ANZIAM J. 57(2016), 205–206
doi:10.1017/S1446181115000462

EDITORIAL: STOCHASTIC AND COMPUTATIONAL METHODS IN FINANCE

As a result of the enormous expansion in the global financial derivative market during the last few decades, many stochastic and computational methods have been developed that address some difficult issues encountered in modern finance. Some of the leading topics in this area include:

- high-frequency trading;
- retirement products and insurance;
- energy markets;
- exotic options pricing;
- stochastic optimal control;
- risk management and regulation;
- numerical methods for partial differential equations;
- stochastic analysis;
- Monte Carlo methods;
- empirical properties of financial markets.

These topics were covered in two key conferences held in Australia and China in 2014: IMS-FPS (Finance, Probability and Statistics), UTS, Sydney, Australia, and International Symposium on Partial Differential Equations and Stochastic Analysis in Mathematical Finance, Sanya, China. The papers selected for this special issue describe up-to-date research by some mathematicians in probabilistic and stochastic finance who participated in these conferences.

These selected papers indicate the wide scope encompassed by the broad area of mathematical finance. In the first paper, Yang et al. have studied a credit derivative product, the so-called constant proportion debt obligation (CPDO), and adopted a stochastic optimal control model to determine the optimal leverage and maximal payoff of a CPDO. Next, Goard presents an analytical approximation for an exotic option, the so-called British put option, in which the optimal exercise depends not only on the risk-free interest rate but also on the real drift of the underlying asset.

Rujivan develops a closed-form pricing formula based on Heston's two-factor stochastic volatility model for discretely sampled gamma swaps defined in terms of weighted variance swaps of the underlying asset, while Le et al. present an analytical solution for another exotic option called a Parisian up-and-in option. They have given the solution in the form of a double integral, which can be computed very quickly by using the so-called "moving window" technique.

On the other hand, Lai and Yao estimate Greeks of multi-asset European-style options for asset prices under subordinated Brownian motion models by using the Malliavin calculus method combined with Monte Carlo and quasi-Monte

Carlo methods. The paper by Alexander et al. provides a method for calculating bounds on prices of arithmetic Asian options and approximations to option deltas. Numerical studies presented in this paper show that the lower bound provides accurate approximations to prices.

Ling and Shevchenko give answers to the question "what will happen if an option is priced using two different methods, and then hedged according to the selected method?". The results of numerical analysis provided in this paper confirms the traders'/quants' folklore that a trader could end up with a good replicating portfolio using a simple Black–Scholes model. Hinz and Yap consider a discrete-time dynamic Markov optimization problem in the framework of dynamic programming. They suggest an original numerical algorithm to reduce the number of simulated paths.

The paper by Zhu et al. considers a jump-diffusion risk model for a surplus of the insurer and studies the optimal proportional reinsurance and investment problems. The optimal stochastic control problem has been solved for maximizing the expected exponential utility. Finally, Maisano et al. discuss a practical problem of calculating probabilistic risk measures such as "earnings at risk" and "value at risk" in the context of electricity markets; they derive an analytical representation of a state-demand forecast, which is the aggregated usage of all electricity consumers in regions such as New South Wales or Victoria.

We are grateful to the authors who participated in these conferences and expanded their conference presentations into these research papers. We are also indebted to the reviewers for their thorough and decisive reports that led to improvement of the papers.

We would also like to thank Professors Andrew Bassom and Graeme Hocking, co-Editors-in-Chief of the ANZIAM Journal, for their encouragement and guidance. Technical assistance received from Professor Tony Roberts during the review phase of this special edition is also gratefully acknowledged.

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