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Syllabus
Frontiers in Econometrics

GOAL: This course is intended as an introduction into the methods and techniques used in a wide range of econometric modelling. Therefore, we will start with reviewing the classical linear regression model since quite a number of important results in other settings can be studied in that rather simple framework. We will generalize the linear model and also consider non-linear regression models. Other important estimation principles like Maximum Likelihood and GMM will be covered. A range of frequently used econometric approaches will be presented.

ORGANIZATION: The daily schedule will be

9.00 - 10.30 : 1st lecture

10.30 - 10.45 : Break

10.45 - 12.15 : 2nd lecture

12.00 - 14.00 : Lunch

14.00 - 16.30 : Problem Set and Reading

16.30 - 17.00 : Presentation

17.00 - 18.00 : Review Session

The first four days are instructed by Prof. Martin Kukuk. The fifth day is taught by Prof. Andrew Tremayne.

TEXTS: We mainly refer to two recent textbooks:

(D) Davidson, R. and J.G. MacKinnon, (2004), *Econometric Theory and Methods*, Oxford University Press.

(V) Verbeek, M., (2004), *A Guide to Modern Econometrics*, 2nd ed., John Wiley. (First edition of this text will also do.)

Other texts like Greene, W, (2003), *Econometric Analysis*, 5th ed., Prentice Hall are also suitable. However, some of the directed reading will refer to Verbeek.

1

Day 1: Linear and Non-linear Regression Models

We review Least-squares estimation of regression models. The geometry of LS will be one main focus. Hypothesis testing, specification analysis, and extension to non-linear LS will also be discussed.

> READINGS: (D) chap. 2, 3 (except 3.3), 4.1–4.4, 6.1, 6.3. (V) chap. 2, 3. Participants should be familiar with matrix algebra and fundamental statistical concepts laid out in (D) chap. 1 and (V) appendices A and B.

Day 2: Asymptotic Theory, GMM, ML

The main principles in asymptotic theory enable us to relax some restrictive assumptions in the classical regression settings and still derive satisfying properties of estimators and tests. The asymptotic results prove helpful in also deriving general properties for ML and GMM estimators.

> READINGS: (D) chap. 3.3., 4.5, 8, 9, 10. (V) chap. 5, 6.

Day 3: GLS, Panel Data, Systems of Equations

General dependency structures for the residuals are studied in the linear regression model, in panel data models, seemingly unrelated regressions, and systems of equations.

> READINGS: (D) chap. 7, 12 (V) chap. 4, 10.

Day 4: Discrete and Limited Dependent Variables

In household and business surveys many variables are encountered as discrete or limited dependent variables. We therefore study binary choice models, ordinal probit, discrete choice, tobit, and duration models. We also discuss approaches dealing with selection bias.

> READINGS: (D) chap. 11. (V) chap. 7.

Day 5: Time Series Techniques

The fifth and final day of the graduate course *Frontiers of Econometrics* will be used to discuss *Time Serise Techniques. The day will be spent in the usual way, viz.* a morning session composed of two 90 minute lectures with a break of half an hour between them. The afternoon will be taken up with directed reading (which will be provided) and some exercise material based on previously worked computer-based problems and other exercises. Again relevant computer output will be provided; students will not need access to suitable econometric software themselves whilst attending the workshop. The day will conclude with a review session and supplementary notes and materials will be distributed as necessary.

The material to be covered will comprise econometric methods for time series data, with special reference to macroeconomic data. In this context, probably the two most important topics are: testing for nonstationarity in data; and model-building with nonstationary data. The two lectures and associated supplementary material will focus on these two topics, with one lecture devoted to each. The techniques exposited will be illustrated in the context of a simple project to assess the evidence for and against the doctrine of purchasing power parity.

References

A basic reference for the material that will be discussed is

Davidson, R. and J.G. MacKinnon, (2004), *Econometric Theory and Methods*, Oxford University Press, Chapter 14.

Other suitable treatments would be provided by, *inter alia*

Greene, W, (2003), *Econometric Analysis*, 5th ed., Prentice Hall, Chapter 20

Maddala, G. S. and I-M Kim, (1998), *Unit Roots, Cointegration and Structural Change*, Cambridge University Press

Verbeek, M., (2004), *A Guide to Modern Econometrics*, 2nd ed., John Wiley, Chapters 8 and 9.

Topics

Specific topics to be covered include: integrated variables; testing for unit roots using Dickey-Fuller and Augmented Dickey-Fuler procedures; testing the hypothesis of stationarity; spurious regressions; error, or equilibrium correction; cointegration; Engle-Granger methodology; and VAR methods for cointegration.