

VIX Reversion Long Term and Short Term

Terms and Conventions: The article is about the **VIX**, but the discussion extends to **Implied Volatility or IV**. I will use these phrases interchangeably. **VIX** is the relative expensiveness of both Put and Call options of the SP500 stocks. I use the phrase “**the market**” as well as the **SP500 and SPX**. To me they are interchangeable. Not to offend anyone, but people who talk about the stock market and then reference the Dow Jones Industrial Average probably are not traders. By far the most liquid market in the world is the S&P 500. Its components, options and futures are the most heavily traded versus the Nasdaq 100, Dow, Russell 2000, and Wilshire 5000 etc. Hard core, “old school” Chicago traders refer to the SP Futures as the “Spoos.” I will spare you and not refer to the market as the Spoos, but as a trader, I will always refer to the idea that the market is the S&P 500. I will refer to “**short volatility or Vega**.” This is a bread and butter concept to options--specifically options sellers. It can be done using many strategies such as short strangles, short straddles, short naked puts, short naked calls, short ratio spreads, long butterflies and others. Otherwise, I am referring to a market position (short volatility/Vega) that will benefit by the VIX falling and will be temporarily hurt by the VIX rising. Realize that with option strategies one can be directionally neutral, slightly bullish, slightly bearish, very bullish or very bearish and be long or short volatility. The biggest trader takeaway I can pass on is that short volatility players can be wrong directionally and still make money by being short volatility and having the market “settle down” such that “**volatility comes in**.” This means that **volatility falls, crushes, fades or reverts to the mean**. Feel free to pick your phrase or use them interchangeably. When I say **short volatility** or short anything I am saying that I **sold the position to open**. Sell first, buy second. I will then buy to close to end the trade. With options think in probabilities. I also think in percentages whenever possible because this gives immediate context. Because options imply movement over a selected future period, I will speak of **standard deviations or std dev**. This is a somewhat complex topic, but suffice it to say that std dev moves are predicted by option models which include the implied volatility and time as the key variables. Since the implied volatility is constantly changing, the implied move is constantly changing. But at a given point in time a 1 standard deviation move should contain 68% of the moves (based on the closing prices) over the number of days used as an input. A 2 std dev move will encompass 95% of the future moves and a 3 std dev move will encompass 99% of the moves. One theme of this article is that the actual move will be less than the implied move which is the option sellers **edge** (most of the time). **Edge** is the advantage a trader has over flipping a coin or engaging in a zero sum game. **Theta** is **time premium** and it is the reason that people sell options vs. buying them. Theta does not come out in a linear fashion. It comes out “in fits and starts.” Option pricing is based on 365 days per year, but the market is only open for about 250 days due to weekends. Since all of the time premium must come out at expiration the “**weekend theta**” must come out also. But, it will mostly come out before the weekend or after based on market participant uncertainty. **Underlying** refers to any stock, index, future or ETF where options can be utilized. **Liquidity** refers to a combination of volume, open interest, but most important **tight Bid/Ask spreads** on a multitude of strikes and expirations for a given underlying. Most liquid products offer Weekly expirations in addition to Monthly and “Leap” or long term expirations. Liquidity is critical as the trader must be able to trade near the theoretical pricing at any given moment. **Fade** refers to a counter-trend trade. The trend that is being faded may be a very recent trend or the longer term trend. “Buy Low, Sell High” is the idea. With options I would change this to “Sell High-Buy Low.” **Takeaways** are mostly data driven and taking the view point of an analyst. **Trader Takeaways** are based on my experience as an options trader. It is my hope that many of our TS Users will see how to connect the two into actual trading.

I have written two articles using the Timing Solution software: **Earnings Seasonal Tendencies** examined how stocks act before and after earnings announcements. **VIX Tendencies** examined how the VIX moves in the vicinity of the monthly options expiration as well as the quarterly “Triple Witching” event. The latter article swam in the shallow end of the pool with respect to VIX. This article will dive and swim in the deep end of Implied Volatility (IV) reversion examining the VIX which is the implied volatility of the SP500.

I have to confess that I am obsessed with the VIX as it exhibits *an inability to trend* for any meaningful period of time. Further, it gives extraordinary clues as to the market condition in terms of future expectations, fear, and complacency. It is forward looking in the sense that it reflects the current handicapping of the SP500 by thousands of market participant including market makers who see the order flow (think-supply and demand) for options and adjust the IV accordingly. SP 500 stocks, SP futures, VIX futures, VIX options and a variety of ETFs that correlate to the VIX are liquid and tradable which is critical to the trading of any

financial instrument. My research using Timing Solution has increased my understanding of the VIX. Actually trading implied volatility has added immensely to this theoretical knowledge. I hope to share the theory as well trading concepts since this is where “the rubber meets the road.”

I trade for a living and use options strategies which always involve **selling** implied volatility via short puts and calls (Strangles, Straddles, and Ratio Spreads). These strategies exploit time decay (Theta) and high Implied Volatility (IV). Time Premium or Theta is *acutely affected by the ebb and flow of the implied volatility* of the underlying stock, ETF or index. Implied volatility (IV) is the “relative expensiveness” of the option. The expensiveness or IV is a function of the supply and demand of the options and market maker adjustments to same. A rise in buy forces of options (puts or calls) will force a rise in IV thereby making the options more expensive. It is a misnomer that it is only the puts that become more expensive as call premium will rise as uncertainty rises. As a seller, this is what I look for so that I can be paid *more* for the risk that I am assuming. This, in turn, gives me more buffer or coverage (both upside and downside) in my position. When I place the trade I understand the probability of the success based on the IV at the time of entry. This probability is dynamic and will change for a given position, but over time the probabilities do work out if similar positions are put on over and over. In fact, they work out more than predicted. I also tend to start off close to neutral in terms of directional bias although I will generally lean opposite of the recent trend and fade that move.

My **trade trigger** is a combination of rising/falling IV and underlying stock/index/ETF movement. I am more likely to trade into rising IV and underlying movement. The idea is that movement often/eventually leads to stagnation and vice-versa. With VIX, upward movement and then reversion to the mean are key concepts and the subject of my research and this article. It is a core belief that **IV overstates actual movement** over 87% of the time since 1990 (Tastytrade.com-Market Measures Nov 19th 2015). This is the “edge” that option sellers exploit.

Trading Volatility: Many stocks, ETFs and indices as well as futures have listed and tradable options. Each and every option for each expiration and strike has an implied volatility that changes with market conditions. The actual pricing of liquid options is very close to the theoretical pricing yielded from pricing models such as Black-Scholes or Bjerksund-Stensland. It would be impossible to analyze the behavior of this many individual options. But, the VIX is an index comprised of a **compilation of the implied volatilities of the SP500** stocks. Therefore, the VIX acts much like individual IV on liquid underlyings and is a **proxy** for most underlyings in terms of the ebb and flow of IV.

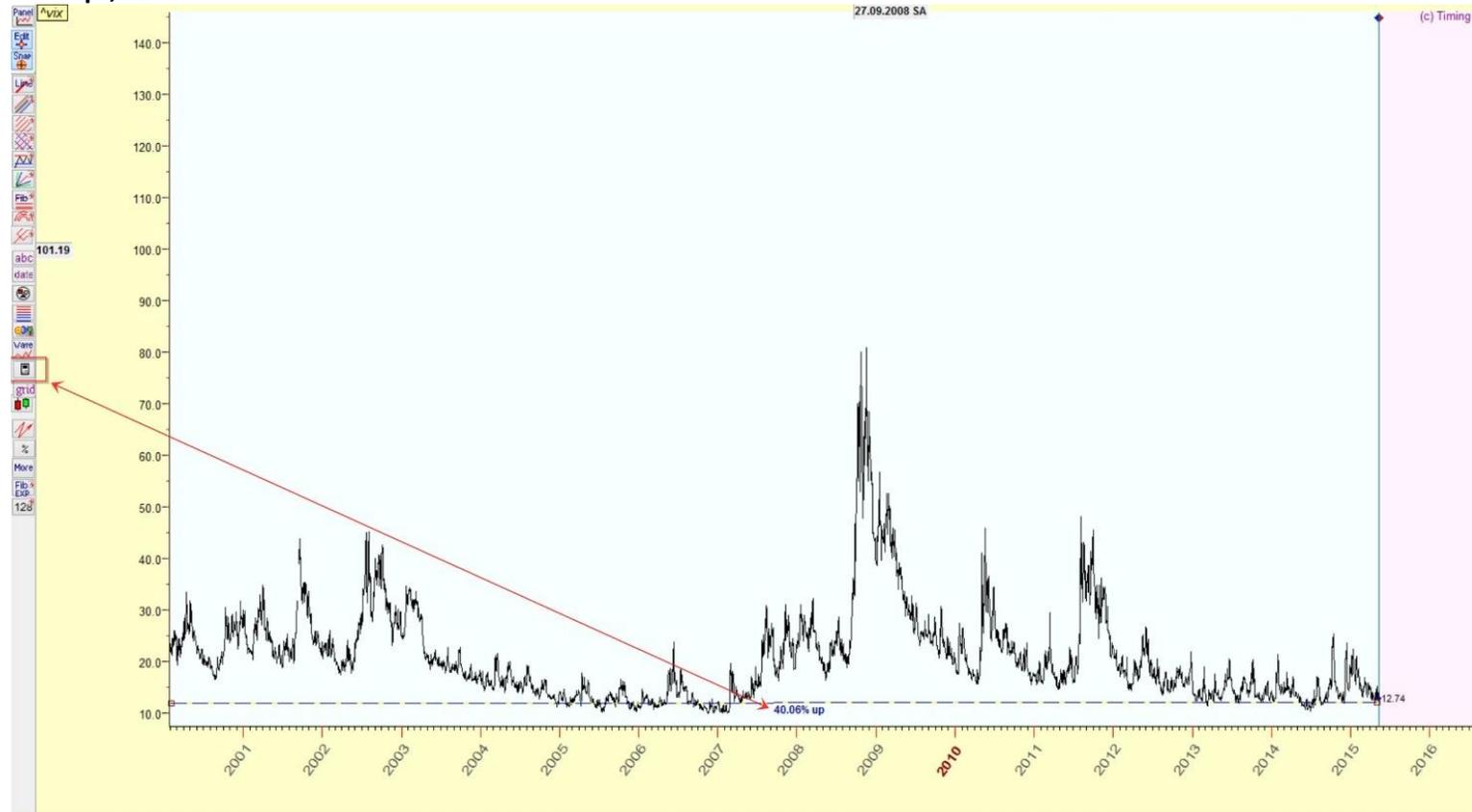
IV vs. HV: VIX and IV are quite different than **historical volatility (HV)** which relies on **past** movement over a given lookback period. Again, the VIX is considered forward looking with regard to **future expectation** of movement in the SP500. It is not a crystal ball, but it does reflect the immediate perception of thousands of market participants. The VIX is often referred to as the **fear/uncertainty** gauge of the market. The VIX will often move opposite to the actual or historical volatility since HV is lagging according to the user selection of a lookback period. Strong up moves from consolidation will expand the HV but will “crush” the IV (sometimes instantly). Strong market down moves especially from stagnation will expand the IV-sometimes dramatically-as uncertainty enters the psyche of market participants. Low actual/historical volatility or movement of the index can behave in a correlated fashion to VIX for periods of time, but I believe this is random and has more to do with stagnant markets or markets that are dull. If the VIX is relatively low and/ or it has been crushed recently it can rise even as the market rises. In fact, the market “settling down” from movement does, in fact, lead to the VIX and all of its derivatives falling most of the time. It is in the case that the VIX remains high as the market seems to stabilize after a down move that indicates that market makers and participants are “not buying” the bullishness and are still nervous. They are willing to pay for portfolio protection by buying Puts which expands IV. Most of my analysis centers on the movement of SP500 AND VIX. I do trade other products such as AAPL, AMZN, bonds, oil, and others. When trading other products their implied volatility is the first thing I examine for context and trade selection.

Nov 26th 2015: Please note that some of the analysis periods are in May of 2014. This is when I started this article. Recent notes (such as this) are in italics. Further analysis was done in the spring of 2015. The final section titled, **Updates, Add-On Comments and Conclusions** adds analysis of the recent market conditions (Nov 2015). In a perfect world I would have re-accomplished every section so that it was perfectly up-to-date as of Thanksgiving 2015. I decided to

press on and publish this with partial updates so that I could get this out to the Group. Time is of the essence with the U.S. stock market as I believe that we are on the verge of returning to much higher volatility (implied and actual). Hopefully, those who are interested can run their own analysis to see if much has changed. I can assure you that it has not. Users might consider different datasets and isolating bull phases from bear phases. Some of my statistics and conclusions come from Tastytrade-an online financial show. I highly recommend www.tastytrade.com to those interested in learning to trade options and futures. Also, I have utilized the Thinkorswim platform (by TD Ameritrade) in my presentation as certain things could not be depicted within Timing Solution.

In Timing Solution the VIX is an ideal index to study as it is *non-directional and mean reverting* so you **don't have to utilize a Relative Price Oscillator to de-trend price**. There are many ways to see this, but a glance at the chart of the VIX itself shows bursts, but no trend since 2000. This is true prior to 2000, also.

VIX--Apr, 2015:



IV and VIX are perhaps the single most important variables for options traders. Premium Sellers want to sell options when their value is relatively high and buy them back for a profit when their relative expensiveness has faded (declined). But, the VIX is also a powerful indicator as to the overall condition of the stock market-specifically the SP500 which is the traders market of choice worldwide. VIX provides context as to the fear of market participants and is often referred to as the "fear indicator."

Recent Note: When I began writing this article in 2014 the VIX was relatively low having been near record lows that summer (Jul-2014 as low as 10.3). The all-time low in VIX occurred in 2006 when it was seen at 9.39 in December (going into the holidays). So a year prior to one of the biggest market meltdowns of all time (2008), the VIX was at record lows. In 2007 we saw the end of the bull market which led to the vicious bear market of 2008-2009. The absolute top of the SP500 occurred in October of 2007-two months prior to the December 2007 VIX low (holiday period). Now that I have decided to finish the article, things have changed with VIX rising marginally relative to the 2015 summer lows and then seemingly out of the blue shooting to 50. In September of 2014 I saw that the range for the VIX appeared to be 11-18. But, soon thereafter it skyrocketed to 31. Most recently in the early summer of 2015 the VIX had settled into a tight range either side of 12. But while we were supposedly in the 'summer doldrums,' the VIX traded above 50. The VIX had not traded this high since 2008 where it recorded an astonishing level of 90. Again, when the VIX is at 50 it is implying a 50% move up or down over the next year. At 90 it implies 90% up/down. THAT is uncertainty! That is fear! More important these sort of moves represent a severe overshoot of VIX and extraordinarily high option pricing. Anyone buying "put protection" with the VIX that high does not understand how options are priced or the reversion tendencies outlined here. Since late August 2015 the VIX has reverted back down, but is nowhere near the low levels seen prior to the multi standard deviation move in August. More on this at the end of this article...The bottom line is that market characteristics change and the implications can have long lasting effects. I believe that the VIX is presently forecasting big changes in the U.S. stock market.

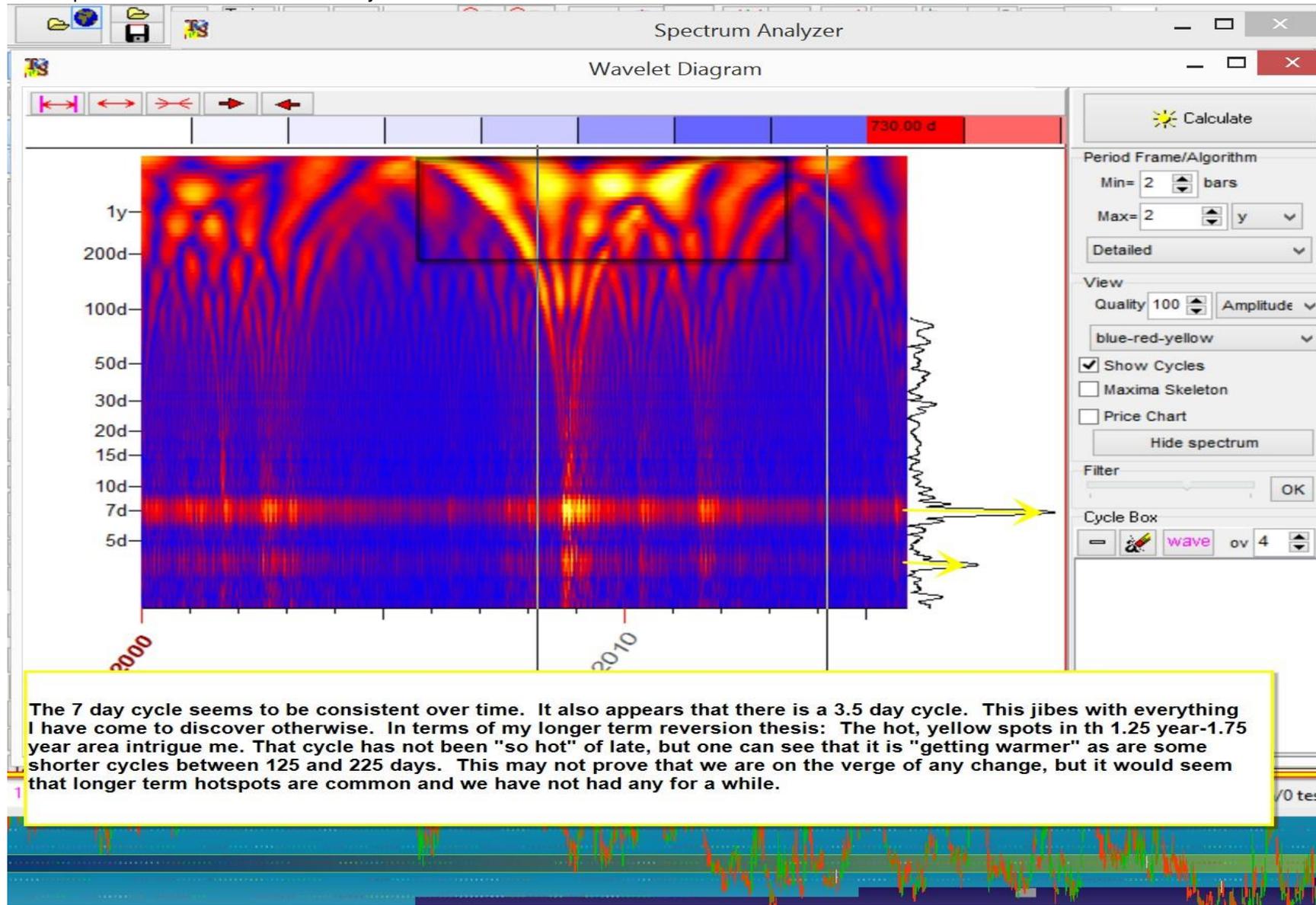
I utilized some of the simplest modules in Timing Solution. ULE Price has an empty box in the Editor so you have to check it just to access price analysis. Yet I found it to be extremely useful as it told me how long to wait to trade. Efficiency test relative to movement and day of week were used heavily along with some statistics modules embedded in the program. I have spent a fair amount of time analyzing Astro and Spectrum techniques, but found these to not give better results than the simple, statistical analysis of price itself. Perhaps it comes down to the fact that the cycles are short and things like day of week, time of day and movement itself offer the most clues as to the behavior.

I have examined other Timing Solution modules to see what else we can determine about the VIX behaviors as they relate to:

- 1. Spectrum (Time Cycles)**
- 2. VIX Mean, 1 Standard Deviation Range-2,5 & 20 Year Analysis**
- 3. Time of Day**
- 4. Day of Week**
- 5. Large VIX Moves: Zig-Zag, Two Day Moves, One Day Moves**
- 6. Monthly Option Expiration--Day of Week**
- 7. Add-Ons, Conclusions and a Forecast**

1. Spectrum Analysis:

Go to Spectrum and then "Wavelet." Adjust as follows:



2. VIX Means, 1 Standard Deviation Ranges--2, 5 and 20 Years

We will examine a two year, five and twenty year look back periods to get a sense of how the VIX trades.

Nov 26th, 2015--Two years of Daily Data:



Nov 26th, 2015, Five Years of Daily Data



Takeaways: Despite some bursts, the VIX has mostly traded either side of 14 for 2 years as well as 5 years. 14 is the mean for the VIX. This is low when compared to the last 20 years (next page). One can also observe that the bell shaped curve is not so bell shaped. The tails to the upside are dramatic. This gets into the topic of log-normal distribution and limited data at the high levels which is beyond the scope of this article. Suffice it to say that the large risk is to the upside and that the downside has a practical floor or around 10-12 where trading long VIX makes sense. The purpose of this slide and the next is to illustrate that VIX reverts back toward its recent mean after bursts to the upside.

Nov 26th, 2015—20 years of Weekly Data:

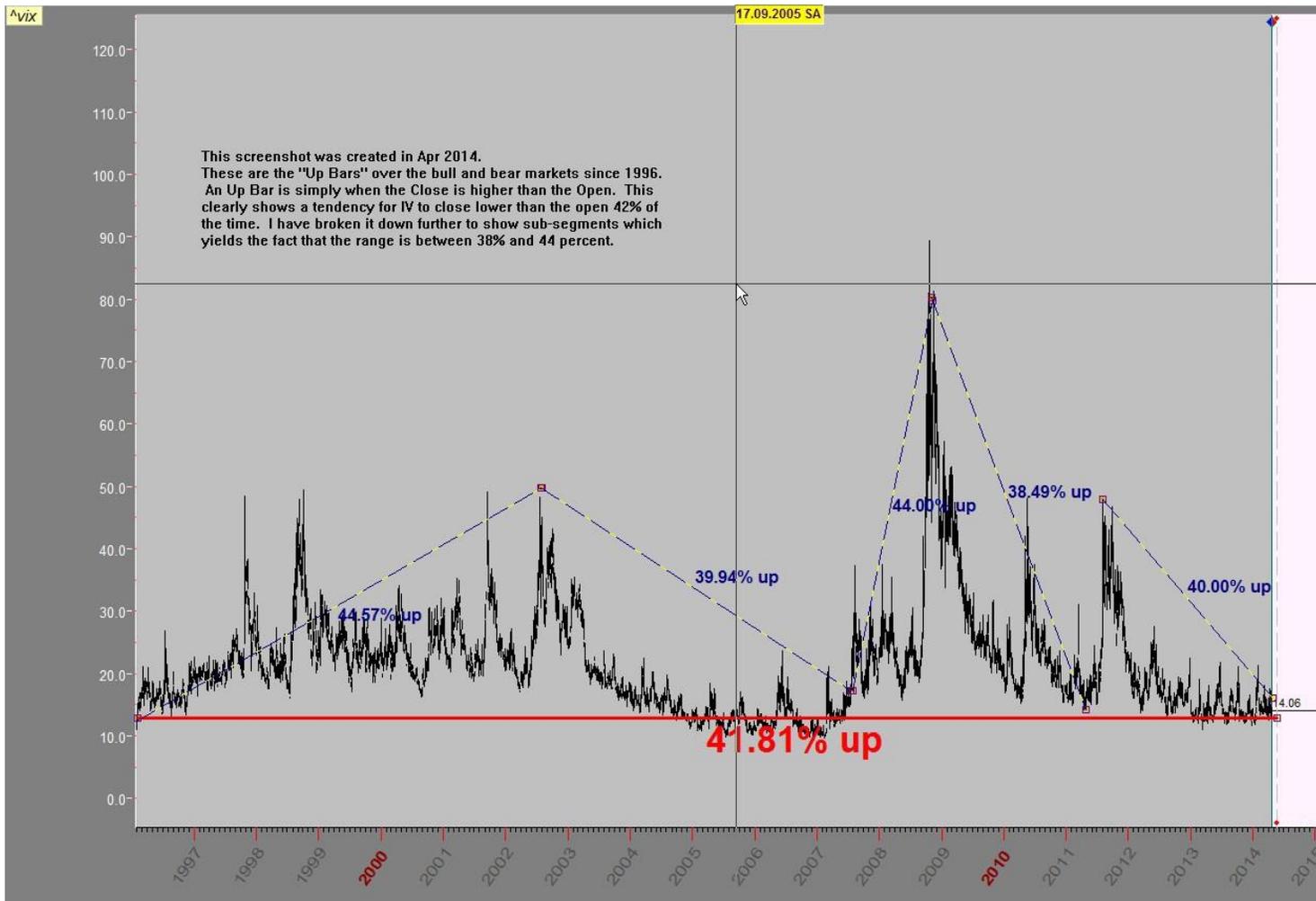


Takeaways: This last chart shows the spike in August of 2015. It ranked as the second highest spike of the dataset. Is this a sign of higher volatility yet to come? The longer term, 20 year mean is much higher than the 2 and 5 year mean and the 1 standard deviation (68%) encapsulation is dramatically broader and higher at 11-28. The reader can speculate as to the cause of this. One might say that the Federal Reserve has taken the risk out of the market. But have they really? The complacency occurs for a period. Then spikes occur followed by short term reversion. **Longer term reversion** would suggest that we will return to the twenty year mean and the twenty year range. The spike peaks mostly occur either side of 50. Higher mean levels could be seen as we revert back to the longer term areas. This would have very large implications for traders, but statisticians would likely consider this it to be normal, long term reversion.

3. VIX—Time of Day (Open vs. Close):

Is it favorable to sell premium early in the market session? It makes sense that IV would be higher in the early portion of the day than the close. Why? Recent news is fresher at the open and often not fully absorbed. Generally speaking, movement is more prevalent in the first hour as compared to the middle of the trading session. Movement creates uncertainty and uncertainty leads to higher option pricing reflected in the VIX. Can we prove this with Timing Solution?

Since 1996 I found that VIX consistently falls 58% of the time rises (Close < Open). 42% of the time it rises intraday (Close > Open). This would imply that selling Volatility is best done near the open. When applied to data since 2000 it is closer to a 60-40 split.



What about during **strong bear phases** in the stock market?

This screenshot shows the VIX in the fall of 2008. From Sep 9th 2008 to Oct 23rd 2008 there was a 32 bar period (44 days) where 60% of the bars were Up Bars. I could find no other period (lasting an expiration cycle or more) where intraday, IV rise was dominant (>50%). Traders will recall that these were among the darkest days of the last 25 years in terms of market/economic collapse.



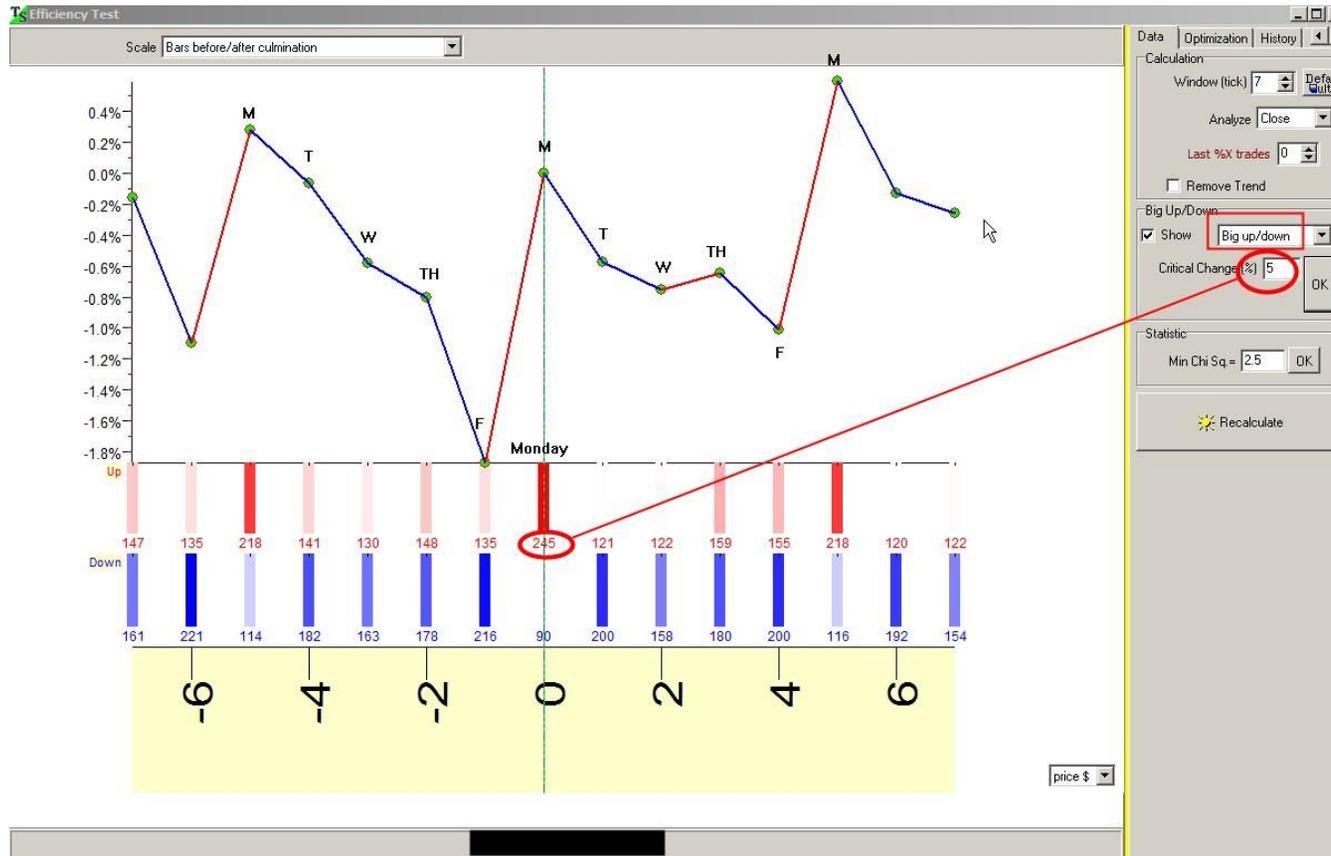
Takeaways: Closing VIX values lower than the open are a simple way of determining the likelihood that fear dissipated after the open and the price movement of the SP500 somehow “settled down.” This occurred about 60% of the time. It is the 40% of the time where fear built (VIX rose) during the day and the VIX close was higher than the open where we can conclude that market participants did not fully digested the news and uncertainty remained. Deviations from this relationship are few and far between. The 2008 market was the exception as described above. Fear built over a course of weeks and caused the VIX to spike to unprecedented levels with very short pauses/reversion.

Trader Takeaways: Avoid the temptation to think that IV must fall immediately after a spike no matter what. Trade small enough to withstand VIX rising further. Do not sell naked VIX calls and do not buy calendar spreads on the VIX. For further explanation reference Tastytrade.com. They have had numerous segments on why a trader wants to avoid these two strategies. The 2008 chart could happen again. The situation in Aug 2015 between August 19th and August 24th could also happen again. Even with naked puts you must trade small enough to withstand a very large move down in the underlying.

4. VIX--Day of Week:

What about the day of the week? Is there a tendency for IV to fall into Fridays vs. Mondays? When does the “weekend Theta” come out?

I was able to utilize two tools in Timing Solution to analyze VIX data since 1994. The first tool does an “Efficiency Test” and considers Mondays as the analyzed day. Either side of Monday (the zero day) I have labeled the days +/– for one week. The price action is the composite over the dataset and percentage changes are reflected in the left hand scale.



Takeaways: This says that Mondays are more likely to have a pop in IV while moving into Fridays there is a tendency to fade. In fact, the whole week tends to fade into Fridays which implies that Mondays are the best day to sell premium. It also shows that over the 19 year dataset that 245 of the pops of 5% or greater occurred on Mondays. This is shown by setting the “Big up/down” setting. The distribution of 5% down days was more evenly distributed, but did favor Fridays.

Trader Takeaways: Weekend Theta may very well substantially come out **prior to the weekend**. Taking positions off after IV crush is never a bad trade. If that happens on a Thursday or Friday then consider exiting and reloading after the next pop in IV.

Note: It also should be pointed out that these tests are done using the Close of VIX for each day. The percentages shown on the left scale reflect Close only and NOT movement off the Highs or the Lows. This means that actual percentages from High to Low could be dramatically greater which implies greater opportunity than shown in terms of IV crush and Theta release. My estimate is that the opportunity may be up to double.

Trader Takeaways: *Market Awareness Still Matters!* During weeks where IV is near the low end of the annual or perhaps even the monthly range, there is a stronger tendency for IV to **rise mildly or drift** rather than fall into Fridays. When IV rises for the week (contrary to the above Efficiency Test) the data is mixed as to whether Monday will show further rise or fade. With the exception of October 2008 I found that when the Friday VIX was up strong the VIX was usually lower by the following Tuesday. No matter what, most successful traders are resistant to being late in the trade. Yes, being early can be painful, but over the long term waiting for things to already happen is trading death. Keep in mind that we are talking about 2-5 day events. Moreover, we are talking about reversion so we are assuming that the sloshing of the VIX will always be in play. But, clearly it can overshoot which is why there are certain trades such as naked VIX Calls and long VIX calendar spreads should be avoided.

VIX rising into week's end:

In the spring of 2014 we saw cases where Monday was a “VIX crush day” due to downward market action and a rising VIX the previous Friday. Here is an example of VIX crush on a Monday in March of 2014:



Takeaways: This shows a move that does not match the Efficiency Test. VIX rose most of the week and did so dramatically on Thursday and Friday. In the above setup the “weekend Theta” would likely *stay in* over the weekend. This premium must come out at some point and investor nervousness can cause the Time Premium to remain in the option pricing as IV rises. On Monday and Tuesday the weekend IV would normally release unless the uncertainty factors increase over the weekend. In markets as we had in late 2008 the IV could easily build from Friday well into the following week and beyond.

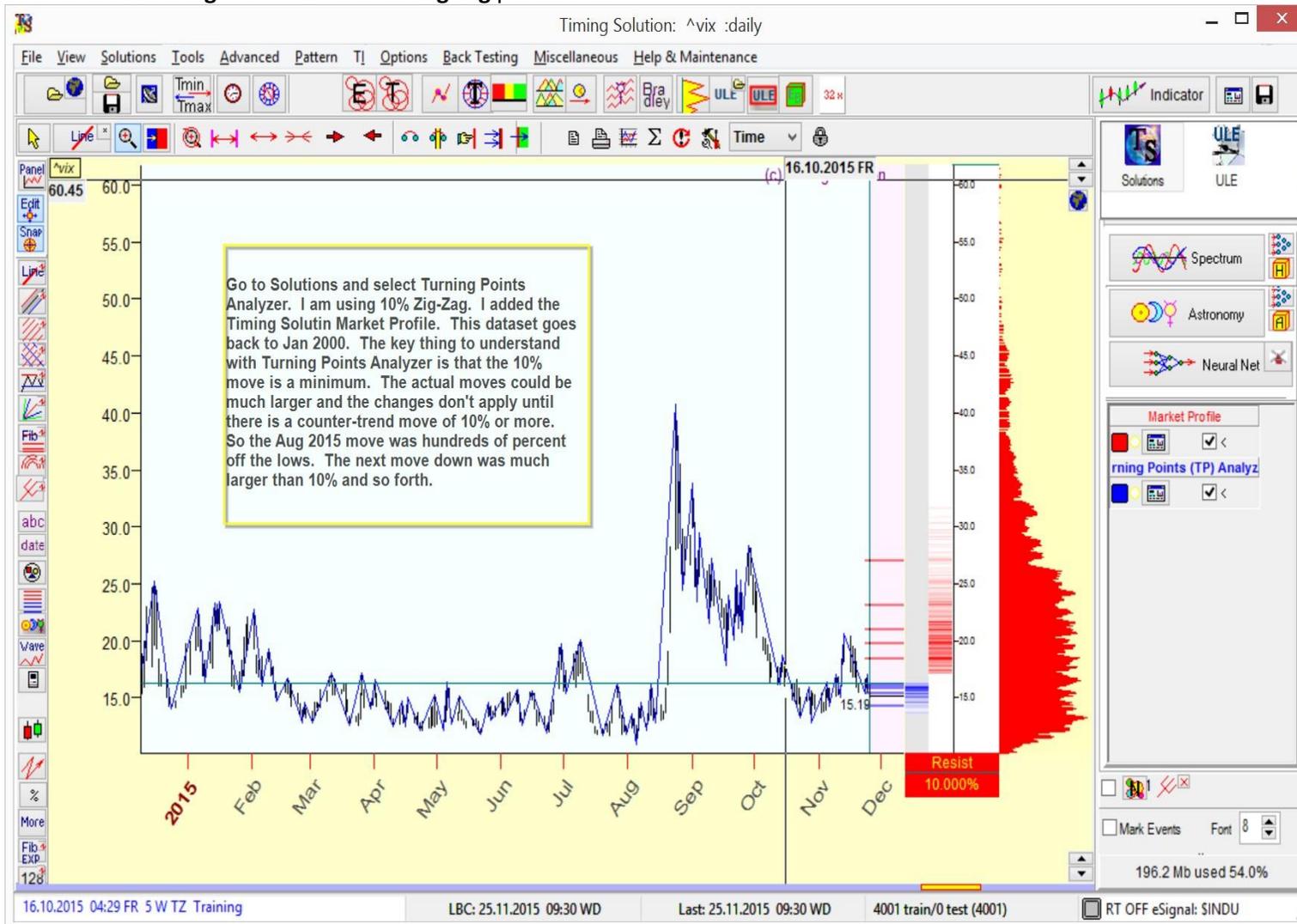
Trader Takeaways: For my trading I have basically concluded that if the week is shaping up as a typical week with IV fade conforming to the Efficiency Test, I will wait until Monday (or Tuesday) to put on short volatility trades. In a week where IV has faded all week I may short an SPX Call into a “crisp up move” in SPX on Thursday or Friday, but will avoid strangles/straddles as there is the possibility of IV working against me on Monday/Tuesday. In a nutshell: I prefer a pop in IV as a trade trigger. Given a typical week with VIX falling into Friday, a trader should consider **buying VIX futures** or going long VXX into the complacency and look to exit Monday or Tuesday. I will often draw a 30-40 day regression channel over the VIX. If I am near the bottom of the channel I will consider a long VIX trade.

If on Thu/Fri SPX is going down and VIX is popping, then I will look to sell Puts, Strangles or unbalanced strangles favoring more Puts than Calls. Full disclosure: I have found this to be a harder trade to put on as I consistently have believed that Monday will show further expansion of IV when there has been a Friday pop in VIX. So I have waited until Monday to “wait and see.” In the current bull market this has often been a mistake as IV quickly fell at the Monday open as nervousness evaporated over the weekend. I would guess that we all have had similar beliefs on a few scary Fridays only to be proven wrong the following Monday. The next section of this article proves that waiting a day makes sense. If and when broad uncertainty returns, I am certain that waiting will be the play. If the VIX pop starts mid-week and continues into Friday, the short volatility trade makes sense. The next section on large VIX Moves will allude to this further.

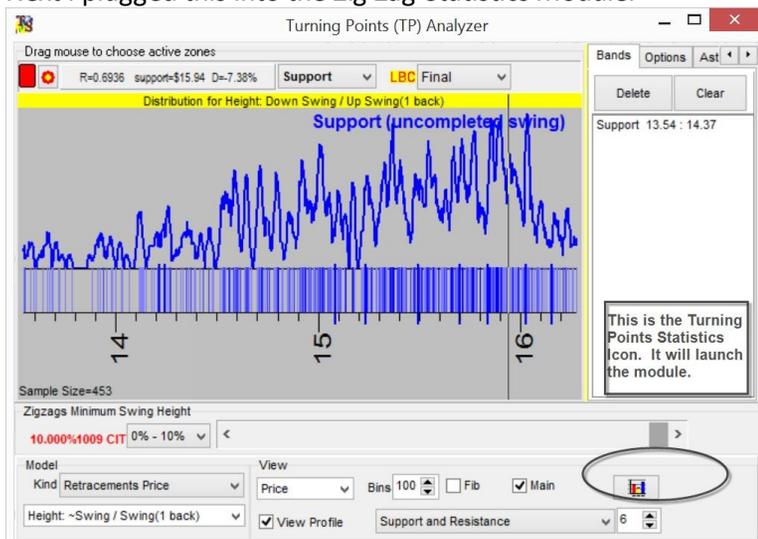
5. Large VIX Moves:

Another Timing Solution tool examines statistics within the **Solutions-Turning Points Analyzer** which allows us to set any percent up/down. For VIX I have used 5, 10, 20% and 50%. In this article I am using 10% which occurs often. The Turning Points analysis is not looking at a one day moves. Rather it is looking for a minimum 10% aggregate move followed by at least a 10% aggregate move in the opposite direction. It is a "Zig-Zag indicator." Note: This is a 10 **percent (%)** move in the VIX. It is NOT a 10 **Point** move in VIX. It treats VIX as a raw number and not a percentage even though technically VIX is a percentage of expected future movement.

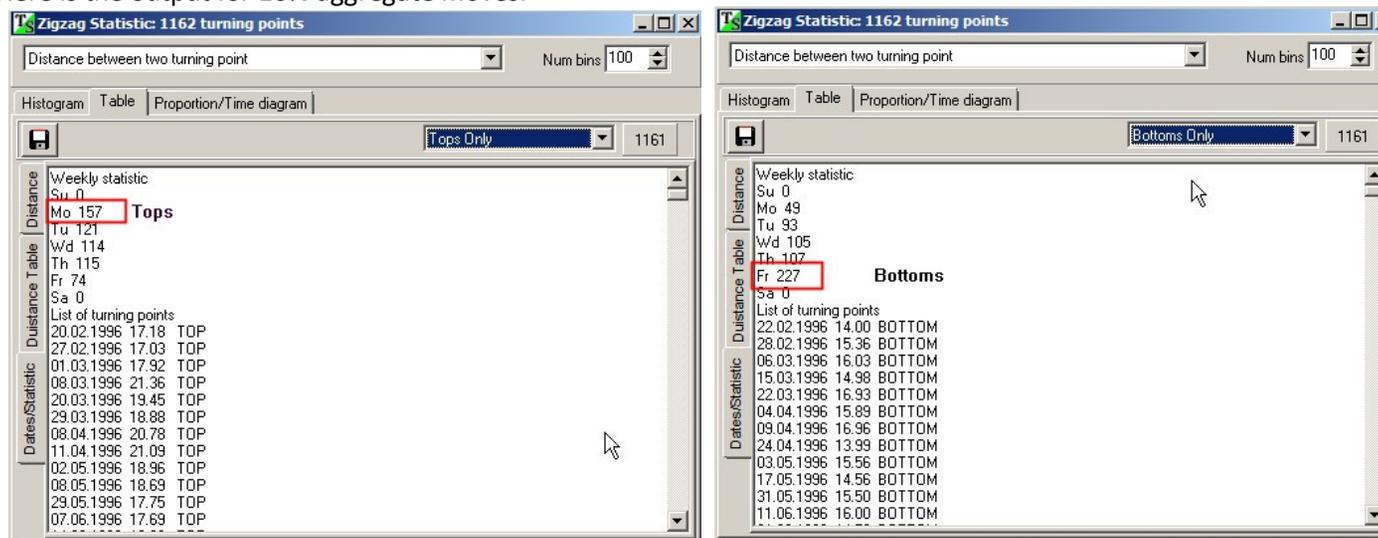
Here is the **VIX** using **>or= to 10% as the zig-zag** parameter:



Next I plugged this into the Zig Zag-Statistics Module.



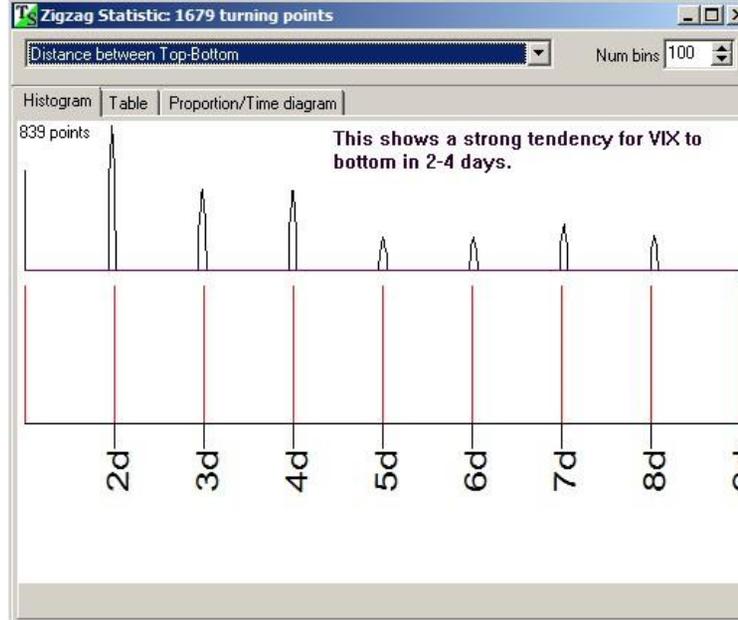
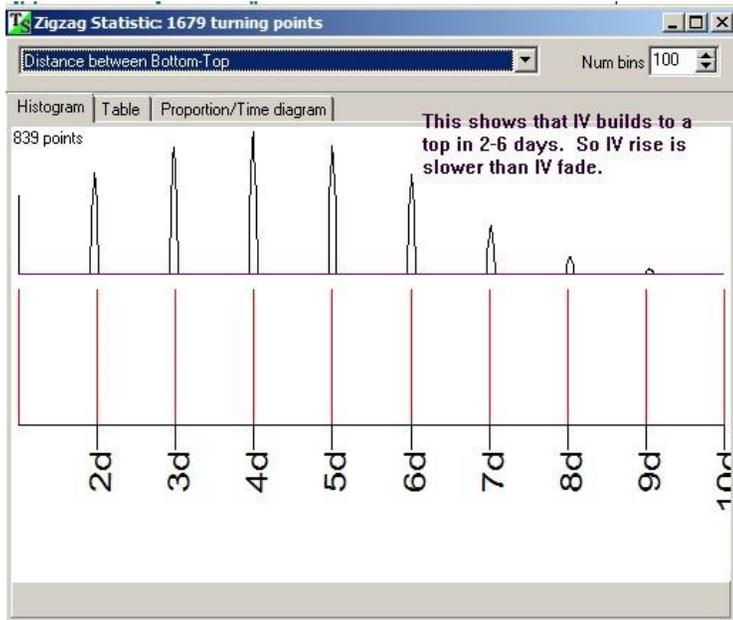
Again, this is different, statistical analysis versus the previous Efficiency Test which simply looked at Day of Week irrespective of price movement. Here is the output for 10% aggregate moves:



Takeaways: This generally shows that the stock market uncertainties are usually dissipated during a given trading week. Bottoms occur on Fridays more often than any other day. Tops occur on Mondays somewhat more than any other day. Obviously this could be affected by news events or other impetus. If there is a report/news or other new impetus that surprises the market on a Friday then this tendency may be obviated by the absorption of the new information.

Trader Takeaway: If news or other factors cause the VIX to rise dramatically at the open of trading late in the week, then the trader should look to see if there is further rise in VIX over the first hour of trading. Further rise in VIX beyond the first hour would imply that the trading day could fit into the category of a VIX Close higher than Open which occurs 40% of the time. I will wait to sell premium in this case.

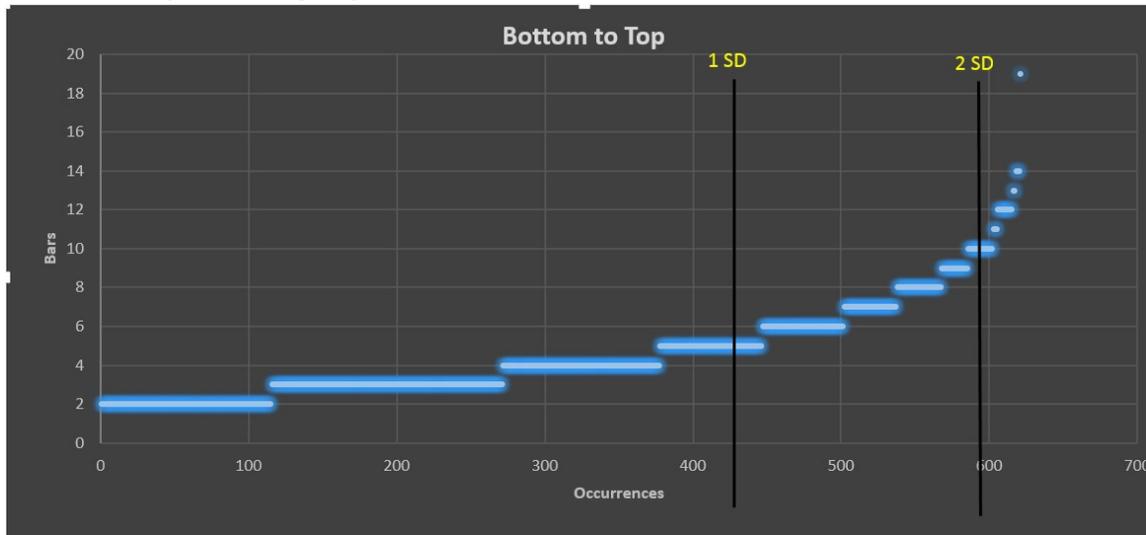
What about the time for the bottoms and tops to evolve (10% zig-zag):



What if we switch to trading days or bars? The statistical chart for Bottom-Top above changes to show the peak at **2 Bars** rather than 4 calendar days. The chart for Top to Bottom stays at 2 which can mean only one thing: Bottoms form intra-week while tops tend to form over a weekend favoring Mondays for the topping day.

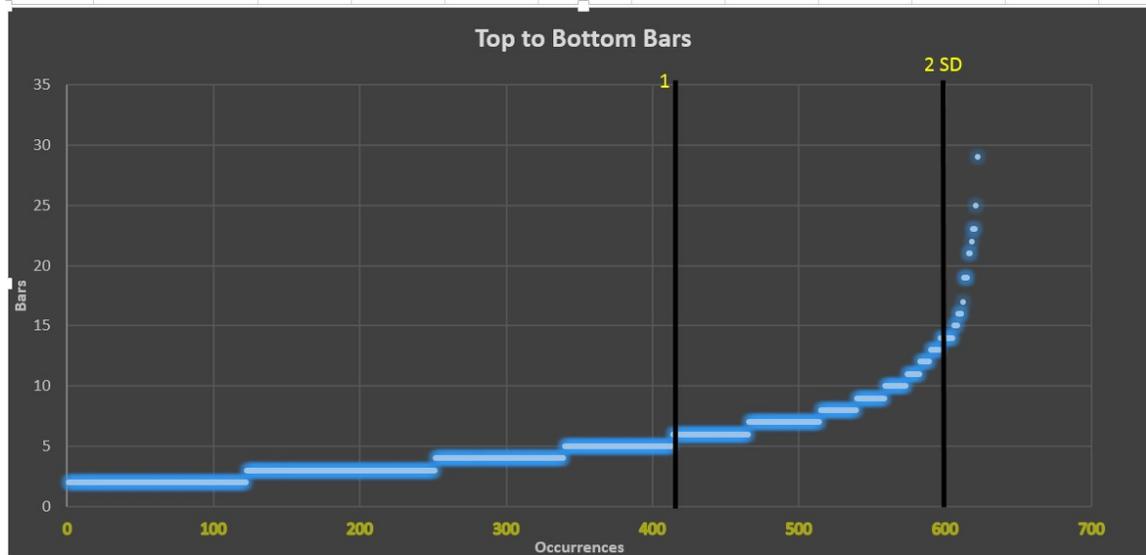
But, this doesn't tell us the whole story. So I plugged the data into Excel and got a more granular and complete picture.

Bottom to Top in Trading Days (Bars):



This shows that in the context of a 10% Zig-Zag, Tops form 95% of the time within 10 trading days. It also shows the most occurrences for Tops to form in 3 days. 68% of the data (1 std dev) is contained within 5 days. The tails show up to 15 days with one outlier of 19.

Top to Bottoms in Trading Days (Bars):



This shows that Bottoms form 95% of the time within 14 trading days. The most occurrences for Bottoms to form is tied at 2 and 3 bars. 68% of the data is contained within 5 days. But note the tail goes to as 25 days with one outlier of 29.

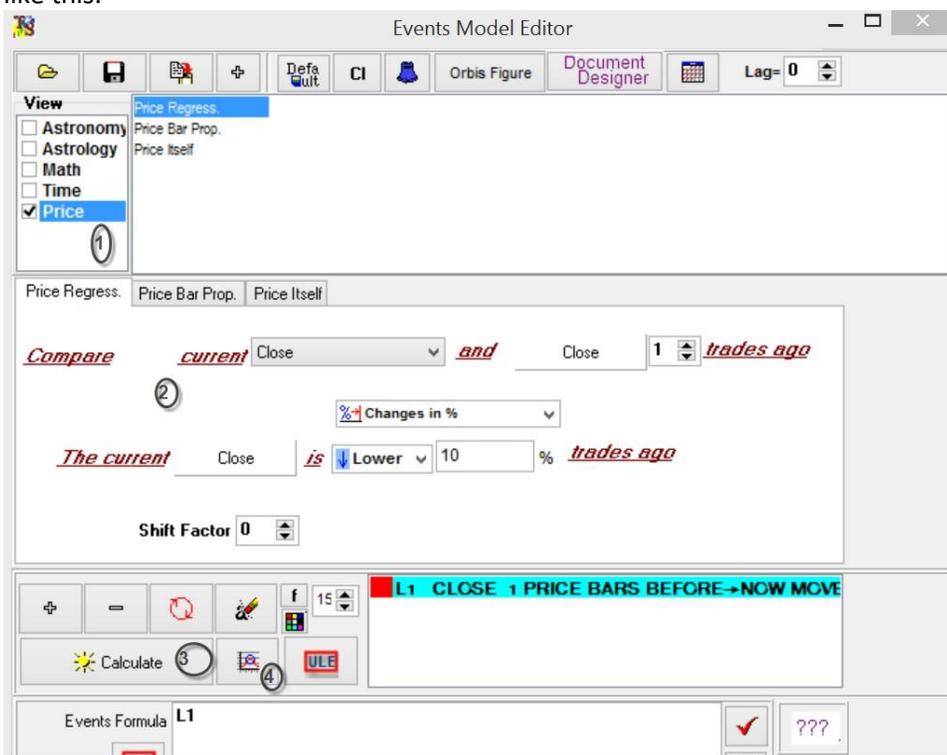
Takeaways: With a 10% Zig-Zag we can see that IV fade/reversion can stretch out longer for Bottoms than Tops despite the fact that most of the data is contained within a trading week. It appears that the idea of a Monday Top in VIX is validated as well as the Friday bottom idea. The longer bottoming tail suggests that once the fear is taken out of the market it can take longer for a pop in IV to occur. The shorter topping tail suggests that IV can build quickly. The predominance of data under 5 days shows us that VIX is generally very “whippy.”

Trader Takeaways: In terms of selling volatility or being long VIX, the idea of waiting after the initial pop in VIX continues to be validated by the data. Then applying half or one third of one’s per-trade capital should be considered followed by a similar trade after another day or two if IV continues to rise and the position is going against you. If already short volatility or long the VIX the trader can consider staying in the trade given that volatility tends to continue lower for some time. That said the largest share of the profit will occur within 2-3 days more often than not so exiting at that point would never be wrong. This will be especially true if we return to more volatile times. This dataset goes back to 1996. It could be that higher VIX will shift the tendencies to a degree favoring more nimbleness. If this is true the chance to lay the short volatility/long VIX trade back out will occur sooner. In other words, the ebb and flow of VIX could easily become more obvious and could be contained within shorter periods allowing the trader to trade more often.

Large Two Day Moves--ULE Price Regression and Efficiency Testing on Large, two day moves?

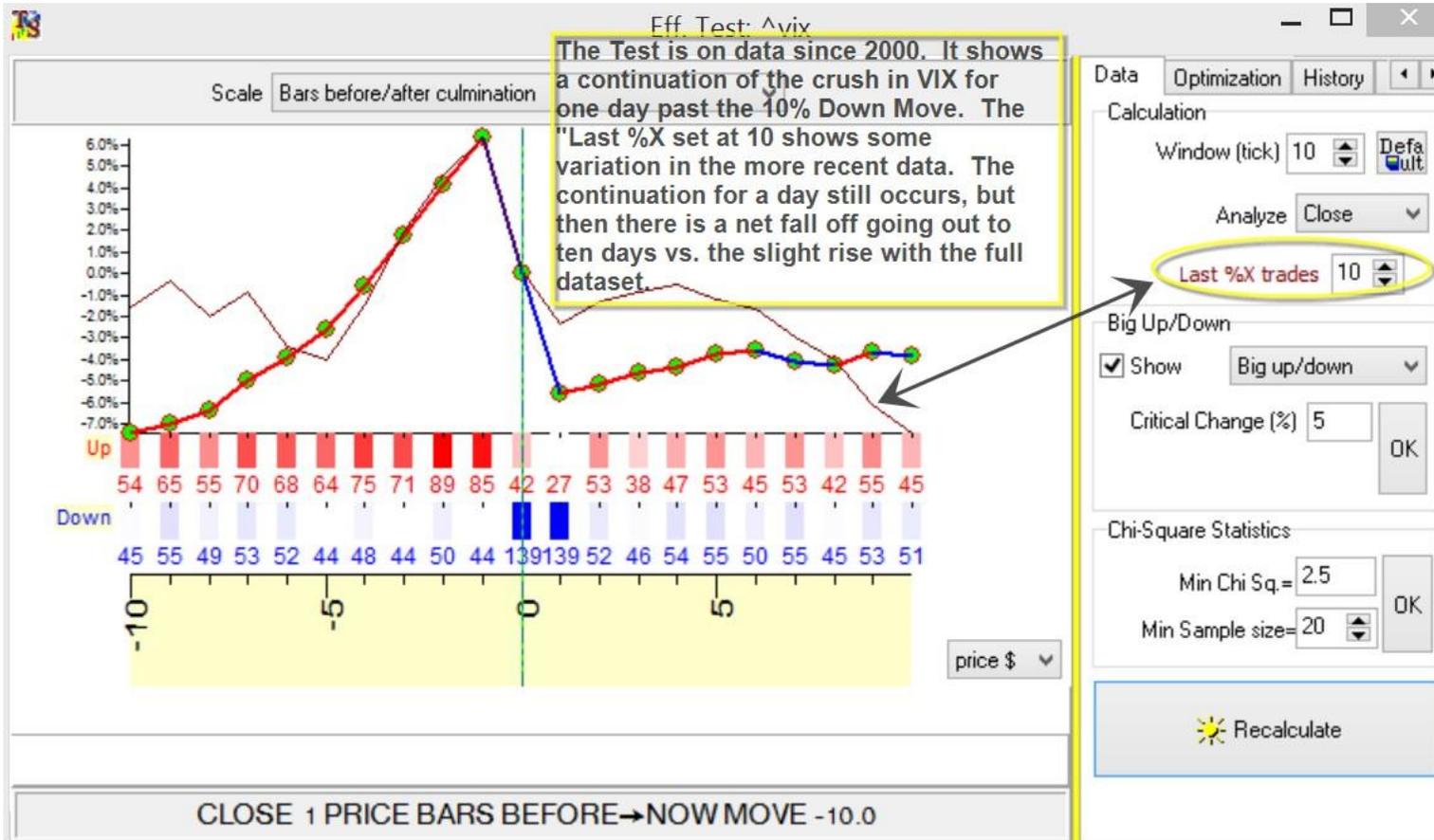
What is a large, Close to Close move for VIX? I have done Efficiency Tests on everything from 5% to 20%. The results all point to waiting a day before placing an applicable trade. I tested 10% up and down moves since these do tend to happen on a regular basis. Remember that 10% is a minimum and actual moves could be substantially greater than 10%. Again, this is based on close to close. **Highs to Lows and Lows to Highs over two days could be dramatically greater.**

Timing Solution Methodology: Go to ULE, ULE Editor, Check the Price Box and select "Price Regression," Change to Close vs. 1 'trades ago,' change from Fuzzy Grade to "Changes in %," change to "The current Close is "Lower 10%, with zero Shift Factor. Hit "Calculate." Hit Efficiency Test icon (4). ULE Editor should look like this:



Price Regression is comparing in this case the Close from one bar to the next. The efficiency test gives us a great picture as to what happens then.

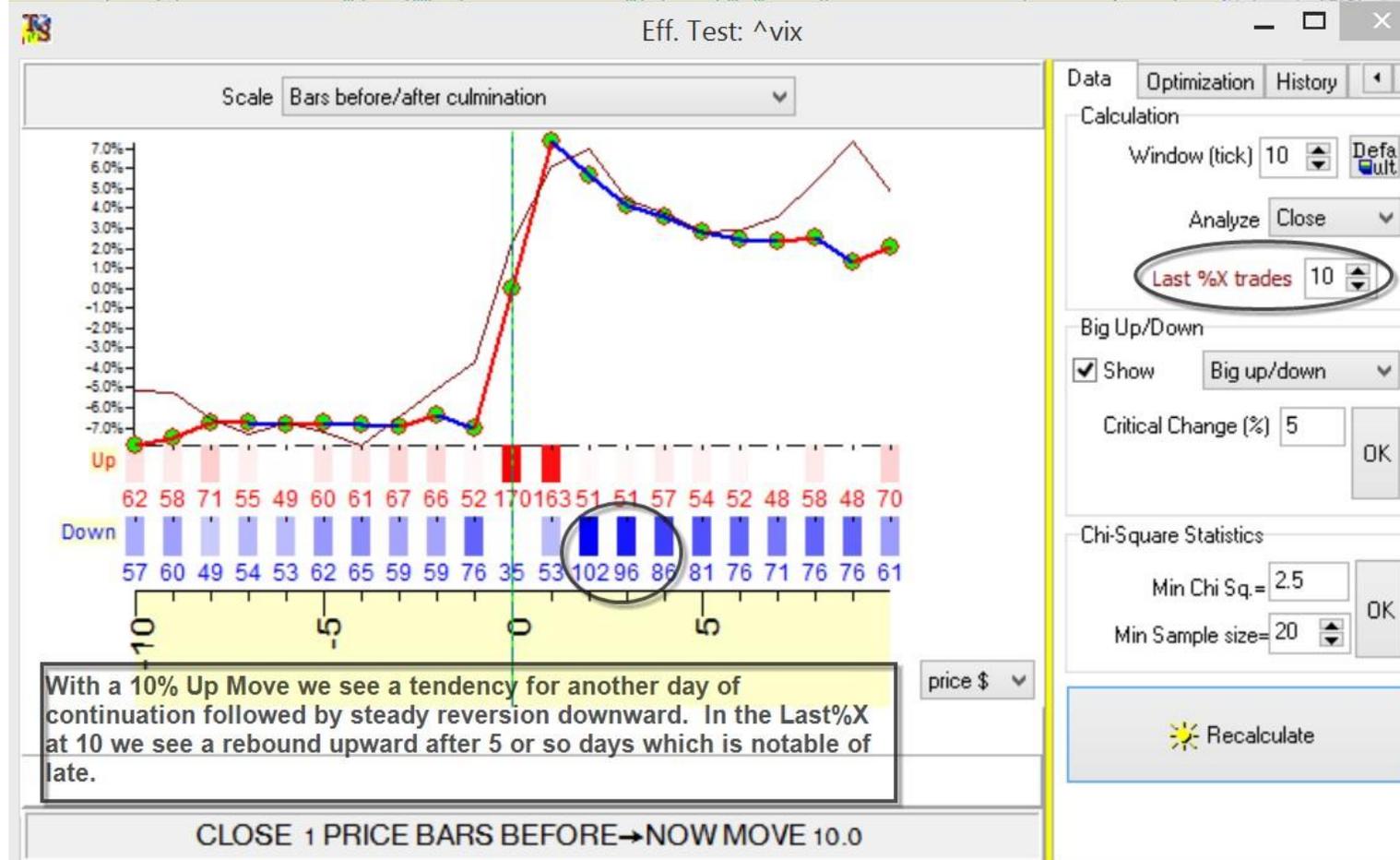
First we examine a $\geq 10\%$ Down Move in VIX.



Takeaways: Notable items are the continuation for a day followed by gentle reversion upward. The Big up/down is set for 5% and shows that after the 10% move down, another 5% or greater occurs the next day. The Last%X shows us what has been happening lately. In this case there is a more recent tendency for VIX to fall even further after a few days of *upward* reversion. Also, note the build in IV that led to the sharp move down. For **ten days** in the full dataset and five days in the last 10% of the trades the IV marched higher.

Trader Takeaway: The majority of profits from being short volatility or long the VIX/VIX futures will occur over a two day period. Selling volatility sooner than later once the move appears may offer some profitability, but the best trade is the one that occurs after a steady build-up in IV. Being early will pay off bigger than being late. Selling volatility or going long VIX into a five or more day move will set up the reversion or crush trade.

Now we examine a $\geq 10\%$ rise in VIX.



Takeaways: A 10% up move is a strong move and these moves are seen quite often. Bursts of 20%, 30% and higher are not uncommon-especially intraday (this test examines close-not high). 5% or greater Up moves after the initial 10% move happen often. The Efficiency Test shows that we see continuation for a day with the recent moves showing a slightly different picture than the Eff Test of the overall dataset. Big Down moves in VIX or “Crush Days” occur 2-4 days past the rise. Compare this with the previous example where VIX fell quickly. Here we have VIX exploding in two days and then fading much more gently.

Trader Takeaway: Wait a day before selling premium into a strong Up Move in the VIX. The initial trade should be small enough so that an additional position can be placed if the IV continues upward. This trade could be larger or a third entry could be considered.

Large Moves--Intraday VIX Spikes:

The previous two tests examined close to close for a 10% or greater move over two days, I wanted to see what happened if the range for a given day (high to low or low to high) was \geq to 10%. I added a small filter for Close-Open. This distinguishes up vs. down moves. I used 2 points, but one could use a much smaller filter.

This method is done in ULE, Event Editor, Price, but shifts to the **Price Bar Proportions** analysis:

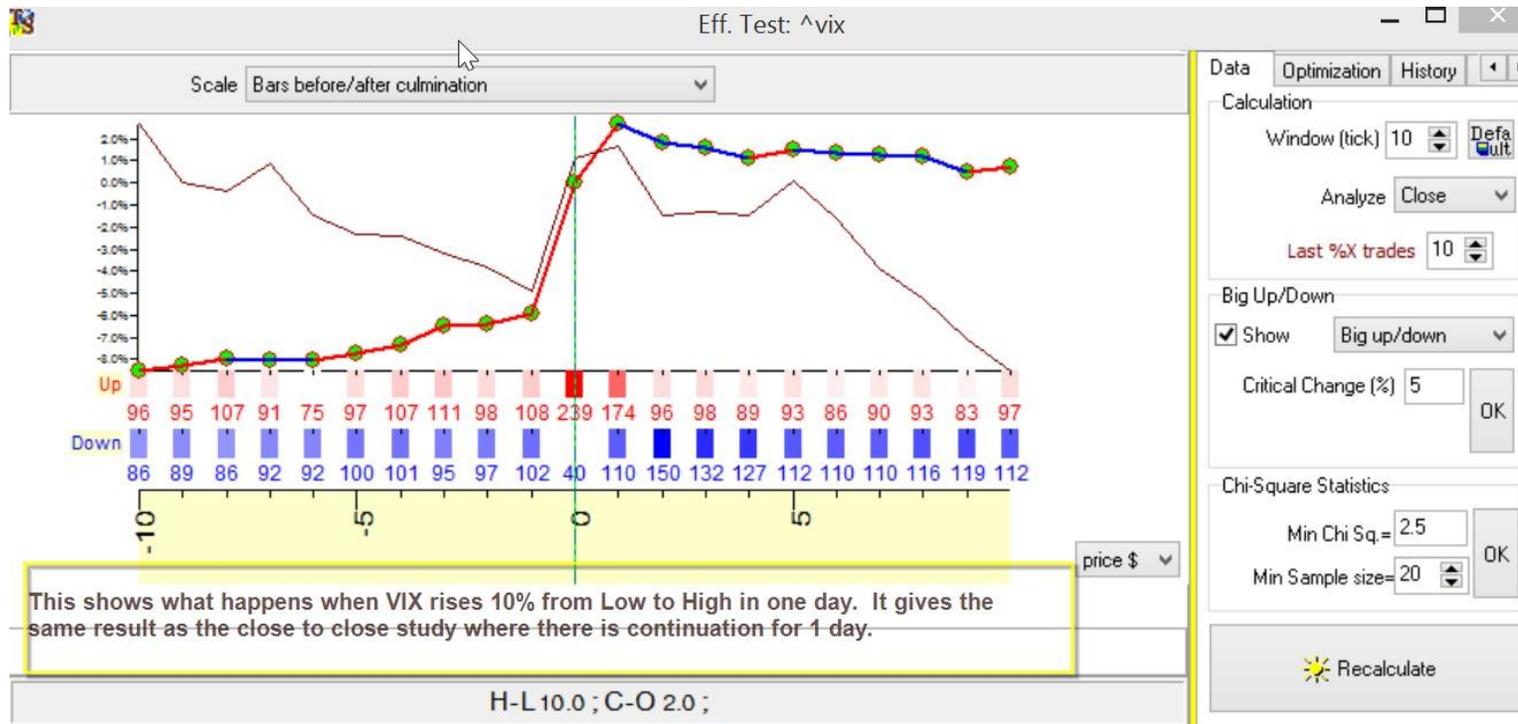
The screenshot shows the 'Events Model Editor' window. The 'View' pane on the left has 'Price' checked. The main workspace is titled 'Price Bar Proportions' and shows the following configuration:

- Price bar proportions:** 0 trades ago from the current moment
- High-Low=** % Changes in % (10%)
- Close-Open=** Changes in points (2 pt), Positiv
- Open-Low=** Non Active

Below the configuration, there are two price bar diagrams illustrating the High-Low and Close-Open filters. The text '4 combinations' is displayed below the diagrams.

The 'Events Formula' pane at the bottom shows the formula: **L1 H-L 10.0 ; C-O 2.0 PT.;**

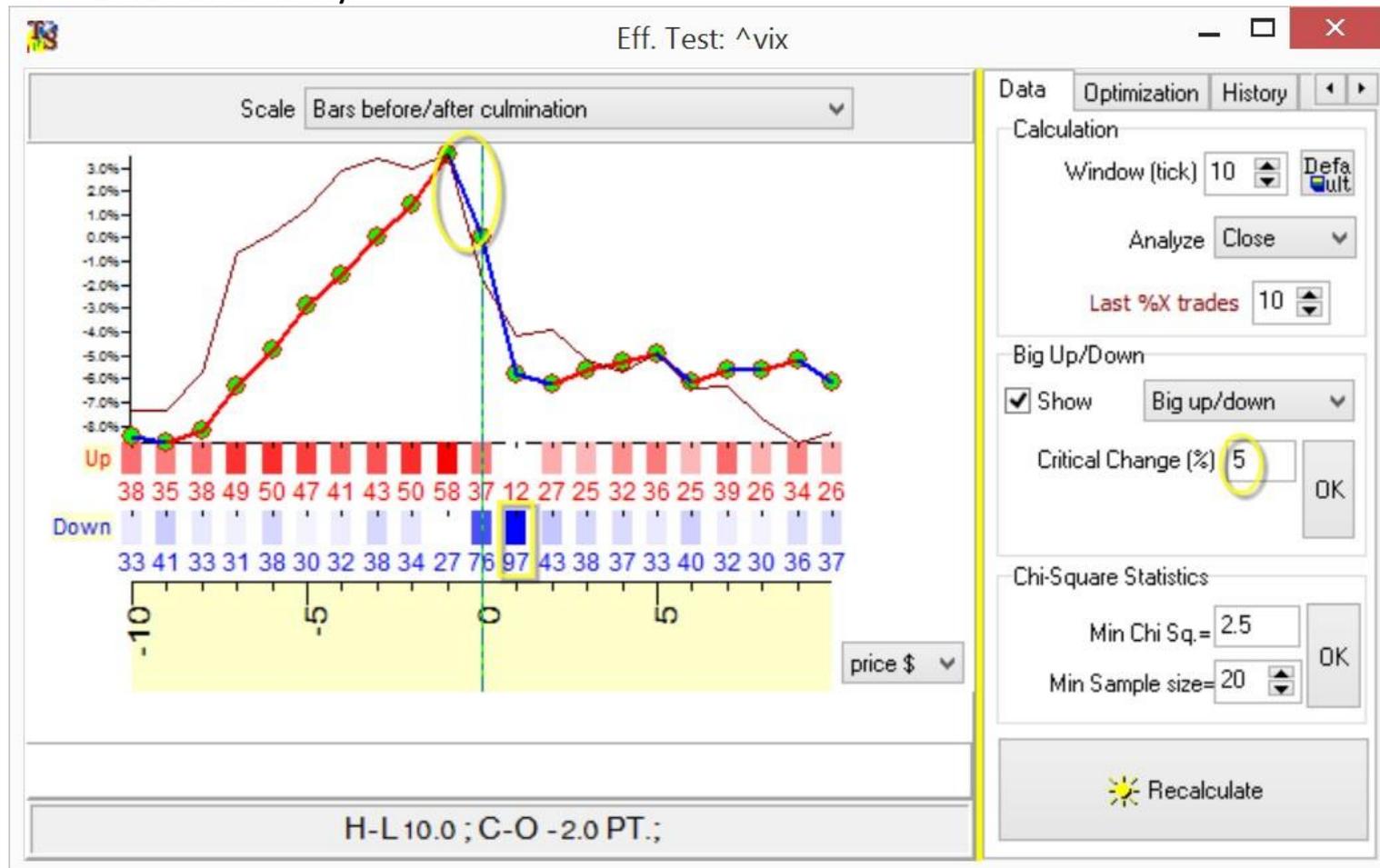
>or= to 10% Up Move in one day:



Takeaway: A sharp, intraday spike usually leads to **continuation of VIX expansion the next day**. Note the Big Up moves the day after.

Trader Takeaway: Sit on your hands and wait to sell premium the day following a sharp spike especially if it seems to come out of nowhere. Then it is a matter of trader's preference as to whether to enter near the open or later the next day or even consider waiting until the open two days after the spike. Also, consider deploying half or a third of your per-trade capital early and then deploying more if the trade goes against you.

To examine a sharp, intraday fall in VIX simply change the Close to Open parameter in ULE Editor to “Negative” and 2 pts.
 >or= to 10% Decline in one day:

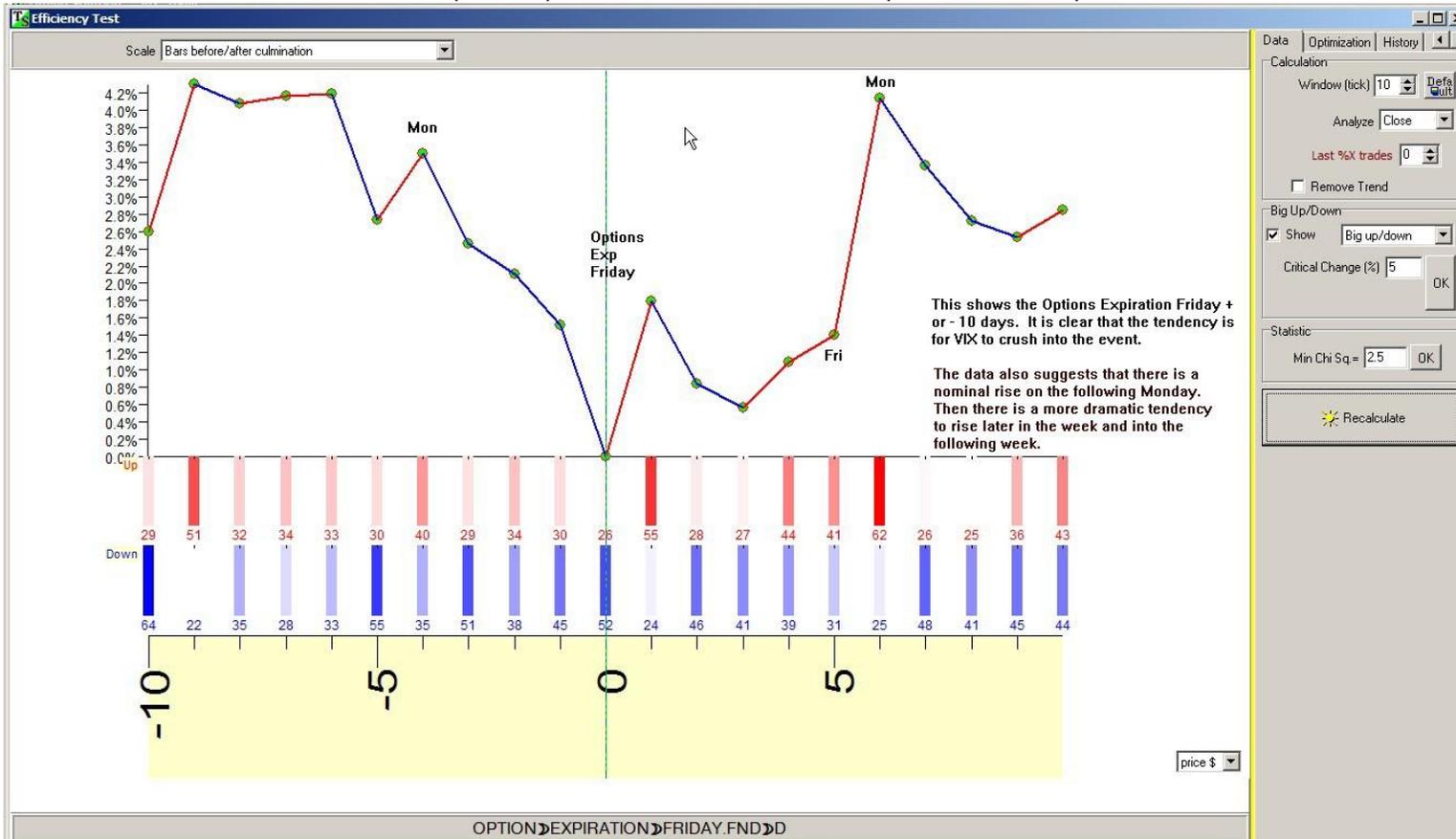


Takeaways: Large VIX moves down of 10% or more tend to continue with moves exceeding at least 5% occurring quite often on the second day. Lately (Last %X trades) indicates that the fade of VIX can continue for up to ten days.

Trader Takeaway: VIX crush will take about two days. Short Volatility Positions that have benefited by the move should probably be closed out within 1-2 days of the initial crush. Some traders might want to exploit the day 2 crush tendency and add to or initiate short volatility positions on day 1. In this case the trader would not be selling the top in volatility, but the Eff Test indicates that there will be more IV crush coming for at least one more day. Shorting Volatility would not be smart after two days. At this point it could make sense for the VIX to bounce for a few days and then consider a short volatility trade. Alternatively, a long VIX position could be considered after day two. I would want VIX to be at the bottom of a regression channel, however as a filter.

6. Options Expiration and the VIX:

So how does the VIX act in relation to Option Expiration? Here is the Efficiency Test +/- 10 days:



Takeaway: This suggests that IV fades into the Expiration and then does a typical Monday bounce (previously outlined in section 1). Eventually VIX rises by the following mid-week with follow through to the upside for a few more days.

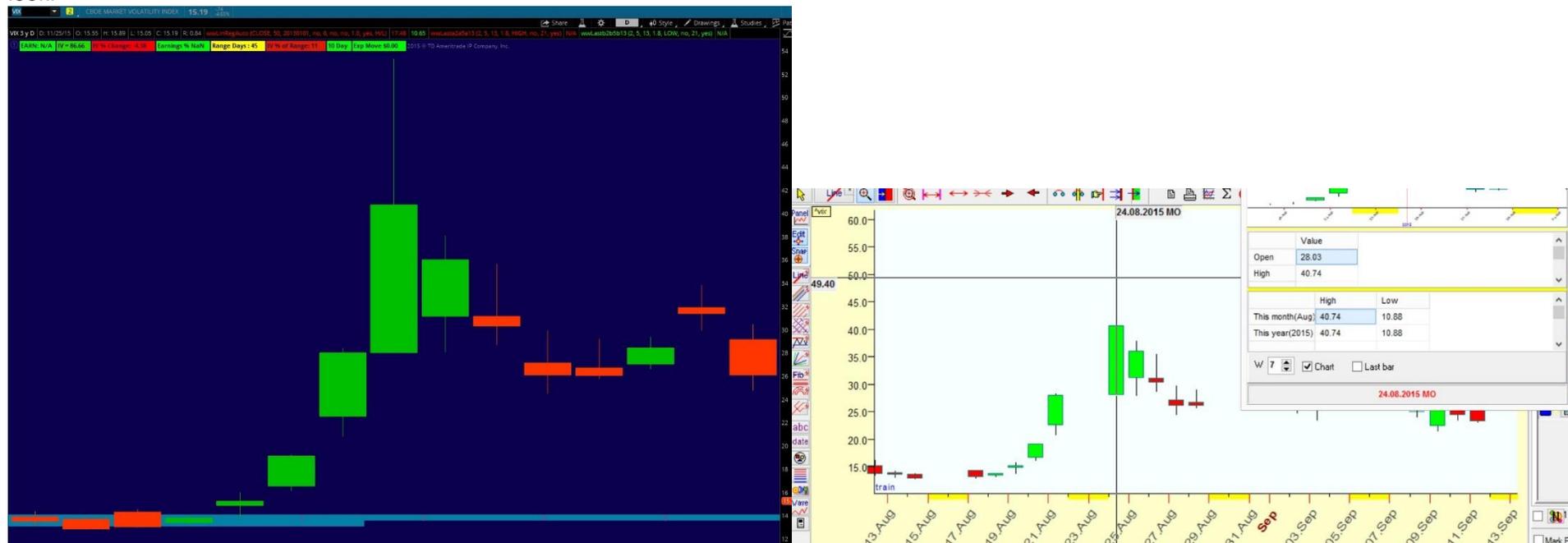
Trader Takeaway: Option Expiration used to be a bigger deal, but I have witnessed the tendency for SP500 to rise and VIX to fall into expiration. Some of this may simply be the aforementioned Friday effect in section 2. If the VIX appears to be falling into expiration, a long VIX futures position, long VXX position or a long VIX options strategy should be considered assuming that VIX is generally in the lower end of its normal range. So for most of the last couple of years a VIX between 10 and 13 is below the mean of 14. This plus the expiration/Friday factors is enough to take the trade. The trade comes off on Monday if there is no bounce and lasts a couple days if there is a large, profitable bounce. A Monday without a bounce in VIX suggests the effect is not happening. The trader assumption is that if all of the conditions have been met (low VIX at the end of a week), then there is not a lot of risk at the open on Monday.

Putting it all together--Trader Takeaways: Combining all of the above will provide many opportunities. The VIX moves and does so in a short cyclic fashion. The moves in VIX can be violent. When it low and stagnant the trader can still find short term opportunity based on the research presented. Long VIX via options, futures or ETFs are trades for complacency and stagnation. When it bursts, short volatility makes sense as long as the trader can withstand continuation. At the very least, the engagement with VIX should add to trader's overall market awareness. Trade small enough to be able to add to a position. This may go against some people's discipline of not adding to a losing trade. *The reversion that clearly occurs gives justification as to why we would consider this.* Successful options traders use strategies where the probabilities of success are known at the time the trade is placed. Traders who favor the sale of options are almost always looking at better than a 50% chance of success. I personally look for about an 80% chance of success over the course of the trades. I also look to manage a winner after volatility crush. Folding in the VIX tendencies for time of day, day of week, large VIX moves and options expiration will add to the trader's edge. Again, I highly recommend Tastytrade.com to better understand options and futures trading.

Updates, Add-On Comments, Conclusions and a Forecast:

I have been working on this article for well over a year and a half. Life events stopped me in my tracks. I was close to submitting this to Sergey this past May when I noted some discrepancies between VIX values that were from Yahoo vs. Thinkorswim. Here is what I found and concluded:

August 2015 Meltdown: I had a chance to see some data variation live. I was watching the market at the open on August 24th and noted the VIX throughout that momentous, bearish day. The VIX traded (near the open) of the U.S. stock market to a level of 53. Yahoo reported the High and the Close of 40.74. Take a look:



Somehow Yahoo failed to show the tail (wick) on the August 24th bar, but gets the close (40.74) correct. Yet, Yahoo shows the correct high of 53.29 when examining the 52 week high on the Summary Page for ^VIX. The fact is that VIX opened to 53.19 that morning (I saw it printing at that level near the open on VIX). Although I cannot explain the discrepancies, I have concluded that everything presented in this article has not materially changed as a result of these discrepancies.

Five Standard Deviation Moves: What I found more notable and am glad to address now is that *August 2015 contained a rare event*. On Wednesday August 19th, 2015 the VIX was trading just above 15. Thus it was forecasting an *annual move* of +/- 15%. A VIX of 15 is implying a weekly (5 bar), 1 standard deviation move of +/- **43** SPX points or about **2%**. We got a 200 point move down (10%) in 4 bars which is somewhere around 5 standard deviations for the SPX index. This is only supposed to happen .0001% of the time. This gets us into the concept that when you get much beyond about 3 standard deviations in the financial markets, the wheels pretty much have come off and very short term predictability becomes impossible. Panic and fear trump statistical math and bell shaped curves grow some amazingly long tails. Perhaps, liquidity and algorithmic trading were factors (as they were in the "Flash Crash"). My contention is that complacency kills. The complacency can be seen in the two year VIX levels versus the twenty year VIX levels. ***The bottom line is that the fear of the stock market melting down becomes greater than the fear of it melting up which is why we see bursts that skew the bell shaped curve and give it the long, upside tail.***

So in August of 2015 the stock market tanked, VIX spiked and then started its reversion to the mean soon after the open on Aug 24th. But, the damage was done: Traders received margin calls on August 24th and some people lost their accounts. Then we saw steady reversion and other traders breathed a sigh of relief.

Regression: The VIX then was mostly contained within a 1 standard deviation channel:

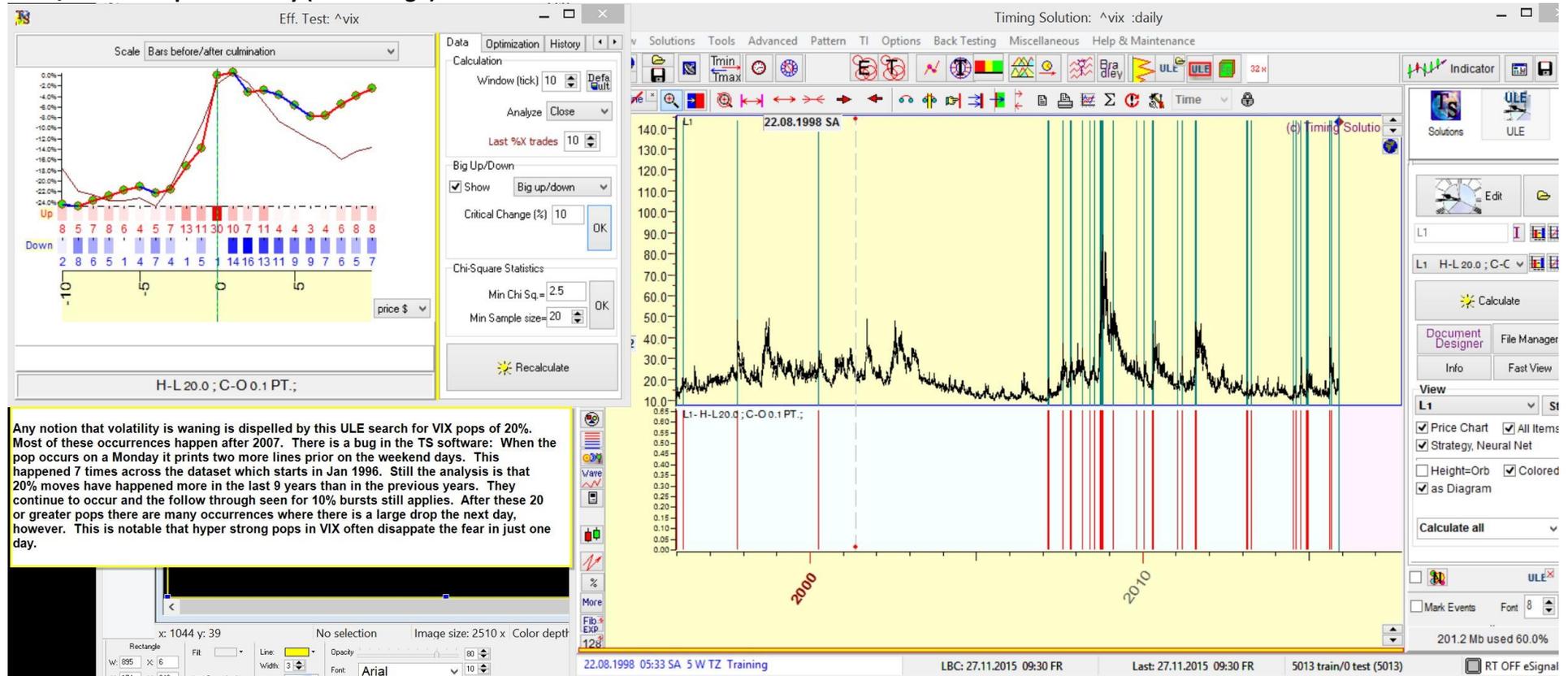


My thesis--Why the wheels came off: What had happened was the same thing that happened in October of 1987. Traders had “discovered” selling naked puts into an up market. Short volatility had become a widespread asset class. Complacency had settled in--born out of a market that had rarely been scary. 2008 was but a distant memory. This led to the August 2015 event. It was free money--until it wasn't. Many people bought into the idea that “this time is different” and “the Fed is your friend.” That phrase is idiotic and offered up by either people who don't trade or people who are doing the opposite (pumping and dumping). History repeats and the Fed only thinks they are in control...

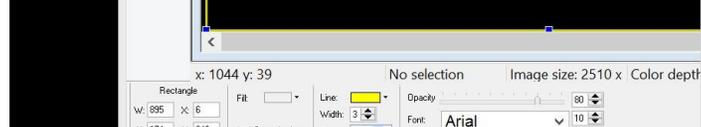
BTW: I sell naked options quite often, but I had stopped selling naked Puts in the spring of 2015. Too many people were doing it. I also believe that market liquidity has been negatively affected by a smaller number of market makers, prop firms and yes, high frequency traders. Finally, in an internet world where anyone can write anything without much research or context, we have people who actually believe that “this time is different.” The Bernanke Put has been replaced by the Yellen Put. By now my perspective should be clear: I believe in reversion when it comes to volatility.

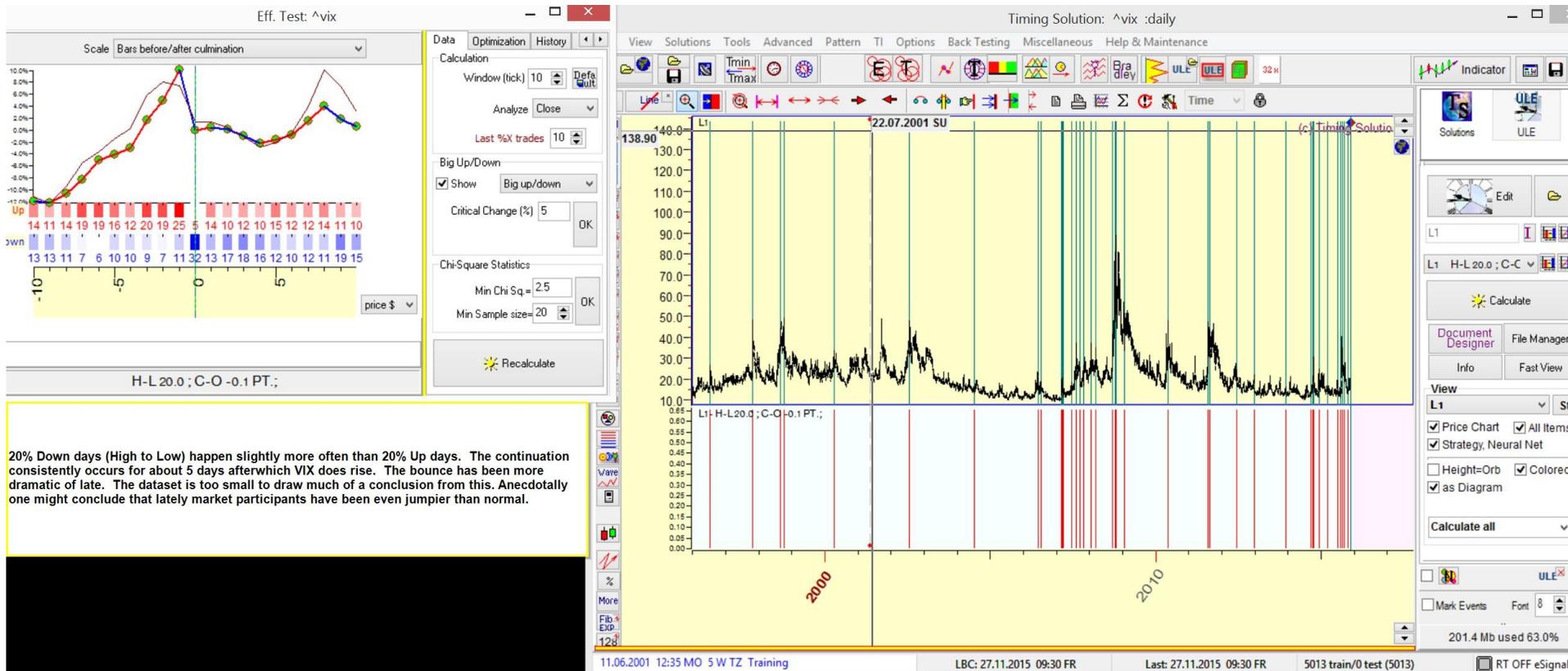
Schizophrenic Markets-I decided to add one more analysis which was to examine $\geq 20\%$ moves Up and Down to address the idea the new normal is for a lower VIX. I utilized the same one day analysis technique from ULE-Price-Price Bar Proportions.

VIX $\geq 20\%$ to 20% Up in One Day (Low to High)



Any notion that volatility is waning is dispelled by this ULE search for VIX pops of 20%. Most of these occurrences happen after 2007. There is a bug in the TS software: When the pop occurs on a Monday it prints two more lines prior on the weekend days. This happened 7 times across the dataset which starts in Jan 1996. Still the analysis is that 20% moves have happened more in the last 9 years than in the previous years. They continue to occur and the follow through seen for 10% bursts still applies. After these 20 or greater pops there are many occurrences where there is a large drop the next day, however. This is notable that hyper strong pops in VIX often disappate the fear in just one day.

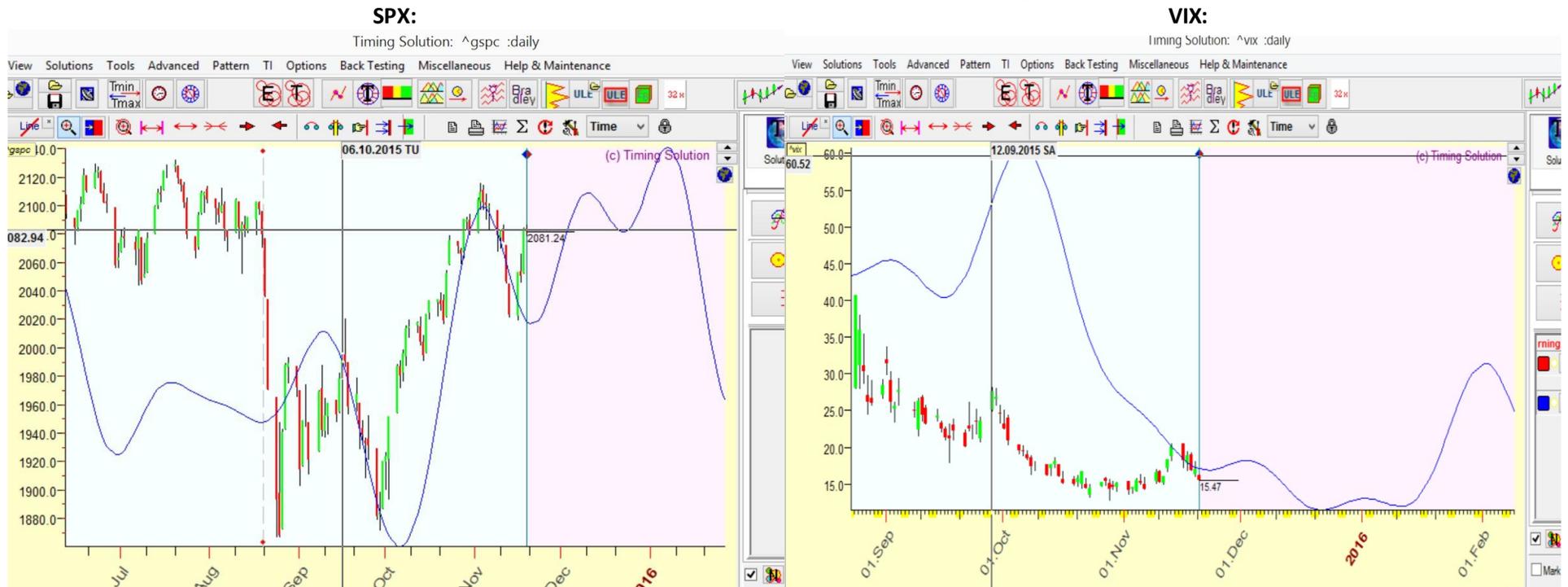




Takeaways: Most of the big moves occurred in the latter half of the dataset which goes back to 1996. *The VIX pops continue to occur despite the VIX mean and 1 standard deviation range lower over the last two years and five years compared to the last twenty years.* Could it be that we are headed back to the longer term range and mean?

Market Prediction: I will close with this: 2015 has seen a very choppy market with no lasting trend in the market. At Thanksgiving we are up (Year to Date) a meager 30 SPX points or about 1.5%. I believe that the VIX movement in August 2015 is a harbinger of things to come. A MarketWatch [article a last weekend](#) suggested that past November 20th we no longer needed to lose sleep (over the U.S. stock market) for the rest of the year. Since 2003 we have not gone down in over the last 30 days of the year. When it all seems so easy and pundits are mentioning it, I want to go the opposite direction.

BTW: The “no need to lose sleep” article jibes with the annual cycle that we can quickly examine in Timing Solution.



The annual cycle says we work higher in SPX and lower in VIX through year's end. I seriously doubt that this will be the case. Aside from the bullish, complacency, I see some behaviors in VIX that don't jibe with this scenario.

VIX and the 2007 Market Top:

What might we look for to determine if a top will lead to a strong bear phase?



Sure, one can say that the down move in July, 2007 created a higher VIX 2-3 months later even with index at new highs. There is a latency with VIX reversion as a recent down move remains in the minds of traders. I would say that this is all part of what occurs at tops. The initial move may come out of complacency, but the final topping comes out of fear. In late 2015 traders are still aware of the carnage of August and VIX is hovering higher than in early August.

As of Nov, 2015--On a relative basis the VIX is remaining high:



World events seem to have shifted the VIX higher despite SP500 near the highs. **Anytime we have similar or higher prices with VIX also higher, we have to pay attention.** This is especially true when considering the context of the holidays and a seasonal bias which favors the upside in the stock market and the downside in the VIX.

In 2007 we made a new high in October and VIX was at 18. 18 was rather high for a market making a new high off a five year move. 2008 showed us that the **high VIX at the top** was a “harbinger of things to come.” The next market top may not be identical compared to the last one, but I believe that the VIX will show some clear, counter-signs at the end of this bull market of almost seven years. The August market indicates that we have already seen the “warning shots across the bow.”

My Play: I will never be able to shed my contrarian approach. I believe we will see rising volatility into next year. New highs in the market? Sure that is possible. There would be no better contrarian trader setup than nominal new highs in an index or two. If simultaneously the VIX falls toward 12 then that would jibe with continuation higher. But, should the VIX be upward of 16-18 with new highs, watch out!

Thanks for reading this. I hope you liked the content and the approach where trading was emphasized. I tried to add as much trading perspective as possible while avoiding the notion of teaching everything that I know about options. I will once again plug **Tastytrade.com** for the ultimate options/futures, trading oriented education. It is free and a “game changer.”

The discussion of trading that results from Timing Solution engagement is something I would like to see more of in the future from Group members.

Afterthought: Lately, there has been some friction between members of the Group over Gann and Elliot Wave along with a few people becoming downright snarky.

If you have something that actually makes you money, then please consider sharing your trading concepts/methods with the TS Group. There is no one in this Group that can move the markets. Also no one who can emulate anyone else's exact trading approach. So don't worry that someone will steal your trades, sell the methodology and take money out of your pockets. All we are really doing is finding our own way of staying engaged and our own way of trading. Sergey welcomes articles and videos that share expertise and insight as to the markets and trading. What do you have to lose?