Investing with Momentum and Economic Outlook

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Table of Contents

Preliminary Idea of Strategy

If we are able to forecast the direction of future economic outlook and stock prices and use them for long-short decisions of a portfolio, then we would have the highest chance of gaining highest returns.

Economic Outlook: Federal Reserve Bank

- Assumption:
  - Investors react to the Federal Reserve Bank's press releases and articles.
  - FRB's Monetary Policy press releases are correlated with economic outlook
- Hypothesis:
  - Press releases by the FRB can gauge the direction of future economic outlook

Word Scraping

- HTML, Python, beautifulsoup
- Federal Reserve Bank press releases on Monetary Policy from 2011-2017
  - https://www.federalreserve.gov/newsevents/pressreleases.htm
- Compiled articles quarterly
- Two lists of words to analyze future economic outlook:
  - ‘Positive’ list of words indicating stronger economic outlook
  - ‘Negative’ list of words indicating weaker economic outlook
- P-count & N-count constructed for each quarter
- Alpha constructed for each quarter using P-count & N-count

HTML, Python, Beautifulsoup

```python
import requests
import urllib2
from bs4 import BeautifulSoup

quote_page = "https://www.federalreserve.gov/newsevents/pressreleases.htm"
base_url = "https://www.federalreserve.gov"

html = requests.get(
    quote_page).text
bs = BeautifulSoup(html,'lxml')
possible_links = bs.find_all('a')

all_links = [base_url + link.attrs['href'] for link in possible_links]

# Function to delete irrelevant parenthesis in scraped data
def deleteIrrelevant(a):
    front=0
    end=0
    for letter in a:
        if letter=='<':
            front=a.index('<')
            end=front
            while a[end]!='>':
                end+=1
            a = a[:front] + a[end+1:]
        if letter ==',':
            a.replace(',',"")
    return a

#Macro Links to be accessed
parsingLinks = []
for link in all_links:
    if "2017" in link:
        parsingLinks.append(link)
    if "2016" in link:
        parsingLinks.append(link)
    if "2015" in link:
        parsingLinks.append(link)
    if "2014" in link:
        parsingLinks.append(link)
    if "2013" in link:
        parsingLinks.append(link)
```

```python
#2012 Monetary Policies Press Releases
mp_201210 = []
mp_201207 = []
mp_201204 = []
mp_201201 = []

#2011 Monetary Policies Press Releases
mp_201110 = []
mp_201107 = []
mp_201104 = []
mp_201101 = []


#Quarterly organization of Fed Monetary Policy Articles
for each in a:
    #2017 Monetary Policy Articles organized quarterly
    if ("newsevents/pressreleases/monetary" in each and "201711" in each):
        mp_201710.append(each)
    if ("newsevents/pressreleases/monetary" in each and "201710" in each):
        mp_201710.append(each)
    if ("newsevents/pressreleases/monetary" in each and "201709" in each):
        mp_201707.append(each)
    if ("newsevents/pressreleases/monetary" in each and "201708" in each):
        mp_201707.append(each)
    if ("newsevents/pressreleases/monetary" in each and "201707" in each):
        mp_201707.append(each)
    if ("newsevents/pressreleases/monetary" in each and "201706" in each):
        mp_201704.append(each)
    if ("newsevents/pressreleases/monetary" in each and "201705" in each):
        mp_201704.append(each)
    if ("newsevents/pressreleases/monetary" in each and "201704" in each):
        mp_201704.append(each)
    if ("newsevents/pressreleases/monetary" in each and "201703" in each):
        mp_201701.append(each)
    if ("newsevents/pressreleases/monetary" in each and "201702" in each):
        mp_201701.append(each)
    if ("newsevents/pressreleases/monetary" in each and "201701" in each):
        mp_201701.append(each)
```

```python
###
### Access quarterly data and converts into list of strings for word count
### wmp = Word form of Monetary Policy Articles

###2017 WMPs
for link in mp_201710:
    r = requests.get(link)
    soup = BeautifulSoup(r.content, 'lxml')
    paragraphFromEachLink = soup.find('div', class_ = 'col-xs-12 col-sm-8 col-md-8').find_all('p')

    for word in paragraphFromEachLink:
        pmp_201710 += str(word)
pmp_201710 = deleteIrrelevant(pmp_201710).lower()
wmp_201710 = pmp_201710.split(' ')

for link in mp_201707:
    r = requests.get(link)
    soup = BeautifulSoup(r.content, 'lxml')
    paragraphFromEachLink = soup.find('div', class_ = 'col-xs-12 col-sm-8 col-md-8').find_all('p')

    for word in paragraphFromEachLink:
        pmp_201707 += str(word)
pmp_201707 = deleteIrrelevant(pmp_201707).lower()
wmp_201707 = pmp_201707.split(' ')
```

```python
### Function to count words
def countWords(plist, wmp, pncount):
    for x in plist:
        for y in wmp:
            if x == y:
                pncount += 1
    return pncount

### 2017
pcount201710 = countWords(plist, wmp_201710, pcount201710)
ncount201710 = countWords(nlist, wmp_201710, ncount201710)
pcount201707 = countWords(plist, wmp_201707, pcount201707)
ncount201707 = countWords(nlist, wmp_201707, ncount201707)
pcount201704 = countWords(plist, wmp_201704, pcount201704)
ncount201704 = countWords(nlist, wmp_201704, ncount201704)
pcount201701 = countWords(plist, wmp_201701, pcount201701)
ncount201701 = countWords(nlist, wmp_201701, ncount201701)
```

Positive and Negative Word Lists & Output

```
627
628 ### Positive and Negative words List
629
630 plist = ['strengthen', 'rising', 'rose', 'rise', 'solid', 'boosting', 'stable', 'stability',
631           'strong', 'evolve', 'growth', 'grew', 'fostered', 'foster', 'expand', 'expanded',
632            'recovery', 'recovering', 'recovered', 'boost', 'certain', 'innovation', 'innovative',
633            'development', 'confident', 'expanding', 'stabilize', 'strengthening', 'increase']
634
635 nlist = ['disruptions', 'lack', 'disrupted', 'insufficient', 'tight', 'weak', 'depressed',
636          'downward', 'slow', 'deterioration', 'uncertainty', 'deteriorate', 'weaken', 'weakening',
637           'stress' , 'stressed', 'drop', 'dropped', 'declined', 'decline', 'fragile', 'below',
638           'weaker', 'unstable', 'decreased', 'declines', 'decline', 'decreases', 'soft',
639           'drops', 'slows', 'deteriorates', 'deteriorated', 'weakens', 'slowed' ,'low']
640
641
642 ### Positive and Negative word counts initialization
643 ## 2017
644 pcount201710 = 0
645 pcount201707 = 0
646 pcount201704 = 0
647 pcount201701 = 0
648
649 ncount201710 = 0
650 ncount201707 = 0
651 ncount201704 = 0
652 ncount201701 = 0
```

```
Macro-links to be accessed:
['https://www.federalreserve.gov/newsevents/pressreleases/2017-press.htm',
'https://www.federalreserve.gov/newsevents/pressreleases/2016-press.htm',
'https://www.federalreserve.gov/newsevents/pressreleases/2015all.htm',
'https://www.federalreserve.gov/newsevents/pressreleases/2014all.htm',
'https://www.federalreserve.gov/newsevents/pressreleases/2013all.htm',
'https://www.federalreserve.gov/newsevents/pressreleases/2012all.htm',
'https://www.federalreserve.gov/newsevents/pressreleases/2011all.htm']

Successfully organized 2011-2017 articles into Quarterly format

Successfully converted Quarterly format into Word-Count format
Successfully counted 2011-2017 Quarterly P-N words
<2017 P-N Count>
201710, positive:  13
201710, negative:  7
201707, positive:  20
201707, negative:  9
201704, positive:  22
201704, negative:  11
201701, positive:  20
201701, negative:  5

<2016 P-N Count>
201610, positive:  20
201610, negative:  8
201607, positive:  16
201607, negative:  13
201604, positive:  15
201604, negative:  13
201601, positive:  13
201601, negative:  17

<2015 P-N Count>
201510, positive:  13
201510, negative:  10
201507, positive:  14
201507, negative:  11
201504, positive:  15
201504, negative:  13
201501, positive:  19
201501, negative:  16

<2014 P-N Count>
201410, positive:  14
201410, negative:  12
201407, positive:  15
201407, negative:  9
201404, positive:  14
201404, negative:  11
201401, positive:  12
201401, negative:  20

<2013 P-N Count>
201310, positive:  14
201310, negative:  19
201307, positive:  13
201307, negative:  13
201304, positive:  16
201304, negative:  13
201301, positive:  13
201301, negative:  15

<2012 P-N Count>
201210, positive:  16
201210, negative:  12
201207, positive:  16
201207, negative:  15
201204, positive:  13
201204, negative:  15
201201, positive:  16
201201, negative:  15

<2011 P-N Count>
201110, positive:  13
201110, negative:  12
201107, positive:  11
201107, negative:  19
201104, positive:  15
201104, negative:  11
201101, positive:  15
201101, negative:  7
```

MACD Envelope Bound

if $\alpha > 0.6$:
  bound = [1.04, 0.99]
elif $\alpha > 0.55$:
  bound = [1.03, 0.98]
elif $\alpha > 0.50$:
  bound = [1.025, 1.025]
elif $\alpha > 0.45$:
  bound = [1.02, 0.97]
else:
  bound = [1.01, 0.96]

	positive	negative	alpha
201712	13	7	0.650
201709	20	9	0.690
201706	22	11	0.667
201703	20	5	0.800
201612	20	8	0.714
201609	16	13	0.552
201606	15	13	0.536
201603	13	17	0.433
201512	13	10	0.565
201509	14	11	0.560
201506	15	13	0.536
201503	19	16	0.543
201412	14	12	0.538
201409	15	9	0.625
201406	14	11	0.560
201403	12	20	0.375
201312	14	19	0.424
201309	13	13	0.500
201306	16	13	0.552
201303	13	15	0.464
201212	16	12	0.571
201209	16	15	0.516
201206	13	15	0.464
201203	16	15	0.516
201112	13	12	0.520
201109	11	19	0.367
201106	15	11	0.577
201103	15	7	0.682

MACD - Moving Average Convergence Divergence (1)

Trend following and momentum

Shorter moving average : 12-ma

Longer moving average : 26-ma

```
MACD Line: (12-day EMA - 26-day EMA)

Signal Line: 9-day EMA of MACD Line

MACD Histogram: MACD Line - Signal Line
```

MACD - Moving Average Convergence Divergence (2)

Long when:

- MACD = 0 (Short MA crosses Long MA)
- MACD increases in positive value
- MACD golden crosses the signal line

Pipeline - long list

Screening conditions:

- Q500US - Average dollar volume, tradable, etc.
- Long debt to equity ratio below 300%
- MACD signal
- Last closing price below the lower bound set by parameter alpha (positive proportion)

Stocks that pass these conditions go into our long list.

Rebalancing

Prior to rebalancing, stocks are shorted in two conditions(runs daily):

1. MACD falls below zero and turns to negative
2. Last closing price is above the upper bound set determined by FRB data

Then, portfolio is rebalanced daily among stocks in already in the portfolio and in the long list with equal portfolio weights. (Opt.targetweight function is used.)

Leverage of one is maintained throughout trading period

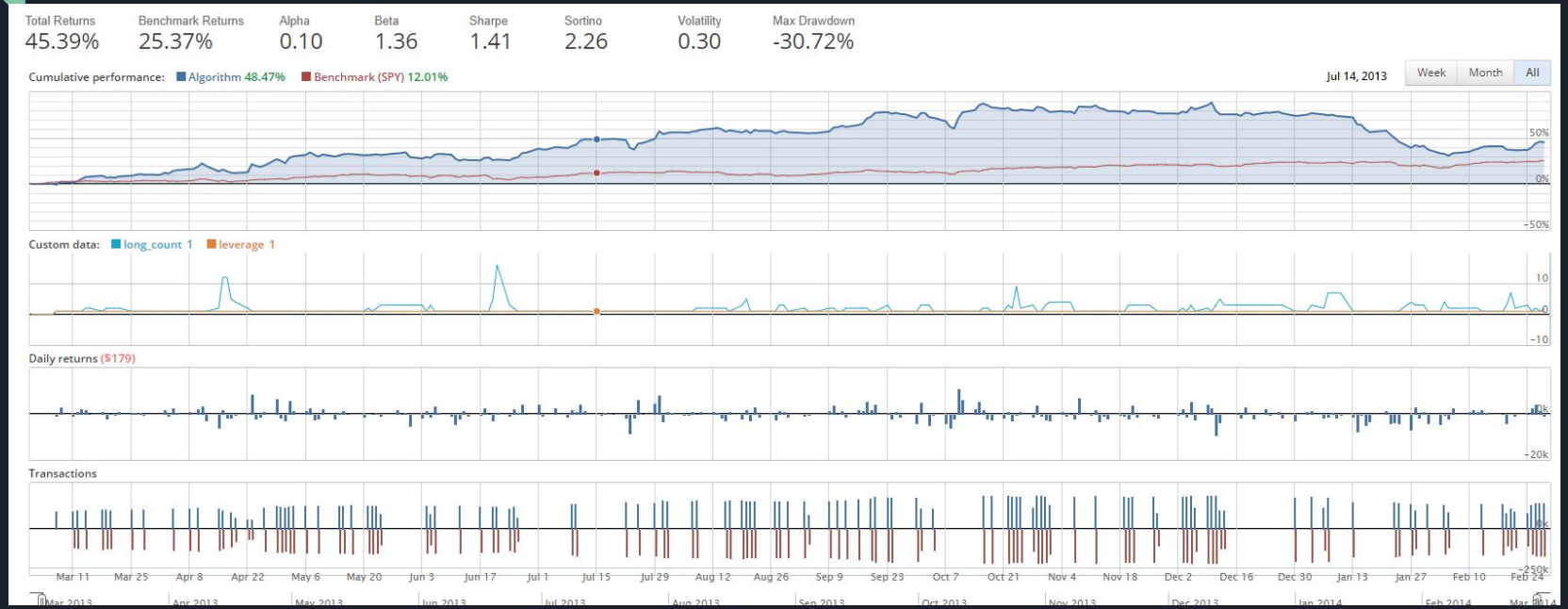
Metrics - Sensitivity analysis

MACD (12, 26, 9) -- (Short, Long, Signal EMA)

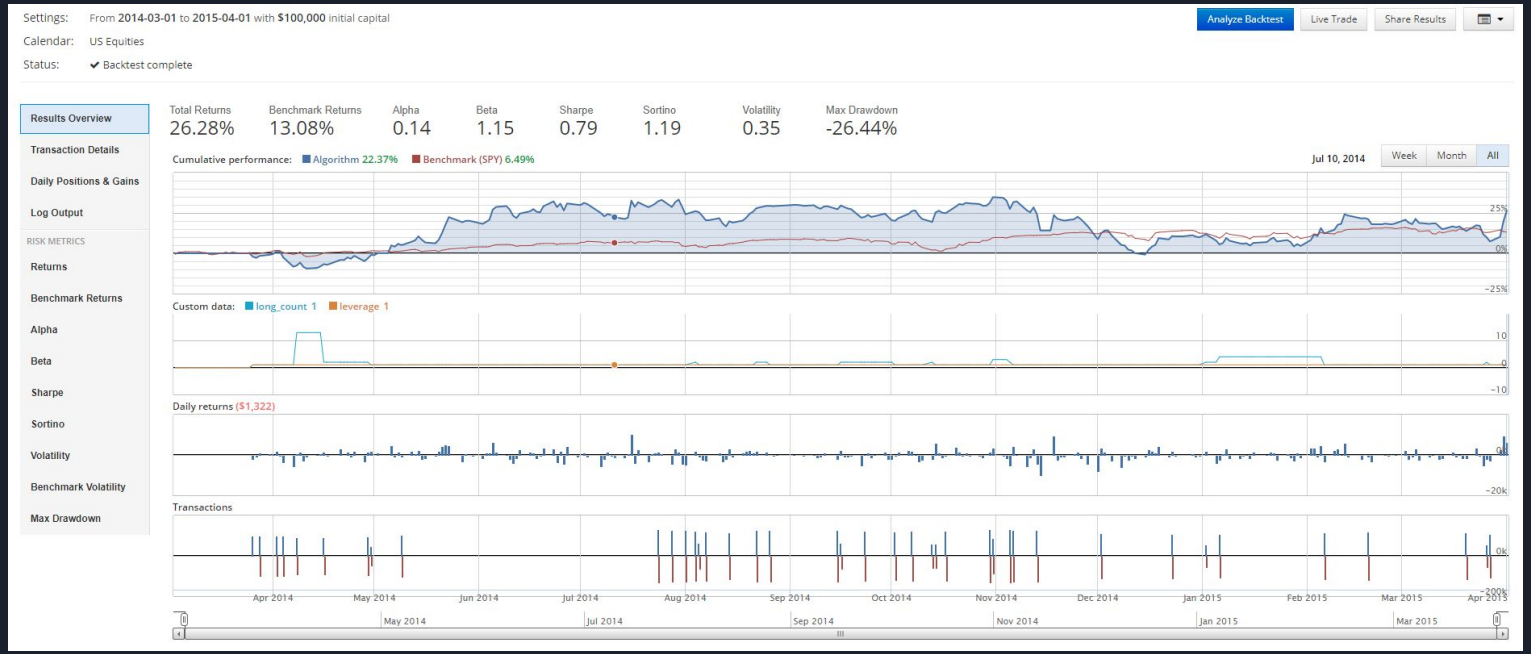
Upper and lower bounds - % change from xdays moving average

Moving Average period	Sharpe	Total Returns	Max Drawdown
40	-0.15	-22.60%	-50.06%
35	-0.43	-33.86%	-54.07%
30	0.59	35.29%	-42.45%
25	-0.32	-36.62%	-59.20%
20	-0.16	-65.88%	-67.57%
All done during the same period			
From April 2011 through Oct. 2012			

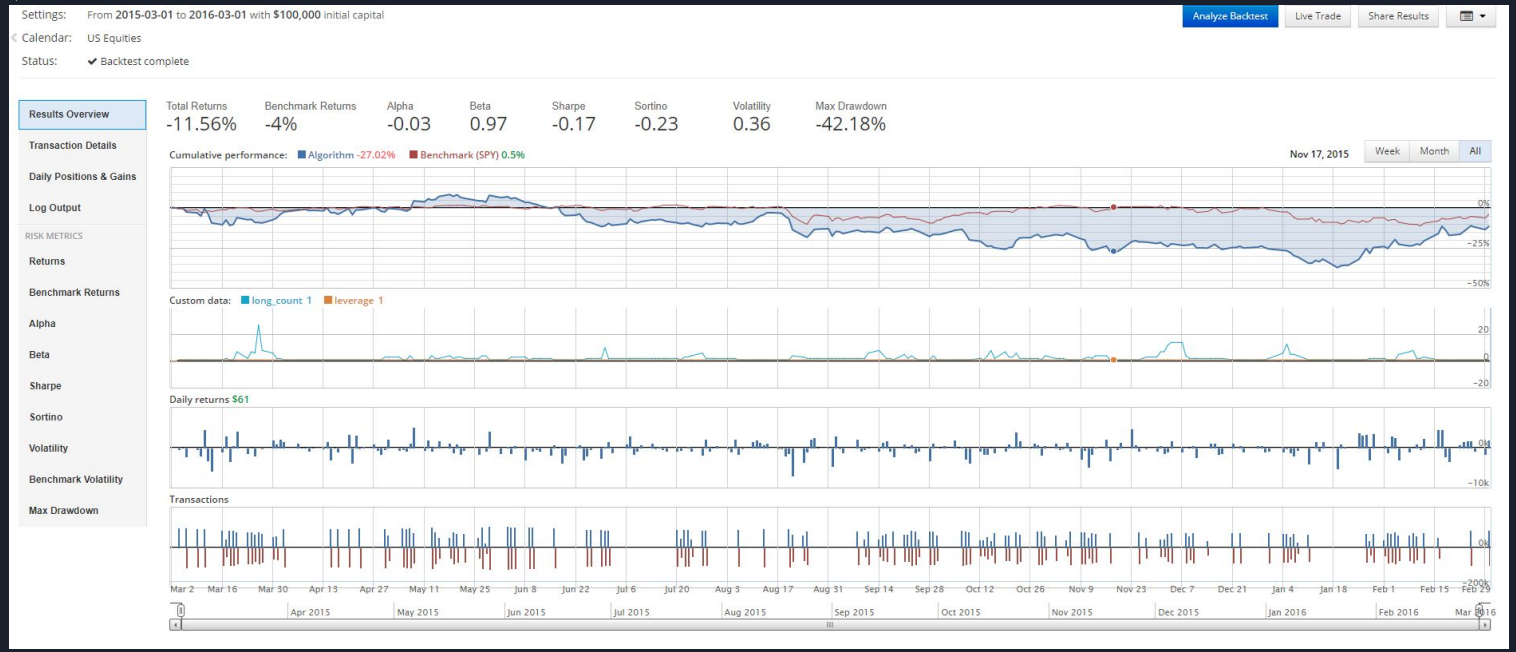
Backtesting - (2013-2014)



Backtesting - (2014 - 2015)



Backtesting - (2015 - 2016)



Weaknesses in our Strategy

- Relying only on Fed Data → use more data from variety of sources
  - Shorter metrics for alpha could be used
- Positive and negative word lists
- Metrics

Q&A