

The David Crighton Lecture

Professor Frank Kelly CBE FRS

**Thursday 12 May 2016 at 6.15 p.m. followed by a reception
at The Royal Society, Carlton House Terrace, London, SW1Y 5AG
Registration will open at 5.45 p.m.**

Mathematics and Financial Markets

Abstract: A substantial proportion of mathematics graduates, at both first degree and doctoral level, enter the financial services sector. This is hardly surprising given the importance of the sector to the economy, and the role of mathematical modelling in the valuation of instruments and the assessment of risk. What is striking is that, with some notable exceptions, few mathematicians have been actively engaged in the design of financial markets. This is undoubtedly a serious challenge with parallels from other large-scale complex networks: to design a distributed system, linking self-interested and intelligent agents, so that the outcome is effective and efficient.

How would an ideal market operate, to allow liquidity between long-term investors to be provided by short-term traders? In the second part of the talk I outline some preliminary work, joint with Elena Yudovina, on this question. I describe a simplified and analytically tractable model of a limit order book where the dynamics are driven by stochastic fluctuations between supply and demand. The model has a natural interpretation for a highly traded market on short time scales where there is a separation between the time scale of trading, represented in the model, and a longer time scale on which fundamentals change.

There has been considerable discussion recently of the effects of competition between multiple high-frequency traders, and of proposals aimed to slow down markets. A key issue is that traders may compete on the speed with which they can snipe an order rather than compete on price, and a proposed regulatory response is to use frequent batch auctions. Our model is clearly a caricature of a real limit order book, but it does provide insight into various high-frequency trading strategies (for example market-making, sniping and mixtures of these) and the impact on Nash equilibria when a market in continuous time is replaced by frequent batch auctions.

Professor Frank Kelly will be presented with the David Crighton Medal which is awarded biennially, for services both to mathematics and to the mathematical community, by the Institute of Mathematics and its Applications, and the London Mathematical Society.

Admission to the lecture and reception is by ticket only.

For tickets please contact Alison Penry at the IMA, Catherine Richards House, 16 Nelson Street, Southend-on-Sea, SS1 1EF or email alison.penry@ima.org.uk by **24 April 2016**. Tickets are free of charge and will be allocated on a first come, first served basis.

Please confirm whether you wish to attend the lecture and reception, or the lecture only.