**Trading Strategy Test & Portfolio Ranking**

Mo Pei

Harvard University, Stats 107 Financial Statistics

Fall 2016 Professor: Michael Parzen

12/08/2016

## Abstract

The stock market has two major characteristics. One is return and the other is risk. Higher return usually associates with higher risk. Many researches and studies describe methods and theory to maximize profit and minimize lose. This project is to conduct three validations to verify different trading and investment ideas. I use training data to get a model of trading or a combination of investment portfolio. By applying test data, I could validate the trading strategy and rank different portfolios. Pairs-Trading applies the Mean-Reverting idea to trading strategy. By selecting an appropriate pair, I could achieve a high return, and the lost could be not canceled off. However, the criteria’s of choosing a pair does not always work. Besides, I took difference, ratio, and log ratio three trading strategies. Bollinger band, Relative Strength Index, VWAP, and SMA are popular trading methods. By different time frames, SMA works better in the long run, RSI is good at short to middle range, and VWAP performs well in short period. Ranking different portfolios include benchmarks of Drawdown, DownsideDeviation, SemiDeviation , Omega, Sharpe Ratio, and Trenoy Ratio. The two portfolios I choose make profits and reduce risk in my test.

## Introduction

“The stock price is random walk” Eugen Fama said. The movie inside jobs tells story of 2008 financial crisis. It surprised me that the story begins at Iceland that I have never thought any relationship with finance. People lost jobs and companies went down. Lehman brothers founded in 1850 filed bankruptcy in 2008. Thereby, market has risk. So people fear about market? Maybe. Many hedge fund companies perform exceedingly impressive. John Pualson who is a HBS graduate is a hedge fund industry tycoon donated 400 million dollars to School of Engineering and Applied Science in 2015. He is one of the greatest hedge fund managers ever!

Trading Strategy and investment theory are interesting. My project tests three major ideas in the market including Pairs trading, Portfolio theory, and ranking of different trading strategy. For portfolio and pairs trading part, I focus on small size to middle size of stocks.

For pairs trading method, I want to research pairs selection. For example, by using by using Dickey–Fuller test (ADF) test and correlation, a pair would make profit and reduce risk. Furthermore, I use normalized ratio, difference, and log ratio three trading strategies. Finally, I take test data to validate the pair I chose.

For portfolio interment method, I form a portfolio by applying portfolio theory. I want to knowI use R to generate tangent portfolio, min variance, and also use Drawdown, DownsideDeviation, SemiDeviation , Omega, Sharpe Ratio, and Trenoy Ratio to rank portfolios.

For comparison of different trading strategy, I checked trading strategies including Bollinger band, Relative Strength Index, VWAP, and SMA. I observe their performance by different time frames. Also, I validated their profit and lost in bull and bear markets respectively.

c) An “**Abstract**” of 100-300 words giving the following: Background, Methods, Results,

Conclusions. The abstract should be written in a style suitable for a general audience.

d) An “**Introduction**” section that states the focus of your analysis and ends with a sentence

stating the primary goal of this analysis, and any possible secondary goals.

e) A “**Methods**” section

f) A “**Results**” section

g) A “**Conclusions and Discussion**” section which should be written in the same “nonstatistical”

style as the abstract (see comments above for the abstract).

h) A “**References**” section that gives 2-5 references (such as software used, data from websites,

research paper you are reproducing, etc.)

i) An “**Appendix**” section. The Appendix may include any R or Excel code (and possible

discussion) that you feel is important in the analysis that you ran.