

## **Crises and Networks in finance : New challenges for the industry**

**11-12 April 2019**

**Jointly organized by Ecole Normale Supérieure de Lyon – IXXI and LabEx ReFi**

**Sponsored by Vivienne investment**

The 2008 financial crisis has been the most important threat for the world-wide banking and financial system since the market crash of October 1929 and the Great Depression. It has led to many substantial analyses not only of the origins of the crisis but also and above all of the mechanisms that enabled it to spread throughout the world and the reasons for its massive impact on the economy world-wide.

Ten years later, it is natural to wonder whether the efforts made to improve the regulation governing the economic and financial networks have been effective, whether the mechanisms inducing fast and world-wide spreading of systemic risks are better understood and controlled, and whether efficient risk management strategies have been designed and implemented.

To investigate these issues, it appears mandatory and beneficial to have recourse to the large variety of tools and concepts aiming to address the analysis of "complex systems and phenomena", stemming from many different scientific fields, ranging from econometric (structural) vs micro-founded (agent-based) modeling to graph theory and statistical signal processing.

The goal of the proposed workshop is thus to gather an interdisciplinary panel of world-leading experts from different fields of science (Accounting, Financial Economics, Mathematics, Physics, Statistics...), both from academy and industry. A series of seven presentations will hence address "Crises and network in finance" with different perspectives, such as impact of network topology, structural instabilities, extreme event forecasting, estimation in large dimension...

**Venue :** Ecole Normale Supérieure de Lyon, Descartes Campus, 46 allée d'Italie 69364 Lyon cedex 7. Room D2 128.

**Registration :** Registration is free of charge but mandatory: [HERE](#)

<https://framaforms.org/crisis-and-networks-in-finance-new-challenges-for-the-industry-1545032975>

**Information:** <http://www.ixxi.fr/agenda/seminaires/crisis-and-networks-in-finance-new-challenges-for-the-industry>

## Program

April 11<sup>th</sup> (Thursday)

13:45 Welcome address

14:00 **Didier Sornette** (ETH Zurich)

*The “endo-exo” problem in financial market price fluctuations, criticality & the ARMA point process*

15:00 **Luidas Giraitis** (Queen Mary University)

Standard testing procedures for white noise and heteroskedasticity

16:00 Coffee Break

16:30 **Minyue Dong** (HEC Lausanne)

*Textual Analysis of Bank's Pillar 3 Documents*

17:30 **Jean-Philippe Bouchaud** (Capital Fund Management)

*Macroeconomic instabilities in Agent Based and Network models*

April 12<sup>th</sup> (Friday)

9:00 **Thomas Lux** (University of Kiel)

*The Dynamics of the Interbank Market: Statistical Stylized Facts and Agent-Based Models*

10:00 Coffee break

10:30 **Cécile Batisdon** (University of Toulon and IXXI)

*Graph-based era segmentation of financial globalization*

11:30 **Monica Billio** (Ca' Foscari University)

*Disagreement in Signed Financial Networks*

12:30 Concluding Remarks

## **Speakers:**

**Cecile Batisdon** is associate professor at the University of Toulon (France). Her research focuses on financial integration issues in advanced and developing economies. She is also a member of the Cliometry and Complexity team (CAC, ENS Lyon, France), where she works on the network dimension of financial globalization in a cliometric perspective.

**Monica Billio** is professor of Econometrics and head of the Department of Economics of the Ca' Foscari University of Venice. Her main research interests include financial econometrics, business cycle analysis, dynamic latent factor models and simulation-based inference techniques. She is involved in many research projects financed by the European Commission, Eurostat and the Italian Ministry of Research (MIUR).

**Jean-Philippe Bouchaud** is founder and Chairman of Capital Fund Management. He has been an adjunct professor of physics at École Polytechnique since 2009 and is co-director of the CFM-Imperial Institute of Quantitative Finance at Imperial College London. His work covers the physics of disordered and glassy systems, granular materials, the statistics of price formation, stock market fluctuations and the modelling of financial risks. He has been named Quant of the Year 2017 by Risk Magazine. He is member of the French Academy of Sciences.

**Minyue Dong** is an associate professor of accounting at Ecole des Hautes Etudes Commerciales (HEC) de Lausanne. She is an expert in financial security and bank accounting. Professor Dong recently became co-editor of the *International Journal of Accounting*.

**Liudas Giraitis** is professor of econometrics at Queen Mary University of London. Professor Giraitis is a world-recognized expert in statistical theory, with significant experience in application to finance. He has completed extensive research on long memory and integrated I(d). His research bridges the fields of econometrics, statistics and probability theory, with a substantial emphasis on time series analysis.

**Thomas Lux** holds the chair of Monetary Economics and International Finance at the University of Kiel. Professor Lux has been the Head of the Research Area “Financial Markets and Macroeconomic Activity” at the Kiel Institute for the World Economy from 2008 to 2013 and the Bank of Spain Professor in Computational Economics at University Jaume I from 2011 to 2016. His research interests cover theoretical and empirical aspects of financial economics including the application of concepts from statistical physics and network theory in financial economics.

**Didier Sornette** is professor of Entrepreneurial Risks at ETH Zurich and has been a Swiss Finance Institute Faculty Member since 2007. Professor Sornette is the founding director of the Financial Crisis Observatory. His research interests include the development of diagnostic tools for financial market anomalies, such as price bubbles, and the prediction of financial crises. He has been elected Fellow of the AAAS for pioneering and novel developments in the prediction of crisis and extreme events in complex systems in 2014.



Abstract :

Title: The "endo-exo" problem in financial market price fluctuations, criticality & the ARMA point process

The "endo-exo" problem -- i.e., decomposing system activity into exogenous and endogenous parts -- lies at the heart of statistical identification in many fields of science. E.g., consider the problem of determining if an earthquake is a mainshock or aftershock, or if a surge in the popularity of a youtube video is because it is "going viral", or simply due to high activity across the platform.

This class of point processes has enjoyed great recent popularity and rapid development within the quantitative finance literature, with particular focus on the study of market microstructure and high frequency price fluctuations. We show that there are important lessons from older fields like time series and econometrics that should also be applied in financial point process modelling. In particular, we emphasize the importance of appropriately treating trends and shocks for the identification of the strength and length of memory in the system. We exploit the powerful Expectation Maximization (EM) algorithm and objective statistical criteria (BIC) to select the flexibility of the deterministic background intensity.

Doing so allows us to test the hypothesis that the market is "critical" -- analogous to a unit root test commonly done in economic time series -- and challenge earlier results. With these methods, we strongly reject the hypothesis that the considered financial markets are critical at univariate and bivariate microstructural levels.

Continuing "lessons learned" from the time series field, it is argued that the Hawkes point process is analogous to integer valued AR time series. Following this analogy, we introduce the ARMA point process, which flexibly combines exo background activity (Poisson), shot-noise bursty dynamics, and self-exciting (Hawkes) endogenous activity. We illustrate a connection to ARMA time series models, as well as derive an MCEM (Monte Carlo Expectation Maximization) algorithm to enable MLE of this process, and assess consistency by simulation study. Remaining challenges in estimation and model selection as well as possible solutions are discussed.

[1] Wheatley, S., Wehrli, A., and Sornette, D. "The endo-exo problem in

high frequency financial price fluctuations and rejecting criticality". To appear in Quantitative Finance (2018).

[https://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=3239443](https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3239443)

[2] Wheatley, S., Schatz, M., and Sornette, D. "The ARMA Point Process and its Estimation." arXiv preprint arXiv:1806.09948 (2018).

L Giraitis (joint work with V Dalla and PCB Phillips)

**Title:** Standard testing procedures for white noise and heteroskedasticity

**Abstract:**

Commonly used tests to assess evidence for the absence of serial correlation between time series in applied work rely on procedures whose validity holds for i.i.d. data. When the series are not i.i.d., the size of correlogram and cumulative Ljung-Box tests can be significantly distorted. This paper adapts standard correlogram tests to accommodate hidden dependence and non-stationarities involving heteroskedasticity, thereby uncoupling these tests from limiting assumptions that reduce their applicability in empirical work. To enhance the Ljung-Box test for non i.i.d. data a new cumulative test is introduced. Asymptotic size of these tests is unaffected by hidden dependence and heteroskedasticity in the series. An extensive Monte Carlo study confirms good performance in both size and power for the new tests. Applications to real data reveal that standard tests frequently

produce  
spurious evidence of serial correlation.

**"Textual Analysis of Bank's Pillar 3 Documents" Authors:  
Minyue Dong, Eric Jondeau, and Michael Rockinger**