

## Further Topics in Regression Analysis: Course Outline

Daniel Buncic

Autumn, 2014

### 1 COURSE DETAILS

<b>Lecture Time</b>	: Thursday, 16:15 – 20:00.
<b>Lecture Room</b>	: 22-004.
<b>Course Code</b>	: 5,260,100.
<b>Instructor</b>	: Daniel Buncic Bodanstrasse 6, 3. Floor, Office 28-303 email: <a href="mailto:daniel.buncic@unisg.ch">daniel.buncic@unisg.ch</a> .
<b>Office Hours</b>	: Fridays, 10:30-12:00 or by appointment.
<b>Course Website</b>	: <a href="http://www.danielbuncic.com/ftra.html">http://www.danielbuncic.com/ftra.html</a> .

### 2 INFORMATION ABOUT THE COURSE

#### 2.1 Course Details

This course extends the basic econometric course ‘*Empirische Wirtschaftsforschung (4.220)*’ by focusing in greater detail on a number of common topics in regression analysis. This course will be beneficial to students wanting to carry out empirical research in the fields of economics and finance. The course builds on the knowledge obtained in ‘*Empirische Wirtschaftsforschung (4.220)*’. It will initially review the topics of regression, non-linear regression functions and the impact of heteroskedasticity and autocorrelation on the regression estimator. The course then proceeds by focusing on the topics listed below.

##### 2.1.1 Topics

**Topic 1:** Review of regression analysis

**Topic 2:** Regression with binary dependent variables and censored regression

**Topic 3:** Instrumental variable regression, two stage least squares, simultaneous equation models and systems.

**Topic 4:** Regression with panel data models

The objective of the course is to get students proficient in estimating economic and financial models using “*real world*” data. Furthermore, students will be taught about the limitations and problems that one often encounters when dealing with empirical economic and financial data.

#### 2.2 Course literature

The reading material for this course will primarily come from the excellent textbook written by Hill, Griffiths and Lim (2011) [[HGL2011](#)]. However, some of the sections from Wooldridge (2009) [[W2009](#)] and from Baum (2006) [[BM2006](#)] will supplement the material in the [HGL2011](#) text. Also, for some specialised topics, reading handouts will be made available on the course website. A list

with the full references is given below under [Textbooks](#). A detailed weekly reading list, outlining the topics that will be covered is provided in the [Weekly Lecture Schedule](#) on the last page of this course outline.

The resource that is listed below under [Additional Material](#) is a computing book that accompanies the [HGL2011](#) text. It's a STATA instructions book for the computing exercises in the [HGL2011](#) text. This book should help students to get started with the econometric software that will be used in the course.

### Textbooks

- (HGL2011) Hill, R. Carter, William E. Griffiths and Guay C. Lim (2011): '*Principles of Econometrics*', Fourth Edition, Wiley. ISBN: 978-0-471-72360-8. Library Call No.: Ordered for the Library.
- (W2009) Wooldridge, Jeffrey M. (2009): '*Introductory Econometrics : A Modern Approach*', Fourth Edition, South-Western. ISBN: 0-324-66054-5. Library Call No.: QH 310 W915.
- (BM2006) Baum, Christopher F. (2006): '*An introduction to modern econometrics using STATA*', Stata Press. ISBN: 1-59718-013-0. Library Call No.: QH 310 B347

### Additional Material

- (Statabook) Adkins, Lee C. and R. Carter Hill (2011): '*Using STATA for Principles of Econometrics Forth Edition*', Wiley. ISBN: 978-0-470-18546-9. Library Call No.: Ordered for the Library.

## 2.3 Pre-requisites

The official prerequisite for the course is '*Empirische Wirtschaftsforschung (4.220)*', which covers the fundamentals of regression analysis. Although there is no official prerequisite for a foundation course in statistics, it is assumed that students are familiar with standard statistical concepts such as random variables, means, variances, covariances, distributions,  $p$ -values, hypothesis testing, and so forth. If students are unsure about these concepts or have simply forgotten them, they should consult Chapter 1 in [HGL2011](#) and Appendices A, B and C (excluding Section C.8) in [HGL2011](#) for a review.

During the first few weeks of the semester we will spend some time reviewing the fundamental concepts of regression analysis that will be needed to have a solid understanding of the later topics covered in the course. Nonetheless, it will be taken for granted that students are familiar with some basic statistical concepts (the ones that are listed above). The aim of the course is not to give a thorough review of the fundamentals of regression analysis but to focus on the three main topics that are listed above under [Topics](#).

## 2.4 Computing requirements

Although the course will deal with some basic econometric theory, the focus of the course is on applied econometric exercises. Due to this, the course will make considerable use of the [STATA](#) computer package throughout the semester. STATA is probably one of the most widely used computer packages for the type of econometric analysis that we will focus on and is widely used by major international organisation such as the World Bank, the IMF, and many others. STATA will be made available in the university's computing labs.

Another good and free statistical and econometric computing environment is [R](#). Depending on what we will be doing, I may use [R](#) from time to time to illustrate how to use some of the packages (or routines) that are available with it on some empirical data. My [teaching website](#) has a number of examples of how to get started with [R](#).

## 2.5 Lectures

The lecture environment will be kept as informal and ‘student’ friendly as is possible, so that students feel comfortable enough to ask (hopefully many) questions that will deepen and strengthen their understanding of the material that is being taught.

Nevertheless, students are expected to read the assigned chapters outlined in the **Weekly Lecture Schedule** before the week’s lecture and are thus expected to be prepared when they come to the lectures. Since lecture time is scarce, the focus of the lectures will be on outlining the statistical details necessary to conduct the required econometric analysis and on providing some empirical examples. Although some intuition about why we are performing a particular econometric test or how to think about econometrics will be provided in the lectures, students will get most of the intuition from the assigned readings.

Also, there are no lab (or computing) classes scheduled for the course. Students are, therefore, expected to familiarise themselves independently with the required computing material and use the resources that are provided in the lecture and the textbook. Introductory material to get started with STATA and/or R are also available on the course website.

## 2.6 Notation

Since we will, at times, pool information from different resources, it is most likely that some differences in notation will arise due to the pooling. I will try to be consistent with the notation (and language) used in the lectures and lecture notes. That is, I will use Greek and Latin letters to denote the population values of interest (ie., parameters) and I will use hats ( $\hat{\cdot}$ ) to mean parameter estimates (ie., sample statistics) obtained from a sample of data. Also, for some computations, especially when we introduce Method of Moment and Instrumental Variable estimation, we will use matrix notation to cut down on unnecessary summation operators.

## 3 COURSE ASSESSMENT

### 3.1 Formal Requirements

In order to pass this course, you must obtain a total grade of at least 50% (ie, 50 out of 100). The total mark is computed as the sum of all assessment components (see below).

### 3.2 Assessment Details

The assessment components are summarised in the table below.

What	How much	Due in
Assignments	30%	to be announced
Final (oral) exam	70%	During the week of 10.11.2014–14.11.2014 after the two week semester break
Total	100%	

The assignment will be handed out after the break. Details regarding the final oral exam, that is, its length, content, etc, will be outlined in class before the exam. The length will be approximately 15 minutes long and it will cover the whole course.

### 3.3 Comments on course assessment

The format, timing and the number of assessment items were designed to maximise the students’ learning outcomes. There exist many pedagogical studies that show that a continuous stream of

learning is much more efficient and beneficial to students than a short intense period of study, since more course material is retained for a longer period of time after the end of the semester. The assessment is thus split into a number of intervals rather than a single assessment item at the end of the semester, so that students are *encouraged* to study for the course on a weekly basis.

#### 4 WEEKLY LECTURE SCHEDULE

The lecture schedule for this course is as follows. The '*Required Readings*' are the assigned reading requirements for the students to be able to follow the lecture material in a sensible way. The Lecture Notes are written so as to condense and to supplement the information provided in the '*Required Readings*'.

Week (Date)	Lecture Topic	Required Readings
1 (18.09.2013) and 2 (25.09.2013)	Introduction, Review of Regression Fundamentals, Hypothesis Testing, Functional Forms, Multiple regression. Heteroskedasticity and Autocorrelation HAC std. errors, Misspecification testing, Regression in Matrix form, multicollinearity.	<b>Topic 1.</b> Chapters 1 – 9 in HGL2011 and Chapters 4 – 7 in BM2006.
2 (25.09.2013) and 3 (02.10.2013)	Intro. to Maximum Likelihood estimation, Introduction to Binary Dependent Variables. Estimation, formulation and testing of binary dependent variable models, assessing goodness of fit, Tobit models for censored data.	<b>Topic 2.</b> Appendix C8. Chapter 16 in HGL2011, Chapter 17 in W2009 and Chapter 10 in BM2006.
4 (09.10.2013) and 5 (16.10.2013)	Intro. to Method of Moments estimation, introduction to Instrumental Variable Regression. Simultaneous Equation Models, Two Stage Least Squares, Weak Instruments in IV Regression, testing for weak instruments	<b>Topic 3.</b> Appendix C8. Chapter 10 in HGL2011 and Chapter 15 in W2009, Chapter 11 in HGL2011, Chapter 15 in W2009, Chapter 8 in BM2006 and Reading Handout.
5 (16.10.2013) and 6 (23.10.2013)	Systems of equations, Seemingly Unrelated Regression and Panel Data Models. More on Fixed Effects, Random Effects and introduction to dynamic Panel Data Models.	<b>Topic 4.</b> Chapter 15 in HGL2011, Chapters 13 – 14 in W2009, Chapter 10 in BM2006 and Reading Handout.
to be advised	Final (oral) examination	

**Note that this schedule is tentative and therefore subject to change!**

Note that there will be some overlap in the topics covered in each week.