

Trading the S&P500 SPY 5min Bars With The Robust Regression Velocity Strategy 1/1/2008 to 12/07/2018

Working Paper December 2018
Copyright © 2018 Dennis Meyers

Disclaimer

The strategies, methods and indicators presented here are given for educational purposes only and should not be construed as investment advice. Be aware that the profitable performance presented here is based upon hypothetical trading with the benefit of hindsight and can in no way be assumed nor can it be claimed that the strategy and methods presented here will be profitable in the future or that they will not result in losses

In previous working papers we examined a trading system that used the velocity of prices fit by a least squares straight line through “N” past prices, to determined buy and sell points. The reasoning behind this type of system was to only trade when the straight-line slope or velocity was above a certain threshold. Many times, during the day prices meandering around without a notable trend. At these times we do not wish to trade because of the whipsaws losses that occur from this type of price action. When a price trend finally starts, the velocity of that price trend moves above some minimum threshold value. Thus, the velocity system would only issue a trade when certain velocity barriers were crossed.

The Least Squares polynomial is determined by minimizing the sum of the squares of the difference between the N prices and the value of the polynomial line.

$$\text{err}^2(t) = [\text{Price}(t) - (a + b * t)]^2 = \text{error squared}$$

$$\text{Minimize}(a, b) \sum_{t=1}^{t=N} \text{err}^2(t)$$

This mathematical technique has an exact solution and dates back to Gauss in the 1800’s.

Recently much work has been done in what is called robust regression and outlier detection techniques, Ref [1]. Robust regression techniques are now defined by a measure called the “breakdown point”. The breakdown point is loosely defined as the smallest amount of bad data points that can cause the regression coefficient solutions to take on values some distance from their true values. Unfortunately, the Least Squares technique has a breakdown point of 1/N. In other words, only one bad data point can significantly change the computation of the velocity or slope of a straight line. The median of a set of numbers has a breakdown point of 50%. This is because when 50% of the numbers are bad then there is no way of telling which the bad numbers are and which are the good numbers. 50% is the highest breakdown point.

The least absolute deviation (LAD) regression estimator from Ref [1] is

$$\text{Minimize}(a, b) \sum_{i=1}^{i=N} \text{absolute value} [\text{err}(i)]$$

and has a breakdown point of 29.8% . For the LAD this means around ¼ of the price points can be bad before the computations of a and b become erroneous. Siegel Ref [2], in his paper

“Robust regression using repeated medians”, introduced a technique for finding the slope that has a 50% breakpoint. The repeated median is also described in Ref [1].

While the repeated median technique may sound complicated it is quite easy to compute. Here’s how. For demonstration purposes let’s suppose we have 15 data points on an x, y graph such that,

X	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Y	1	2	10	4	5	6	7	8	9	18	11	12	13	18	15	20

We’ve added two bad Y points at X positions 10 and 14. To calculate the repeated median slope we would take the slope of every pair of y values and then find the median of all the pairs of slopes. For this example, we would take

slope	1	$y(2)-y(1)/(2-1) =$	1.00
slope	2	$y(3)-y(1)/(3-1) =$	4.50
slope	3	$y(4)-y(1)/(4-1) =$	1.00
slope	4	$y(5)-y(1)/(5-1) =$	1.00
slope	5	$y(6)-y(1)/(6-1) =$	1.00
slope	6	$y(7)-y(1)/(7-1) =$	1.00
slope	7	$y(8)-y(1)/(8-1) =$	1.00
slope	8	$y(9)-y(1)/(9-1) =$	1.00
slope	9	$y(10)-y(1)/(10-1) =$	1.89
slope	10	$y(11)-y(1)/(11-1) =$	1.00
slope	11	$y(12)-y(1)/(12-1) =$	1.00
slope	12	$y(13)-y(1)/(13-1) =$	1.00
slope	13	$y(14)-y(1)/(14-1) =$	1.31
slope	14	$y(15)-y(1)/(15-1) =$	1.00
slope	14	$y(16)-y(1)/(16-1) =$	1.27
		Median =	1.00

The median slope of the above is 1. The above process is repeated for:

$$(y(2)-y(i))/(2-i), i=1 \text{ to } 15 \ i \neq 2,$$

$$(y(3)-y(i))/(3-i), i=1 \text{ to } 15 \ i \neq 3,$$

.....

$$(y(16)-y(i))/(16-i), i=1 \text{ to } 16 \ i \neq 16.$$

The final slope is then the **median of all the medians calculated above**. While the repeated median looks redundant because the very first calculation produced the correct slope, price data is not so nicely distributed as our example and the extra calculations are needed to assure that the outliers are eliminated.

The mathematical formula for the above is

$$\text{Slope}(t) = \text{median}_i \{ \text{median}_{j \neq i} [\text{price}(t) - \text{price}(t-i) / (i-j)] \}$$

$i=1 \text{ to } N$ $j=1 \text{ to } N$

Figure 1 below shows a plot of the x,y numbers above with the repeated median line and the least squares line on the graph. Notice how the bad points draw the least squares line towards them while the repeated median line is completely unaffected by the outliers. The least Squares line is given by the formula $y = -0.65 + 1.1074 * x$. The true line is given by the formula $y = x$. From this simple example we can observe how noise has distorted the least squares estimates of **a** and **b**, where $y = a + bx$.

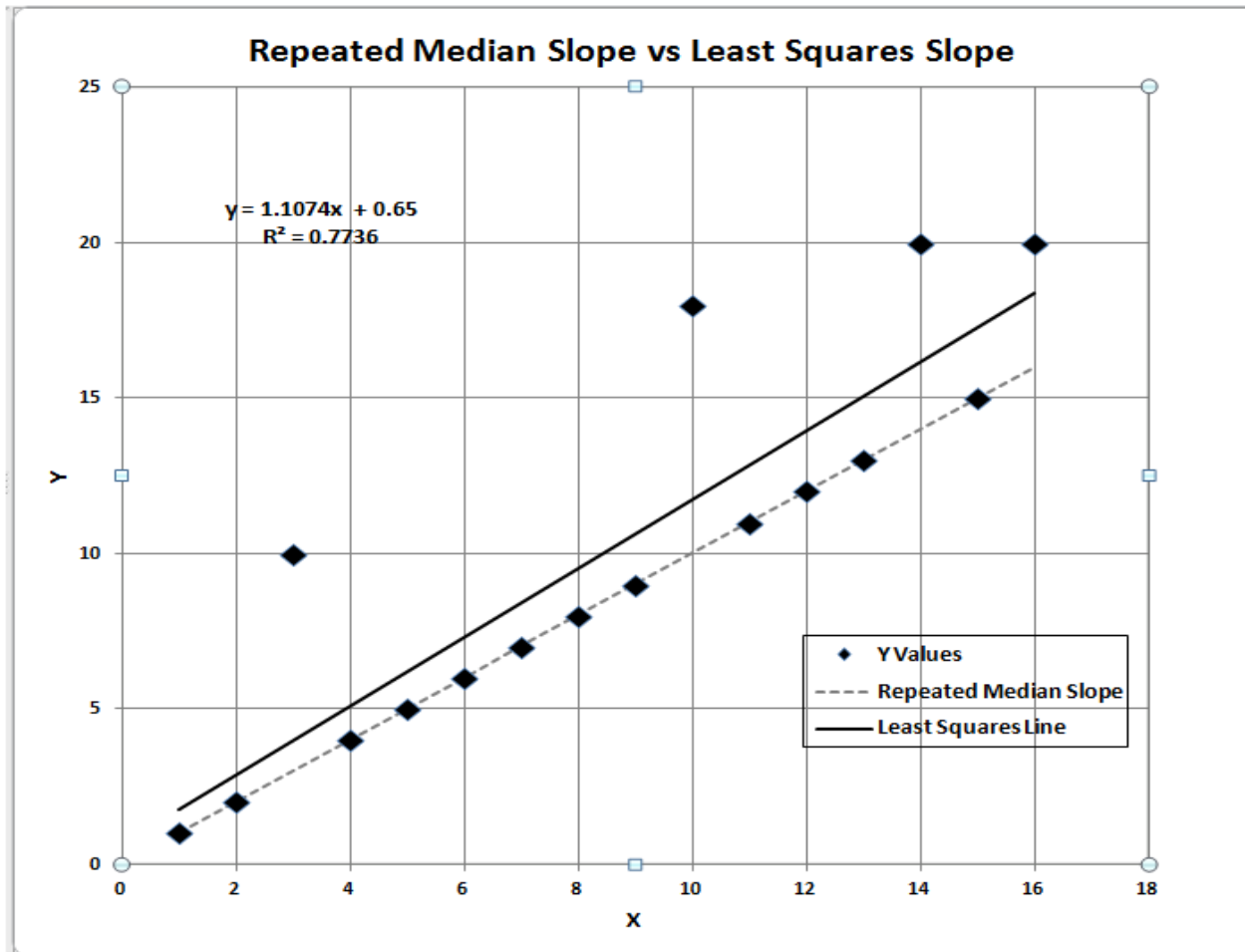


Figure 1 Repeated Median Slope vs Least Squares Slope.

The Repeated Median Velocity(RMedV) System Defined

Here we will use the repeated median slope to create a trading system. For a straight line the velocity is equal to the slope. The repeated median velocity, also called the **robust velocity**, has the advantage that it is a natural random price noise inhibitor. We can create a system such that unless the repeated median velocity using N past price bars is greater than some threshold value we will not buy or sell. A large percentage of price movements are just noise which generates a lot of back and forth movements of small magnitudes. This back and forth movement creates many false buy and sell signals. However, using the repeated median velocity over N past prices, we will attempt to filter out many of the small price noise movements by requiring that the repeated median velocity to be greater than some threshold before we act.

At each price bar we calculate the repeated median velocity (**RMedV**) from the formula above. When the velocity is greater than the threshold amount *vup* we will go long. When the velocity is less than the threshold amount *-vdn* we will go short.

The Repeated Median Velocity Trading Strategy

Buy Rule:

IF RMedV is greater than the threshold amount *vup* then buy at the market.

Sell Rule:

IF RMedV is less than the threshold amount *-vdn* then sell at the market.

Intraday Bars Exit Rule:

Close all positions on the SPY close at 1500 CST(no trades will be carried overnight).

First Trade of Day Entry Rule:

All trade signals before *xop* minutes after the open are ignored. We've included this rule because with overnight trading there are often gaps in the open creating immediate strategy buys and sells. Many times, these gaps are closed creating a losing whipsaw trade. In order to avoid the opening gap whipsaw trade problem, we've delayed the first trade of the day for *xop* minutes until after the opening

Data Discussion

To test this strategy, we will use 5-minute bar prices of the SPDR S&P 500 ETF known by the symbol SPY for the 566 weeks from January 3, 2008 to December 7, 2018.

We will test this strategy with the above SPX 5min bars on a walk forward basis, as will be described below. In TradeStation (TS) or MultiCharts(MC), we will run the RMedV Strategy on the SPY 5 min bar data from January 3, 2008 to December 7, 2018. We will breakup and create 30-day calendar in-sample sections along with their corresponding one calendar week out-of-sample sections from the 566 weeks of SPY (see Walk forward Testing below) creating 566 out-of-sample weeks. To create our walk forward files we will use the *add-in* software product called the Power Walk Forward Optimizer (PWFO) <http://meyersanalytics.com/Walk-Forward-Optimization.html>. In TS/MC, we will run the PWFO strategy *add-in* along with the RMedV Strategy on the Spy 5min data from 1/3/2008 to 12/7/2018. The PWFO will breakup and create 30-day calendar in-sample sections along with their corresponding one calendar week out-of-sample sections from the 566 weeks of SPY (see Walk Forward Testing below) creating 566 out-of-sample weeks

Testing the Repeated Median Velocity System (RMedV) Using Walk Forward Optimization

There are four strategy inputs to determine:

1. *N*, is the lookback period to calculate the **RMedV**.
2. *vup*, the threshold amount that RMedV must be greater than to issue a buy signal
3. *vdn*, the threshold amount that RMedV must less than to issue a sell signal
4. *xop*, no trades until xop min after open.

We will test the RMedV strategy with the above SPY 5 min bars on a *walk forward basis*, as will be described below.

What Is A Walk Forward Optimization with In-Sample Section and Out-Of-Sample Sections?

Whenever we do a TradeStation(TS) or MultiCharts(MC) optimization on a number of different strategy inputs, TS/MC generates a report of performance metrics (total net profits, number of losing trades, etc.) vs these different strategy inputs. If the report is sorted on say the total net profits(*tnp*) performance metric column then the highest *tnp* would correspond to a certain set of inputs. This is called an *in-sample(IS) section*. If we choose a set of strategy inputs from this report based upon some performance metric, we have no idea whether these strategy inputs will produce the same results on future price data or data they have not been tested on. Price data that is not in the in-sample section is defined as *out-of-sample(OOS) data*. Since the performance metrics generated in the in-sample section are mostly due to “curve fitting” or “data mining” it is important to see how the strategy inputs chosen from the in-sample section perform on out-of-sample price data.

What do we mean by “*curve fitting*” or *data mining*? As a simple example, suppose you were taking a subway to work. In the subway car you are in, suppose you counted the number of blond women in that car and suppose the percent of blond women vs all other women hair colors was 80%. Being that you can't observe what is in the other subway cars, you would assume that all the other subway cars and perhaps all women in general had the same percentage of blond hair. This observation was due to chance. That is an example of curve fitting. The same goes for combinatorial searches. You are observing results from a finite sample of data without knowing the data outside the sample you examined.

Walk forward analysis attempts to minimize the curve fitting of price noise by using the law of averages from the Central Limit Theorem on the out-of-sample performance. In walk forward analysis the data is broken up into many in-sample and out-of-sample sections. Usually for any strategy, one has some performance metric selection procedure, which we will call a *filter*, used to select the input parameters from the optimization run. For instance, a *filter* example might be all cases that have a profit factor (PF) greater than 1 and less than 3. For the number of cases left, we might select the cases that had the best percent profit. This procedure would leave you with one case in the in-sample section and its associated strategy input parameters. Now suppose we ran our optimization on each of our many in-sample sections and applied our filter to each in-sample section. We would then use the strategy input parameters found by the *filter* in each in-sample section on the out-of-sample section immediately following that in-sample section. The strategy input parameters found in each in-sample section and applied to each out-of-sample section would produce independent net profits or losses for each of the out-of-sample sections. Using this method, we now have “x” number of independent out-of-sample section profit and losses from our filter. If we take the average of these out-of-sample section net profits and losses, then we will have an estimate of how our strategy will perform on average. Due to the Central Limit Theorem, as your sample size increases, the spurious noise results in the out-of-sample section performance tend to average out to zero in the limit, leaving us with what to expect from our strategy and filter. *Mathematical note: This assumption assumes that the out-of-sample returns are from probability distributions that have a finite variance.*

Why use the walk forward technique? Why not just perform an optimization on the whole price series and choose the input parameters that give the best total net profits or profit factor? Surely the price noise cancels itself out with such a large number of in-sample trades. Unfortunately, nothing could be farther from the truth! Optimization is a misnomer and should really be called combinatorial search. As stated above, whenever we run a combinatorial search over many different combinations of input parameters on noisy data on a fixed number of prices, *no matter how many*, the best performance parameters found are guaranteed to be due to “*curve fitting*” the noise and signal. The price series that we trade consists of random spurious price movements, which we call noise, and repeatable price patterns (*if they exist*). When we run, for example, 5000 different inputs parameter combinations, the best performance parameters will be from those strategy input variables that are able to produce profits from the price pattern *and* the random spurious movements. While the price patterns will repeat, the same spurious price movements will not. If the spurious price movements that were captured by a certain set of input parameters were a large part of the total net profits, as they are in real intraday price series, then choosing these input parameters will produce losses when traded on future data. These losses occur because the spurious price movements will not be repeated in the same way. This is why strategy optimization or combinatorial searches with no out-of-sample testing cause losses when traded in real time from something that looked great in the in-sample section.

In order to gain confidence that our input parameter selection method using the optimization output of the in-sample data will produce profits, we must test the input parameters we found in the in-sample section on out-of-sample data. In addition, we must perform the in-sample/out-of-sample analysis many times. Why not just do the out-of-sample analysis once or just 10 times? Well just as in Poker or any card game, where there is considerable variation in luck from hand to hand, walk forward out-of-sample analysis give considerable variation in week-to-week out-of-sample profit “luck”. That is, by pure chance we may have chosen some input parameter set that did well in the in-sample section data *and* the out-of-sample section data. In order to minimize this type of “luck”, statistically, we must repeat the walk forward out-of-sample (oos) analysis over many (>30) in-sample/out-of-sample sections and take an average over all out-of-sample sections. This average gives us an expected out-of-sample return and a standard deviation of out-of-sample returns which allows us to statistically estimate the expected equity and its range for N out-of-sample periods in the future

Finding the Strategy Parameters Using Walk Forward Optimization

There are four strategy parameters to find *N*, *vup*, *vdn* and *xop*.

For the test data we will run the TradeStation optimization engine on **SPY 5** min price bars from 1/3/2008 to 12/7/2018 with the following optimization ranges for the RMedV strategy inputs. I will create a 30-calendar day in-sample periods each followed by a 7 day out-of-sample period (See Table 1 for the in-sample/out-of-sample periods). This will create 566 in-sample 30-day periods followed by 566 out-of-sample 7-day periods from 1/3/2008 to 12/7/2018.

I will use the following strategy input optimization ranges.

N from 4 to 24 in steps of 1

vup from 0.25 to 3 steps of 0.25

vdn from 0.25 to 3 in steps of 0.25

xop from 845 to 900 step 15min. All trade signals before xop minutes after the open are ignored **Mult**=5.33* \sqrt{N} . Note: this normalizes the RMedV Velocity range for each N to one standard deviation. Else the Velocity would have different ranges for different N and it would be difficult to find a vup and vdn that worked for all N ranges. See Appendix for a detailed explanation.

This will produce 6048 different input combinations or cases of the strategy input parameters. for each of the 566 in-sample/out-of-sample files for the approximately 10+ years of 5 min bar SPY prices from 1/3/2008 to 12/7/2018.

The question we are attempting to answer statistically is which performance metric or combination of performance metrics (which we will call a *filter*) applied to the in-sample section will produce in-sample strategy inputs that produce statistically valid average profits in the out-of-sample section. In other words, we wish to find a performance metric *filter* that we can apply to the in-sample section that can give us strategy inputs that will produce, on average, good trading results in the future.

When TS/MC does an optimization over many combinations of inputs, it creates an output page that has as its rows each strategy input combination and as its columns various trading performance measures such as Profit Factor, Total Net Profits, etc. An example of a simple filter would be to choose the strategy input optimization row in the in-sample section that had the highest Net Profit or perhaps a row that had the best Profit Factor with their associated strategy inputs. Unfortunately, it was found that this type of simple metric performance filter very rarely produces good out-of-sample results. More complicated metric filters can produce good out-of-sample results minimizing spurious price movement biases in the selection of strategy inputs.

The combination metric filters are found by a program called WFME64v8x. Details of this program can be found at <http://meyersanalytics.com/wfme.html>.

We will use the WFME64 v8x program to find in-sample combination metric filters which are applied to the out-of-sample data from the SPY data from 1/3/2008 to 12/8/17. This will consist 514 in-sample and out-of-sample sections We will leave the 52 sections of SPY data from 12/15/17 to 12/7/2018 out of the WFME64 calculations so that we can see how the metric filters found by the WFME64 performs on these 52 following *future* weeks which was not included in the original WFME64 run.

Here is a metric combination *filter* found by the WFME64 v8x program that was used in this paper. High profit factors (**pf**) in the in-sample section usually mean poor performance in the out-of-sample-section. This is a kind of reversion to the mean. So, in the in-sample(IS) section we eliminate all strategy input rows that have a **pf**>2 . We also wish to limit the number losing trades in a row (**lr**) in the IS period to 3 or less (**lr**≤3). In addition, high a **Kendall rank correlation coefficient (ktau)** in the in-sample section usually mean poor performance in the out-of-sample-section. This is also a kind of reversion to the mean. So, in the in-sample section we eliminate all strategy input rows that have a **ktau**>70 Using the **pf-lr-ktau** elimination screen, as described, there can still be 100's of rows left in the in-sample section. The PWFO generates the performance metric named **mTrd**. This metric is **the median of all trades in the In-Sample section for a given set of strategy inputs**. We use the median for this statistic, because we do not want this statistic distorted by a few outlier trades Let us choose the **50** rows in the in-sample section that contain the **maximum mTrd** values from the rows that are left from the **pf-**

lr-ktau screen. In other words, we sort **mTrd** from high to low, eliminate the rows that have **lr>3, pf>2, ktau>70** and then choose the largest **mTrd** 50 rows of whatever is left. This filter will now leave 50 cases or rows in the in-sample section that satisfy the above filter conditions. We call this filter **t50mTrd |p≤2|lr≤3|ktau≤70** where **t50mTrd** means the top or maximum **50 mTrd** rows left *after* the **pf-lr-ktau** in-sample row elimination. Suppose for this filter, within the 50 in-sample rows that are left, we want the row that has the highest value of the metric called **t**. **t** is the **Student t-statistic**, used to determine the probability that the Average Trade Profit (tnp/nT) $\neq 0$ for a given set of strategy inputs. We abbreviate this final filter as **t50mTrd |p≤2|lr≤3|ktau≤70-t**. For each in-sample section this filter leaves only one row in the in-sample section with its associated strategy inputs and following out-of-sample net profit in the out-of-sample section using the strategy inputs found in the in-sample section. This **t50mTrd |p≤2|lr≤3|ktau≤70-t filter** is then applied to each of the 514 in-sample sections which give 514 sets of strategy inputs that are used to produce the corresponding 514 out-of-sample performance results. The average out-of-sample performance is calculated from these 514 out-of-sample performance results. In addition, many other important out-of-sample performance statistics for this filter are calculated and summarized.

Figure 3 shows such a computer run along with a small sample of other WFME64 filter combinations that are constructed in a similar manner. **Row 3** of the sample output in **Figure 3** shows the results of the filter discussed above.

We also will use a program called **WFINP64 v8x**. Details of this program can be found at <http://meyersanalytics.com/wfinp64v8x.html>. Briefly what this program does is attempt to find a set of strategy inputs in the in-sample section that satisfy a few metric screens. If the strategy inputs satisfy the in-sample metric screens, then the strategy inputs are used to trade the following out-of-sample section. If the strategy inputs do not satisfy the in-sample metric screens, then no trades will be done in the following out-of-sample section. Here is an *input/filter* combination found by the WFINP64 program that was used in of this paper. **7|2|1.75|845** are the strategy inputs, **N, vup, vdn, xop**. If in the in-sample section those strategy inputs generate a **pf≤4 AND a ktau≤70**, then this set of strategy inputs are used to trade the following out-of-sample data. If in the in-sample section these strategy inputs do not generate a **pf≤4** and a **ktau≤70** then no trades will be made in the following out-of-sample section. The logic being, as I said above, that high profit factors (**pf**) in the in-sample section usually mean poor performance in the out-of-sample-section. This is a kind of reversion to the mean so when the **pf>4**, we don't wish to trade the out-of-sample section. High **Kendall rank correlation coefficient (ktau)** in the in-sample section also usually mean poor performance in the out-of-sample-section. This is also a kind of reversion to the mean. in-sample section for that given set of strategy inputs. The logic being that we do not wish to trade in the out-of-sample section if both or either one of the **pf** and **ktau** for our strategy inputs in the in-sample section are too high.

Figure 4 shows such a computer run along with a small sample of other strategy WFINP64 *input/filter* combinations that are constructed in a similar manner. **Row 3** of the sample output in **Figure 4** shows the filter used in this paper.

Bootstrap Probability of Filter Results.

Using modern "Bootstrap" techniques, we can calculate the probability of obtaining our filter's total out-of-sample *net* profits by chance. Here's how the bootstrap technique is applied. Suppose as an example, we have 500 files of in-sample/out-of-sample data. A mirror random

filter is created. Instead of picking an out-of-sample net profit (OSNP) from a *filter* row as before, the mirror filter picks a *random* row's OSNP in each of the 500 files. We repeat this random picking in each of the 500 files 5000 times. Each of the 5000 mirror filters will choose a random row's OSNP of their own in each of the 500 files. At the end, each of the 5000 mirror filters will have 500 *random* OSNP's picked from the rows of the 500 files. The sum of the 5000 random OSNP picks for each mirror filter will generate a random total out-of-sample net profit (**toNP**) or final random equity. The average and standard deviation of the 5000-mirror filter's different random **toNPs** will allow us to calculate the chance probability of our above chosen filter's **toNP**. Thus, given the mirror filter's bootstrap random **toNP** average and standard deviation, we can calculate the probability of obtaining our chosen filter's **toNP** by pure chance alone. **Figure 3** lists the 5000-mirror filter's bootstrap average for our 514 out-of-sample files of **(\$6.4)** with a bootstrap standard deviation of **\$7.8**. (Side Note. The average is the average per out-of-sample period(weekly). So, the average for the random selection would be the random (Average Random toNP/514) and the average net weekly for the filter from **Figure 3, Row 3** would be the **filter toNP/ (# of OOS)** periods traded or **14801/456=32.46**. The probability of obtaining our filters average weekly net profit of **32.46** is 3.29×10^{-7} which is **5** standard deviations from the bootstrap average. For our filter, in Row 3, the expected number of cases that we could obtain by pure chance that would match or exceed **\$32.46** is $[1 - (3.29 \times 10^{-7})]^{172980} \approx 172980 \times 3.29 \times 10^{-7} = 0.057$ where **172980** is the total number of different filters we looked at in this run. This number is much less than one, so it is improbable that our result was due to pure chance

Results

Figure 1 presents a graph of the equity curve generated by using the WFME64 filter on the 514 weeks ending 2/8/2008 – 12/8/17 and the equity curve on the 52 weeks following until 12/7/2018(note the starting date 1/3/2008 was part of the first 30 day in-sample period). The equity curves are plotted from Equity and Net Equity columns in Table 1. Plotted on the equity curves is the 2nd Order Polynomial curve. The blue line is the equity curve without commissions and the red dots on the blue line are new highs in equity. The brown line is the equity curve with commissions and the green dots are the new highs in net equity. The grey line is the SPY weekly closing prices superimposed on the Equity Chart. The vertical dotted red line on the right separates the future excluded period equity from 12/8/17 to 12/7/18. This is what would have happened if you used the strategy inputs found by the filter **t50mTrd|p≤2|lr≤3|ktau≤70-t** on data not included in the initial run.

Figure 2 presents a graph of the equity curve generated by using the WFINP64 filter on the 514 weeks ending 2/8/2008 – 12/8/17 and the equity curve on the 52 weeks following until 12/7/2018(note the first month starting 1/3/2008 was part of the first 30 day in-sample period). Plotted on the equity curves is the 2nd Order Polynomial curve. The blue line is the equity curve without commissions and the red dots on the blue line are new highs in equity. The brown line is the equity curve with commissions and the green dots are the new highs in net equity. The grey line is the SPY weekly closing prices superimposed on the Equity Chart. The vertical dotted red line on the right separates the future excluded period equity from 12/8/17 to 12/7/18. This is what would have happened if you used the **7|2|1.75|845|pf<4|ktau<70** filter found by the WFINP64 on *future* data not included in the 1/3/2008 – 12/8/17 run.

Figure 5 presents the out-of-sample SPY 5-minute bar chart of all the buy and sell signals of the WFME64 filter 11/28/18 to 12/7/18 with the RMedV Indicator or those dates.

Figure 6 presents the out-of-sample SPY 5-minute bar chart of all the buy and sell signals of the WFINP64 filter 11/28/18 to 12/7/18 with the RMedV Indicator or those dates.

Table 1 below presents a table of the 514 plus the 52 future weeks in-sample and out-of-sample dates, the WFME **Filter** selected, strategy inputs and the weekly out-of-sample profit/loss results using the $t50mTrd|p\leq 2|lr\leq 3|k\tau\leq 70-t$ filter described above.

Table 2 below presents a table of the 514 plus the 52 future weeks in-sample and out-of-sample dates, the WFINP **Filter** selected, strategy inputs and the weekly out-of-sample profit/loss results using the $7|2|1.75|845|pf<4|k\tau<70$ filter described above.

Discussion of Strategy Performance of the WFME64 run

In **Figure 3, Row 3** is the filter chosen, $t50mTrd|p\leq 2|lr\leq 3|k\tau\leq 70-t$. This Metric Filter produced \$14,801 net profits after costs in 514 weeks and \$5,891 net profits after costs in the withheld 52 weeks from the initial WFME run. The spreadsheet columns present some statistics that are of interest for the filter. An interesting statistic is **Blw**. **Blw** is the maximum number of weeks the **OOS** equity curve for this filter failed to make a new high. **Blw** is 34 weeks for this filter. This means that 34 weeks was the longest time that the equity for this strategy failed to make a new equity high in the 514 out-of-sample weeks. For this strategy, the **%P** (% of oos periods that are positive) was **60%**, and the **%Wtr** (The % of all oos trades that are positive) was **51%**. This low **%Wtr** was made up for by **oW/oL** (average oos winning trades/average oos losing trades) equal to 1.31.

To see the effect of walk forward analysis, look at **Table 1**. Notice how the input parameters **N**, **vup**, **vdn** take sudden jumps from high to low and back. This is the walk forward process quickly adapting to changing volatility conditions in the in-sample sample. In addition, notice how often **N** changes from 4 to 20. When the data gets very noisy with a lot of spurious price movements, the look back period, **N**, should be higher. During other times when the noise level is not as much **N** can be lower to get onboard a trend faster.

Figure 1 presents a graph of the equity curve using the $t50mTrd|p\leq 2|lr\leq 3|k\tau\leq 70-t$ filter on the 514 weeks of out-of-sample data. Notice how the equity curve follows the 2nd order polynomial trend line with an R^2 of 0.98. This R^2 dropped to 0.96 for the net equity curve.

Using this filter, the strategy generated a profit of \$20,692 net equity after commissions and slippage of \$4/trade trading 100 SPY shares for the total 566 weeks. From **Table 1**, the largest losing week was -\$874 on the week ending 1/8/2016. The largest drawdown was -\$1246 from the week ending on 9/12/08 to 9/26/08. This drawdown lasted 2 weeks and took 2 weeks to recover and made a new equity. The **future** period that was not included in the WFME64 run from 12/08/17 to 12/7/18 was a volatile whipsaw market yet the RMedV strategy/WFME filter did well making a net profit of \$5891 during that time.

Lastly, as can be seen in **Figure 3**, the top 10 filters all did very well in the 52 **future** weeks from 12/15/17 to 12/7/2018 following the original analysis.

In observing Table 1 we can see that this strategy and filter made trades from a low of no trades in 62 of the 514 weeks to a high of 25 trades/week with an average of 4.1 trades/week in the weeks it did trade.

Discussion of Strategy Performance of the WFINP64 run

In **Figure 4, Row 3** is the filter, $7|2|1.75|845|pf<4|ktau<70$. The spreadsheet columns present some statistics that are of interest for the filter. An interesting statistic is **Blw**. **Blw** is the maximum number of weeks the **OOS** equity curve for this filter failed to make a new high. **Blw** is 54 weeks for this filter. This means that 54 weeks was the longest time that the equity for this strategy failed to make a new equity high in the 514 out-of-sample weeks. For this strategy, the **%P** (% of oos periods that are positive) was 59%, and the **%Wtr** (The % of all oos trades that are positive) was 49%. The average oos winning trades/average oos losing trades (**oW/oL**) is equal to 1.43.

Figure 2 presents a graph of the equity curve using the filter on the 514 weeks of out-of-sample data. Notice how the equity curve follows the 2nd order polynomial trend line with an R^2 of 0.93. This R^2 dropped to 0.90 for the net equity curve.

Using this filter, the strategy generated a profit of \$22,556 net equity after commissions and slippage of \$4/100 shares trading 100 SPY shares for 566 weeks. From **Table 2**, the largest losing week was -\$722 on the week ending 1/8/2016. The largest drawdown was -\$1163 from the week ending on 7/6/10 to 5/13/11. This drawdown lasted 41 weeks and took 12 weeks to recover and made a new equity. The *future* period that was not included in the WFINP64 run from 12/15/17 to 12/7/18 was a volatile whipsaw market, yet the RMedV strategy/WFINP filter did very well making a net profit of \$4455 during that time.

Lastly, as can be seen in **Figure 4**, the top 10 filters all did very well in the 52 *future* weeks from 12/15/17 to 12/7/18 following the original analysis.

In observing Table 2 we can see that this strategy and filter made trades from a low of no trades in 58 of the 514 weeks to a high of 24 trades/week in the volatile 11/12/18-11/16/18 week with an average of 4.8 trades/week in the weeks it did trade.

Comparison of the WFME64 Filter Results and WFINP64 Filter Results

For the period 2/1/08(start of first oos period) to 12/7/18 the WFINP64 filter generated \$22,556 in net profits with 2652 trades compared to the \$20692 net profits with 2173 trades of the WFME filter. The WFINP filter was superior to the WFME filter over the full 10+ year period.

As an aside if one held 100 SPY shares from 2/1/08 to 12/7/18 one would have made \$14,599+\$3,724 in dividends= \$18,323 vs the WFINP filter \$22,556 net profit and the WFME filter \$20,692 net profit. However, buy and holding 100 SPY shares during this 10-year period you would have had a maximum drawdown of \$7077 which was a 51% drawdown on 3/6/2009. The maximum drawdown for the WFINP was \$1163 and the maximum drawdown for the WFME was \$1246.

References

1. Rousseeuw, P.J., Leroy, A.M., (1987) “Robust Regression and Outlier Detection”, New York, John Wiley & Sons.
2. Siegel, A.F. (1982), “Robust Regression using Repeated Medians.” *Biometrika*. 69, pp242-244.
3. Efron, B., Tibshirani, R.J., (1993), “An Introduction to the Bootstrap”, New York, Chapman & Hall/CRC.
4. Meyers, Dennis (2014) “Trading the S&P500 E-Mini with The Robust Regression Velocity Strategy”, Working Paper Oct 2014, <http://meyersanalytics.com/publications2/ES1RMedVxL.pdf>

Figure 1 Graph of RMedV Strategy OOS Net Equity Applying the WFME64 Filter Each Week to In-Sample RMedV SPY5min Bar Prices 2/08/2008 to 12/08/2017 >>12/07/2018

Note: The blue line is the equity curve without commissions and the red dots on the blue line are new highs in equity. The brown line is the equity curve with commissions of \$4/round trip trade and the green dots are the new highs in net equity. The grey line is the SPY Weekly Closing prices superimposed on the Equity Chart. The vertical dotted red line on the right separates the future excluded period equity from 12/8/17 to 12/7/18. This is what would have happened if you used $t50mTrd|p\leq 2|lr\leq 3|k\tau\leq 70-t$ on future data 12/15/2017-12/7/18 which was not included in the WFME filter run.

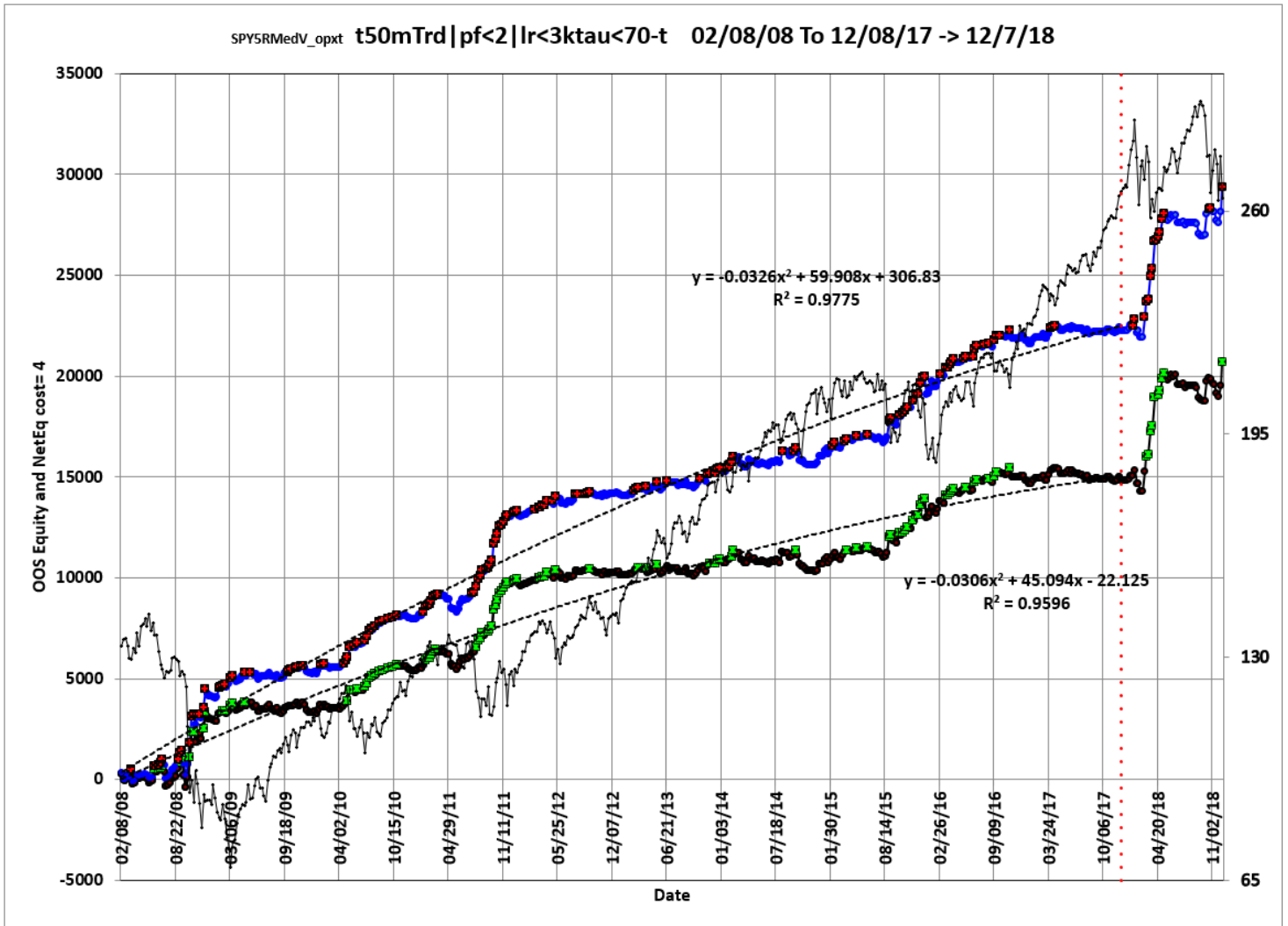


Figure 2 Graph of RMedV Strategy OOS Net Equity Applying the WFINP64 Filter Each Week to In-Sample RMedV SPY5min Bar Prices 2/08/2008 to 12/08/2017 >>12/07/2018

Note: The blue line is the equity curve without commissions and the red dots on the blue line are new highs in equity. The brown line is the equity curve with commissions of \$4/round trip trade and the green dots are the new highs in net equity. The grey line is the SPY Weekly Closing prices superimposed on the Equity Chart. The vertical dotted red line on the right separates the future excluded period equity from 12/8/17 to 12/7/18. This is what would have happened if you used, $7|2|1.75|845|1500|5.33|pf<4|ktau<70$ on future data 12/15/2017-12/7/18 which was not included in the WFINP filter run.

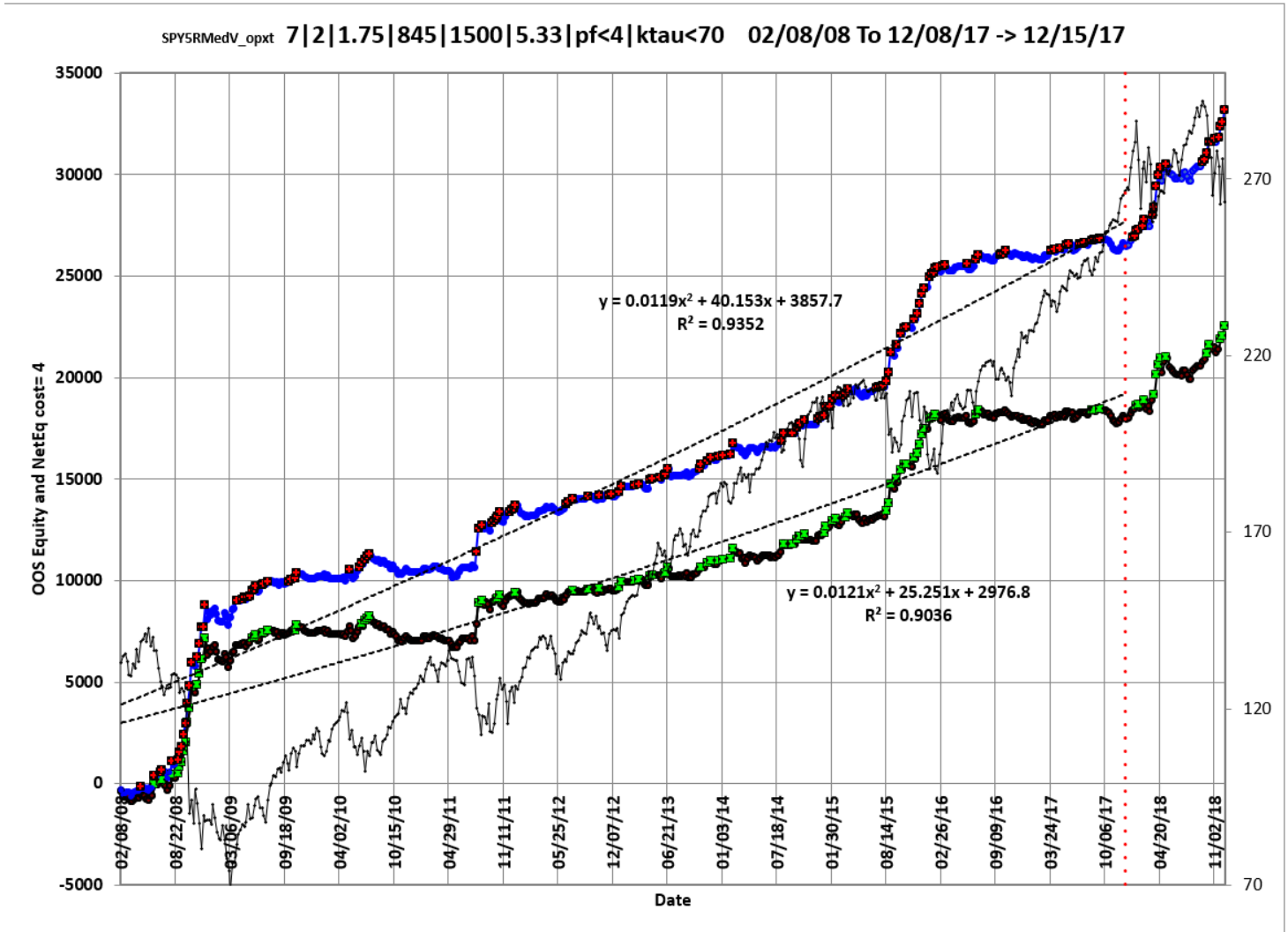


Figure 3 Partial output of the Walk Forward Metric Explorer (WFME64 v8X)
SPY 5 min bars RMedV Velocity Strategy

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	SPY5RMedV-opxt	s02/08/08	e12/08/17	#514	AnyTnp	#52							
2	Filter-Metric	toGP	toNP	aoGP	aoTr	ao#T	std	skew	kur	t	oW oL	%Wtr	%P
3	t50mTrd pf<2 lr<3ktau<70-t	22221	14801	49	12.0	4.1	204	0.832	10.27	5.11	1.31	51	60
4	t50mTrd pf<2 ktau<50-mLb	19692	14020	48	13.9	3.5	227	2.850	22.74	4.3	1.22	53	58
5	t20mTrd pf<2 lr<3-mWb mlb	18786	13850	47	15.2	3.1	214	2.774	24.69	4.4	1.28	52	61
6	t50mTrd pf<2 lr<5ktau<70-PF	19306	13546	44	13.4	3.3	193	0.812	10.55	4.79	1.26	52	63
7	t50mTrd pf<2 ktau<60-mLb	19063	13463	47	13.6	3.4	227	2.860	22.87	4.17	1.23	53	58
8	t20mTrd pf<2 -mWb mlb	18215	13347	45	15.0	3	207	1.983	12.33	4.39	1.29	52	60
9	t50mTrd pf<2 lr<5-PF	18972	13320	44	13.4	3.3	196	0.946	10.59	4.64	1.27	52	62
10	t50eqTrn pf<2 lr<3ktau<70-eqR2	22044	13316	47	10.1	4.7	224	1.948	17.89	4.57	1.31	50	59
11	t50mTrd pf<2 lr<3-t	20513	13125	45	11.1	4	214	0.133	12.19	4.48	1.26	51	60

	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A/	AB	AC	AD	AE	AF	AG	AH
1	a(6.4)	s7.8	f172980					c=\$4							s12/15/17	e12/07/18	#52				t566
2	LlTr	LlP	eqDD	wpr	lpr	#	V20	Dev^2	KTau	eqR2	Blw	BE	tkr bl		toGPx	toNPx	aoTRx	aoNTx	#x	tOnpNet	Prob
3	-427	-874	-1246	12	5	456	25	1167	96	97	34	83	1394		7123	5891	23	6.4	48	20692	3.29E-07
4	-412	-733	-1298	7	9	407	9	1154	92	96	50	117	758		5493	4317	19	6.3	47	18337	8.57E-08
5	-385	-606	-903	9	5	400	5	1386	91	92	40	112	918		4224	3208	17	5.4	47	17058	7.58E-08
6	-445	-779	-1246	11	6	435	14	961	93	97	57	94	759		3502	2382	13	6	47	15928	7.76E-07
7	-412	-733	-1298	9	9	407	8	1205	93	95	50	124	732		4605	3385	15	6.5	47	16848	2.18E-07
8	-427	-505	-1007	11	6	402	6	1424	91	91	40	112	909		2906	1846	11	5.8	46	15193	2.01E-07
9	-445	-779	-1246	10	5	433	9	1107	92	96	75	100	543		3339	2223	12	5.9	47	15543	9.88E-07
10	-477	-779	-1619	14	10	465	32	1613	90	91	65	103	575		5429	4117	17	6.7	49	17433	3.67E-06
11	-427	-1308	-1802	12	5	457	20	1011	96	97	34	108	1235		7085	5853	23	6.4	48	18978	3.49E-06

Figure 4 Partial output of the Walk Forward Input Explorer (WFIMP64 v8X)
SPY 5 min bars RMedV Velocity Strategy

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	SPY5RMedV-opxt	s02/08/08	e12/08/17	#514	AnyTnp	#52							
2	N vup vdn xop xt mult <PF<ktau	toGP	toNP	aoGP	aoTr	ao#T	std	skew	kur	t	oW oL	%Wtr	%P
3	7 2 1.75 845 1500 5.33 pf<4 ktau<70	26605	18101	60	12.5	4.8	219	1.617	8.97	5.79	1.43	49	59
4	7 2 1.75 845 1500 5.33 pf<5 ktau<70	26513	17949	59	12.4	4.8	218	1.627	9.05	5.76	1.42	49	58
5	7 2 1.75 845 1500 5.33 ktau<70	26515	17911	58	12.3	4.7	216	1.641	9.15	5.75	1.42	49	58
6	7 2 1.75 845 1500 5.33 pf<4 ktau<65	26226	17838	60	12.5	4.8	220	1.613	8.9	5.72	1.43	49	58
7	7 1.75 1.75 845 1500 5.33 pf<3 ktau<70	27195	17683	62	11.4	5.4	222	1.458	8.63	5.86	1.43	48	60
8	7 2 1.75 845 1500 5.33 pf<5 ktau<65	26001	17561	59	12.3	4.8	219	1.624	8.96	5.65	1.42	49	58
9	7 2 1.75 845 1500 5.33 ktau<65	26003	17523	58	12.3	4.7	218	1.639	9.07	5.65	1.43	49	58
10	7 1.75 1.75 845 1500 5.33 ktau<70	27335	17415	58	11.0	5.3	216	1.500	8.98	5.82	1.43	48	59
11	7 2 2 845 1500 5.33 ktau<65	24501	17285	57	13.6	4.2	228	1.600	9.17	5.21	1.37	50	58

	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	A/	AB	AC	AD	AE	AF	AG	AH
1	a(6.6)	s8.0	f241919					c=\$4							s12/15/17	e12/07/18	#52				t566
2	LlTr	LlP	eqDD	wpr	lpr	#	V20	Dev^2	KTau	eqR2	Blw	BE	tkr bl		toGPx	toNPx	aoTRx	aoNTx	#x	tOnpNet	Prob
3	-306	-722	-1163	9	8	441	16	1823	95	93	54	64	954		6559	4455	12	10.5	50	22556	1.52E-09
4	-306	-722	-1163	9	8	448	14	1832	95	93	54	65	947		6559	4455	12	10.5	50	22404	3.17E-09
5	-306	-722	-1154	9	8	454	14	1819	95	93	54	65	947		6559	4455	12	10.5	50	22366	4.98E-09
6	-306	-722	-1163	9	8	435	16	1832	95	93	54	66	934		7271	5235	14	10.6	48	23073	1.56E-09
7	-306	-648	-1251	15	8	437	29	2048	92	91	53	63	929		7215	4911	13	11.5	50	22594	2.35E-09
8	-306	-722	-1163	9	8	441	14	1851	95	93	54	68	920		7271	5235	14	10.6	48	22796	3.79E-09
9	-306	-722	-1154	9	8	447	14	1838	95	93	54	68	920		7271	5235	14	10.6	48	22758	5.98E-09
10	-306	-648	-1242	15	8	471	28	2000	93	91	53	64	931		7494	5130	13	11.6	51	22545	2.93E-08
11	-312	-664	-1395	8	7	427	6	1684	89	94	62	80	708		6703	4795	14	9.5	50	22080	2.32E-09

The WFME/WFINP64 v8X AVE File Output Cols are defined as follows

❖ Row 1 Columns:

A=The PWFO Stub, **B**=File Start Date, **C**=File End Date, **D**= Number of oos periods (in this example weeks), **N**= Bootstrap average, **O**= Bootstrap Standard Deviation, **P**=Number of filters run, **U**= Cost/trade

❖ Row 1 and Row 2 Columns AA, AB,AC,AD,AE Future Results Not Included in the WFME64 Run. These set of results show how it would turn out if the Strategy Inputs/Filter was used on pwfo files not included in the WFME64 run.

Row 1 Col AA: Future PWFO File Start Date

Row 1 Col AB: Future PWFO File End Date

Row 1 Col AC: Future Number of PWFO Files not included in the WFME64 run (in this example weeks)

Row 1 Col AG: Number of Total oos+future PWFO Files

Row 2 Col AA: **toGPx** Total gross profit for the 52 future excluded periods (for this run periods = weeks).

Row 2 Col AB: **toNPx** Total Net profit (toGP-Number of Trade Weeks*cost) for the 52 future excluded periods.

Row 2 Col AC: **aoTrx** Average profit per trade for the 52 future excluded periods

Row 2 Col AD: **aoNTx** Average number of trades per week for the 52 future excluded periods

Row 2 Col AE: **#x** The number of the 52 future excluded periods this strategy/filter traded. Note for some periods there can be no strategy inputs/filter that satisfy the Strategy Inputs/Filter criteria and no trades will be made during that period.

❖ Row 2 to Last Row Columns: A through AG

Col A: **The Strategy Input/Filter Names** Example Row 3: **t50mLTr|lr<3r2<80|nt>5-mDev.**

Col B: **toGP** - Total out-of-sample(oos) gross profit for these 347 oos periods (= weeks).

Col C: **toNP** - Total out-of-sample(oos) Net profit (toGP-Number of Trade Weeks*cost) for the 347 oos periods.

Col D: **aoGP** - Average oos gross profit for the 347 oos periods

Col E: **aoTr** - Average oos profit per trade

Col F: **ao#T** - Average number of oos trades per week

Col G: **std** - he standard deviation of the 347 oos period profits and losses

Col H: **skew** - The Skew statistic of the 347 oos period profits and losses

Col I: **kur** - he kurtosis statistic of the 347 oos period profits and losses

Col J: **t** - The student t statistic for the 347 oos periods. The higher the t statistic the higher the probability that this result was not due to pure chance

Col K: **oW/oL** - Ratio of average oos winning trades divided by average oos losing trades.

Col L: **%Wtr** - he percentage if oos winning trades

Col M: **%P** - percent of all oos periods that were profitable.

Col N: **LLtr** - The largest losing oos trade in all oos periods

Col O: **LLp** - The largest losing oos period

Col P: **eqDD** - The oos equity drawdown

Col Q: **wpr** - The largest number of winning oos periods (weeks) in a row.

Col R: **lpr** - he largest number of losing oos periods in a row

Col S: **#** - The number of oos periods this filter produced any profit or loss. Note for some oos periods there can be no strategy inputs that satisfy a given filters criteria and no trades will be made during that period.

Col T: **eqA2** - The acceleration of a 2nd order polynomial fit to the oos equity curve.

Col U: **Dev^2** - measure of equity curve smoothness. The square root of the average (equity curve minus a straight line)^2)

Col V: **KTau^2** - The Kendall rank coefficient is often used as a test statistic in a statistical hypothesis test to establish whether two variables may be regarded as statistically dependent. This test is non-parametric, as it does not rely on any assumptions on the distributions of X or Y or the distribution of (X,Y)

Col W: *eqR2* - The correlation coefficient(R^2) of a straight line fit to the equity curve.

Col X: *Blw* - The maximum number of oos periods the oos equity curve failed to make a new high.

Col Y: *BE* - Break even in oos periods. Assuming the average and standard deviation are from a normal distribution, this is the number of oos periods you would have to trade to have a 98% probability that your oos equity is above zero.

Col AA: *toGPx* - Total gross profit for the 53 future excluded periods (for this run periods = weeks).

Col AB: *toNPx* - Total Net profit (toGP-Number of Trade Weeks*cost) for the 53 future excluded periods.

Col AC: *aoTRx* - Average profit per trade for the 252 future excluded periods

Col AD: *aoNTx* - Average number of trades per week for the 52 future excluded periods

Col AE: *#x* - The number of the 52 future excluded periods this strategy/filter traded. Note for some periods there can be no strategy inputs/filter that satisfy the Strategy Inputs/Filter criteria and no trades will be made during that period.

Col AG: *tOnpNet* - toNP+toNPx = Total Net Profits of oos+future periods

Col AH: *Prob* - The probability that the filters toNP was due to pure chance. Row 1 lists the random bootstrap average for the 347 out-of-sample files of (\$417.4) with a bootstrap standard deviation of \$105.1. (Note. The average for the random selection is computed as the Average Random toNP/347) The average net weekly for the filter would be the filter toNP/ (# of OOS) periods traded or 121519/357=340.4. The probability of obtaining our filters average weekly net profit of 340.4 is 2.77×10^{-13} which is 7.2 standard deviations from the bootstrap average. For our filter, in row 6, the expected number of cases that we could obtain by pure chance that would match or exceed \$340.4 is $[1-(1- 2.77 \times 10^{-13})^{30752}] \approx 30752 \times 2.77 \times 10^{-13} \approx 0$ where 30752 is the total number of different filters we looked at in this run. This number is much less than one, so it is improbable that our result was due to pure chance

Figure 6 The out-of-sample 5-minute bar chart of all the RMedV Strategy buy and sell signals of the WFINP64 filter with the RMedV Indicator. 11/28/18 to 12/7/18



**Table 1 Walk Forward Out-Of-Sample Performance Summary
SPY-5 min bars RMedV Strategy with WFME64 Filter**

SPY 5 min bars 1/3/2008 - 12/7/2018 OOS weekly performance using the below filter on each in-sample segment. The input values *N*, *vup*, *vdn*, *xop* are the values found from applying the filter to the in-sample section.

In-sample Section Filter: `t50mTrd|pf<2|lr<3|ktau<70-t`

Where:

osnp = Weekly Out-of-sample gross profit in \$

NOnp\$4 = Weekly Out-Of-Sample Net Profit in \$ = **osnp-ont*4**

ont = The number of trades in the out-of-sample week.

oilt = The largest losing trade in the out-of-sample section in \$.

odd = The drawdown in the out-of-sample section in \$.

Equity = Running Sum of weekly out-of-sample gross profits \$

NetEq = running sum of the weekly out-of-sample net profits in \$

N = N the lookback period

vup, the threshold amount that velocity has to be greater than to issue a buy signal

vdn, the threshold amount that velocity has to be less than to issue a sell signal

Note: Blank rows indicate that no out-of-sample trades were made that week

In-Sample Dates	Out-Of-Sample Dates	osnp	ont	NOnp\$4	oilt	odd	EQ	NetEq	N	vup	vdn	xop
01/03/08 to 02/01/08	02/04/08 to 02/08/08	293	2	285	0	0	293	285	12	1.5	3	900
01/10/08 to 02/08/08	02/11/08 to 02/15/08	-281	7	-309	-177	-324	12	-24	21	1.5	1.5	900
01/17/08 to 02/15/08	02/18/08 to 02/22/08	-42	2	-50	-118	-118	-30	-74	24	1	2	900
01/24/08 to 02/22/08	02/25/08 to 02/29/08	255	3	243	-67	-67	225	169	10	1.75	3	900
01/31/08 to 02/29/08	03/03/08 to 03/07/08	-129	4	-145	-184	-184	96	24	20	0.75	2.75	845
02/07/08 to 03/07/08	03/10/08 to 03/14/08	427	6	403	-109	-162	523	427	14	0.75	3	900
02/14/08 to 03/14/08	03/17/08 to 03/21/08	-652	5	-672	-411	-736	-129	-245	19	2.25	2.5	845
02/21/08 to 03/21/08	03/24/08 to 03/28/08	53	1	49	0	0	-76	-196	16	2.75	2.25	900
02/28/08 to 03/28/08	03/31/08 to 04/04/08	275	1	271	0	0	199	75	16	2.75	2.25	900
03/06/08 to 04/04/08	04/07/08 to 04/11/08	-34	1	-38	-34	-34	165	37	24	1.5	3	845
03/13/08 to 04/11/08	04/14/08 to 04/18/08	57	1	53	0	0	222	90	18	2.75	1.75	845
03/20/08 to 04/18/08	04/21/08 to 04/25/08	8	2	0	-52	-52	230	90	22	1.25	2.75	845
03/27/08 to 04/25/08	04/28/08 to 05/02/08	25	3	13	-67	-67	255	103	19	1.5	1.5	900
04/03/08 to 05/02/08	05/05/08 to 05/09/08	-41	4	-57	-134	-134	214	46	14	1.5	1.5	900
04/10/08 to 05/09/08	05/12/08 to 05/16/08	-189	2	-197	-135	-189	25	-151	24	1.25	1.5	900
04/17/08 to 05/16/08	05/19/08 to 05/23/08	34	1	30	0	0	59	-121	21	1.25	2.25	845
04/24/08 to 05/23/08	05/26/08 to 05/30/08	55	3	43	0	0	114	-78	9	1	2	845
05/01/08 to 05/30/08	06/02/08 to 06/06/08	575	4	559	0	0	689	481	8	1.5	2.5	845
05/08/08 to 06/06/08	06/09/08 to 06/13/08	-51	8	-83	-115	-232	638	398	15	2.75	0.75	845
05/15/08 to 06/13/08	06/16/08 to 06/20/08	98	2	90	-9	-9	736	488	13	1.5	2.25	845
05/22/08 to 06/20/08	06/23/08 to 06/27/08	108	7	80	-64	-88	844	568	11	1.5	1.25	845
05/29/08 to 06/27/08	06/30/08 to 07/04/08	136	8	104	-62	-124	980	672	8	2	0.5	900
06/05/08 to 07/04/08	07/07/08 to 07/11/08	-258	5	-278	-167	-310	722	394	13	1.75	2.5	900
06/12/08 to 07/11/08	07/14/08 to 07/18/08	-663	17	-731	-230	-718	59	-337	4	2.75	1.25	900
06/19/08 to 07/18/08	07/21/08 to 07/25/08	46	1	42	0	0	105	-295	19	2.25	3	845
06/26/08 to 07/25/08	07/28/08 to 08/01/08	101	1	97	0	0	206	-198	19	2.25	3	845
07/03/08 to 08/01/08	08/04/08 to 08/08/08	264	4	248	-149	-159	470	50	12	1.25	3	900
07/10/08 to 08/08/08	08/11/08 to 08/15/08	74	5	54	-90	-90	544	104	10	1	3	845
07/17/08 to 08/15/08	08/18/08 to 08/22/08	81	5	61	-144	-149	625	165	13	0.25	2.5	845
07/24/08 to 08/22/08	08/25/08 to 08/29/08	380	3	368	0	0	1005	533	5	2.5	1.75	845
07/31/08 to 08/29/08	09/01/08 to 09/05/08	318	5	298	-103	-103	1323	831	10	2.5	0.5	845
08/07/08 to 09/05/08	09/08/08 to 09/12/08	127	4	111	-126	-153	1450	942	10	2	3	900
08/14/08 to 09/12/08	09/15/08 to 09/19/08	-687	18	-759	-273	-951	763	183	12	2.25	2.25	900
08/21/08 to 09/19/08	09/22/08 to 09/26/08	-559	6	-583	-217	-566	204	-400	18	2.5	2.5	900
08/28/08 to 09/26/08	09/29/08 to 10/03/08	531	5	511	-164	-164	735	111	12	3	2.25	845
09/04/08 to 10/03/08	10/06/08 to 10/10/08	1085	22	997	-259	-443	1820	1108	10	3	1.75	845
09/11/08 to 10/10/08	10/13/08 to 10/17/08	1332	14	1276	-316	-410	3152	2384	15	3	0.25	900

In-Sample Dates			Out-Of-Sample Dates			osnp	ont	NOnp\$4	ollt	odd	EQ	NetEq	N	vup	vdn	xop
09/18/08	to	10/17/08	10/20/08	to	10/24/08	77	19	1	-233	-472	3229	2385	11	1.75	1.5	900
09/25/08	to	10/24/08	10/27/08	to	10/31/08	-494	16	-558	-357	-834	2735	1827	10	2.25	2	900
10/02/08	to	10/31/08	11/03/08	to	11/07/08	504	8	472	-126	-311	3239	2299	23	2.75	0.25	900
10/09/08	to	11/07/08	11/10/08	to	11/14/08	8	13	-44	-349	-898	3247	2255	11	0.75	3	900
10/16/08	to	11/14/08	11/17/08	to	11/21/08	-201	11	-245	-330	-727	3046	2010	21	1.5	2.75	845
10/23/08	to	11/21/08	11/24/08	to	11/28/08	541	6	517	-118	-184	3587	2527	12	0.75	3	900
10/30/08	to	11/28/08	12/01/08	to	12/05/08	876	12	828	-165	-165	4463	3355	10	1.5	2.25	845
11/06/08	to	12/05/08	12/08/08	to	12/12/08	-221	10	-261	-139	-240	4242	3094	7	2.75	2.25	845
11/13/08	to	12/12/08	12/15/08	to	12/19/08	-94	4	-110	-163	-233	4148	2984	6	2.75	3	900
11/20/08	to	12/19/08	12/22/08	to	12/26/08	0	0	0	0	0	4148	2984	4	3	3	900
11/27/08	to	12/26/08	12/29/08	to	01/02/09	-72	1	-76	-72	-72	4076	2908	22	2.75	0.75	900
12/04/08	to	01/02/09	01/05/09	to	01/09/09	-28	5	-48	-124	-124	4048	2860	19	3	1	845
12/11/08	to	01/09/09	01/12/09	to	01/16/09	34	8	2	-69	-145	4082	2862	16	2.5	0.75	900
12/18/08	to	01/16/09	01/19/09	to	01/23/09	437	4	421	-54	-54	4519	3283	24	1.5	2.25	900
12/25/08	to	01/23/09	01/26/09	to	01/30/09	64	6	40	-118	-265	4583	3323	23	1.25	1.75	900
01/01/09	to	01/30/09	02/02/09	to	02/06/09	88	5	68	-166	-166	4671	3391	20	1	2.25	900
01/08/09	to	02/06/09	02/09/09	to	02/13/09	53	6	29	-97	-99	4724	3420	15	1.75	2.75	845
01/15/09	to	02/13/09	02/16/09	to	02/20/09	-162	4	-178	-168	-238	4562	3242	19	1.25	2.75	900
01/22/09	to	02/20/09	02/23/09	to	02/27/09	159	3	147	-54	-54	4721	3389	9	3	3	845
01/29/09	to	02/27/09	03/02/09	to	03/06/09	296	2	288	0	0	5017	3677	24	2	3	900
02/05/09	to	03/06/09	03/09/09	to	03/13/09	114	4	98	-88	-88	5131	3775	24	1.75	2.75	900
02/12/09	to	03/13/09	03/16/09	to	03/20/09	-78	8	-110	-257	-427	5053	3665	8	3	0.5	845
02/19/09	to	03/20/09	03/23/09	to	03/27/09	-222	5	-242	-251	-251	4831	3423	7	3	0.75	900
02/26/09	to	03/27/09	03/30/09	to	04/03/09	72	4	56	-64	-64	4903	3479	6	2.5	1.5	900
03/05/09	to	04/03/09	04/06/09	to	04/10/09	44	3	32	-75	-75	4947	3511	24	0.75	2.5	845
03/12/09	to	04/10/09	04/13/09	to	04/17/09	155	5	135	-48	-48	5102	3646	22	0.75	2	845
03/19/09	to	04/17/09	04/20/09	to	04/24/09	184	5	164	-107	-157	5286	3810	17	1.75	2.25	845
03/26/09	to	04/24/09	04/27/09	to	05/01/09	-151	5	-171	-108	-177	5135	3639	15	1	3	845
04/02/09	to	05/01/09	05/04/09	to	05/08/09	130	4	114	-152	-152	5265	3753	18	1.75	2.5	845
04/09/09	to	05/08/09	05/11/09	to	05/15/09	53	3	41	-35	-35	5318	3794	24	1.25	1.5	845
04/16/09	to	05/15/09	05/18/09	to	05/22/09	-1	3	-13	-219	-219	5317	3781	22	1.5	2.75	845
04/23/09	to	05/22/09	05/25/09	to	05/29/09	-158	4	-174	-152	-161	5159	3607	8	2.25	2.5	845
04/30/09	to	05/29/09	06/01/09	to	06/05/09	52	2	44	-24	-24	5211	3651	23	1.5	2	845
05/07/09	to	06/05/09	06/08/09	to	06/12/09	-240	5	-260	-101	-240	4971	3391	23	1.25	1	845
05/14/09	to	06/12/09	06/15/09	to	06/19/09	17	3	5	-10	-10	4988	3396	7	2	1.75	900
05/21/09	to	06/19/09	06/22/09	to	06/26/09	112	1	108	0	0	5100	3504	17	2.75	1.75	845
05/28/09	to	06/26/09	06/29/09	to	07/03/09	0	0	0	0	0	5100	3504	7	2	2.75	900
06/04/09	to	07/03/09	07/06/09	to	07/10/09	0	0	0	0	0	5100	3504	12	2.25	2.5	900
06/11/09	to	07/10/09	07/13/09	to	07/17/09	96	2	88	-26	-26	5196	3592	5	3	2	845
06/18/09	to	07/17/09	07/20/09	to	07/24/09	94	2	86	0	0	5290	3678	17	1.75	1.75	845
06/25/09	to	07/24/09	07/27/09	to	07/31/09	-180	5	-200	-68	-180	5110	3478	4	2	1.75	845
07/02/09	to	07/31/09	08/03/09	to	08/07/09	2	2	-6	-15	-15	5112	3472	22	1.5	1.75	845
07/09/09	to	08/07/09	08/10/09	to	08/14/09	-70	1	-74	-70	-70	5042	3398	19	2	1.5	900
07/16/09	to	08/14/09	08/17/09	to	08/21/09	156	4	140	0	0	5198	3538	20	0.75	2	900
07/23/09	to	08/21/09	08/24/09	to	08/28/09	-176	6	-200	-83	-238	5022	3338	17	0.75	1.25	900
07/30/09	to	08/28/09	08/31/09	to	09/04/09	-29	8	-61	-111	-165	4993	3277	9	0.5	2.25	845
08/06/09	to	09/04/09	09/07/09	to	09/11/09	83	3	71	0	0	5076	3348	5	1	2.5	845
08/13/09	to	09/11/09	09/14/09	to	09/18/09	202	5	182	-70	-80	5278	3530	10	0.25	2.5	900
08/20/09	to	09/18/09	09/21/09	to	09/25/09	53	5	33	-62	-62	5331	3563	24	0.75	1.5	900
08/27/09	to	09/25/09	09/28/09	to	10/02/09	98	4	82	-82	-82	5429	3645	12	1.75	1.5	845
09/03/09	to	10/02/09	10/05/09	to	10/09/09	30	2	22	0	0	5459	3667	20	1.25	1.25	845
09/10/09	to	10/09/09	10/12/09	to	10/16/09	0	0	0	0	0	5459	3667	22	2	1.5	845
09/17/09	to	10/16/09	10/19/09	to	10/23/09	46	3	34	-24	-24	5505	3701	7	2.25	1.5	900
09/24/09	to	10/23/09	10/26/09	to	10/30/09	99	4	83	-126	-126	5604	3784	6	1.75	1.75	900
10/01/09	to	10/30/09	11/02/09	to	11/06/09	-132	6	-156	-177	-268	5472	3628	6	2	2.5	845
10/08/09	to	11/06/09	11/09/09	to	11/13/09	155	3	143	-5	-5	5627	3771	23	2.5	1	845
10/15/09	to	11/13/09	11/16/09	to	11/20/09	26	2	18	0	0	5653	3789	5	2.5	2.25	845
10/22/09	to	11/20/09	11/23/09	to	11/27/09	-91	4	-107	-57	-91	5562	3682	21	0.75	1	900
10/29/09	to	11/27/09	11/30/09	to	12/04/09	-252	7	-280	-158	-344	5310	3402	6	0.25	2	845

In-Sample Dates			Out-Of-Sample Dates			osnp	ont	NOnp\$4	ollt	odd	EQ	NetEq	N	vup	vdn	xop
11/05/09	to	12/04/09	12/07/09	to	12/11/09	-47	6	-71	-43	-84	5263	3331	5	0.25	3	845
11/12/09	to	12/11/09	12/14/09	to	12/18/09	0	0	0	0	0	5263	3331	4	1.5	1.75	900
11/19/09	to	12/18/09	12/21/09	to	12/25/09	-29	1	-33	-29	-29	5234	3298	4	2	1	900
11/26/09	to	12/25/09	12/28/09	to	01/01/10	95	3	83	-11	-11	5329	3381	5	2.25	0.5	900
12/03/09	to	01/01/10	01/04/10	to	01/08/10	-95	1	-99	-95	-95	5234	3282	4	1.25	1.25	900
12/10/09	to	01/08/10	01/11/10	to	01/15/10	179	3	167	0	0	5413	3449	8	1	1.5	845
12/17/09	to	01/15/10	01/18/10	to	01/22/10	282	3	270	-20	-20	5695	3719	22	2.25	0.5	845
12/24/09	to	01/22/10	01/25/10	to	01/29/10	-111	8	-143	-70	-224	5584	3576	12	1	1.5	900
12/31/09	to	01/29/10	02/01/10	to	02/05/10	151	5	131	-47	-58	5735	3707	16	1.75	0.5	845
01/07/10	to	02/05/10	02/08/10	to	02/12/10	-104	1	-108	-104	-104	5631	3599	18	2.5	1.75	845
01/14/10	to	02/12/10	02/15/10	to	02/19/10	0	0	0	0	0	5631	3599	11	2.5	1.75	900
01/21/10	to	02/19/10	02/22/10	to	02/26/10	-108	2	-116	-133	-133	5523	3483	22	2.5	1.5	900
01/28/10	to	02/26/10	03/01/10	to	03/05/10	42	4	26	-29	-57	5565	3509	15	1	2.75	900
02/04/10	to	03/05/10	03/08/10	to	03/12/10	0	0	0	0	0	5565	3509	16	1.5	2.25	900
02/11/10	to	03/12/10	03/15/10	to	03/19/10	0	0	0	0	0	5565	3509	10	1.5	2.5	845
02/18/10	to	03/19/10	03/22/10	to	03/26/10	0	0	0	0	0	5565	3509	16	1.25	2	845
02/25/10	to	03/26/10	03/29/10	to	04/02/10	-15	1	-19	-15	-15	5550	3490	10	1.25	1.25	900
03/04/10	to	04/02/10	04/05/10	to	04/09/10	131	4	115	-19	-19	5681	3605	20	0.5	1.75	845
03/11/10	to	04/09/10	04/12/10	to	04/16/10	67	6	43	-32	-60	5748	3648	24	0.25	1.5	845
03/18/10	to	04/16/10	04/19/10	to	04/23/10	133	6	109	-53	-90	5881	3757	16	0.25	1.75	900
03/25/10	to	04/23/10	04/26/10	to	04/30/10	167	3	155	0	0	6048	3912	9	1.5	3	845
04/01/10	to	04/30/10	05/03/10	to	05/07/10	537	7	509	-49	-49	6585	4421	9	2	1.5	900
04/08/10	to	05/07/10	05/10/10	to	05/14/10	-5	5	-25	-70	-115	6580	4396	19	2.5	1	900
04/15/10	to	05/14/10	05/17/10	to	05/21/10	78	13	26	-105	-139	6658	4422	10	1.5	1.25	845
04/22/10	to	05/21/10	05/24/10	to	05/28/10	-108	6	-132	-297	-430	6550	4290	9	2.5	1.5	845
04/29/10	to	05/28/10	05/31/10	to	06/04/10	210	4	194	-33	-33	6760	4484	9	1.25	1.75	900
05/06/10	to	06/04/10	06/07/10	to	06/11/10	-59	6	-83	-125	-269	6701	4401	13	3	0.5	845
05/13/10	to	06/11/10	06/14/10	to	06/18/10	0	0	0	0	0	6701	4401	13	3	2.75	900
05/20/10	to	06/18/10	06/21/10	to	06/25/10	33	2	25	-26	-26	6734	4426	13	2.75	2	900
05/27/10	to	06/25/10	06/28/10	to	07/02/10	165	2	157	0	0	6899	4583	21	2.75	1.25	845
06/03/10	to	07/02/10	07/05/10	to	07/09/10	214	3	202	-95	-95	7113	4785	8	2	2.5	845
06/10/10	to	07/09/10	07/12/10	to	07/16/10	274	3	262	0	0	7387	5047	5	1.75	2.75	845
06/17/10	to	07/16/10	07/19/10	to	07/23/10	96	2	88	0	0	7483	5135	9	3	2.5	845
06/24/10	to	07/23/10	07/26/10	to	07/30/10	-81	4	-97	-123	-162	7402	5038	11	1	3	845
07/01/10	to	07/30/10	08/02/10	to	08/06/10	211	5	191	-21	-21	7613	5229	16	0.25	3	845
07/08/10	to	08/06/10	08/09/10	to	08/13/10	-35	5	-55	-73	-73	7578	5174	5	1.5	2.5	845
07/15/10	to	08/13/10	08/16/10	to	08/20/10	218	6	194	-7	-7	7796	5368	20	0.25	2.25	845
07/22/10	to	08/20/10	08/23/10	to	08/27/10	-46	3	-58	-119	-119	7750	5310	15	1.75	2.5	900
07/29/10	to	08/27/10	08/30/10	to	09/03/10	131	2	123	0	0	7881	5433	15	1.75	2.75	900
08/05/10	to	09/03/10	09/06/10	to	09/10/10	0	0	0	0	0	7881	5433	22	1.5	2	900
08/12/10	to	09/10/10	09/13/10	to	09/17/10	0	1	-4	0	0	7881	5429	20	1.25	2	845
08/19/10	to	09/17/10	09/20/10	to	09/24/10	114	2	106	0	0	7995	5535	20	1.25	2.25	845
08/26/10	to	09/24/10	09/27/10	to	10/01/10	-33	2	-41	-128	-128	7962	5494	8	1	2	900
09/02/10	to	10/01/10	10/04/10	to	10/08/10	93	1	89	0	0	8055	5583	21	1.5	2.25	900
09/09/10	to	10/08/10	10/11/10	to	10/15/10	0	0	0	0	0	8055	5583	9	2	3	845
09/16/10	to	10/15/10	10/18/10	to	10/22/10	109	2	101	0	0	8164	5684	18	1.5	2.25	845
09/23/10	to	10/22/10	10/25/10	to	10/29/10	-78	1	-82	-78	-78	8086	5602	22	1.75	1.75	845
09/30/10	to	10/29/10	11/01/10	to	11/05/10	-6	3	-18	-103	-103	8080	5584	23	1.5	1.5	845
10/07/10	to	11/05/10	11/08/10	to	11/12/10	16	1	12	0	0	8096	5596	22	1.75	1.5	845
10/14/10	to	11/12/10	11/15/10	to	11/19/10	41	1	37	0	0	8137	5633	13	2.25	3	845
10/21/10	to	11/19/10	11/22/10	to	11/26/10	-6	1	-10	-6	-6	8131	5623	12	2.75	1.75	900
10/28/10	to	11/26/10	11/29/10	to	12/03/10	-99	3	-111	-120	-152	8032	5512	5	2.75	1	845
11/04/10	to	12/03/10	12/06/10	to	12/10/10	-48	2	-56	-78	-78	7984	5456	5	1.75	2	845
11/11/10	to	12/10/10	12/13/10	to	12/17/10	-48	3	-60	-32	-62	7936	5396	10	0.75	2.5	845
11/18/10	to	12/17/10	12/20/10	to	12/24/10	0	1	-4	0	0	7936	5392	5	1.25	2.25	845
11/25/10	to	12/24/10	12/27/10	to	12/31/10	0	0	0	0	0	7936	5392	10	1.5	2.75	900
12/02/10	to	12/31/10	01/03/11	to	01/07/11	59	5	39	-39	-43	7995	5431	17	0.25	1.75	845
12/09/10	to	01/07/11	01/10/11	to	01/14/11	154	8	122	-25	-25	8149	5553	5	0.25	1.5	900
12/16/10	to	01/14/11	01/17/11	to	01/21/11	-29	4	-45	-71	-71	8120	5508	4	0.5	1.5	900

In-Sample Dates			Out-Of-Sample Dates			osnp	ont	NOnp\$4	ollt	odd	EQ	NetEq	N	vup	vdn	xop
12/23/10	to	01/21/11	01/24/11	to	01/28/11	164	5	144	-54	-54	8284	5652	14	0.5	1.25	845
12/30/10	to	01/28/11	01/31/11	to	02/04/11	282	4	266	0	0	8566	5918	12	0.5	2	900
01/06/11	to	02/04/11	02/07/11	to	02/11/11	88	4	72	-64	-64	8654	5990	7	1	2	845
01/13/11	to	02/11/11	02/14/11	to	02/18/11	24	1	20	0	0	8678	6010	8	1.75	1.75	845
01/20/11	to	02/18/11	02/21/11	to	02/25/11	199	6	175	-44	-76	8877	6185	24	0.25	0.75	845
01/27/11	to	02/25/11	02/28/11	to	03/04/11	195	4	179	-47	-47	9072	6364	9	2	1.5	845
02/03/11	to	03/04/11	03/07/11	to	03/11/11	77	2	69	0	0	9149	6433	24	1.75	1.25	900
02/10/11	to	03/11/11	03/14/11	to	03/18/11	26	7	-2	-95	-142	9175	6431	9	2	2	845
02/17/11	to	03/18/11	03/21/11	to	03/25/11	-82	2	-90	-80	-82	9093	6341	13	3	1.5	900
02/24/11	to	03/25/11	03/28/11	to	04/01/11	0	0	0	0	0	9093	6341	4	2.75	2	900
03/03/11	to	04/01/11	04/04/11	to	04/08/11	0	0	0	0	0	9093	6341	9	2	2.25	900
03/10/11	to	04/08/11	04/11/11	to	04/15/11	1	1	-3	0	0	9094	6338	4	2.5	3	845
03/17/11	to	04/15/11	04/18/11	to	04/22/11	-140	4	-156	-68	-140	8954	6182	22	2.5	0.25	845
03/24/11	to	04/22/11	04/25/11	to	04/29/11	0	0	0	0	0	8954	6182	8	2	3	845
03/31/11	to	04/29/11	05/02/11	to	05/06/11	-447	6	-471	-154	-447	8507	5711	17	0.25	2	845
04/07/11	to	05/06/11	05/09/11	to	05/13/11	-64	8	-96	-96	-186	8443	5615	10	1.25	0.5	845
04/14/11	to	05/13/11	05/16/11	to	05/20/11	-5	5	-25	-72	-82	8438	5590	9	0.5	3	845
04/21/11	to	05/20/11	05/23/11	to	05/27/11	-147	4	-163	-106	-165	8291	5427	17	2	0.5	900
04/28/11	to	05/27/11	05/30/11	to	06/03/11	177	5	157	-48	-70	8468	5584	9	1.75	0.75	845
05/05/11	to	06/03/11	06/06/11	to	06/10/11	272	4	256	0	0	8740	5840	10	1.75	1	845
05/12/11	to	06/10/11	06/13/11	to	06/17/11	170	4	154	-30	-30	8910	5994	12	1.75	1	845
05/19/11	to	06/17/11	06/20/11	to	06/24/11	-30	3	-42	-121	-121	8880	5952	8	1.5	1.25	900
05/26/11	to	06/24/11	06/27/11	to	07/01/11	83	2	75	0	0	8963	6027	22	1.75	1.75	845
06/02/11	to	07/01/11	07/04/11	to	07/08/11	-3	2	-11	-31	-31	8960	6016	15	2	1.75	900
06/09/11	to	07/08/11	07/11/11	to	07/15/11	109	1	105	0	0	9069	6121	11	3	1.75	845
06/16/11	to	07/15/11	07/18/11	to	07/22/11	168	3	156	0	0	9237	6277	14	1.25	1.5	900
06/23/11	to	07/22/11	07/25/11	to	07/29/11	74	3	62	-61	-72	9311	6339	13	1.25	2.25	845
06/30/11	to	07/29/11	08/01/11	to	08/05/11	229	7	201	-192	-199	9540	6540	13	2	2.25	900
07/07/11	to	08/05/11	08/08/11	to	08/12/11	430	21	346	-228	-369	9970	6886	6	2.25	2.5	845
07/14/11	to	08/12/11	08/15/11	to	08/19/11	124	6	100	-120	-163	10094	6986	8	2.25	1.75	845
07/21/11	to	08/19/11	08/22/11	to	08/26/11	304	9	268	-117	-176	10398	7254	8	2	1.75	845
07/28/11	to	08/26/11	08/29/11	to	09/02/11	-119	6	-143	-166	-324	10279	7111	15	3	0.5	845
08/04/11	to	09/02/11	09/05/11	to	09/09/11	136	3	124	-171	-171	10415	7235	14	2.5	2	845
08/11/11	to	09/09/11	09/12/11	to	09/16/11	73	2	65	0	0	10488	7300	9	2.25	2.75	900
08/18/11	to	09/16/11	09/19/11	to	09/23/11	166	4	150	-132	-132	10654	7450	9	3	2	845
08/25/11	to	09/23/11	09/26/11	to	09/30/11	195	5	175	-164	-164	10849	7625	17	2.5	2	845
09/01/11	to	09/30/11	10/03/11	to	10/07/11	819	6	795	-110	-110	11668	8420	22	1.25	2.5	845
09/08/11	to	10/07/11	10/10/11	to	10/14/11	235	6	211	-60	-61	11903	8631	22	0.75	2.5	845
09/15/11	to	10/14/11	10/17/11	to	10/21/11	296	3	284	0	0	12199	8915	22	1.5	2.25	845
09/22/11	to	10/21/11	10/24/11	to	10/28/11	344	3	332	0	0	12543	9247	12	2.5	2	900
09/29/11	to	10/28/11	10/31/11	to	11/04/11	76	1	72	0	0	12619	9319	22	2.5	3	845
10/06/11	to	11/04/11	11/07/11	to	11/11/11	183	2	175	0	0	12802	9494	12	2.5	2.25	845
10/13/11	to	11/11/11	11/14/11	to	11/18/11	198	2	190	0	0	13000	9684	11	2	2.75	845
10/20/11	to	11/18/11	11/21/11	to	11/25/11	104	2	96	-13	-13	13104	9780	11	2	2.25	845
10/27/11	to	11/25/11	11/28/11	to	12/02/11	-40	4	-56	-131	-131	13064	9724	16	1.75	2	900
11/03/11	to	12/02/11	12/05/11	to	12/09/11	-19	4	-35	-114	-170	13045	9689	16	2.5	1.25	900
11/10/11	to	12/09/11	12/12/11	to	12/16/11	177	6	153	-87	-95	13222	9842	21	2.75	1	845
11/17/11	to	12/16/11	12/19/11	to	12/23/11	48	4	32	-87	-87	13270	9874	5	2	2	845
11/24/11	to	12/23/11	12/26/11	to	12/30/11	82	1	78	0	0	13352	9952	19	2.25	1.25	900
12/01/11	to	12/30/11	01/02/12	to	01/06/12	-259	3	-271	-116	-259	13093	9681	23	2	1.25	845
12/08/11	to	01/06/12	01/09/12	to	01/13/12	-82	1	-86	-82	-82	13011	9595	21	2.75	1.25	845
12/15/11	to	01/13/12	01/16/12	to	01/20/12	79	1	75	0	0	13090	9670	8	1.75	2	900
12/22/11	to	01/20/12	01/23/12	to	01/27/12	25	3	13	-71	-71	13115	9683	5	1.25	2	845
12/29/11	to	01/27/12	01/30/12	to	02/03/12	16	1	12	0	0	13131	9695	6	1.25	1.25	900
01/05/12	to	02/03/12	02/06/12	to	02/10/12	90	5	70	0	0	13221	9765	20	0.25	2.75	845
01/12/12	to	02/10/12	02/13/12	to	02/17/12	79	5	59	-76	-76	13300	9824	12	0.5	3	845
01/19/12	to	02/17/12	02/20/12	to	02/24/12	36	2	28	-37	-37	13336	9852	7	0.75	1.5	900
01/26/12	to	02/24/12	02/27/12	to	03/02/12	29	3	17	-8	-8	13365	9869	6	1.25	1.25	900
02/02/12	to	03/02/12	03/05/12	to	03/09/12	-28	1	-32	-28	-28	13337	9837	4	1.75	1.5	845

In-Sample Dates			Out-Of-Sample Dates			osnp	ont	NOnp\$4	ollt	odd	EQ	NetEq	N	vup	vdn	xop
02/09/12	to	03/09/12	03/12/12	to	03/16/12	151	2	143	-37	-37	13488	9980	20	1	3	900
02/16/12	to	03/16/12	03/19/12	to	03/23/12	16	1	12	0	0	13504	9992	24	0.75	3	900
02/23/12	to	03/23/12	03/26/12	to	03/30/12	92	2	84	0	0	13596	10076	16	1	1.75	900
03/01/12	to	03/30/12	04/02/12	to	04/06/12	11	2	3	-18	-18	13607	10079	8	2	1.5	845
03/08/12	to	04/06/12	04/09/12	to	04/13/12	220	5	200	-30	-30	13827	10279	12	1.5	1.5	845
03/15/12	to	04/13/12	04/16/12	to	04/20/12	-54	10	-94	-61	-123	13773	10185	7	0.75	1.5	900
03/22/12	to	04/20/12	04/23/12	to	04/27/12	-18	2	-26	-38	-38	13755	10159	9	1.25	3	845
03/29/12	to	04/27/12	04/30/12	to	05/04/12	87	5	67	-46	-93	13842	10226	12	1.5	1	845
04/05/12	to	05/04/12	05/07/12	to	05/11/12	-231	2	-239	-121	-231	13611	9987	8	2	1.5	900
04/12/12	to	05/11/12	05/14/12	to	05/18/12	427	5	407	0	0	14038	10394	16	2.25	0.75	900
04/19/12	to	05/18/12	05/21/12	to	05/25/12	-87	5	-107	-123	-142	13951	10287	5	2	1	900
04/26/12	to	05/25/12	05/28/12	to	06/01/12	-56	7	-84	-88	-172	13895	10203	6	1.5	1	900
05/03/12	to	06/01/12	06/04/12	to	06/08/12	-217	5	-237	-139	-217	13678	9966	5	2.25	0.5	900
05/10/12	to	06/08/12	06/11/12	to	06/15/12	0	0	0	0	0	13678	9966	11	2.75	3	900
05/17/12	to	06/15/12	06/18/12	to	06/22/12	-53	1	-57	-53	-53	13625	9909	9	2.25	2.25	900
05/24/12	to	06/22/12	06/25/12	to	06/29/12	160	2	152	0	0	13785	10061	14	2.75	3	845
05/31/12	to	06/29/12	07/02/12	to	07/06/12	4	1	0	0	0	13789	10061	15	2.25	2.25	845
06/07/12	to	07/06/12	07/09/12	to	07/13/12	-32	5	-52	-171	-186	13757	10009	11	0.25	2.75	900
06/14/12	to	07/13/12	07/16/12	to	07/20/12	80	5	60	-65	-85	13837	10069	5	0.5	2.75	845
06/21/12	to	07/20/12	07/23/12	to	07/27/12	291	5	271	-58	-58	14128	10340	6	0.5	3	900
06/28/12	to	07/27/12	07/30/12	to	08/03/12	16	1	12	0	0	14144	10352	22	1.75	2.75	845
07/05/12	to	08/03/12	08/06/12	to	08/10/12	-35	1	-39	-35	-35	14109	10313	9	1.5	2	900
07/12/12	to	08/10/12	08/13/12	to	08/17/12	0	0	0	0	0	14109	10313	19	1	1.25	900
07/19/12	to	08/17/12	08/20/12	to	08/24/12	34	1	30	0	0	14143	10343	16	1.75	1.25	900
07/26/12	to	08/24/12	08/27/12	to	08/31/12	14	2	6	-14	-14	14157	10349	22	1.5	0.75	900
08/02/12	to	08/31/12	09/03/12	to	09/07/12	49	2	41	-43	-43	14206	10390	18	1.25	1.75	845
08/09/12	to	09/07/12	09/10/12	to	09/14/12	66	2	58	-37	-37	14272	10448	21	1.5	1.25	900
08/16/12	to	09/14/12	09/17/12	to	09/21/12	-62	1	-66	-62	-62	14210	10382	19	2	2	900
08/23/12	to	09/21/12	09/24/12	to	09/28/12	-27	1	-31	-27	-27	14183	10351	12	1.75	2	845
08/30/12	to	09/28/12	10/01/12	to	10/05/12	-51	1	-55	-51	-51	14132	10296	11	2	2	845
09/06/12	to	10/05/12	10/08/12	to	10/12/12	-68	1	-72	-68	-68	14064	10224	8	2.25	3	845
09/13/12	to	10/12/12	10/15/12	to	10/19/12	0	0	0	0	0	14064	10224	6	2.75	1.5	900
09/20/12	to	10/19/12	10/22/12	to	10/26/12	51	5	31	-21	-24	14115	10255	6	2.75	0.75	900
09/27/12	to	10/26/12	10/29/12	to	11/02/12	-92	2	-100	-171	-171	14023	10155	8	1.5	1.75	845
10/04/12	to	11/02/12	11/05/12	to	11/09/12	164	3	152	-8	-8	14187	10307	14	1.25	1.5	845
10/11/12	to	11/09/12	11/12/12	to	11/16/12	-105	2	-113	-124	-124	14082	10194	19	1.25	3	845
10/18/12	to	11/16/12	11/19/12	to	11/23/12	16	2	8	-65	-65	14098	10202	9	2.25	1.25	845
10/25/12	to	11/23/12	11/26/12	to	11/30/12	64	3	52	-54	-54	14162	10254	10	1.5	1.75	900
11/01/12	to	11/30/12	12/03/12	to	12/07/12	0	0	0	0	0	14162	10254	19	2.5	1.5	900
11/08/12	to	12/07/12	12/10/12	to	12/14/12	0	0	0	0	0	14162	10254	24	2.25	1.5	845
11/15/12	to	12/14/12	12/17/12	to	12/21/12	62	2	54	-35	-35	14224	10308	8	1.75	2.5	845
11/22/12	to	12/21/12	12/24/12	to	12/28/12	-24	2	-32	-74	-74	14200	10276	20	0.5	2	900
11/29/12	to	12/28/12	12/31/12	to	01/04/13	-102	3	-114	-227	-227	14098	10162	10	2	0.75	845
12/06/12	to	01/04/13	01/07/13	to	01/11/13	-21	1	-25	-21	-21	14077	10137	9	1.25	2.75	900
12/13/12	to	01/11/13	01/14/13	to	01/18/13	0	0	0	0	0	14077	10137	4	2.25	3	900
12/20/12	to	01/18/13	01/21/13	to	01/25/13	0	0	0	0	0	14077	10137	8	1.25	1.75	900
12/27/12	to	01/25/13	01/28/13	to	02/01/13	0	0	0	0	0	14077	10137	8	1.25	1.75	900
01/03/13	to	02/01/13	02/04/13	to	02/08/13	103	6	79	-44	-69	14180	10216	16	0.75	1	845
01/10/13	to	02/08/13	02/11/13	to	02/15/13	-35	1	-39	-35	-35	14145	10177	8	1	1.5	845
01/17/13	to	02/15/13	02/18/13	to	02/22/13	157	5	137	-36	-39	14302	10314	8	1.25	1.25	845
01/24/13	to	02/22/13	02/25/13	to	03/01/13	125	3	113	-143	-176	14427	10427	5	2.5	1.25	845
01/31/13	to	03/01/13	03/04/13	to	03/08/13	43	1	39	0	0	14470	10466	5	2.5	2	845
02/07/13	to	03/08/13	03/11/13	to	03/15/13	0	0	0	0	0	14470	10466	7	1.75	1.75	900
02/14/13	to	03/15/13	03/18/13	to	03/22/13	-71	2	-79	-53	-71	14399	10387	7	1.5	1.75	900
02/21/13	to	03/22/13	03/25/13	to	03/29/13	21	1	17	0	0	14420	10404	5	1.25	2	900
02/28/13	to	03/29/13	04/01/13	to	04/05/13	88	2	80	-4	-4	14508	10484	4	1.25	2.75	900
03/07/13	to	04/05/13	04/08/13	to	04/12/13	-235	4	-251	-135	-235	14273	10233	5	1.75	1	900
03/14/13	to	04/12/13	04/15/13	to	04/19/13	56	4	40	-76	-146	14329	10273	14	0.5	3	845
03/21/13	to	04/19/13	04/22/13	to	04/26/13	105	3	93	-21	-21	14434	10366	7	1	1.75	845

In-Sample Dates			Out-Of-Sample Dates			osnp	ont	NOnp\$4	ollt	odd	EQ	NetEq	N	vup	vdn	xop
03/28/13	to	04/26/13	04/29/13	to	05/03/13	66	3	54	-7	-7	14500	10420	13	1.25	1.5	900
04/04/13	to	05/03/13	05/06/13	to	05/10/13	0	0	0	0	0	14500	10420	13	1.5	1.5	845
04/11/13	to	05/10/13	05/13/13	to	05/17/13	261	5	241	-83	-83	14761	10661	7	0.25	2.5	845
04/18/13	to	05/17/13	05/20/13	to	05/24/13	-263	11	-307	-119	-263	14498	10354	6	1	1.75	845
04/25/13	to	05/24/13	05/27/13	to	05/31/13	-152	4	-168	-100	-152	14346	10186	11	1.5	1.75	845
05/02/13	to	05/31/13	06/03/13	to	06/07/13	83	12	35	-157	-319	14429	10221	4	0.75	2.25	845
05/09/13	to	06/07/13	06/10/13	to	06/14/13	201	1	197	0	0	14630	10418	5	2	2.75	900
05/16/13	to	06/14/13	06/17/13	to	06/21/13	177	6	153	-44	-82	14807	10571	7	2.75	1	900
05/23/13	to	06/21/13	06/24/13	to	06/28/13	-78	2	-86	-60	-78	14729	10485	10	3	2.5	900
05/30/13	to	06/28/13	07/01/13	to	07/05/13	-31	1	-35	-31	-31	14698	10450	24	2.75	1	845
06/06/13	to	07/05/13	07/08/13	to	07/12/13	0	0	0	0	0	14698	10450	4	2	3	845
06/13/13	to	07/12/13	07/15/13	to	07/19/13	0	0	0	0	0	14698	10450	4	2	2.5	845
06/20/13	to	07/19/13	07/22/13	to	07/26/13	0	0	0	0	0	14698	10450	4	2	2.25	845
06/27/13	to	07/26/13	07/29/13	to	08/02/13	-122	9	-158	-60	-221	14576	10292	5	0.75	1.25	900
07/04/13	to	08/02/13	08/05/13	to	08/09/13	26	6	2	-12	-12	14602	10294	12	0.25	1.75	900
07/11/13	to	08/09/13	08/12/13	to	08/16/13	34	1	30	0	0	14636	10324	12	2	1.75	845
07/18/13	to	08/16/13	08/19/13	to	08/23/13	-5	4	-21	-95	-95	14631	10303	9	1.5	1.5	845
07/25/13	to	08/23/13	08/26/13	to	08/30/13	139	1	135	0	0	14770	10438	5	2.5	3	845
08/01/13	to	08/30/13	09/02/13	to	09/06/13	-226	3	-238	-137	-226	14544	10200	12	2	2	845
08/08/13	to	09/06/13	09/09/13	to	09/13/13	0	0	0	0	0	14544	10200	5	3	2.5	845
08/15/13	to	09/13/13	09/16/13	to	09/20/13	7	3	-5	-48	-48	14551	10195	10	1.25	2.75	845
08/22/13	to	09/20/13	09/23/13	to	09/27/13	-104	3	-116	-42	-104	14447	10079	8	1	2.25	900
08/29/13	to	09/27/13	09/30/13	to	10/04/13	104	2	96	0	0	14551	10175	4	1.75	2.5	845
09/05/13	to	10/04/13	10/07/13	to	10/11/13	166	3	154	-26	-26	14717	10329	9	1.75	2	845
09/12/13	to	10/11/13	10/14/13	to	10/18/13	217	5	197	-106	-106	14934	10526	14	0.75	3	845
09/19/13	to	10/18/13	10/21/13	to	10/25/13	-4	3	-16	-38	-38	14930	10510	14	0.75	2	845
09/26/13	to	10/25/13	10/28/13	to	11/01/13	-61	3	-73	-70	-83	14869	10437	17	0.75	1.5	845
10/03/13	to	11/01/13	11/04/13	to	11/08/13	-95	7	-123	-153	-300	14774	10314	17	0.25	1.75	845
10/10/13	to	11/08/13	11/11/13	to	11/15/13	335	5	315	0	0	15109	10629	18	0.25	2.25	845
10/17/13	to	11/15/13	11/18/13	to	11/22/13	71	1	67	0	0	15180	10696	19	1	2.25	845
10/24/13	to	11/22/13	11/25/13	to	11/29/13	0	0	0	0	0	15180	10696	8	1.25	3	845
10/31/13	to	11/29/13	12/02/13	to	12/06/13	11	2	3	-37	-37	15191	10699	8	1.25	3	845
11/07/13	to	12/06/13	12/09/13	to	12/13/13	5	1	1	0	0	15196	10700	15	1	3	845
11/14/13	to	12/13/13	12/16/13	to	12/20/13	182	2	174	-48	-48	15378	10874	13	1	1.5	900
11/21/13	to	12/20/13	12/23/13	to	12/27/13	59	2	51	0	0	15437	10925	19	0.75	1.25	900
11/28/13	to	12/27/13	12/30/13	to	01/03/14	-37	2	-45	-75	-75	15400	10880	15	1	1.25	900
12/05/13	to	01/03/14	01/06/14	to	01/10/14	-136	5	-156	-81	-195	15264	10724	17	1.5	0.75	845
12/12/13	to	01/10/14	01/13/14	to	01/17/14	0	0	0	0	0	15264	10724	4	2	2.25	845
12/19/13	to	01/17/14	01/20/14	to	01/24/14	209	3	197	-39	-39	15473	10921	16	1.5	1.5	845
12/26/13	to	01/24/14	01/27/14	to	01/31/14	28	10	-12	-85	-132	15501	10909	9	0.75	2	845
01/02/14	to	01/31/14	02/03/14	to	02/07/14	202	15	142	-77	-216	15703	11051	4	1.25	1.75	845
01/09/14	to	02/07/14	02/10/14	to	02/14/14	314	5	294	-56	-56	16017	11345	12	0.5	3	845
01/16/14	to	02/14/14	02/17/14	to	02/21/14	-155	4	-171	-140	-175	15862	11174	11	0.5	2.25	900
01/23/14	to	02/21/14	02/24/14	to	02/28/14	61	5	41	-38	-39	15923	11215	11	0.5	2.5	845
01/30/14	to	02/28/14	03/03/14	to	03/07/14	35	2	27	-35	-35	15958	11242	18	2	2.25	845
02/06/14	to	03/07/14	03/10/14	to	03/14/14	-332	2	-340	-240	-332	15626	10902	11	1.25	2.75	900
02/13/14	to	03/14/14	03/17/14	to	03/21/14	-42	6	-66	-147	-161	15584	10836	11	3	0.75	900
02/20/14	to	03/21/14	03/24/14	to	03/28/14	-104	2	-112	-63	-104	15480	10724	8	2.5	2.5	845
02/27/14	to	03/28/14	03/31/14	to	04/04/14	18	6	-6	-52	-188	15498	10718	15	3	0.5	900
03/06/14	to	04/04/14	04/07/14	to	04/11/14	381	4	365	-151	-151	15879	11083	7	2.25	1.25	845
03/13/14	to	04/11/14	04/14/14	to	04/18/14	-161	3	-173	-93	-161	15718	10910	4	2.5	2.25	845
03/20/14	to	04/18/14	04/21/14	to	04/25/14	22	2	14	-30	-30	15740	10924	7	2.5	2	845
03/27/14	to	04/25/14	04/28/14	to	05/02/14	18	2	10	0	0	15758	10934	4	2	2.25	900
04/03/14	to	05/02/14	05/05/14	to	05/09/14	-124	2	-132	-103	-124	15634	10802	23	2.5	1.25	845
04/10/14	to	05/09/14	05/12/14	to	05/16/14	-25	1	-29	-25	-25	15609	10773	5	2	2.75	900
04/17/14	to	05/16/14	05/19/14	to	05/23/14	43	1	39	0	0	15652	10812	19	1.5	1.5	845
04/24/14	to	05/23/14	05/26/14	to	05/30/14	32	1	28	0	0	15684	10840	5	1.75	1.75	845
05/01/14	to	05/30/14	06/02/14	to	06/06/14	-60	2	-68	-93	-93	15624	10772	5	1.75	2.25	845
05/08/14	to	06/06/14	06/09/14	to	06/13/14	-34	1	-38	-34	-34	15590	10734	6	2.75	1.75	845

In-Sample Dates			Out-Of-Sample Dates			osnp	ont	NOnp\$4	ollt	odd	EQ	NetEq	N	vup	vdn	xop
05/15/14	to	06/13/14	06/16/14	to	06/20/14	-51	2	-59	-35	-51	15539	10675	6	2.25	1.5	845
05/22/14	to	06/20/14	06/23/14	to	06/27/14	161	6	137	-46	-46	15700	10812	17	0.5	0.75	900
05/29/14	to	06/27/14	06/30/14	to	07/04/14	59	2	51	0	0	15759	10863	20	1.25	1	900
06/05/14	to	07/04/14	07/07/14	to	07/11/14	-59	4	-75	-114	-114	15700	10788	10	1.25	1.25	845
06/12/14	to	07/11/14	07/14/14	to	07/18/14	98	3	86	-41	-42	15798	10874	10	1.5	1.25	900
06/19/14	to	07/18/14	07/21/14	to	07/25/14	-9	4	-25	-31	-42	15789	10849	18	0.5	3	900
06/26/14	to	07/25/14	07/28/14	to	08/01/14	-72	6	-96	-112	-164	15717	10753	9	1.5	1.75	900
07/03/14	to	08/01/14	08/04/14	to	08/08/14	537	7	509	-18	-27	16254	11262	5	1.75	1.5	845
07/10/14	to	08/08/14	08/11/14	to	08/15/14	-27	3	-39	-37	-38	16227	11223	14	2.25	0.75	845
07/17/14	to	08/15/14	08/18/14	to	08/22/14	24	1	20	0	0	16251	11243	13	2	1	900
07/24/14	to	08/22/14	08/25/14	to	08/29/14	-8	1	-12	-8	-8	16243	11231	13	1.5	1.25	900
07/31/14	to	08/29/14	09/01/14	to	09/05/14	-201	2	-209	-164	-201	16042	11022	20	1.25	1.25	845
08/07/14	to	09/05/14	09/08/14	to	09/12/14	57	3	45	-69	-69	16099	11067	6	2.5	1.5	845
08/14/14	to	09/12/14	09/15/14	to	09/19/14	168	5	148	-17	-17	16267	11215	5	1	2	845
08/21/14	to	09/19/14	09/22/14	to	09/26/14	157	5	137	-105	-105	16424	11352	7	0.75	2	900
08/28/14	to	09/26/14	09/29/14	to	10/03/14	-215	8	-247	-210	-450	16209	11105	6	1.5	2	845
09/04/14	to	10/03/14	10/06/14	to	10/10/14	-381	9	-417	-198	-382	15828	10688	9	0.75	2.75	845
09/11/14	to	10/10/14	10/13/14	to	10/17/14	-59	12	-107	-133	-422	15769	10581	9	3	1.75	900
09/18/14	to	10/17/14	10/20/14	to	10/24/14	27	6	3	-126	-126	15796	10584	15	2.75	0.5	900
09/25/14	to	10/24/14	10/27/14	to	10/31/14	-125	5	-145	-62	-125	15671	10439	19	2.5	0.5	900
10/02/14	to	10/31/14	11/03/14	to	11/07/14	-79	1	-83	-79	-79	15592	10356	15	2.5	1.5	845
10/09/14	to	11/07/14	11/10/14	to	11/14/14	0	0	0	0	0	15592	10356	24	1.75	1.75	900
10/16/14	to	11/14/14	11/17/14	to	11/21/14	-7	4	-23	-72	-72	15585	10333	14	1	1.5	845
10/23/14	to	11/21/14	11/24/14	to	11/28/14	0	0	0	0	0	15585	10333	9	1.75	3	845
10/30/14	to	11/28/14	12/01/14	to	12/05/14	-1	6	-25	-75	-75	15584	10308	11	1.25	1.75	845
11/06/14	to	12/05/14	12/08/14	to	12/12/14	124	13	72	-122	-294	15708	10380	10	1.25	1.5	845
11/13/14	to	12/12/14	12/15/14	to	12/19/14	308	8	276	-82	-134	16016	10656	6	2.25	2.25	900
11/20/14	to	12/19/14	12/22/14	to	12/26/14	0	0	0	0	0	16016	10656	11	2	2.75	845
11/27/14	to	12/26/14	12/29/14	to	01/02/15	0	0	0	0	0	16016	10656	11	2.25	2.75	845
12/04/14	to	01/02/15	01/05/15	to	01/09/15	291	6	267	-94	-94	16307	10923	11	2.5	2.25	845
12/11/14	to	01/09/15	01/12/15	to	01/16/15	88	6	64	-166	-192	16395	10987	16	2.75	2	900
12/18/14	to	01/16/15	01/19/15	to	01/23/15	-244	4	-260	-188	-292	16151	10727	14	2.75	1	845
12/25/14	to	01/23/15	01/26/15	to	01/30/15	181	5	161	-241	-241	16332	10888	17	2.75	1	845
01/01/15	to	01/30/15	02/02/15	to	02/06/15	187	4	171	-129	-129	16519	11059	17	2.75	1.5	900
01/08/15	to	02/06/15	02/09/15	to	02/13/15	200	5	180	-76	-76	16719	11239	7	0.25	3	900
01/15/15	to	02/13/15	02/16/15	to	02/20/15	-236	1	-240	-236	-236	16483	10999	14	2.5	1.5	845
01/22/15	to	02/20/15	02/23/15	to	02/27/15	0	0	0	0	0	16483	10999	8	2.25	2.75	900
01/29/15	to	02/27/15	03/02/15	to	03/06/15	-79	1	-83	-79	-79	16404	10916	13	2.75	3	845
02/05/15	to	03/06/15	03/09/15	to	03/13/15	235	3	223	0	0	16639	11139	5	2	2.5	845
02/12/15	to	03/13/15	03/16/15	to	03/20/15	137	2	129	0	0	16776	11268	21	1.75	2	900
02/19/15	to	03/20/15	03/23/15	to	03/27/15	111	2	103	-50	-50	16887	11371	21	1.5	2	900
02/26/15	to	03/27/15	03/30/15	to	04/03/15	-8	4	-24	-92	-131	16879	11347	11	2	2.5	900
03/05/15	to	04/03/15	04/06/15	to	04/10/15	0	0	0	0	0	16879	11347	11	3	2	900
03/12/15	to	04/10/15	04/13/15	to	04/17/15	-69	3	-81	-116	-125	16810	11266	6	3	2.5	845
03/19/15	to	04/17/15	04/20/15	to	04/24/15	9	1	5	0	0	16819	11271	23	3	0.75	900
03/26/15	to	04/24/15	04/27/15	to	05/01/15	222	3	210	0	0	17041	11481	17	1.5	1.75	845
04/02/15	to	05/01/15	05/04/15	to	05/08/15	-99	5	-119	-87	-182	16942	11362	5	2.5	3	845
04/09/15	to	05/08/15	05/11/15	to	05/15/15	8	3	-4	-94	-94	16950	11358	16	2	1.25	845
04/16/15	to	05/15/15	05/18/15	to	05/22/15	0	0	0	0	0	16950	11358	13	1.75	1.75	845
04/23/15	to	05/22/15	05/25/15	to	05/29/15	72	1	68	0	0	17022	11426	23	2	1.75	845
04/30/15	to	05/29/15	06/01/15	to	06/05/15	0	0	0	0	0	17022	11426	15	2.5	3	900
05/07/15	to	06/05/15	06/08/15	to	06/12/15	96	1	92	0	0	17118	11518	11	2.5	2.75	845
05/14/15	to	06/12/15	06/15/15	to	06/19/15	-122	5	-142	-130	-257	16996	11376	23	1.75	1	845
05/21/15	to	06/19/15	06/22/15	to	06/26/15	-4	1	-8	-4	-4	16992	11368	10	2.25	1.75	845
05/28/15	to	06/26/15	06/29/15	to	07/03/15	-21	1	-25	-21	-21	16971	11343	13	2.25	3	845
06/04/15	to	07/03/15	07/06/15	to	07/10/15	-105	7	-133	-188	-229	16866	11210	20	1.75	1.5	845
06/11/15	to	07/10/15	07/13/15	to	07/17/15	43	1	39	0	0	16909	11249	24	2.25	2.25	900
06/18/15	to	07/17/15	07/20/15	to	07/24/15	34	1	30	0	0	16943	11279	21	3	1.5	845
06/25/15	to	07/24/15	07/27/15	to	07/31/15	-120	1	-124	-120	-120	16823	11155	9	2.75	2.25	900

In-Sample Dates		Out-Of-Sample Dates			osnp	ont	NOnp\$4	ollt	odd	EQ	NetEq	N	vup	vdn	xop	
07/02/15	to	07/31/15	08/03/15	to	08/07/15	-156	2	-164	-107	-156	16667	10991	24	1	3	900
07/09/15	to	08/07/15	08/10/15	to	08/14/15	123	6	99	-69	-118	16790	11090	17	2	0.75	845
07/16/15	to	08/14/15	08/17/15	to	08/21/15	163	7	135	-198	-286	16953	11225	9	2	2.75	900
07/23/15	to	08/21/15	08/24/15	to	08/28/15	838	11	794	-241	-241	17791	12019	18	1.5	3	900
07/30/15	to	08/28/15	08/31/15	to	09/04/15	130	6	106	-118	-122	17921	12125	18	1.25	2.5	845
08/06/15	to	09/04/15	09/07/15	to	09/11/15	-254	5	-274	-427	-469	17667	11851	12	1.75	3	900
08/13/15	to	09/11/15	09/14/15	to	09/18/15	200	5	180	-213	-213	17867	12031	15	1.25	2.5	845
08/20/15	to	09/18/15	09/21/15	to	09/25/15	-291	7	-319	-167	-300	17576	11712	10	2.25	2.5	900
08/27/15	to	09/25/15	09/28/15	to	10/02/15	520	5	500	-147	-147	18096	12212	10	2.5	2.5	900
09/03/15	to	10/02/15	10/05/15	to	10/09/15	-89	6	-113	-183	-333	18007	12099	23	1.25	2.25	900
09/10/15	to	10/09/15	10/12/15	to	10/16/15	149	3	137	-113	-113	18156	12236	16	1.25	2.5	900
09/17/15	to	10/16/15	10/19/15	to	10/23/15	120	2	112	0	0	18276	12348	21	1.25	3	845
09/24/15	to	10/23/15	10/26/15	to	10/30/15	190	2	182	0	0	18466	12530	16	1.25	2.5	900
10/01/15	to	10/30/15	11/02/15	to	11/06/15	0	0	0	0	0	18466	12530	22	1.25	2.25	900
10/08/15	to	11/06/15	11/09/15	to	11/13/15	-60	5	-80	-175	-200	18406	12450	11	1.5	2	900
10/15/15	to	11/13/15	11/16/15	to	11/20/15	384	3	372	0	0	18790	12822	4	3	2.25	845
10/22/15	to	11/20/15	11/23/15	to	11/27/15	0	0	0	0	0	18790	12822	13	2.25	2	900
10/29/15	to	11/27/15	11/30/15	to	12/04/15	296	5	276	-122	-195	19086	13098	12	2.25	1.5	900
11/05/15	to	12/04/15	12/07/15	to	12/11/15	32	5	12	-145	-145	19118	13110	15	1.25	2.75	845
11/12/15	to	12/11/15	12/14/15	to	12/18/15	519	6	495	-104	-104	19637	13605	22	1.5	2	845
11/19/15	to	12/18/15	12/21/15	to	12/25/15	272	2	264	0	0	19909	13869	13	1.5	2.75	900
11/26/15	to	12/25/15	12/28/15	to	01/01/16	51	3	39	-84	-84	19960	13908	21	1.75	2	900
12/03/15	to	01/01/16	01/04/16	to	01/08/16	-874	9	-910	-352	-874	19086	12998	16	1.75	3	845
12/10/15	to	01/08/16	01/11/16	to	01/15/16	76	9	40	-264	-264	19162	13038	24	2	1.25	900
12/17/15	to	01/15/16	01/18/16	to	01/22/16	195	6	171	-198	-240	19357	13209	11	1.75	2.75	900
12/24/15	to	01/22/16	01/25/16	to	01/29/16	371	10	331	-124	-377	19728	13540	7	2.5	2.25	845
12/31/15	to	01/29/16	02/01/16	to	02/05/16	-261	5	-281	-385	-491	19467	13259	23	3	2.5	845
01/07/16	to	02/05/16	02/08/16	to	02/12/16	-19	9	-55	-155	-323	19448	13204	9	2	2.5	900
01/14/16	to	02/12/16	02/15/16	to	02/19/16	224	4	208	-78	-78	19672	13412	7	1.75	2.75	845
01/21/16	to	02/19/16	02/22/16	to	02/26/16	395	5	375	-113	-168	20067	13787	6	1.5	2.5	900
01/28/16	to	02/26/16	02/29/16	to	03/04/16	0	0	0	0	0	20067	13787	4	2.75	3	900
02/04/16	to	03/04/16	03/07/16	to	03/11/16	-47	8	-79	-245	-362	20020	13708	17	0.5	2.75	900
02/11/16	to	03/11/16	03/14/16	to	03/18/16	399	5	379	0	0	20419	14087	6	0.25	2.75	900
02/18/16	to	03/18/16	03/21/16	to	03/25/16	18	4	2	-70	-70	20437	14089	21	0.5	2	900
02/25/16	to	03/25/16	03/28/16	to	04/01/16	131	4	115	-76	-142	20568	14204	9	1.5	2.75	845
03/03/16	to	04/01/16	04/04/16	to	04/08/16	107	5	87	-77	-114	20675	14291	6	1.5	3	845
03/10/16	to	04/08/16	04/11/16	to	04/15/16	166	5	146	-65	-65	20841	14437	19	1	1.5	845
03/17/16	to	04/15/16	04/18/16	to	04/22/16	-203	5	-223	-101	-308	20638	14214	9	1.5	1.75	900
03/24/16	to	04/22/16	04/25/16	to	04/29/16	37	4	21	-47	-84	20675	14235	12	2.25	1.75	845
03/31/16	to	04/29/16	05/02/16	to	05/06/16	-31	4	-47	-44	-49	20644	14188	9	2	2	845
04/07/16	to	05/06/16	05/09/16	to	05/13/16	93	2	85	-26	-26	20737	14273	18	1.75	2	845
04/14/16	to	05/13/16	05/16/16	to	05/20/16	110	8	78	-46	-110	20847	14351	4	2	1.75	845
04/21/16	to	05/20/16	05/23/16	to	05/27/16	116	3	104	-14	-14	20963	14455	4	2	1.75	845
04/28/16	to	05/27/16	05/30/16	to	06/03/16	-9	3	-21	-47	-47	20954	14434	5	1.5	2.5	845
05/05/16	to	06/03/16	06/06/16	to	06/10/16	-50	5	-70	-72	-72	20904	14364	21	0.5	3	845
05/12/16	to	06/10/16	06/13/16	to	06/17/16	-5	13	-57	-90	-302	20899	14307	4	1	2.5	845
05/19/16	to	06/17/16	06/20/16	to	06/24/16	70	4	54	-74	-74	20969	14361	4	2.25	3	845
05/26/16	to	06/24/16	06/27/16	to	07/01/16	402	6	378	-50	-50	21371	14739	23	1.25	3	845
06/02/16	to	07/01/16	07/04/16	to	07/08/16	149	4	133	-104	-104	21520	14872	19	1.75	3	845
06/09/16	to	07/08/16	07/11/16	to	07/15/16	-53	1	-57	-53	-53	21467	14815	20	1.75	3	845
06/16/16	to	07/15/16	07/18/16	to	07/22/16	0	0	0	0	0	21467	14815	21	1.75	2.25	900
06/23/16	to	07/22/16	07/25/16	to	07/29/16	-60	1	-64	-60	-60	21407	14751	13	2.25	1.75	900
06/30/16	to	07/29/16	08/01/16	to	08/05/16	136	5	116	-19	-19	21543	14867	8	0.25	2	900
07/07/16	to	08/05/16	08/08/16	to	08/12/16	0	0	0	0	0	21543	14867	23	2.25	2	845
07/14/16	to	08/12/16	08/15/16	to	08/19/16	85	5	65	-59	-59	21628	14932	12	0.25	2	900
07/21/16	to	08/19/16	08/22/16	to	08/26/16	-89	7	-117	-79	-227	21539	14815	5	0.25	2.75	900
07/28/16	to	08/26/16	08/29/16	to	09/02/16	-95	4	-111	-97	-127	21444	14704	10	2	2.5	845
08/04/16	to	09/02/16	09/05/16	to	09/09/16	324	1	320	0	0	21768	15024	9	2	2.75	900
08/11/16	to	09/09/16	09/12/16	to	09/16/16	230	5	210	-25	-25	21998	15234	6	2.5	2.25	845

In-Sample Dates		Out-Of-Sample Dates			osnp	ont	NOnp\$4	ollt	odd	EQ	NetEq	N	vup	vdn	xop	
08/18/16	to	09/16/16	09/19/16	to	09/23/16	0	0	0	0	21998	15234	9	3	2	900	
08/25/16	to	09/23/16	09/26/16	to	09/30/16	7	5	-13	-51	-84	22005	15221	7	1.75	1.75	900
09/01/16	to	09/30/16	10/03/16	to	10/07/16	-38	3	-50	-76	-92	21967	15171	5	2	2	900
09/08/16	to	10/07/16	10/10/16	to	10/14/16	-3	1	-7	-3	-3	21964	15164	5	2.25	2	900
09/15/16	to	10/14/16	10/17/16	to	10/21/16	-41	1	-45	-41	-41	21923	15119	5	2	1.5	900
09/22/16	to	10/21/16	10/24/16	to	10/28/16	40	3	28	0	0	21963	15147	9	2.75	1.5	900
09/29/16	to	10/28/16	10/31/16	to	11/04/16	334	5	314	0	0	22297	15461	6	2.75	0.25	900
10/06/16	to	11/04/16	11/07/16	to	11/11/16	-406	10	-446	-150	-493	21891	15015	11	3	0.75	845
10/13/16	to	11/11/16	11/14/16	to	11/18/16	0	0	0	0	0	21891	15015	14	2.75	3	845
10/20/16	to	11/18/16	11/21/16	to	11/25/16	0	0	0	0	0	21891	15015	16	2.75	2.25	900
10/27/16	to	11/25/16	11/28/16	to	12/02/16	0	0	0	0	0	21891	15015	16	2.75	2.25	900
11/03/16	to	12/02/16	12/05/16	to	12/09/16	-32	1	-36	-32	-32	21859	14979	17	2.25	1.75	900
11/10/16	to	12/09/16	12/12/16	to	12/16/16	109	5	89	-52	-52	21968	15068	17	1.25	1.25	845
11/17/16	to	12/16/16	12/19/16	to	12/23/16	10	4	-6	-10	-18	21978	15062	13	0.5	1.5	845
11/24/16	to	12/23/16	12/26/16	to	12/30/16	-203	4	-219	-125	-203	21775	14843	17	0.25	2	845
12/01/16	to	12/30/16	01/02/17	to	01/06/17	-40	4	-56	-52	-112	21735	14787	4	1.75	1	845
12/08/16	to	01/06/17	01/09/17	to	01/13/17	-122	2	-130	-125	-125	21613	14657	18	2.25	1.25	900
12/15/16	to	01/13/17	01/16/17	to	01/20/17	0	0	0	0	0	21613	14657	13	2.5	2	845
12/22/16	to	01/20/17	01/23/17	to	01/27/17	173	2	165	0	0	21786	14822	13	0.75	3	845
12/29/16	to	01/27/17	01/30/17	to	02/03/17	117	6	93	-83	-99	21903	14915	14	0.75	2	845
01/05/17	to	02/03/17	02/06/17	to	02/10/17	0	0	0	0	0	21903	14915	10	2	2.75	900
01/12/17	to	02/10/17	02/13/17	to	02/17/17	0	0	0	0	0	21903	14915	10	2	2.75	900
01/19/17	to	02/17/17	02/20/17	to	02/24/17	34	1	30	0	0	21937	14945	10	2	2	900
01/26/17	to	02/24/17	02/27/17	to	03/03/17	125	1	121	0	0	22062	15066	5	1.5	3	845
02/02/17	to	03/03/17	03/06/17	to	03/10/17	-200	5	-220	-82	-200	21862	14846	13	1.75	1.25	900
02/09/17	to	03/10/17	03/13/17	to	03/17/17	-8	1	-12	-8	-8	21854	14834	11	1.75	1.75	845
02/16/17	to	03/17/17	03/20/17	to	03/24/17	252	3	240	-55	-55	22106	15074	12	2.5	1.5	845
02/23/17	to	03/24/17	03/27/17	to	03/31/17	262	2	254	0	0	22368	15328	4	1.75	2.5	845
03/02/17	to	03/31/17	04/03/17	to	04/07/17	62	3	50	-69	-69	22430	15378	4	2	2	900
03/09/17	to	04/07/17	04/10/17	to	04/14/17	77	2	69	0	0	22507	15447	7	1.75	2.5	900
03/16/17	to	04/14/17	04/17/17	to	04/21/17	0	0	0	0	0	22507	15447	6	3	2.75	900
03/23/17	to	04/21/17	04/24/17	to	04/28/17	-96	1	-100	-96	-96	22411	15347	6	1.5	2.25	900
03/30/17	to	04/28/17	05/01/17	to	05/05/17	-171	5	-191	-88	-171	22240	15156	6	2.5	0.25	845
04/06/17	to	05/05/17	05/08/17	to	05/12/17	0	0	0	0	0	22240	15156	24	1	3	845
04/13/17	to	05/12/17	05/15/17	to	05/19/17	41	9	5	-105	-259	22281	15161	9	1.25	1.25	845
04/20/17	to	05/19/17	05/22/17	to	05/26/17	65	2	57	0	0	22346	15218	7	1.5	1.75	845
04/27/17	to	05/26/17	05/29/17	to	06/02/17	83	2	75	-44	-44	22429	15293	5	1.5	2	845
05/04/17	to	06/02/17	06/05/17	to	06/09/17	-141	4	-157	-148	-184	22288	15136	7	1.25	1.75	845
05/11/17	to	06/09/17	06/12/17	to	06/16/17	197	7	169	-34	-50	22485	15305	9	0.25	3	845
05/18/17	to	06/16/17	06/19/17	to	06/23/17	-55	5	-75	-90	-125	22430	15230	4	0.25	2.75	900
05/25/17	to	06/23/17	06/26/17	to	06/30/17	-83	4	-99	-92	-92	22347	15131	22	1	2.5	845
06/01/17	to	06/30/17	07/03/17	to	07/07/17	0	0	0	0	0	22347	15131	4	1.75	2.5	900
06/08/17	to	07/07/17	07/10/17	to	07/14/17	-2	2	-10	-14	-14	22345	15121	14	2.5	1.25	900
06/15/17	to	07/14/17	07/17/17	to	07/21/17	-4	2	-12	-51	-51	22341	15109	4	1.75	2	845
06/22/17	to	07/21/17	07/24/17	to	07/28/17	-122	1	-126	-122	-122	22219	14983	4	1.75	2.5	845
06/29/17	to	07/28/17	07/31/17	to	08/04/17	0	0	0	0	0	22219	14983	11	1.75	1.75	900
07/06/17	to	08/04/17	08/07/17	to	08/11/17	73	2	65	-91	-91	22292	15048	14	1.5	1.75	845
07/13/17	to	08/11/17	08/14/17	to	08/18/17	-195	3	-207	-137	-227	22097	14841	18	1	2.5	900
07/20/17	to	08/18/17	08/21/17	to	08/25/17	23	2	15	-76	-76	22120	14856	12	1.5	2	845
07/27/17	to	08/25/17	08/28/17	to	09/01/17	49	1	45	0	0	22169	14901	9	2	2.5	845
08/03/17	to	09/01/17	09/04/17	to	09/08/17	16	1	12	0	0	22185	14913	13	1.25	2.5	845
08/10/17	to	09/08/17	09/11/17	to	09/15/17	29	3	17	-54	-54	22214	14930	5	2	2.25	845
08/17/17	to	09/15/17	09/18/17	to	09/22/17	-33	1	-37	-33	-33	22181	14893	10	2	3	845
08/24/17	to	09/22/17	09/25/17	to	09/29/17	0	0	0	0	0	22181	14893	9	2	2.5	845
08/31/17	to	09/29/17	10/02/17	to	10/06/17	0	0	0	0	0	22181	14893	10	2.5	2	845
09/07/17	to	10/06/17	10/09/17	to	10/13/17	-25	1	-29	-25	-25	22156	14864	11	1.25	3	845
09/14/17	to	10/13/17	10/16/17	to	10/20/17	164	5	144	-12	-12	22320	15008	4	0.25	2	845
09/21/17	to	10/20/17	10/23/17	to	10/27/17	-9	5	-29	-96	-150	22311	14979	7	0.75	2	900
09/28/17	to	10/27/17	10/30/17	to	11/03/17	-58	4	-74	-68	-134	22253	14905	8	1	1.75	845

In-Sample Dates			Out-Of-Sample Dates			osnp	ont	NOnp\$4	ollt	odd	EQ	NetEq	N	vup	vdn	xop
10/05/17	to	11/03/17	11/06/17	to	11/10/17	-43	2	-51	-46	-46	22210	14854	10	1	3	845
10/12/17	to	11/10/17	11/13/17	to	11/17/17	-48	6	-72	-74	-134	22162	14782	18	1	2	845
10/19/17	to	11/17/17	11/20/17	to	11/24/17	29	2	21	0	0	22191	14803	22	0.5	1.5	900
10/26/17	to	11/24/17	11/27/17	to	12/01/17	204	6	180	-78	-78	22395	14983	24	0.75	3	900
11/02/17	to	12/01/17	12/04/17	to	12/08/17	-174	2	-182	-227	-227	22221	14801	21	1.25	3	900
11/09/17	to	12/08/17	12/11/17	to	12/15/17	36	1	32	0	0	22257	14833	20	1.25	1.25	900
11/16/17	to	12/15/17	12/18/17	to	12/22/17	-26	1	-30	-26	-26	22231	14803	9	2.5	1.75	845
11/23/17	to	12/22/17	12/25/17	to	12/29/17	0	0	0	0	0	22231	14803	8	2	1.75	900
11/30/17	to	12/29/17	01/01/18	to	01/05/18	113	3	101	-13	-13	22344	14904	21	1.25	1.25	845
12/07/17	to	01/05/18	01/08/18	to	01/12/18	150	3	138	-46	-46	22494	15042	20	1.5	0.5	845
12/14/17	to	01/12/18	01/15/18	to	01/19/18	17	2	9	-131	-131	22511	15051	21	1.75	1.75	845
12/21/17	to	01/19/18	01/22/18	to	01/26/18	309	4	293	-77	-77	22820	15344	7	1.5	3	845
12/28/17	to	01/26/18	01/29/18	to	02/02/18	-665	8	-697	-340	-665	22155	14647	7	1.75	3	845
01/04/18	to	02/02/18	02/05/18	to	02/09/18	85	15	25	-605	-1243	22240	14672	19	1.5	2.75	845
01/11/18	to	02/09/18	02/12/18	to	02/16/18	-322	11	-366	-245	-481	21918	14306	16	2	2.5	900
01/18/18	to	02/16/18	02/19/18	to	02/23/18	7	9	-29	-183	-312	21925	14277	24	1	2.25	900
01/25/18	to	02/23/18	02/26/18	to	03/02/18	995	6	971	-230	-230	22920	15248	22	2.25	1.5	845
02/01/18	to	03/02/18	03/05/18	to	03/09/18	787	5	767	-7	-7	23707	16015	24	1.5	2.5	900
02/08/18	to	03/09/18	03/12/18	to	03/16/18	120	4	104	-100	-100	23827	16119	19	2.25	1.5	900
02/15/18	to	03/16/18	03/19/18	to	03/23/18	1144	4	1128	0	0	24971	17247	22	2.5	1.5	845
02/22/18	to	03/23/18	03/26/18	to	03/30/18	341	9	305	-146	-184	25312	17552	23	1.75	2	900
03/01/18	to	03/30/18	04/02/18	to	04/06/18	1402	6	1378	-153	-153	26714	18930	17	2.75	2.5	900
03/08/18	to	04/06/18	04/09/18	to	04/13/18	12	6	-12	-116	-174	26726	18918	16	2	2.5	900
03/15/18	to	04/13/18	04/16/18	to	04/20/18	176	5	156	-73	-73	26902	19074	24	1.25	2	845
03/22/18	to	04/20/18	04/23/18	to	04/27/18	244	6	220	-210	-242	27146	19294	16	1.75	2.5	900
03/29/18	to	04/27/18	04/30/18	to	05/04/18	631	7	603	-10	-10	27777	19897	23	2.5	0.75	900
04/05/18	to	05/04/18	05/07/18	to	05/11/18	276	4	260	-42	-42	28053	20157	20	1.25	2.75	900
04/12/18	to	05/11/18	05/14/18	to	05/18/18	-62	2	-70	-47	-62	27991	20087	15	3	1.5	845
04/19/18	to	05/18/18	05/21/18	to	05/25/18	-299	3	-311	-190	-299	27692	19776	7	2.75	2.75	845
04/26/18	to	05/25/18	05/28/18	to	06/01/18	143	3	131	-116	-116	27835	19907	20	1.25	2.75	900
05/03/18	to	06/01/18	06/04/18	to	06/08/18	139	2	131	0	0	27974	20038	24	1.5	1.25	900
05/10/18	to	06/08/18	06/11/18	to	06/15/18	-72	1	-76	-72	-72	27902	19962	12	3	2.75	900
05/17/18	to	06/15/18	06/18/18	to	06/22/18	100	3	88	-61	-61	28002	20050	4	1.75	3	900
05/24/18	to	06/22/18	06/25/18	to	06/29/18	-406	14	-462	-196	-505	27596	19588	4	1.5	3	845
05/31/18	to	06/29/18	07/02/18	to	07/06/18	0	0	0	0	0	27596	19588	4	2.75	2.75	900
06/07/18	to	07/06/18	07/09/18	to	07/13/18	0	0	0	0	0	27596	19588	4	2.75	2.5	900
06/14/18	to	07/13/18	07/16/18	to	07/20/18	75	2	67	-22	-22	27671	19655	16	1.25	1.75	900
06/21/18	to	07/20/18	07/23/18	to	07/27/18	-206	3	-218	-118	-206	27465	19437	16	2.25	1.5	845
06/28/18	to	07/27/18	07/30/18	to	08/03/18	104	4	88	-105	-105	27569	19525	15	1	3	900
07/05/18	to	08/03/18	08/06/18	to	08/10/18	22	3	10	-22	-38	27591	19535	24	1.25	0.75	845
07/12/18	to	08/10/18	08/13/18	to	08/17/18	-20	5	-40	-160	-160	27571	19495	13	2	1.25	845
07/19/18	to	08/17/18	08/20/18	to	08/24/18	0	0	0	0	0	27571	19495	14	2	3	845
07/26/18	to	08/24/18	08/27/18	to	08/31/18	48	3	36	-33	-33	27619	19531	5	2.5	2.25	845
08/02/18	to	08/31/18	09/03/18	to	09/07/18	-105	4	-121	-91	-105	27514	19410	6	2.75	1.25	845
08/09/18	to	09/07/18	09/10/18	to	09/14/18	-440	7	-468	-166	-440	27074	18942	13	2.25	0.75	845
08/16/18	to	09/14/18	09/17/18	to	09/21/18	-127	8	-159	-78	-148	26947	18783	5	0.5	1.5	900
08/23/18	to	09/21/18	09/24/18	to	09/28/18	-34	3	-46	-91	-91	26913	18737	5	1.5	3	845
08/30/18	to	09/28/18	10/01/18	to	10/05/18	95	13	43	-115	-251	27008	18780	24	1	0.25	845
09/06/18	to	10/05/18	10/08/18	to	10/12/18	995	9	959	-98	-164	28003	19739	23	2.75	0.25	845
09/13/18	to	10/12/18	10/15/18	to	10/19/18	280	25	180	-98	-327	28283	19919	8	1.75	1	900
09/20/18	to	10/19/18	10/22/18	to	10/26/18	39	22	-49	-222	-410	28322	19870	11	2.75	0.5	900
09/27/18	to	10/26/18	10/29/18	to	11/02/18	-173	18	-245	-249	-865	28149	19625	8	3	1	900
10/04/18	to	11/02/18	11/05/18	to	11/09/18	-17	6	-41	-138	-248	28132	19584	22	2.75	0.25	900
10/11/18	to	11/09/18	11/12/18	to	11/16/18	-413	9	-449	-264	-879	27719	19135	21	1.5	2.5	900
10/18/18	to	11/16/18	11/19/18	to	11/23/18	-133	7	-161	-185	-443	27586	18974	24	2	1.5	845
10/25/18	to	11/23/18	11/26/18	to	11/30/18	572	2	564	0	0	28158	19538	11	3	3	845
11/01/18	to	11/30/18	12/03/18	to	12/07/18	1186	8	1154	-246	-246	29344	20692	16	1.75	2.25	900

**Table 2 Walk Forward Out-Of-Sample Performance Summary
SPY 5 min bars RMedV Strategy with WFINP64 Filter**

SPY 5 min bars 1/3/2008–12/7/2018 OOS weekly performance using the below filter on each in-sample segment.

In-sample Section Filter: $7|2|1.75|845|pf<4|ktau<70$

Where:

osnp = Weekly Out-of-sample gross profit in \$

NOnp\$4 = Weekly Out-Of-Sample Net Profit in \$ = **osnp-ont*4**.

ont = The number of trades in the out-of-sample week.

oltt = The largest losing trade in the out-of-sample section in \$.

odd = The drawdown in the out-of-sample section in \$.

Equity = Running Sum of weekly out-of-sample gross profits \$

NetEq = running sum of the weekly out-of-sample net profits in \$

N = N the lookback period

vup, the threshold amount that velocity has to be greater than to issue a buy signal

vdn, the threshold amount that velocity has to be less than to issue a sell signal

Note: Blank rows indicate that no out-of-sample trades were made that week

In-Sample Dates			Out-Of-Sample dates			osnp	NOnp\$4	ont	oltt	odd	EQ	NetEq
1/3/2008	to	2/1/2008	2/4/2008	to	2/8/2008	-330	-374	11	-177	-629	-330	-374
1/10/2008	to	2/8/2008	2/11/2008	to	2/15/2008	-237	-269	8	-125	-237	-567	-643
1/17/2008	to	2/15/2008	2/18/2008	to	2/22/2008	20	-12	8	-116	-192	-547	-655
1/24/2008	to	2/22/2008	2/25/2008	to	2/29/2008	108	76	8	-119	-181	-439	-579
1/31/2008	to	2/29/2008	3/3/2008	to	3/7/2008	8	-36	11	-109	-257	-431	-615
2/7/2008	to	3/7/2008	3/10/2008	to	3/14/2008	-210	-254	11	-150	-373	-641	-869
2/14/2008	to	3/14/2008	3/17/2008	to	3/21/2008	44	-16	15	-122	-225	-597	-885
2/21/2008	to	3/21/2008	3/24/2008	to	3/28/2008	134	114	5	-79	-79	-463	-771
2/28/2008	to	3/28/2008	3/31/2008	to	4/4/2008	64	40	6	-102	-239	-399	-731
3/6/2008	to	4/4/2008	4/7/2008	to	4/11/2008	30	14	4	-59	-78	-369	-717
3/13/2008	to	4/11/2008	4/14/2008	to	4/18/2008	195	187	2	0	0	-174	-530
3/20/2008	to	4/18/2008	4/21/2008	to	4/25/2008	-83	-99	4	-111	-112	-257	-629
3/27/2008	to	4/25/2008	4/28/2008	to	5/2/2008	28	20	2	-47	-47	-229	-609
4/3/2008	to	5/2/2008	5/5/2008	to	5/9/2008	-136	-152	4	-209	-209	-365	-761
4/10/2008	to	5/9/2008	5/12/2008	to	5/16/2008	-43	-47	1	-43	-43	-408	-808
4/17/2008	to	5/16/2008	5/19/2008	to	5/23/2008	203	191	3	0	0	-205	-617
4/24/2008	to	5/23/2008	5/26/2008	to	5/30/2008	0	0	0	0	0	-205	-617
5/1/2008	to	5/30/2008	6/2/2008	to	6/6/2008	594	574	5	0	0	389	-43
5/8/2008	to	6/6/2008	6/9/2008	to	6/13/2008	0	0	0	0	0	389	-43
5/15/2008	to	6/13/2008	6/16/2008	to	6/20/2008	0	0	0	0	0	389	-43
5/22/2008	to	6/20/2008	6/23/2008	to	6/27/2008	191	163	7	-75	-75	580	120
5/29/2008	to	6/27/2008	6/30/2008	to	7/4/2008	78	54	6	-64	-113	658	174
6/5/2008	to	7/4/2008	7/7/2008	to	7/11/2008	-43	-91	12	-86	-213	615	83
6/12/2008	to	7/11/2008	7/14/2008	to	7/18/2008	-128	-184	14	-106	-275	487	-101
6/19/2008	to	7/18/2008	7/21/2008	to	7/25/2008	-215	-239	6	-198	-215	272	-340
6/26/2008	to	7/25/2008	7/28/2008	to	8/1/2008	246	230	4	-8	-8	518	-110
7/3/2008	to	8/1/2008	8/4/2008	to	8/8/2008	574	558	4	0	0	1092	448
7/10/2008	to	8/8/2008	8/11/2008	to	8/15/2008	-177	-193	4	-81	-177	915	255
7/17/2008	to	8/15/2008	8/18/2008	to	8/22/2008	7	-9	4	-116	-116	922	246
7/24/2008	to	8/22/2008	8/25/2008	to	8/29/2008	249	241	2	0	0	1171	487
7/31/2008	to	8/29/2008	9/1/2008	to	9/5/2008	387	367	5	-139	-139	1558	854
8/7/2008	to	9/5/2008	9/8/2008	to	9/12/2008	270	214	14	-103	-215	1828	1068
8/14/2008	to	9/12/2008	9/15/2008	to	9/19/2008	609	505	26	-94	-217	2437	1573
8/21/2008	to	9/19/2008	9/22/2008	to	9/26/2008	518	470	12	-107	-131	2955	2043
8/28/2008	to	9/26/2008	9/29/2008	to	10/3/2008	1014	962	13	-213	-426	3969	3005
9/4/2008	to	10/3/2008	10/6/2008	to	10/10/2008	838	702	34	-306	-741	4807	3707
9/11/2008	to	10/10/2008	10/13/2008	to	10/17/2008	1176	1072	26	-209	-336	5983	4779
9/18/2008	to	10/17/2008	10/20/2008	to	10/24/2008	0	0	0	0	0	5983	4779

In-Sample Dates		Out-Of-Sample dates			osnp	NOnp\$4	ont	ollt	odd	EQ	NetEq	
9/25/2008	to	10/24/2008	10/27/2008	to	10/31/2008	-190	-290	25	-157	-866	5793	4489
10/2/2008	to	10/31/2008	11/3/2008	to	11/7/2008	465	393	18	-128	-363	6258	4882
10/9/2008	to	11/7/2008	11/10/2008	to	11/14/2008	613	541	18	-277	-313	6871	5423
10/16/2008	to	11/14/2008	11/17/2008	to	11/21/2008	828	720	27	-181	-339	7699	6143
10/23/2008	to	11/21/2008	11/24/2008	to	11/28/2008	3	-49	13	-205	-485	7702	6094
10/30/2008	to	11/28/2008	12/1/2008	to	12/5/2008	1107	1051	14	-134	-154	8809	7145
11/6/2008	to	12/5/2008	12/8/2008	to	12/12/2008	-722	-810	22	-116	-741	8087	6335
11/13/2008	to	12/12/2008	12/15/2008	to	12/19/2008	360	332	7	-135	-135	8447	6667
11/20/2008	to	12/19/2008	12/22/2008	to	12/26/2008	-169	-181	3	-109	-175	8278	6486
11/27/2008	to	12/26/2008	12/29/2008	to	1/2/2009	225	217	2	0	0	8503	6703
12/4/2008	to	1/2/2009	1/5/2009	to	1/9/2009	99	79	5	-63	-88	8602	6782
12/11/2008	to	1/9/2009	1/12/2009	to	1/16/2009	-272	-308	9	-201	-394	8330	6474
12/18/2008	to	1/16/2009	1/19/2009	to	1/23/2009	-333	-377	11	-297	-648	7997	6097
12/25/2008	to	1/23/2009	1/26/2009	to	1/30/2009	-40	-76	9	-113	-355	7957	6021
1/1/2009	to	1/30/2009	2/2/2009	to	2/6/2009	10	-26	9	-90	-145	7967	5995
1/8/2009	to	2/6/2009	2/9/2009	to	2/13/2009	420	396	6	-33	-34	8387	6391
1/15/2009	to	2/13/2009	2/16/2009	to	2/20/2009	-177	-201	6	-170	-301	8210	6190
1/22/2009	to	2/20/2009	2/23/2009	to	2/27/2009	-443	-499	14	-228	-517	7767	5691
1/29/2009	to	2/27/2009	3/2/2009	to	3/6/2009	403	359	11	-104	-140	8170	6050
2/5/2009	to	3/6/2009	3/9/2009	to	3/13/2009	406	378	7	-86	-130	8576	6428
2/12/2009	to	3/13/2009	3/16/2009	to	3/20/2009	56	28	7	-68	-183	8632	6456
2/19/2009	to	3/20/2009	3/23/2009	to	3/27/2009	383	347	9	-128	-128	9015	6803
2/26/2009	to	3/27/2009	3/30/2009	to	4/3/2009	0	0	0	0	0	9015	6803
3/5/2009	to	4/3/2009	4/6/2009	to	4/10/2009	0	0	0	0	0	9015	6803
3/12/2009	to	4/10/2009	4/13/2009	to	4/17/2009	65	53	3	-100	-100	9080	6856
3/19/2009	to	4/17/2009	4/20/2009	to	4/24/2009	107	87	5	-139	-139	9187	6943
3/26/2009	to	4/24/2009	4/27/2009	to	5/1/2009	-140	-172	8	-119	-182	9047	6771
4/2/2009	to	5/1/2009	5/4/2009	to	5/8/2009	157	129	7	-123	-209	9204	6900
4/9/2009	to	5/8/2009	5/11/2009	to	5/15/2009	57	41	4	-27	-27	9261	6941
4/16/2009	to	5/15/2009	5/18/2009	to	5/22/2009	238	222	4	-70	-70	9499	7163
4/23/2009	to	5/22/2009	5/25/2009	to	5/29/2009	85	65	5	-124	-124	9584	7228
4/30/2009	to	5/29/2009	6/1/2009	to	6/5/2009	123	103	5	-66	-66	9707	7331
5/7/2009	to	6/5/2009	6/8/2009	to	6/12/2009	-304	-320	4	-138	-304	9403	7011
5/14/2009	to	6/12/2009	6/15/2009	to	6/19/2009	101	89	3	-10	-10	9504	7100
5/21/2009	to	6/19/2009	6/22/2009	to	6/26/2009	276	268	2	0	0	9780	7368
5/28/2009	to	6/26/2009	6/29/2009	to	7/3/2009	83	75	2	0	0	9863	7443
6/4/2009	to	7/3/2009	7/6/2009	to	7/10/2009	-32	-40	2	-59	-59	9831	7403
6/11/2009	to	7/10/2009	7/13/2009	to	7/17/2009	122	118	1	0	0	9953	7521
6/18/2009	to	7/17/2009	7/20/2009	to	7/24/2009	0	0	0	0	0	9953	7521
6/25/2009	to	7/24/2009	7/27/2009	to	7/31/2009	0	0	0	0	0	9953	7521
7/2/2009	to	7/31/2009	8/3/2009	to	8/7/2009	-14	-22	2	-47	-47	9939	7499
7/9/2009	to	8/7/2009	8/10/2009	to	8/14/2009	-59	-79	5	-119	-131	9880	7420
7/16/2009	to	8/14/2009	8/17/2009	to	8/21/2009	58	46	3	0	0	9938	7466
7/23/2009	to	8/21/2009	8/24/2009	to	8/28/2009	-195	-211	4	-145	-195	9743	7255
7/30/2009	to	8/28/2009	8/31/2009	to	9/4/2009	167	159	2	-15	-15	9910	7414
8/6/2009	to	9/4/2009	9/7/2009	to	9/11/2009	0	0	0	0	0	9910	7414
8/13/2009	to	9/11/2009	9/14/2009	to	9/18/2009	-117	-121	1	-117	-117	9793	7293
8/20/2009	to	9/18/2009	9/21/2009	to	9/25/2009	65	53	3	-27	-27	9858	7346
8/27/2009	to	9/25/2009	9/28/2009	to	10/2/2009	109	89	5	-86	-129	9967	7435
9/3/2009	to	10/2/2009	10/5/2009	to	10/9/2009	78	66	3	-14	-14	10045	7501
9/10/2009	to	10/9/2009	10/12/2009	to	10/16/2009	-1	-13	3	-55	-55	10044	7488
9/17/2009	to	10/16/2009	10/19/2009	to	10/23/2009	69	61	2	0	0	10113	7549
9/24/2009	to	10/23/2009	10/26/2009	to	10/30/2009	260	244	4	-114	-114	10373	7793
10/1/2009	to	10/30/2009	11/2/2009	to	11/6/2009	-57	-77	5	-149	-205	10316	7716
10/8/2009	to	11/6/2009	11/9/2009	to	11/13/2009	-30	-46	4	-138	-174	10286	7670
10/15/2009	to	11/13/2009	11/16/2009	to	11/20/2009	26	18	2	0	0	10312	7688
10/22/2009	to	11/20/2009	11/23/2009	to	11/27/2009	-146	-162	4	-79	-146	10166	7526
10/29/2009	to	11/27/2009	11/30/2009	to	12/4/2009	-40	-60	5	-119	-123	10126	7466
11/5/2009	to	12/4/2009	12/7/2009	to	12/11/2009	-57	-65	2	-34	-57	10069	7401

In-Sample Dates		Out-Of-Sample dates			osnp	NOnp\$4	ont	ollt	odd	EQ	NetEq	
11/12/2009	to	12/11/2009	12/14/2009	to	12/18/2009	20	12	2	-38	-38	10089	7413
11/19/2009	to	12/18/2009	12/21/2009	to	12/25/2009	15	11	1	0	0	10104	7424
11/26/2009	to	12/25/2009	12/28/2009	to	1/1/2010	0	0	0	0	0	10104	7424
12/3/2009	to	1/1/2010	1/4/2010	to	1/8/2010	57	53	1	0	0	10161	7477
12/10/2009	to	1/8/2010	1/11/2010	to	1/15/2010	21	17	1	0	0	10182	7494
12/17/2009	to	1/15/2010	1/18/2010	to	1/22/2010	0	0	0	0	0	10182	7494
12/24/2009	to	1/22/2010	1/25/2010	to	1/29/2010	0	0	0	0	0	10182	7494
12/31/2009	to	1/29/2010	2/1/2010	to	2/5/2010	110	94	4	-71	-130	10292	7588
1/7/2010	to	2/5/2010	2/8/2010	to	2/12/2010	-175	-187	3	-132	-195	10117	7401
1/14/2010	to	2/12/2010	2/15/2010	to	2/19/2010	113	109	1	0	0	10230	7510
1/21/2010	to	2/19/2010	2/22/2010	to	2/26/2010	-137	-149	3	-154	-158	10093	7361
1/28/2010	to	2/26/2010	3/1/2010	to	3/5/2010	0	0	0	0	0	10093	7361
2/4/2010	to	3/5/2010	3/8/2010	to	3/12/2010	0	0	0	0	0	10093	7361
2/11/2010	to	3/12/2010	3/15/2010	to	3/19/2010	0	0	0	0	0	10093	7361
2/18/2010	to	3/19/2010	3/22/2010	to	3/26/2010	4	0	1	0	0	10097	7361
2/25/2010	to	3/26/2010	3/29/2010	to	4/2/2010	0	0	0	0	0	10097	7361
3/4/2010	to	4/2/2010	4/5/2010	to	4/9/2010	-33	-37	1	-33	-33	10064	7324
3/11/2010	to	4/9/2010	4/12/2010	to	4/16/2010	50	46	1	0	0	10114	7370
3/18/2010	to	4/16/2010	4/19/2010	to	4/23/2010	-136	-144	2	-179	-179	9978	7226
3/25/2010	to	4/23/2010	4/26/2010	to	4/30/2010	270	254	4	-76	-76	10248	7480
4/1/2010	to	4/30/2010	5/3/2010	to	5/7/2010	301	253	12	-87	-174	10549	7733
4/8/2010	to	5/7/2010	5/10/2010	to	5/14/2010	-171	-199	7	-135	-256	10378	7534
4/15/2010	to	5/14/2010	5/17/2010	to	5/21/2010	-322	-402	20	-149	-483	10056	7132
4/22/2010	to	5/21/2010	5/24/2010	to	5/28/2010	152	128	6	-172	-172	10208	7260
4/29/2010	to	5/28/2010	5/31/2010	to	6/4/2010	239	215	6	-102	-187	10447	7475
5/6/2010	to	6/4/2010	6/7/2010	to	6/11/2010	223	195	7	-53	-53	10670	7670
5/13/2010	to	6/11/2010	6/14/2010	to	6/18/2010	201	193	2	0	0	10871	7863
5/20/2010	to	6/18/2010	6/21/2010	to	6/25/2010	-100	-120	5	-184	-220	10771	7743
5/27/2010	to	6/25/2010	6/28/2010	to	7/2/2010	287	267	5	0	0	11058	8010
6/3/2010	to	7/2/2010	7/5/2010	to	7/9/2010	147	131	4	-121	-162	11205	8141
6/10/2010	to	7/9/2010	7/12/2010	to	7/16/2010	112	92	5	-109	-149	11317	8233
6/17/2010	to	7/16/2010	7/19/2010	to	7/23/2010	-111	-127	4	-229	-229	11206	8106
6/24/2010	to	7/23/2010	7/26/2010	to	7/30/2010	-131	-147	4	-114	-161	11075	7959
7/1/2010	to	7/30/2010	8/2/2010	to	8/6/2010	-39	-51	3	-98	-147	11036	7908
7/8/2010	to	8/6/2010	8/9/2010	to	8/13/2010	-79	-95	4	-106	-136	10957	7813
7/15/2010	to	8/13/2010	8/16/2010	to	8/20/2010	57	41	4	-73	-73	11014	7854
7/22/2010	to	8/20/2010	8/23/2010	to	8/27/2010	-162	-182	5	-138	-289	10852	7672
7/29/2010	to	8/27/2010	8/30/2010	to	9/3/2010	102	90	3	-77	-77	10954	7762
8/5/2010	to	9/3/2010	9/6/2010	to	9/10/2010	-25	-33	2	-45	-45	10929	7729
8/12/2010	to	9/10/2010	9/13/2010	to	9/17/2010	-156	-172	4	-92	-163	10773	7557
8/19/2010	to	9/17/2010	9/20/2010	to	9/24/2010	1	-11	3	-83	-83	10774	7546
8/26/2010	to	9/24/2010	9/27/2010	to	10/1/2010	-178	-186	2	-166	-178	10596	7360
9/2/2010	to	10/1/2010	10/4/2010	to	10/8/2010	124	120	1	0	0	10720	7480
9/9/2010	to	10/8/2010	10/11/2010	to	10/15/2010	-126	-130	1	-126	-126	10594	7350
9/16/2010	to	10/15/2010	10/18/2010	to	10/22/2010	-91	-107	4	-114	-192	10503	7243
9/23/2010	to	10/22/2010	10/25/2010	to	10/29/2010	-181	-193	3	-75	-181	10322	7050
9/30/2010	to	10/29/2010	11/1/2010	to	11/5/2010	44	28	4	-82	-85	10366	7078
10/7/2010	to	11/5/2010	11/8/2010	to	11/12/2010	-89	-93	1	-89	-89	10277	6985
10/14/2010	to	11/12/2010	11/15/2010	to	11/19/2010	153	145	2	0	0	10430	7130
10/21/2010	to	11/19/2010	11/22/2010	to	11/26/2010	138	122	4	-51	-51	10568	7252
10/28/2010	to	11/26/2010	11/29/2010	to	12/3/2010	-123	-135	3	-144	-176	10445	7117
11/4/2010	to	12/3/2010	12/6/2010	to	12/10/2010	-36	-44	2	-72	-72	10409	7073
11/11/2010	to	12/10/2010	12/13/2010	to	12/17/2010	-25	-29	1	-25	-25	10384	7044
11/18/2010	to	12/17/2010	12/20/2010	to	12/24/2010	0	0	0	0	0	10384	7044
11/25/2010	to	12/24/2010	12/27/2010	to	12/31/2010	0	0	0	0	0	10384	7044
12/2/2010	to	12/31/2010	1/3/2011	to	1/7/2011	9	5	1	0	0	10393	7049
12/9/2010	to	1/7/2011	1/10/2011	to	1/14/2011	0	0	0	0	0	10393	7049
12/16/2010	to	1/14/2011	1/17/2011	to	1/21/2011	0	0	0	0	0	10393	7049
12/23/2010	to	1/21/2011	1/24/2011	to	1/28/2011	203	199	1	0	0	10596	7248

In-Sample Dates		Out-Of-Sample dates			osnp	NOnp\$4	ont	oltt	odd	EQ	NetEq
12/30/2010	to	1/28/2011	1/31/2011	to	2/4/2011	0	0	0	0	10596	7248
1/6/2011	to	2/4/2011	2/7/2011	to	2/11/2011	-96	-100	1	-96	10500	7148
1/13/2011	to	2/11/2011	2/14/2011	to	2/18/2011	0	0	0	0	10500	7148
1/20/2011	to	2/18/2011	2/21/2011	to	2/25/2011	97	85	3	-52	10597	7233
1/27/2011	to	2/25/2011	2/28/2011	to	3/4/2011	84	72	3	0	10681	7305
2/3/2011	to	3/4/2011	3/7/2011	to	3/11/2011	-17	-37	5	-116	10664	7268
2/10/2011	to	3/11/2011	3/14/2011	to	3/18/2011	-9	-41	8	-95	10655	7227
2/17/2011	to	3/18/2011	3/21/2011	to	3/25/2011	-85	-93	2	-101	10570	7134
2/24/2011	to	3/25/2011	3/28/2011	to	4/1/2011	0	0	0	0	10570	7134
3/3/2011	to	4/1/2011	4/4/2011	to	4/8/2011	-25	-29	1	-25	10545	7105
3/10/2011	to	4/8/2011	4/11/2011	to	4/15/2011	-88	-92	1	-88	10457	7013
3/17/2011	to	4/15/2011	4/18/2011	to	4/22/2011	-2	-10	2	-28	10455	7003
3/24/2011	to	4/22/2011	4/25/2011	to	4/29/2011	0	0	0	0	10455	7003
3/31/2011	to	4/29/2011	5/2/2011	to	5/6/2011	-128	-144	4	-118	10327	6859
4/7/2011	to	5/6/2011	5/9/2011	to	5/13/2011	-173	-181	2	-169	10154	6678
4/14/2011	to	5/13/2011	5/16/2011	to	5/20/2011	13	5	2	-19	10167	6683
4/21/2011	to	5/20/2011	5/23/2011	to	5/27/2011	-2	-6	1	-2	10165	6677
4/28/2011	to	5/27/2011	5/30/2011	to	6/3/2011	226	214	3	0	10391	6891
5/5/2011	to	6/3/2011	6/6/2011	to	6/10/2011	101	97	1	0	10492	6988
5/12/2011	to	6/10/2011	6/13/2011	to	6/17/2011	161	153	2	0	10653	7141
5/19/2011	to	6/17/2011	6/20/2011	to	6/24/2011	0	0	0	0	10653	7141
5/26/2011	to	6/24/2011	6/27/2011	to	7/1/2011	0	0	0	0	10653	7141
6/2/2011	to	7/1/2011	7/4/2011	to	7/8/2011	0	0	0	0	10653	7141
6/9/2011	to	7/8/2011	7/11/2011	to	7/15/2011	-76	-88	3	-126	10577	7053
6/16/2011	to	7/15/2011	7/18/2011	to	7/22/2011	186	178	2	0	10763	7231
6/23/2011	to	7/22/2011	7/25/2011	to	7/29/2011	-163	-179	4	-175	10600	7052
6/30/2011	to	7/29/2011	8/1/2011	to	8/5/2011	843	795	12	-100	11443	7847
7/7/2011	to	8/5/2011	8/8/2011	to	8/12/2011	1147	1079	17	-136	12590	8926
7/14/2011	to	8/12/2011	8/15/2011	to	8/19/2011	-46	-78	8	-120	12544	8848
7/21/2011	to	8/19/2011	8/22/2011	to	8/26/2011	186	150	9	-197	12730	8998
7/28/2011	to	8/26/2011	8/29/2011	to	9/2/2011	-186	-222	9	-149	12544	8776
8/4/2011	to	9/2/2011	9/5/2011	to	9/9/2011	179	159	5	-199	12723	8935
8/11/2011	to	9/9/2011	9/12/2011	to	9/16/2011	-88	-124	9	-128	12635	8811
8/18/2011	to	9/16/2011	9/19/2011	to	9/23/2011	-227	-279	13	-132	12408	8532
8/25/2011	to	9/23/2011	9/26/2011	to	9/30/2011	454	402	13	-102	12862	8934
9/1/2011	to	9/30/2011	10/3/2011	to	10/7/2011	70	10	15	-192	12932	8944
9/8/2011	to	10/7/2011	10/10/2011	to	10/14/2011	139	123	4	-81	13071	9067
9/15/2011	to	10/14/2011	10/17/2011	to	10/21/2011	67	35	8	-79	13138	9102
9/22/2011	to	10/21/2011	10/24/2011	to	10/28/2011	222	194	7	-64	13360	9296
9/29/2011	to	10/28/2011	10/31/2011	to	11/4/2011	-450	-494	11	-188	12910	8802
10/6/2011	to	11/4/2011	11/7/2011	to	11/11/2011	-36	-60	6	-149	12874	8742
10/13/2011	to	11/11/2011	11/14/2011	to	11/18/2011	263	243	5	-20	13137	8985
10/20/2011	to	11/18/2011	11/21/2011	to	11/25/2011	205	181	6	-30	13342	9166
10/27/2011	to	11/25/2011	11/28/2011	to	12/2/2011	41	17	6	-97	13383	9183
11/3/2011	to	12/2/2011	12/5/2011	to	12/9/2011	81	57	6	-157	13464	9240
11/10/2011	to	12/9/2011	12/12/2011	to	12/16/2011	56	36	5	-81	13520	9276
11/17/2011	to	12/16/2011	12/19/2011	to	12/23/2011	166	150	4	-87	13686	9426
11/24/2011	to	12/23/2011	12/26/2011	to	12/30/2011	0	0	0	0	13686	9426
12/1/2011	to	12/30/2011	1/2/2012	to	1/6/2012	-233	-245	3	-147	13453	9181
12/8/2011	to	1/6/2012	1/9/2012	to	1/13/2012	-145	-157	3	-81	13308	9024
12/15/2011	to	1/13/2012	1/16/2012	to	1/20/2012	-82	-86	1	-82	13226	8938
12/22/2011	to	1/20/2012	1/23/2012	to	1/27/2012	-71	-75	1	-71	13155	8863
12/29/2011	to	1/27/2012	1/30/2012	to	2/3/2012	13	1	3	-83	13168	8864
1/5/2012	to	2/3/2012	2/6/2012	to	2/10/2012	-11	-15	1	-11	13157	8849
1/12/2012	to	2/10/2012	2/13/2012	to	2/17/2012	29	21	2	0	13186	8870
1/19/2012	to	2/17/2012	2/20/2012	to	2/24/2012	0	0	0	0	13186	8870
1/26/2012	to	2/24/2012	2/27/2012	to	3/2/2012	0	0	0	0	13186	8870
2/2/2012	to	3/2/2012	3/5/2012	to	3/9/2012	48	44	1	0	13234	8914
2/9/2012	to	3/9/2012	3/12/2012	to	3/16/2012	190	186	1	0	13424	9100

In-Sample Dates			Out-Of-Sample dates			osnp	NOnp\$4	ont	ollt	odd	EQ	NetEq
2/16/2012	to	3/16/2012	3/19/2012	to	3/23/2012	0	0	0	0	0	13424	9100
2/23/2012	to	3/23/2012	3/26/2012	to	3/30/2012	20	12	2	-67	-67	13444	9112
3/1/2012	to	3/30/2012	4/2/2012	to	4/6/2012	42	38	1	0	0	13486	9150
3/8/2012	to	4/6/2012	4/9/2012	to	4/13/2012	168	152	4	-36	-46	13654	9302
3/15/2012	to	4/13/2012	4/16/2012	to	4/20/2012	-83	-99	4	-132	-221	13571	9203
3/22/2012	to	4/20/2012	4/23/2012	to	4/27/2012	-3	-11	2	-33	-33	13568	9192
3/29/2012	to	4/27/2012	4/30/2012	to	5/4/2012	56	44	3	-46	-64	13624	9236
4/5/2012	to	5/4/2012	5/7/2012	to	5/11/2012	-83	-95	3	-46	-83	13541	9141
4/12/2012	to	5/11/2012	5/14/2012	to	5/18/2012	-148	-160	3	-145	-148	13393	8981
4/19/2012	to	5/18/2012	5/21/2012	to	5/25/2012	-28	-44	4	-137	-179	13365	8937
4/26/2012	to	5/25/2012	5/28/2012	to	6/1/2012	17	-3	5	-68	-110	13382	8934
5/3/2012	to	6/1/2012	6/4/2012	to	6/8/2012	109	93	4	-82	-82	13491	9027
5/10/2012	to	6/8/2012	6/11/2012	to	6/15/2012	40	36	1	0	0	13531	9063
5/17/2012	to	6/15/2012	6/18/2012	to	6/22/2012	216	204	3	-34	-34	13747	9267
5/24/2012	to	6/22/2012	6/25/2012	to	6/29/2012	151	135	4	-35	-35	13898	9402
5/31/2012	to	6/29/2012	7/2/2012	to	7/6/2012	0	0	0	0	0	13898	9402
6/7/2012	to	7/6/2012	7/9/2012	to	7/13/2012	133	121	3	-71	-71	14031	9523
6/14/2012	to	7/13/2012	7/16/2012	to	7/20/2012	-93	-105	3	-116	-136	13938	9418
6/21/2012	to	7/20/2012	7/23/2012	to	7/27/2012	8	-12	5	-114	-161	13946	9406
6/28/2012	to	7/27/2012	7/30/2012	to	8/3/2012	75	67	2	0	0	14021	9473
7/5/2012	to	8/3/2012	8/6/2012	to	8/10/2012	-30	-34	1	-30	-30	13991	9439
7/12/2012	to	8/10/2012	8/13/2012	to	8/17/2012	0	0	0	0	0	13991	9439
7/19/2012	to	8/17/2012	8/20/2012	to	8/24/2012	0	0	0	0	0	13991	9439
7/26/2012	to	8/24/2012	8/27/2012	to	8/31/2012	0	0	0	0	0	13991	9439
8/2/2012	to	8/31/2012	9/3/2012	to	9/7/2012	147	143	1	0	0	14138	9582
8/9/2012	to	9/7/2012	9/10/2012	to	9/14/2012	0	0	0	0	0	14138	9582
8/16/2012	to	9/14/2012	9/17/2012	to	9/21/2012	0	0	0	0	0	14138	9582
8/23/2012	to	9/21/2012	9/24/2012	to	9/28/2012	-9	-21	3	-30	-30	14129	9561
8/30/2012	to	9/28/2012	10/1/2012	to	10/5/2012	-138	-150	3	-63	-138	13991	9411
9/6/2012	to	10/5/2012	10/8/2012	to	10/12/2012	-27	-35	2	-74	-74	13964	9376
9/13/2012	to	10/12/2012	10/15/2012	to	10/19/2012	231	223	2	0	0	14195	9599
9/20/2012	to	10/19/2012	10/22/2012	to	10/26/2012	-163	-175	3	-119	-181	14032	9424
9/27/2012	to	10/26/2012	10/29/2012	to	11/2/2012	0	0	0	0	0	14032	9424
10/4/2012	to	11/2/2012	11/5/2012	to	11/9/2012	129	117	3	-28	-28	14161	9541
10/11/2012	to	11/9/2012	11/12/2012	to	11/16/2012	31	15	4	-56	-56	14192	9556
10/18/2012	to	11/16/2012	11/19/2012	to	11/23/2012	22	14	2	-69	-69	14214	9570
10/25/2012	to	11/23/2012	11/26/2012	to	11/30/2012	42	22	5	-51	-73	14256	9592
11/1/2012	to	11/30/2012	12/3/2012	to	12/7/2012	-128	-132	1	-128	-128	14128	9460
11/8/2012	to	12/7/2012	12/10/2012	to	12/14/2012	0	0	0	0	0	14128	9460
11/15/2012	to	12/14/2012	12/17/2012	to	12/21/2012	80	72	2	-15	-15	14208	9532
11/22/2012	to	12/21/2012	12/24/2012	to	12/28/2012	160	148	3	-1	-1	14368	9680
11/29/2012	to	12/28/2012	12/31/2012	to	1/4/2013	248	240	2	0	0	14616	9920
12/6/2012	to	1/4/2013	1/7/2013	to	1/11/2013	0	0	0	0	0	14616	9920
12/13/2012	to	1/11/2013	1/14/2013	to	1/18/2013	0	0	0	0	0	14616	9920
12/20/2012	to	1/18/2013	1/21/2013	to	1/25/2013	0	0	0	0	0	14616	9920
12/27/2012	to	1/25/2013	1/28/2013	to	2/1/2013	0	0	0	0	0	14616	9920
1/3/2013	to	2/1/2013	2/4/2013	to	2/8/2013	0	0	0	0	0	14616	9920
1/10/2013	to	2/8/2013	2/11/2013	to	2/15/2013	0	0	0	0	0	14616	9920
1/17/2013	to	2/15/2013	2/18/2013	to	2/22/2013	98	90	2	0	0	14714	10010
1/24/2013	to	2/22/2013	2/25/2013	to	3/1/2013	0	0	0	0	0	14714	10010
1/31/2013	to	3/1/2013	3/4/2013	to	3/8/2013	43	39	1	0	0	14757	10049
2/7/2013	to	3/8/2013	3/11/2013	to	3/15/2013	-3	-7	1	-3	-3	14754	10042
2/14/2013	to	3/15/2013	3/18/2013	to	3/22/2013	-13	-29	4	-53	-85	14741	10013
2/21/2013	to	3/22/2013	3/25/2013	to	3/29/2013	-167	-179	3	-109	-167	14574	9834
2/28/2013	to	3/29/2013	4/1/2013	to	4/5/2013	-99	-107	2	-99	-99	14475	9727
3/7/2013	to	4/5/2013	4/8/2013	to	4/12/2013	0	0	0	0	0	14475	9727
3/14/2013	to	4/12/2013	4/15/2013	to	4/19/2013	506	486	5	-5	-5	14981	10213
3/21/2013	to	4/19/2013	4/22/2013	to	4/26/2013	53	49	1	0	0	15034	10262
3/28/2013	to	4/26/2013	4/29/2013	to	5/3/2013	0	0	0	0	0	15034	10262

In-Sample Dates			Out-Of-Sample dates			osnp	NOnp\$4	ont	ollt	odd	EQ	NetEq
4/4/2013	to	5/3/2013	5/6/2013	to	5/10/2013	0	0	0	0	0	15034	10262
4/11/2013	to	5/10/2013	5/13/2013	to	5/17/2013	0	0	0	0	0	15034	10262
4/18/2013	to	5/17/2013	5/20/2013	to	5/24/2013	17	-7	6	-80	-134	15051	10255
4/25/2013	to	5/24/2013	5/27/2013	to	5/31/2013	-137	-149	3	-83	-137	14914	10106
5/2/2013	to	5/31/2013	6/3/2013	to	6/7/2013	274	246	7	-100	-214	15188	10352
5/9/2013	to	6/7/2013	6/10/2013	to	6/14/2013	62	54	2	0	0	15250	10406
5/16/2013	to	6/14/2013	6/17/2013	to	6/21/2013	282	258	6	-51	-69	15532	10664
5/23/2013	to	6/21/2013	6/24/2013	to	6/28/2013	-73	-97	6	-78	-142	15459	10567
5/30/2013	to	6/28/2013	7/1/2013	to	7/5/2013	-380	-396	4	-143	-380	15079	10171
6/6/2013	to	7/5/2013	7/8/2013	to	7/12/2013	51	35	4	-43	-43	15130	10206
6/13/2013	to	7/12/2013	7/15/2013	to	7/19/2013	0	0	0	0	0	15130	10206
6/20/2013	to	7/19/2013	7/22/2013	to	7/26/2013	0	0	0	0	0	15130	10206
6/27/2013	to	7/26/2013	7/29/2013	to	8/2/2013	43	35	2	-11	-11	15173	10241
7/4/2013	to	8/2/2013	8/5/2013	to	8/9/2013	-43	-47	1	-43	-43	15130	10194
7/11/2013	to	8/9/2013	8/12/2013	to	8/16/2013	79	75	1	0	0	15209	10269
7/18/2013	to	8/16/2013	8/19/2013	to	8/23/2013	-40	-52	3	-105	-105	15169	10217
7/25/2013	to	8/23/2013	8/26/2013	to	8/30/2013	155	147	2	0	0	15324	10364
8/1/2013	to	8/30/2013	9/2/2013	to	9/6/2013	-232	-248	4	-115	-232	15092	10116
8/8/2013	to	9/6/2013	9/9/2013	to	9/13/2013	49	45	1	0	0	15141	10161
8/15/2013	to	9/13/2013	9/16/2013	to	9/20/2013	169	157	3	-31	-31	15310	10318
8/22/2013	to	9/20/2013	9/23/2013	to	9/27/2013	-11	-15	1	-11	-11	15299	10303
8/29/2013	to	9/27/2013	9/30/2013	to	10/4/2013	55	47	2	-27	-27	15354	10350
9/5/2013	to	10/4/2013	10/7/2013	to	10/11/2013	180	160	5	-70	-95	15534	10510
9/12/2013	to	10/11/2013	10/14/2013	to	10/18/2013	169	161	2	0	0	15703	10671
9/19/2013	to	10/18/2013	10/21/2013	to	10/25/2013	0	0	0	0	0	15703	10671
9/26/2013	to	10/25/2013	10/28/2013	to	11/1/2013	-56	-68	3	-67	-111	15647	10603
10/3/2013	to	11/1/2013	11/4/2013	to	11/8/2013	264	248	4	-38	-60	15911	10851
10/10/2013	to	11/8/2013	11/11/2013	to	11/15/2013	0	0	0	0	0	15911	10851
10/17/2013	to	11/15/2013	11/18/2013	to	11/22/2013	135	127	2	0	0	16046	10978
10/24/2013	to	11/22/2013	11/25/2013	to	11/29/2013	0	0	0	0	0	16046	10978
10/31/2013	to	11/29/2013	12/2/2013	to	12/6/2013	-151	-167	4	-141	-224	15895	10811
11/7/2013	to	12/6/2013	12/9/2013	to	12/13/2013	0	0	0	0	0	15895	10811
11/14/2013	to	12/13/2013	12/16/2013	to	12/20/2013	203	195	2	-27	-27	16098	11006
11/21/2013	to	12/20/2013	12/23/2013	to	12/27/2013	-2	-6	1	-2	-2	16096	11000
11/28/2013	to	12/27/2013	12/30/2013	to	1/3/2014	61	57	1	0	0	16157	11057
12/5/2013	to	1/3/2014	1/6/2014	to	1/10/2014	0	0	0	0	0	16157	11057
12/12/2013	to	1/10/2014	1/13/2014	to	1/17/2014	0	0	0	0	0	16157	11057
12/19/2013	to	1/17/2014	1/20/2014	to	1/24/2014	0	0	0	0	0	16157	11057
12/26/2013	to	1/24/2014	1/27/2014	to	1/31/2014	74	34	10	-110	-138	16231	11091
1/2/2014	to	1/31/2014	2/3/2014	to	2/7/2014	507	487	5	-31	-31	16738	11578
1/9/2014	to	2/7/2014	2/10/2014	to	2/14/2014	-174	-178	1	-174	-174	16564	11400
1/16/2014	to	2/14/2014	2/17/2014	to	2/21/2014	0	0	0	0	0	16564	11400
1/23/2014	to	2/21/2014	2/24/2014	to	2/28/2014	-64	-84	5	-19	-64	16500	11316
1/30/2014	to	2/28/2014	3/3/2014	to	3/7/2014	39	23	4	-49	-69	16539	11339
2/6/2014	to	3/7/2014	3/10/2014	to	3/14/2014	-239	-255	4	-104	-239	16300	11084
2/13/2014	to	3/14/2014	3/17/2014	to	3/21/2014	46	30	4	-48	-48	16346	11114
2/20/2014	to	3/21/2014	3/24/2014	to	3/28/2014	-224	-256	8	-89	-235	16122	10858
2/27/2014	to	3/28/2014	3/31/2014	to	4/4/2014	204	188	4	-78	-78	16326	11046
3/6/2014	to	4/4/2014	4/7/2014	to	4/11/2014	196	172	6	-151	-151	16522	11218
3/13/2014	to	4/11/2014	4/14/2014	to	4/18/2014	-29	-57	7	-116	-230	16493	11161
3/20/2014	to	4/18/2014	4/21/2014	to	4/25/2014	22	14	2	-30	-30	16515	11175
3/27/2014	to	4/25/2014	4/28/2014	to	5/2/2014	-38	-50	3	-46	-55	16477	11125
4/3/2014	to	5/2/2014	5/5/2014	to	5/9/2014	-155	-175	5	-146	-165	16322	10950
4/10/2014	to	5/9/2014	5/12/2014	to	5/16/2014	135	127	2	0	0	16457	11077
4/17/2014	to	5/16/2014	5/19/2014	to	5/23/2014	114	106	2	0	0	16571	11183
4/24/2014	to	5/23/2014	5/26/2014	to	5/30/2014	25	21	1	0	0	16596	11204
5/1/2014	to	5/30/2014	6/2/2014	to	6/6/2014	0	0	0	0	0	16596	11204
5/8/2014	to	6/6/2014	6/9/2014	to	6/13/2014	0	0	0	0	0	16596	11204
5/15/2014	to	6/13/2014	6/16/2014	to	6/20/2014	0	0	0	0	0	16596	11204

In-Sample Dates		Out-Of-Sample dates				osnp	NOnp\$4	ont	ollt	odd	EQ	NetEq
5/22/2014	to	6/20/2014	6/23/2014	to	6/27/2014	-58	-66	2	-63	-63	16538	11138
5/29/2014	to	6/27/2014	6/30/2014	to	7/4/2014	39	35	1	0	0	16577	11173
6/5/2014	to	7/4/2014	7/7/2014	to	7/11/2014	-58	-66	2	-95	-95	16519	11107
6/12/2014	to	7/11/2014	7/14/2014	to	7/18/2014	143	135	2	0	0	16662	11242
6/19/2014	to	7/18/2014	7/21/2014	to	7/25/2014	5	-3	2	-23	-23	16667	11239
6/26/2014	to	7/25/2014	7/28/2014	to	8/1/2014	191	167	6	-90	-106	16858	11406
7/3/2014	to	8/1/2014	8/4/2014	to	8/8/2014	386	374	3	0	0	17244	11780
7/10/2014	to	8/8/2014	8/11/2014	to	8/15/2014	-33	-37	1	-33	-33	17211	11743
7/17/2014	to	8/15/2014	8/18/2014	to	8/22/2014	0	0	0	0	0	17211	11743
7/24/2014	to	8/22/2014	8/25/2014	to	8/29/2014	0	0	0	0	0	17211	11743
7/31/2014	to	8/29/2014	9/1/2014	to	9/5/2014	0	0	0	0	0	17211	11743
8/7/2014	to	9/5/2014	9/8/2014	to	9/12/2014	70	66	1	0	0	17281	11809
8/14/2014	to	9/12/2014	9/15/2014	to	9/19/2014	-50	-58	2	-52	-52	17231	11751
8/21/2014	to	9/19/2014	9/22/2014	to	9/26/2014	284	272	3	-8	-8	17515	12023
8/28/2014	to	9/26/2014	9/29/2014	to	10/3/2014	167	147	5	-95	-95	17682	12170
9/4/2014	to	10/3/2014	10/6/2014	to	10/10/2014	71	27	11	-228	-365	17753	12197
9/11/2014	to	10/10/2014	10/13/2014	to	10/17/2014	-143	-223	20	-209	-387	17610	11974
9/18/2014	to	10/17/2014	10/20/2014	to	10/24/2014	309	293	4	-11	-11	17919	12267
9/25/2014	to	10/24/2014	10/27/2014	to	10/31/2014	-225	-253	7	-164	-339	17694	12014
10/2/2014	to	10/31/2014	11/3/2014	to	11/7/2014	-31	-35	1	-31	-31	17663	11979
10/9/2014	to	11/7/2014	11/10/2014	to	11/14/2014	0	0	0	0	0	17663	11979
10/16/2014	to	11/14/2014	11/17/2014	to	11/21/2014	-16	-28	3	-62	-74	17647	11951
10/23/2014	to	11/21/2014	11/24/2014	to	11/28/2014	15	11	1	0	0	17662	11962
10/30/2014	to	11/28/2014	12/1/2014	to	12/5/2014	5	1	1	0	0	17667	11963
11/6/2014	to	12/5/2014	12/8/2014	to	12/12/2014	300	256	11	-115	-155	17967	12219
11/13/2014	to	12/12/2014	12/15/2014	to	12/19/2014	86	26	15	-270	-563	18053	12245
11/20/2014	to	12/19/2014	12/22/2014	to	12/26/2014	-49	-57	2	-26	-49	18004	12188
11/27/2014	to	12/26/2014	12/29/2014	to	1/2/2015	146	134	3	-73	-73	18150	12322
12/4/2014	to	1/2/2015	1/5/2015	to	1/9/2015	402	370	8	-114	-197	18552	12692
12/11/2014	to	1/9/2015	1/12/2015	to	1/16/2015	-10	-74	16	-139	-346	18542	12618
12/18/2014	to	1/16/2015	1/19/2015	to	1/23/2015	35	11	6	-110	-241	18577	12629
12/25/2014	to	1/23/2015	1/26/2015	to	1/30/2015	346	314	8	-141	-141	18923	12943
1/1/2015	to	1/30/2015	2/2/2015	to	2/6/2015	-39	-75	9	-205	-299	18884	12868
1/8/2015	to	2/6/2015	2/9/2015	to	2/13/2015	221	213	2	0	0	19105	13081
1/15/2015	to	2/13/2015	2/16/2015	to	2/20/2015	-320	-328	2	-226	-320	18785	12753
1/22/2015	to	2/20/2015	2/23/2015	to	2/27/2015	-30	-34	1	-30	-30	18755	12719
1/29/2015	to	2/27/2015	3/2/2015	to	3/6/2015	139	127	3	-77	-86	18894	12846
2/5/2015	to	3/6/2015	3/9/2015	to	3/13/2015	235	223	3	0	0	19129	13069
2/12/2015	to	3/13/2015	3/16/2015	to	3/20/2015	76	56	5	-202	-231	19205	13125
2/19/2015	to	3/20/2015	3/23/2015	to	3/27/2015	233	217	4	-11	-11	19438	13342
2/26/2015	to	3/27/2015	3/30/2015	to	4/3/2015	-68	-92	6	-70	-185	19370	13250
3/5/2015	to	4/3/2015	4/6/2015	to	4/10/2015	-49	-65	4	-92	-149	19321	13185
3/12/2015	to	4/10/2015	4/13/2015	to	4/17/2015	-28	-40	3	-75	-84	19293	13145
3/19/2015	to	4/17/2015	4/20/2015	to	4/24/2015	93	85	2	0	0	19386	13230
3/26/2015	to	4/24/2015	4/27/2015	to	5/1/2015	24	8	4	-204	-207	19410	13238
4/2/2015	to	5/1/2015	5/4/2015	to	5/8/2015	-245	-269	6	-191	-384	19165	12969
4/9/2015	to	5/8/2015	5/11/2015	to	5/15/2015	-72	-88	4	-108	-200	19093	12881
4/16/2015	to	5/15/2015	5/18/2015	to	5/22/2015	-85	-89	1	-85	-85	19008	12792
4/23/2015	to	5/22/2015	5/25/2015	to	5/29/2015	226	214	3	-2	-2	19234	13006
4/30/2015	to	5/29/2015	6/1/2015	to	6/5/2015	-149	-169	5	-78	-149	19085	12837
5/7/2015	to	6/5/2015	6/8/2015	to	6/12/2015	144	136	2	0	0	19229	12973
5/14/2015	to	6/12/2015	6/15/2015	to	6/19/2015	51	31	5	-110	-126	19280	13004
5/21/2015	to	6/19/2015	6/22/2015	to	6/26/2015	0	-4	1	0	0	19280	13000
5/28/2015	to	6/26/2015	6/29/2015	to	7/3/2015	122	98	6	-84	-174	19402	13098
6/4/2015	to	7/3/2015	7/6/2015	to	7/10/2015	76	48	7	-199	-202	19478	13146
6/11/2015	to	7/10/2015	7/13/2015	to	7/17/2015	58	46	3	-37	-37	19536	13192
6/18/2015	to	7/17/2015	7/20/2015	to	7/24/2015	2	-2	1	0	0	19538	13190
6/25/2015	to	7/24/2015	7/27/2015	to	7/31/2015	54	42	3	-101	-101	19592	13232
7/2/2015	to	7/31/2015	8/3/2015	to	8/7/2015	-81	-101	5	-75	-161	19511	13131

In-Sample Dates		Out-Of-Sample dates		osnp	NOnp\$4	ont	ollt	odd	EQ	NetEq
7/9/2015	to 8/7/2015	8/10/2015	to 8/14/2015	331	315	4	-15	-15	19842	13446
7/16/2015	to 8/14/2015	8/17/2015	to 8/21/2015	389	353	9	-135	-196	20231	13799
7/23/2015	to 8/21/2015	8/24/2015	to 8/28/2015	1026	930	24	-153	-403	21257	14729
7/30/2015	to 8/28/2015	8/31/2015	to 9/4/2015	0	0	0	0	0	21257	14729
8/6/2015	to 9/4/2015	9/7/2015	to 9/11/2015	-206	-246	10	-189	-338	21051	14483
8/13/2015	to 9/11/2015	9/14/2015	to 9/18/2015	550	518	8	-26	-34	21601	15001
8/20/2015	to 9/18/2015	9/21/2015	to 9/25/2015	-148	-196	12	-75	-216	21453	14805
8/27/2015	to 9/25/2015	9/28/2015	to 10/2/2015	716	668	12	-99	-188	22169	15473
9/3/2015	to 10/2/2015	10/5/2015	to 10/9/2015	-42	-70	7	-80	-201	22127	15403
9/10/2015	to 10/9/2015	10/12/2015	to 10/16/2015	334	322	3	0	0	22461	15725
9/17/2015	to 10/16/2015	10/19/2015	to 10/23/2015	31	3	7	-93	-147	22492	15728
9/24/2015	to 10/23/2015	10/26/2015	to 10/30/2015	-26	-46	5	-98	-142	22466	15682
10/1/2015	to 10/30/2015	11/2/2015	to 11/6/2015	-1	-17	4	-40	-55	22465	15665
10/8/2015	to 11/6/2015	11/9/2015	to 11/13/2015	-42	-66	6	-149	-149	22423	15599
10/15/2015	to 11/13/2015	11/16/2015	to 11/20/2015	458	438	5	-41	-41	22881	16037
10/22/2015	to 11/20/2015	11/23/2015	to 11/27/2015	-48	-60	3	-92	-125	22833	15977
10/29/2015	to 11/27/2015	11/30/2015	to 12/4/2015	308	288	5	-139	-207	23141	16265
11/5/2015	to 12/4/2015	12/7/2015	to 12/11/2015	493	461	8	-29	-29	23634	16726
11/12/2015	to 12/11/2015	12/14/2015	to 12/18/2015	494	466	7	-134	-163	24128	17192
11/19/2015	to 12/18/2015	12/21/2015	to 12/25/2015	285	269	4	0	0	24413	17461
11/26/2015	to 12/25/2015	12/28/2015	to 1/1/2016	0	0	0	0	0	24413	17461
12/3/2015	to 1/1/2016	1/4/2016	to 1/8/2016	0	0	0	0	0	24413	17461
12/10/2015	to 1/8/2016	1/11/2016	to 1/15/2016	550	482	17	-202	-202	24963	17943
12/17/2015	to 1/15/2016	1/18/2016	to 1/22/2016	150	86	16	-118	-393	25113	18029
12/24/2015	to 1/22/2016	1/25/2016	to 1/29/2016	72	24	12	-269	-451	25185	18053
12/31/2015	to 1/29/2016	2/1/2016	to 2/5/2016	187	139	12	-224	-298	25372	18192
1/7/2016	to 2/5/2016	2/8/2016	to 2/12/2016	41	-23	16	-86	-277	25413	18169
1/14/2016	to 2/12/2016	2/15/2016	to 2/19/2016	-102	-122	5	-176	-270	25311	18047
1/21/2016	to 2/19/2016	2/22/2016	to 2/26/2016	-126	-158	8	-246	-456	25185	17889
1/28/2016	to 2/26/2016	2/29/2016	to 3/4/2016	305	285	5	-55	-102	25490	18174
2/4/2016	to 3/4/2016	3/7/2016	to 3/11/2016	36	12	6	-81	-107	25526	18186
2/11/2016	to 3/11/2016	3/14/2016	to 3/18/2016	-122	-142	5	-69	-122	25404	18044
2/18/2016	to 3/18/2016	3/21/2016	to 3/25/2016	-147	-159	3	-117	-147	25257	17885
2/25/2016	to 3/25/2016	3/28/2016	to 4/1/2016	-31	-51	5	-135	-190	25226	17834
3/3/2016	to 4/1/2016	4/4/2016	to 4/8/2016	44	20	6	-89	-158	25270	17854
3/10/2016	to 4/8/2016	4/11/2016	to 4/15/2016	132	112	5	-113	-113	25402	17966
3/17/2016	to 4/15/2016	4/18/2016	to 4/22/2016	9	1	2	-101	-101	25411	17967
3/24/2016	to 4/22/2016	4/25/2016	to 4/29/2016	71	55	4	-50	-80	25482	18022
3/31/2016	to 4/29/2016	5/2/2016	to 5/6/2016	-19	-35	4	-39	-56	25463	17987
4/7/2016	to 5/6/2016	5/9/2016	to 5/13/2016	13	1	3	-81	-81	25476	17988
4/14/2016	to 5/13/2016	5/16/2016	to 5/20/2016	16	-4	5	-110	-129	25492	17984
4/21/2016	to 5/20/2016	5/23/2016	to 5/27/2016	130	122	2	0	0	25622	18106
4/28/2016	to 5/27/2016	5/30/2016	to 6/3/2016	-323	-335	3	-154	-323	25299	17771
5/5/2016	to 6/3/2016	6/6/2016	to 6/10/2016	-22	-34	3	-46	-46	25277	17737
5/12/2016	to 6/10/2016	6/13/2016	to 6/17/2016	81	53	7	-81	-184	25358	17790
5/19/2016	to 6/17/2016	6/20/2016	to 6/24/2016	82	58	6	-139	-139	25440	17848
5/26/2016	to 6/24/2016	6/27/2016	to 7/1/2016	391	359	8	-32	-62	25831	18207
6/2/2016	to 7/1/2016	7/4/2016	to 7/8/2016	204	180	6	-79	-79	26035	18387
6/9/2016	to 7/8/2016	7/11/2016	to 7/15/2016	-17	-29	3	-16	-17	26018	18358
6/16/2016	to 7/15/2016	7/18/2016	to 7/22/2016	-37	-41	1	-37	-37	25981	18317
6/23/2016	to 7/22/2016	7/25/2016	to 7/29/2016	-140	-148	2	-73	-140	25841	18169
6/30/2016	to 7/29/2016	8/1/2016	to 8/5/2016	46	34	3	-6	-10	25887	18203
7/7/2016	to 8/5/2016	8/8/2016	to 8/12/2016	13	1	3	-9	-9	25900	18204
7/14/2016	to 8/12/2016	8/15/2016	to 8/19/2016	-127	-143	4	-85	-141	25773	18061
7/21/2016	to 8/19/2016	8/22/2016	to 8/26/2016	-26	-42	4	-52	-114	25747	18019
7/28/2016	to 8/26/2016	8/29/2016	to 9/2/2016	-15	-31	4	-51	-51	25732	17988
8/4/2016	to 9/2/2016	9/5/2016	to 9/9/2016	244	236	2	-112	-112	25976	18224
8/11/2016	to 9/9/2016	9/12/2016	to 9/16/2016	-12	-40	7	-222	-222	25964	18184
8/18/2016	to 9/16/2016	9/19/2016	to 9/23/2016	90	66	6	-93	-99	26054	18250

In-Sample Dates		Out-Of-Sample dates			osnp	NOnp\$4	ont	ollt	odd	EQ	NetEq	
8/25/2016	to	9/23/2016	9/26/2016	to	9/30/2016	36	12	6	-51	-84	26090	18262
9/1/2016	to	9/30/2016	10/3/2016	to	10/7/2016	18	-2	5	-31	-31	26108	18260
9/8/2016	to	10/7/2016	10/10/2016	to	10/14/2016	140	116	6	-66	-66	26248	18376
9/15/2016	to	10/14/2016	10/17/2016	to	10/21/2016	-105	-121	4	-100	-139	26143	18255
9/22/2016	to	10/21/2016	10/24/2016	to	10/28/2016	-103	-123	5	-86	-147	26040	18132
9/29/2016	to	10/28/2016	10/31/2016	to	11/4/2016	-71	-79	2	-72	-72	25969	18053
10/6/2016	to	11/4/2016	11/7/2016	to	11/11/2016	121	65	14	-105	-281	26090	18118
10/13/2016	to	11/11/2016	11/14/2016	to	11/18/2016	5	1	1	0	0	26095	18119
10/20/2016	to	11/18/2016	11/21/2016	to	11/25/2016	-20	-28	2	-84	-84	26075	18091
10/27/2016	to	11/25/2016	11/28/2016	to	12/2/2016	-84	-92	2	-144	-144	25991	17999
11/3/2016	to	12/2/2016	12/5/2016	to	12/9/2016	27	23	1	0	0	26018	18022
11/10/2016	to	12/9/2016	12/12/2016	to	12/16/2016	-107	-139	8	-95	-188	25911	17883
11/17/2016	to	12/16/2016	12/19/2016	to	12/23/2016	-10	-18	2	-7	-10	25901	17865
11/24/2016	to	12/23/2016	12/26/2016	to	12/30/2016	87	79	2	-38	-38	25988	17944
12/1/2016	to	12/30/2016	1/2/2017	to	1/6/2017	-21	-33	3	-51	-80	25967	17911
12/8/2016	to	1/6/2017	1/9/2017	to	1/13/2017	-118	-138	5	-84	-119	25849	17773
12/15/2016	to	1/13/2017	1/16/2017	to	1/20/2017	-39	-47	2	-35	-39	25810	17726
12/22/2016	to	1/20/2017	1/23/2017	to	1/27/2017	80	76	1	0	0	25890	17802
12/29/2016	to	1/27/2017	1/30/2017	to	2/3/2017	-33	-45	3	-83	-107	25857	17757
1/5/2017	to	2/3/2017	2/6/2017	to	2/10/2017	-59	-63	1	-59	-59	25798	17694
1/12/2017	to	2/10/2017	2/13/2017	to	2/17/2017	-20	-28	2	-52	-52	25778	17666
1/19/2017	to	2/17/2017	2/20/2017	to	2/24/2017	12	4	2	-40	-40	25790	17670
1/26/2017	to	2/24/2017	2/27/2017	to	3/3/2017	229	221	2	0	0	26019	17891
2/2/2017	to	3/3/2017	3/6/2017	to	3/10/2017	-71	-83	3	-45	-71	25948	17808
2/9/2017	to	3/10/2017	3/13/2017	to	3/17/2017	60	52	2	0	0	26008	17860
2/16/2017	to	3/17/2017	3/20/2017	to	3/24/2017	274	258	4	-72	-72	26282	18118
2/23/2017	to	3/24/2017	3/27/2017	to	3/31/2017	0	0	0	0	0	26282	18118
3/2/2017	to	3/31/2017	4/3/2017	to	4/7/2017	44	32	3	-63	-91	26326	18150
3/9/2017	to	4/7/2017	4/10/2017	to	4/14/2017	-147	-159	3	-71	-147	26179	17991
3/16/2017	to	4/14/2017	4/17/2017	to	4/21/2017	124	120	1	0	0	26303	18111
3/23/2017	to	4/21/2017	4/24/2017	to	4/28/2017	79	67	3	0	0	26382	18178
3/30/2017	to	4/28/2017	5/1/2017	to	5/5/2017	-71	-75	1	-71	-71	26311	18103
4/6/2017	to	5/5/2017	5/8/2017	to	5/12/2017	-51	-55	1	-51	-51	26260	18048
4/13/2017	to	5/12/2017	5/15/2017	to	5/19/2017	273	253	5	-69	-69	26533	18301
4/20/2017	to	5/19/2017	5/22/2017	to	5/26/2017	27	23	1	0	0	26560	18324
4/27/2017	to	5/26/2017	5/29/2017	to	6/2/2017	-44	-48	1	-44	-44	26516	18276
5/4/2017	to	6/2/2017	6/5/2017	to	6/9/2017	-26	-34	2	-50	-50	26490	18242
5/11/2017	to	6/9/2017	6/12/2017	to	6/16/2017	-270	-290	5	-112	-270	26220	17952
5/18/2017	to	6/16/2017	6/19/2017	to	6/23/2017	66	58	2	-19	-19	26286	18010
5/25/2017	to	6/23/2017	6/26/2017	to	6/30/2017	100	76	6	-82	-82	26386	18086
6/1/2017	to	6/30/2017	7/3/2017	to	7/7/2017	177	169	2	0	0	26563	18255
6/8/2017	to	7/7/2017	7/10/2017	to	7/14/2017	5	-3	2	-12	-12	26568	18252
6/15/2017	to	7/14/2017	7/17/2017	to	7/21/2017	47	39	2	-25	-25	26615	18291
6/22/2017	to	7/21/2017	7/24/2017	to	7/28/2017	0	0	0	0	0	26615	18291
6/29/2017	to	7/28/2017	7/31/2017	to	8/4/2017	-114	-122	2	-74	-114	26501	18169
7/6/2017	to	8/4/2017	8/7/2017	to	8/11/2017	113	101	3	-91	-101	26614	18270
7/13/2017	to	8/11/2017	8/14/2017	to	8/18/2017	160	144	4	-73	-133	26774	18414
7/20/2017	to	8/18/2017	8/21/2017	to	8/25/2017	33	13	5	-58	-58	26807	18427
7/27/2017	to	8/25/2017	8/28/2017	to	9/1/2017	-88	-96	2	-130	-130	26719	18331
8/3/2017	to	9/1/2017	9/4/2017	to	9/8/2017	96	92	1	0	0	26815	18423
8/10/2017	to	9/8/2017	9/11/2017	to	9/15/2017	29	17	3	-54	-54	26844	18440
8/17/2017	to	9/15/2017	9/18/2017	to	9/22/2017	-27	-35	2	-34	-34	26817	18405
8/24/2017	to	9/22/2017	9/25/2017	to	9/29/2017	-34	-38	1	-34	-34	26783	18367
8/31/2017	to	9/29/2017	10/2/2017	to	10/6/2017	0	0	0	0	0	26783	18367
9/7/2017	to	10/6/2017	10/9/2017	to	10/13/2017	-35	-39	1	-35	-35	26748	18328
9/14/2017	to	10/13/2017	10/16/2017	to	10/20/2017	-52	-60	2	-108	-108	26696	18268
9/21/2017	to	10/20/2017	10/23/2017	to	10/27/2017	-137	-145	2	-79	-137	26559	18123
9/28/2017	to	10/27/2017	10/30/2017	to	11/3/2017	-210	-222	3	-129	-210	26349	17901
10/5/2017	to	11/3/2017	11/6/2017	to	11/10/2017	-59	-63	1	-59	-59	26290	17838

In-Sample Dates		Out-Of-Sample dates			osnp	NOnp\$4	ont	ollt	odd	EQ	NetEq	
10/12/2017	to	11/10/2017	11/13/2017	to	11/17/2017	-88	-104	4	-79	-178	26202	17734
10/19/2017	to	11/17/2017	11/20/2017	to	11/24/2017	35	31	1	0	0	26237	17765
10/26/2017	to	11/24/2017	11/27/2017	to	12/1/2017	174	158	4	-29	-29	26411	17923
11/2/2017	to	12/1/2017	12/4/2017	to	12/8/2017	194	178	4	-115	-115	26605	18101
11/9/2017	to	12/8/2017	12/11/2017	to	12/15/2017	-108	-112	1	-108	-108	26497	17989
11/16/2017	to	12/15/2017	12/18/2017	to	12/22/2017	-30	-34	1	-30	-30	26467	17955
11/23/2017	to	12/22/2017	12/25/2017	to	12/29/2017	16	12	1	0	0	26483	17967
11/30/2017	to	12/29/2017	1/1/2018	to	1/5/2018	250	238	3	0	0	26733	18205
12/7/2017	to	1/5/2018	1/8/2018	to	1/12/2018	193	181	3	-46	-46	26926	18386
12/14/2017	to	1/12/2018	1/15/2018	to	1/19/2018	62	42	5	-65	-94	26988	18428
12/21/2017	to	1/19/2018	1/22/2018	to	1/26/2018	242	218	6	-55	-91	27230	18646
12/28/2017	to	1/26/2018	1/29/2018	to	2/2/2018	73	13	15	-151	-214	27303	18659
1/4/2018	to	2/2/2018	2/5/2018	to	2/9/2018	-5	-157	38	-360	-1557	27298	18502
1/11/2018	to	2/9/2018	2/12/2018	to	2/16/2018	167	107	15	-186	-253	27465	18609
1/18/2018	to	2/16/2018	2/19/2018	to	2/23/2018	307	271	9	-245	-298	27772	18880
1/25/2018	to	2/23/2018	2/26/2018	to	3/2/2018	-335	-427	23	-267	-512	27437	18453
2/1/2018	to	3/2/2018	3/5/2018	to	3/9/2018	183	131	13	-131	-403	27620	18584
2/8/2018	to	3/9/2018	3/12/2018	to	3/16/2018	-195	-239	11	-180	-361	27425	18345
2/15/2018	to	3/16/2018	3/19/2018	to	3/23/2018	563	503	15	-137	-536	27988	18848
2/22/2018	to	3/23/2018	3/26/2018	to	3/30/2018	413	333	20	-141	-294	28401	19181
3/1/2018	to	3/30/2018	4/2/2018	to	4/6/2018	1042	942	25	-187	-322	29443	20123
3/8/2018	to	4/6/2018	4/9/2018	to	4/13/2018	545	489	14	-94	-289	29988	20612
3/15/2018	to	4/13/2018	4/16/2018	to	4/20/2018	375	359	4	0	0	30363	20971
3/22/2018	to	4/20/2018	4/23/2018	to	4/27/2018	-682	-746	16	-133	-729	29681	20225
3/29/2018	to	4/27/2018	4/30/2018	to	5/4/2018	590	546	11	-124	-124	30271	20771
4/5/2018	to	5/4/2018	5/7/2018	to	5/11/2018	264	240	6	-56	-88	30535	21011
4/12/2018	to	5/11/2018	5/14/2018	to	5/18/2018	-82	-98	4	-73	-90	30453	20913
4/19/2018	to	5/18/2018	5/21/2018	to	5/25/2018	-410	-438	7	-135	-410	30043	20475
4/26/2018	to	5/25/2018	5/28/2018	to	6/1/2018	-40	-76	9	-162	-222	30003	20399
5/3/2018	to	6/1/2018	6/4/2018	to	6/8/2018	-86	-94	2	-66	-86	29917	20305
5/10/2018	to	6/8/2018	6/11/2018	to	6/15/2018	-122	-134	3	-124	-146	29795	20171
5/17/2018	to	6/15/2018	6/18/2018	to	6/22/2018	-24	-48	6	-112	-112	29771	20123
5/24/2018	to	6/22/2018	6/25/2018	to	6/29/2018	53	-3	14	-160	-376	29824	20120
5/31/2018	to	6/29/2018	7/2/2018	to	7/6/2018	-47	-71	6	-134	-134	29777	20049
6/7/2018	to	7/6/2018	7/9/2018	to	7/13/2018	286	274	3	0	0	30063	20323
6/14/2018	to	7/13/2018	7/16/2018	to	7/20/2018	39	35	1	0	0	30102	20358
6/21/2018	to	7/20/2018	7/23/2018	to	7/27/2018	-199	-219	5	-129	-201	29903	20139
6/28/2018	to	7/27/2018	7/30/2018	to	8/3/2018	-241	-249	2	-273	-273	29662	19890
7/5/2018	to	8/3/2018	8/6/2018	to	8/10/2018	30	18	3	-22	-22	29692	19908
7/12/2018	to	8/10/2018	8/13/2018	to	8/17/2018	465	441	6	0	0	30157	20349
7/19/2018	to	8/17/2018	8/20/2018	to	8/24/2018	98	90	2	0	0	30255	20439
7/26/2018	to	8/24/2018	8/27/2018	to	8/31/2018	123	111	3	-33	-33	30378	20550
8/2/2018	to	8/31/2018	9/3/2018	to	9/7/2018	0	0	0	0	0	30378	20550
8/9/2018	to	9/7/2018	9/10/2018	to	9/14/2018	0	0	0	0	0	30378	20550
8/16/2018	to	9/14/2018	9/17/2018	to	9/21/2018	240	228	3	0	0	30618	20778
8/23/2018	to	9/21/2018	9/24/2018	to	9/28/2018	91	79	3	0	0	30709	20857
8/30/2018	to	9/28/2018	10/1/2018	to	10/5/2018	335	299	9	-118	-215	31044	21156
9/6/2018	to	10/5/2018	10/8/2018	to	10/12/2018	553	457	24	-230	-383	31597	21613
9/13/2018	to	10/12/2018	10/15/2018	to	10/19/2018	33	-63	24	-143	-289	31630	21550
9/20/2018	to	10/19/2018	10/22/2018	to	10/26/2018	-30	-162	33	-133	-690	31600	21388
9/27/2018	to	10/26/2018	10/29/2018	to	11/2/2018	163	87	19	-175	-536	31763	21475
10/4/2018	to	11/2/2018	11/5/2018	to	11/9/2018	-202	-250	12	-138	-447	31561	21225
10/11/2018	to	11/9/2018	11/12/2018	to	11/16/2018	235	139	24	-212	-426	31796	21364
10/18/2018	to	11/16/2018	11/19/2018	to	11/23/2018	573	517	14	-111	-194	32369	21881
10/25/2018	to	11/23/2018	11/26/2018	to	11/30/2018	204	168	9	-141	-327	32573	22049
11/1/2018	to	11/30/2018	12/3/2018	to	12/7/2018	591	507	21	-154	-317	33164	22556

Appendix: The Normalization Multiplier

Repeated Median Velocity Normalization Multiplier

One of the inputs to the calculation of RMedV is N , the number of lookback bars. When we plot the RMedV we notice that the amplitude, and the maximum and minimum values of the RMedV vary quite significantly with different N inputs.

Below is a table, generated by the #iRMedVtMULTSTD indicator of the standard deviation(SD) of the 108333 calculated RMedV values for different N . We used 5 min bars of the CL from 3/8/2014 to 2/12/2016 to generate this table.

@CL 5 min bars Date Range 1140803 to 1160212
Total Number of Bars=108333 Sqrt(n) Norm=0
Trading Times Constraint Start Time=800 EndTime=1430
RMedVx Multiplier to Scale RMedVx N Range to One Std

4 Std=0.0734077 1/std=13.6226
6 Std=0.056242 1/std=17.7803
8 Std=0.0470003 1/std=21.2765
10 Std=0.0414414 1/std=24.1304
12 Std=0.0375377 1/std=26.6399
14 Std=0.0346289 1/std=28.8776
16 Std=0.0322738 1/std=30.9849
18 Std=0.0302399 1/std=33.0689
20 Std=0.0285976 1/std=34.968
22 Std=0.0272164 1/std=36.7426
24 Std=0.0259991 1/std=38.4629
26 Std=0.0249334 1/std=40.1069
28 Std=0.0239323 1/std=41.7845
30 Std=0.0230171 1/std=43.446
1/Std Mult Average=30.8494

As one can see the RMedV Standard Deviation for $N=4$ is over 3 times the SD for $N=30$. This makes it difficult to find a range for v_{up} and v_{dn} that satisfy all N . We would like to find a multiplier of the RMedV that normalizes all the RMedV standard deviations for any given N to the same SDs.

Fortunately, the SDs for the different N s for The RMedV are proportional to \sqrt{N} . So, if we multiply the RMedV by the \sqrt{N} , the RMedV for different N should have the same SDs and ranges. Below are the results for multiplying the RMedV by \sqrt{N} and computing it's standard deviation.

@CL 5 min bars Date Range 1140803 to 1160212
Total Number of Bars=108333 Sqrt(n) Norm=1
Trading Times Constraint Start Time=800 EndTime=1430
RMedVx Multiplier to Scale RMedVx N Range to One Std

4 Std=0.146815 1/std=6.81128
6 Std=0.137764 1/std=7.25878
8 Std=0.132937 1/std=7.52237
10 Std=0.131049 1/std=7.63072
12 Std=0.130034 1/std=7.69028
14 Std=0.12957 1/std=7.71786
16 Std=0.129095 1/std=7.74622
18 Std=0.128297 1/std=7.79441
20 Std=0.127892 1/std=7.81907
22 Std=0.127656 1/std=7.83354
24 Std=0.127369 1/std=7.8512
26 Std=0.127136 1/std=7.86561
28 Std=0.126638 1/std=7.89652
30 Std=0.12607 1/std=7.93212
1/Std Mult Average=7.66928

As we can see the SDs are now very close. If we multiply all RMedVs by $7.669 \cdot \sqrt{N}$ then the SDs of the velocities for all will be normalized to 1. For this case 7.669 would be the multiplier *xmult*, in the strategy and indicator. This allows us to do an optimization search for ranges of vup and vdn from 0.2 to 3.4 standard deviations for all N.

Please note that different futures and different time bars give different multipliers.