Monte Carlo tests in Matlab with applications in financial markets
Online course
Centre for Econometric Analysis
Delivered by: Professor Annamaria Bianchi

Course overview
This course introduces Monte Carlo test techniques, which provide a simple method for building provably exact tests, based on any statistic whose finite sample distribution may be intractable but can be simulated. In contrast to bootstrap techniques, the validity of the tests so obtained does not depend on the number of replications employed (which can be small). Further, Monte Carlo tests turn out to be very useful when combining multiple non-independent tests.

This course will provide participants with the essential theoretical and practical tools for performing Monte Carlo tests with Matlab. The fundamental issues that discourage participants using Monte Carlo test techniques in practice will be addressed. The course will show how any hypothesis test, for which the test statistic can be simulated under the null, can be improved (by achieving size control) by its corresponding MC test. The emphasis will be on concepts rather than technical details and the exposition will aim at being intuitive. The ideas will be illustrated using practical econometric and financial problems. Instructional examples with real and simulated data will be provided.

Benefits
- You will be introduced to the concepts of Monte Carlo simulation test techniques
- You will learn theoretical and practical tools for performing Monte Carlo simulation tests with programming language Matlab
- You will practise and work on practical econometric and financial problems
- You will implement Monte Carlo simulation tests on your own on real datasets.

Target audience
This course is particularly useful to both professionals working in the financial industry and researchers in the field of statistics, econometrics, and economics.

Course prerequisites
Participants should have a basic knowledge of probability, inferential statistics, and econometrics.

Fees:
£180 City Students, Alumni, Staff
£210 External Students
£360 External rate
A 15% discount is available for groups of three or more participants

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Contents

Day 1: 4 hours online

Topic 1: An introduction to Monte Carlo tests and their implementation in Matlab

- Primer/intermediate on Matlab. This block reviews basic Matlab programming language, that will allow participants to understand and build their own codes
- Review of basic notions of hypothesis testing, with focus on important statistical issues motivating Monte Carlo (MC) tests
- MC test methods and their implementation in Matlab: MC tests based on pivotal statistics; MC tests in the presence of nuisance parameters; comparison with the bootstrap.

Day 2: 4 hours online

Topic 2: Monte Carlo Tests, Diagnostic Procedures and Tests Combination

- MC tests in econometrics and finance
- Multivariate diagnostic procedures in Multiple Linear Regression based financial studies, including tests for normality, tests for serial correlation, and tests for ARCH and GARCH effects. Empirical applications to stock return rates and other financial assets
- Problems related to combining non-independent tests and remedies proposed in the literature
- MC tests for combining non-independent tests. Combining tests for multiple structural breaks in the context of cointegrated regression. Empirical applications to 1) identify breaks in foreign exchange rates and 2) in money demand and comparison with the method proposed by Mogliani and Urga (2018) using a dataset of yearly observations for the US from 1900 and 2013.

Recommended reading

The following textbooks and journal articles are recommended for this course:

Registration, payment and cancellation policy

Payment of course fees is required prior to the course start date.

In case a course is cancelled, registered participants will receive the full refund.

Registration closes 7-calendar days prior to the start of the course.