the institute for advanced studies

Limits to Rationality in Financial Markets
Workshop 5: Mathematical Modelling

29th – 30th June 2009

Programme and abstracts

Monday 29th June

9.45 - 10.00	Opening Remarks
10.00 - 11.00	Gary Friedman (Drexel University)
11.00 - 11.30	*Coffee*
11.30 - 12.30	Paul Ormerod (Volterra Consulting)
12.30 - 2.00	*Lunch*
2.00 - 3.00	Alexei Pokrovskii (Cork)
3.00 - 3.30	*Tea*
3.30 - 4.30	Jeff Schank (UC Davis)
4.30	*Discussion*
	Workshop Dinner

Tuesday 30th June

10.00 - 11.00	Roger Waldeck, Télécom-Bretagne
11.00 - 11.30	*Coffee*
11.30 - 12.30	Harbir Lamba (George Mason University)
12.30 -2.00	*Lunch*
2.00 – 3.00	Jean-Pierre Nadal (Ecole Normale Supérieure)

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3.00 - 3.30 *Tea*

3.30 - 4.30 Sheri Markose (Essex)

Titles and Abstracts

Gary Friedman - Generalized Hysteresis Models with Return Point Memory and with Stochastic Input

Harbir Lamba - ***Modelling imperfect financial markets***

Much of mainstream economics and mathematical finance relies upon very strong assumptions about both the rationality of agents within the system and the integrity of the system itself. However the real world suffers from both irrational behaviour and systemic defects such as perverse incentives, moral hazard and incomplete/asymmetric/fraudulent information. We describe a modelling framework that attempts to include such systemic defects and the findings of behavioural economics in a consistent yet plausible manner. One advantage of this approach is that the framework contains within it an unadulterated perfect market that is, both practically and philosophically, the market hypothesized by neo-classical theory. This makes it possible to investigate the effects of weakening various efficient market and rational expectations assumptions. Furthermore, questions regarding the distribution of price changes within a financial market can be translated into related problems from queueing theory.

Markose - ***Perverse Effects, Regulatory Arbitrage and the Lucas Critique: A Complex System Approach to Policy Design***

A comprehensive market and regulatory failure marks the 2007 global economic crisis. It will be argued that a long standing misunderstanding (see, Markose, 1998) of the Lucas Critique on the capacity of a rule breaking private sector which can rationally anticipate policy and negate it or jeopardize the system by a process of regulatory arbitrage is central to the current crisis. Lucas prescribed 'surprise' strategies in order for policy to remain effective. Instead of this being germane to policy design, most macro-economists adhered to a narrow view that 'surprise' inflation seemed untoward for monetary authorities to pursue. Hence, pre-commitment to a fixed and transparent rule was prescribed for central banks rather than the capacity to oversee regulatee behaviour in a dynamic way. The most infamous of these pre-commitment strategies is the ERM currency peg rule which got toppled by George Soros in 1992 who claimed to have made his £2bn heist using the paradigm of the Cretan "Liar' from antiquity. While the US authorities did not sign up to a written constitution which reduced the Bank of England oversight of monetary and financial stability to a box ticking exercise based on tracking the Consumer Price Index (CPI) for signs of inflation, the Federal Reserve presided over a rump of a reserve based banking system while a perverse explosion of credit creation emanated in a reserve free shadow banking sector from 20 years of capital adequacy regulation. Based on Markose(2002, 2005, 2006), we will set out the mathematics of a complex adaptive system (CAS) which shows how the system of intelligent agents in a contrarian or oppositional structure (as in a parasite-host or regulator-regulatee setting) will produce a Red Queen type arms race of 'surprise' or innovation based structure changing dynamics. While there is a fundamental role for indeterminism in the design of arbitrage free institutions that cannot be gamed, we are left with the challenge of developing artificially intelligent test beds for policy analysis to screen for potential perverse effects.

Paul Ormerod - ***A general, evolutionary model of long-tailed distributions in the social sciences***

Schank -- Agent-based modeling: Issues of space and time

Abstract: Agent-based modeling (ABM) is well suited for the study of behavioral interactions of groups of agents and the phenomena that emerge from their interactions. Examples include the evolution of altruistic behavior, mate choice, and the economic decision making of groups. An intriguing aspect of ABM is that it allows us to explicitly model behavior in space and time. Indeed, movement patterns can be strategies such as walk-away strategies in iterated prisoner's dilemma games. This talk will provide an overview of issues of space and time in implementing ABMs. I will illustrate some of these issues and paradoxical results that can emerge when agents move and interact in space with simulations developed in MASON (a multi-agent simulation environment).

Schank - ***Agent-based modeling: Issues of space and time***

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Roger Waldeck (Télécom-Bretagne)- ***Rationality and modelling***

Since Milton Friedman "as if" argument, there is a long debate on the appropriate rationality assumptions in social sciences. Simon insisted on the fact that although economic science was built on substantive rationality, procedural rationality was what actually governed individual decision making. In addition, classical game theory is also build on strong assumptions about players' knowledge. We want to stress on two factors in terms of rationality that seem crucial in terms of emergent patterns. First, for a simple search market model, a fundamental difference in price formation arises from two different choice procedures, namely individual learning (where sellers act in "isolation") versus social learning (where sellers mimic the successful pricing experiments of other sellers). Second, we discuss some experimental results which suggest that the pure consequentialist assumption is not appropriate in every situation. Emotions and norms may play a role. Actions are judged according to an implicit norm or beliefs how one should act in a given situation and deviation from the norm may lead to punishment or emotions which in turn may sustain an explicit norm (some kind of emergent majority behavior).

Jean-Pierre Nadal - Pricing of Goods with Bandwagon Properties: Entanglement between Demand and Supply

Pokrovskii – TBA

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