

[Home](#) > [Annals of Operations Research](#) > [Article](#)

A mean-absolute deviation-skewness portfolio optimization model

| Published: December 1993

| Volume 45, pages 205–220, (1993) [Cite this article](#)



[Annals of Operations Research](#)

[Aims and scope](#) →

[Submit manuscript](#) →

[Hiroshi Konno](#)¹, [Hiroshi Shirakawa](#)² & [Hiroaki Yamazaki](#)³

 **1444** Accesses  **194** Citations [Explore all metrics](#) →

Abstract

It is assumed in the standard portfolio analysis that an investor is risk averse and that his utility is a function of the mean and variance of the rate of the return of the portfolio or can be approximated as such. It turns out, however, that the third moment (skewness) plays an important role if the distribution of the rate of return of assets is asymmetric around the mean. In particular, an investor would prefer a portfolio with larger third moment if the mean and variance are the same. In this paper, we propose a practical scheme to obtain a portfolio with a large third moment under the constraints on the first and second moment. The problem we need to solve is a linear programming problem, so that a large scale model can be optimized without difficulty. It is demonstrated that this model generates a portfolio with a large third moment very quickly.



Access this article

[Log in via an institution](#) →

Subscribe and save

✓ Springer+

from €37.37 /Month

- Starting from 10 chapters or articles per month
- Access and download chapters and articles from more than 300k books and 2,500 journals
- Cancel anytime

[View plans](#) →

Buy Now

[Buy article PDF 39,95 €](#)

Price includes VAT (Poland)

Instant access to the full article PDF.

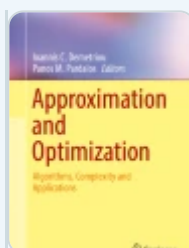
[Institutional subscriptions](#) →

Similar content being viewed by others



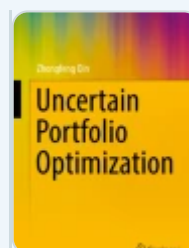
Mean–variance–skewness portfolio optimization with uncertain returns via co-skewness

Article | 01 April 2025



Impact of Error in Parameter Estimations on Large Scale Portfolio Optimization

Chapter | © 2019



Credibilistic Mean-Absolute Deviation Model

Chapter | © 2016

Explore related subjects

Discover the latest articles, books and news in related subjects, suggested using machine learning.

[Mathematics in Business, Economics and Finance](#)

[Mathematical Finance](#)

[Quantitative Finance](#)

[Risk Theory](#)

[Statistical Finance](#)

[Stochastic Analysis](#)

References

[1] F. Arditti, Risk and required return on equity, J. Fin. 22 (1967) 19–36.

[Google Scholar](#)

[2] V. Chvátal, *Linear Programming* (Freeman and Co, 1983).

[3] E.J. Elton, and M.J. Gruber, *Modern Portfolio Theory and Investment Analysis*, 3rd ed. (Wiley, 1987).

[4] G.A. Hawawini, An analytical examination of the intervaling effect on skewness and other moments, J. Fin. Quantit. Anal. 15 (1980) 1121–1128.

[Google Scholar](#)

[5] J.E. Ingersoll, Jr., *Theory of Financial Decision Making* (Rowman and Littlefield, 1987).

[6] T. Kariya et al., *Distribution of Stock Prices in the Stock Market of Japan* (Toyo Keizai, 1989), in Japanese.

[7] H. Konno, Piecewise linear risk functions and portfolio optimization, J. Oper.

- [8] H. Konno, and K. Suzuki, A fast algorithm of solving large scale mean-variance models by compact factorization of covariance matrices, J. Oper. Res. Soc. Japan 35 (1992) 93–104.

- [9] H. Konno and H. Yamazaki, Mean-absolute deviation portfolio optimization model and its application to Tokyo Stock Exchange, Manag. Sci. 37 (1991) 519–531.

- [10] A. Kraus, and R. Litzenberger, Skewness preference and the valuation of risky assets, J. Fin. 21 (1976) 1085–1094.

- [11] Y. Kroll, H. Levy, and H. Markowitz, Mean-variance versus direct utility maximization, J. Fin. 39 (1984) 47–62.

- [12] H. Markowitz, *Portfolio Selection: Efficient Diversification of Investments* (Wiley, 1959).

- [13] H. Markowitz et al., Fast computation of mean-variance efficient sets using historical covariance, Daiwa Securities Trust Co., Jersey City, NJ (1991).

- [14] R. Merton, Optimum consumption and portfolio rules in continuous-time

model, J. Econ. Theory 3 (1971) 373-413.

[Google Scholar](#)

- [15] A. Perold, Large scale portfolio optimizations, Manag. Sci. 30 (1984) 1143-1160.

[Google Scholar](#)

- [16] P.A. Samuelson, The fundamental approximation theorem of portfolio analysis in terms of means, variances and higher moments, Rev. Econ. Studies 25 (1958) 65-86.

[Google Scholar](#)

- [17] M. Sarnat, A note on the implications of quadratic utility for portfolio theory, J. Fin. Quantit. Anal. 9 (1974) 687-689.

[Google Scholar](#)

- [18] W.F. Sharpe, *Portfolio Theory and Capital Market* (McGraw-Hill, 1970).

- [19] H. Takehara, An application of the interior point algorithm for large scale optimization in finance, *Proc. 3rd RAMP Symp.*, (Operations Research Society of Japan, 1991) pp. 43-52 (in Japanese).

Author information

Authors and Affiliations

**Institute of Human and Social Sciences, Tokyo Institute of Technology,
Tokyo, Japan**
Hiroshi Konno

**Institute of Socio-Economic Planning, University of Tsukuba, 305,
Tsukuba, Ibaraki, Japan**

Hiroshi Shirakawa

**Department of Social Engineering, Tokyo Institute of Technology, Tokyo,
Japan**

Hiroaki Yamazaki

Rights and permissions

[Reprints and permissions](#)

About this article

Cite this article

Konno, H., Shirakawa, H. & Yamazaki, H. A mean-absolute deviation-skewness portfolio optimization model. *Ann Oper Res* **45**, 205–220 (1993). <https://doi.org/10.1007/BF02282050>

Issue date

December 1993

DOI

<https://doi.org/10.1007/BF02282050>

Keywords

[Optimization Model](#)

[Programming Problem](#)

[Scale Model](#)

[Linear Programming Problem](#)

[Portfolio Optimization](#)

Search

Search by keyword or author



Navigation

Find a journal

Publish with us

Track your research

