
INTRODUCTION

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We are delighted to present the second special issue of the *Journal of Investment Management*, commemorating the 50th anniversary of the revolutionary Black-Merton-Scholes (BMS) option pricing model. This edition builds upon the themes of our first special issue, which featured Robert Merton’s keynote address and pivotal contributions from various scholars. In this issue, we have the privilege of highlighting the keynote delivered by Nobel Laureate Myron Scholes, whose insights continue to shape financial theory and practice.

Myron Scholes’ keynote address at the 2023 CISDM Conference at UMass Amherst serves as a focal point for this issue. Scholes reflects on the model’s historical significance and its profound impact on the fields of corporate finance, risk management, and portfolio optimization. He explores the “micro-positive” aspects of the BMS model, which emphasize a bottom-up approach to decision-making, helping firms manage risks and allocate capital more effectively. Scholes delves into the model’s ability to capture the interplay between changing market conditions and investor behavior, highlighting how option pricing informs not only risk management but also strategic asset allocation during periods of market stress. Notably, he highlights the evolving role of options in providing early signals of changing risks, emphasizing the importance of forward-looking approaches to risk management in dynamic markets. His analysis offers both a retrospective and a forward-looking lens, encouraging further innovation and adaptation of

the BMS framework to contemporary financial challenges.

Following Scholes’ keynote speech, George Constantinides presents a critical analysis of the BMS model, focusing on its empirical shortcomings, such as the volatility smile and skew. Constantinides emphasizes that these discrepancies often arise from real-world complexities like stochastic volatility and trading frictions, which the BMS model does not fully address. He highlights how shifts in supply and demand dynamics—particularly between risk-averse customers and market makers—impact option prices and necessitate ongoing refinements. His analysis suggests that incorporating these factors into models can enhance our understanding of option pricing in incomplete markets with market imperfections.

The main section of the special issue begins with two papers which showcase the role of artificial intelligence (AI) in finance. AI has emerged as a transformative force, enabling more sophisticated modeling of financial markets, improved decision-making, and enhanced trading strategies. With the rapid evolution of machine learning and reinforcement learning techniques, AI is now addressing challenges that traditional models like BMS face, such as dynamic hedging and the identification of latent market inefficiencies.

John Hull’s paper explores the application of reinforcement learning to hedge barrier options, a notoriously difficult task due to discontinuities in delta when the asset price approaches the barrier. Hull demonstrates that reinforcement learning not

only offers a more flexible hedging strategy but also reduces transaction costs with less frequency of trading. Moreover, his findings reveal that RL adapts more effectively to sudden volatility shifts, making it a strong candidate for managing the complexities of exotic options under real-world constraints. His results suggest that AI-driven methods are better suited for environments characterized by abrupt changes in asset prices, providing a potential breakthrough in managing exotic options.

Dilip Madan's contribution shifts the focus to machine learning models for trading stocks. Madan challenges the efficient market hypothesis, arguing that AI can identify market inefficiencies more effectively than traditional models, particularly in cases of non-linear relationships and high volatility. By using advanced algorithms capable of analyzing complex, high-frequency data, Madan demonstrates that AI-driven strategies can exploit abnormal returns, especially in markets with prices deviating from their fundamental values. His work underscores AI's potential to reshape financial modeling and trading, emphasizing its adaptability in navigating both routine market dynamics and rare, high-impact events.

Sanjay Nawalkha's paper, *Fooled by the Black Swan*, offers a critical reassessment of Taleb's widely popular book, *The Black Swan*, in the context of his normative black swan theory. Nawalkha argues that Taleb's emphasis on holding barbell portfolios consisting of a small allocation in positive black swan opportunities and the rest in safe securities like U.S. Treasuries is myopic, leads to bleeding in realistic option markets, and has the potential to create financial bubbles and crashes. Conversely, extreme aversion to negative black swans—like underinvestment in stocks

and corporate bonds—can result in significant wealth shortfalls and broader economic downturns. Nawalkha defends the BMS model's core principles and demonstrates the strawman nature of Taleb's critique, which focuses only on the Gaussian assumption while ignoring the myriad fat-tailed models in finance that BMS inspired for pricing and risk management.

The issue concludes with Robert Jarrow's retrospective on the BMS model and its enduring relevance in arbitrage pricing theory over the past 50 years. Jarrow highlights how the model's mathematical foundations, based on the absence of arbitrage, have been pivotal in extending its applications to various derivatives. His review emphasizes that while the BMS methodology has evolved through relaxation of its assumptions, it remains fundamentally robust. Jarrow explores several extensions, including alternative risky asset price evolutions, the Heath-Jarrow-Morton model, reduced form credit risk models, market frictions, incomplete markets, and noncompetitive markets. He concludes that the BMS methodology remains robust to all of these extensions, except when the competitive market assumption is violated.

Together, these contributions celebrate the legacy of the Black-Merton-Scholes model and its profound impact on financial economics over the past 50 years. As we honor Myron Scholes and his groundbreaking work, we also recognize the model's evolving role in a rapidly changing financial landscape, fueled by AI, empirical anomalies, and deeper explorations into arbitrage pricing. We hope this special issue not only commemorates the past but also inspires future innovations in financial theory and practice.