Mathematical Statistics
Stockholm University
Research Report **2015:15**,
http://www.math.su.se

A Linear Test for the Global Minimum Variance Portfolio for Small Sample and Singular Covariance

October 2015

Taras Bodnar[a], Stepan Mazur[b] and Krzysztof Podgórski[b] [1]

[a] *Department of Mathematics, Stockholm University, Roslagsvägen 101, SE-10691 Stockholm, Sweden*
[b] *Department of Statistics, Lund University, Tycho Brahes väg 1, SE-22007 Lund, Sweden*

Abstract

Bodnar and Schmid (2008) derived the distribution of the global minimum variance portfolio weights and obtained the distribution of the test statistics for the general linear hypothesis. Their results are obtained in the case when the number of observations n is bigger or equal than the size of portfolio k. In the present paper, we extend the result by analyzing the portfolio weights in a small sample case of $n < k$, with the singular covariance matrix. The results are illustrated using actual stock returns. A discussion of practical relevance of the model is presented.

ASM Classification: 91G10, 62H12
Keywords: global minimum variance portfolio, singular Wishart distribution, singular covariance matrix, small sample problem

[1]The authors appreciate the financial support of the Swedish Research Council Grant Dnr: 2013-5180 and Riksbankens Jubileumsfond Grant Dnr: P13-1024:1