Trading Crude Light 5min Bars Using
The End Point Fast Fourier Transform With
Walk Forward 5 days in-sample and 1 day out-of-sample
Working Paper February 2016
Copyright © 2016 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 the working paper entitled "The Discrete Fourier Transform Illusion" ",
www.meyersanalytics.com/publications2/dft.pdf, we demonstrated the misuses of the mathematical technique called the Fourier Transform as applied to the S&P500 index. There we showed how fitting the Fourier Transform to the S&P500 index data series produced a perfect curve fit on past data giving the illusion that this technique would predict the major turning points of the S&P500 index. Why does this happen? When the FFT went to fit the data, it already knew where all the tops and bottoms were. The FFT mathematics minimizes the error between the curve it generates and the real data points. This error minimization process forces the generated curve to smoothly fit the past data like a glove. As a matter of fact, it's almost impossible not to get an excellent fit. However, as we demonstrated, when we examined the Fourier Transform on a day-by-day walk forward basis this seemingly wondrous predictive capability disappeared.

Here it will be shown how to use EPFFT technique on a walk forward basis to trade 5-minute bars of Crude Light (CL) futures.

The End Point FFT
In order to avoid the past data curve fit illusion, we will create an indicator that walks forward one bar at a time. This indicator will calculate the noise filtered FFT curve but only save the last point, or end point, of the curve on the day that it is calculated. We will then connect all the generated end points to produce a curve that matches what we would have seen if we performed the noise filtered FFT on the end point dates.

EPFFT Construction Details
Unfortunately constructing the noise filtered FFT of a price data series is not quite as simple as just taking 512 closing prices, and directly plugging them into a FFT algorithm.

The mathematics of the Discrete Fourier Transform(DFT) assumes that the time-domain sample is periodic and that it has captured an integral number of periods. This means that the DFT assumes the end of the sampled series implicitly wraps around to the beginning to start all over again. Thus for 512 sampled data points the DFT assumes that these 512 sampled data points repeat every 512 samples. With real data series this is seldom the case and this creates what is called a wraparound effect in the frequency domain. The wraparound effect creates a lot of distortion on the ends of the price series when the noise filtered FFT is transformed back. Unfortunately the end point of the price series is the very point we wish to estimate. While we can do nothing about the wrap around violation, we can significantly lessen it's effects by what is called zero padding.

The DFT assumes the time domain sample is periodic and repeats. Suppose a price series starts at 400 and wiggles and wags for 512 data samples ending at the value of 600. The DFT assumes that the price series starts at zero, suddenly jumps to 400, goes to 600 and suddenly jumps down to zero again and then repeats. The DFT must create all kinds of different frequencies in the frequency domain to try and match this type of behavior. These false frequencies created to match the jumps and the high average price completely swamp the amplitudes of any real frequencies making them look like noise. Fortunately this effect can be almost eliminated by a simple technique called end point flattening.

The calculation of end point flattening coefficients is simple. If $x(1)$ represents the first price in the sampled data series, $x(n)$ represent the last point in the data series and $y(i)$ equal to the new endpoint flattened series then:

$$a = x(1) \quad b=(x(n)-x(1))/(n-1)$$

$$y(i) = x(i) - [a + b*(i-1)] \quad \text{for } i=1 \text{ to } n \quad (1)$$

We can see that when i=1 then y(1)=0 and when i=n then y(n) =0. What we've done is subtract the beginning value of the time series to make the first value equal to zero and then rotate the rest of the time series such that the end point is now zero. This technique reduces the endpoint distortion but introduces a low frequency artifact into the Fourier Frequency spectrum.

EPFFT Curve Construction
For this article a sliding time-bar window of 1024 5-minute bars of CL continuous futures from 8/1/14 to 2/12/16 will be used.

Step 1 Take the Log_e of the 1024 prices to minimize the exponential trend movements of the CL.   End flatten these 1024 log prices using equation (1) above.

Step 2 Take the FFT of these 1024 points to create 1024 frequency domain complex numbers $\mathbf{f_i}$.

Step 3 Use a Low Pass Threshold filter that zeros out the frequencies whose magnitudes are less than thres*Fmax. Thres is the decimal percentage of Fmax and Fmax is the maximum frequency amplitude of the spectrum.

Step 4 Do an inverse FFT on the noise filtered spectrum and save the last 2 points. Although it's not obvious yet, we will need the noise filtered point one sample before the endpoint.

Add back the end point flattening of **Step 1** and taking the exponential value to reverse the $\log_e$

Step 5 Save the filtered end point and the point before. Call the endpoint ep(k) and the point before ep1(k) where k is the order of the sliding window. That is, the first sliding window k=1, the second, k=2, etc. Slide the 1024 bar data window forward one bar, and repeat steps 1 through 4.

When the data window is moved forward one bar at a time a new data sample is added to the end and the data sample at the beginning is subtracted. This adding and subtracting causes the end point flattening coefficients and the power in the frequency spectrum to jump around creating distortion and jitter in the calculation of the noise filtered end point. This random jumping of the FFT endpoints as the data window slides forward in time adds a random jump to FFT end point curve. Fortunately this jumping can be minimized by creating a new end point curve from the two saved noise filtered end points, ep(k) and ep1(k), above in step 5. Since turning points are of interest rather than magnitude then in **step 5** a new variable will be created called **sumEP** where

$$\text{sumEP(k)} = \text{sumEP(k-1)} + \text{ep(k)-ep1(k)}$$

This new curve **sumEP(k)** is the sum of all the changes in the individual ep(k)'s from their noise filtered FFT value one sample before. This change series minimizes the magnitude jump problem creating a fairly smooth EPFFT curve.

The EPFFT System Defined
Even though sumEP is a fairly smooth curve it still has a number of short term wiggles preventing us from simply going long when the curve turns up and going short when the curve turns down. To create a system, we will use a simple curve following technique on CL 5-minute bars.

Buy Rule:
- **IF sumEP** has moved up by more than the point amount of *pntup* from the lowest low recorded in **sumEP** while short then buy the CL futures at the market..

Sell Rule:
- **IF sumEP** has moved down by more than the point amount *pntdn* from the highest high recorded in **sumEP** while long then sell the CL futures at the market.

Intraday Bars Exit Rule:
Close the position at 1430 ET (no trades will be carried overnight).

Intraday Bars First Trade of Day Entry Rule:

Ignore all trade signals before **8:00**am ET . For the Buy and Sell rules above we have included a first trade of the day entry rule. Trading in the CL futures has changed a lot in the last 5 years because of 24hr Globex trading. In particular trading starts a lot earlier in the morning when Asia and then Europe opens and then dies down. The CL volume starts to pick up again around 800am ET so we will have the strategy resume trading at 800am ET

Discussion of Crude Light Future Prices

Crude Light futures (CL) are traded on Globex and on the trading floor at the NYMEX. On Globex the CL is traded on a 23hour basis . The NYMEX hours for open outcry floor trading (RTH) are 9:00 ET to 14:30 ET. Over 60% of the volume in the CL is done on Globex during the NYMEX open outcry hours. We have restricted our study to only trading the CL during the 8:00 to 14:30 ET hours.

Testing The EPFFT System Using Walk Forward Optimization

There will be three strategy parameters to determine:
1. *thres*, Threshold filter.
2. *pntup*, if sumEP has moved up by more than the point amount of *pntup* from the lowest low recorded in **sumEP** while short then issue a buy signal
3. *pntdn*, **if sumEP** has moved down by more than the point amount *pntdn* from the highest high recorded in **sumEP** while long then sell

To test this system we will use five-minute bar prices of Crude Light (CL) futures contract traded on the NYMEX/Globex and known by the symbol CL for the 378 days from August 11, 2014 to February 12, 2016.

We will test the EPFFT strategy with the above CL 5 min bars on a *walk forward basis*, where the **in-sample(IS)** will be **5 trading weekdays** and the **out-of-sample(OOS)** will be the **next trading weekday** following as will be described below. The days are weekdays only. Weekdays where the OOS falls on a exchange holiday or partial days are eliminated. Holidays that fall on a weekday create a 4day IS. All other **IS** periods consist of 5 trading weekdays.

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

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 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 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 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 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 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 strategy 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 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 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 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. 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 metric 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 loses 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 strategy 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 day-to-day 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 (>50) 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 EPFFT Strategy Parameters Using Walk Forward Optimization
There are three strategy parameters to find *thres, pntup and pntdn.*

For the test data we will run the TradeStation optimization engine on **CL** 5 min price bars from 8/1/2014 to 2/12/2016 with the following optimization ranges for the EPFFT strategy inputs. This will create **378, 5 weekday in-sample periods each followed by a 1 day out-of-sample period** (See Figure 1 for the in-sample/out-of-sample periods). The days are weekdays only . Weekdays where the OOS falls on a exchange holiday or partial days are eliminated. Holidays that fall on a weekday create a 4day IS. All other ***IS*** periods consist of 5 trading weekdays.

1. thres from 10 to 25 in steps of 5
2. pntup from 0.25 to 5 steps of 0.25
3. pntdn from 0.25 to 5 in steps of 0.25
4. pntjup = 999 not used.
5. pntjdn = 999 not used.
6. djp = 1 not used
7. logofcls = 1
8. nsamp = 1024
9. Xn = 1
10. myStartTime = 800
11. Xopn = 0
12. Xtime = 1430

13. XonCls =0
14. xmult = 1
15. prc = c

This will produce 1600 different cases or combinations of the input parameters for each of the 378 PWFO output files. Notice we are using an nsamp=1024 of 5 min bars. For CL which trades from 1800hrs to 1700hrs (next Day) there are 23*12=276, 5min bars per day. With 1024 5 min bars the FFT is processing 3.7 days of closing 5min price bars.

The question we are attempting to answer statistically is which best performance metric or combination of best performance metrics (which we will call a ***filter***) applied to the in-sample section will produce in-sample strategy inputs that produce statistically valid 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 does an optimization routine 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 metrics such as Profit Factor, Total Net Profits, etc. An example of a simple filter would be to choose the strategy 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.

Here is a combination ***filter*** that is used in this paper with good out-of-sample results after examining 14,415 different filters(more on the problem of examining so many filters below). 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>1.5** . In addition we wish to limit the number losing trades in a row in the 5 day IS period to 3 or less (**LR<3**). The PWFO generates the metric **mWTr.** This metric is the **Median of the winning trades in the in-sample section.** We use the median for this metric, because we do not want the statistic distorted by any outlier trades as it might be with an average. Let us choose the 50 rows that contain the Largest(Top) **mWTr** values from the rows that are left from the **PF** -**LR** elimination. This particular filter will now leave 50 cases or rows in the in-sample section that satisfy the above filter conditions. . Suppose for this filter, within the 50 in-sample rows that are left, we want the row that has the maximum PWFO metric **tWb** in the in-sample section. **tWb = Total Winning Bars in the Winning Trades in the In-Sample Section.** Thus we would want the **tWb** to be as large as possible and we find the row that has the highest **tWb** column. This would produce a filter named **t50mWTr|p<1.5|lr3-tWb.** This in-sample filter leaves only one row in the PWFO in-sample section with its associated strategy inputs and out-of-sample net profit in the out-of-sample section. This particular **t50mWTr|p<1.5|lr3-tWb** filter finds the strategy inputs parameters in each of the 378 in-sample sections and applies these inputs to the out-of-sample section immediately following. Using the filter in-sample strategy inputs on the 378 out-of-sample sections, the average out-of-sample performance is calculated. In addition many other important out-of-sample performance statistics for this filter are calculated and summarized. **Figure 3** shows such a filter computer run along with a small sample of other filter combinations that are constructed in a similar manner. **Row 4** of the sample output in **Figure 3** shows the results of the filter discussed above. A total of 14415 different metric filters were examined. More on this below on how that number of filters combinations effect the probability that the filter chosen was or was not due to chance.

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 is how the bootstrap technique is applied. Suppose as an example, we have 100 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 100 files. We repeat this random picking in each of the 100 files 5000 times. Each of the 5000 mirror filters will choose a random row's OSNP of their own in each of the 100 files.. At the end, each of the 5000 mirror filters will have 100 ***random*** OSNP's picked from the rows of the 100 files. The sum of the 100 random OSNP picks for each mirror filter will generate a random total out-of-sample net profit (tOnpNet) or final random equity. The average and standard deviation of the 5000 mirror filter's different random tOnpNets will allow us to calculate the chance probability of our above chosen filter's tOnpNet. Thus given the mirror filter's bootstrap random tOnpNet average and standard

deviation, we can calculate the probability of obtaining our chosen filter's tOnpNet by pure chance alone. Figure 3 lists the 5000 mirror filter's bootstrap average for our 378 out-of-sample files of **$21,351** with a bootstrap standard deviation of **$14486**. The probability of obtaining our filters net profit of **$69,180** is **4.81x10^{-4}** which is **3.30** standard deviations from the bootstrap average. For our filter, in row 4 in Figure 3, the expected number of cases that we could obtain by pure chance that would match or exceed the **$69,180** is **14415**x **4.81x10^{-4}** = **6.9** where **14415** is the total number of different filters we looked at in this run. This number basically says this if we repeated the random selection 14415 times we would find approximately 7 cases on average that would produce better profits than our filter. I usually like to see this number much less than 1. However the 14415 bootstrap random average was $21,351 which meant that 50% of the random picks were at or above $21,351. This indicates that this strategy is in general a profitable strategy no matter what the inputs. Thus in my opinion the 7 random cases that could beat our filter does not negate the validity of the out-of-sample filter chosen.

Results
Table 1 below presents a table of the 378 in-sample and out-of-sample windows , the selected strategy inputs applied to the out-of-sample section and the out-of-sample number of trades, net profit/losses, drawdowns and largest losing trade , results using the filter described above.

Figure 1 presents a graph of the equity curve generated by using the filter on the 378 days of 8/11/14 – 2/12/16. The equity curves are plotted from the Equity and Net Equity columns in Table 1. Plotted on the equity curves are 2nd Order Polynomial fits to the equity curves . 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 net equity curve with commissions and the green dots are the new highs in net equity. The grey line is the daily CL prices superimposed on the equity chart.

Figure 2 presents the out-of-sample 5 minute bar chart of CL for 2/11/16 to 2/12/16 with the EPFFT Indicator and all the buy and sell signals for those dates.

Figure 3 Partial output of the Walk Forward Metric Performance Explorer (WFME) Run on the 378 PWFO files of the CL 5min bars EPFFT strategy

Discussion of System Performance
In Figure 3 Row 4 of the spreadsheet filter output are some statistics that are of interest for our filter. An interesting statistic is **Blw**. Blw is the maximum number of days the OSNP equity curve failed to make a new high. Blw is 30 days for this filter. This means that 30 trading days was the longest time that the equity for this strategy failed to make a new equity high.

To see the effect of walk forward analysis, take a look at **Table 1**. Notice how the input parameters **_thres, pntup and pntdn_** 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 **_thres_** changes from 10 to 25. When the data gets very noisy with a lot of spurious price movements, the threshold to include frequencies has to be higher. During other times when the noise level is not as much the threshold to include frequencies can be lower to get the higher FFT frequencies and get onboard a trend faster. This is what the threshold filter is doing.

In Figure 1, which presents a graph of the equity curve using the filter on the 378 days of 8/11/14 – 2/12/16, notice how the equity curve follows the trend line with an R^2 of 0.989. The weekly plot of CL prices is superimposed on the equity curve plot. Notice how fast the equity curve is able to adapt with changing trends in CL. From 10/3/14 to 1/27/15 CL fell fast from 100 to 53. From 1/27/15 to 5/15/15 CL slowly climbed from 53 to 68. From 5/15/15 to 8/26/15 CL fell from 68 to 43 and from 10/9/15 to 2/11/16 CL fell from 53 to 26. Yet despite these changing price trends the EPFFT strategy was able to adapt to fast and slow changing trends and follow the trend line.

Using this filter, the strategy was able to generate $69,180 net equity after $20 commissions and slippage trading one CL contract for 378 days ~1.5 years. This period of time from 8/11/14 to 2/12/16 was one of the most volatile markets in history. Yet the EPFFT strategy was able to adapt quite well. Note $20 roundtrip commission and slippage was subtracted from each trade and no positions were carried over night. From Table 1, the largest net losing day $2790 on 2/4/16 a very wild financial time and market week. The largest drawdown was -$5690. However this only lasted seven days from 1/13/15 to 1/22/15 and completely recovered and made a new equity high in eight days. The longest time between new equity highs was 30 days.

In observing Table 1 we can see that this strategy and filter made trades from a low of 0 trades/day to a high of 7 trades/day with an average of 1.8 trades/day. .

Given 24 hour trading of the Crude Light, restricting the strategy to trade only from 8am to 1430pm ET caused the strategy to miss many profitable trends opportunities when Asia and then Europe opened trading in the early morning. Further research will include the A.M. time zones.

References

1. Efron, B., Tibshirani, R.J., (1993), "An Introduction to the Bootstrap", New York, Chapman & Hall/CRC.
2. Morrison, Norman "Introduction to Sequential Smoothing and Prediction", McGraw-Hill Book Company, New York, 1969.
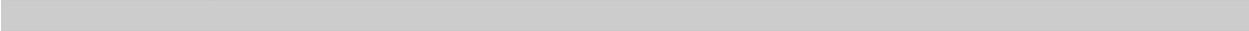
Note: The blue line is the equity curve without commissions and the red dots on the blue line are new highs in equity.
The brown line is the equity curve with commissions and the green dots are the new highs in net equity
The grey line is the EC Weekly Closing prices superimposed on the Equity Chart.

CL5EPFFT_5x1d **t50mWTr|p<1.5|l3-tWb   08/11/14 To 2/12/2016**

$$y = -0.1114x^2 + 255.48x - 642.08$$
$$R^2 = 0.9894$$

$$y = -0.1118x^2 + 220.92x - 487.28$$
$$R^2 = 0.9846$$
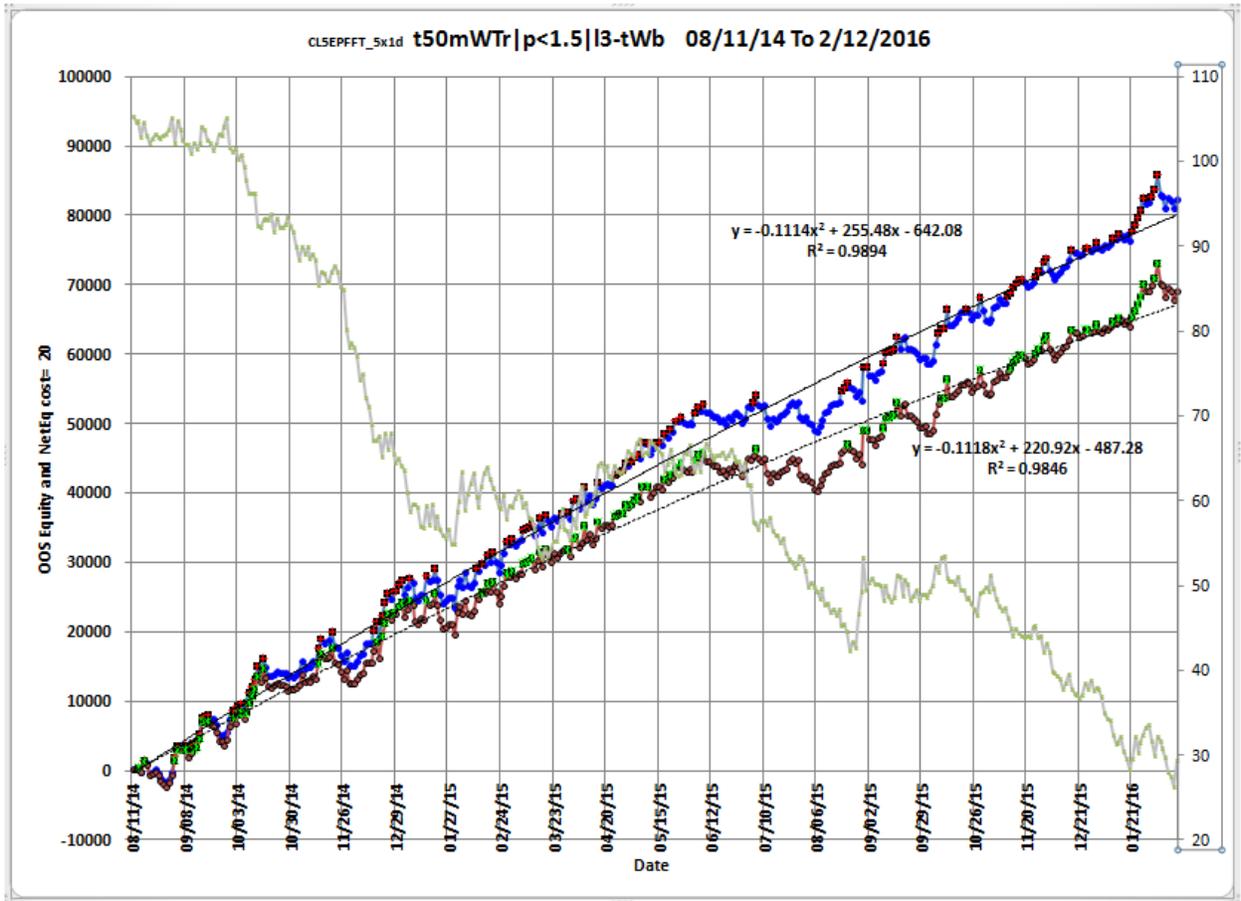
Figure 3_ Partial output of the Walk Forward Metric Performance Explorer (WFME)

CL 5 min bars End Pont Fast Fourier Transform Strategy

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	CL5EPFFT-5x1d	s08/11/14	e02/12/16	#378	AnyTnp								a21351	s14486	f14415							c=$20			
2	Filter-Metric	toGP	aoGP	aoTr	ao#T	aoW	aoL	oW|oL	PFtr	%Wtr	t	std	LLtr	LLp	eqDD	LRp	#	eqTrn	eqV^2	eqR2	Dev^2	Blw	BE	tOnpNet	Prob
3	t50eq2A|p<1.5|-mWTr	84310	224	131.3	1.7	737	479	1.54	1.55	50	4.22	1029	-2860	-2860	-6050	7	376	211	21	93	6493	58	84.3	71470	2.70E-04
4	t50mWTr|p<1.5|l3-tWb	82360	220	125.0	1.8	731	505	1.45	1.5	51	4.01	1061	-2120	-2790	-5690	6	374	213	171	99	2684	30	92.9	69180	4.81E-04
5	t50mLTr|p<1.5|-eq2A	81540	218	122.4	1.8	728	491	1.48	1.5	50	4.13	1021	-2470	-3100	-6030	6	374	210	-55	89	8179	57	87.8	68220	6.07E-04
6	b50nT|p<3|l3-mLb	80250	213	132.0	1.6	779	515	1.51	1.51	50	3.83	1081	-2860	-3090	-5520	4	376	228	32	93	6791	73	102.7	68090	6.27E-04
7	t50eq2A|p<1.5|-mWT|LT	78060	208	120.3	1.7	728	493	1.48	1.49	50	3.87	1039	-2860	-2860	-5110	7	376	212	87	96	4445	50	100.2	65080	1.27E-03
8	b50tLb|p<2|l3-m(ru-p)	79150	210	111.3	1.9	709	446	1.59	1.48	48	4.04	1010	-2470	-2340	-6110	8	377	213	76	96	4665	49	92.6	64930	1.31E-03
9	t50eq2A|p<1.5|l3-mWT|LT	77740	208	121.1	1.7	778	496	1.57	1.47	48	3.79	1060	-2440	-2730	-6350	5	374	200	15	93	5969	34	104.1	64900	1.32E-03
10	t50eq2A|p<1.5|-mWb|mLb	77440	205	115.1	1.8	745	470	1.59	1.47	48	3.87	1030	-1730	-2890	-7830	8	377	197	-37	90	7314	57	100.5	63980	1.63E-03

The WFME Filter Output Columns are defined as follows:

Row 1 CL5EPFFT-5x1d is the strategy abbreviation, First OOS Date(8/11/14), Last OOS Date(2/12/16), **Number of OOS days**(#378) **a**=average of bootstrap random picks. **s**= standard deviation of bootstrap random picks. **f**=number of different filters examined. **c**= slippage and round trip trade cost(c=$20).

Filter = The filter that was run. Row10 filter **b50mWTr|p<1.5|lr3-tWb**

The b50mWTr|p<1.5|lr3-tWb filter produced the following average 378 week statistics on row 4.

toGP = Total out-of-sample(oos) Gross profit for these 378 days.

aoGP = Average 1 day oos gross profit for the 378 days

aoTr = Average oos profit per trade

ao#T = Average number of oos trades per day

aoW = Average of the oos winning trades

aoL = Average of the oos losing trades

aoW|aoL = the ratio of the average winning oos trades to average losing oos trades.

PFtr = Total wins/Total Losses

%Wtr = The percentage of oos trades that were profitable

t = The student t statistic for the 378 daily oos profits. The higher the t statistic the higher the probability that this result was not due to pure chance

std = The standard deviation of the 378 daily oos profits

LLtr = The largest losing oos trade in the whole period

LLp = The largest losing oos period(day)

eqDD = The oos equity drawdown

LRp = The largest number of losing oos days in a row

= The number of days this filter produced a daily result. Note for some days there can be no strategy inputs that satisfy a given filter's criteria.

eqTrn = The straight line trend of the oos gross profit equity curve in $/day.

eqV^2 = The ending velocity of 2nd order polynomial that is fit to the equity curve

eqR2 = The correlation coefficient(r^2) of a straight line fit to the equity curve

Dev^2 = A measure of equity curve smoothness. The square root of the average [(equity curve minus a straight line)^2]

Blw = The maximum number of days the oos equity curve failed to make a new high.

BE = Break even days. Assuming the average and standard deviation are from a normal distribution, this is the number of days you would have to trade to have a 98% probability that your oos equity is above zero.

tOnpNet = Total out-of-sample net profit(tOnpNet) minus the total trade cost.
$$tOnpNet = tOnp - (\text{Number of trade days})*aOnT*Cost.$$

Prob = the probability that the filter's tOnpNet was due to pure chance.
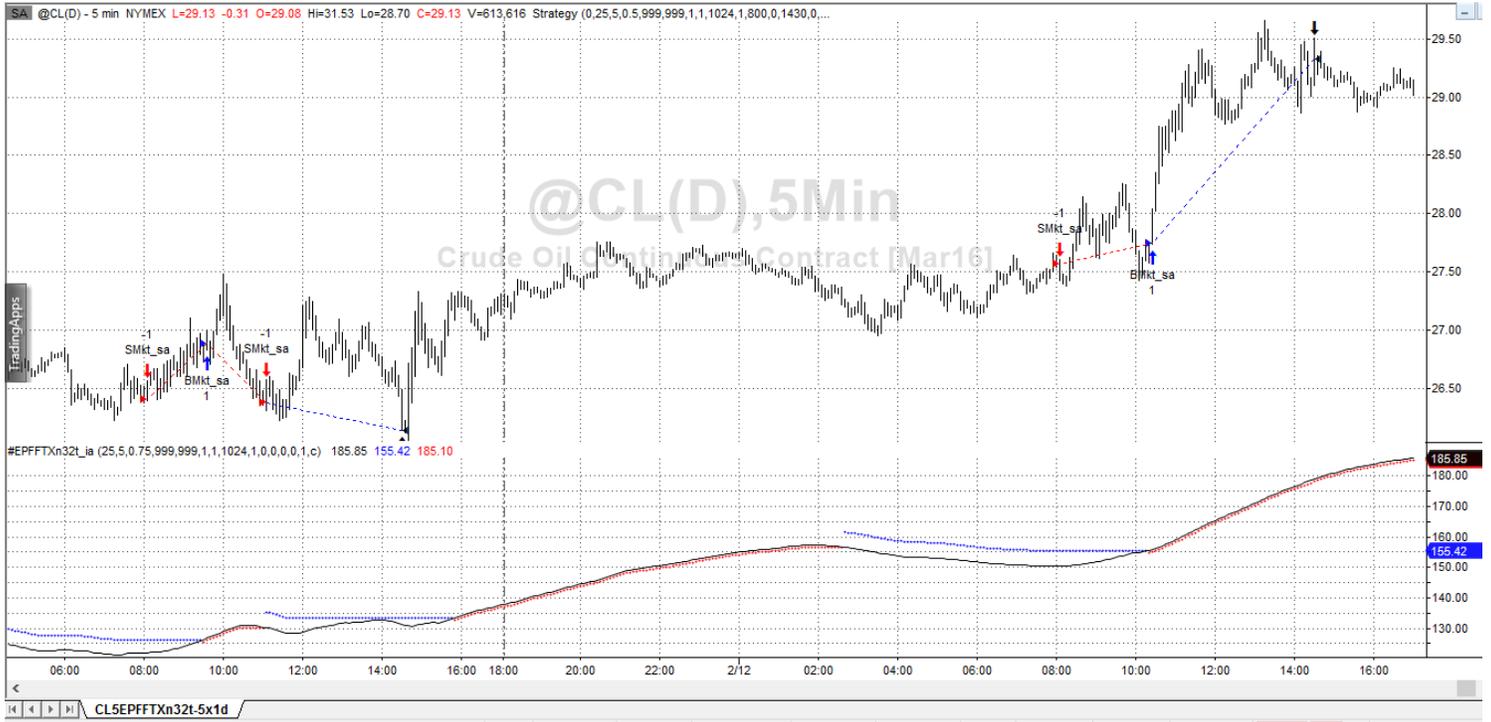
Table 1 CL-5 min bars 8/11/2014 - 2/12/2016. The input values *Thres, pntup, pntdn* are the values found from applying the filter to the in-sample section optimization runs.

Filter= t50mWTr |p<1.5|lr3-tWb   PF<=1.5, LR<=3 and Top 50 mWTr and then maximum tWb

osnp = Daily Out-of-sample gross profit in $
Equity = Running Sum of weekly out-of-sample gross profits $
NOnp$20 = Daily Out-Of-Sample Net Profit in $ = **osnp-ont*20**.
NetEq = running sum of the daily 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 day.
thres= the decimal percentage of Fmax where Fmax is the maximum frequency amplitude of the spectrum
pntup= the point amount of *pntup* from the lowest low recorded in **sumEP** while short then buy the CL futures at the market..
pntdn, the point amount *pntdn* from the highest high recorded in **sumEP** while long then sell the CL futures at the market.
 Note: Blank rows indicate that no out-of-sample trades were made that week

In_Sample Dates			OOS Date	osnp	Equity	NOnp$20	NetEq	ont	ollt	odd	Thres	pntup	pntdn
08/04/14	to	08/08/14	08/11/14	240	240	220	220	1	0	0	20	0.25	2.25
08/05/14	to	08/11/14	08/12/14	(10)	230	(50)	170	2	-20	-20	20	0.25	1.75
08/06/14	to	08/12/14	08/13/14	200	430	180	350	1	0	0	10	1.5	3.25
08/07/14	to	08/13/14	08/14/14	(530)	(100)	(570)	(220)	2	-1200	-1200	25	0.75	2
08/08/14	to	08/14/14	08/15/14	1600	1500	1580	1360	1	0	0	10	0.5	3.25
08/11/14	to	08/15/14	08/18/14	(450)	1050	(490)	870	2	-560	-560	20	0.5	2.5
08/12/14	to	08/18/14	08/19/14	(1430)	(380)	(1470)	(600)	2	-1350	-1430	15	4	4.5
08/13/14	to	08/19/14	08/20/14	160	(220)	140	(460)	1	0	0	20	2.5	3.5
08/14/14	to	08/20/14	08/21/14	350	130	330	(130)	1	0	0	20	2.75	3.5
08/15/14	to	08/21/14	08/22/14	(490)	(360)	(550)	(680)	3	-270	-510	20	0.25	3.5
08/18/14	to	08/22/14	08/25/14	(780)	(1140)	(820)	(1500)	2	-570	-780	20	4	1.75
08/19/14	to	08/25/14	08/26/14	(400)	(1540)	(460)	(1960)	3	-340	-400	10	0.25	1.5
08/20/14	to	08/26/14	08/27/14	(280)	(1820)	(300)	(2260)	1	-280	-280	10	1.25	3.25
08/21/14	to	08/27/14	08/28/14	520	(1300)	500	(1760)	1	0	0	25	0.25	3.5
08/22/14	to	08/28/14	08/29/14	1100	(200)	1080	(680)	1	0	0	15	0.25	3.25
08/26/14	to	09/01/14	09/02/14	2140	1940	2120	1440	1	0	0	25	3	3
08/27/14	to	09/02/14	09/03/14	1590	3530	1570	3010	1	0	0	25	3	0.25
08/28/14	to	09/03/14	09/04/14		3530		3010						
08/29/14	to	09/04/14	09/05/14		3530		3010						
09/01/14	to	09/05/14	09/08/14	40	3570	20	3030	1	0	0	20	1	3.25
09/02/14	to	09/08/14	09/09/14	(1070)	2500	(1090)	1940	1	-1070	-1070	20	0.25	3.25
09/03/14	to	09/09/14	09/10/14	710	3210	690	2630	1	0	0	10	0.75	0.5
09/04/14	to	09/10/14	09/11/14	470	3680	430	3060	2	-920	-920	10	0.75	0.25
09/05/14	to	09/11/14	09/12/14	350	4030	310	3370	2	-180	-180	20	1.25	0.5
09/08/14	to	09/12/14	09/15/14	1260	5290	1220	4590	2	0	0	10	3.25	2.5
09/09/14	to	09/15/14	09/16/14	2390	7680	2370	6960	1	0	0	20	0.25	5
09/10/14	to	09/16/14	09/17/14	50	7730	30	6990	1	0	0	20	0.75	1.25
09/11/14	to	09/17/14	09/18/14	210	7940	170	7160	2	-480	-480	20	0.5	0.5
09/12/14	to	09/18/14	09/19/14	(550)	7390	(590)	6570	2	-300	-550	15	0.5	2
09/15/14	to	09/19/14	09/22/14	(10)	7380	(70)	6500	3	-500	-500	15	1	0.5
09/16/14	to	09/22/14	09/23/14	(800)	6580	(840)	5660	2	-590	-800	15	4.25	0.25
09/17/14	to	09/23/14	09/24/14	(1410)	5170	(1430)	4230	1	-1410	-1410	10	4	1
09/18/14	to	09/24/14	09/25/14	0	5170	(60)	4170	3	-300	-570	10	3.5	0.25
09/19/14	to	09/25/14	09/26/14	(560)	4610	(580)	3590	1	-560	-560	10	4.75	0.5
09/22/14	to	09/26/14	09/29/14	970	5580	950	4540	1	0	0	10	3.25	3.75
09/23/14	to	09/29/14	09/30/14	1960	7540	1920	6460	2	-650	-650	20	2	2.5
09/24/14	to	09/30/14	10/01/14	1180	8720	1120	7580	3	-80	-80	10	3.25	0.5

In_Sample Dates			OOS Date	osnp	Equity	NOnp$20	NetEq	ont	ollt	odd	Thres	pntup	pntdn
09/25/14	to	10/01/14	10/02/14	(780)	7940	(820)	6760	2	-1280	-1280	25	3.25	2
09/26/14	to	10/02/14	10/03/14	1340	9280	1280	8040	3	0	0	25	1	4.75
09/29/14	to	10/03/14	10/06/14	340	9620	320	8360	1	0	0	25	3.75	4.25
09/30/14	to	10/06/14	10/07/14	(820)	8800	(860)	7500	2	-1090	-1090	20	0.25	4.75
10/01/14	to	10/07/14	10/08/14	920	9720	900	8400	1	0	0	10	4	0.25
10/02/14	to	10/08/14	10/09/14	1410	11130	1390	9790	1	0	0	15	2.75	0.5
10/03/14	to	10/09/14	10/10/14	980	12110	960	10750	1	0	0	10	4.75	2.5
10/06/14	to	10/10/14	10/13/14	930	13040	910	11660	1	0	0	10	4.75	2.75
10/07/14	to	10/13/14	10/14/14	1940	14980	1900	13560	2	-460	-460	20	0.25	1
10/08/14	to	10/14/14	10/15/14	(700)	14280	(720)	12840	1	-700	-700	25	4.75	4.75
10/09/14	to	10/15/14	10/16/14	1860	16140	1820	14660	2	-30	-30	15	0.25	0.5
10/10/14	to	10/16/14	10/17/14	(1120)	15020	(1160)	13500	2	-980	-1120	15	1.75	3.5
10/13/14	to	10/17/14	10/20/14	(1280)	13740	(1320)	12180	2	-900	-1280	10	2.75	0.25
10/14/14	to	10/20/14	10/21/14	(160)	13580	(200)	11980	2	-220	-220	15	1	1.75
10/15/14	to	10/21/14	10/22/14	340	13920	300	12280	2	-1000	-1000	15	1.75	5
10/16/14	to	10/22/14	10/23/14	440	14360	420	12700	1	0	0	15	2	1.75
10/17/14	to	10/23/14	10/24/14	(250)	14110	(290)	12410	2	-200	-250	20	0.75	1
10/20/14	to	10/24/14	10/27/14	80	14190	40	12450	2	-160	-160	10	4	2
10/21/14	to	10/27/14	10/28/14	(190)	14000	(210)	12240	1	-190	-190	15	2.5	4.75
10/22/14	to	10/28/14	10/29/14	(660)	13340	(700)	11540	2	-340	-660	10	1.5	1.25
10/23/14	to	10/29/14	10/30/14	310	13650	290	11830	1	0	0	15	2.5	1.5
10/24/14	to	10/30/14	10/31/14	(130)	13520	(150)	11680	1	-130	-130	10	1.5	3.75
10/27/14	to	10/31/14	11/03/14	390	13910	350	12030	2	-870	-870	10	1.5	2.75
10/28/14	to	11/03/14	11/04/14	330	14240	290	12320	2	-190	-190	15	4.5	1
10/29/14	to	11/04/14	11/05/14	1550	15790	1530	13850	1	0	0	15	1.75	0.25
10/30/14	to	11/05/14	11/06/14	(990)	14800	(1030)	12820	2	-690	-990	10	1.5	3.25
10/31/14	to	11/06/14	11/07/14	180	14980	160	12980	1	0	0	20	0.25	1.75
11/03/14	to	11/07/14	11/10/14	(100)	14880	(140)	12840	2	-1050	-1050	20	0.25	1.5
11/04/14	to	11/10/14	11/11/14	950	15830	910	13750	2	0	0	25	0.75	0.5
11/05/14	to	11/11/14	11/12/14	(360)	15470	(420)	13330	3	-270	-500	10	2.25	0.5
11/06/14	to	11/12/14	11/13/14	2140	17610	2120	15450	1	0	0	25	1.25	1.75
11/07/14	to	11/13/14	11/14/14	1370	18980	1350	16800	1	0	0	20	1.25	1.25
11/10/14	to	11/14/14	11/17/14	(660)	18320	(680)	16120	1	-660	-660	25	3.75	3.25
11/11/14	to	11/17/14	11/18/14	140	18460	100	16220	2	-400	-400	20	2.75	0.5
11/12/14	to	11/18/14	11/19/14	340	18800	300	16520	2	0	0	15	1.5	2.25
11/13/14	to	11/19/14	11/20/14	1170	19970	1150	17670	1	0	0	15	0.5	1.5
11/14/14	to	11/20/14	11/21/14	(1960)	18010	(2000)	15670	2	-1530	-1960	15	0.25	1.5
11/17/14	to	11/21/14	11/24/14	(350)	17660	(410)	15260	3	-510	-920	10	1.25	1.5
11/18/14	to	11/24/14	11/25/14	(950)	16710	(990)	14270	2	-1550	-1550	25	0.25	5
11/19/14	to	11/25/14	11/26/14	(1010)	15700	(1050)	13220	2	-610	-1010	20	1.5	3.25
11/24/14	to	11/28/14	12/01/14	1350	17050	1310	14530	2	-90	-90	20	1.5	4
11/25/14	to	12/01/14	12/02/14	(1910)	15140	(1950)	12580	2	-1570	-1910	25	3.25	1.75
11/26/14	to	12/02/14	12/03/14	10	15150	(30)	12550	2	-60	-60	25	3.25	0.75
11/27/14	to	12/03/14	12/04/14	60	15210	20	12570	2	-20	-20	25	4.5	4.5
11/28/14	to	12/04/14	12/05/14	640	15850	620	13190	1	0	0	25	3.25	1.25
12/01/14	to	12/05/14	12/08/14	790	16640	770	13960	1	0	0	20	1.5	5
12/02/14	to	12/08/14	12/09/14	160	16800	140	14100	1	0	0	20	3.5	2.25
12/03/14	to	12/09/14	12/10/14	1590	18390	1570	15670	1	0	0	20	3	0.75
12/04/14	to	12/10/14	12/11/14	(100)	18290	(140)	15530	2	-580	-580	25	1	0.75
12/05/14	to	12/11/14	12/12/14	150	18440	110	15640	2	-570	-570	25	1.75	0.75
12/08/14	to	12/12/14	12/15/14	1760	20200	1740	17380	1	0	0	10	3.5	2.75
12/09/14	to	12/15/14	12/16/14	1170	21370	1110	18490	3	-200	-200	10	3	2.75
12/10/14	to	12/16/14	12/17/14	(2200)	19170	(2240)	16250	2	-2040	-2200	25	5	0.5
12/11/14	to	12/17/14	12/18/14	3100	22270	3060	19310	2	-210	-210	15	2.5	2.5
12/12/14	to	12/18/14	12/19/14	1930	24200	1910	21220	1	0	0	25	3.5	4
12/15/14	to	12/19/14	12/22/14	1380	25580	1360	22580	1	0	0	25	2.75	2
12/16/14	to	12/22/14	12/23/14	(760)	24820	(820)	21760	3	-990	-1520	15	0.25	0.75

In_Sample Dates			OOS Date	osnp	Equity	NOnp$20	NetEq	ont	ollt	odd	Thres	pntup	pntdn
12/19/14	to	12/25/14	12/26/14	980	25800	960	22720	1	0	0	10	4.75	2.75
12/22/14	to	12/26/14	12/29/14	30	25830	(10)	22710	2	-830	-830	10	5	3.5
12/23/14	to	12/29/14	12/30/14	930	26760	910	23620	1	0	0	25	1.5	1.5
12/24/14	to	12/30/14	12/31/14	570	27330	550	24170	1	0	0	10	0.25	4.25
12/26/14	to	01/01/15	01/02/15	(1910)	25420	(1970)	22200	3	-1130	-2000	15	3	0.5
12/29/14	to	01/02/15	01/05/15	1040	26460	1020	23220	1	0	0	20	5	0.5
12/30/14	to	01/05/15	01/06/15	1260	27720	1240	24460	1	0	0	25	4.5	5
12/31/14	to	01/06/15	01/07/15	(630)	27090	(670)	23790	2	-500	-630	20	5	0.5
01/01/15	to	01/07/15	01/08/15	(2130)	24960	(2170)	21620	2	-1190	-2130	20	5	0.75
01/02/15	to	01/08/15	01/09/15	(400)	24560	(440)	21180	2	-290	-400	20	5	1.5
01/05/15	to	01/09/15	01/12/15	870	25430	850	22030	1	0	0	25	1.25	3.25
01/06/15	to	01/12/15	01/13/15	(300)	25130	(340)	21690	2	-810	-810	25	1.25	4
01/07/15	to	01/13/15	01/14/15	2850	27980	2830	24520	1	0	0	20	1.5	2
01/08/15	to	01/14/15	01/15/15	(670)	27310	(730)	23790	3	-1660	-2000	15	4	3.75
01/09/15	to	01/15/15	01/16/15	290	27600	250	24040	2	-730	-730	15	4.25	0.5
01/13/15	to	01/19/15	01/20/15	1460	29060	1440	25480	1	0	0	25	2.5	0.5
01/14/15	to	01/20/15	01/21/15	(1580)	27480	(1620)	23860	2	-1330	-1580	25	2.75	0.5
01/15/15	to	01/21/15	01/22/15	(2090)	25390	(2130)	21730	2	-2120	-2120	25	2.75	2
01/16/15	to	01/22/15	01/23/15	(1280)	24110	(1320)	20410	2	-930	-1280	25	0.5	4.25
01/19/15	to	01/23/15	01/26/15	350	24460	310	20720	2	-150	-150	25	4.5	2
01/20/15	to	01/26/15	01/27/15	430	24890	410	21130	1	0	0	25	5	3.25
01/21/15	to	01/27/15	01/28/15		24890		21130				25	5	4.5
01/22/15	to	01/28/15	01/29/15	(1520)	23370	(1560)	19570	2	-840	-1520	15	3	2.5
01/23/15	to	01/29/15	01/30/15	3220	26590	3200	22770	1	0	0	25	2.75	4.75
01/26/15	to	01/30/15	02/02/15	970	27560	950	23720	1	0	0	25	2	4.75
01/27/15	to	02/02/15	02/03/15	(1000)	26560	(1060)	22660	3	-1590	-1590	15	4.75	2.25
01/28/15	to	02/03/15	02/04/15	2040	28600	1980	24640	3	-600	-810	20	0.5	1
01/29/15	to	02/04/15	02/05/15	(2010)	26590	(2050)	22590	2	-1590	-2010	25	4.75	0.75
01/30/15	to	02/05/15	02/06/15	(100)	26490	(120)	22470	1	-100	-100	25	4.75	0.25
02/02/15	to	02/06/15	02/09/15	550	27040	530	23000	1	0	0	15	0.75	2.25
02/03/15	to	02/09/15	02/10/15	2130	29170	2110	25110	1	0	0	15	0.75	1.5
02/04/15	to	02/10/15	02/11/15	(330)	28840	(370)	24740	2	-690	-690	20	0.25	3
02/05/15	to	02/11/15	02/12/15	960	29800	940	25680	1	0	0	15	1.25	1.5
02/06/15	to	02/12/15	02/13/15	(50)	29750	(70)	25610	1	-50	-50	15	1.25	3
02/10/15	to	02/16/15	02/17/15	1380	31130	1340	26950	2	0	0	10	4.25	0.5
02/11/15	to	02/17/15	02/18/15	(1140)	29990	(1220)	25730	4	-620	-1180	10	0.75	2
02/12/15	to	02/18/15	02/19/15	1470	31460	1410	27140	3	0	0	10	0.25	1.75
02/13/15	to	02/19/15	02/20/15	(1320)	30140	(1400)	25740	4	-690	-1640	10	1.25	1.5
02/16/15	to	02/20/15	02/23/15	(1520)	28620	(1600)	24140	4	-560	-1520	10	1.25	0.25
02/17/15	to	02/23/15	02/24/15	990	29610	950	25090	2	0	0	10	1.25	0.75
02/18/15	to	02/24/15	02/25/15	1670	31280	1650	26740	1	0	0	20	0.75	3.75
02/19/15	to	02/25/15	02/26/15	1700	32980	1680	28420	1	0	0	20	4.5	1.25
02/20/15	to	02/26/15	02/27/15	(400)	32580	(420)	28000	1	-400	-400	10	5	3
02/23/15	to	02/27/15	03/02/15	730	33310	710	28710	1	0	0	20	3	2.75
02/24/15	to	03/02/15	03/03/15	(860)	32450	(920)	27790	3	-720	-860	10	5	4
02/25/15	to	03/03/15	03/04/15	550	33000	490	28280	3	-500	-530	15	3.75	2.25
02/26/15	to	03/04/15	03/05/15	210	33210	150	28430	3	-490	-490	15	2	2.25
02/27/15	to	03/05/15	03/06/15	1430	34640	1410	29840	1	0	0	15	3.75	2.5
03/02/15	to	03/06/15	03/09/15	240	34880	220	30060	1	0	0	15	3.5	2.75
03/03/15	to	03/09/15	03/10/15	250	35130	230	30290	1	0	0	10	3.75	4.5
03/04/15	to	03/10/15	03/11/15	410	35540	390	30680	1	0	0	25	1.25	0.25
03/05/15	to	03/11/15	03/12/15	(1580)	33960	(1600)	29080	1	-1580	-1580	25	3.75	4.25
03/06/15	to	03/12/15	03/13/15	1130	35090	1110	30190	1	0	0	10	2.25	0.75
03/09/15	to	03/13/15	03/16/15	1320	36410	1280	31470	2	0	0	10	2.25	1
03/10/15	to	03/16/15	03/17/15	(1990)	34420	(2030)	29440	2	-1350	-1990	25	3.75	0.75
03/11/15	to	03/17/15	03/18/15	2390	36810	2370	31810	1	0	0	15	4.5	1
03/12/15	to	03/18/15	03/19/15	(780)	36030	(840)	30970	3	-470	-780	20	0.75	2.75

Trading CL 5min Bars Using The EPFFT IS-5d OOS-1d

In_Sample Dates			OOS Date	osnp	Equity	NOnp$20	NetEq	ont	ollt	odd	Thres	pntup	pntdn
03/13/15	to	03/19/15	03/20/15	(800)	35230	(860)	30110	3	-1000	-1000	20	4.5	3.25
03/16/15	to	03/20/15	03/23/15	1270	36500	1250	31360	1	0	0	20	0.25	3.5
03/17/15	to	03/23/15	03/24/15	(550)	35950	(590)	30770	2	-300	-550	25	4.25	4.5
03/18/15	to	03/24/15	03/25/15	660	36610	620	31390	2	-520	-520	25	3	2
03/19/15	to	03/25/15	03/26/15	450	37060	410	31800	2	0	0	20	3	1.25
03/20/15	to	03/26/15	03/27/15	(60)	37000	(100)	31700	2	-960	-960	20	1.25	4
03/23/15	to	03/27/15	03/30/15	210	37210	170	31870	2	-100	-100	20	3.25	2
03/24/15	to	03/30/15	03/31/15	(970)	36240	(1010)	30860	2	-570	-970	20	4.5	4
03/25/15	to	03/31/15	04/01/15	2590	38830	2570	33430	1	0	0	20	2	1.25
03/26/15	to	04/01/15	04/02/15	300	39130	260	33690	2	0	0	20	4.25	3.5
03/30/15	to	04/03/15	04/06/15	(1430)	37700	(1470)	32220	2	-1730	-1730	25	4.75	0.25
03/31/15	to	04/06/15	04/07/15	750	38450	710	32930	2	-800	-800	10	0.5	3.25
04/01/15	to	04/07/15	04/08/15	2390	40840	2350	35280	2	0	0	10	0.5	2.5
04/02/15	to	04/08/15	04/09/15	(1960)	38880	(2020)	33260	3	-860	-1960	10	0.5	2.5
04/03/15	to	04/09/15	04/10/15	830	39710	810	34070	1	0	0	10	0.5	2.75
04/06/15	to	04/10/15	04/13/15	(1390)	38320	(1450)	32620	3	-590	-1390	10	1.25	3.5
04/07/15	to	04/13/15	04/14/15	940	39260	920	33540	1	0	0	10	1.25	4.5
04/08/15	to	04/14/15	04/15/15	2310	41570	2290	35830	1	0	0	20	1.5	2.5
04/09/15	to	04/15/15	04/16/15	(900)	40670	(940)	34890	2	-1130	-1130	15	4	3.25
04/10/15	to	04/16/15	04/17/15	570	41240	550	35440	1	0	0	10	1.25	4
04/13/15	to	04/17/15	04/20/15	60	41300	20	35460	2	-550	-550	10	1.25	4
04/14/15	to	04/20/15	04/21/15	(200)	41100	(240)	35220	2	-680	-680	10	2.5	3.75
04/15/15	to	04/21/15	04/22/15	140	41240	100	35320	2	-20	-20	10	3.25	2.5
04/16/15	to	04/22/15	04/23/15	1340	42580	1300	36620	2	0	0	10	3.25	1
04/17/15	to	04/23/15	04/24/15	250	42830	230	36850	1	0	0	10	3.75	0.75
04/20/15	to	04/24/15	04/27/15	180	43010	160	37010	1	0	0	25	3.5	4.25
04/21/15	to	04/27/15	04/28/15	130	43140	90	37100	2	-40	-40	10	4	0.75
04/22/15	to	04/28/15	04/29/15	1180	44320	1140	38240	2	-240	-240	10	3.25	4
04/23/15	to	04/29/15	04/30/15	(280)	44040	(320)	37920	2	-430	-430	15	3	2.25
04/24/15	to	04/30/15	05/01/15	440	44480	420	38340	1	0	0	25	2.5	2.75
04/27/15	to	05/01/15	05/04/15	620	45100	600	38940	1	0	0	25	2.75	1.5
04/28/15	to	05/04/15	05/05/15	420	45520	400	39340	1	0	0	20	2.25	4.25
04/29/15	to	05/05/15	05/06/15	(490)	45030	(530)	38810	2	-680	-680	25	2.75	0.25
04/30/15	to	05/06/15	05/07/15	2140	47170	2120	40930	1	0	0	15	4.5	0.25
05/01/15	to	05/07/15	05/08/15	(40)	47130	(60)	40870	1	-40	-40	25	3.75	0.5
05/04/15	to	05/08/15	05/11/15	90	47220	70	40940	1	0	0	20	3	0.5
05/05/15	to	05/11/15	05/12/15	(1480)	45740	(1560)	39380	4	-640	-1480	10	2	0.25
05/06/15	to	05/12/15	05/13/15	790	46530	770	40150	1	0	0	15	4	0.5
05/07/15	to	05/13/15	05/14/15	730	47260	710	40860	1	0	0	15	4	1.75
05/08/15	to	05/14/15	05/15/15	80	47340	60	40920	1	0	0	15	3.5	2
05/11/15	to	05/15/15	05/18/15	(450)	46890	(490)	40430	2	-750	-750	15	4	2
05/12/15	to	05/18/15	05/19/15	1550	48440	1530	41960	1	0	0	20	4.75	1.25
05/13/15	to	05/19/15	05/20/15	(400)	48040	(440)	41520	2	-380	-400	20	1.5	0.25
05/14/15	to	05/20/15	05/21/15	1120	49160	1100	42620	1	0	0	10	1.5	2.25
05/15/15	to	05/21/15	05/22/15	(250)	48910	(290)	42330	2	-400	-400	25	0.25	4
05/19/15	to	05/25/15	05/26/15	1430	50340	1410	43740	1	0	0	10	0.75	4.75
05/20/15	to	05/26/15	05/27/15		50340		43740						
05/21/15	to	05/27/15	05/28/15	620	50960	560	44300	3	-90	-90	25	0.25	2.25
05/22/15	to	05/28/15	05/29/15	(860)	50100	(920)	43380	3	-1300	-1990	10	1	0.25
05/25/15	to	05/29/15	06/01/15	(240)	49860	(280)	43100	2	-350	-350	20	0.5	1.75
05/26/15	to	06/01/15	06/02/15	340	50200	320	43420	1	0	0	20	3.5	4.25
05/27/15	to	06/02/15	06/03/15	(340)	49860	(400)	43020	3	-520	-840	10	5	2.25
05/28/15	to	06/03/15	06/04/15	1690	51550	1670	44690	1	0	0	25	3.5	5
05/29/15	to	06/04/15	06/05/15	820	52370	780	45470	2	0	0	25	3.5	3.25
06/01/15	to	06/05/15	06/08/15	(450)	51920	(470)	45000	1	-450	-450	25	2.5	4.75
06/02/15	to	06/08/15	06/09/15	810	52730	790	45790	1	0	0	25	2.75	5
06/03/15	to	06/09/15	06/10/15	(1080)	51650	(1120)	44670	2	-660	-1080	20	3.25	3.75

In_Sample Dates			OOS Date	osnp	Equity	NOnp$20	NetEq	ont	ollt	odd	Thres	pntup	pntdn
06/04/15	to	06/10/15	06/11/15	(40)	51610	(60)	44610	1	-40	-40	10	0.5	0.75
06/05/15	to	06/11/15	06/12/15	(350)	51260	(390)	44220	2	-220	-350	10	0.5	1.5
06/08/15	to	06/12/15	06/15/15	(240)	51020	(280)	43940	2	-270	-270	10	3.75	3.25
06/09/15	to	06/15/15	06/16/15	50	51070	30	43970	1	0	0	25	0.25	4
06/10/15	to	06/16/15	06/17/15	(800)	50270	(840)	43130	2	-1050	-1050	20	0.5	1
06/11/15	to	06/17/15	06/18/15	240	50510	200	43330	2	0	0	20	0.5	0.25
06/12/15	to	06/18/15	06/19/15	(660)	49850	(740)	42590	4	-370	-710	20	0.5	0.5
06/15/15	to	06/19/15	06/22/15	1080	50930	1020	43610	3	-120	-120	20	0.75	1
06/16/15	to	06/22/15	06/23/15	(440)	50490	(480)	43130	2	-680	-680	20	0.5	0.75
06/17/15	to	06/23/15	06/24/15	880	51370	860	43990	1	0	0	10	2.5	1.25
06/18/15	to	06/24/15	06/25/15	350	51720	310	44300	2	0	0	10	2.5	3.25
06/19/15	to	06/25/15	06/26/15	(540)	51180	(580)	43720	2	-630	-630	15	2	3.25
06/22/15	to	06/26/15	06/29/15	(1150)	50030	(1210)	42510	3	-650	-1180	10	2.75	3.25
06/23/15	to	06/29/15	06/30/15	780	50810	760	43270	1	0	0	20	5	3.5
06/24/15	to	06/30/15	07/01/15	1660	52470	1640	44910	1	0	0	15	4.25	2
06/25/15	to	07/01/15	07/02/15	(150)	52320	(170)	44740	1	-150	-150	10	4.25	4.25
06/29/15	to	07/03/15	07/06/15	710	53030	630	45370	4	-200	-260	10	5	0.25
06/30/15	to	07/06/15	07/07/15	1060	54090	1000	46370	3	0	0	15	2	3.5
07/01/15	to	07/07/15	07/08/15	(1330)	52760	(1370)	45000	2	-1070	-1330	20	5	3.5
07/02/15	to	07/08/15	07/09/15	(340)	52420	(380)	44620	2	-250	-340	20	4.75	1
07/03/15	to	07/09/15	07/10/15	350	52770	330	44950	1	0	0	10	3	1.25
07/06/15	to	07/10/15	07/13/15	(1940)	50830	(2000)	42950	3	-910	-1940	15	2.75	0.5
07/07/15	to	07/13/15	07/14/15	(1200)	49630	(1300)	41650	5	-630	-1400	10	3	0.25
07/08/15	to	07/14/15	07/15/15	1150	50780	1130	42780	1	0	0	10	3.25	0.5
07/09/15	to	07/15/15	07/16/15	(360)	50420	(400)	42380	2	-640	-640	25	2.25	0.75
07/10/15	to	07/16/15	07/17/15	40	50460	(20)	42360	3	-250	-320	15	1	1.5
07/13/15	to	07/17/15	07/20/15	790	51250	770	43130	1	0	0	20	3	0.25
07/14/15	to	07/20/15	07/21/15	260	51510	220	43350	2	-70	-70	10	2.5	0.25
07/15/15	to	07/21/15	07/22/15	310	51820	270	43620	2	-280	-280	25	0.25	0.5
07/16/15	to	07/22/15	07/23/15	880	52700	860	44480	1	0	0	25	2.25	0.5
07/17/15	to	07/23/15	07/24/15	490	53190	470	44950	1	0	0	25	0.75	0.5
07/20/15	to	07/24/15	07/27/15	(510)	52680	(550)	44400	2	-310	-510	25	0.25	0.5
07/21/15	to	07/27/15	07/28/15	460	53140	440	44840	1	0	0	15	4	1
07/22/15	to	07/28/15	07/29/15	(2120)	51020	(2160)	42680	2	-1630	-2120	15	3.75	0.25
07/23/15	to	07/29/15	07/30/15	(540)	50480	(600)	42080	3	-500	-540	20	3.25	0.25
07/24/15	to	07/30/15	07/31/15	480	50960	460	42540	1	0	0	25	3.75	4.5
07/27/15	to	07/31/15	08/03/15	(760)	50200	(820)	41720	3	-970	-970	15	0.25	4
07/28/15	to	08/03/15	08/04/15	(190)	50010	(210)	41510	1	-190	-190	10	2.75	3
07/29/15	to	08/04/15	08/05/15	(940)	49070	(980)	40530	2	-930	-940	25	1.25	3.75
07/30/15	to	08/05/15	08/06/15	(120)	48950	(160)	40370	2	-70	-120	25	1.25	2.25
07/31/15	to	08/06/15	08/07/15	730	49680	710	41080	1	0	0	10	3.75	0.25
08/03/15	to	08/07/15	08/10/15	950	50630	930	42010	1	0	0	10	1.75	2.5
08/04/15	to	08/10/15	08/11/15	920	51550	900	42910	1	0	0	15	2	1.25
08/05/15	to	08/11/15	08/12/15	250	51800	210	43120	2	0	0	10	1.5	0.25
08/06/15	to	08/12/15	08/13/15	890	52690	870	43990	1	0	0	15	2	0.25
08/07/15	to	08/13/15	08/14/15	230	52920	190	44180	2	0	0	25	0.5	0.25
08/10/15	to	08/14/15	08/17/15	(100)	52820	(120)	44060	1	-100	-100	10	1.25	0.75
08/11/15	to	08/17/15	08/18/15	270	53090	230	44290	2	-300	-300	20	4.25	2
08/12/15	to	08/18/15	08/19/15	1680	54770	1660	45950	1	0	0	15	4.75	1
08/13/15	to	08/19/15	08/20/15	330	55100	310	46260	1	0	0	10	0.25	1.5
08/14/15	to	08/20/15	08/21/15	790	55890	730	46990	3	0	0	10	0.5	2
08/17/15	to	08/21/15	08/24/15	(650)	55240	(670)	46320	1	-650	-650	15	0.25	2.25
08/18/15	to	08/24/15	08/25/15	(190)	55050	(230)	46090	2	-170	-190	15	1	0.5
08/19/15	to	08/25/15	08/26/15	(1110)	53940	(1150)	44940	2	-970	-1110	10	2	3.75
08/20/15	to	08/26/15	08/27/15	680	54620	620	45560	3	-910	-910	10	2.75	3.75
08/21/15	to	08/27/15	08/28/15	(1290)	53330	(1330)	44230	2	-2040	-2040	15	4	1
08/24/15	to	08/28/15	08/31/15	4760	58090	4740	48970	1	0	0	20	0.25	1.75

In_Sample Dates			OOS Date	osnp	Equity	NOnp$20	NetEq	ont	ollt	odd	Thres	pntup	pntdn
08/25/15	to	08/31/15	09/01/15	110	58200	70	49040	2	-1070	-1070	25	0.5	0.25
08/26/15	to	09/01/15	09/02/15	(1290)	56910	(1350)	47690	3	-1500	-2190	25	0.5	1.25
08/27/15	to	09/02/15	09/03/15	80	56990	40	47730	2	-280	-280	25	1	1
08/28/15	to	09/03/15	09/04/15	(680)	56310	(700)	47030	1	-680	-680	25	1.75	1.25
08/31/15	to	09/04/15	09/07/15	1040	57350	1000	48030	2	-140	-140	20	3.5	4
09/01/15	to	09/07/15	09/08/15	220	57570	200	48230	1	0	0	20	3.5	3.25
09/02/15	to	09/08/15	09/09/15	1100	58670	1080	49310	1	0	0	25	0.5	2.75
09/03/15	to	09/09/15	09/10/15	1490	60160	1470	50780	1	0	0	25	3.75	2
09/04/15	to	09/10/15	09/11/15	90	60250	70	50850	1	0	0	25	2	0.25
09/07/15	to	09/11/15	09/14/15	290	60540	270	51120	1	0	0	20	2.5	0.5
09/08/15	to	09/14/15	09/15/15	160	60700	140	51260	1	0	0	25	0.75	0.75
09/09/15	to	09/15/15	09/16/15	1790	62490	1770	53030	1	0	0	15	1.25	2.25
09/10/15	to	09/16/15	09/17/15	(1770)	60720	(1830)	51200	3	-750	-1770	20	1.25	0.25
09/11/15	to	09/17/15	09/18/15	1570	62290	1550	52750	1	0	0	15	2.25	0.5
09/14/15	to	09/18/15	09/21/15	170	62460	110	52860	3	-300	-300	10	2	1.25
09/15/15	to	09/21/15	09/22/15	(1710)	60750	(1770)	51090	3	-720	-1710	15	1.5	0.75
09/16/15	to	09/22/15	09/23/15	40	60790	0	51090	2	-1090	-1090	20	0.5	0.75
09/17/15	to	09/23/15	09/24/15	(250)	60540	(290)	50800	2	-390	-390	10	5	2
09/18/15	to	09/24/15	09/25/15	(340)	60200	(380)	50420	2	-350	-350	10	2.5	3.5
09/21/15	to	09/25/15	09/28/15	(910)	59290	(970)	49450	3	-590	-1080	10	4.25	2.5
09/22/15	to	09/28/15	09/29/15	130	59420	110	49560	1	0	0	25	0.5	3.75
09/23/15	to	09/29/15	09/30/15	60	59480	40	49600	1	0	0	25	0.5	3.75
09/24/15	to	09/30/15	10/01/15	(840)	58640	(880)	48720	2	-1070	-1070	15	2.25	4.25
09/25/15	to	10/01/15	10/02/15	50	58690	10	48730	2	-160	-160	20	4.75	2
09/28/15	to	10/02/15	10/05/15	310	59000	270	49000	2	-10	-10	10	2.75	3.5
09/29/15	to	10/05/15	10/06/15	2350	61350	2330	51330	1	0	0	15	0.25	2.25
09/30/15	to	10/06/15	10/07/15	1600	62950	1580	52910	1	0	0	10	2.5	0.5
10/01/15	to	10/07/15	10/08/15	710	63660	670	53580	2	-270	-270	10	2.5	0.5
10/02/15	to	10/08/15	10/09/15	90	63750	50	53630	2	-280	-280	25	3.25	2.75
10/05/15	to	10/09/15	10/12/15	2740	66490	2720	56350	1	0	0	25	2.25	2.75
10/06/15	to	10/12/15	10/13/15	(2330)	64160	(2370)	53980	2	-1370	-2330	25	4.75	2
10/07/15	to	10/13/15	10/14/15	70	64230	50	54030	1	0	0	25	5	0.25
10/08/15	to	10/14/15	10/15/15	360	64590	320	54350	2	0	0	25	2.25	0.5
10/09/15	to	10/15/15	10/16/15	580	65170	560	54910	1	0	0	20	3.75	3.25
10/12/15	to	10/16/15	10/19/15	870	66040	850	55760	1	0	0	20	4	2.25
10/13/15	to	10/19/15	10/20/15	20	66060	0	55760	1	0	0	20	3	4.5
10/14/15	to	10/20/15	10/21/15	450	66510	430	56190	1	0	0	20	3.75	4.25
10/15/15	to	10/21/15	10/22/15	(380)	66130	(400)	55790	1	-380	-380	20	3.75	4.5
10/16/15	to	10/22/15	10/23/15	(1150)	64980	(1190)	54600	2	-1110	-1150	20	2.75	2.75
10/19/15	to	10/23/15	10/26/15	630	65610	610	55210	1	0	0	25	1.75	1
10/20/15	to	10/26/15	10/27/15	180	65790	160	55370	1	0	0	25	1.75	1
10/21/15	to	10/27/15	10/28/15	2410	68200	2390	57760	1	0	0	25	1.75	1
10/22/15	to	10/28/15	10/29/15	(1970)	66230	(2030)	55730	3	-1050	-1970	10	4.75	0.25
10/23/15	to	10/29/15	10/30/15	(1340)	64890	(1380)	54350	2	-830	-1340	15	3.5	1.75
10/26/15	to	10/30/15	11/02/15	(230)	64660	(250)	54100	1	-230	-230	20	2.75	3.5
10/27/15	to	11/02/15	11/03/15	360	65020	320	54420	2	-530	-530	25	0.75	0.5
10/28/15	to	11/03/15	11/04/15	1690	66710	1670	56090	1	0	0	10	4.75	4.25
10/29/15	to	11/04/15	11/05/15	310	67020	270	56360	2	-400	-400	10	3.5	3.75
10/30/15	to	11/05/15	11/06/15	1090	68110	1070	57430	1	0	0	25	1.5	3.5
11/02/15	to	11/06/15	11/09/15	(730)	67380	(770)	56660	2	-900	-900	10	3.75	2
11/03/15	to	11/09/15	11/10/15	90	67470	70	56730	1	0	0	25	1.25	2
11/04/15	to	11/10/15	11/11/15	820	68290	800	57530	1	0	0	15	3	1
11/05/15	to	11/11/15	11/12/15	570	68860	550	58080	1	0	0	15	3	1
11/06/15	to	11/12/15	11/13/15	770	69630	730	58810	2	-170	-170	10	3.25	0.5
11/09/15	to	11/13/15	11/16/15	530	70160	470	59280	3	-820	-820	10	3.25	0.5
11/10/15	to	11/16/15	11/17/15	540	70700	520	59800	1	0	0	10	4.25	0.5
11/11/15	to	11/17/15	11/18/15	120	70820	100	59900	1	0	0	15	3.25	1

Trading CL 5min Bars Using The EPFFT IS-5d OOS-1d

In_Sample Dates			OOS Date	osnp	Equity	NOnp$20	NetEq	ont	ollt	odd	Thres	pntup	pntdn
11/12/15	to	11/18/15	11/19/15	(350)	70470	(370)	59530	1	-350	-350	25	4.75	0.25
11/13/15	to	11/19/15	11/20/15	(730)	69740	(830)	58700	5	-570	-970	10	3.75	1
11/16/15	to	11/20/15	11/23/15	250	69990	170	58870	4	-450	-540	10	2.5	4.25
11/17/15	to	11/23/15	11/24/15	430	70420	410	59280	1	0	0	10	2.5	4.25
11/18/15	to	11/24/15	11/25/15	790	71210	770	60050	1	0	0	10	0.25	4.75
11/23/15	to	11/27/15	11/30/15	720	71930	660	60710	3	-50	-50	10	1	2.5
11/24/15	to	11/30/15	12/01/15	(100)	71830	(120)	60590	1	-100	-100	10	4.5	0.25
11/25/15	to	12/01/15	12/02/15	1450	73280	1430	62020	1	0	0	10	1.75	0.25
11/26/15	to	12/02/15	12/03/15	530	73810	510	62530	1	0	0	25	4.25	4.75
11/27/15	to	12/03/15	12/04/15	(1640)	72170	(1680)	60850	2	-1620	-1640	25	4.25	5
11/30/15	to	12/04/15	12/07/15	(640)	71530	(680)	60170	2	-1080	-1080	25	0.25	4.75
12/01/15	to	12/07/15	12/08/15	(820)	70710	(860)	59310	2	-610	-820	20	1.5	0.25
12/02/15	to	12/08/15	12/09/15	650	71360	610	59920	2	0	0	25	3	1.75
12/03/15	to	12/09/15	12/10/15	480	71840	460	60380	1	0	0	15	3.25	2.5
12/04/15	to	12/10/15	12/11/15	660	72500	640	61020	1	0	0	15	2.75	0.25
12/07/15	to	12/11/15	12/14/15	190	72690	150	61170	2	-750	-750	25	2.25	0.75
12/08/15	to	12/14/15	12/15/15	920	73610	900	62070	1	0	0	15	2.5	1.5
12/09/15	to	12/15/15	12/16/15	1400	75010	1380	63450	1	0	0	25	0.5	1.25
12/10/15	to	12/16/15	12/17/15	(260)	74750	(320)	63130	3	-230	-260	15	3.25	0.25
12/11/15	to	12/17/15	12/18/15	(60)	74690	(80)	63050	1	-60	-60	20	3.75	0.25
12/14/15	to	12/18/15	12/21/15	(450)	74240	(490)	62560	2	-360	-450	25	1.5	1
12/15/15	to	12/21/15	12/22/15	210	74450	190	62750	1	0	0	20	2	3.5
12/16/15	to	12/22/15	12/23/15	750	75200	730	63480	1	0	0	20	2.5	3.5
12/21/15	to	12/25/15	12/28/15	100	75300	80	63560	1	0	0	15	1.75	3
12/22/15	to	12/28/15	12/29/15	(420)	74880	(460)	63100	2	-600	-600	10	2.5	4.75
12/23/15	to	12/29/15	12/30/15	360	75240	340	63440	1	0	0	20	0.75	0.25
12/24/15	to	12/30/15	12/31/15	820	76060	800	64240	1	0	0	15	1.5	4.75
12/28/15	to	01/01/16	01/04/16	(760)	75300	(820)	63420	3	-740	-820	10	1.5	5
12/29/15	to	01/04/16	01/05/16	(250)	75050	(290)	63130	2	-440	-440	25	0.5	4.5
12/30/15	to	01/05/16	01/06/16	730	75780	710	63840	1	0	0	15	4	2.75
12/31/15	to	01/06/16	01/07/16	(340)	75440	(380)	63460	2	-280	-340	25	4	1.75
01/01/16	to	01/07/16	01/08/16	580	76020	560	64020	1	0	0	15	3.5	1.25
01/04/16	to	01/08/16	01/11/16	690	76710	650	64670	2	-260	-260	20	1.25	0.25
01/05/16	to	01/11/16	01/12/16	(130)	76580	(170)	64500	2	-550	-550	25	3	0.75
01/06/16	to	01/12/16	01/13/16	730	77310	710	65210	1	0	0	15	2.75	0.25
01/07/16	to	01/13/16	01/14/16	(70)	77240	(130)	65080	3	-240	-240	15	2.75	0.25
01/08/16	to	01/14/16	01/15/16	(660)	76580	(720)	64360	3	-390	-710	15	3.5	0.5
01/12/16	to	01/18/16	01/19/16	580	77160	540	64900	2	-310	-310	10	3.75	3.25
01/13/16	to	01/19/16	01/20/16	(890)	76270	(950)	63950	3	-660	-960	10	3.75	3.25
01/14/16	to	01/20/16	01/21/16	1370	77640	1330	65280	2	-60	-60	20	5	4.25
01/15/16	to	01/21/16	01/22/16	960	78600	940	66220	1	0	0	10	2	3.25
01/18/16	to	01/22/16	01/25/16	1000	79600	980	67200	1	0	0	15	1.75	3.75
01/19/16	to	01/25/16	01/26/16	1080	80680	1060	68260	1	0	0	20	0.5	1
01/20/16	to	01/26/16	01/27/16	1840	82520	1800	70060	2	0	0	15	0.75	2.5
01/21/16	to	01/27/16	01/28/16	(810)	81710	(950)	69110	7	-530	-1250	10	0.25	0.25
01/22/16	to	01/28/16	01/29/16	130	81840	50	69160	4	-20	-20	25	3	0.25
01/25/16	to	01/29/16	02/01/16	860	82700	840	70000	1	0	0	25	4	2.75
01/26/16	to	02/01/16	02/02/16	930	83630	910	70910	1	0	0	25	4.25	2.75
01/27/16	to	02/02/16	02/03/16	2150	85780	2130	73040	1	0	0	25	4	2.75
01/28/16	to	02/03/16	02/04/16	(2790)	82990	(2850)	70190	3	-1600	-3020	10	0.5	0.75
01/29/16	to	02/04/16	02/05/16	(150)	82840	(190)	70000	2	-660	-660	15	0.25	0.75
02/01/16	to	02/05/16	02/08/16	(1690)	81150	(1730)	68270	2	-870	-1690	10	3.5	4.5
02/02/16	to	02/08/16	02/09/16	1420	82570	1360	69630	3	-150	-280	10	5	2
02/03/16	to	02/09/16	02/10/16	(450)	82120	(550)	69080	5	-310	-700	10	5	1.25
02/04/16	to	02/10/16	02/11/16	(1160)	80960	(1260)	67820	5	-580	-1690	25	3.75	0.5
02/05/16	to	02/11/16	02/12/16	1400	82360	1360	69180	2	-180	-180	25	5	0.75

Figure 2   Walk Forward Out-Of-Sample Performance Summary for CL EPFFT System 5 minute bar chart from 6/16/10-6/18/2010