



Recent advances in mathematical methods for finance

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In recent years, Mathematical Finance has witnessed the emergence of new research directions spurred by developments of financial markets, technological advances, and societal challenges. On the one hand, financial markets have seen the introduction of new financial products, regulatory frameworks, and trading infrastructures. On the other hand, artificial intelligence and machine learning techniques are introducing revolutionary changes in numerical methods in finance, overcoming computational challenges considered insurmountable until recently. In addition, new types of risks, such as climate-related and cyber-risks, have gained prominence, significantly impacting financial institutions and society at large.

This special issue on Recent Advances in Mathematical Methods for Finance provides a comprehensive overview of some of the latest developments in Mathematical Finance. We decided to launch this special issue on the occasion of the 10th General AMaMeF Conference, organised by the Guest Editors at the University of Padova and held in a virtual format on June 22–25, 2021. AMaMeF is the acronym for Advanced Mathematical Methods for Finance, and was born as a programme network of the European Science Foundation from 2005 to 2010, under the Sixth Framework Program for research and technological development of the European Union. AMaMeF now represents a European network of research promoting the exchange and diffusion of knowledge in the field of Mathematical Finance, spanning more than 20 countries. The biannual general conference stands as the flagship event of the AMaMeF network. The 10th General AMaMeF Conference spanned a broad range of topics in mathematical finance, including algorithmic trading and financial technologies, asset pricing under market frictions, collateralization and XVA, credit risk and interest rate modeling, energy and commodity markets, equilibrium and principal-agents models, climate risk, green and sustainable finance, machine learning and computational methods in finance, market microstructure, mean-field games and McKean–Vlasov equations, model uncertainty, model risk and robust finance, risk measures, stochastic control and portfolio optimization, stochastic volatility modeling, systemic risk and financial net-

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works. These topics were specifically targeted by the call for papers for the special issue, which was open to the entire scientific community and not restricted to papers presented at the conference.

The special issue contains 44 papers, which underwent a rigorous peer review process under the supervision of the Guest Editors. Coherently with the title of the special issue, in the selection of the submitted papers emphasis was placed on the originality and interest of the mathematical methods employed, alongside the relevance of their financial applications. The selected papers encompass theoretical contributions as well as more applied research, offering a comprehensive view of promising research directions in mathematical finance.

We are thankful to Prof. Endre Boros, Editor-in-Chief of *Annals of Operations Research*, for giving us the opportunity to edit this special issue and to the Springer staff for their assistance throughout the production process. We are grateful to the referees for their valuable feedback and constructive criticisms, which aided in the selection of the submissions and enhanced the quality of accepted papers. Finally, our most sincere gratitude goes to the authors of the submitted papers, for contributing their work to this special issue. We hope that this collection of papers will stimulate further research on several emerging topics in Mathematical Finance.

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