Mean Reversion in US Equities

This is intended to be a very brief overview of the project and the results.

<u>Main purpose:</u>

I set out to test whether short term mean reversion is still present in equities. The main methodology is to rank equities by weekly performance into one of twenty quantiles and test the performance over the next calendar week and over the next 30 calendar days. Additionally, I tested to see under which volatility conditions both strategies perform marginally better. I didn't run a Fama-McBeth type of regression primarily because the preliminary results indicated that all of the 20 quantiles, with the exception of one, have marginal performance as suggested by their ranking. Moreover, this is a warm up exercise and proof of concept. The next project will incorporate several signals into a more complete strategy. For much of the same reasons I didn't model transaction costs, portfolio volatility estimates and other constraints. In short, everything that would ordinarily be part of the quadratic equation was left off.

<u>Data Structure:</u>

All the data is from CRSP database from 2010-01-01 to 2016-12-31. The structure is as follows:

Name	Description	Class
PERMNO	CRSP's Permanent Identifier	integer
Date	Date	integer
SHRCD	Share Code	integer
EXCHCD	Exchange Code	integer
DLRET	Delisting Return	Character
PRC	Price	Numneric
VOL	Volume	integer
RET	Return	Character
SHROUT	Number of Shares Outstanding	integer
vwretd	Value Weighted Return of the Broad Market Including Dividends	Numeric

<u>Procedure (these are only the broad points I felt were important to mention):</u>

- Extract only the common shares that are listed on either NYSE, NASDAQ or AMEX.
- Drop observations that are either below 100% or above 300%, they are assumed to be incorrect data.
- Aggregate the returns for every equity over a 7 calendar days period.
- Use the weekly returns to sort the equities into twenty quantiles. NB: any equity that lost over 85% of its value in the given week doesn't get ranked.
- Create a portfolio for any week that goes long in the 1st quantile (worst performing) and shorts the 20th quantile (best performing) based on previous week's ranking. One portfolio will be held for 7 calendar days and a second for 30 calendar days.

- o Add three lagged market volatility measures for each portfolio observation: mean return volatility for the week, last observation of a 10 trading days rolling volatility and last observation of a 20 days rolling volatility.
- o The 20 days rolling volatility is empirically the most correlated to portfolio returns.

Results:

The annualized sharpe ratio of mean reversion over seven days significantly outperform the market. Moreover, as market volatility increase the results of the strategy improve by a significant margin, see below. However, the cost is that, by construction, less than half of the sample qualifies for strategy testing when evaluated on a rolling basis. I didn't annualize the sharpe ratio to a yearly basis because not all weeks in the year are investable.
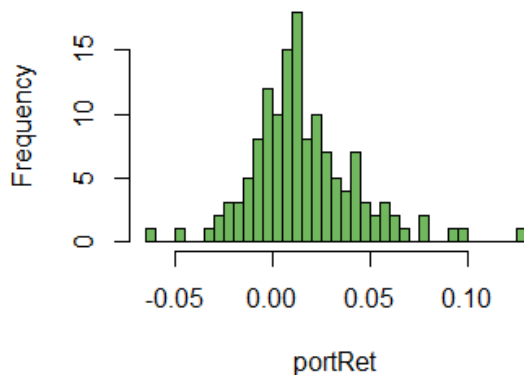
Histogram of Market Returns
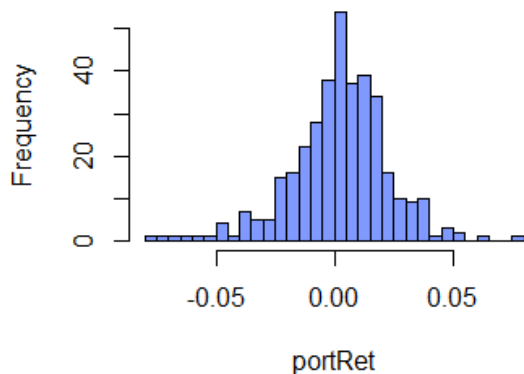
Mean Market Ret	Strat SR(1WK)	Strat SR(1YR)
0.002239088	0.1095719	0.7901342

Histogram of Long-Short Returns
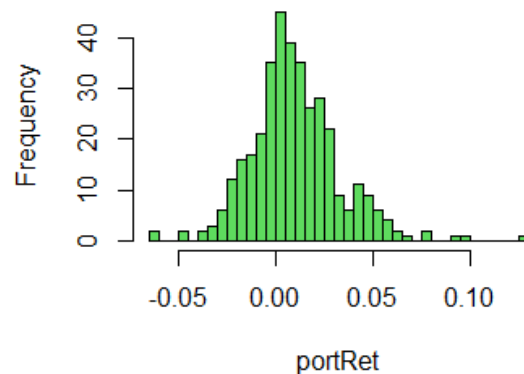
Mean Long-Short Ret	Strat SR(1WK)	Strat SR(1Yr)
0.009855738	0.424395	3.060356

Histogram of Long-Short Returns w. Vol Overlay

Mean L/S w. vol overlay Ret	Strat SR(1WK)
0.01575108	0.5782706

Histogram of Long-Short 30 Day Return
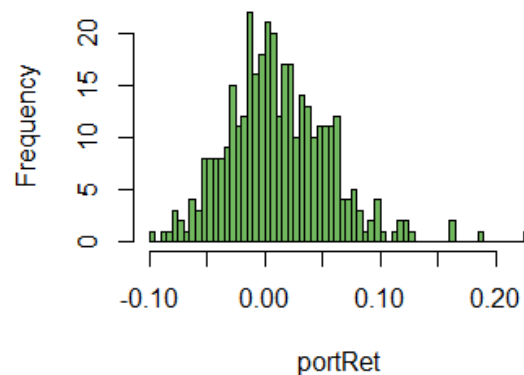
Mean L/S 30D Ret	Strat SR(30D)	Strat SR(1Yr)
0.01220343	0.2719942	0.9422154

Project Time Management:

The entire code executes in roughly a minute and a half. The base results took a day to code and another few days to work out unforeseen bugs that were caught during code cleanup and one more day to optimize the operations.