Title: Optimal Derivative Hedging a Monte Carlo Approach

Please note that this project was proposed by Christopher Windsor

Research will be conducted upon (optimal) hedging strategies within European derivative markets. In particular, it will aim to uncover principle risks in the valuation of derivatives that are not captured under the assumptions of the Black-Scholes Formula.

The project will test the impact of dynamic hedging using simulations of discretised jump diffusion processes [Nicola Bruti-Liberati and Eckhard Platen (2007), Approximation of jump diffusions in finance and economics, Computational Economics, Volume 29, Issue 3-4, pp 283-312]. Sensitivity to such model misspecification will be investigated with a particular emphasis on the impact of factors such as liquidity, mean reversion and underlying momentum.

The project will have a number of phases (each with a potential 'deliverable' in the form of a summary report, the combination of which will be combined to produce the project report):

1. A literature review in which existing modelling strategies will be investigated and some alternative approaches to hedging under these strategies identified.

2. Will investigate the sensitivity of the performance of standard dynamic hedging to model misspecification (using simulation and the models identified in 1).

3. If time permits, alternative hedging schemes will be investigated in the context of the models considered previously.

4. Conclusions will provide practical guidance on hedging in “realistic” market conditions.

There is considerable interest in modelling financial markets beyond the Black-Scholes paradigm and there will be no shortage of potentially interested users in the world of finance. Deviating from the simple geometric Brownian motion formalism introduces many difficulties but it is possible to investigate these without unnecessary technicality by simple simulation approaches.