

Econ 611 Econometrics of Energy Markets 2022-2023

COURSE AIMS & OBJECTIVES, KEY SKILLS AND LEARNING OUTCOMES

Course Aims & Objectives: This course will show how energy returns can be modelled, analysed and forecasted. The aim is to provide understanding and insight into the methods used, as well as explaining the technical details. Econometric modelling and forecasting will be demonstrated using the Eviews and Matlab and participants will be given the opportunity to learn these softwares in class. The course will discuss univariate and multivariate GARCH models for energy returns and the Value at Risk and Global Minimum Variance portfolio used by policy makers, traders and academics to identify the best econometric model of energy returns.

Key Skills: By the end of this course, students should have some knowledge and understanding of

- The modelling of univariate and multivariate time series of energy returns
- Practical time series modelling using Eviews and Matlab
- Nonlinear time series models, including volatility modelling and the score-driven approach
- Forecasting energy price volatilities and correlation
- Forecasting Value at risk for energy markets:

Desired Outcomes: By the end of this course, students should be able to:

- Understand the nature of time series models and the way they are applied in practice.
- Present, interpret and analyse information and results from Eviews and Matlab

COURSE STRUCTURE

Econ 611 is a 10 credits course and therefore students are expected to input approximately 100 hours of study into the course. The total number of contact hours on Econ 611 is 15 hours. This leaves 85 hours for private study. Course Delivery comes in the form of Lectures with 15 hours delivered over the first 3 weeks of the term (10 hours of lectures and 5 hours of tutorials). There will be optional clinics on the last day of the course.

During your private study you should strike a balance between reading the course material (which is the primary source of information) and the recommended textbooks, thinking critically about how these fit in to the body of knowledge on the subject and

about how our level of knowledge can be improved, performing exercises, completing coursework and revising for examinations. You can expect to perform well on this course only if you work consistently through the year.

COURSE CONVENOR

Dr Malvina Marchese

LECTURERS CONTACT INFORMATION (Including Office Hours)

Email: malvinamarchese@temberlake.co.uk

Available by appointment (please email to arrange a convenient time)

COURSEWORK ASSESSMENT

The final mark for the course will depend on a written exam. Timetable for details of time and venues will be communicated via Moodle and by Timberlake well in advance.

The CWA mark will be calculated as 100% coursework. The coursework will be assigned at the beginning of the module.

Coursework must be submitted electronically through the Moodle site for this course: <https://mle.lancs.ac.uk/course>. Login using your regular Lancaster University access details. This opens a page headed MLE: My home.

The format of the submission is as follows.

- The submitted file must be in pdf format with the following name

stud#_studname_cw_cw#.pdf

where: **stud#** is your student number, **studname** is your name in the format *surname_name*, **cw#** is either 1 or 2 according to the piece of coursework submitted. Eg a student with student number 111 would submit a file named *111_surname_firstname_cw_1.pdf*.

- Maximum file size is 2MB: figures resolution must be adjusted accordingly.

Note that your work will be screened using software designed to detect plagiarism.

Do not rely upon someone else to submit your coursework.

*Word counts are inclusive of all material submitted apart from the Bibliography.

FEEDBACK ON COURSEWORK:

The coursework will be marked and returned to students within 4 weeks of the submission deadline. Feedback will consist of marker's notes appended to the pdf of your coursework.

MARKING CRITERIA AND PENALTIES

Marking criteria can be found in the Economics Undergraduate Handbook and the general course information paper. An electronic copy of this can be found via the Current Student page of the university website then follow the Academic Regulations link
<https://gap.lancs.ac.uk/ASQ/QAE/MARP/Documents/UG-Assess-Regs.pdf>

FINAL MARK INFORMATION

This course is assessed 100% by means of coursework. The final mark is the average of the marks obtained in the two pieces of coursework.

COURSE TEXT AND RECOMMENDED READING

COURSE TEXT AND RECOMMENDED READING

Main text

Tsay, R.S., 2014. Financial time series. *Wiley*.

Recommended Readings

- Harvey, A. C. Dynamic Models for Volatility and Heavy Tails. Cambridge University Press, 2013.
- Harvey, A. C., Time Series Models (TSM), 2nd Edition, Harvester Wheatsheaf, 1993. [Currently out of print]
- Harvey, A. C. (2020) Score-driven time series models.
- Martin, V., Hurn, S. and D. Harris, (2013) Econometric Modelling with Time Series: Specification, Estimation and Testing.
- Taylor, S. Modelling Financial Time Series, 2nd edition. World Scientific, 2008.

COURSE OUTLINE/LECTURE SCHEDULE

Day 1: Stationary time series.

- Review of the basic concepts of stationary time series.
- Stylized fact of energy returns
- Short and Long memory dependence in returns time series

Day 2: Univariate Linear Time series models of energy returns.

- ARIMA models.
- Structural time series models.
- Estimating ARIMA models in Eviews and Matlab

Day 3: Univariate GARCH models of energy returns

- Short memory GARCH : estimation and testing
- Long memory GARCH ; estimation and testing

Forecasting energy returns with GARCH models

Day 4: Multivariate GARCH models

- CCC, DCC, BEKK models
- Estimation of MGARCH Models in matlab

Day 5: Modelling the Value at risk

- Historical approach
- Parametric approach

Back testing the V@R