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EDITORIAL: SPECIAL ISSUE ON FINANCIAL MATHEMATICS AND QUANTITATIVE FINANCE

The nexus between world financial markets and the discipline of quantitative finance, which is heavily based on mathematics and statistics, has become increasingly clearer as a result of enormously expanded global financial derivative markets over the past two decades. To understand important and yet complicated market behaviours, mathematicians and statisticians worldwide have proposed many stochastic and computational methods that can be applied to address some quite challenging issues encountered in modern finance. This special issue contains selected papers submitted by participants of the 2nd International Symposium on Partial Differential Equations & Stochastic Analysis in Mathematical Finance, held during 6–10 January 2020 at Sanya, China.

The editorial team for this special issue consists of Professor Song-Ping Zhu, Dr. Xiaoping Lu and Dr. Xin-Jiang He, who had called for submission of papers before the symposium took place in January 2020 with topics of special interest including, but not limited to:

- High-frequency trading: data, models and strategies
- Pricing derivatives, including energy and weather derivatives
- Portfolio selection
- Change-point models
- Volatility models
- Stochastic optimal control
- Retirement products
- Insurance
- Irregular markets
- Risk and regulation

Among a large number of submitted manuscripts, eight papers presenting the results of research conducted recently by the authors in one of these areas were finally accepted after a rigorous review process was conducted over a nine-month period upon the closure of the submission.

All accepted papers can be categorized into the following three groups, each of which has its own distinguishing features.

The first category consists of all those papers presenting innovative analytical approaches in solving quantitative financial problems. In this category, Fukasawa et al. discussed a pair trading strategy under a one-dimensional ergodic diffusion model and determined the corresponding optimal thresholds for the static maximization of long-term average profit. Han et al. investigated the pricing problem of European call options under a fractional stochastic volatility model and derived an analytical solution of European option prices, while Nonsoong et al. considered a risky asset following a mean-reverting dynamic process with time-dependent parameters and presented an analytical pricing formula for the price of European options under this dynamic process. Potentially, the derived formula could be used for options written on an underlying with seasonal variation in agricultural commodity markets.

The second category includes three papers demonstrating how analytical approximation approaches can be adopted in an innovative way in quantitative finance. First, Lu and Putri presented a thorough semi-analytic analysis of the optimal redeeming prices, the values and the fair service fees of finite maturity American-style stock loans under a two-state regime-switching economy. Next, He and Lin considered the pricing problem of a credit default swap contract when the underlying price is assumed to follow a regime-switching model and derived an analytical approximation written in a Fourier cosine series, which shows great advantages in terms of accuracy and efficiency. Finally, Wang et al. presented a second-order asymptotic solution of timer option prices as well as a second-order approximation for the effective implied volatility under a multi-scale stochastic volatility model.

There are two papers in the third category in this special issue, presenting innovative numerical solution approaches. In the first paper, Thakoor adopted a localized radial basis function method to solve the two-dimensional SABR pricing equation and demonstrated some numerical advantages in terms of meshlessness as well as unstructured grids or randomly scattered grid points involved in the numerical computation. In the second paper, Tour et al. proposed a Legendre–Laguerre spectral approximation to price European and double barrier options in the time-fractional framework. Through the combination of the Richardson extrapolation method and the spectral approximation in space, the newly proposed scheme is shown to converge exponentially.

Before closing off this editorial, we would like to express our sincere appreciation to all the authors who extended their conference presentations and turned them into the papers to be considered for publication in this special issue and, among them, we are of course grateful to the authors of the eight accepted papers for their great contribution to the special issue. We are also indebted to the fellow reviewers for their thorough and decisive reports that have led to improvement of the papers selected for the publication.

Finally, we would like to gratefully acknowledge the encouragement and help given by the co-Editors-in-Chief of *ANZIAM Journal*, Professor Andrew Bassom and Professor Graeme Hocking, before and during the editorial process. Technical assistance received from Professor Tony Roberts during the review phase and the

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