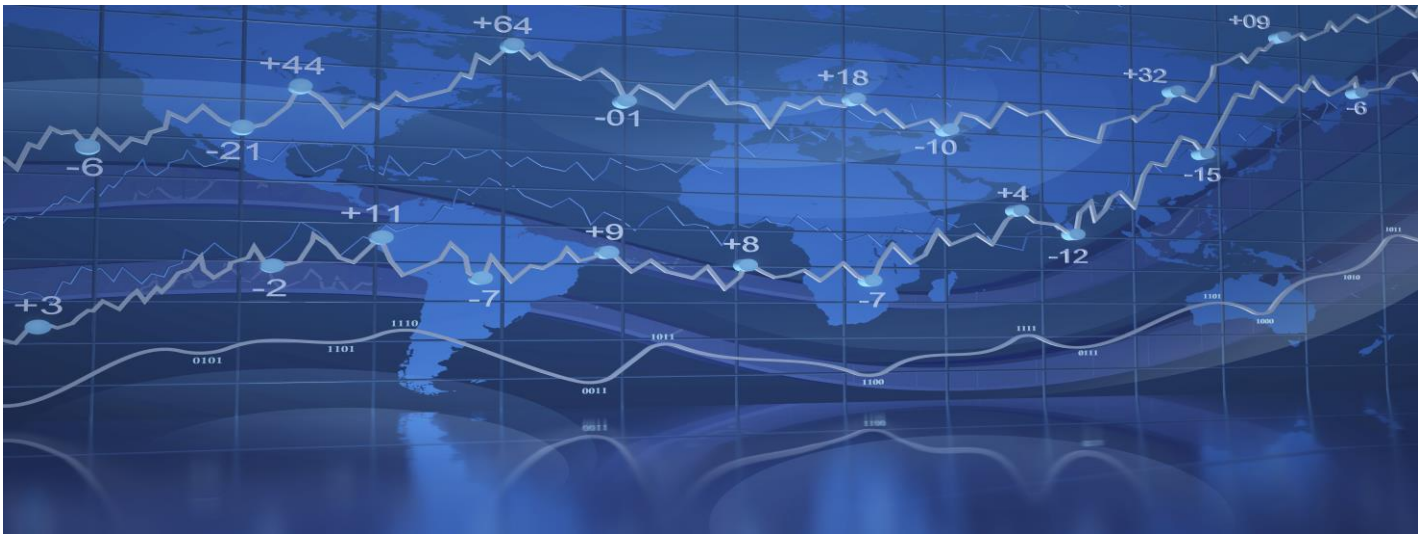
Finance, Mathematics and Philosophy



Increasingly finance, mathematics and philosophy are posing and solving problems reciprocally. Mathematics is being employed to make sense of the behavior of financial markets, to detect patterns that may enable us to forecast the behavior of financial systems. Philosophy is used to develop new approaches for solving these problems. Finance continually dishes up new problems, which it cannot solve alone.

The workshop will examine how one contributes to advancing knowledge in the others.

Rome, Villa Mirafiori - Via Carlo Fea, 2
12-13 June 2014, Room V

Registration required
No fees

SAPIENZA
UNIVERSITÀ DI ROMA

Department of Philosophy
Department of Physics
Ph.D. in Philosophy and History of Philosophy

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web: http://web.uniroma1.it/logic/FMP

Program

Thursday 12 June 2014, Room V

9:45-10:45 **Juan Pablo Pardo-Guerra (LSE),** *Synthetic Markets and the Design of Economic Institutions*
10:45-11:10 Discussion
coffee break
11:20-12:20 **Matthias Leiss (ETH Risk Center)**, *Super-exponential endogenous bubbles in an equilibrium model of rational and noise traders*
12:20-12:45 Discussion

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15:30-16:30 **Alex Preda (UCL)**, *Finance as a boundary science. What can social scientists bring to the table?*
16:30-16:55 Discussion
coffee break
17:10-18:10 **Luciano Pietronero (ICS-CNR, Sapienza)**, *Economic Complexity*
18:10-18:35 Discussion
18:40-19:30 *Round Table*: Leiss, Pardo-Guerra, Pietronero, Preda
Chairman: Sergio Caprara (Sapienza University of Rome)

Friday 13 June, Villa Mirafiori, Room V

9:45-10:45 **Emiliano Ippoliti (Sapienza)** *Logic, Heuristic & Finance*
10:45-11:10 Discussion
coffee break
11:20-12:20 **Steve Keen (Western Sydney Un.)**, *The Dodgy Dynamics of Economics*
12:20-12:45 Discussion
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15:30-16:30 **Ping Chen (China Center for Economic Research)**, *What can we learn from high moments and time-varying probability distribution? Philosophical vision, mathematical representation, and financial application*
16:30-16:55 Discussion
coffee break
17:10- 18:10 **Guido Maria Brera (Kairos Partners),** *On the trading floor there is a reflection of the world. Outside there is the world, oblivious to its own reflection.*
18:10-18:35 Discussion
18:40- 19:30 Round Table: Brera, Chen, Ippoliti, Keen
Chairman: Sergio Caprara (Sapienza University of Rome)

20:50 *Social Dinner*

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List of the speakers (alphabetical order)
Abstracts of the papers and bio info

Guido Maria Brera, *On the trading floor there is a reflection of the world. Outside there is the world, oblivious to its own reflection.*

Abstract

The neo-liberal–to borrow Freud's concept–is a melancholy man. Melancholy diverges from grief as the melancholy man does not know what he lost, whereas the grieving man does. The neo-liberal man (economic entrepreneur) lost the sense of sharing and community as he does not make any more distinctions between the professional sphere (goods) and the private / human one (values). This is why he is lonely. Him and his own analysis of costs and benefits only. Brera's view of finance from his black box reaches these conclusions inspired by the underlying ideologies of three significant men: Foster Wallace, Steve Jobs, and Fabrizio De André. They all push to thinking outside of the box and to being hungry as well as foolish, but when excess are transcended, the line between the political, economic and personal sphere disappears. Brera leads us through the passage of time to explain how we reached neo-liberism–which in his view is the fusion of the worst aspects of Communism and Capitalism, a true State Capitalism–starting from Bretton Woods (1944) and the end of the Marshall Plan, through the fall of the Berlin Wall in 1989, the US Twin Deficit in 2000 and Chinamerica. This all leads to Neo-liberism, Walmart Economy and Credit Expansion. Banks become the New Welfare and in 2008 Lehman Brothers collapses, pointing the end to Chinamerica. An endless Quantitative Easing starts and the Euro gets brutally attacked. Why all this? Old habits and new technologies lead to "unintended consequences": Gini's index (poverty) at its historical maximum, families' real income falling vs productivity, no homes for everyone, Food Stamp Participation at the peak, student loans reaching $1trillion with a sharp rise in the percentage of delinquent student loans.

Guido Maria Brera is is Chief Investment Officer and co-founder of an important Italian Investment Management Company. He is the author of the finance-based novel '*I diavoli*' (*The demons*), Rizzoli, 2014. Graduated from Università La Sapienza of Rome and qualified as Dottore Commercialista (chartered accountant). In 1994, he joined Fineco SIM, concentrating on relative value trades, calendar spreads, stock index futures arbitrages and the establishment of structured products for institutional clients. In 1996, he joined Cisalpina Gestioni as manager of the Cisalpina Bilanciato and Cisalpina Indice funds. In 1997, he joined Giubergia Warburg as director, Head of Proprietary Trading.

Ping Chen, *What can we learn from high moments and time-varying probability distribution? Philosophical vision, mathematical representation, and financial application*

Abstract

The breakthrough in crisis diagnosis in financial economics is resulted from a persistent effort in developing non-equilibrium statistical mechanics since 1982. The philosophical vision is that living world is Non-equilibrium in nature because of dissipative structure in open system. Its mathematical representation must be a multi-humped probability distribution. We search for non-equilibrium distribution from chemistry, physiology, to financial market. In contrast, the belief in self-stabilizing market led to equilibrium illusion, such as Frisch noise-driven cycles, Fama efficient market hypothesis, and Lucas model of micro foundations and rational expectations. New economic thinking needs a new dialogue among Philosophy, Mathematics, Physics, and Economics.

Ping Chen (Ph.D. in Physics, 1987, University of Texas at Austin. Supervisor: Prof. Ilya Prigogine) is Professor of Economics at China Center for Economic Research, Co-Director for Virtual Science of Complexity - Peking University, Professor and Senior Research Fellow, Chair of Academic Committee Center for New Political Economy, Economic School, Fudan University Shanghai, Visiting Scholar at the Center for Complex Quantum Systems at University of Texas in Austin. His main areas of research are: nonlinear dynamics, non-equilibrium statistical mechanics, and complexity science; and their applications in economic-behavioral systems; business cycle theory and monetary theory; nonlinear and non-stationary time series analysis, and their applications in economic analysis and forecasting; evolutionary dynamics of complex systems: the origin of division of labor, the origin of science and capitalism; Financial economics and option pricing; theory of financial crises; Comparative studies of economic transition and institutional reform. China's reform policy and strategy.

Emiliano Ippoliti, *Heuristic and Finance*

Abstract

The explanation and forecast of the stock markets prices (SMP) is an interesting and hard problem both from a quantitative and a qualitative view point. On the former, the SMP is a data-fitting problem and, as such, it is underdeterminated: it admits infinite solutions—an infinite amount of curves (equations) that approximates the data and forecasts the next point of the series. On the latter, the problem requires determining the variables that affect the price of a share in a financial market. It is a hard descriptive problem: these variables are virtually infinite, as prices are the result of the actions of investors who sell and buy them. Moreover stock markets future is essentially uncertain (not simply risky) and therefore the traders' evaluations of companies' future profitability will change. It is difficult to predict future directions of stock market prices even if we are considering time scales of the order of decades, for which one could hope for a negligible influence of 'noise'. Several hypotheses have been put forward to approach the problem, so it is an interesting case for the study of heuristics. These hypotheses can be broken down in two main classes, the random walk and non-random walk. I will examine several of these hypotheses and show how inferential means employed to generate them are essential to explain why some of these hypotheses are successful and effective and some not, why some of them select and encapsulate specific features of SMP, and can also shed light on the extent to which a particular hypothesis can be usefully applied. Thus the study of the means of generation of hypotheses for SMP will offer us both a guide for formulating new hypotheses in a reliable and cogent fashion, and will help us in the generation of better and better hypotheses for handling SMP.

Emiliano Ippoliti is Assistant Professor in Logic at Department of Philosophy (*Sapienza* University of Rome). He got a Ph.D in Logic and Epistemology (2005) at *Sapienza* University of Rome and was visiting scholar at Penn State University (2008). His interests and area of research are the logic of scientific discovery, heuristics and problem-solving, philosophy of science, philosophy of mathematics, and finance.

Matthias Leiss, *Super-exponential endogenous bubbles in an equilibrium model of rational and noise traders*

Abstract

We introduce a model of super-exponential financial bubbles with two assets (risky and risk-free), in which rational investors and noise traders co-exist. Rational investors form expectations on the return and risk of a risky asset and maximize their constant relative risk aversion expected utility with respect to their allocation on the risky asset versus the risk-free asset. Noise traders are subjected to social imitation and

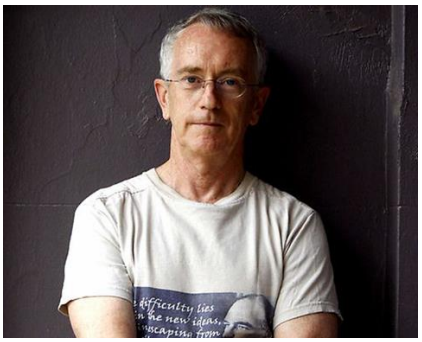
follow momentum trading. Allowing for random time-varying herding propensity, we are able to reproduce several well-known stylized facts of financial markets such as a fat-tail distribution of returns and volatility clustering. In particular, we observe transient faster-than-exponential bubble growth with approximate log-periodic behavior and give analytical arguments why this follows from our framework. The model accounts well for the behavior of traders and for the price dynamics that developed during the dotcom bubble in 1995-2000. Momentum strategies are shown to be transiently profitable, supporting these strategies as enhancing herding behavior.

Matthias Leiss is a PhD candidate (ETHZ Risk Center). He is supervised by Dirk Helbing, Chair of Sociology in particular Modeling and Simulation, and Didier Sornette, Chair of Entrepreneurial Risks. Matthias Leiss is trained as a theoretical physicist studying in Munich, Belfast and Lausanne. He then started working on financial crises at ETH Zurich. His PhD focusses on the mechanisms and consequences of financial instabilities, both from a modeling and a data-driven perspective.

Steve Keen, *The Dodgy Dynamics of Economics*

Abstract

While Neoclassical economics was once defined by comparative static analysis, and dynamic models were mainly the purview of non-mainstream economists, today both mainstream Neoclassical and non-mainstream Post Keynesian economic models purport to be dynamic. However the actual practice of dynamics in both schools of thought is inferior to modern dynamic analysis in other disciplines. The first steps towards genuine economic dynamics involve embracing complexity and nonlinearity, and abandoning the habit of modeling the economy using difference equations.



Steve Keen Steve Keen is Professor of Economics & Finance at the University of Western Sydney, and author of the popular book **Debunking Economics**, (Zed Books UK, 2011; www.debunkingeconomics.com). He received the 2010 Revere Award from the Real World Economics Review for being the economist who most cogently warned of the crisis, and whose work is most likely to prevent future crises. He has over 60 academic publications on diverse topics: financial instability, the money creation process, mathematical flaws in the conventional model of supply and demand, flaws in Marxian economics, the application of physics to economics, Islamic finance, and the role of chaos and complexity theory in economics. His work has been translated into Chinese, German and Russian. From November 2006 till March 2010, he published **Debtwatch**, a monthly report which explains the dangers of excessive private debt. In March 2007, he started the blog Steve Keen's Debtwatch, which now has over 13,000 members and more than 60,000 unique readers each month.

Juan-Pablo Pardo-Guerra, *Synthetic Markets and the Design of Economic Institutions*

Abstract

What happens when we think of markets as objects of design? In this paper, I address this question by exploring the possibilities offered by the metaphor of “market design.” Inspired by work within the homonymous sub-field of economics that creates tailored-made matching devices for solving specific allocation problems, I argue that the concept of market design calls for a fundamental shift in the conceptualization of markets and their relation to society. In exploring this shift, I draw parallels between

the economic literature on auction design and discussions about the role of technology in society, focusing in particular on the visions and promises of the burgeoning literature on synthetic biology.

Juan Pablo Pardo-Guerra is Assistant Professor in Sociology at the London School of Economics and Political Science, where he teaches economic sociology, the sociology of markets, the undergraduate dissertation, and a selection of topics in research methods and science studies. Trained in physics (UNAM, Mexico) and science and technology studies (Edinburgh), he is interested in the role and constitution of markets in modern societies. He is working on a book ('Engineering Markets: Experts, Technology, and the Making of Global Finance'). His area of research are Other ongoing research projects focus on evaluation practices in financial markets (with Donald MacKenzie, Iain Hardy, James Clunie and Alex Preda); a sociology of high frequency trading; market devices in the art world; and the role of market devices in restructuring knowledge production in higher-education.

Luciano Pietronero, *Economic complexity*

Abstract

The increasing interconnectedness and the growing complexity of economic and financial systems have challenged mainstream economic theories. The subprime financial crisis, the following economic recession in western countries and the slow recovery from stagnacy have dramatically showed how crucial is for the future of our society a paradigm shift of the present economic thinking in the direction of more concrete scientific grounding of this discipline. In contrast to standard approach we need that the new economic thinking should be strongly data-driven in order to scientifically ground and test economic theories. Present economic theories which have been introduced over the years are now considered as global paradigms which compete one against the other as ideologies with the underlying idea that each of them could be right in any economic scenario. A more scientific foundation of economic thinking instead will lead to a scenario in which the various theories can be more or less suitable depending on the particular situation of economy as it happens in Natural Sciences. In this perspective, concepts as market efficiency and the degree of coupling between Finance and Economy could be tested, falsified and even quantitatively assessed. In this perspective we discuss the introduction of new metrics for measuring intangible properties for the competitiveness of countries and the complexity of products. The comparison of these measures with monetary figures, as the GDP or the income pro capita, uncovers new information to assess the hidden potential for growth and development of countries.

Luciano Pietronero is Director **ICS-CNR**, and Professor of **Condensed Matter Physics Sapienza University of Rome**. Experience in industrial research and academic institutions. Xerox, USA and Bown Boveri, CH, then Professor at the University of Groningen, NL and since 1987 at the University of Rome Sapienza. Founder (2004) and director of the Institute of Complex Systems of the National Research Council, Rome, Italy. Activity in fundamental and applied problems in the areas of Condensed Matter Theory, Statistical Physics and Complex Systems. Recent interest in Economic Complexity. Author of about 400 papers in leading scientific journals (mostly physics). Enrico Fermi Prize (2008)—highest award of the Italian Physical Society.

Alex Preda, *Finance as a boundary science. What can social scientists bring to the table?*

Abstract

I will argue that finance is increasingly becoming part of a group of disciplines which do not operate any longer along the classic distinction between the natural and the social sciences. Instead, these disciplines are situated at the boundaries between the two sets of disciplines, and borrow elements from both sides. I

call them boundary sciences. Within this domain, the old theoretical assumptions about human behavior are being partly suspended, and new theoretical developments become necessary. An example of this position is the rise of econophysicism, which is explicitly positioned against the tenets of the efficient market hypothesis and hence against its behavioral assumptions. I discuss here the institutional changes related to this disciplinary shift, and ask, what contribution can the social sciences--and particularly sociology and anthropology--make in this new disciplinary landscape? I argue that the evolution of finance into a boundary science provides a new chance for the social sciences to advance the understanding of human action.

Alex Preda (UCL) is Professor of Accounting, Accountability and Financial Management. He holds a PhD from the University of Bielefeld. Prior to joining the Department of Management at King's College he worked at the University of Edinburgh and at the University of Konstanz.

His principal research activities relate to global financial markets, and his research interests include: strategic behaviour in financial markets; decision-making and cognitive processes in electronic anonymous markets; market automation and trading technologies; valuation processes in markets; the role of communication in decision-making processes; the public understanding of finance; the governance of global finance. He has recently conducted an ESRC-funded research project, *Technology, Action and Cognition in Online Anonymous Markets: A Sociological Study of Non-institutional Traders* and is investigator on *Evaluation Practices in Financial Markets*, a five-year project funded by the European Research Council, working together with colleagues from the University of Edinburgh and the London School of Economics. His publications include, among others, *Framing Finance: The Boundaries of Markets and Modern Capitalism* (University of Chicago Press, 2009) and *Information, Knowledge, and Economic Life: An Introduction to the Sociology of Markets*, (Oxford University Press, 2009). He is the co-editor (with Karin Knorr Cetina) of the *Handbook of the Sociology of Finance* (Oxford University Press, 2012) and *The Sociology of Financial* Markets (Oxford University Press, 2005.