Trading SPY 30min Bars with the 5 parameter Parabolic
6/1/2008 -6/29/2018

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

The Parabolic Stop and Reversal Indicator
The Parabolic stop and reversal indicator was introduced by J. Welles Wilder in *New Concepts in Technical Trading Strategies.* The Parabolic is a trend following indicator which is always long or short the market. This indicator is now standard on all modern technical analysis software. The Parabolic can be applied to any bar chart such as, monthly, weekly, daily, hourly, or even point and figure charts.

The Parabolic creates a trailing stop that is at first far enough away from the initial buy price so that price retracements in the early stages of the trend do not drop below the trailing stop price and stop you out of your position. As the price trend matures the trailing stop moves closer and closer at an accelerating rate to recent local lows of the current price, until the stop is penetrated by an adverse price movement and a sell signal is given (opposite logic applies for sell signal).

The shape, slope, and speed of the Parabolic is controlled by three parameters, the starting acceleration factor (startAF), the increment that the starting acceleration factor can change when a new price high or low is made (incAF), and the maximum acceleration factor (maxAF), the maximum value the acceleration factor can be increased to. Because of the way the Parabolic is calculated, the shape of the trend following curve resembles a parabolic type curve, hence its name.

We will demonstrate the calculation of the Parabolic with the 30 min bar chart of SPY in Figure 1a and the Excel spreadsheet of SPY data and Parabolic curve calculations in Figure 1b.

The Parabolic parameters are startAF=0.02, incAF=0.02 and maxAF=0.20. On 04/03/14 at 1500, SPY broke through to the upside of the previous day's down sloping Parabolic stop loss of 188.75. A buy position was established at the stop loss price of 188.05. The stop loss was put at the lowest low of the previous downtrend which was 188.05. Thus, the first stop loss value of the Parabolic on 04/03/13 at 1500 is 188.05 and the AF is equal to the starting AF of 0.02. The next bar, 04/04/14 at 900, SPY made a new high of 189.70. Since SPY made a new high the starting AF is increased by incAF to 0.04 for the next calculation of the new stop loss. The new stop loss is calculated as New Stop Loss = 188.05 + 0.02*(189.70 -188.05) = 188.08. The general formula is:

New Stop Loss = Old Stop Loss + AF*(EP – Old Stop Loss)

Where EP(extreme price) is equal to the highest high encountered while long or the lowest low encountered while short. In addition, AF is only increased if a new high is made. Otherwise AF stays the same. AF can only be increased to the maximum AF.

On 04/04/14 @11:00 the low of SPY broke through the stop loss of 188.22 to the downside. The market position of SPY went from long to short with a stop at the previous high while long of 189.70. At 4/4/14 @ 11:30 SPY mad a new low so AF was increased by 0.02 to 0.04 and a new stop loss of 189.7+0.02(187.06-189.7)=189.65. On 4/4/14 @ 12:00 SPY made a new low of 187.17. AF is increased by 0.02 to 0.06 and the new stop loss is 189.65 +0.04(187.17-189.65)=189.55. This procedure is followed until 04/07/14 @14:00 where the high of SPY broke the stop loss to the upside and a long position was establish.

Most software packages only allow one to vary the AF increment and the AF maximum, fixing the starting AF at 0.02. This restriction hampers the trend following abilities of the Parabolic and will be relaxed in this study by allowing different starting values in our search for optimum parameters later in this article.

The 5 Parameter Parabolic
Many times, as the Parabolic stop loss hugs the price curve it is penetrated by a price bar by a small amount, as it was on 4/08/14 in Figure 1a, generating an opposite signal. The price then immediately turns around and resumes going in the direction it was going before this penetration occurred causing a costly whipsaw loss. Many of the whipsaws losses are caused by noise or spurious movements in the price. Thus, if the Parabolic stop loss is to represent the trend of a real price series it must have the capability to ignore small penetrations of noise level amounts. To this end, I have modified the Parabolic Stop Loss formula to include a variable that allows the Parabolic stop loss not to reverse unless penetrated by a defined amount (**xo**). I define this new parameter as **xo**, for noise crossover increment. In addition, the initial starting value for the stop loss is always set at the previous low or high EP. In some instances, the strategy will produce less whipsaws if the initial starting value of the stop loss is the previous high plus some amount called **xpr** or the previous low minus **xpr**. I call this new five parameter Parabolic, **parabxot**.

Data Discussion
To test this strategy, we will use 30 minute bar prices of the SPDR S&P 500 ETF known by the symbol SPY for the 520 weeks from June 1, 2008 to June 29, 2018.

We will test this strategy with the above SPX 30 min bars on a walk forward basis, as will be described below. In TradeStation (TS), we will run the Parabxot Strategy on the SPY 30 min bar data from June 1, 2008 to June 29, 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 520 weeks of SPY (see Walk forward Testing below) creating 520 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 TradeStation (TS) or MultiCharts(MC), we will run the PWFO strategy *add-in* along with the Parabxot Strategy on the Spy 30min data from 6/1/2008 to 6/29/2018 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 520 weeks of SPY (see Walk Forward Testing below) creating 520 out-of-sample weeks

In-Sample Section and Out-Of-Sample Section Definition

Whenever we do a TS optimization on a number of different strategy inputs, TS generates a report of performance metrics (total net profits, number of losing trades, etc.) vs these different 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)*** or ***test 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 were due to chance, over fitting the IS section or 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 data***. Since the performance metrics generated in the in-sample section are mostly due to "curve fitting" (see Walk Forward Out-of-Sample Testing section below) it is important to see how the strategy inputs chosen from the in-sample section perform on out-of-sample data.

The Parabxot Strategy Defined

In general, what we will be doing is following the plotted curve of **parabxot** . When the price of the current bar exceeds the previous bar value of the parabxot by the amount **xo,** we will go long. When the price of the current bar falls below the previous bar value of the parabxot by the amount **xo,** we will go short.

Buy Rule:
- **Buy parabxot[1] + xo Stop**.

Sell Rule:
- **Sell parabxot[1] –xo Stop**.

Where parabxot[1] is the previous bar value of parabxot.

Finding the Strategy Parameters Using Walk Forward Optimization

There are five strategy parameters to find. *Start,* the starting value of AF. *Inc*, the amount AF is incremented, *max*, the maximum amount AF can go to. *xo*, the noise amount the price bar has to cross over the parabolic curve in order to generate a buy or sell signal and *xpr*, the extra amount to add or subtract from the staring price of the parabolic stop loss.

For our computer run we will break up the 520 weeks of SPY 30-minute bar price data into 520 in-sample/out-of sample files. The in-sample(IS) sections will be 30 calendar days and the out-of-sample(OOS) section will be the one week following the in-sample section. The OOS week will always end on a Friday as will the 30 calendar day in-sample section.

The 520 in-sample/out-of-sample section dates are shown in **Table 1** on page 14 below.

For the in-sample data we will run the TradeStation optimization engine on the 520 weeks of SPY 30 min bars with the following ranges for the Five Parameter Parabolic strategy input variables.
1. **start** from 0.01 to 0.02 in steps of 0.01
2. **inc** from 0.01 to 0.05 in steps of 0.01.

3. **max** from 0.06 to 0.3 in steps of 0.02
4. **xo** from 0 to 0.6 in steps of 0.1
5. **xpr** from 0 to 0.6 in steps of 0.1

This will produce 6370 different cases or combinations of the strategy input parameters for each of the 520 in-sample/out-of-sample files for the two years of SPY 30min bar data.

Walk Forward Out-of-Sample Testing
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 IS optimization run. For instance, a *filter* 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 output and its associated strategy input parameters. Now suppose we ran our optimization on each of our many IS sections and applied our filter to each in-sample section output. 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 input parameters found in each in-sample section and applied to each out-of-sample section would produce independent net profits and 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 our 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 on average. ***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 or some other chosen metric? Surely the price noise cancels itself out with such a large number of in-sample prices and 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. What do we mean by *"curve fitting"*? 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 input 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 movements that were captured by a certain set of input parameters were a large part of the total net profits, as they usually are in real price data, then choosing these input parameters will produce losses when traded on future data. These losses occur because the random price movements will not be repeated in the same way. This is why strategy optimization, neural net optimizations or combinatorial searches with no out-of-sample testing cause loses when traded in real time from something that looked great in the in-sample section.

It is human nature to look for patterns and extrapolate past performance to project future trading results. However, results from curve fitting give the illusion, a modern "siren call" so to speak, of future trading profits, that will not exist.

In order to gain confidence that our input parameter selection method using the optimization output of the in-sample data will produce profits on data it hasn't been tested on, 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 twice or three 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 or luck 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 IS/OOS sections and take an average of our weekly results over all out-of-sample sections. This average gives us an expected weekly return and a standard deviation of weekly returns which allows us to statistically estimate the expected equity and its range for N weeks in the future.

Finding the Strategy Input Parameters in The Walk Forward Test Sections

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 output page that has as its rows each strategy input combination and as it's 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 combination 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 WFME64 v8x. 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 6/1/2008 to 6/30/2017. This will consist 468 in-sample and out-of-sample sections We will leave the 52 sections of ES data from 6/30/2017 to 6/29/2018 out of the WFME64 calculations so that we can see how the metric filters found by the WFME64 performed on these 52 following *future* weeks which was not included in the WFME64 run.

Here is a metric combination *filter* found by the WFME64 v8x program that was used in of 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 section we eliminate all strategy input rows that have a pf>**2** . In addition, we wish to limit the number losing trades in a row (**lr**) in the IS period to 3 or less (**lr≤3**). *R-squared* (**r2**)is a statistical measure of how close the equity curve is to its fitted regression line. It is also known as the coefficient of determination. High (**r2**) 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 **r2>80** . Using the **pf-lr-r2** 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 **eq10**. This metric is the **Projected Equity 10 Trades in Future Using 2nd Order Polynomial Line on the In-Sample Equity curve.** Let us choose the 2**0** rows in the in-sample section that contain the largest **eq10** values from the rows that are left from the **pf-lr-r2** screen. In other words, we sort **eq10** from high to low, eliminate the rows that have **lr>3**, **pf>2, r2>80** and then choose the largest **eq10** 20 Rows of whatever is left. This filter will now leave 20 cases or rows in the in-sample section that satisfy the above filter conditions. We call this filter **t20eq10|p≤2lr≤3r2≤80** where **t20eq10** means the top or maximum **20 eq10** rows left *after* the **pf-lr-r2** in-sample row elimination. Suppose for this filter, within the 20 in-sample rows that are left, we want the row that has the highest value of the metric called **eqTrn. eqTrn is Slope of the In-Sample Trade Equity Trend Line** inputs. We abbreviate this final filter as **t20eq10|p≤2|lr≤3r2≤80-eqTrn** . 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 **t20eq10|p≤2|lr≤3r2≤80-eqTrn filter** is then applied to each of the 468 in-sample sections which give 468 sets of strategy inputs that are used to produce the corresponding 468 out-of-sample performance results. The average out-of-sample performance is calculated from these 468 out-of-sample performance results. In addition, many other important out-of-sample performance statistics for this filter are calculated and summarized.

Figure 4 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 4** shows the results of the filter discussed above.

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 468 out-of-sample files of (**$1.0**) with a bootstrap standard deviation of **$10.0**. (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/468) and the average net weekly for the filter from **Figure 3, Row 3** would be the filter toNP/ (# of OOS) periods traded or **19994/459=43.56**. The probability of obtaining our filters average weekly net profit of **43.56** is **4.23x10^{-6}** which is **4.456** standard deviations from the bootstrap average. For our filter, in Row 4 , the expected number of cases that we could obtain by pure chance that would match or exceed **$43.56 is [1-(1- 4.23x10^{-6})^{92256}** $\approx$ **92256 x 4.23x10^{-6} = 0.39** where **92256** is the total number of different filters we looked at in this run. This number is less than one, so it is improbable that our result was due to pure chance

Results
Table 1 on page 10 below presents a table of the 520 in-sample and out-of-sample windows, the selected optimum parameters and the weekly out-of-sample results using the filter described above. The out-of-sample results are for 100 shares of SPY and the net figures use a $4 round trip trade cost and slippage.

Figure 3 presents a graph of the equity curve generated by using the WFME64 filter on the 468 weeks ending 7/18/2008 – 6/30/2017 and the equity curve on the 52 weeks following until 6/29/2018 (note the first oos month ending 7/18/2008 was part of the first 30 day in-sample and 7 day out-of-sample periods). 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 7/7/17 to 6/29/18. This is what would have happened if you used the **t20eq10|p≤2|lr≤3r2≤80-eqTrn** filter found by the WFME64 on *future* data not included in the 6/1/2008 – 6/30/2017 run.

Figure 5   30 minute bar chart of SPY from 5/29/18-6/29/2018 with the Walk Forward Out-Of-Sample strategy inputs for the SPY Parabxot Strategy

Discussion of Strategy Performance
In **Figure 4, Row 3** is the filter chosen, **t20eq10|p≤2|lr≤3r2≤80-eqTrn**. 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 51 weeks for this filter. This means that 51 weeks was the longest time that the equity for this strategy failed to make a new equity high in the 468 out-of-sample weeks. For this strategy, the **%P** (% of oos weeks that are positive) was 58%, and the **%Wtr** (The % of all oos trades that are positive) was 46%. This low **%Wtr** was made up for by **oW/oL** (average oos winning trades/average oos losing trades) equal to 1.58.

To see the effect of walk forward analysis, take a look at **Table 1**. Notice how the input parameters *start,inc,max,xo,xprc* 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 section. In addition, notice how often *xo* changes from 0 to 0.6. When the data gets very noisy with a lot of spurious price movements, the xo changes to 0.6. During other times when the noise level is not as much xo changes to 0. This is what the xo noise filter is doing.

Figure 3 presents a graph of the equity curve using the filter on the 520 weeks of out-of-sample data. Notice how the equity curve follows the 2nd order polynomial trend line with an R^2 of 0.95. This R^2 dropped to 0.91 for the net equity curve.

Using this filter, the strategy generated a profit of $19,994 net equity after commissions and slippage of $4/trade trading 100 shares of SPY for 468 weeks. From **Table 1**, the largest losing week was -$1223 on the week ending 5/21/2010. The largest drawdown was -$1953 from the week ending on 11/20/09 to 4/9/10. This drawdown lasted 20 weeks and took 21 weeks to recover and made a new equity. The *future* period not included in the WFME64 run did very well making a net profit of $7392 from 6/30/17 to 6/29/18. The period from 1/26/18 to 6/30/18 was a very volatile whipsaw market. As can be seen from the equity plot, the Parabxot strategy/WFME filter did well during this volatile whipsaw market making a net profit of $6683 during this period.

The strategy did very well in the bear market of 2008-2009. The SPY dropped 47% from 8/15/2008 to 3/6/2009. During that time the parabxot strategy made a net profit of $7730. The parabxot strategy didn't do well from 11/20/2009 to 9/23/2011 only making $612 net profit. The maximum drawdown of -1953 also occurred during that period. However, from 9/23/2011 to 6/29/2018 the parabxot strategy did very well with little drawdown and an equity curve moving straight up. In addition, if you purchased 100 SPY on 7/18/2008 for 125.98 and sold it on 6/29/2018 for 271.28 you would have made $14,530. The parabxot strategy made a net of $27,386 during this same period.

In observing Table 1 we can see that this strategy /filter made trades from a low of no trades in 9 of the 468 weeks to a high of 9 trades/week with an average of 3.6 trades/week in the weeks it did trade.

Lastly. as can be seen in **Figure 3**, the top 10 filters all did very well in the 52 *future* weeks from 7/7/2017 to 6/29/2018 following the original analysis.

References
Wilder, J. Welles, *New Concepts in Technical Trading strategies*, Trend Research, 1978.
Meyers, Dennis , "Modifying the Parabolic Stop And Reversal", *Technical Analysis of Stocks & Commodities*, April 1995

Figure 1a Parabolic with the 30 min bar chart of SPY

L=185.43 1.23 0.67% B=185.43 A=185.44 O=185.47 Hi=186.14 Lo=184.65 C=186.13 V=105,147,724 Strategy (0,0.02,0.02,0.2,0,0,0,False,True,True) #iParabxotb (0,0.02,0.02,0.2,0,0,False) 18

FIGURE 1b SPY Parabolic Stop Loss Calculation

Date	Time	high	low	close	AF	Position	sar
4/3/2014	1000	188.80	188.51	188.79	0.02	SHORT	189.19
4/3/2014	1030	188.81	188.55	188.59	0.02	SHORT	189.18
4/3/2014	1100	188.66	188.44	188.51	0.04	SHORT	189.16
4/3/2014	1130	188.66	188.39	188.51	0.06	SHORT	189.13
4/3/2014	1200	188.51	188.26	188.35	0.08	SHORT	189.08
4/3/2014	1230	188.62	188.31	188.61	0.08	SHORT	189.01
4/3/2014	1300	188.76	188.51	188.55	0.08	SHORT	188.95
4/3/2014	1330	188.62	188.38	188.40	0.08	SHORT	188.9
4/3/2014	1400	188.40	188.05	188.39	0.10	SHORT	188.83
4/3/2014	1430	188.66	188.35	188.65	0.10	SHORT	188.75
4/3/2014	1500	188.89	188.60	188.61	0.02	LONG	188.05
4/4/2014	900	189.70	188.66	188.98	0.04	LONG	188.08
4/4/2014	930	189.55	188.97	189.28	0.04	LONG	188.15
4/4/2014	1000	189.54	189.00	189.06	0.04	LONG	188.21
4/4/2014	1030	189.06	188.22	188.34	0.04	LONG	188.22
4/4/2014	1100	188.57	187.72	188.02	0.02	SHORT	189.7
4/4/2014	1130	188.04	187.27	187.60	0.04	SHORT	189.65
4/4/2014	1200	187.77	187.02	187.17	0.06	SHORT	189.55
4/4/2014	1230	187.49	186.95	187.13	0.08	SHORT	189.39
4/4/2014	1300	187.23	186.86	186.96	0.10	SHORT	189.19
4/4/2014	1330	187.10	186.62	186.65	0.12	SHORT	188.93
4/4/2014	1400	186.76	186.10	186.59	0.14	SHORT	188.59
4/4/2014	1430	186.89	186.20	186.77	0.14	SHORT	188.24
4/4/2014	1500	186.79	186.32	186.39	0.14	SHORT	187.94
4/7/2014	900	186.05	185.22	186.00	0.16	SHORT	187.56
4/7/2014	930	186.26	185.64	185.65	0.16	SHORT	187.19
4/7/2014	1000	185.87	185.17	185.33	0.18	SHORT	186.86
4/7/2014	1030	185.60	185.13	185.21	0.20	SHORT	186.55
4/7/2014	1100	185.45	184.78	184.79	0.20	SHORT	186.2
4/7/2014	1130	184.94	184.38	184.54	0.20	SHORT	185.83
4/7/2014	1200	184.83	184.46	184.76	0.20	SHORT	185.54
4/7/2014	1230	184.90	184.19	184.39	0.20	SHORT	185.27
4/7/2014	1300	184.45	184.14	184.21	0.20	SHORT	185.05
4/7/2014	1330	184.40	183.97	184.12	0.20	SHORT	184.83
4/7/2014	1400	184.86	183.96	184.69	0.02	LONG	183.96
4/7/2014	1430	185.11	184.53	185.10	0.04	LONG	183.96
4/7/2014	1500	185.10	184.30	184.31	0.04	LONG	184.01
4/8/2014	900	184.76	184.06	184.20	0.04	LONG	184.05
4/8/2014	930	184.59	183.59	183.60	0.02	SHORT	185.11
4/8/2014	1000	184.68	183.59	184.54	0.02	SHORT	185.08
4/8/2014	1030	185.20	184.55	184.98	0.02	LONG	183.59
4/8/2014	1100	185.09	184.64	185.02	0.02	LONG	183.62
4/8/2014	1130	185.16	184.84	185.14	0.02	LONG	183.65
4/8/2014	1200	185.17	184.77	184.79	0.02	LONG	183.68
4/8/2014	1230	185.40	184.78	185.30	0.04	LONG	183.72
4/8/2014	1300	185.33	185.05	185.28	0.04	LONG	183.79
4/8/2014	1330	185.32	184.69	184.81	0.04	LONG	183.85
4/8/2014	1400	185.00	184.62	184.90	0.04	LONG	183.91
4/8/2014	1430	185.15	184.69	185.08	0.04	LONG	183.97
4/8/2014	1500	185.28	185.00	185.11	0.04	LONG	184.03

Figure 3 Graph of Parabxot Strategy Net Equity Applying the WFME64 Filter Each Week on Out-Of-Sample SPY 30min Bar Prices 7/18/2008 to 6/30/2017 -> 6/29/2018

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 6/30/17 to 6/29/18. This is what would have happened if you used t20eq10|p≤2|lr≤3r2≤80-eqTrn on future data 6/30/17 to 6/29/18 which was not included in the WFME filter run.

SPY30Parabxot2 **t20eq10|pf<2|lr<3r2<80-eqTrn 07/18/08 To 06/30/17 -> 07/07/17**

$y = -0.0433x^2 + 69.953x + 3809$
$R^2 = 0.9492$

$y = -0.0441x^2 + 56.356x + 3717.2$
$R^2 = 0.9064$
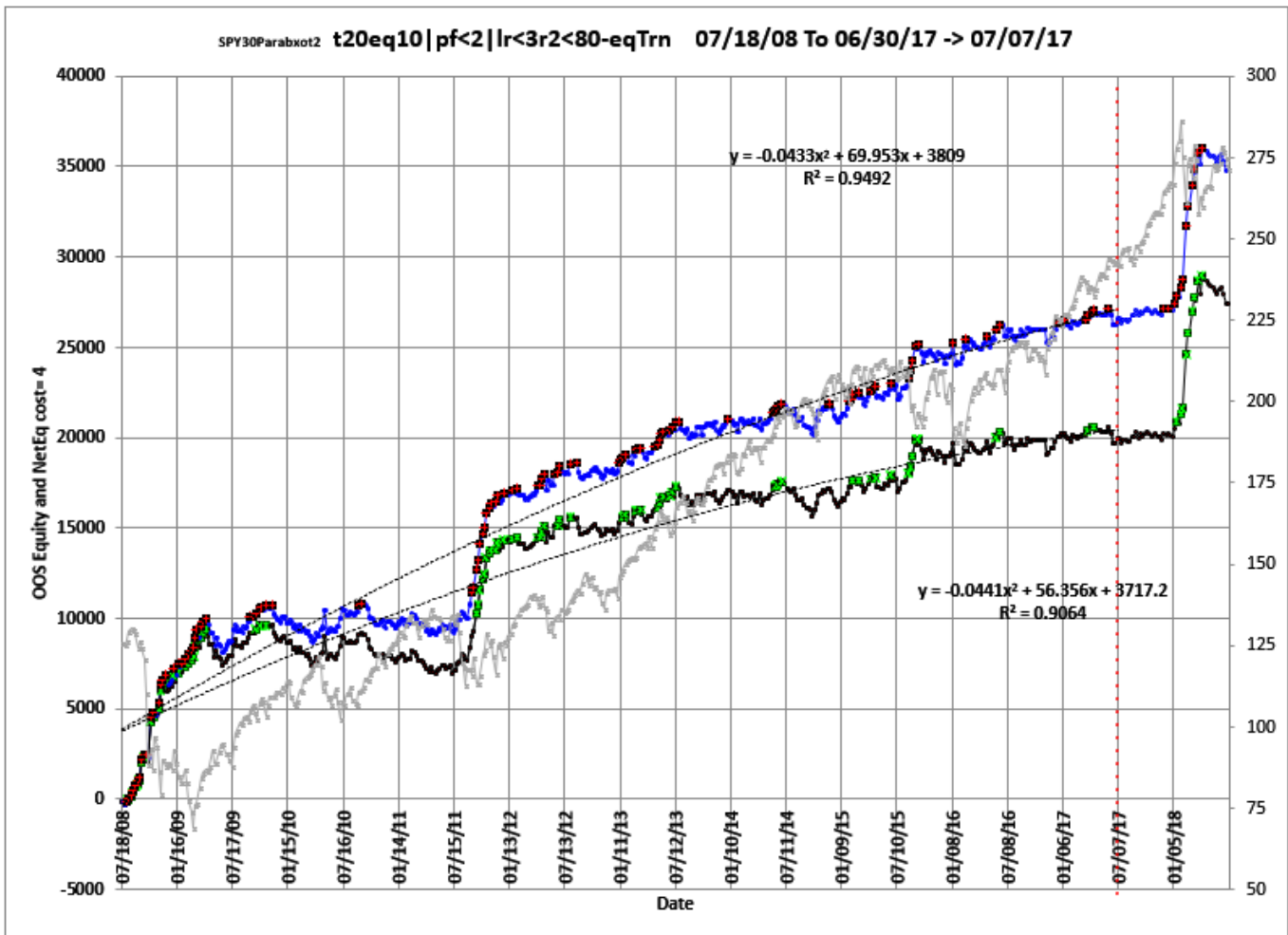
Figure 4 **Partial output of the Walk Forward Metric Explorer (WFME64 v8X)**
SPX 30 min bars Parabxot Strategy

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	SPY30Parabxot2	s07/18/08	e06/30/17	#468	tnp>0	#52							
2	Filter-Metric	toGP	toNP	aoGP	aoTr	ao#T	std	skew	kur	t	oW|oL	%Wtr	%P
3	t20eq10|pf<2|lr<3r2<80-eqTrn	26578	19994	58	16.1	3.6	311	0.530	8.62	3.98	1.56	46	58
4	t10eq10|pf<2|lr<3-mTrd	25633	18933	56	15.3	3.6	324	0.849	9.76	3.7	1.47	47	57
5	t20eqTrn|pf<2|lr<5r2<70-mWTr	25447	18711	55	15.1	3.6	314	0.655	7.1	3.76	1.56	45	57
6	t20eqTrn|pf<2|r2<70-mWTr	25367	18627	55	15.1	3.6	314	0.653	7.08	3.75	1.57	45	57
7	t20eq10|pf<2|lr<3r2<70-mKr	25113	18557	55	15.3	3.6	312	0.571	7.73	3.76	1.54	45	57
8	t20eq2V|pf<2|lr<3r2<80-ktau	25297	18469	55	14.8	3.7	304	0.670	8.57	3.88	1.5	46	58
9	t20eq10|pf<2|lr<3-eqTrn	25017	18397	55	15.1	3.6	322	0.489	7.99	3.63	1.52	46	57
10	t20eq2A|pf<2|lr<3-eqTrn	24901	18361	54	15.2	3.6	334	0.892	9.46	3.48	1.52	46	58
11	t20eq2V|pf<2|lr<3r2<80-eqR2	25302	18314	55	14.5	3.8	302	0.786	8.28	3.91	1.52	46	58
12	t20eq2V|pf<2|lr<3-eqTrn	24883	18203	54	14.9	3.6	320	0.507	8.12	3.63	1.49	46	57

	N	O	P	Q	R	S	T	U	V	W	X	Y	Z	AA	AB	AC	AD	AE	AF	AG
1	a(1.0)	s10.0	f92256					c=$4					|	s07/07/17	e06/29/18	#52				t520
2	LLtr	LLp	eqDD	wpr	lpr	#	V20	Dev^2	KTau	eqR2	Blw	BE	|	toGPx	toNPx	aoTRx	aoNTx	#x	tOnpNet	Prob
3	-622	-1223	-1953	11	5	459	27	1712	90	94	51	124	|	8212	7392	40	4	51	27386	4.23E-06
4	-723	-1183	-1986	17	5	459	13	1664	89	92	59	144	|	8062	7258	40	3.9	51	26191	1.21E-05
5	-639	-939	-3025	10	6	465	-7	1710	86	93	92	139	|	6969	6237	38	3.5	52	24948	1.88E-05
6	-639	-939	-2933	10	6	465	-6	1690	86	93	92	140	|	7095	6359	39	3.5	52	24986	2.04E-05
7	-647	-1223	-4619	12	6	459	22	1932	81	93	100	139	|	7014	6202	35	4	51	24759	1.73E-05
8	-619	-1169	-2147	12	7	459	9	1627	91	95	55	131	|	8881	8053	43	4.1	51	26522	1.88E-05
9	-629	-1223	-2403	11	6	459	32	1760	87	93	60	149	|	7839	7015	38	4	51	25412	2.02E-05
10	-622	-1295	-2879	11	5	459	-16	2130	82	89	93	162	|	6391	5591	32	3.9	51	23952	2.09E-05
11	-632	-763	-2043	11	7	459	15	1614	91	95	57	129	|	7986	7166	39	4	51	25480	2.18E-05

The WFME64 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 oss 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: *V20 -* The velocity of the oos equity curve for the last 20 weeks.

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.

Figure 5   Walk Forward Out-Of-Sample Performance for SPY Parabxot Strategy
30 minute bar chart of SPY from 5/29/18-6/29/18

Table 1 Walk Forward Out-Of-Sample Performance Summary for SPY 30min bar Parabxot Strategy

SPY-30 min bars 7/18/2008 - 6/29/2018. The input values *start, inc max, xo, xprc* are the values found from applying the filter to the in-sample section optimization runs.

Filter= t20eq10|p≤2|lr≤3r2≤80-eqTrn

osnp = Weekly Out-of-sample gross profit in $
Equity = Running Sum of weekly out-of-sample gross profits $
NOnp$4 = Weekly Out-Of-Sample Net Profit in $ = **osnp-ont*4**.
NetEq = running sum of the weekly out-of-sample net profits in $
ollt = The largest losing trade in the out-of-sample section in $.
odd = The drawdown in the out-of-sample section in $.
ont = The number of trades in the out-of-sample week.
start= parabolic start AF
inc = AF increment
max= maximum AF
xo= The noise crossover amount. The amount the price has to break above or below the parabolic curve to issue a buy or sell signal.
Xprc = the amount to add or substrate to the starting value of the stop loss when a new buy or sell is initiated.
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	ollt	odd	EQ	NetEq	start	inc	max	xo	xpc
06/12/08	to	07/11/08	07/14/08	to	07/18/08	(138)	7	(166)	-218	-334	(138)	(166)	0.02	0.05	0.2	0.1	0.3
06/19/08	to	07/18/08	07/21/08	to	07/25/08	(142)	4	(158)	-193	-277	(280)	(324)	0.01	0.02	0.3	0.2	0.3
06/26/08	to	07/25/08	07/28/08	to	08/01/08	152	5	132	-134	-259	(128)	(192)	0.02	0.02	0.3	0.4	0
07/03/08	to	08/01/08	08/04/08	to	08/08/08	165	4	149	-102	-102	37	(43)	0.02	0.04	0.1	0.3	0.4
07/10/08	to	08/08/08	08/11/08	to	08/15/08	159	4	143	0	0	196	100	0.02	0.05	0.1	0.3	0.2
07/17/08	to	08/15/08	08/18/08	to	08/22/08	331	3	319	0	0	527	419	0.02	0.04	0.3	0.3	0.3
07/24/08	to	08/22/08	08/25/08	to	08/29/08	260	4	244	-47	-47	787	663	0.01	0.02	0.18	0.1	0.4
07/31/08	to	08/29/08	09/01/08	to	09/05/08	224	3	212	-303	-303	1011	875	0.01	0.02	0.3	0.3	0.6
08/07/08	to	09/05/08	09/08/08	to	09/12/08	188	4	172	-241	-241	1199	1047	0.02	0.01	0.08	0.5	0.3
08/14/08	to	09/12/08	09/15/08	to	09/19/08	1007	1	1003	0	0	2206	2050	0.01	0.01	0.14	0.5	0
08/21/08	to	09/19/08	09/22/08	to	09/26/08	275	7	247	-204	-479	2481	2297	0.02	0.04	0.14	0.1	0
08/28/08	to	09/26/08	09/29/08	to	10/03/08	2	5	(18)	-400	-691	2483	2279	0.01	0.01	0.16	0.3	0.2
09/04/08	to	10/03/08	10/06/08	to	10/10/08	(162)	6	(186)	-557	-1151	2321	2093	0.02	0.05	0.08	0	0.6
09/11/08	to	10/10/08	10/13/08	to	10/17/08	2182	4	2166	0	0	4503	4259	0.01	0.05	0.16	0.6	0.6
09/18/08	to	10/17/08	10/20/08	to	10/24/08	278	4	262	-462	-462	4781	4521	0.01	0.01	0.16	0.1	0.6
09/25/08	to	10/24/08	10/27/08	to	10/31/08	(110)	4	(126)	-339	-339	4671	4395	0.01	0.02	0.22	0.1	0.6
10/02/08	to	10/31/08	11/03/08	to	11/07/08	78	4	62	-198	-372	4749	4457	0.01	0.01	0.16	0.4	0.6
10/09/08	to	11/07/08	11/10/08	to	11/14/08	558	4	542	-206	-206	5307	4999	0.01	0.01	0.16	0.5	0.5
10/16/08	to	11/14/08	11/17/08	to	11/21/08	1030	1	1026	0	0	6337	6025	0.02	0.01	0.06	0	0.5
10/23/08	to	11/21/08	11/24/08	to	11/28/08	288	4	272	-333	-334	6625	6297	0.01	0.02	0.08	0	0.4
10/30/08	to	11/28/08	12/01/08	to	12/05/08	236	4	220	-50	-50	6861	6517	0.01	0.02	0.1	0.6	0.3
11/06/08	to	12/05/08	12/08/08	to	12/12/08	(508)	7	(536)	-284	-866	6353	5981	0.02	0.05	0.24	0.3	0.5
11/13/08	to	12/12/08	12/15/08	to	12/19/08	64	6	40	-138	-268	6417	6021	0.02	0.05	0.14	0	0.4
11/20/08	to	12/19/08	12/22/08	to	12/26/08	183	1	179	0	0	6600	6200	0.01	0.01	0.08	0.2	0.6
11/27/08	to	12/26/08	12/29/08	to	01/02/09	585	1	581	0	0	7185	6781	0.01	0.03	0.28	0.3	0.6
12/04/08	to	01/02/09	01/05/09	to	01/09/09	(278)	6	(302)	-208	-345	6907	6479	0.01	0.02	0.26	0	0.6
12/11/08	to	01/09/09	01/12/09	to	01/16/09	557	3	545	-49	-49	7464	7024	0.01	0.03	0.06	0.2	0.3
12/18/08	to	01/16/09	01/19/09	to	01/23/09	(117)	3	(129)	-152	-152	7347	6895	0.01	0.05	0.12	0.6	0.4
12/25/08	to	01/23/09	01/26/09	to	01/30/09	120	3	108	-158	-158	7467	7003	0.01	0.02	0.18	0.6	0.3
01/01/09	to	01/30/09	02/02/09	to	02/06/09	325	4	309	-49	-49	7792	7312	0.01	0.02	0.22	0	0.5
01/08/09	to	02/06/09	02/09/09	to	02/13/09	(89)	6	(113)	-338	-648	7703	7199	0.02	0.01	0.14	0	0.4
01/15/09	to	02/13/09	02/16/09	to	02/20/09	281	1	277	0	0	7984	7476	0.02	0.02	0.26	0.5	0.2
01/22/09	to	02/20/09	02/23/09	to	02/27/09	172	4	156	-148	-182	8156	7632	0.01	0.04	0.12	0.4	0
01/29/09	to	02/27/09	03/02/09	to	03/06/09	214	4	198	-150	-150	8370	7830	0.01	0.01	0.12	0.5	0.6

In-Sample Dates			Out-of_Sample Dates			osnp	ont	NOnp$4	ollt	odd	EQ	NetEq	start	inc	max	xo	xpc
02/05/09	to	03/06/09	03/09/09	to	03/13/09	568	1	564	0	0	8938	8394	0.01	0.01	0.06	0.2	0.4
02/12/09	to	03/13/09	03/16/09	to	03/20/09	452	5	432	-15	-15	9390	8826	0.02	0.01	0.16	0	0.6
02/19/09	to	03/20/09	03/23/09	to	03/27/09	(433)	5	(453)	-281	-616	8957	8373	0.02	0.01	0.1	0.4	0.5
02/26/09	to	03/27/09	03/30/09	to	04/03/09	586	6	562	-68	-68	9543	8935	0.01	0.05	0.3	0.2	0.6
03/05/09	to	04/03/09	04/06/09	to	04/10/09	271	1	267	0	0	9814	9202	0.02	0.05	0.12	0.6	0.3
03/12/09	to	04/10/09	04/13/09	to	04/17/09	154	4	138	-79	-79	9968	9340	0.01	0.03	0.2	0.1	0.6
03/19/09	to	04/17/09	04/20/09	to	04/24/09	(275)	4	(291)	-197	-322	9693	9049	0.01	0.01	0.06	0	0.4
03/26/09	to	04/24/09	04/27/09	to	05/01/09	(436)	4	(452)	-216	-329	9257	8597	0.01	0.03	0.16	0.1	0.5
04/02/09	to	05/01/09	05/04/09	to	05/08/09	(55)	6	(79)	-166	-464	9202	8518	0.01	0.03	0.18	0.1	0.6
04/09/09	to	05/08/09	05/11/09	to	05/15/09	(678)	6	(702)	-208	-634	8524	7816	0.01	0.02	0.26	0.3	0.1
04/16/09	to	05/15/09	05/18/09	to	05/22/09	405	1	401	0	0	8929	8217	0.02	0.01	0.06	0.5	0.6
04/23/09	to	05/22/09	05/25/09	to	05/29/09	(340)	4	(356)	-219	-417	8589	7861	0.01	0.01	0.06	0.6	0.4
04/30/09	to	05/29/09	06/01/09	to	06/05/09	(102)	3	(114)	-145	-145	8487	7747	0.02	0.01	0.16	0.6	0.3
05/07/09	to	06/05/09	06/08/09	to	06/12/09	(375)	4	(391)	-217	-491	8112	7356	0.02	0.02	0.24	0.6	0.3
05/14/09	to	06/12/09	06/15/09	to	06/19/09	199	5	179	-82	-82	8311	7535	0.02	0.03	0.3	0.1	0.5
05/21/09	to	06/19/09	06/22/09	to	06/26/09	230	4	214	-107	-107	8541	7749	0.01	0.03	0.12	0.1	0.4
05/28/09	to	06/26/09	06/29/09	to	07/03/09	186	1	182	0	0	8727	7931	0.01	0.02	0.06	0.5	0.5
06/04/09	to	07/03/09	07/06/09	to	07/10/09	35	1	31	0	0	8762	7962	0.01	0.02	0.06	0.5	0.5
06/11/09	to	07/10/09	07/13/09	to	07/17/09	619	1	615	0	0	9381	8577	0.02	0.01	0.06	0.5	0.4
06/18/09	to	07/17/09	07/20/09	to	07/24/09	232	3	220	-77	-77	9613	8797	0.01	0.01	0.1	0	0.1
06/25/09	to	07/24/09	07/27/09	to	07/31/09	(323)	4	(339)	-157	-281	9290	8458	0.02	0.05	0.12	0.6	0
07/02/09	to	07/31/09	08/03/09	to	08/07/09	59	3	47	-89	-89	9349	8505	0.01	0.02	0.12	0.3	0.2
07/09/09	to	08/07/09	08/10/09	to	08/14/09	(74)	4	(90)	-39	-57	9275	8415	0.01	0.01	0.06	0	0.6
07/16/09	to	08/14/09	08/17/09	to	08/21/09	268	1	264	0	0	9543	8679	0.01	0.03	0.16	0	0.4
07/23/09	to	08/21/09	08/24/09	to	08/28/09	(13)	4	(29)	-82	-109	9530	8650	0.01	0.05	0.2	0.6	0.2
07/30/09	to	08/28/09	08/31/09	to	09/04/09	301	1	297	0	0	9831	8947	0.02	0.03	0.08	0.1	0.5
08/06/09	to	09/04/09	09/07/09	to	09/11/09	268	1	264	0	0	10099	9211	0.01	0.01	0.1	0.6	0.6
08/13/09	to	09/11/09	09/14/09	to	09/18/09	30	3	18	-90	-90	10129	9229	0.01	0.04	0.16	0.5	0.6
08/20/09	to	09/18/09	09/21/09	to	09/25/09	(30)	3	(42)	-128	-174	10099	9187	0.01	0.01	0.14	0.3	0.6
08/27/09	to	09/25/09	09/28/09	to	10/02/09	200	3	188	-148	-148	10299	9375	0.01	0.05	0.08	0.1	0.6
09/03/09	to	10/02/09	10/05/09	to	10/09/09	268	5	248	-129	-129	10567	9623	0.02	0.04	0.3	0.1	0.5
09/10/09	to	10/09/09	10/12/09	to	10/16/09	60	5	40	-45	-45	10627	9663	0.02	0.03	0.1	0.1	0.6
09/17/09	to	10/16/09	10/19/09	to	10/23/09	(122)	4	(138)	-106	-228	10505	9525	0.01	0.02	0.1	0.5	0.3
09/24/09	to	10/23/09	10/26/09	to	10/30/09	171	4	155	-113	-113	10676	9680	0.02	0.01	0.12	0.5	0.4
10/01/09	to	10/30/09	11/02/09	to	11/06/09	(10)	7	(38)	-175	-261	10666	9642	0.02	0.05	0.28	0.1	0.1
10/08/09	to	11/06/09	11/09/09	to	11/13/09	(117)	5	(137)	-122	-270	10549	9505	0.01	0.04	0.18	0.2	0.6
10/15/09	to	11/13/09	11/16/09	to	11/20/09	140	3	128	-7	-7	10689	9633	0.01	0.01	0.12	0.3	0.2
10/22/09	to	11/20/09	11/23/09	to	11/27/09	(451)	1	(455)	-451	-451	10238	9178	0.02	0.01	0.12	0.3	0.1
10/29/09	to	11/27/09	11/30/09	to	12/04/09	(182)	4	(198)	-121	-121	10056	8980	0.01	0.05	0.3	0.4	0
11/05/09	to	12/04/09	12/07/09	to	12/11/09	(107)	3	(119)	-93	-156	9949	8861	0.02	0.05	0.2	0.4	0.4
11/12/09	to	12/11/09	12/14/09	to	12/18/09	(134)	5	(154)	-141	-209	9815	8707	0.02	0.03	0.18	0.3	0
11/19/09	to	12/18/09	12/21/09	to	12/25/09	234	1	230	0	0	10049	8937	0.02	0.03	0.12	0.3	0.1
11/26/09	to	12/25/09	12/28/09	to	01/01/10	43	3	31	-58	-93	10092	8968	0.02	0.04	0.16	0.2	0.3
12/03/09	to	01/01/10	01/04/10	to	01/08/10	(325)	4	(341)	-190	-375	9767	8627	0.01	0.03	0.18	0.4	0.6
12/10/09	to	01/08/10	01/11/10	to	01/15/10	13	5	(7)	-61	-83	9780	8620	0.01	0.03	0.08	0.1	0.2
12/17/09	to	01/15/10	01/18/10	to	01/22/10	123	4	107	-125	-253	9903	8727	0.02	0.01	0.06	0	0
12/24/09	to	01/22/10	01/25/10	to	01/29/10	(364)	7	(392)	-139	-441	9539	8335	0.01	0.05	0.3	0	0.6
12/31/09	to	01/29/10	02/01/10	to	02/05/10	63	4	47	-203	-250	9602	8382	0.02	0.01	0.2	0.5	0.5
01/07/10	to	02/05/10	02/08/10	to	02/12/10	(279)	3	(291)	-203	-283	9323	8091	0.01	0.05	0.3	0.5	0.6
01/14/10	to	02/12/10	02/15/10	to	02/19/10	317	1	313	0	0	9640	8404	0.01	0.02	0.24	0.4	0.4
01/21/10	to	02/19/10	02/22/10	to	02/26/10	(310)	5	(330)	-226	-385	9330	8074	0.01	0.05	0.3	0.5	0.5
01/28/10	to	02/26/10	03/01/10	to	03/05/10	57	3	45	-147	-147	9387	8119	0.02	0.02	0.26	0.5	0.6
02/04/10	to	03/05/10	03/08/10	to	03/12/10	(195)	3	(207)	-157	-157	9192	7912	0.02	0.03	0.06	0.3	0.6
02/11/10	to	03/12/10	03/15/10	to	03/19/10	105	1	101	0	0	9297	8013	0.01	0.01	0.16	0.6	0.2
02/18/10	to	03/19/10	03/22/10	to	03/26/10	(281)	5	(301)	-137	-274	9016	7712	0.01	0.01	0.2	0.1	0.6
02/25/10	to	03/26/10	03/29/10	to	04/02/10	(280)	3	(292)	-132	-248	8736	7420	0.02	0.02	0.28	0.4	0.2
03/04/10	to	04/02/10	04/05/10	to	04/09/10	127	3	115	-23	-23	8863	7535	0.02	0.01	0.14	0.2	0.6

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In-Sample Dates			Out-of_Sample Dates			osnp	ont	NOnp$4	ollt	odd	EQ	NetEq	start	inc	max	xo	xpc
03/11/10	to	04/09/10	04/12/10	to	04/16/10	282	1	278	0	0	9145	7813	0.01	0.01	0.14	0.2	0.6
03/18/10	to	04/16/10	04/19/10	to	04/23/10	(116)	5	(136)	-201	-283	9029	7677	0.01	0.04	0.3	0	0.3
03/25/10	to	04/23/10	04/26/10	to	04/30/10	365	4	349	-39	-39	9394	8026	0.01	0.04	0.14	0.3	0.5
04/01/10	to	04/30/10	05/03/10	to	05/07/10	141	4	125	-136	-255	9535	8151	0.01	0.05	0.18	0.5	0.6
04/08/10	to	05/07/10	05/10/10	to	05/14/10	910	3	898	0	0	10445	9049	0.01	0.05	0.14	0	0.6
04/15/10	to	05/14/10	05/17/10	to	05/21/10	(1223)	8	(1255)	-397	-905	9222	7794	0.02	0.05	0.3	0.1	0.4
04/22/10	to	05/21/10	05/24/10	to	05/28/10	140	3	128	0	0	9362	7922	0.01	0.02	0.14	0.4	0
04/29/10	to	05/28/10	05/31/10	to	06/04/10	85	3	73	-75	-76	9447	7995	0.02	0.02	0.18	0.5	0.3
05/06/10	to	06/04/10	06/07/10	to	06/11/10	(116)	8	(148)	-115	-143	9331	7847	0.02	0.05	0.14	0	0.3
05/13/10	to	06/11/10	06/14/10	to	06/18/10	(31)	5	(51)	-85	-85	9300	7796	0.02	0.04	0.22	0.3	0
05/20/10	to	06/18/10	06/21/10	to	06/25/10	254	5	234	-103	-103	9554	8030	0.02	0.03	0.18	0.2	0.1
05/27/10	to	06/25/10	06/28/10	to	07/02/10	451	1	447	0	0	10005	8477	0.01	0.02	0.06	0.5	0.1
06/03/10	to	07/02/10	07/05/10	to	07/09/10	569	1	565	0	0	10574	9042	0.01	0.02	0.08	0.6	0.6
06/10/10	to	07/09/10	07/12/10	to	07/16/10	(87)	4	(103)	-186	-293	10487	8939	0.01	0.01	0.16	0.2	0.3
06/17/10	to	07/16/10	07/19/10	to	07/23/10	(288)	4	(304)	-247	-367	10199	8635	0.02	0.01	0.2	0.4	0.3
06/24/10	to	07/23/10	07/26/10	to	07/30/10	(1)	3	(13)	0	0	10198	8622	0.01	0.05	0.16	0.6	0.6
07/01/10	to	07/30/10	08/02/10	to	08/06/10	154	3	142	-27	-27	10352	8764	0.01	0.02	0.08	0.2	0.5
07/08/10	to	08/06/10	08/09/10	to	08/13/10	(119)	3	(131)	-212	-212	10233	8633	0.01	0.02	0.18	0.3	0.5
07/15/10	to	08/13/10	08/16/10	to	08/20/10	21	4	5	-121	-121	10254	8638	0.02	0.02	0.1	0.2	0.5
07/22/10	to	08/20/10	08/23/10	to	08/27/10	106	4	90	-121	-126	10360	8728	0.01	0.04	0.26	0.2	0.5
07/29/10	to	08/27/10	08/30/10	to	09/03/10	393	1	389	0	0	10753	9117	0.01	0.01	0.1	0.6	0.5
08/05/10	to	09/03/10	09/06/10	to	09/10/10	52	4	36	-60	-60	10805	9153	0.01	0.03	0.12	0	0.6
08/12/10	to	09/10/10	09/13/10	to	09/17/10	(66)	4	(82)	-68	-134	10739	9071	0.01	0.04	0.16	0	0.6
08/19/10	to	09/17/10	09/20/10	to	09/24/10	49	4	33	-68	-68	10788	9104	0.01	0.01	0.12	0.1	0.3
08/26/10	to	09/24/10	09/27/10	to	10/01/10	(253)	3	(265)	-118	-220	10535	8839	0.02	0.04	0.06	0.4	0.3
09/02/10	to	10/01/10	10/04/10	to	10/08/10	(458)	5	(478)	-239	-462	10077	8361	0.01	0.04	0.1	0.1	0.6
09/09/10	to	10/08/10	10/11/10	to	10/15/10	(48)	5	(68)	-71	-91	10029	8293	0.01	0.02	0.08	0	0.6
09/16/10	to	10/15/10	10/18/10	to	10/22/10	(227)	5	(247)	-112	-303	9802	8046	0.02	0.03	0.3	0.2	0.5
09/23/10	to	10/22/10	10/25/10	to	10/29/10	(142)	4	(158)	-98	-104	9660	7888	0.02	0.04	0.24	0.2	0.6
09/30/10	to	10/29/10	11/01/10	to	11/05/10	16	4	0	-159	-195	9676	7888	0.02	0.05	0.3	0.2	0.6
10/07/10	to	11/05/10	11/08/10	to	11/12/10	152	6	128	-31	-31	9828	8016	0.01	0.04	0.18	0	0.1
10/14/10	to	11/12/10	11/15/10	to	11/19/10	68	6	44	-106	-106	9896	8060	0.02	0.04	0.18	0	0.5
10/21/10	to	11/19/10	11/22/10	to	11/26/10	(354)	4	(370)	-162	-391	9542	7690	0.01	0.03	0.06	0.6	0.6
10/28/10	to	11/26/10	11/29/10	to	12/03/10	276	1	272	0	0	9818	7962	0.02	0.04	0.06	0.4	0.3
11/04/10	to	12/03/10	12/06/10	to	12/10/10	41	5	21	-77	-77	9859	7983	0.02	0.04	0.12	0	0.3
11/11/10	to	12/10/10	12/13/10	to	12/17/10	(49)	3	(61)	-16	-16	9810	7922	0.01	0.05	0.12	0.4	0.6
11/18/10	to	12/17/10	12/20/10	to	12/24/10	(163)	4	(179)	-144	-209	9647	7743	0.02	0.05	0.14	0.3	0.5
11/25/10	to	12/24/10	12/27/10	to	12/31/10	(159)	1	(163)	-159	-159	9488	7580	0.01	0.01	0.12	0.3	0.5
12/02/10	to	12/31/10	01/03/11	to	01/07/11	180	5	160	0	0	9668	7740	0.01	0.04	0.12	0	0.6
12/09/10	to	01/07/11	01/10/11	to	01/14/11	111	3	99	-52	-52	9779	7839	0.02	0.02	0.1	0	0.4
12/16/10	to	01/14/11	01/17/11	to	01/21/11	196	4	180	0	0	9975	8019	0.02	0.05	0.28	0.1	0.4
12/23/10	to	01/21/11	01/24/11	to	01/28/11	(69)	4	(85)	-138	-208	9906	7934	0.02	0.01	0.14	0.3	0.6
12/30/10	to	01/28/11	01/31/11	to	02/04/11	(274)	4	(290)	-177	-303	9632	7644	0.01	0.01	0.06	0.2	0.5
01/06/11	to	02/04/11	02/07/11	to	02/11/11	134	5	114	-23	-54	9766	7758	0.01	0.03	0.3	0	0.6
01/13/11	to	02/11/11	02/14/11	to	02/18/11	(33)	4	(49)	-68	-79	9733	7709	0.01	0.03	0.18	0.1	0.6
01/20/11	to	02/18/11	02/21/11	to	02/25/11	506	1	502	0	0	10239	8211	0.02	0.05	0.08	0.1	0
01/27/11	to	02/25/11	02/28/11	to	03/04/11	(77)	4	(93)	-41	-41	10162	8118	0.02	0.01	0.12	0.3	0.6
02/03/11	to	03/04/11	03/07/11	to	03/11/11	(177)	3	(189)	-169	-187	9985	7929	0.01	0.01	0.18	0.3	0.4
02/10/11	to	03/11/11	03/14/11	to	03/18/11	(293)	4	(309)	-225	-418	9692	7620	0.01	0.01	0.12	0.1	0.6
02/17/11	to	03/18/11	03/21/11	to	03/25/11	51	4	35	-148	-148	9743	7655	0.01	0.02	0.22	0.2	0.5
02/24/11	to	03/25/11	03/28/11	to	04/01/11	(48)	4	(64)	-77	-77	9695	7591	0.01	0.01	0.14	0	0.3
03/03/11	to	04/01/11	04/04/11	to	04/08/11	(191)	3	(203)	-111	-188	9504	7388	0.01	0.03	0.2	0	0.5
03/10/11	to	04/08/11	04/11/11	to	04/15/11	(182)	4	(198)	-166	-266	9322	7190	0.02	0.04	0.3	0.3	0.6
03/17/11	to	04/15/11	04/18/11	to	04/22/11	(188)	1	(192)	-188	-188	9134	6998	0.01	0.01	0.16	0.4	0
03/24/11	to	04/22/11	04/25/11	to	04/29/11	270	1	266	0	0	9404	7264	0.02	0.02	0.06	0.4	0.4
03/31/11	to	04/29/11	05/02/11	to	05/06/11	(197)	4	(213)	-136	-192	9207	7051	0.01	0.02	0.24	0.1	0.6
04/07/11	to	05/06/11	05/09/11	to	05/13/11	(77)	4	(93)	-163	-195	9130	6958	0.02	0.03	0.14	0.6	0.4

In-Sample Dates			Out-of_Sample Dates			osnp	ont	NOnp$4	ollt	odd	EQ	NetEq	start	inc	max	xo	xpc
04/14/11	to	05/13/11	05/16/11	to	05/20/11	170	3	158	0	0	9300	7116	0.02	0.01	0.08	0.3	0
04/21/11	to	05/20/11	05/23/11	to	05/27/11	158	4	142	-132	-132	9458	7258	0.02	0.02	0.22	0	0.5
04/28/11	to	05/27/11	05/30/11	to	06/03/11	140	1	136	0	0	9598	7394	0.01	0.01	0.14	0	0.5
05/05/11	to	06/03/11	06/06/11	to	06/10/11	(24)	4	(40)	-81	-114	9574	7354	0.02	0.01	0.16	0.2	0.4
05/12/11	to	06/10/11	06/13/11	to	06/17/11	(116)	4	(132)	-65	-65	9458	7222	0.01	0.05	0.14	0.4	0.6
05/19/11	to	06/17/11	06/20/11	to	06/24/11	57	5	37	-115	-115	9515	7259	0.01	0.03	0.08	0.1	0
05/26/11	to	06/24/11	06/27/11	to	07/01/11	151	6	127	-102	-102	9666	7386	0.02	0.03	0.24	0	0.6
06/02/11	to	07/01/11	07/04/11	to	07/08/11	(400)	4	(416)	-166	-341	9266	6970	0.01	0.04	0.18	0.3	0.6
06/09/11	to	07/08/11	07/11/11	to	07/15/11	164	4	148	-59	-59	9430	7118	0.02	0.01	0.12	0.1	0.6
06/16/11	to	07/15/11	07/18/11	to	07/22/11	364	3	352	0	0	9794	7470	0.02	0.04	0.06	0.6	0.1
06/23/11	to	07/22/11	07/25/11	to	07/29/11	157	4	141	-111	-111	9951	7611	0.02	0.02	0.08	0	0.4
06/30/11	to	07/29/11	08/01/11	to	08/05/11	396	5	376	-368	-368	10347	7987	0.01	0.02	0.26	0.4	0.2
07/07/11	to	08/05/11	08/08/11	to	08/12/11	(71)	3	(83)	-331	-331	10276	7904	0.01	0.01	0.12	0.5	0.1
07/14/11	to	08/12/11	08/15/11	to	08/19/11	(202)	4	(218)	-462	-671	10074	7686	0.02	0.01	0.18	0.6	0.2
07/21/11	to	08/19/11	08/22/11	to	08/26/11	(48)	4	(64)	-160	-160	10026	7622	0.01	0.02	0.06	0.2	0
07/28/11	to	08/26/11	08/29/11	to	09/02/11	740	1	736	0	0	10766	8358	0.01	0.01	0.08	0.3	0.5
08/04/11	to	09/02/11	09/05/11	to	09/09/11	703	3	691	0	0	11469	9049	0.01	0.02	0.16	0.6	0.4
08/11/11	to	09/09/11	09/12/11	to	09/16/11	259	3	247	-143	-143	11728	9296	0.02	0.02	0.24	0.2	0.5
08/18/11	to	09/16/11	09/19/11	to	09/23/11	965	4	949	0	0	12693	10245	0.01	0.03	0.16	0.1	0.6
08/25/11	to	09/23/11	09/26/11	to	09/30/11	506	4	490	-275	-275	13199	10735	0.01	0.05	0.3	0.4	0.3
09/01/11	to	09/30/11	10/03/11	to	10/07/11	909	4	893	-183	-183	14108	11628	0.02	0.04	0.22	0.3	0.6
09/08/11	to	10/07/11	10/10/11	to	10/14/11	565	5	545	-131	-131	14673	12173	0.02	0.04	0.3	0.2	0.3
09/15/11	to	10/14/11	10/17/11	to	10/21/11	314	6	290	-151	-151	14987	12463	0.02	0.03	0.3	0	0.2
09/22/11	to	10/21/11	10/24/11	to	10/28/11	886	4	870	0	0	15873	13333	0.01	0.04	0.26	0	0.3
09/29/11	to	10/28/11	10/31/11	to	11/04/11	236	6	212	-190	-288	16109	13545	0.02	0.05	0.2	0	0.6
10/06/11	to	11/04/11	11/07/11	to	11/11/11	239	4	223	-10	-10	16348	13768	0.01	0.05	0.28	0.1	0.6
10/13/11	to	11/11/11	11/14/11	to	11/18/11	(111)	6	(135)	-214	-325	16237	13633	0.01	0.02	0.14	0.1	0
10/20/11	to	11/18/11	11/21/11	to	11/25/11	185	4	169	-212	-360	16422	13802	0.02	0.04	0.16	0.6	0
10/27/11	to	11/25/11	11/28/11	to	12/02/11	394	1	390	0	0	16816	14192	0.01	0.03	0.3	0.5	0.6
11/03/11	to	12/02/11	12/05/11	to	12/09/11	(406)	4	(422)	-202	-413	16410	13770	0.02	0.05	0.08	0.4	0.5
11/10/11	to	12/09/11	12/12/11	to	12/16/11	163	1	159	0	0	16573	13929	0.01	0.01	0.18	0.6	0.2
11/17/11	to	12/16/11	12/19/11	to	12/23/11	369	1	365	0	0	16942	14294	0.01	0.02	0.18	0.5	0.5
11/24/11	to	12/23/11	12/26/11	to	12/30/11	(23)	3	(35)	-35	-35	16919	14259	0.01	0.05	0.16	0.5	0.4
12/01/11	to	12/30/11	01/02/12	to	01/06/12	(42)	1	(46)	-42	-42	16877	14213	0.01	0.01	0.14	0.5	0.4
12/08/11	to	01/06/12	01/09/12	to	01/13/12	48	3	36	-158	-158	16925	14249	0.01	0.01	0.12	0.5	0.5
12/15/11	to	01/13/12	01/16/12	to	01/20/12	184	1	180	0	0	17109	14429	0.01	0.01	0.08	0.4	0.3
12/22/11	to	01/20/12	01/23/12	to	01/27/12	(139)	4	(155)	-80	-141	16970	14274	0.01	0.05	0.2	0.5	0.6
12/29/11	to	01/27/12	01/30/12	to	02/03/12	225	1	221	0	0	17195	14495	0.02	0.04	0.06	0.2	0.4
01/05/12	to	02/03/12	02/06/12	to	02/10/12	(336)	4	(352)	-335	-431	16859	14143	0.02	0.01	0.14	0.2	0.2
01/12/12	to	02/10/12	02/13/12	to	02/17/12	1	3	(11)	-100	-100	16860	14132	0.02	0.03	0.1	0.4	0.6
01/19/12	to	02/17/12	02/20/12	to	02/24/12	0	0	0	0	0	16860	14132					
01/26/12	to	02/24/12	02/27/12	to	03/02/12	(245)	7	(273)	-106	-308	16615	13859	0.02	0.05	0.24	0	0.4
02/02/12	to	03/02/12	03/05/12	to	03/09/12	0	0	0	0	0	16615	13859					
02/09/12	to	03/09/12	03/12/12	to	03/16/12	112	3	100	-77	-77	16727	13959	0.01	0.01	0.16	0.2	0.6
02/16/12	to	03/16/12	03/19/12	to	03/23/12	50	1	46	0	0	16777	14005	0.01	0.02	0.26	0.5	0.3
02/23/12	to	03/23/12	03/26/12	to	03/30/12	97	3	85	-22	-22	16874	14090	0.01	0.03	0.14	0.6	0.3
03/01/12	to	03/30/12	04/02/12	to	04/06/12	186	1	182	0	0	17060	14272	0.01	0.05	0.16	0.6	0.6
03/08/12	to	04/06/12	04/09/12	to	04/13/12	250	3	238	0	0	17310	14510	0.02	0.04	0.1	0.1	0.6
03/15/12	to	04/13/12	04/16/12	to	04/20/12	28	5	8	-179	-179	17338	14518	0.01	0.03	0.24	0.3	0.5
03/22/12	to	04/20/12	04/23/12	to	04/27/12	378	3	366	0	0	17716	14884	0.02	0.01	0.12	0.4	0.2
03/29/12	to	04/27/12	04/30/12	to	05/04/12	249	5	229	-139	-139	17965	15113	0.01	0.03	0.18	0	0.5
04/05/12	to	05/04/12	05/07/12	to	05/11/12	(870)	9	(906)	-252	-997	17095	14207	0.01	0.02	0.24	0	0
04/12/12	to	05/11/12	05/14/12	to	05/18/12	573	1	569	0	0	17668	14776	0.02	0.04	0.06	0.5	0
04/19/12	to	05/18/12	05/21/12	to	05/25/12	(270)	4	(286)	-132	-224	17398	14490	0.01	0.01	0.1	0.6	0.5
04/26/12	to	05/25/12	05/28/12	to	06/01/12	14	4	(2)	-231	-231	17412	14488	0.01	0.04	0.26	0.6	0.6
05/03/12	to	06/01/12	06/04/12	to	06/08/12	595	4	579	0	0	18007	15067	0.02	0.05	0.12	0	0.1
05/10/12	to	06/08/12	06/11/12	to	06/15/12	88	1	84	0	0	18095	15151	0.01	0.01	0.2	0.5	0.4

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In-Sample Dates			Out-of_Sample Dates			osnp	ont	NOnp$4	ollt	odd	EQ	NetEq	start	inc	max	xo	xpc
05/17/12	to	06/15/12	06/18/12	to	06/22/12	312	3	300	0	0	18407	15451	0.01	0.05	0.3	0.5	0.6
05/24/12	to	06/22/12	06/25/12	to	06/29/12	(270)	4	(286)	-384	-483	18137	15165	0.01	0.01	0.06	0.5	0.2
05/31/12	to	06/29/12	07/02/12	to	07/06/12	(82)	1	(86)	-82	-82	18055	15079	0.02	0.02	0.06	0.4	0.3
06/07/12	to	07/06/12	07/09/12	to	07/13/12	10	6	(14)	-112	-180	18065	15065	0.02	0.05	0.3	0.1	0.4
06/14/12	to	07/13/12	07/16/12	to	07/20/12	(10)	4	(26)	-134	-187	18055	15039	0.01	0.02	0.16	0.3	0.2
06/21/12	to	07/20/12	07/23/12	to	07/27/12	510	4	494	-98	-109	18565	15533	0.01	0.04	0.28	0.2	0.6
06/28/12	to	07/27/12	07/30/12	to	08/03/12	(6)	3	(18)	-47	-83	18559	15515	0.01	0.01	0.14	0.3	0.1
07/05/12	to	08/03/12	08/06/12	to	08/10/12	(26)	1	(30)	-26	-26	18533	15485	0.01	0.01	0.06	0.5	0.5
07/12/12	to	08/10/12	08/13/12	to	08/17/12	42	1	38	0	0	18575	15523	0.01	0.02	0.22	0.5	0.5
07/19/12	to	08/17/12	08/20/12	to	08/24/12	(468)	7	(496)	-119	-441	18107	15027	0.02	0.05	0.3	0.3	0.2
07/26/12	to	08/24/12	08/27/12	to	08/31/12	(310)	8	(342)	-86	-293	17797	14685	0.02	0.05	0.08	0	0
08/02/12	to	08/31/12	09/03/12	to	09/07/12	(15)	3	(27)	-167	-253	17782	14658	0.01	0.01	0.06	0	0.6
08/09/12	to	09/07/12	09/10/12	to	09/14/12	138	3	126	-75	-126	17920	14784	0.01	0.01	0.08	0.2	0.5
08/16/12	to	09/14/12	09/17/12	to	09/21/12	(7)	1	(11)	-7	-7	17913	14773	0.01	0.01	0.06	0.3	0.6
08/23/12	to	09/21/12	09/24/12	to	09/28/12	62	1	58	0	0	17975	14831	0.01	0.01	0.06	0.6	0.3
08/30/12	to	09/28/12	10/01/12	to	10/05/12	225	1	221	0	0	18200	15052	0.01	0.01	0.06	0.6	0.5
09/06/12	to	10/05/12	10/08/12	to	10/12/12	40	3	28	-143	-143	18240	15080	0.01	0.04	0.18	0.5	0.6
09/13/12	to	10/12/12	10/15/12	to	10/19/12	143	3	131	-187	-187	18383	15211	0.02	0.03	0.28	0.4	0.6
09/20/12	to	10/19/12	10/22/12	to	10/26/12	(239)	4	(255)	-174	-203	18144	14956	0.02	0.01	0.14	0.3	0.5
09/27/12	to	10/26/12	10/29/12	to	11/02/12	(109)	3	(121)	-113	-155	18035	14835	0.01	0.05	0.06	0.4	0.1
10/04/12	to	11/02/12	11/05/12	to	11/09/12	(241)	3	(253)	-287	-455	17794	14582	0.01	0.01	0.16	0.6	0.4
10/11/12	to	11/09/12	11/12/12	to	11/16/12	104	3	92	-68	-68	17898	14674	0.01	0.03	0.08	0.3	0.4
10/18/12	to	11/16/12	11/19/12	to	11/23/12	312	3	300	-81	-81	18210	14974	0.02	0.02	0.22	0	0.5
10/25/12	to	11/23/12	11/26/12	to	11/30/12	(69)	5	(89)	-132	-143	18141	14885	0.02	0.05	0.3	0.3	0.5
11/01/12	to	11/30/12	12/03/12	to	12/07/12	(3)	3	(15)	-32	-50	18138	14870	0.02	0.01	0.06	0.2	0.5
11/08/12	to	12/07/12	12/10/12	to	12/14/12	109	4	93	-68	-68	18247	14963	0.01	0.05	0.06	0	0.5
11/15/12	to	12/14/12	12/17/12	to	12/21/12	(242)	4	(258)	-259	-259	18005	14705	0.01	0.02	0.14	0.1	0
11/22/12	to	12/21/12	12/24/12	to	12/28/12	122	3	110	-82	-82	18127	14815	0.01	0.03	0.22	0.5	0.5
11/29/12	to	12/28/12	12/31/12	to	01/04/13	452	1	448	0	0	18579	15263	0.01	0.02	0.22	0.6	0.6
12/06/12	to	01/04/13	01/07/13	to	01/11/13	176	1	172	0	0	18755	15435	0.02	0.04	0.26	0.5	0
12/13/12	to	01/11/13	01/14/13	to	01/18/13	126	1	122	0	0	18881	15557	0.01	0.01	0.12	0.6	0.5
12/20/12	to	01/18/13	01/21/13	to	01/25/13	186	1	182	0	0	19067	15739	0.01	0.01	0.06	0.6	0.4
12/27/12	to	01/25/13	01/28/13	to	02/01/13	(44)	5	(64)	-60	-135	19023	15675	0.01	0.05	0.08	0.3	0
01/03/13	to	02/01/13	02/04/13	to	02/08/13	(376)	3	(388)	-215	-377	18647	15287	0.01	0.03	0.1	0.6	0.5
01/10/13	to	02/08/13	02/11/13	to	02/15/13	(65)	1	(69)	-65	-65	18582	15218	0.01	0.01	0.06	0.6	0.4
01/17/13	to	02/15/13	02/18/13	to	02/22/13	468	3	456	0	0	19050	15674	0.01	0.05	0.3	0	0.6
01/24/13	to	02/22/13	02/25/13	to	03/01/13	285	5	265	-49	-49	19335	15939	0.02	0.04	0.3	0.1	0.5
01/31/13	to	03/01/13	03/04/13	to	03/08/13	40	4	24	-122	-122	19375	15963	0.02	0.03	0.24	0.1	0.3
02/07/13	to	03/08/13	03/11/13	to	03/15/13	84	7	56	-145	-145	19459	16019	0.01	0.05	0.3	0	0.3
02/14/13	to	03/15/13	03/18/13	to	03/22/13	(252)	3	(264)	-139	-139	19207	15755	0.01	0.05	0.16	0.5	0.4
02/21/13	to	03/22/13	03/25/13	to	03/29/13	(308)	3	(320)	-207	-314	18899	15435	0.01	0.01	0.06	0.4	0.4
02/28/13	to	03/29/13	04/01/13	to	04/05/13	(20)	5	(40)	-68	-164	18879	15395	0.01	0.03	0.1	0.3	0
03/07/13	to	04/05/13	04/08/13	to	04/12/13	276	1	272	0	0	19155	15667	0.01	0.01	0.06	0.2	0.6
03/14/13	to	04/12/13	04/15/13	to	04/19/13	38	4	22	-193	-193	19193	15689	0.01	0.02	0.1	0.4	0.5
03/21/13	to	04/19/13	04/22/13	to	04/26/13	205	1	201	0	0	19398	15890	0.01	0.01	0.06	0.4	0.3
03/28/13	to	04/26/13	04/29/13	to	05/03/13	136	3	124	-58	-58	19534	16014	0.01	0.02	0.08	0.2	0.5
04/04/13	to	05/03/13	05/06/13	to	05/10/13	97	1	93	0	0	19631	16107	0.02	0.01	0.08	0.2	0.1
04/11/13	to	05/10/13	05/13/13	to	05/17/13	278	3	266	-37	-37	19909	16373	0.01	0.03	0.3	0.1	0.3
04/18/13	to	05/17/13	05/20/13	to	05/24/13	299	3	287	0	0	20208	16660	0.02	0.01	0.28	0.3	0.2
04/25/13	to	05/24/13	05/27/13	to	05/31/13	74	1	70	0	0	20282	16730	0.01	0.01	0.18	0.2	0.5
05/02/13	to	05/31/13	06/03/13	to	06/07/13	(11)	4	(27)	-207	-321	20271	16703	0.01	0.01	0.1	0.2	0.6
05/09/13	to	06/07/13	06/10/13	to	06/14/13	(117)	7	(145)	-209	-258	20154	16558	0.01	0.04	0.18	0.1	0.6
05/16/13	to	06/14/13	06/17/13	to	06/21/13	270	6	246	-231	-290	20424	16804	0.01	0.04	0.12	0.2	0.3
05/23/13	to	06/21/13	06/24/13	to	06/28/13	172	4	156	-111	-111	20596	16960	0.01	0.02	0.12	0.1	0.5
05/30/13	to	06/28/13	07/01/13	to	07/05/13	(184)	3	(196)	-142	-237	20412	16764	0.02	0.05	0.08	0.6	0.2
06/06/13	to	07/05/13	07/08/13	to	07/12/13	470	1	466	0	0	20882	17230	0.02	0.01	0.06	0.6	0.1
06/13/13	to	07/12/13	07/15/13	to	07/19/13	1	3	(11)	-74	-82	20883	17219	0.01	0.01	0.1	0.2	0.6

In-Sample Dates			Out-of_Sample Dates			osnp	ont	NOnp$4	ollt	odd	EQ	NetEq	start	inc	max	xo	xpc
06/20/13	to	07/19/13	07/22/13	to	07/26/13	(358)	3	(370)	-182	-244	20525	16849	0.02	0.05	0.16	0.4	0.6
06/27/13	to	07/26/13	07/29/13	to	08/02/13	(105)	3	(117)	-142	-234	20420	16732	0.01	0.01	0.22	0.3	0.1
07/04/13	to	08/02/13	08/05/13	to	08/09/13	(122)	4	(138)	-155	-209	20298	16594	0.02	0.01	0.22	0.5	0.4
07/11/13	to	08/09/13	08/12/13	to	08/16/13	181	3	169	-80	-105	20479	16763	0.01	0.02	0.14	0	0.4
07/18/13	to	08/16/13	08/19/13	to	08/23/13	(504)	5	(524)	-214	-508	19975	16239	0.01	0.03	0.22	0.1	0.5
07/25/13	to	08/23/13	08/26/13	to	08/30/13	246	5	226	-171	-221	20221	16465	0.01	0.05	0.16	0.2	0.5
08/01/13	to	08/30/13	09/02/13	to	09/06/13	(152)	3	(164)	-73	-89	20069	16301	0.02	0.02	0.1	0	0.5
08/08/13	to	09/06/13	09/09/13	to	09/13/13	91	1	87	0	0	20160	16388	0.02	0.02	0.06	0.6	0
08/15/13	to	09/13/13	09/16/13	to	09/20/13	460	1	456	0	0	20620	16844	0.01	0.03	0.12	0.1	0.6
08/22/13	to	09/20/13	09/23/13	to	09/27/13	(31)	3	(43)	-250	-250	20589	16801	0.01	0.01	0.06	0.4	0.3
08/29/13	to	09/27/13	09/30/13	to	10/04/13	(420)	3	(432)	-214	-267	20169	16369	0.02	0.01	0.08	0.5	0.2
09/05/13	to	10/04/13	10/07/13	to	10/11/13	456	1	452	0	0	20625	16821	0.01	0.01	0.06	0.6	0.2
09/12/13	to	10/11/13	10/14/13	to	10/18/13	127	4	111	-128	-161	20752	16932	0.01	0.05	0.2	0.2	0.4
09/19/13	to	10/18/13	10/21/13	to	10/25/13	(25)	3	(37)	-91	-91	20727	16895	0.01	0.01	0.16	0.5	0.2
09/26/13	to	10/25/13	10/28/13	to	11/01/13	47	3	35	0	0	20774	16930	0.01	0.05	0.3	0.6	0.6
10/03/13	to	11/01/13	11/04/13	to	11/08/13	(110)	3	(122)	-89	-154	20664	16808	0.01	0.02	0.14	0.5	0.2
10/10/13	to	11/08/13	11/11/13	to	11/15/13	193	3	181	-45	-84	20857	16989	0.02	0.03	0.16	0.4	0.3
10/17/13	to	11/15/13	11/18/13	to	11/22/13	(461)	5	(481)	-191	-519	20396	16508	0.01	0.04	0.18	0	0.6
10/24/13	to	11/22/13	11/25/13	to	11/29/13	(127)	3	(139)	-73	-87	20269	16369	0.01	0.01	0.1	0.2	0.3
10/31/13	to	11/29/13	12/02/13	to	12/06/13	194	1	190	0	0	20463	16559	0.01	0.01	0.06	0.2	0.5
11/07/13	to	12/06/13	12/09/13	to	12/13/13	191	3	179	-46	-46	20654	16738	0.01	0.01	0.1	0.4	0.6
11/14/13	to	12/13/13	12/16/13	to	12/20/13	177	3	165	-84	-84	20831	16903	0.02	0.01	0.06	0	0.4
11/21/13	to	12/20/13	12/23/13	to	12/27/13	229	1	225	0	0	21060	17128	0.01	0.03	0.12	0.2	0.6
11/28/13	to	12/27/13	12/30/13	to	01/03/14	(52)	4	(68)	-56	-90	21008	17060	0.01	0.02	0.12	0	0.6
12/05/13	to	01/03/14	01/06/14	to	01/10/14	(97)	3	(109)	-112	-112	20911	16951	0.01	0.04	0.24	0.5	0.1
12/12/13	to	01/10/14	01/13/14	to	01/17/14	(168)	4	(184)	-87	-164	20743	16767	0.01	0.01	0.2	0.5	0
12/19/13	to	01/17/14	01/20/14	to	01/24/14	34	4	18	-174	-203	20777	16785	0.02	0.05	0.3	0	0.6
12/26/13	to	01/24/14	01/27/14	to	01/31/14	(436)	5	(456)	-191	-394	20341	16329	0.01	0.05	0.16	0	0.6
01/02/14	to	01/31/14	02/03/14	to	02/07/14	675	1	671	0	0	21016	17000	0.01	0.01	0.12	0.3	0.6
01/09/14	to	02/07/14	02/10/14	to	02/14/14	(3)	3	(15)	-217	-217	21013	16985	0.01	0.05	0.06	0.3	0
01/16/14	to	02/14/14	02/17/14	to	02/21/14	(211)	3	(223)	-101	-145	20802	16762	0.02	0.01	0.06	0.3	0.1
01/23/14	to	02/21/14	02/24/14	to	02/28/14	71	4	55	-15	-15	20873	16817	0.01	0.01	0.3	0.1	0.5
01/30/14	to	02/28/14	03/03/14	to	03/07/14	41	3	29	-41	-41	20914	16846	0.01	0.01	0.16	0.1	0.4
02/06/14	to	03/07/14	03/10/14	to	03/14/14	(110)	6	(134)	-73	-100	20804	16712	0.01	0.05	0.3	0	0.2
02/13/14	to	03/14/14	03/17/14	to	03/21/14	237	4	221	0	0	21041	16933	0.02	0.05	0.26	0.1	0.5
02/20/14	to	03/21/14	03/24/14	to	03/28/14	(357)	8	(389)	-187	-622	20684	16544	0.02	0.05	0.24	0.1	0.5
02/27/14	to	03/28/14	03/31/14	to	04/04/14	(41)	4	(57)	-211	-340	20643	16487	0.01	0.04	0.1	0	0.6
03/06/14	to	04/04/14	04/07/14	to	04/11/14	399	6	375	-165	-283	21042	16862	0.01	0.02	0.18	0	0.3
03/13/14	to	04/11/14	04/14/14	to	04/18/14	(569)	4	(585)	-355	-659	20473	16277	0.01	0.04	0.1	0.5	0.6
03/20/14	to	04/18/14	04/21/14	to	04/25/14	302	3	290	0	0	20775	16567	0.01	0.01	0.16	0.2	0.5
03/27/14	to	04/25/14	04/28/14	to	05/02/14	53	3	41	-61	-61	20828	16608	0.01	0.01	0.1	0.6	0.4
04/03/14	to	05/02/14	05/05/14	to	05/09/14	28	1	24	0	0	20856	16632	0.01	0.01	0.16	0.3	0
04/10/14	to	05/09/14	05/12/14	to	05/16/14	191	3	179	0	0	21047	16811	0.02	0.03	0.06	0.6	0.2
04/17/14	to	05/16/14	05/19/14	to	05/23/14	326	5	306	-45	-45	21373	17117	0.02	0.05	0.28	0	0.5
04/24/14	to	05/23/14	05/26/14	to	05/30/14	130	3	118	-49	-49	21503	17235	0.02	0.05	0.16	0.2	0.6
05/01/14	to	05/30/14	06/02/14	to	06/06/14	83	3	71	-95	-142	21586	17306	0.02	0.05	0.18	0.2	0.6
05/08/14	to	06/06/14	06/09/14	to	06/13/14	148	3	136	-1	-1	21734	17442	0.02	0.03	0.3	0.4	0.2
05/15/14	to	06/13/14	06/16/14	to	06/20/14	71	1	67	0	0	21805	17509	0.01	0.01	0.06	0.6	0
05/22/14	to	06/20/14	06/23/14	to	06/27/14	(47)	3	(59)	-38	-56	21758	17450	0.02	0.01	0.18	0.2	0.4
05/29/14	to	06/27/14	06/30/14	to	07/04/14	47	3	35	-96	-96	21805	17485	0.01	0.01	0.18	0.1	0.4
06/05/14	to	07/04/14	07/07/14	to	07/11/14	(247)	5	(267)	-239	-375	21558	17218	0.01	0.04	0.12	0	0.2
06/12/14	to	07/11/14	07/14/14	to	07/18/14	(155)	3	(167)	-134	-146	21403	17051	0.01	0.02	0.06	0.5	0.3
06/19/14	to	07/18/14	07/21/14	to	07/25/14	(54)	6	(78)	-146	-146	21349	16973	0.02	0.05	0.28	0	0.6
06/26/14	to	07/25/14	07/28/14	to	08/01/14	246	6	222	-117	-117	21595	17195	0.01	0.05	0.2	0	0.5
07/03/14	to	08/01/14	08/04/14	to	08/08/14	(331)	5	(351)	-199	-401	21264	16844	0.02	0.01	0.18	0.2	0.1
07/10/14	to	08/08/14	08/11/14	to	08/15/14	(288)	5	(308)	-217	-397	20976	16536	0.02	0.01	0.2	0.5	0
07/17/14	to	08/15/14	08/18/14	to	08/22/14	51	1	47	0	0	21027	16583	0.01	0.02	0.08	0.6	0.6

In-Sample Dates			Out-of_Sample Dates			osnp	ont	NOnp$4	ollt	odd	EQ	NetEq	start	inc	max	xo	xpc
07/24/14	to	08/22/14	08/25/14	to	08/29/14	97	3	85	0	0	21124	16668	0.02	0.03	0.26	0.1	0.6
07/31/14	to	08/29/14	09/01/14	to	09/05/14	(415)	3	(427)	-186	-255	20709	16241	0.01	0.02	0.08	0.5	0.5
08/07/14	to	09/05/14	09/08/14	to	09/12/14	(108)	3	(120)	-154	-154	20601	16121	0.01	0.03	0.06	0.3	0.6
08/14/14	to	09/12/14	09/15/14	to	09/19/14	18	9	(18)	-71	-103	20619	16103	0.01	0.05	0.12	0	0
08/21/14	to	09/19/14	09/22/14	to	09/26/14	(116)	3	(128)	-197	-197	20503	15975	0.01	0.01	0.24	0.6	0.5
08/28/14	to	09/26/14	09/29/14	to	10/03/14	(293)	4	(309)	-302	-377	20210	15666	0.01	0.01	0.12	0.6	0.6
09/04/14	to	10/03/14	10/06/14	to	10/10/14	385	6	361	-166	-166	20595	16027	0.01	0.05	0.24	0.4	0.1
09/11/14	to	10/10/14	10/13/14	to	10/17/14	402	5	382	-146	-146	20997	16409	0.02	0.04	0.16	0.3	0.3
09/18/14	to	10/17/14	10/20/14	to	10/24/14	441	4	425	-172	-172	21438	16834	0.01	0.03	0.1	0.3	0.2
09/25/14	to	10/24/14	10/27/14	to	10/31/14	83	3	71	-223	-223	21521	16905	0.02	0.01	0.1	0.6	0.3
10/02/14	to	10/31/14	11/03/14	to	11/07/14	170	1	166	0	0	21691	17071	0.01	0.05	0.06	0.6	0.6
10/09/14	to	11/07/14	11/10/14	to	11/14/14	(90)	1	(94)	-90	-90	21601	16977	0.01	0.02	0.3	0.6	0.5
10/16/14	to	11/14/14	11/17/14	to	11/21/14	210	4	194	-10	-10	21811	17171	0.01	0.03	0.3	0.1	0.3
10/23/14	to	11/21/14	11/24/14	to	11/28/14	6	1	2	0	0	21817	17173	0.02	0.04	0.3	0.3	0.6
10/30/14	to	11/28/14	12/01/14	to	12/05/14	(182)	6	(206)	-147	-341	21635	16967	0.02	0.04	0.28	0	0.6
11/06/14	to	12/05/14	12/08/14	to	12/12/14	(424)	5	(444)	-349	-776	21211	16523	0.01	0.02	0.1	0.2	0.4
11/13/14	to	12/12/14	12/15/14	to	12/19/14	(150)	4	(166)	-328	-581	21061	16357	0.02	0.04	0.06	0.4	0.3
11/20/14	to	12/19/14	12/22/14	to	12/26/14	(189)	1	(193)	-189	-189	20872	16164	0.01	0.05	0.18	0.2	0
11/27/14	to	12/26/14	12/29/14	to	01/02/15	277	3	265	-155	-155	21149	16429	0.01	0.05	0.18	0.2	0
12/04/14	to	01/02/15	01/05/15	to	01/09/15	187	5	167	-197	-332	21336	16596	0.02	0.05	0.3	0.5	0.4
12/11/14	to	01/09/15	01/12/15	to	01/16/15	(68)	4	(84)	-267	-305	21268	16512	0.02	0.01	0.14	0.6	0.1
12/18/14	to	01/16/15	01/19/15	to	01/23/15	361	1	357	0	0	21629	16869	0.02	0.02	0.16	0.2	0.3
12/25/14	to	01/23/15	01/26/15	to	01/30/15	381	3	369	-85	-85	22010	17238	0.02	0.01	0.12	0.4	0.1
01/01/15	to	01/30/15	02/02/15	to	02/06/15	63	5	43	-202	-249	22073	17281	0.01	0.03	0.16	0.2	0.6
01/08/15	to	02/06/15	02/09/15	to	02/13/15	351	1	347	0	0	22424	17628	0.01	0.01	0.06	0.1	0.3
01/15/15	to	02/13/15	02/16/15	to	02/20/15	(80)	3	(92)	-113	-169	22344	17536	0.02	0.04	0.06	0.4	0
01/22/15	to	02/20/15	02/23/15	to	02/27/15	(64)	4	(80)	-86	-89	22280	17456	0.01	0.03	0.06	0.1	0.1
01/29/15	to	02/27/15	03/02/15	to	03/06/15	226	4	210	-87	-87	22506	17666	0.01	0.02	0.06	0	0.6
02/05/15	to	03/06/15	03/09/15	to	03/13/15	(281)	6	(305)	-194	-367	22225	17361	0.01	0.03	0.08	0.1	0.6
02/12/15	to	03/13/15	03/16/15	to	03/20/15	(393)	4	(409)	-224	-496	21832	16952	0.01	0.02	0.08	0.6	0.3
02/19/15	to	03/20/15	03/23/15	to	03/27/15	246	3	234	-112	-112	22078	17186	0.01	0.01	0.1	0.6	0.3
02/26/15	to	03/27/15	03/30/15	to	04/03/15	280	4	264	-39	-39	22358	17450	0.01	0.03	0.24	0	0.5
03/05/15	to	04/03/15	04/06/15	to	04/10/15	196	3	184	-85	-85	22554	17634	0.01	0.05	0.3	0.6	0.6
03/12/15	to	04/10/15	04/13/15	to	04/17/15	67	4	51	-52	-52	22621	17685	0.01	0.01	0.12	0	0.6
03/19/15	to	04/17/15	04/20/15	to	04/24/15	174	5	154	-117	-117	22795	17839	0.02	0.05	0.14	0.1	0.6
03/26/15	to	04/24/15	04/27/15	to	05/01/15	(547)	7	(575)	-216	-618	22248	17264	0.02	0.05	0.16	0.1	0.6
04/02/15	to	05/01/15	05/04/15	to	05/08/15	42	5	22	-233	-376	22290	17286	0.02	0.05	0.18	0.3	0.4
04/09/15	to	05/08/15	05/11/15	to	05/15/15	(89)	8	(121)	-120	-135	22201	17165	0.02	0.05	0.3	0	0
04/16/15	to	05/15/15	05/18/15	to	05/22/15	(5)	5	(25)	-28	-37	22196	17140	0.01	0.02	0.24	0	0.1
04/23/15	to	05/22/15	05/25/15	to	05/29/15	289	3	277	0	0	22485	17417	0.02	0.03	0.18	0.5	0.2
04/30/15	to	05/29/15	06/01/15	to	06/05/15	(64)	3	(76)	-97	-192	22421	17341	0.01	0.04	0.3	0.6	0.5
05/07/15	to	06/05/15	06/08/15	to	06/12/15	265	3	253	0	0	22686	17594	0.01	0.05	0.3	0.4	0.6
05/14/15	to	06/12/15	06/15/15	to	06/19/15	294	3	282	0	0	22980	17876	0.01	0.02	0.24	0.5	0.6
05/21/15	to	06/19/15	06/22/15	to	06/26/15	(263)	3	(275)	-205	-368	22717	17601	0.02	0.01	0.14	0.2	0.5
05/28/15	to	06/26/15	06/29/15	to	07/03/15	167	3	155	-196	-196	22884	17756	0.02	0.03	0.06	0.5	0.6
06/04/15	to	07/03/15	07/06/15	to	07/10/15	(757)	4	(773)	-435	-910	22127	16983	0.01	0.01	0.08	0.5	0
06/11/15	to	07/10/15	07/13/15	to	07/17/15	213	3	201	-143	-143	22340	17184	0.02	0.05	0.14	0.4	0
06/18/15	to	07/17/15	07/20/15	to	07/24/15	403	4	387	-49	-49	22743	17571	0.01	0.03	0.1	0	0.3
06/25/15	to	07/24/15	07/27/15	to	07/31/15	(1)	4	(17)	-145	-145	22742	17554	0.01	0.04	0.14	0.2	0.2
07/02/15	to	07/31/15	08/03/15	to	08/07/15	112	4	96	-91	-91	22854	17650	0.01	0.03	0.26	0.4	0.3
07/09/15	to	08/07/15	08/10/15	to	08/14/15	409	4	393	0	0	23263	18043	0.01	0.04	0.26	0.4	0.4
07/16/15	to	08/14/15	08/17/15	to	08/21/15	423	5	403	-313	-458	23686	18446	0.02	0.05	0.22	0.6	0.6
07/23/15	to	08/21/15	08/24/15	to	08/28/15	553	6	529	-326	-326	24239	18975	0.01	0.05	0.26	0.2	0.6
07/30/15	to	08/28/15	08/31/15	to	09/04/15	867	4	851	0	0	25106	19826	0.01	0.03	0.2	0.5	0.5
08/06/15	to	09/04/15	09/07/15	to	09/11/15	(197)	1	(201)	-197	-197	24909	19625	0.02	0.01	0.06	0.1	0.6
08/13/15	to	09/11/15	09/14/15	to	09/18/15	288	5	268	-230	-414	25197	19893	0.01	0.01	0.08	0	0
08/20/15	to	09/18/15	09/21/15	to	09/25/15	(492)	7	(520)	-278	-593	24705	19373	0.01	0.05	0.28	0.2	0.6

In-Sample Dates			Out-of_Sample Dates			osnp	ont	NOnp$4	ollt	odd	EQ	NetEq	start	inc	max	xo	xpc
08/27/15	to	09/25/15	09/28/15	to	10/02/15	(523)	8	(555)	-344	-1144	24182	18818	0.01	0.04	0.16	0	0.6
09/03/15	to	10/02/15	10/05/15	to	10/09/15	378	4	362	-100	-100	24560	19180	0.01	0.04	0.18	0	0.6
09/10/15	to	10/09/15	10/12/15	to	10/16/15	164	5	144	-107	-194	24724	19324	0.01	0.02	0.08	0	0
09/17/15	to	10/16/15	10/19/15	to	10/23/15	98	3	86	-170	-237	24822	19410	0.01	0.01	0.06	0.5	0
09/24/15	to	10/23/15	10/26/15	to	10/30/15	(158)	4	(174)	-132	-262	24664	19236	0.01	0.05	0.1	0.6	0.5
10/01/15	to	10/30/15	11/02/15	to	11/06/15	(148)	4	(164)	-194	-194	24516	19072	0.01	0.02	0.24	0.5	0.1
10/08/15	to	11/06/15	11/09/15	to	11/13/15	(224)	4	(240)	-248	-620	24292	18832	0.01	0.02	0.14	0.4	0.6
10/15/15	to	11/13/15	11/16/15	to	11/20/15	385	1	381	0	0	24677	19213	0.01	0.01	0.22	0.6	0.2
10/22/15	to	11/20/15	11/23/15	to	11/27/15	(16)	1	(20)	-16	-16	24661	19193	0.01	0.01	0.22	0.5	0.5
10/29/15	to	11/27/15	11/30/15	to	12/04/15	(191)	4	(207)	-175	-277	24470	18986	0.01	0.01	0.14	0.5	0.6
11/05/15	to	12/04/15	12/07/15	to	12/11/15	(356)	4	(372)	-338	-694	24114	18614	0.01	0.01	0.08	0.2	0.4
11/12/15	to	12/11/15	12/14/15	to	12/18/15	406	7	378	-156	-191	24520	18992	0.02	0.05	0.28	0.4	0.1
11/19/15	to	12/18/15	12/21/15	to	12/25/15	3	3	(9)	-274	-274	24523	18983	0.02	0.05	0.26	0.4	0.3
11/26/15	to	12/25/15	12/28/15	to	01/01/16	141	3	129	-103	-111	24664	19112	0.02	0.01	0.16	0.2	0.6
12/03/15	to	01/01/16	01/04/16	to	01/08/16	576	3	564	-311	-311	25240	19676	0.01	0.02	0.08	0.3	0.4
12/10/15	to	01/08/16	01/11/16	to	01/15/16	(1169)	5	(1189)	-500	-1068	24071	18487	0.01	0.02	0.16	0	0.5
12/17/15	to	01/15/16	01/18/16	to	01/22/16	76	4	60	-362	-460	24147	18547	0.02	0.03	0.14	0.5	0.1
12/24/15	to	01/22/16	01/25/16	to	01/29/16	(36)	5	(56)	-140	-400	24111	18491	0.02	0.01	0.06	0	0.2
12/31/15	to	01/29/16	02/01/16	to	02/05/16	320	4	304	-175	-175	24431	18795	0.01	0.02	0.1	0.3	0.2
01/07/16	to	02/05/16	02/08/16	to	02/12/16	630	8	598	-276	-413	25061	19393	0.02	0.05	0.3	0	0.2
01/14/16	to	02/12/16	02/15/16	to	02/19/16	365	3	353	-273	-273	25426	19746	0.01	0.02	0.1	0.6	0.5
01/21/16	to	02/19/16	02/22/16	to	02/26/16	(485)	3	(497)	-315	-625	24941	19249	0.01	0.02	0.16	0.6	0.2
01/28/16	to	02/26/16	02/29/16	to	03/04/16	453	3	441	-11	-11	25394	19690	0.02	0.04	0.24	0.4	0.4
02/04/16	to	03/04/16	03/07/16	to	03/11/16	(117)	4	(133)	-239	-329	25277	19557	0.01	0.04	0.26	0.3	0.6
02/11/16	to	03/11/16	03/14/16	to	03/18/16	(163)	4	(179)	-139	-277	25114	19378	0.01	0.05	0.26	0.5	0.6
02/18/16	to	03/18/16	03/21/16	to	03/25/16	(131)	4	(147)	-131	-179	24983	19231	0.02	0.01	0.2	0.1	0.4
02/25/16	to	03/25/16	03/28/16	to	04/01/16	(27)	5	(47)	-170	-205	24956	19184	0.02	0.05	0.28	0.3	0.5
03/03/16	to	04/01/16	04/04/16	to	04/08/16	(26)	5	(46)	-61	-61	24930	19138	0.01	0.02	0.2	0	0.6
03/10/16	to	04/08/16	04/11/16	to	04/15/16	232	4	216	-66	-66	25162	19354	0.01	0.04	0.26	0.1	0.5
03/17/16	to	04/15/16	04/18/16	to	04/22/16	125	6	101	-86	-109	25287	19455	0.01	0.05	0.14	0.1	0.3
03/24/16	to	04/22/16	04/25/16	to	04/29/16	341	6	317	-69	-87	25628	19772	0.02	0.05	0.14	0	0.5
03/31/16	to	04/29/16	05/02/16	to	05/06/16	(560)	7	(588)	-184	-584	25068	19184	0.02	0.05	0.3	0.1	0.6
04/07/16	to	05/06/16	05/09/16	to	05/13/16	339	4	323	-117	-117	25407	19507	0.02	0.02	0.2	0.3	0.5
04/14/16	to	05/13/16	05/16/16	to	05/20/16	105	7	77	-107	-107	25512	19584	0.01	0.03	0.26	0	0.1
04/21/16	to	05/20/16	05/23/16	to	05/27/16	474	1	470	0	0	25986	20054	0.01	0.03	0.06	0.3	0.3
04/28/16	to	05/27/16	05/30/16	to	06/03/16	(27)	1	(31)	-27	-27	25959	20023	0.01	0.01	0.18	0.3	0.5
05/05/16	to	06/03/16	06/06/16	to	06/10/16	280	1	276	0	0	26239	20299	0.01	0.02	0.18	0.5	0.5
05/12/16	to	06/10/16	06/13/16	to	06/17/16	(16)	4	(32)	-209	-390	26223	20267	0.01	0.03	0.14	0.6	0.5
05/19/16	to	06/17/16	06/20/16	to	06/24/16	(595)	4	(611)	-622	-793	25628	19656	0.01	0.03	0.12	0.3	0.5
05/26/16	to	06/24/16	06/27/16	to	07/01/16	0	0	0	0	0	25628	19656					
06/02/16	to	07/01/16	07/04/16	to	07/08/16	299	6	275	-178	-276	25927	19931	0.02	0.05	0.28	0	0.6
06/09/16	to	07/08/16	07/11/16	to	07/15/16	53	4	37	-127	-127	25980	19968	0.01	0.01	0.24	0.3	0.3
06/16/16	to	07/15/16	07/18/16	to	07/22/16	(358)	3	(370)	-108	-215	25622	19598	0.02	0.02	0.12	0.6	0.2
06/23/16	to	07/22/16	07/25/16	to	07/29/16	(227)	3	(239)	-113	-221	25395	19359	0.02	0.03	0.1	0.6	0.4
06/30/16	to	07/29/16	08/01/16	to	08/05/16	254	3	242	-37	-37	25649	19601	0.02	0.04	0.06	0.1	0.6
07/07/16	to	08/05/16	08/08/16	to	08/12/16	(12)	6	(36)	-59	-65	25637	19565	0.02	0.05	0.3	0	0.5
07/14/16	to	08/12/16	08/15/16	to	08/19/16	309	5	289	-9	-9	25946	19854	0.02	0.05	0.3	0	0.5
07/21/16	to	08/19/16	08/22/16	to	08/26/16	(278)	3	(290)	-168	-210	25668	19564	0.01	0.02	0.3	0.3	0.6
07/28/16	to	08/26/16	08/29/16	to	09/02/16	45	1	41	0	0	25713	19605	0.01	0.01	0.06	0.1	0.5
08/04/16	to	09/02/16	09/05/16	to	09/09/16	379	4	363	-90	-155	26092	19968	0.02	0.05	0.24	0.1	0.2
08/11/16	to	09/09/16	09/12/16	to	09/16/16	(179)	8	(211)	-95	-288	25913	19757	0.02	0.05	0.26	0.1	0.4
08/18/16	to	09/16/16	09/19/16	to	09/23/16	80	3	68	-150	-150	25993	19825	0.01	0.03	0.2	0.4	0.2
08/25/16	to	09/23/16	09/26/16	to	09/30/16	0	0	0	0	0	25993	19825					
09/01/16	to	09/30/16	10/03/16	to	10/07/16	0	0	0	0	0	25993	19825					
09/08/16	to	10/07/16	10/10/16	to	10/14/16	0	0	0	0	0	25993	19825					
09/15/16	to	10/14/16	10/17/16	to	10/21/16	0	0	0	0	0	25993	19825					
09/22/16	to	10/21/16	10/24/16	to	10/28/16	0	0	0	0	0	25993	19825					

In-Sample Dates			Out-of_Sample Dates			osnp	ont	NOnp$4	ollt	odd	EQ	NetEq	start	inc	max	xo	xpc
09/29/16	to	10/28/16	10/31/16	to	11/04/16	0	0	0	0	0	25993	19825					
10/06/16	to	11/04/16	11/07/16	to	11/11/16	(763)	5	(783)	-456	-838	25230	19042	0.02	0.02	0.08	0.5	0.3
10/13/16	to	11/11/16	11/14/16	to	11/18/16	83	1	79	0	0	25313	19121	0.01	0.03	0.06	0.5	0.3
10/20/16	to	11/18/16	11/21/16	to	11/25/16	317	1	313	0	0	25630	19434	0.02	0.01	0.06	0.4	0.6
10/27/16	to	11/25/16	11/28/16	to	12/02/16	(39)	3	(51)	-120	-138	25591	19383	0.01	0.01	0.18	0.5	0
11/03/16	to	12/02/16	12/05/16	to	12/09/16	438	3	426	-86	-86	26029	19809	0.01	0.05	0.3	0.1	0.3
11/10/16	to	12/09/16	12/12/16	to	12/16/16	265	1	261	0	0	26294	20070	0.01	0.01	0.22	0.2	0.5
11/17/16	to	12/16/16	12/19/16	to	12/23/16	(1)	3	(13)	-65	-65	26293	20057	0.01	0.05	0.28	0.5	0.6
11/24/16	to	12/23/16	12/26/16	to	12/30/16	148	3	136	-33	-33	26441	20193	0.01	0.02	0.18	0.5	0.5
12/01/16	to	12/30/16	01/02/17	to	01/06/17	49	1	45	0	0	26490	20238	0.01	0.02	0.28	0.6	0.5
12/08/16	to	01/06/17	01/09/17	to	01/13/17	(198)	5	(218)	-127	-246	26292	20020	0.01	0.04	0.14	0	0
12/15/16	to	01/13/17	01/16/17	to	01/20/17	(65)	4	(81)	-55	-98	26227	19939	0.01	0.04	0.26	0	0.3
12/22/16	to	01/20/17	01/23/17	to	01/27/17	(144)	4	(160)	-187	-301	26083	19779	0.01	0.01	0.12	0.5	0
12/29/16	to	01/27/17	01/30/17	to	02/03/17	338	1	334	0	0	26421	20113	0.01	0.01	0.2	0	0.5
01/05/17	to	02/03/17	02/06/17	to	02/10/17	(77)	3	(89)	-143	-220	26344	20024	0.01	0.01	0.12	0.1	0.5
01/12/17	to	02/10/17	02/13/17	to	02/17/17	(69)	5	(89)	-133	-158	26275	19935	0.01	0.05	0.2	0.5	0.1
01/19/17	to	02/17/17	02/20/17	to	02/24/17	82	3	70	-45	-45	26357	20005	0.02	0.01	0.06	0.1	0.3
01/26/17	to	02/24/17	02/27/17	to	03/03/17	97	3	85	-27	-27	26454	20090	0.01	0.02	0.08	0.6	0.1
02/02/17	to	03/03/17	03/06/17	to	03/10/17	17	1	13	0	0	26471	20103	0.02	0.03	0.06	0.6	0.2
02/09/17	to	03/10/17	03/13/17	to	03/17/17	74	1	70	0	0	26545	20173	0.01	0.01	0.16	0.4	0.2
02/16/17	to	03/17/17	03/20/17	to	03/24/17	235	4	219	-39	-39	26780	20392	0.02	0.05	0.3	0.3	0.2
02/23/17	to	03/24/17	03/27/17	to	03/31/17	(20)	3	(32)	-99	-99	26760	20360	0.01	0.01	0.06	0.2	0.6
03/02/17	to	03/31/17	04/03/17	to	04/07/17	225	6	201	-64	-64	26985	20561	0.01	0.05	0.3	0.1	0.3
03/09/17	to	04/07/17	04/10/17	to	04/14/17	66	3	54	-97	-97	27051	20615	0.02	0.05	0.14	0.2	0.5
03/16/17	to	04/14/17	04/17/17	to	04/21/17	(200)	6	(224)	-248	-459	26851	20391	0.02	0.05	0.12	0.2	0.1
03/23/17	to	04/21/17	04/24/17	to	04/28/17	57	3	45	-8	-8	26908	20436	0.02	0.03	0.3	0	0.6
03/30/17	to	04/28/17	05/01/17	to	05/05/17	(54)	1	(58)	-54	-54	26854	20378	0.01	0.01	0.18	0.6	0.6
04/06/17	to	05/05/17	05/08/17	to	05/12/17	(64)	3	(76)	-97	-164	26790	20302	0.01	0.01	0.14	0.6	0.6
04/13/17	to	05/12/17	05/15/17	to	05/19/17	38	3	26	-164	-164	26828	20328	0.01	0.02	0.16	0.5	0.4
04/20/17	to	05/19/17	05/22/17	to	05/26/17	12	3	0	-143	-143	26840	20328	0.01	0.03	0.18	0.2	0.5
04/27/17	to	05/26/17	05/29/17	to	06/02/17	287	1	283	0	0	27127	20611	0.02	0.01	0.22	0.2	0.3
05/04/17	to	06/02/17	06/05/17	to	06/09/17	(328)	4	(344)	-115	-286	26799	20267	0.02	0.01	0.1	0.3	0.4
05/11/17	to	06/09/17	06/12/17	to	06/16/17	(532)	3	(544)	-308	-434	26267	19723	0.01	0.02	0.18	0.2	0.6
05/18/17	to	06/16/17	06/19/17	to	06/23/17	(12)	5	(32)	-117	-171	26255	19691	0.01	0.02	0.16	0	0.5
05/25/17	to	06/23/17	06/26/17	to	06/30/17	323	5	303	0	0	26578	19994	0.02	0.04	0.16	0.1	0
06/01/17	to	06/30/17	07/03/17	to	07/07/17	0	3	(12)	-17	-17	26578	19982	0.01	0.04	0.16	0.3	0.6
06/08/17	to	07/07/17	07/10/17	to	07/14/17	(238)	7	(266)	-134	-334	26340	19716	0.02	0.05	0.28	0	0.5
06/15/17	to	07/14/17	07/17/17	to	07/21/17	178	4	162	0	0	26518	19878	0.02	0.04	0.3	0	0.5
06/22/17	to	07/21/17	07/24/17	to	07/28/17	(22)	6	(46)	-84	-150	26496	19832	0.02	0.03	0.1	0	0.1
06/29/17	to	07/28/17	07/31/17	to	08/04/17	(72)	3	(84)	-61	-61	26424	19748	0.01	0.03	0.2	0.1	0.6
07/06/17	to	08/04/17	08/07/17	to	08/11/17	83	5	63	-186	-346	26507	19811	0.02	0.02	0.3	0.1	0.6
07/13/17	to	08/11/17	08/14/17	to	08/18/17	230	6	206	-121	-234	26737	20017	0.02	0.04	0.26	0.1	0.6
07/20/17	to	08/18/17	08/21/17	to	08/25/17	71	3	59	-57	-57	26808	20076	0.01	0.03	0.22	0.5	0.5
07/27/17	to	08/25/17	08/28/17	to	09/01/17	252	3	240	-41	-41	27060	20316	0.02	0.01	0.08	0.5	0.5
08/03/17	to	09/01/17	09/04/17	to	09/08/17	(321)	4	(337)	-233	-470	26739	19979	0.02	0.02	0.1	0.3	0.5
08/10/17	to	09/08/17	09/11/17	to	09/15/17	230	3	218	0	0	26969	20197	0.01	0.05	0.1	0	0.6
08/17/17	to	09/15/17	09/18/17	to	09/22/17	(127)	3	(139)	-72	-72	26842	20058	0.02	0.05	0.14	0.1	0.5
08/24/17	to	09/22/17	09/25/17	to	09/29/17	172	1	168	0	0	27014	20226	0.01	0.01	0.14	0	0.3
08/31/17	to	09/29/17	10/02/17	to	10/06/17	86	3	74	-117	-117	27100	20300	0.02	0.05	0.22	0.2	0.6
09/07/17	to	10/06/17	10/09/17	to	10/13/17	(75)	1	(79)	-75	-75	27025	20221	0.01	0.01	0.22	0.6	0
09/14/17	to	10/13/17	10/16/17	to	10/20/17	(159)	3	(171)	-188	-197	26866	20050	0.02	0.01	0.18	0.3	0.4
09/21/17	to	10/20/17	10/23/17	to	10/27/17	108	3	96	-85	-85	26974	20146	0.02	0.05	0.1	0.6	0.4
09/28/17	to	10/27/17	10/30/17	to	11/03/17	72	4	56	-52	-52	27046	20202	0.01	0.03	0.3	0	0.6
10/05/17	to	11/03/17	11/06/17	to	11/10/17	(164)	5	(184)	-114	-178	26882	20018	0.01	0.03	0.3	0.2	0
10/12/17	to	11/10/17	11/13/17	to	11/17/17	13	4	(3)	-68	-80	26895	20015	0.02	0.04	0.3	0.4	0.4
10/19/17	to	11/17/17	11/20/17	to	11/24/17	(97)	3	(109)	-129	-129	26798	19906	0.02	0.04	0.3	0.4	0.4
10/26/17	to	11/24/17	11/27/17	to	12/01/17	345	5	325	-128	-128	27143	20231	0.01	0.04	0.3	0	0.4

In-Sample Dates			Out-of_Sample Dates			osnp	ont	NOnp$4	ollt	odd	EQ	NetEq	start	inc	max	xo	xpc
11/02/17	to	12/01/17	12/04/17	to	12/08/17	(54)	1	(58)	-54	-54	27089	20173	0.01	0.02	0.12	0.6	0.5
11/09/17	to	12/08/17	12/11/17	to	12/15/17	58	3	46	-178	-178	27147	20219	0.01	0.01	0.16	0.5	0.6
11/16/17	to	12/15/17	12/18/17	to	12/22/17	(94)	4	(110)	-131	-171	27053	20109	0.01	0.05	0.14	0.3	0.6
11/23/17	to	12/22/17	12/25/17	to	12/29/17	(17)	3	(29)	-39	-75	27036	20080	0.01	0.05	0.08	0	0.4
11/30/17	to	12/29/17	01/01/18	to	01/05/18	407	1	403	0	0	27443	20483	0.02	0.05	0.1	0.1	0.6
12/07/17	to	01/05/18	01/08/18	to	01/12/18	429	5	409	-192	-192	27872	20892	0.02	0.02	0.26	0.1	0.4
12/14/17	to	01/12/18	01/15/18	to	01/19/18	(72)	3	(84)	-159	-160	27800	20808	0.02	0.01	0.3	0.4	0.5
12/21/17	to	01/19/18	01/22/18	to	01/26/18	469	3	457	-75	-75	28269	21265	0.01	0.01	0.28	0.2	0.1
12/28/17	to	01/26/18	01/29/18	to	02/02/18	437	4	421	-186	-186	28706	21686	0.02	0.03	0.22	0.5	0.1
01/04/18	to	02/02/18	02/05/18	to	02/09/18	2979	6	2955	-305	-305	31685	24641	0.01	0.05	0.3	0	0.1
01/11/18	to	02/09/18	02/12/18	to	02/16/18	1142	1	1138	0	0	32827	25779	0.02	0.01	0.06	0.5	0.5
01/18/18	to	02/16/18	02/19/18	to	02/23/18	0	0	0	0	0	32827	25779					
01/25/18	to	02/23/18	02/26/18	to	03/02/18	1159	3	1147	0	0	33986	26926	0.01	0.02	0.08	0.4	0.6
02/01/18	to	03/02/18	03/05/18	to	03/09/18	885	3	873	-42	-42	34871	27799	0.02	0.05	0.26	0.5	0.1
02/08/18	to	03/09/18	03/12/18	to	03/16/18	(225)	6	(249)	-189	-388	34646	27550	0.02	0.03	0.24	0.2	0
02/15/18	to	03/16/18	03/19/18	to	03/23/18	1103	5	1083	-318	-318	35749	28633	0.01	0.05	0.3	0.6	0.6
02/22/18	to	03/23/18	03/26/18	to	03/30/18	(656)	4	(672)	-449	-628	35093	27961	0.01	0.01	0.18	0.6	0.3
03/01/18	to	03/30/18	04/02/18	to	04/06/18	951	6	927	-357	-357	36044	28888	0.01	0.05	0.28	0.6	0.3
03/08/18	to	04/06/18	04/09/18	to	04/13/18	(127)	7	(155)	-268	-677	35917	28733	0.01	0.05	0.28	0.1	0.5
03/15/18	to	04/13/18	04/16/18	to	04/20/18	(64)	5	(84)	-251	-251	35853	28649	0.01	0.02	0.24	0.4	0.4
03/22/18	to	04/20/18	04/23/18	to	04/27/18	(153)	5	(173)	-326	-438	35700	28476	0.01	0.04	0.2	0.4	0.6
03/29/18	to	04/27/18	04/30/18	to	05/04/18	(101)	5	(121)	-207	-362	35599	28355	0.01	0.01	0.12	0	0.3
04/05/18	to	05/04/18	05/07/18	to	05/11/18	(66)	7	(94)	-157	-293	35533	28261	0.02	0.04	0.22	0	0.3
04/12/18	to	05/11/18	05/14/18	to	05/18/18	(83)	5	(103)	-115	-246	35450	28158	0.01	0.05	0.22	0.3	0.6
04/19/18	to	05/18/18	05/21/18	to	05/25/18	(194)	4	(210)	-287	-381	35256	27948	0.01	0.05	0.2	0.5	0.6
04/26/18	to	05/25/18	05/28/18	to	06/01/18	272	4	256	-53	-53	35528	28204	0.01	0.04	0.16	0	0.6
05/03/18	to	06/01/18	06/04/18	to	06/08/18	152	3	140	-187	-187	35680	28344	0.01	0.01	0.14	0.5	0
05/10/18	to	06/08/18	06/11/18	to	06/15/18	(387)	4	(403)	-287	-371	35293	27941	0.02	0.04	0.3	0.4	0.2
05/17/18	to	06/15/18	06/18/18	to	06/22/18	(509)	9	(545)	-227	-727	34784	27396	0.02	0.04	0.3	0	0.5
05/24/18	to	06/22/18	06/25/18	to	06/29/18	6	4	(10)	-141	-218	34790	27386	0.02	0.01	0.06	0.4	0.3