

Econ 612 Econometrics of high-frequency data 2022-2023

COURSE AIMS & OBJECTIVES, KEY SKILLS AND LEARNING OUTCOMES

Course Aims & Objectives: The purpose of this course is to provide students with an introduction to various methods applicable to high frequency financial data. This includes the study of the statistical properties of these series such as heteroskedasticity, periodicity, the presence of jumps and microstructure noise.

Different methods will be discussed such as GARCH models, the estimation of the intraday periodicity in volatility, jumps tests but also various non-parametric estimators of the class of the realized volatility.

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

- The basic properties of high-frequency financial series;
- The main continuous time processes;
- The identification of jumps in high-frequency financial series;
- The calculation of the daily volatility from intra-day data.

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

- Understand research papers focusing on intraday financial data.
- Estimate realized volatility and bi-power variation.
- Test the presence of discontinuities in intraday prices.
- Estimate the intraday periodicity the the volatility.
- Understand the concept of Epps effect.
- Calculate realized correlations.
- Apply basic statistical techniques to analyse intraday financial data.
- Work effectively both individually and within a team environment.

COURSE STRUCTURE

Econ 612 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 612 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

Sébastien LAURENT

LECTURERS CONTACT INFORMATION (Including Office Hours)

Email: sebastien.laurent@univ-amu.fr

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

Main texts

Estimating and Forecasting ARCH Models using GARCH. Available at

<http://slaurent.net/>, section GARCH.

Students should purchase a copy of this book. For the computer labs you will also need:

OxMetrics 8

Students will also find the following texts useful as further reading.

The main recommended textbook is: **Handbook of Volatility Models and Their Applications**
Editor(s): Luc Bauwens, Christian Hafner and Sébastien Laurent

Print ISBN:9780470872512 | Online ISBN:9781118272039 | DOI:10.1002/9781118272039

Note Copies of the lecture slides will be made available on the course web pages. You **MUST** print off the notes for each lecture **prior to** attending. Solutions to exercises, and some additional material associated with these lectures and course announcements will also be placed on this website.

COURSE OUTLINE/LECTURE SCHEDULE

Day 1: Introduction: Stylized facts for (Intraday) Financial Returns

Day 2: Univariate GARCH models

Day 3: Non-parametric volatility

Day 4: Intraday periodicity

Day 5: Jumps