Objective: In ECON 412 we examine some aspects of time-series and nonstationary panel data econometrics that have become widely used in the estimation and testing of macroeconomic relationships in recent years. Upon successful completion of ECON412, you should be able to:

- Demonstrate an understanding of contemporary econometric methods used in time-series and panel time-series data analysis in macroeconomic contexts.
- Interpret and critically evaluate applied time-series and panel time-series econometric studies in the literature.
- Apply macroeconometric methods, using appropriate computer software, to relevant data in practice and interpret the results obtained.
- Explain the relevant estimation and testing methods and interpretation of results.

Prerequisites: The paper assumes knowledge of econometrics roughly equivalent to the material covered in ECON 375 Econometrics, including familiarity with the basics of at least one of the main econometric or statistical software packages (e.g., Stata, EViews, OxMetrics, R, SHAZAM).

Lecturer: Dorian Owen (Rm. OBS508, Ext. 8655)
email: Dorian.Owen@otago.ac.nz
Office hours will be posted weekly on the whiteboard outside 508

Lecture times: Tuesday 12-12.50am &Wednesday 2-3.50pm, Semester 1
Location: OBS320

Workload: Note that ECON 412 is a 20-point semester paper. Under the University’s points conventions, this corresponds approximately to an average workload of 16 hours per week (including contact hours), or roughly 240 hours in total over a 15-week period (including the end-of-semester exam period).

Lecture notes: Copies of lecture overheads will be provided in the lectures and on Blackboard (https://blackboard.otago.ac.nz/).

Assessment: Internal assessment: (50%, 12.5% each)
Due dates: Assignment 1 20 March Test 3 April
Assignment 2 30 April Assignment 3 21May
Final examination, 3 hours (at the end of Semester 1), 50%

Plussage will be applied to the test result, i.e. the test result will be counted in the final grade only if it improves it, but the computing assignments will not be subject to plussage.

Academic Integrity
Academic integrity means being honest in your studying and assessments. It is the basis for ethical decision-making and behaviour in an academic context. Academic integrity is informed by the values of honesty, trust, responsibility, fairness, respect and courage.
Students are expected to be aware of, and act in accordance with, the University’s Academic Integrity Policy.

Academic Misconduct, such as plagiarism or cheating, is a breach of Academic Integrity and is taken very seriously by the University. Types of misconduct include plagiarism, copying, unauthorised collaboration, taking unauthorised material into a test or exam, impersonation, and assisting someone else’s misconduct. A more extensive list of the types of academic misconduct and associated processes and penalties is available in the University’s Student Academic Misconduct Procedures.

It is your responsibility to be aware of and use acceptable academic practices when completing your assessments. To access the information in the Academic Integrity Policy and learn more, please visit the University’s Academic Integrity website at www.otago.ac.nz/study/academicintegrity or ask at the Student Learning Centre or Library.

Topics and Reading

The list below is relatively extensive. Don’t be put off by this! You are not expected to read everything. The aim is to provide a range of material that you can choose from depending on which areas you need to reinforce or in which you have a particular interest (e.g., because you are using specific techniques in your dissertation). Some of the more advanced material may be of use beyond this course.

A taste of what ‘cointegration’ is about can be obtained from the material posted on the Nobel Prize website commemorating the award of the Nobel Prize in Economics in 2003 to Professor Clive Granger (jointly with Professor Rob Engle). This includes a video of Professor Granger’s prize lecture at:


General reading: (* denotes reading that is initially the most accessible).

Useful texts:

More technically advanced treatments are available in:


Concise single textbook chapters that introduce some of the key concepts, at an accessible level, include:


Other useful textbook coverage of some of the material in this paper is given in:


A very accessible set of YouTube videos by Ben Lambert covers some of the material in the course. These are mostly included in the undergraduate course in econometrics playlists (parts 1 and 2) at https://www.youtube.com/user/SpartacanUsuals/playlists; the most relevant are listed in the individual topics below.
Topics and specific reading:

References in bold are highly recommended. References in squared brackets are more advanced readings. Topics and readings are a general guide; changes may be made depending on our rate of progress, relevant new references, etc.

1. Motivation and a review of basic concepts in time series analysis: stochastic processes, DGP, realizations and models; stationarity and non-stationarity, order of integration

   Nobel Prize in Economics 2003, resources cited above
   Patterson, op. cit., Chs 1-3.


   Banerjee et al, op. cit., Introduction and Overview, Ch. 1, especially pp.1-13, 27-42.


   [Hendry, 1995, op. cit., Ch. 2.]

   B. Lambert YouTube videos, undergrad part 1 playlist, #166-168, 170-172

2. Autocorrelation and partial autocorrelation functions; autoregressive (AR), moving average (MA), ARMA, and ARIMA processes; stationarity and invertibility; outline of Box-Jenkins modelling

   For a brief introduction:


   Gujarati, op. cit., Ch. 22.

   Patterson, op. cit., Sections 6.1, 6.2, 7.2.

   Burke and Hunter, op. cit., Ch. 2.


   More detailed coverage is available in, for example:


   B. Lambert YouTube videos, undergrad part 1 playlist, #174-182; part 2 playlist, #3-4

3. Autoregressive distributed lag models, special cases (including differenced data, common factor models), error correction mechanisms and general-to-specific modelling
For general discussions of the LSE/Hendry methodology, including diagnostic testing and encompassing:

**Charemza and Deadman, op. cit., Ch.4** (and Ch. 3).


**Hendry and Nielsen, op. cit., especially Chs 11 and 13.**

Hendry, *op. cit.*, 2015, especially Ch. 4.


Patterson, *op. cit.*, Ch. 1.

B. Lambert YouTube video on general-to-specific modelling [https://www.youtube.com/watch?v=p4c_ZBFNpL0](https://www.youtube.com/watch?v=p4c_ZBFNpL0)

For a detailed discussion of the AD(1,1) model and models nested in it:

**Hendry, 1995, op. cit., Ch. 7.**

B. Lambert YouTube videos, undergrad part 2 playlist, #1-2, 5-7; part 1 playlist, 199

For insights into more recent developments in general-to-specific modelling:

**Hendry and Nielsen, op. cit., Ch. 19.**


Hendry and Doornik, *op. cit.*

4. Non-stationarity in economic time series - random walks, difference stationary vs trend stationary models, problems with integrated series using 'standard' econometric techniques, spurious regressions

**Banerjee et al, op. cit., Ch. 3.**

**Patterson, op. cit., Sections 6.2.4 - 6.2.8.**

Stewart, *op. cit.*, Sections 17.1-17.2

B. Lambert YouTube videos, undergrad part 1 playlist, #168-169, 183-187, 192
5. Testing for unit roots - Dickey-Fuller, augmented Dickey-Fuller, Phillips-Perron tests, more powerful tests, practical examples

**Patterson, op. cit., Sections 6.3, 6.4, 7.3, 7.6, 7.9, 7.10** [7.4, 7.5, 7.7, 7.8].

**Banerjee et al, op. cit., Ch. 4, especially pp. 99-119.**

Enders, *op. cit.*, Ch.4.


Stewart, *op. cit.*, Sections 17.3-17.4


B. Lambert YouTube videos, undergrad part 1 playlist, #188-191

6. Cointegration, long-run relationships, tests for non-cointegration, Engle-Granger 2-step method, Granger representation theorem, testing for cointegration via the ECM

**Patterson, op. cit., Ch. 8 with case studies in Chs 10-13.**

**Banerjee et al, op. cit., Ch. 7, especially pp. 204-238.**


Stewart, *op. cit.*, Ch. 18

Burke and Hunter, *op. cit.*, Ch. 3.

Charemza and Deadman, *op.cit.*, Ch. 5.


B. Lambert YouTube videos, undergrad part 1 playlist, #193-196; part 2 playlist, 6-7

7. Cointegration in multivariate systems, the Johansen approach, modelling with integrated variables

**Patterson, op. cit., Ch. 14 with applications in Ch. 15.**

Burke and Hunter, *op. cit.*, Ch. 4-5.

[Martin et al., *op. cit.*, Ch. 18.]

[Juselius, *op. cit.*, especially parts II-IV.]

[Verbeek, *op. cit.*, Sections 9.4-9.8.]

8. Panel unit roots and cointegration: key characteristics of panel time-series: nonstationarity, parameter heterogeneity, cross-sectional dependence; testing for panel unit roots, cross-sectional dependence, cointegration; estimation in heterogeneous parameter models: mean group, augmented mean group, and common correlated effects estimators

Baltagi, *op. cit.*, Ch. 12.

