

The SoFiE Financial Econometrics Summer School is an annual week-long research-based course for Ph.D. students and new faculty in financial econometrics. For the first two years it was held at Oxford University's Oxford-Man Institute and in 2014 it moved to Harvard University. In 2015, a Spring School was also organized in Brussels. In 2016, Brussels will now host the Summer School instead.

The editorial board for these annual series is made up of Professors Luc Bauwens (Catholic University of Louvain), Francis X. Diebold (University of Pennsylvania, past President of SoFiE), Eric Ghysels (University of North Carolina, Chapel Hill, Secretary and Founding Co-President of SoFiE and Editor of JFEC), Eric Renault (Brown University and SoFiE President), and Neil Shephard (Harvard University).

### **SoFiE Financial Econometrics Summer School 2016**

**Location:** Brussels, National Bank of Belgium,  
Room A, Rue Montagne aux Herbes Potagères/Warmoesberg 61, 1000 Brussels

**Start date:** Monday, July 11, 2016

**End date:** Friday, July 15, 2016

**The 2016 confirmed lecturers are:**

- Professor Christian Gourieroux (University of Toronto & CREST)
- Professor Jean-Michel Zakoian (University of Lille & CREST)

**This year's topic:**

***“Noncausal Autoregressive process and the Modelling of Speculative Bubbles”***

A recent statistical and econometric literature highlights the importance of mixed causal/noncausal ARMA processes for the modeling of macroeconomic and financial time series. Indeed the nonlinear causal dynamic of such processes can capture unit roots, asymmetric cycles, and bubbles features.

The objective of the lectures is to present the notions and concepts of the literature on noncausal processes and to explain how they can be used for the modeling and analysis of speculative bubbles. The focus will be both on the modelling and statistical aspects.

## Outline of Lectures:

### **i) Noncausal ARMA Process**

Review on nonlinear processes, conditions for the existence and uniqueness of an infinite moving average representation when innovations have fat tails, interpretation of trajectories as random linear combinations of deterministic paths and the creation of bubbles.

### **ii) Noncausal AR(1) Process with Stable Errors**

Properties of errors with stable distributions, stationary distribution of the noncausal AR(1) process, analysis of its conditional moments, aggregation of noncausal processes.

### **iii) State Space Representation of Noncausal Processes**

The causal and noncausal “innovations” of a mixed one-dimensional process, the state space representation, application to maximum likelihood estimation, prediction and filtering, extension to mixed VAR(1) process. Application to the exchange rate bitcoin/US\$, prediction of future bubbles and of bubble crash.

### **iv) Test Procedures**

Standard tests for unit root and random walk hypotheses, behavior of these testing procedures for a noncausal Cauchy process, stationary versus nonstationary martingales, robust tests of the martingale hypothesis.

### **v) Modelling Speculative Bubbles**

The modeling of speculative bubbles in the economic literature. The role of martingales in linear rational expectation models, the multiplicity of solutions in a RE model, how to construct the impulse response functions.

## Applications:

Applications should be sent to [luc.bauwens@uclouvain.be](mailto:luc.bauwens@uclouvain.be) (including the words ‘SoFiE Summer School 2016’ in the subject line). The applications should include a full CV and motivation letter of half a page explaining why attending this course would be helpful to the applicant’s research work.

**The application deadline is now extended to 23 April 2016.**

Applicants are strongly encouraged to present some of their thesis work during the afternoon sessions. For this, they should preferably append a paper to their application. They can submit an extensive abstract if the paper is not yet finished. Priority in admission to the school will be given firstly to applicants who submit an acceptable paper, secondly to those who submit an acceptable abstract, thirdly to other. The paper topics need not be closely linked to the course but obviously must be in the field of financial econometrics. Papers will be selected by the organizing committee on the basis of their quality.

**Fees:**

200 Euros for Ph.D. students and faculty members attending this course.

500 euros for Ph.D. level colleagues from industry.

Confirmed admission of a selected applicants will be conditional on the fee payment in due time (details will be provided in the admission email).

All accepted participants will be expected to be members of SoFiE or join before their place is confirmed. See <http://sofie.stern.nyu.edu/membership> on how to join the society (\*a student membership option is available).

People attending will be required to pay their own travel and accommodation. No assistance will be offered in this respect. During the teaching schedule (Monday-Friday) at the National Bank of Belgium, lunch, coffee and tea will be provided free of charge. A free social event based on beer tasting will be organized on one day of the teaching week, where students and faculty can meet informally. Evening meals will not be organized and will be at the expense of the participants.

**Local Organizing Committee**

Luc Bauwens (UCL),  
Kris Boudt (VUB),  
Christophe Croux (KU Leuven),  
Geert Dhaene (KU Leuven),  
Leonardo Iania (UCL),  
David Veredas (Vlerick Business School),  
Raf Wouters (NBB)

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