Abstract

The celebrated Markowitz mean-variance portfolio optimisation framework is constructed based on known mean return and covariance as inputs. However, in practice the inputs are unknown and have to be estimated. Using the sample mean and covariance matrix from historical returns is a common yet naive practice which is backward-looking and may lead to poor performance of the selected portfolio. The thesis reviews estimators in the literature and tests their performance with a sliding time window with stock returns data from 2008 to 2015. These estimators are then implemented as part of an MACD-based trading strategy. A trading system with if-then rules is proposed that combines all the inputs and is able to give trading decision on each of the trading days. The trading system with weekly trading is tested on 30 component stocks of DJIA index in the high volatility period in 2015 with simulated trading decisions. Using MLE estimate from historical returns time series has shown suboptimal performance in the trading simulation with various covariance estimators and perfect information on next-period returns and the system can outperform buy-and-hold strategy on the DJIA index since outset of the period.