Part1

The Project 10 tends to build a portfolio consisting of info tech companies.

As for data, we need its annual financial ratios of net profit margin, P/E ratios and daily close prices as well as benchmark(NASDAQ), which can be collected from Wharton Database as suggested.

We will divide the whole process into 3 main steps.

The first step, after data collecting and data cleaning, we focus on stocks selecting. We use the net profit margin to sort IT stocks on each year, we cut off the first 30 top performance stocks.

The second step, based on the stock history performance (its return and stock movement covariance matrix), we use the fPortfolio, PortfolioAnalytics, PerformanceAnalytics, ROI, ROI.plugin.glpk and ROI.plugin.quadprog to do optimization after adding suitable constrains as required.

The third step, we will form a function to do back-test for the strategy that we use net profit margin as stock selection criteria to check its performance on multi-dimension to see whether it outperformed the benchmark index for tech companies. Maybe we will use DEoptim and robustbase packages for further discussion.

Up to now, we are working on the first two steps at the same time. For the first step, the problem we are facing is how to find a balance between the minimum standard deviation and the maximum net profit margin when selecting stocks. And the second step is still progressing smoothly.

Part 2

1. Convertible arbitrage is a trading strategy that typically involves taking a long position (buy) in a convertible security and a short position (sell) in the underlying common stock. The goal of the convertible arbitrage strategy is to capitalize on pricing inefficiencies between the convertible and the stock. Convertible arbitrage is a long-short strategy that has been employed by hedge funds. It is a arbitrage strategy focusing on the price inefficiency on the convertible security.
2. Managed futures or Commodity Trading Advisors (CTAs). It makes full use of the market momentum indicators, it trades the futures and underlying asset and study their correlation and movement, the vast majority CTA strategies are market follower and when clear pattern shows, the CTA funds will bid for the market will keep moving in the favorite direction.
3. Distressed securities are financial instruments issued by a company that is near to—or currently going through—bankruptcy. Distressed securities can include common and preferred shares, bank debt, trade claims, and corporate bonds. When other investors abandon these securities and the price of these financial instruments will suffer a dramatic lose and it has to provide a high yield to attract the investors. Here comes the distressed securities strategy traders, they tend to use risk management and corporate finance knowledge to dig out these under-value securities and buy them at a relative low price to gain profits.
4. Equity market neutral (EMN) describes an investment strategy where the manager attempts to exploit differences in stock prices by being long and short an equal amount in closely related stocks. For example, it can trade stocks in the same sector, for example, IT. It long some stocks and shorts others to build a portfolio seems hedge against the market, it makes money by discovering those under-valued or underestimated companies and gain money when they rise or selling those overpriced one and make profit when they drop back to where it belongs.
5. An event-driven strategy refers to an investment strategy in which an institutional investor attempts to profit from a stock mispricing that may occur during or after a corporate event.

It trades on the security and it will study how the event will affect the stock’s future income.

1. Fixed Income Arbitrage, Fixed-income arbitrage is an investment strategy that exploits pricing differentials between fixed-income securities. It trades on the fixed-income security and its derivates, it will build a hedged portfolio to buy those under-valued and sell those over-valued securities.

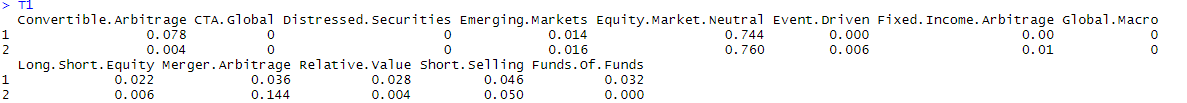
Part2. B

Take all strategies into playground and set the two main investment constraints, full investment and long only. Set the minimum standard deviation as objective.

Take the first 10 years data as df1 and do optimization using 10000 random portfolios

Check the weights and objective\_measures

Take the last 10 years as df2 and do the optimization using the same way get y\_minstd\_2



Chart

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