



School of Business
Te Kura Pakihi

ECON 375 (18 points)

Econometrics

Semester 2, 2011

Course Description

Literally interpreted, 'econometrics' means 'economic measurement'. Although measurement is an important part of econometrics, the scope of econometrics and this course are much broader.

Econometrics makes use of statistical methods for estimating economics relationships, testing economic theories, selecting economic models, and evaluating government and business policy. This course examines the theory and application of linear estimation and testing techniques in the context of multiple regression and dynamic and simultaneous equation models. Topics will include least squares estimation, the Gauss-Markov theorem, generalised least squares, autocorrelation and heteroscedasticity, multicollinearity, and the identification and estimation of simultaneous equation systems, dynamic modelling, maximum likelihood estimation, limited dependent variables estimation, and an introduction to panel data methods.

The goal of this course is developing a good understanding of some of the main techniques used in econometrics, reviewing and building on the skills and knowledge obtained in *ECON 210* (or equivalent). Practical computing exercises, assignments and interactive tutorials will provide experience in applying these techniques.

Please note that this course is a prerequisite for the ECON 400 level econometrics papers and also for ECON 426. Furthermore, the applied practical skills taught aim to provide a valuable preparation for everybody intending to undertake an empirical Honours dissertation at the 400 level.

Prerequisites: ECON 210 and ECON 270 (or equivalent Mathematics and Statistics papers approved by the Head of Department)

Lecture Times: Wednesdays and Thursdays at 1 pm, Fridays at 10 am.

Computing Labs: Mondays, either at 3 pm or at 4 pm; these start in the second week of classes

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Office Hours: tba

Learning Aims and Objectives

Assessment

There will be a mid-semester test, worth 15%, two computing assignments, worth 12.5% each, and a 2 hour final examination, worth 60%. ***Plussage will not be applied in the usual way.*** If the midterm test score is lower by one full letter grade (10%), or more, than the mark on the final examination, the midterm test will only count 7.5% (instead of 15%) towards the assessment and the final examination in this case will count 67.5%. If a student misses the midterm test for a valid and approved reason, the 15% weight will be transferred to the final examination. The test and final examination will **not** be “open book” examinations.

The mid-semester test is scheduled for the regular class time (1 hour long). The exact date and details of what it will cover will be provided in lectures.

The computing assignments will be distributed later in the course. They will be due by the date stated on the assignment. There is a penalty for handing it in late of 10% of the total points for every day that it is late.

The final exam will be comprehensive.

Workload

Note that this is an 18-point semester paper. Under the University’s points conventions, an 18-point paper corresponds approximately to an average workload of 12 hours per week (including contact hours), or roughly 180 hours in total over a 15-week period (including the end-of-semester exam period).

DISHONEST PRACTICE AND PLAGIARISM

STUDENTS SHOULD MAKE SURE THAT ALL SUBMITTED WORK IS THEIR OWN. *Any student found responsible for dishonest practice (for example, copying, the use of unauthorised material in tests, etc) in relation to any piece of work submitted for assessment shall be subject to the University’s dishonest practice regulations which may result in various penalties, including forfeiture of marks for the piece of work submitted, a zero grade for the paper or in extreme cases exclusion from the University.*

Plagiarism is a form of dishonest practice. Plagiarism is defined as copying or paraphrasing another’s work and presenting it as one’s own (University of Otago Calendar 2011 page 224). In practice this means plagiarism includes any attempt in any piece of submitted work (e.g. an assignment or test) to present as one’s own work the work of another (whether of another student

or a published authority). Any student found responsible for plagiarism in any piece of work submitted for assessment shall be subject to the University's dishonest practice regulations which may result in various penalties, including forfeiture of marks for the piece of work submitted, a zero grade for the paper, or in extreme cases exclusion from the University. The University of Otago reserves the right to use plagiarism detection tools.

Recommended Textbooks:

There is no one set textbook for the course. Wooldridge's book was the text for *ECON 210* and contains many useful examples. Stock and Watson's text is highly recommended. Kennedy's text is a very useful supplement that concentrates on an intuitive understanding and less on technical detail. For those students interested in more details, a textbook one step up is that by Johnston and DiNardo.

Stock, James H., and Mark W. Watson, *Introduction to Econometrics*, 2nd Edition, Pearson, 2007 **(SW)**.

Wooldridge, Jeffrey M., *Introductory Econometrics: A Modern Approach*, 4th Edition, Thomson, 2009; 3rd edition is also acceptable **(W)**.

Kennedy, Peter, *A Guide to Econometrics*, 6th edition, Blackwell, 2008 **(K)**.

An advanced treatment is provided by:

Johnston, Jack, and John DiNardo, *Econometric Methods*, 4th Edition, McGraw-Hill, 1997.

The texts are available at the close reserve desk in the Central Library. The first part of this course will *review and enhance understanding* of concepts seen before. *ECON 375* is intended as a progression from *ECON 210* (or *FINC 203*), and therefore students are expected to have at least some familiarity with introductory/intermediate econometrics. The intention is to develop and enhance an understanding of key statistical concepts and the fundamental assumptions (and violations) of the classical linear regression model. Most of your learning will take place by taking notes in lectures, attending computer labs as well as preparing for, and participating in, tutorials (built into the lectures).

Course Outline

Topic 1

Review of basic concepts

Simple Linear Regression. Objectives of OLS. Estimated coefficients as random variables. Discussion of the error term and assumptions. Sampling distribution concept. Desirable properties of point estimators.

Other concepts: Dummies; testing for structural change (Chow test); consequences of misspecification: omitted variables bias.

Reading: **SW:** Ch. 2 - 7 (not all parts), 9.2.
 W: Ch. 2 - 7.
 K: Ch. 1, 2, 3, 5, 12, 15.
 Review your notes from *ECON 210* or equivalent.

Topic 2

Multiple regression in matrix notation

Matrix notation. Derivation of OLS in matrix notation. Inference, hypothesis-testing concepts, power of a test, p -values.

Reading: **SW:** Ch. 6.2 to 6.6, 7.1 to 7.4 , Appendix 18.1 (Matrix Algebra).
 W: Appendix D and E.

Topic 3

Introduction to maximum likelihood estimation

The idea of maximum likelihood. MLE versus OLS in simple linear regression. Deriving maximum likelihood estimators.

Reading: **SW:** Ch. 11.3 (pp. 398-399)
 K: Ch. 2.9.

Topic 4

Heteroscedasticity and GLS

Its implications and how to test for it. Estimation methods and correction for heteroscedasticity. Generalised Least Squares (GLS) estimation.

Reading: **SW:** Ch. 5.4.
 W: Ch. 8, 12.6.
 K: Ch. 8.

Topic 5

Autocorrelation

Causes and implications for OLS estimation. Tests for autocorrelation. Generalised Least Squares (GLS) estimation of models with autocorrelated errors. HAC estimation.

Reading: **W:** Ch. 12.1 to 12.5.
 K: Ch. 8.

Topic 6

Measurement errors and instrumental variables

Implications for properties of OLS estimators. The role of, and criteria for, IV estimation. How to choose good instruments.

Reading: **SW:** Ch. 9.2, 12.1.

Topic 7

Autoregressive and moving average models (AR&MA), vector ARs (VARs) and forecasting

Definitions and estimation problems. Introduction to time-series analysis, spurious regressions, non-stationarity, vector auto-regressions and cointegration.

Reading: **SW:** Ch. 14, 16.1-16.4; not all parts.
 W: Ch 18.2 to 18.5.
 K: Ch. 19.

Topic 8

Autoregressive conditional heteroscedasticity (ARCH)

Definitions and estimation problems. Testing for ARCH. Estimation under ARCH. Extension: GRACH.

Reading: **SW:** Ch. 16.5.
 W: Ch 12.6

Topic 9

Simultaneous equation models and instrumental variables (IV)

The nature of the simultaneity problem (as a violation of the classical assumptions). Identification. Two stage least squares.

Reading: **SW:** Ch. 12.1, 12.2.
 W: Ch 15, 16.
 K: Ch. 11.

Topic 10 (may not be covered)

Panel data estimation

Nature of panel data. Fixed versus random effects. Estimation.

Reading: SW: Ch. 10.
W: Ch. 13, 14.
K: Ch. 18.

Topic 11

Binary dependent variables

Logit and probit estimation.

Reading: SW: Ch. 11.
W: Ch. 17.1.
K: Ch. 16.

CLASS REPRESENTATIVES

The class representative system is an avenue for encouraging communication and consultation between staff and students involved in a particular paper or course of study at the University of Otago. It provides students with a vehicle for communicating their views on matters associated with the teaching and delivery of their paper or course of study. It provides staff with the opportunity to communicate information to and gain constructive feedback from students. It contributes to the development of a sense of community within a Department/School/Faculty and it adds a further dimension to the range of support services that the University of Otago offers its students. The School of Business fully supports the class representative system.

Volunteers to act as class representatives for this paper will be called early in the semester. The OUSA then invites all class representatives to a training session, conducted by OUSA, about what it means to be a class representative and some of the possible procedures for dealing with issues that arise. They also provide information on the services that OUSA offers and the role OUSA can play in solving problems that may occur. The OUSA also provides ongoing support to class representatives during the semester. School of Business staff will also meet during the semester with the class representatives for this paper to discuss general issues or matters they wish to have considered

DISCLAIMER

While every effort has been made to ensure that the information contained in this document is accurate, the information is subject to change. Changes will be notified in class and/or tutorials. Students are encouraged to check notice boards, etc for any changes. It is your responsibility to be informed.