

Abstract

This thesis examines the use of differential evolution in a real-world portfolio optimization task based on US stock data. We empirically test the capability of the algorithm to find an inter-sector allocation that outperforms a broad-market stock index. Two constrained sector ETF portfolios are constructed to simulate realistic agent-based settings and performance of the competing portfolios is analyzed in terms of both return and risk. The results are further extended to include Markowitz' global minimum variance portfolio and a naive 1/N portfolio. We show that the constructed portfolios are indeed capable of outperforming the market whilst simultaneously maintaining lower tail risk, however, the performance significantly deteriorates if the portfolios are rebalanced based on rolling data windows. Overall the algorithm delivers satisfying results while providing the user with a relative freedom when choosing portfolio constraints.

JEL Classification: C61, G11, G17, G19
Keywords: portfolio optimization, exchange-traded funds, differential evolution, empirical analysis

Title: Sector ETF Portfolio Optimization Using Differential Evolution

Author's e-mail: rene.holesinsky@gmail.com
Supervisor's e-mail: frantisek.cech@fsv.cuni.cz