

Course Outline: Quantitative Methods II (Ec2203) - Spring Term

Econometrics

Lecturer: Jonathan Wadsworth

Office: H215A

Office Hours: Mon: 2:30-3:30 Thrs. 2.30-3.30

Aims

The second half of the course is intended to provide students with a solid understanding and practical experience of the essentials of empirical research techniques (ie econometrics) used by applied economists.

Learning Outcomes

By the end of this term, students should be able to:

- understand the theory behind standard econometric techniques
- manipulate and analyse data sets and conduct their own econometric investigations and tests of economic hypotheses both written and using computer software.

Course Delivery

As with last term, there will be two, hourly lectures and a one hour class each week. In lectures live use of the econometrics package Stata to enable students to understand the practical art of econometrics as well as the basic theory. There will be a handout to accompany each lecture which will cover the basic materials. Students are expected to take notes to supplement these handouts both during the lectures and after consulting the relevant pages in the course texts. The course is therefore very much an 'applied hands-on' econometrics full of real world data and practical examples. As such, students who do not attend the lectures and classes or attempt the problem sets will find this course almost impossible.

Problem Sets

One problem set will be given out and discussed each week which will involve both written questions and computer-based exercises. To have any hope of doing well in the end of year examination and the dissertation all these problem sets should be attempted. Students should bring written answers to the class to be discussed by the class teacher. Students will be allowed to retain their work so that they can add comments and rectify errors during the discussion. There will not be time to discuss all the answers to every question in the problems sets. Students will be expected to work through the answers to those questions not covered in classes in their own time.

To facilitate this, answers to the problems sets – along with lecture handouts and data sets - will be posted (with a lag) on the course website

<http://web.rhul.ac.uk/Economics/For-Students/ugcourses/ec2203.html>

Computer Exercises

To really understand econometrics and empirical work, you need to have experience of doing it yourself. Most of the problem sets assigned during term will include questions

requiring use of real world data sets and use of the Stata regression package. Detailed instructions for using the package will be included in a separate handout and in the problem sets. The seminars will take place in the computer labs. So you will have plenty of opportunity for practice.

Assessment

There is one remaining test to be conducted during this term, accounting for 10% of the final mark for the course. In addition students will have to devise and undertake their own econometric project - to be completed by the end of term - which will also comprise 10% of the final mark. Details about the project will also be given in a separate handout. The end of year exam, which will address the topics covered in **both** terms, accounts for 60% of the total mark.

Reading

The course text, which you should probably buy, although there are some copies in the library is

C. Dougherty, "Introduction to Econometrics 3rd Edition", Oxford University Press, (Library Code: 330.01 DOU)

Another useful text is

D. Gujarati, "Basic Econometrics", McGraw-Hill Press, (Library Code: 330.01 GUJ)

Also

J. Wooldridge, *Introductory Econometrics*, South Western College Press, 2000 (Library code: 330.01 WOO)

and

J. Stock and M. Watson, *Introduction to Econometrics*, 2nd Ed., Pearson International, 2006. (Library code: 330.01 STO)

(though both are probably pitched just above the overall level of this course, they are more comprehensive and contain lots of useful intuition and worked examples).

The lectures and associated classes will **not** cover basic statistical issues like expected values, covariances, the normal distribution, hypothesis testing or confidence intervals. It is assumed that you have a good knowledge of these topics from last year. If you need to revise them,

T. Wonnacott & R. Wonnacott, "Introductory Statistics for Business and Economics", Wiley Press (Library Code: 330.0182 WON)

is a good source.

Time permitting, the course will go over the following areas.

Week 1. Simple Regression Analysis

Simple regression model; derivation of linear regression equation; goodness of fit.

Aims: know the formulae for the regression coefficients and understand the principle underlying how they are derived; know the definition of R^2 and how it is related to the residual sum of squares

Week 2: Properties of Regression coefficients

Gauss-Markov conditions and unbiasedness of the regression coefficients; precision of the regression coefficients; Gauss-Markov theorem; t test of a hypothesis relating to a regression coefficient; Type I error and Type II error; confidence intervals; F test of goodness of fit.

Aims: How to interpret a regression coefficient; how to investigate whether or not estimators are biased;

Week 3. Multiple Regression Analysis

Regression with 2 explanatory variables; properties of multiple regression; Hypothesis testing

Aims: To be able to perform F tests, Chow tests, give economic interpretation of estimated coefficients

Week 4. Specification of Regression Equations

Functional form; F tests in multiple regression model; transformation of variables elasticities; dummy variables; omitted variable bias.

Aims: know tests for omitted variables, functional form

Week 5. Endogeneity

Definition and consequences of endogeneity; simultaneous equation systems; measurement error; tests endogeneity; instrumental variable estimation as a solution to problem

Aims: Demonstrate consistency of IV estimation and perform relevant tests.

Week 6. Heteroskedasticity

Meaning and consequences of heteroskedasticity. Tests for heteroskedasticity

Aims: How to undertake tests for heteroskedasticity.

Week 7. Autocorrelation

Definition and consequences; tests for AR(1) autocorrelation; autocorrelation with lagged dependent variable

Aims: to be able to perform tests and be aware of possible solutions to autocorrelation.

Week 8. Models using Time Series Data and Non-Stationary Processes

Dynamic models; short and long-run coefficients; partial adjustment predictions; stationary and non-stationary processes; cointegration

Aims: to analyse short and long-run implications of dynamic models; to determine whether a time series is stationary; to understand the principles behind the unit root test

Week 9. Panel Data

The idea of panel data. Fixed Effects and Random effects.

Aims: To have a simple appreciation of panel models.

Week 10. Binary Choice Models and Maximum Likelihood Estimation

Linear probability model; logit and probit models; maximum likelihood estimation of coefficients; marginal effects;

Aims: to be able to estimate binary choice models and interpret their coefficients.