1. General Information
Session WS18/19
Michael Hauser
Y2CO Financial Econometrics, 0666
English

11 days, Oct 1 – Nov 12
Monday 13.00-15.00 Location: TC.3.21,
except **Oct 22, TC.0.02 Red Bull**
except **Nov 12, TC.0.02 Red Bull**
Wednesday 13.00-15.00 Location: various
Oct 3, TC.5.01
Oct 10, TC.3.05
Oct 17, 24, TC.3.21
Oct 31, TC.4.03

2. Prerequisites
Course Y1P4 Econometrics

3. Objectives and Learning outcomes
After completion of the course the student will be able
- to understand and apply more specific methods for modeling data of financial markets.
- to apply a selection of frequently used procedures for financial data, covering models for conditional heteroscadsticity (GARCH), VAR (vector autoregressive models), VEC (vector error correction models), Kalman filter and state space models, characteristics of high frequency data, analysis of static and dynamic panels.
- to interpret the output of empirical estimates.

Participants will be trained in
- manipulating formulas,
- reading and executing R scripts
- interpreting the results of small empirical projects

when doing the assignments and presenting them in class.
Exams cover theoretical aspects, deeper understanding as well as empirical applications.

Content:
In general the presentation develops as follows: posing the problem, model specification, listing the assumptions, interpretation, estimation, inference, model selection, model sensitivity, e.g. impulse response analysis, misspecification analysis and empirical applications.

GARCH or generalized autoregressive conditional heteroscedasticity models are able to capture the stylized facts of financial return data, that periods of high volatility are followed by periods of low volatility.

VEC or cointegrated VAR allow for cointegrated series leading to non standard estimation procedures and inference. The model interpretation will stress the distinction between long run properties and short run adaption.

The class of state space models comprises the ARIMA class and helps to understand the dynamics of multivariate dynamic processes. The flexibility of the class will be demonstrated and the estimation and forecasting steps explained. Empirical examples will cover e.g. volatility modeling.

High frequency data have some distinct properties like irregularly observed values, measuring an underlying continuous processes

(with/without jumps), different observational frequencies among different series, pronounced intraday "seasonality". For the latter the concept of realized volatility will be introduced and illustrated for the Microsoft stock data.

Panel structures allow the simultaneous modeling of cross-section and time series data. Especially we deal with constant or hardly changing information over time on the individual level. We will consider specification, estimation and inference of fixed and variable effects and dynamic models. Empirical examples are provided.

4. Teaching methods
Lecture with slides. The methods are illustrated using some computer packages and real data sets. Discussion of the assignments in class. Additional readings are supplied.

5. Grading
Grading will be based on homework assignments, answers given during presentations of the assignments in class, and on the exams. Some assignments have to be solved individually, others in small groups. The assignments are handed in printed on paper at the beginning of the class.

Criteria for the investigation of empirical relationships are the ability to pose a problem, to discuss different methodological approaches, to choose a favorite model, to justify the statistical assumptions, to interpret the output and to conclude wrt the posed problem, or to reformulate the problem.

Criteria for the formal exercises are the ability to read formula and to do simple proofs.
The computation exercises are to be presented in a clear way and the single steps explained.

Criteria for the written exams are the ability to apply the methodology apart from the understanding of the models and their statistical properties.
The contributions to the grade are

- 30% homework assignments and classroom presentations
- 40% mid-term exam
- 30% final exam

The minimum percentage for passing is 51%.

A minimal attendance of 80% of the lectures is mandatory.

6. Tests
The test is a *closed book* test. Cheating is seen as a serious violation of our rules and may lead to a negative grade independent of your performance. Mobile phones or Google Glasses are prohibited in the tests. Coats have to be put on the provided hooks on the walls, bags are under the table. On the table are only a pencil/eraser or a ball pen, and the handed out test. You will be seated.

Some details:
Formal exercises have to be worked out in a stringent mathematical way, arguing each relevant step. If propositions have to be proofed, the conclusion has to be drawn in a way so that the relation to the original conjecture is discernable. If a proposition is shown not to hold in general, a counter example has to be given.

Computing exercises are presented in a way so that a non-informed colleague can understand the steps. The problem has to be stated first, the code has to be explained, the output has to be interpreted.

Empirical projects always start with the description of the economic/financial problem to be investigated. Then the data have to be commented on, their behavior according to the instruments/concepts available discussed and the transformations - if necessary - argued in that framework. The specific model applied has to be justified. Alternative modeling techniques have to be excluded, or – if applicable - at least characterized as second best. When applying a statistical technique, some thoughts are necessary whether the usage is justified. Empirical results - estimates or tests - have to be interpreted with respect to the original economic question.

For the written exams, the assessment will be based on the ability to interpret computer output of empirical examples, to discuss the usage, advantages and disadvantages of modeling approaches, specification assumptions, estimators and testing procedures. Further some ability to derive properties of estimators, tests, models and processes is required. In general, short and precise answers to the questions posed are expected and not surveys on a related topic.

6. References

Greene: Econometric Analysis, 6th ed., Chp. 13.2
Ramanathan: Introductory Econometrics, Chp. 10
Tsay: Analysis of Financial Time Series, Chp. 5, 8, 11
Verbeek: Modern Econometrics, Chp. 8, 10

Master copies are available at the secretary, D4, floor 4.

7. Classes and topics

Oct 01: Chp. 1, Conditional heteroscedasticity, Random walk, Endogeneity,
Oct 03: Ganger causality and IV Estimation
Oct 08: Chp. 2, Vector autoregressions, VAR
Oct 10: Chp. 2
Oct 15: Chp. 3, High Frequency Data
Oct 17: Chp. 4, Vector error correction model, VECM, Cointegrated VAR
Oct 22: *Midterm test (Chp. 1-3)* **TC.0.02 Red Bull**
Oct 24: Chp. 4
Oct 29: Chp. 5, Panel Data Models
Oct 31: Chp. 5
Nov 12: *Final test (Chp. 4, 5)* **TC.0.02 Red Bull**