

# 10142608-26 Financial Econometrics

## Summer term 2022

**Instructor:** Lars Winkelmann.

**Lectures/tutorials:** Fr: 10.15am to 11.45am and 12.15 to 1.45pm in HS 104.

**Course website:** all material and instructions will be posted on blackboard. You can register for this course via Campus Management.

### Course description

This course introduces master students to financial statistics. Selected topics include extreme value theory, volatility modeling, high-frequency statistics, large dimensional factor modeling and forecast evaluation. The course requires a solid background in statistics and mathematics and some knowledge of economics and finance. Examples drawn from risk management and portfolio management will highlight the practical relevance of the statistical methods. The main objectives are to give students a background that will enable them to understand and critically appraise applied work on financial issues, and to provide students with some practical experience in working with financial data.

### Organizational issues and grading

Our first session is April 22nd at 10.15am in HS104. We will follow some selected parts of the book "Analysis of Financial Time Series" (Tsay) and "Financial Econometrics: Models and Methods" (Linton) which will be available as pdf-files on blackboard. In addition, we will cover some topics that go beyond the content of standard text books and require reading some recent journal articles. Those articles will be available on blackboard too.

A homework assignment will be posted in early May. Except the coding, homework problems look very similar to what you can expect in the final exam. July 1st is the day where we will have a tutorial in preparation of the exam. I expect that for each and every homework problem at least one student or group of students voluntarily presents their solution. The final exam will take place July 8th 10.00 am, HS104.

### Prerequisites

Students are required to have taken the master-level econometrics class (10120301). Having taken a time series course (10141508) or taking it concurrently is recommended. Students are assumed to be familiar with basic concepts in linear algebra, analysis, probability theory and statistical inference. Basic programming abilities in R are required to be able to solve the homework.

## Course outline and reading list

### 1) Review of statistical concepts and properties (22.4-29.4)

- Return, multi period, continuous compounding.  
Reading: Linton Chap 1,
- Distributions: joint, marginal, moments, conditioning.  
Reading: Tsay Chap 1, Linton Chap 1
- Efficient Market Hypothesis: definitions and statistical tests.  
Reading: Linton Chap 3, 4.

### 2) Assessing market risks (6.5-20.5)

- Measures of market risk.  
Reading: Linton Chap 14.1, 14.2.
- Extreme Value Theory.  
Reading: Tsay Chap 7, Linton Chap 14.3, 14.4.
- Volatility.  
Reading: Tsay Chap 3, Linton Chap 11, Corsi (2009), Noureldin et al.(2012).
- Forecast evaluation.  
Reading: Gneiting (2011); Patton (2012, 2020);  
Patton, Ziegel, Chen (2019).

### 3) Portfolio management (10.6-17.6)

- Risk-return tradeoff: risk minimization.
- Multivariate volatility and PCA.  
Reading: Tsay Chap 9, 10.
- Factor models and portfolio allocation.  
Reading: Fan et al. (2008); Xiu et al. (2016); Ait-Sahalia, Xiu (2017); Ao et al. (2019); Chen et al.(2020).