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„High-Frequency Econometrics“

The availability of high-frequency data on the lowest aggregation level has strongly influenced recent research in financial econometrics and statistics. High-frequency data provide deeper insights into trading processes and liquidity as well volatility dynamics on the highest frequency. Capturing the specific statistical properties of this data requires developing new type of models combining time series techniques with methods from microeconometrics, point process theory and multivariate statistics.

This course covers the recent developments in this field including models for trading processes, liquidity and order book dynamics as well as high-frequency volatility. Moreover, cutting-edge research results on high-dimensional covariance estimation using high-frequency data as well as local adaptive methods for market monitoring are discussed.

A part of the course consists of empirical illustrations or practical exercises where participants are instructed to apply econometric concepts to financial data using statistical software.

1. Properties of Financial Transaction Data

- 1.1. Handling High-Frequency Data
- 1.2. Aggregation Issues
- 1.3. Intraday Seasonality
- 1.4. Dynamic and Distribution Properties

2. Econometrics of Trading Processes

- 2.1. Multiplicative Error Models for Trading and Liquidity Processes
- 2.2. Modelling Discrete-Valued High-Frequency Data: Autoregressive Poisson and Multinomial Models
- 2.3. Intensity-Based Models

2.4. Real-Time Monitoring of Trading Processes

3. High-Frequency Based Volatility Estimation

3.1. Realized Intraday Variance

3.2. Spot Variance and Jumps

3.3. Intensity Based Volatility Estimation

4. Estimating and Predicting Liquidity

4.1. Price Impact Measures

4.2. Modelling Order Book Curves

4.3. Estimating the Market Impact of Trades and Limit Orders

4.4. A Statistical Model for Hidden Volume

5. Estimating Vast-Dimensional Covariances Using High-Frequency Data

5.1. Realized Covariance

5.2. Multivariate Realized Kernels

5.3. A Blocking and Regularization Approach

5.4. Forecasting Covariances Using Realized Spectral Components