Simulation and Optimization in Finance: Modeling with MATLAB, @Risk, or VBA

By Dessislava A. Pachamanova, Frank J. Fabozzi

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An introduction to the theory and practice of financial simulation and optimization

In recent years, there has been a notable increase in the use of simulation and optimization methods in the financial industry. Applications include portfolio allocation, risk management, pricing, and capital budgeting under uncertainty.

This accessible guide provides an introduction to the simulation and optimization techniques most widely used in finance, while at the same time offering background on the financial concepts in these applications. In addition, it clarifies difficult concepts in traditional models of uncertainty in finance, and teaches you how to build models with software. It does this by reviewing current simulation and optimization methodology-along with available software-and proceeds with portfolio risk management, modeling of random processes, pricing of financial derivatives, and real options applications.

- Contains a unique combination of finance theory and rigorous mathematical modeling emphasizing a hands-on approach through implementation with software
- Highlights not only classical applications, but also more recent developments, such as pricing of mortgage-backed securities
- Includes models and code in both spreadsheet-based software (@RISK, Solver, Evolver, VBA) and mathematical modeling software (MATLAB)

Filled with in-depth insights and practical advice, *Simulation and Optimization Modeling in Finance* offers essential guidance on some of the most important topics in financial management.

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Editorial Review

From the Inside Flap

In recent years, there has been a notable increase in the use of simulation and optimization methods in risk management, portfolio allocation, asset pricing, derivatives pricing, and capital budgeting under uncertainty.

With *Simulation and Optimization in Finance* and its companion Web site, authors Dessislava Pachamanova and Frank Fabozzi explain the application of these tools for both financial professionals and academics in this field.

Divided into five comprehensive parts, this reliable guide provides an accessible introduction to the simulation and optimization techniques most widely used in finance, while offering fundamental background information on the financial concepts surrounding these techniques.

In addition, the authors use simulation and optimization as a means to clarify difficult concepts in traditional risk models in finance, and explain how to build financial models with certain software. They review current simulation and optimization methodologies—along with the available software—and proceed with portfolio risk management, modeling of random processes, pricing of financial derivatives, and capital budgeting applications.

Designed for practitioners and students, this book:

- Contains a unique combination of finance theory and rigorous mathematical modeling emphasizing a hands-on approach through implementation with software
- Highlights both classical applications and more recent developments such as pricing of mortgage-backed securities
- Includes models and code in both spreadsheet-based software (@RISK, Solver, and VBA) and mathematical modeling software (MATLAB)
- Incorporates a companion Web site containing ancillary materials, including the models and code used in the book, appendices with introductions to the software, and practice sections
- And much more

Filled with in-depth insights and practical advice, *Simulation and Optimization in Finance* offers essential guidance on some of the most important topics in financial management.

From the Back Cover

Engaging and accessible, this book and its companion Web site provide an introduction to the simulation and optimization techniques most widely used in finance, while, at the same time, offering essential information on the financial concepts surrounding these applications.

This practical guide is divided into five informative parts:

- Part I, Fundamental Concepts, provides insights on the most important issues in finance, simulation, optimization, and optimization under uncertainty
- Part II, Portfolio Optimization and Risk Measures, reviews the theory and practice of equity and fixed

income portfolio management, from classical frameworks to recent advances in the theory of risk measurement

- Part III, Asset Pricing Models, discusses classical static and dynamic models for asset pricing, such as factor models and different types of random walks
- Part IV, Derivative Pricing and Use, introduces important types of financial derivatives, shows how their value can be determined by simulation, and discusses how derivatives can be employed for portfolio risk management and return enhancement purposes
- Part V, Capital Budgeting Decisions, reviews capital budgeting decision models, including real options, and discusses applications of simulation and optimization in capital budgeting under uncertainty

Supplemented with models and code in both spreadsheet-based software (@RISK, Solver, and VBA) and mathematical modeling software (MATLAB), Simulation and Optimization in Finance is a well-rounded guide to a dynamic discipline.

About the Author

DESSISLAVA A. PACHAMANOVA, PhD, is an Associate Professor of Operations Research at Babson College where she holds the Zwerling Term Chair. She has published a number of articles in operations research, finance, and engineering journals, and co-authored the Wiley title *Robust Portfolio Optimization and Management*. Pachamanova's academic research is supplemented by consulting and previous work in the financial industry, including projects with quantitative strategy groups at WestLB and Goldman Sachs. She holds an AB in mathematics from Princeton University and a PhD in operations research from the Sloan School of Management at MIT.

Frank J. Fabozzi, PhD, CFA, CPA, is Professor in the Practice of Finance and Becton Fellow at theYale School of Management and Editor of the Journal of Portfolio Management. He is an Affiliated Professor at the University of Karlsruhe's Institute of Statistics, Econometrics, and Mathematical Finance and is on the Advisory Council for the Department of Operations Research and Financial Engineering at Princeton University. He earned a doctorate in economics from the City University of New York.

Users Review

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