

Financial Econometrics - Syllabus

Revised: September 27th, 2021

Information at a glance. This course covers contents about volatility modelling with applications for risk management. Real data applications will be provided through Python (version 3.7 or later). The ultimate goal of the course is to enable students to handle real financial data through Python and to manage empirical models for financial volatility. Reaching this goal requires to focus more on the pro and cons of each methodology described over the course. When choosing a model, you should have in mind the following questions: What am I looking at? Is the methodology considered able to describe what I need to model? How can I do that in practice?

Prerequisites. You are expected to be familiar with standard material in statistics, probability and time series econometrics at the level of Enders (2014).

Teaching method. There will be ten meetings, lasting 2h30 each (inclusive of 15mins breaks). Active students' participation is usually expected. Relevant material is made available via a class Dropbox before classes start. Lectures will be online. Regarding the Python's lecture, I recommend to attend classes using also a computer with installed Anaconda Python. Jupyter notebook and eventually Spyder will be used (anyway, they are part of the Anaconda distribution).

Examination policy. There is one deliverable for credit in the course (just for Ph.d students). At the end of the course, students are required to write a short essay in which an empirical problem is tackled through Python. The essay will be discussed with me. I expect no more than 15 pages for the written part of the essay. Furthermore the Python notebook or the corresponding script is required.

Reading material. Textbooks for this class are:

- Kevin Sheppard (2020), Financial Econometrics Notes, University of Oxford, available at this webpage
- Kevin Sheppard (2020), Introduction to Python for Econometrics, Statistics and Numerical Analysis: Fourth Edition, University of Oxford, available at this webpage

Further readings are:

- Walter Enders (2014), Applied Econometric Time Series, 4th Edition, Wiley

Additional material, readings and notebooks, will be provided in class.

Schedule. Unless differently specified, classes are held online through Zoom.

- 1 *When:* 4/11, 15.30-18.00
What: Presentation of the course. Definitions. Univariate volatility modelling: parametric and nonparametric approaches.
- 2 *When:* 5/11, 15.30-18.00
What: Introduction to Python. Built-in and `numpy` data types. A primer on `pandas`.
- 3 *When:* 11/11, 15.30-18.00
What: Realized volatility. Inference, methods and forecasting.
- 4 *When:* 12/11, 15.30-18.00
What: Python: empirical issues about tick-by-tick data.
- 5 *When:* 18/11, 15.30-18.00
What: Value-at-Risk and Expected shortfall. Parametric and nonparametric methods.
- 6 *When:* 19/11, 15.30-18.00
What: Python: Empirical applications.
- 7 *When:* 25/11, 15.30-18.00
What: State space models.
- 8 *When:* 26/11, 15.30-18.00
What: Python: empirical analysis with state space dynamics.
- 9 *When:* 2/12, 15.30-18.00
What: Multivariate volatility: Garch models and realized covariance methods.
- 10 *When:* 3/12, 15.30-18.00
What: Python: Dealing with asynchronous multivariate data through examples.