



# Advanced Stochastic Models, Risk Assessment, and Portfolio Optimization: The Ideal Risk, Uncertainty, and Performance Measures

*By Svetlozar T. Rachev, Stoyan V. Stoyanov, Frank J. Fabozzi*

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This groundbreaking book extends traditional approaches of risk measurement and portfolio optimization by combining distributional models with risk or performance measures into one framework. Throughout these pages, the expert authors explain the fundamentals of probability metrics, outline new approaches to portfolio optimization, and discuss a variety of essential risk measures. Using numerous examples, they illustrate a range of applications to optimal portfolio choice and risk theory, as well as applications to the area of computational finance that may be useful to financial engineers.

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**Bibliography**

- Sales Rank: #2954927 in Books
- Published on: 2008-02-25
- Original language: English
- Number of items: 1
- Dimensions: 9.30" h x 1.30" w x 6.35" l, 1.32 pounds
- Binding: Hardcover
- 382 pages

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## **Editorial Review**

From the Inside Flap

Since the 1990s, significant progress has been made in developing the concept of a risk measure from both a theoretical and a practical viewpoint. This notion has evolved into a materially different form from the original idea behind traditional mean-variance analysis. As a consequence, the distinction between risk and uncertainty, which translates into a distinction between a risk measure and a dispersion measure, offers a new way of looking at the problem of optimal portfolio selection.

In *Advanced Stochastic Models, Risk Assessment, and Portfolio Optimization*, the authors assert that the ideas behind the concept of probability metrics can be borrowed and applied in the field of asset management in order to construct an ideal risk measure which would be "ideal" for a given optimal portfolio selection problem. They provide a basic introduction to the theory of probability metrics and the problem of optimal portfolio selection considered in the general context of risk and reward measures.

Generally, the theory of probability metrics studies the problem of measuring distances between random quantities. There are no limitations in the theory of probability metrics concerning the nature of the random quantities, which makes its methods fundamental and appealing. Actually, it is more appropriate to refer to the random quantities as random elements: they can be random variables, random vectors, random functions, or random elements of general spaces. In the context of financial applications, we can study the distance between two random stocks prices, or between vectors of financial variables building portfolios, or between entire yield curves that are much more complicated objects. The methods of the theory remain the same, no matter the nature of the random elements.

Using numerous illustrative examples, this book shows how probability metrics can be applied to a range of areas in finance, including: stochastic dominance orders, the construction of risk and dispersion measures, problems involving average value-at-risk and spectral risk measures in particular, reward-risk analysis, generalizing mean-variance analysis, benchmark tracking, and the construction of performance measures. For each chapter where more technical knowledge is necessary, an appendix is included.

From the Back Cover

*Advanced Stochastic Models, Risk Assessment, and Portfolio Optimization*

The finance industry is seeing increased interest in new risk measures and techniques for portfolio optimization when parameters of the model are uncertain.

This groundbreaking book extends traditional approaches of risk measurement and portfolio optimization by combining distributional models with risk or performance measures into one framework. Throughout these pages, the expert authors explain the fundamentals of probability metrics, outline new approaches to portfolio optimization, and discuss a variety of essential risk measures. Using numerous examples, they illustrate a range of applications to optimal portfolio choice and risk theory, as well as applications to the area of computational finance that may be useful to financial engineers. They also clearly show how stochastic models, risk assessment, and optimization are essential to mastering risk, uncertainty, and

performance measurement.

*Advanced Stochastic Models, Risk Assessment, and Portfolio Optimization* provides quantitative portfolio managers (including hedge fund managers), financial engineers, consultants, and academic researchers with answers to the key question of which risk measure is best for any given problem.

#### About the Author

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