Econometrics
(Winter Term 2013/2014)
Instructor:

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Tutorials:

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This course: Times and dates

Lectures:
Wednesdays 16.00–17.30h in lecture room (HS) XIII, (100 Hauptgebäude),

Exercises:
Fridays 14.00–15.30h in lecture room (HS) XXIII, (101 WiSo-Hochhaus).
This course: Goals and Prerequisites

- The goal of this course is to familiarize master students with a wide range of topics in modern econometrics, focusing on what is important for doing and understanding empirical work.
- It covers econometric techniques used for cross-sectional analysis as well as time series analysis.
- The econometric methods are illustrated using applications from fields like labor economics, finance, international economics, consumer behavior, macro economics.
- Background knowledge in Statistics (*Statistik A* and *Statistik B*) and Mathematics are absolutely necessary.
- Having taken a course in Econometrics at the bachelor level would be a great advantage, but is not necessary.
This course: Organization

- The course will closely follow the book *A Guide to Modern Econometrics* by Marno Verbeek.
- Lecture slides and exercises will be available via the system ILIAS.
- There will be a course manual that contains all the information relevant for taking this class (required reading, exercises, additional exercises, review questions).
- Solutions to the exercises will be made available.
- Computer exercises applying the econometric techniques discussed during the lecture to real data will be performed using the (open source) program *gretl*.
- An introduction to *gretl* will be given.
• Given the suboptimal student/teacher ratio, adequate self study is crucial.

• My advise is to work continuously throughout the semester.

• You will not be able to fully understand the material if you just go to the classes and listen.

• Complete self study of the course should be possible, but you are likely to miss some important explanations, hints or recommendations.
• It is obligatory to read the textbook.

• I will give precise reading indications for every week.

• Secondary reading will be given and it is recommended to look at a different textbook every now and then.

• The lectures will closely follow the book, so that lectures aid your reading and your reading aids understanding the lectures.

• Further advantage of this: the same notation is always used.
This course: Exam

- There will be a 60 minute written exam during the last lecture.
- You will be allowed one A4 page (two sided) of hand-written notes.
- There will be no formula sheet.
- The questions will rather aim at you understanding of the material and your ability to interpret regression output.
This course: Contents

1 Elements of Matrix Algebra, Statistical and Distribution Theory

2 Linear Regression Model
   2.1 Ordinary Least Squares (OLS) as an Algebraic Instrument
   2.2 The Linear Regression Model and its Assumptions
   2.3 The OLS Estimator and its Properties
   2.4 Example: Irregularities in the 2000 US Presidential Election
   2.5 Goodness-of-fit
   2.6 Hypothesis Testing: $t$- and $F$-Tests
   2.7 Multicollinearity
   2.8 Predictions
   2.9 Example: The Capital Asset Pricing Model
3 Interpreting and Selecting Regression Models
   3.1 The Regression Function and its Interpretation
   3.2 Selecting the Regressors
   3.3 Specifying the Functional Form of the Regression Function
   3.4 Examples: Explaining House Prices, Individual Wages

4 Heteroskedastic Errors
   4.1 Empirical Illustrations Involving Heteroskedasticity
   4.2 What is Heteroskedasticity?
   4.3 Consequences of Heteroskedasticity for the OLS Estimator
   4.4 The Generalized Least Squares (GLS) and the Feasible GLS Estimator
   4.5 Heteroskedasticity-consistent Standard Errors for OLS
   4.6 Testing for Heteroskedasticity: Testing Equality of two Unknown Variances, Breusch-Pagan Test, White Test
5  Autocorrelated Errors

5.1  What is Autocorrelation?
5.2  First-order Autocorrelation and the (F)GLS Estimator
5.3  Testing for First-order Autocorrelation
5.4  Higher-order Autocorrelation and Moving Average Errors
5.5  Heteroskedasticity-and-autocorrelation-consistent Standard Errors for OLS
6 Endogeneity and Instrumental Variables
   6.1 A Review of the Properties of the OLS Estimator
   6.2 Situations Where the OLS is not Applicable: Autocorrelation with Lagged Dependent Variable, Measurement Errors, Endogeneity and Omitted Variables, Simultaneity and Reverse Causality
   6.3 Instrumental Variable (IV) Estimation
   6.4 Example: Returns to Schooling
   6.5 Generalized IV Estimator
   6.6 Specification Tests
7 Maximum Likelihood

7.1 Maximum Likelihood (ML) Estimation
7.2 ML Estimator for the Parameters of the Linear Regression Model
7.3 ML Estimator for the Parameters of Limited Dependent Variable Models: Binary Choice Models, Logit and Probit Model, Ordered Multiresponse Model, Count Data Models, Tobit Models
8 Time Series Models

8.1 Time Series Data and Detrending
8.2 Autoregressive-Moving-Average (ARMA) Models
8.3 Estimation of the Parameters of ARMA Models
8.4 Model Selection
8.5 Forecasting with ARMA Models
8.6 Stationarity and Unit Roots
This course: Literature

• The main textbook

• Additional recommended books

• A german textbook