Mathematical Overview of Mean-VaR Optimization

Ignas Gasparavičius [*], Andrius Grigutis [†] and Marius Gvergždys [‡]

Institute of Mathematics, Vilnius University, Naugarduko g. 24, LT-03225, Vilnius, Lithuania

Abstract

In our work, we generalize the classical mean–variance framework of Markowitz by formulating a mean–Value–at–Risk (VaR) portfolio optimization problem. Using the Lagrangian multiplier method, we derive the fundamental propositions of portfolio theory within the mean–VaR setting, extending our previous results obtained in the mean–variance framework from the perspective of mathematical completeness [1]. We establish the corresponding optimality conditions and characterize efficient portfolios under VaR constraints. The results provide a theoretical extension of modern portfolio theory under an alternative risk measure.

Keywords: mean-VaR optimization, portfolio selection theory.

References

[1] Gasparavičius, I. and Grigutis, A. (2024), "The famous American economist H. Markowitz and mathematical overview of his portfolio selection theory." *Lithuanian Mathematical Journal*, vol. **64**(4), pp. 467–480.

[*]E-mail address: ignas.gasparavicius@mif.stud.vu.lt
[†]E-mail address: andrius.grigutis@mif.vu.lt
[‡]E-mail address: marius.gvergzdys@mif.stud.vu.lt