an introduction to modern time series econometrics. The first part of the course deals with univariate time series processes but the main emphasis is on the multivariate case. In particular, we study the estimation, interpretation, and identification of VAR models. The analysis starts from a stationary context, which is then extended to a non-stationary one including cointegration analysis. Finally, the course also examines factor models. Each week, exercises in the computer lab complement the lectures with empirical applications.

Coronavirus

The course will take place as usual. The room for the lecture is big such that masks should not be necessary.

Learning outcomes

At the end of the semester, the students will (1) know a comprehensive set of tools and techniques for analyzing univariate and multivariate time series and (2) be able to use up-to-date econometric software to apply these tools. This will bring them in a position to understand the current literature in applied time series econometrics and to write empirical papers themselves.

Course materials and textbook

We will post all materials on ILIAS. We do not follow one textbook during the whole semester but will provide specific references for each part of the courses and make them available on ILIAS.

Recommended prerequisites

- We take for granted that the students are familiar with regression analysis and with asymptotic reasoning at the level of the course Econometrics II.
- Despite the name of the course, students can take it without prior knowledge in time series analysis. In particular, we do not assume that students have taken Time Series Analysis I (Zeitreihenanalyse I).

Assessment

- Homework Assignments 21%: There will be three homework assignments during the semester and each of them will count for 7% of the grade.
- Final Exam 79%: It is scheduled for Thursday, December 17, from 10:15am to 12:00pm.

Tentative course outline

ARMA models (1 week)

- What is a time series
- Univariate ARMA models
- Vector ARMA models

Characteristics of ARMA models (1 week)

- Autocovariance and autocorrelation
- Predictions
- Impulse-response functions

Estimation of AR models (2.5 weeks)

- Stationarity and ergodicity
- MA(∞) and AR(∞) representations
- Estimation of AR(p) models

Estimation of reduced-form VAR (2.5 weeks)

- Least squares estimation
- Granger causality
- Maximum likelihood estimation
- Bayesian estimation

Structural VAR (2 weeks)

- Short-run restrictions
- Structural VAR Tools
- Estimation and Inference
- Long-run restriction

Non-stationary time series (2 weeks)

- Univariate integrated processes
- Unit root tests
- Cointegration
- Estimation and inference on cointegration

Factor models (2 weeks)

- Principal component analysis
- Static factor models
- Dynamic factor models