How Risky is the Optimal Portfolio Which Maximizes the Sharpe Ratio?

March 2015

Taras Bodnar[a,*] and Taras Zabolotskyy[b]

[a] *Department of Mathematics, Stockholm University, Roslagsvägen 101, SE-10691, Stockholm, Sweden*

[b] *Lviv Institute of Banking, University of Banking of the National Bank of Ukraine, Shevchenka Ave. 9, 79005 Lviv, Ukraine*

Abstract

In this paper, we investigate the properties of the optimal portfolio in the sense of maximizing the Sharpe ratio (SR) and develop a procedure for the calculation of the risk of this portfolio. This is achieved by constructing an optimal portfolio which minimizes the Value-at-Risk (VaR) and at the same time coincides with the tangency (market) portfolio on the efficient frontier which is related to the SR portfolio. The resulting significance level of the minimum VaR portfolio is then used in the determination of the risk of both the market portfolio and the corresponding SR portfolio. However, the expression of this significance level depends on the unknown parameters which have to be estimated in practice. It leads to an estimator of the significance level whose distributional properties are investigated in detail. Based on these results, a confidence interval for the suggested risk measure of the SR portfolio is constructed and applied to real data. Both theoretical and empirical findings document that the SR portfolio is very risky since the corresponding significance level is smaller than 90% in most of the considered cases.

---

* Corresponding author. E-mail address: taras.bodnar@math.su.se. Tel: +46 8 164562. Fax: +46 8 612 6717.