

Outliers Effect on Portfolio Optimization

G. Küçükkocaoğlu¹

¹ Başkent University, Faculty of Economics and Administrative Sciences, Management Department, 06533 Bağlıca ANKARA, Turkey

Abstract: Investment portfolios of 30 Istanbul Stock Exchange companies randomly selected from a set of 300 stocks are analysed here for efficiency in diversification and robustness. Since the pioneering work of Markowitz, the analytical tools have been available to show that negative correlation of the risky asset returns provide the strongest incentive to diversify. It is well-known in the statistical literature that the classical covariance matrix estimates and sample means can be very greatly influenced by outliers. In such cases even a few outliers can have a significant negative effect on the statistical estimates, efficient frontier shapes and ultimately on the performance of the optimized portfolios. Thus, the stocks weights on optimal portfolios and the efficient frontier shapes can be greatly influenced by a small fraction of outliers in the returns.

The traditional statistical estimates are based on the least squares method, where it is generally used to estimate the beta coefficients of ISE listed stocks, has ideal theoretical properties for large samples and for normally distributed variables. However, Ordinary Least Squares (OLS) estimators are very sensitive to extraordinary returns (outliers), especially if the sample size is not large enough. For this reason, to eliminate the distorting effects of outliers on the efficient frontier shapes we have constructed different portfolios using the Least Median Squares (LMS) method and comment on the results. The findings of the study show that when we estimate the robust beta coefficients of common stocks by using the LMS method, outliers in stock returns are eventually detected and omitted from the variance and covariance matrixes, which yields different efficient frontier shapes and more realistic expectations on portfolio returns.

Keywords: Outliers, Portfolio Optimization, Ordinary Least Squares, Least Median Squares