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EXPIRING MONTHLY

THE OPTION TRADERS JOURNAL

VIX Spikes and Mean Reversion

Is the Low VVIX a Bearish Indicator?

Trading VIX Options at **EXPIRATION**

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Prior to becoming a full-time investor, Bill was a business strategy consultant for two decades and advised clients across a broad range of industries on issues such as strategy formulation, strategy implementation, and metrics. When not trading or blogging, he can often be found running, hiking, and kayaking in Northern California.

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Jared Woodard

Jared is the principal of Condor Options. With over a decade of experience trading options, equities, and futures, he publishes the Condor Options newsletter (iron condors) and associated blog.

Jared has been quoted in various media outlets including The Wall Street Journal, Bloomberg, Financial Times Alphaville, and The Chicago Sun-Times. He is also a contributor to TheStreet's Options Profits service.

In 2008, he was profiled as a top options mentor in Stocks, Futures, and Options Magazine. He is also an associate member of the National Futures Association and registered principal of Clinamen Financial Group LLC, a commodity trading advisor.

Jared has master's degrees from Fordham University and the University of Edinburgh.

Mark Sebastian

Mark is a professional option trader and option mentor. He graduated from Villanova University in 2001 with a degree in finance. He was hired into an option trader training program by Group 1 Trading. He spent two years in New York trading options on the American Stock Exchange before moving back to Chicago to trade SPX and DJX options For the next five years, he traded a variety of option products successfully, both on and off the CBOE floor.

In December 2008 he started working as a mentor at Sheridan Option Mentoring. Currently, Mark writes a daily blog on all things option trading at Option911.com and works part time as risk manager for a hedge fund. In March 2010 he became Director of Education for a new education firm OptionPit.com.

Andrew Giovinazzi

Andrew Giovinazzi started his career in the financial markets after graduating from the University of California, Santa Cruz with a B.A. in Economics in 1989. He joined Group One, Ltd. and quickly became a member of the Pacific Stock Exchange (and later the CBOE), where he traded both equity and index options over a 15 year span. During that period he never had a down year.

At the same time, Andrew started and ran the Designated Primary Market Marker post for GroupOne on the floor of the CBOE. It became one of the highest-grossing posts for the company in 1992 and 1993. While actively trading, Andrew was instrumental in creating and managing an option trader training program for Group One.

He left Group One, Ltd. to co-found Henry Capital Management in 2001. Andrew then joined Aqumin LLC (2008–2011) to help bring 3D quoting and analysis to financial data. He is Chief Options Strategist at Option Pit.

Editor's Notes

Bill Luby

THE AUGUST OPTIONS EXPIRATION witnessed the lowest daily close in the VIX since June 2007, as investors pondered the potential for central bank stimulus measures in the euro zone, as well as in the United States and China. Reflecting the widely divergent expectations about near-term and longer-term risk, the VIX futures recorded it steepest contango reading ever for each of the past three days.

While the markets have certainly changing as of late, so too is Expiring Monthly. Thanks to reader feedback, there will be some changes in the magazine's content and format going forward, with some of those changes beginning to be implemented in the current edition. Two themes that were highlighted in the reader responses were the desire to see more trade ideas and actionable original research.

Largely as a result of reader feedback, this month there are two Follow That Trade articles. In A Halting Trend in Natural Gas, Jared Woodard discusses a UNG August call butterfly; while Mark Sebastian examines a VIX August put spread in Trading VIX Options at Expiration.

On the research front, Mark Sebastian analyzes the CBOE's "VIX of VIX" Index in Is the Low VVIX a Bearish Indicator, while I weigh in with some historical analysis and commentary on the subject of VIX spikes in VIX Spikes and Mean Reversion.

As always, readers are encouraged to send questions, comments or guest article contribution ideas to editor@expiringmonthly.com.

Have a good expiration cycle,

Bill Luby
Contributing Editor

VIX Spikes and Mean Reversion

Bill Luby

WITH THE EVENTS IN Greece and Spain making headlines on almost a daily basis, dire predictions about a hard landing in China, ongoing concerns about Iran's nuclear ambitions and talk of a 'fiscal cliff' in the United States, many investors are waiting for a large spike in the VIX to reflect the magnitude of those threats to the financial markets.

At the same time, there are quite a few investors who use VIX spikes as a market timing signal and are looking forward to a VIX spike as an opportunity to get long equities or sell options with historically high implied volatilities. When a VIX spike happens, however, the situation is rarely cut and dry. Evaluating whether the VIX has risen to levels to sufficiently discount future uncertainty and risk is no easy matter. Handicapping the likelihood of another spike in volatility versus a decline in the VIX from elevated levels is vitally important to options traders, yet weighing investor sentiment against macroeconomic risk can all too often seem like a lesson in futility.

This article analyzes VIX spikes of different magnitude in an effort to determine at what point investors can reasonably begin to assume that the gravitational effect of mean reversion will pull the VIX back down in the direction of its historical average of about 20.

Research Methodology and Summary of Findings

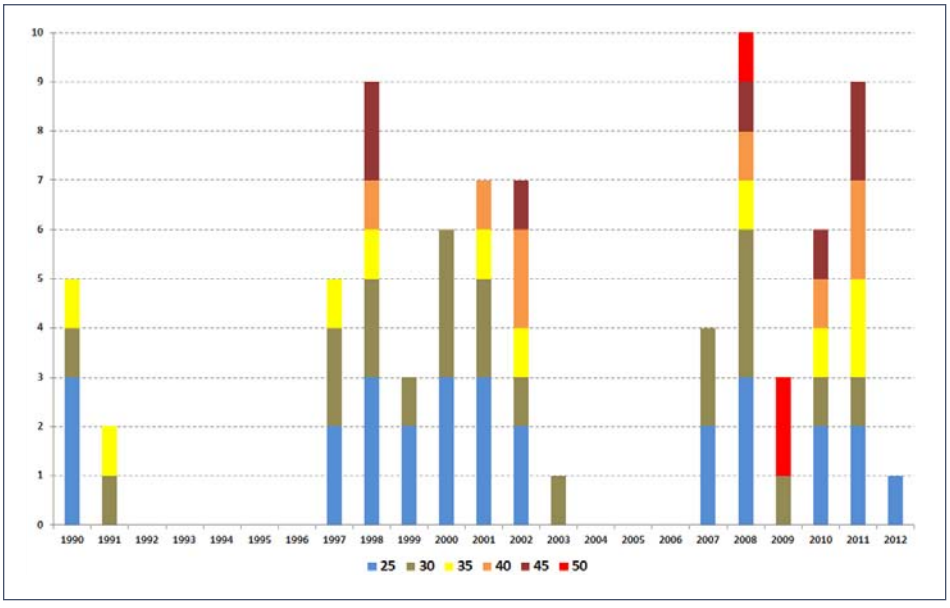
For this study, I used VIX historical data going back to 1990 and defined all VIX spikes in absolute numerical terms, using five point increments, so that VIX spikes with closing values above 25, 30, 35, etc. were analyzed, with the upper cutoff threshold being a VIX spike above 50. In order to minimize the double-counting of VIX spikes due to clustering, I added the condition that the close above the specified level also had to be the first time in 20 days that the VIX closed above the specified threshold. The 20-day condition removed almost all instances of double-counting and also approximates one expiration cycle.

Figure 1 shows the distribution of VIX spikes during each year from 1990–2012 that fit the criteria described above. It also shows pockets of relative calm during the mid-90s and mid-2000s, sandwiched between three distinct volatility periods:

1. 1990–1991: Gulf War
2. 1997–2003: Asian Financial Crisis, Long-Term Capital Management, Dot-com bubble
3. 2007–2012: Subprime Crisis, Financial Crisis of 2008, European Sovereign Debt Crisis

The frequency of VIX spikes ranged from 28 with closes above 25 to three instances in which the VIX closed above 50. *[Only partial post-spike data is available for the most recent VIX spike above 25, hence the most recent instance is not included in the calculations below.]*

Figure 2 shows the percentage of instances in which the VIX was down from the initial close above the threshold level some 1, 3, 5, 10, 20, 50 and 100 trading days later. Note that following a VIX spike above 25, the VIX



CBOE, VIX and More

FIGURE 1 *VIX Spike Frequency and Severity by Year*

was more likely to be higher 5 days and 10 days later (green shading), yet when the VIX spikes above the 35, 40 and 45 levels, the likelihood of a mean reversion move downward in the VIX in the following 1 day to 100 day period is generally in the range of 80–100%. Finally, while the data is less compelling following a VIX spike above 50, it is important to note that these includes only three instances and all three instances date from the height of the 2008–2009 financial crisis.

VIX	Down +1	Down +3	Down +5	Down +10	Down +20	Down +50	Down +100	N =
25	63%	63%	44%	48%	59%	52%	74%	**27**
30	55%	73%	64%	68%	64%	86%	95%	**22**
35	80%	80%	80%	80%	80%	80%	90%	**10**
40	88%	88%	88%	75%	88%	88%	88%	**8**
45	100%	100%	86%	86%	71%	86%	86%	**7**
50	67%	67%	33%	67%	67%	67%	67%	**3**

CBOE, VIX and More

FIGURE 2 *VIX Spike Mean Reversion History*

VIX	Avg Close	ROI +1	ROI +3	ROI +5	ROI +10	ROI +20	ROI +50	ROI +100
25	26.49	0.16%	-3.82%	0.52%	**5.22%**	**2.15%**	**4.87%**	2.83%
30	31.35	-1.01%	-4.56%	-5.41%	-0.88%	-4.98%	-12.65%	-26.31%
35	38.70	-9.10%	-14.91%	-12.59%	-9.62%	-6.51%	-23.66%	-32.58%
40	43.20	-11.73%	-9.57%	-14.51%	-6.10%	-7.49%	-26.62%	-31.94%
45	46.01	-11.88%	-16.74%	-20.43%	-19.14%	-12.40%	-31.10%	-39.75%
50	51.89	-6.67%	-0.43%	-0.54%	-5.30%	-10.18%	-15.56%	-31.58%
CENSUS	**20.54**	0.19%	0.48%	0.69%	1.07%	1.85%	3.60%	4.98%

FIGURE 3 *VIX Spike Return Matrix*

The Magnitude of Post-Spike Mean Reversion

Figure 3 shows the mean changes in the VIX during the 1–100 day period following the initial VIX close above various levels. The cells with the green shading indicate where the VIX showed a net gain in the period following the initial spike. Additionally, the bold font (a VIX of 25, with performance data for the following 10, 20 and 50 days) indicates the range in which the VIX spike data outperformed the full 22-year data set, otherwise known as the 'census.'

Note that all the data points from 1–100 days with a VIX spike over 30 to a VIX spike over 50 demonstrate that, on average, mean reversion is a persistent theme. The table suggests that the degree of mean reversion is a function both of the magnitude of the spike and the amount of time following the spike.

While there is little evidence of mean reversion with a VIX spike over 25, there is considerable evidence of mean reversion once the VIX spikes over 30. Moving from a VIX spike over 30 to a VIX spike over 35 also dramatically increases the degree of mean reversion, particularly in the shorter time frames. While VIX spikes over 40 and 45 do bring some incremental mean reversion into play, the data indicates that there are some diminishing returns with larger VIX spikes at this stage. Finally, the limited data points with a VIX spike over 50 makes it difficult to draw meaningful conclusions, but here the provisional takeaway is that there is limited incremental mean reversion, if any at all. The other potential takeaway is that in retrospect, there was obviously very little in the way of mean reversion during the period from September through November 2008.

Conclusion

Traders who take on long or short volatility positions invariably have some sort of expectations or hopes about how high the VIX will rise before mean reversion begins to kick in and the VIX begins to subside.

The data above examine VIX spikes in absolute terms (not in relative terms such as against a moving average or Bollinger bands) and suggest that based on 22 years of historical data, one should not anticipate much in the way of mean reversion when the VIX spikes above 25. Mean reversion begins to be an important factor once the VIX spikes above 30 and is

A critical task will be to determine whether recent high water marks in volatility are the result of 50-year floods or 10-year floods.

even more critical when the VIX spikes above 35, 40 and 45.

Note that using data from 1990, the only time the VIX spiked above 50 was at the height of the 2008–2009 financial crisis. Had this same analysis had been performed prior to September 2008, the data would have shown a pattern of even stronger mean reversion at work for VIX spikes of all magnitudes.

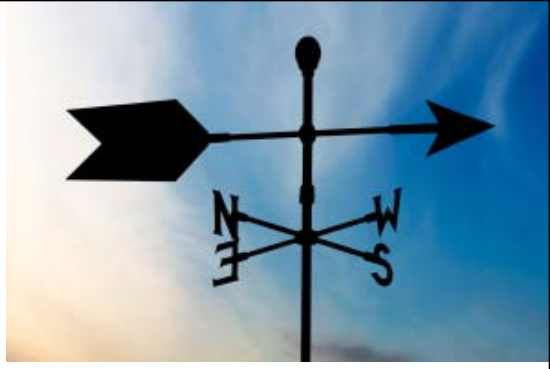
Of course, an important part of this data is understanding how it is the product of specific volatility regimes, some of which were characterized by low volatility and others which included periods of high volatility. Going forward, a critical task will be to determine whether recent high water marks in volatility are the result of 50-year floods or 10-year floods. If the last few years have taught us anything, it should be that the future need not resemble the past in any shape or form. Until that future comes into better focus, the data presented above should help to provide a framework for understanding VIX spikes and the mean reverting nature of the VIX following those spikes. EM

Further Reading

"Calculating the Future Range of the VIX," *Expiring Monthly*, February 2012.

"The VIX Term Structure as a Predictor of Future Returns," *Expiring Monthly*, March 2012.

Is the Low VVIX a Bearish Indicator?



Mark Sebastian

WHILE INCREASES in implied volatility in equity options are generally considered an indicator of movement, increases in implied volatility are not considered great indicators of direction. The VIX and all volatilities correlate with movement, but, they aren't good leading indicators. One thing the last few years should have taught many a trader is that when the VIX is at a recent high or low it can quickly turn around or just as easily keep moving in that direction. It is important not to confuse correlation with prediction. The VIX has a correlation with the SPX (albeit negative); however, it does not do a good job of actually predicting direction in the SPX. Yet, traders are constantly trying to use the VIX in new ways, and do analysis on VIX to see if there might be some predictive quality to the index.

Recently the CBOE listed the VVIX, the VIX of the VIX. While at first I simply assumed that the VVIX offered little insight into movement in the SPX, after all, so far the VIX index has been a goose egg of an indicator despite everyone trying to come up with 'predictive qualities.' Then, I took a look at a chart of VVIX vs. the VIX in mid-July. TD-Ameritrade along with many other option software providers were only providing the data since the CBOE officially listed the index and not the data available on the CBOE micro site (which goes back to Jan 3 2007). On July 16th, if one only looked at the data available on one of the option platforms, one might reasonably come to one conclusion: if the VVIX drops to 85, the VIX is going to rally (Figure 1).

Then, the VVIX crossed 85 again on August 6th but this time, the VIX did not move higher. In fact, as I am editing this, the VIX is at a new recent low of 13.45 (Figure 2).

Every indicator fails, and in this case I clearly did not have enough data to make a decision one way or the other. So with that I pulled up the historical data provided by the CBOE and began digging in to VVIX.

The Data provided by the CBOE interpolates the VVIX based on end of day pricing in the VIX going back to January 3 2007. This present some potential distortion issues with VVIX as anytime we are interpolating volatility from end of day data there is going to be some small issues. That said the VIX is liquid enough that I have a hard

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FIGURE 1

FIGURE 2

time believing that we are going to see any massive distortions with VVIX. We are then going to pull up end of day VIX data from the same time period. That too could have some aftermarket issues, but for the most part should be relatively sold.

Initially I ran a graph of VVIX over VIX (Figure 3). One immediately notices that the VVIX does peak with the VIX, but it also, to the naked eye appears to peak with lows in the VIX as well. However, simply looking at a graph is not going to answer our question, we must run a test on the data itself. One also notices that the VVIX does not fall below 85 with the same frequency from 2010–2012 as it did prior (this is also mentioned on the CBOE Micro site). However, we can't assume that anything has permanently changed with VIX options, so we are going to use the whole data set.

Our test is going to start out as follows; we are going to check each day to see if the VVIX closed below 85%. On the days it closed below 85, we are going to subtract the closing price of the VIX from the closing price of VIX itself. If there is edge in the indicator, we are going to be picking up positive 'VIX points" points gained form end of day to end of day. Then our belief would be that positive VIX points would also lead to a tip in direction.

In total we have 1419 occurrences in our data from Jan 3 2007 to Aug 17 2012. During that time there were 672 instances when the VVIX was below 85.

	Days	Points
Up	314	356.92
Down	358	-314.46
Total	672	42.46

FIGURE 4

The next day the VIX ticked up 314 times yielding just less than 357 VIX points. The VIX ticked down 358 times yielding just over 314 negative VIX points. The net VIX points picked up was 42.46, or about .06 for every day the VVIX was under 85. Not exactly a great yield and likely less than the bid-ask spread.

Conclusion, on its own a VVIX below 85 means nothing.

Next we tried the VVIX below 75. Surprising this returned much better results.

	Days	Points
Up	123	140.53
Down	141	-110.43
Total	264	30.1

FIGURE 5

While we manage to cut our days by about 2/3, we only give up about 25% of our VIX points. Even so, the net return of just over .1 VIX points per occurrence is barely over the bid-ask spread, if it is beyond that at all.

Surprisingly when we dropped our threshold to 65 the results were actually worse than the results from 75.

	Days	Points
Up	40	46.13
Down	56	-40.34
Total	96	5.79

FIGURE 6

While we do manage to reduce our total occurrences, the net return yields less than 6 VIX points. Again, VVIX seems to be coming up short on its ability to predict much of anything.

Our Conclusion

Based solely on the level of VVIX, one cannot gain any significant return by going long VIX or short VIX.

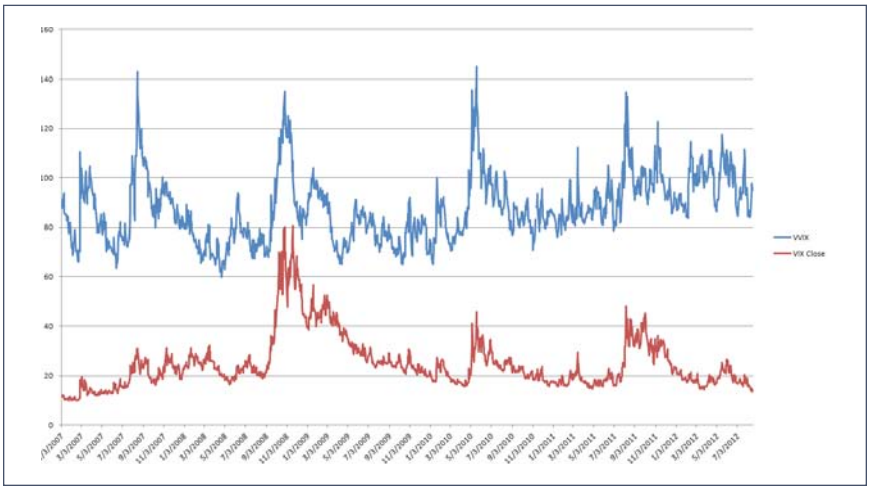

FIGURE 3

The second variable

I then decided to add a second variable to our equation. Rather than simply looking at VVIX, we added VVIX momentum. Our new question was if VVIX is below 85, and closed at a higher level than it did the previous day can we get a positive expectancy.

This criterion significantly cut down on our occurrences of VVIX trades. Rather than 674 we had 271 occurrences, about 40% of the number of occurrences. In that time period we had 170 days when the VIX went up the following day, and 101 days where the VIX went down the following day. This was our first study that provided a positive number of VIX days. Even better was the number of VIX points returned?

	Days	Points
Up	170	196.01
Down	101	-67.26
Total	271	128.75

FIGURE 7

Our 170 up days returned over 196 VIX points, our down days, less than 68 VIX points. Net we collected over 128 VIX points, an average return of almost .5 a VIX point per occurrence. Interestingly when I did passes at 75 and 65, we did not get a positive expectancy, only with 85. Thus, I think we may actually have something here. While I am sure the data needs much more refining and digging into, I think based on the research we have started here, there may be a quantifiable trade that combines the momentum of VVIX and the level of VVIX that could potentially yield a quite positive expectancy. EM

A Halting Trend in Natural Gas

Jared Woodard

IN 2012, NATURAL gas futures found a zone of fundamental support after a steady multi-year decline. A long-standing problem in the natural gas market was that producers were incentivized to drill for gas—even if they knew they would only be sending it to storage—in order to meet drilling requirements for holding leases on those resources. Government data on natural gas storage capacity showed that, based on consistently above-average inventory reports, there was a reasonable chance that producers would exhaust storage capacity in the late summer. The worst-case image was of producers simply burning off the gas they were drilling rather than lose valuable leases. This supply imbalanced pushed futures, which were as high as $13 in the summer of 2008, down to $2 in late April.

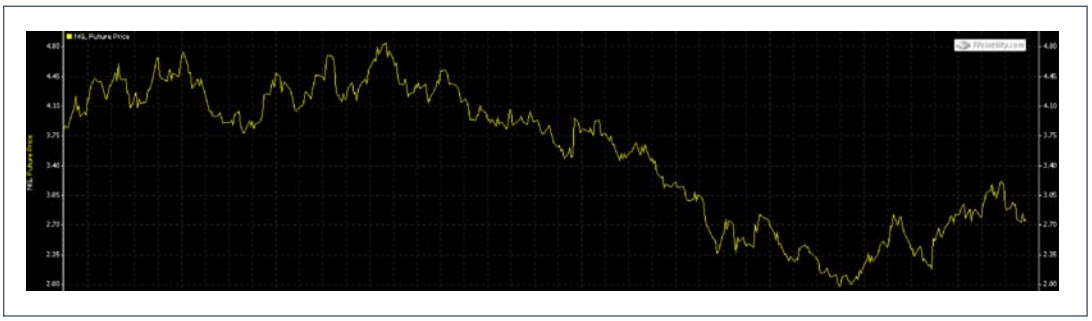

FIGURE 1 *Natural Gas Futures, 2011–2012*

In the summer months, two catalysts emerged. Gas companies trimmed production, but more importantly, higher-than-expected summer temperatures led electric utilities to take advantage of low natural gas prices and many power plants switched from coal to gas. By the middle of July, inventory reports showed that builds were finally coming in lower than the historical norm, and that overall storage trends were likely to fall back within the average historical window, averting the worst-case scenario.

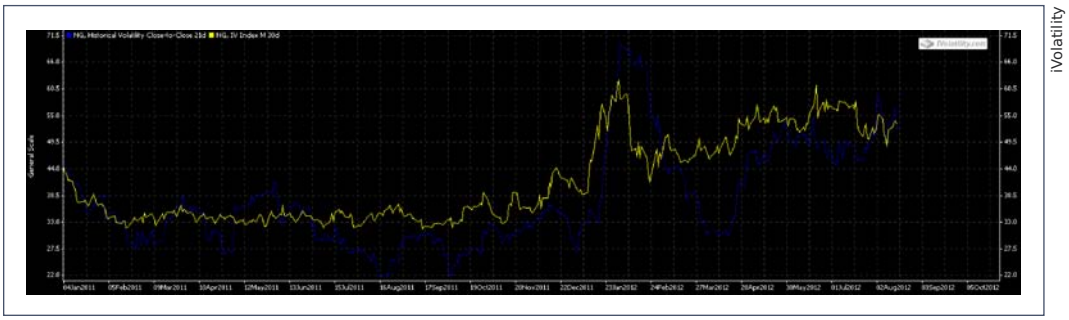

FIGURE 2 *NG 1M Implied and Historical Volatility, 2011–2012*

The change in trend caused the implied volatility of NG futures options to rise steadily, and the option premium overshot the trailing volatility of the underlying. We played this perceived $2 floor via some straightforward short vertical put spreads in client accounts. Where things became more challenging was in mid-July, when futures were approaching the $3 level and the rationale for utilities to switch from coal to gas had disappeared.

Industry analysts began talking about $3 as a short-term ceiling for the commodity, since prices above that level would incentivize electric companies to switch back to coal.

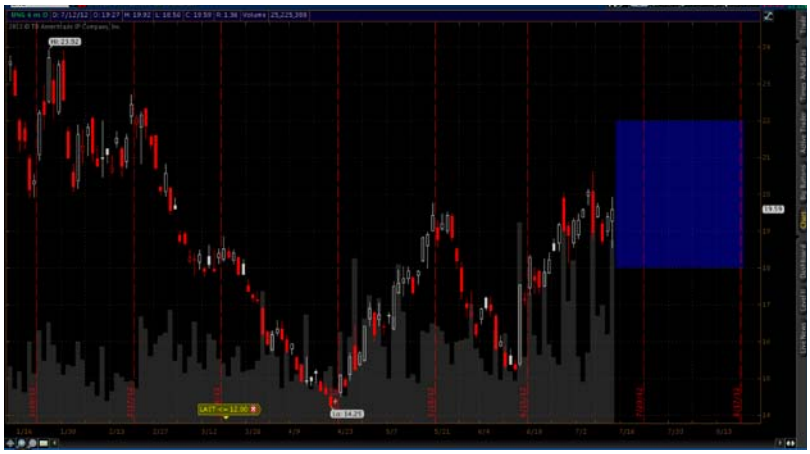

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FIGURE 3 *UNG Daily Closing Prices and Range Target*

This looked like a good opportunity to play a likely range-bound market. Fig. 3 shows the price area we were targeting in the UNG ETF. Since the implied volatility in the options was still pretty elevated, we traded an imbalanced August call butterfly with a downside bias. The risk profile for the 18/20/24 call fly, bought for $0.20 on July 13th, is at fig. 4.

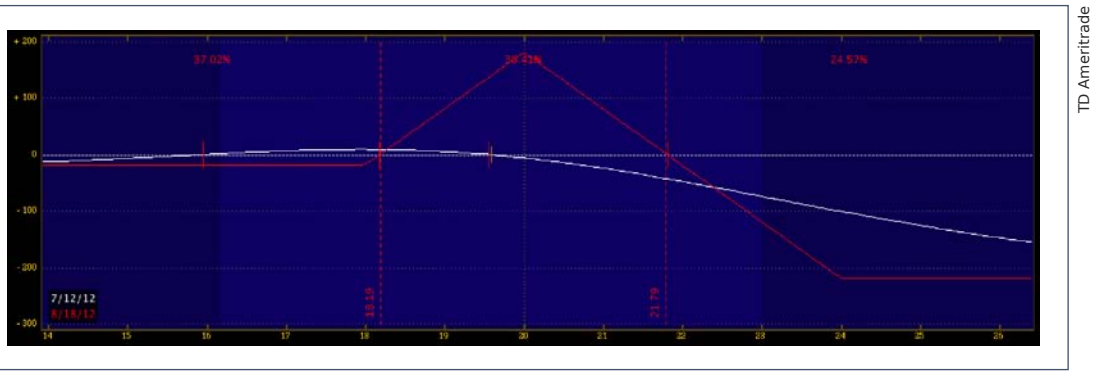

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FIGURE 4 *UNG August Call Butterfly Risk Profile*

The trade was structured so that if there was a sharp drop in natural gas prices, we would only lose the premium paid for the spread. If UNG was between 18 and 22 (or thereabouts) near expiration, the spread would profit, while a sharp rise in prices carried greater risk. Our intention was not to hold this trade to expiration, but even so, the targeted range was much narrower than even the first standard deviation implied by options prices.

Over the next twelve sessions, UNG rose from $19.61 (the price at position entry) to an intraday high of $22.42—a 14% gain. That corresponded to a move above $3.20 in NG futures—the point at which our fundamentals story was supposed to kick in. The rapid climb coincided with continued higher-than-expected temperatures, boosting utility demand. Because of the structure of the butterfly spread, we were prepared to exit half of the position on a close in the ETF above $22.50. As it happened, July 31st marked the short-term high and UNG fell back to $20 over the next two sessions.

Holding on to the trade felt, at that point, like tempting fate: while the range targets for the trade turned out to be correct, from a volatility perspective it was a rougher ride than anticipated. The position was closed on August 6th for a $0.62 credit.

In retrospect, we were not prepared for the effects of short-term weather forecasts on daily price action. A wider distance between the long strikes would have lowered the odds of getting shaken out of part of the position too early (which almost happened). By August expiration, UNG had fallen back to $18.71, with the 18 calls expiring at $0.75. Holding the trade to expiration would have yielded an extra $0.13, but at the psychological cost of holding the position for another two weeks and of watching the position edge steadily closer toward unprofitability. As is so often the case with targeted-range butterflies, an early exit here was for the better. EM

Trading VIX Options at Expiration

Mark Sebastian

ONE TRADE I COMMONLY MAKE in VIX is what I call an expiration decay trade. One of the interesting things about VIX is that while it trades off the futures, it expires into a print that is very similar to the VIX cash. So while traders absolutely should use the VX futures as the VIX underlying, if one has a short term bet on a low VIX not rallying to much traders can make a trade that has somewhat better statistical odds. We are going to look at a trade that if expired today would return 150%, while having better than 50/50 odds.

On August 15th, the VIX is trading 14.65, if one believes the VIX is going to stay below 15% a trader can set up an expiration decay trade. At the close of business the trader buys a VIX August 15/16 put spread paying .40.

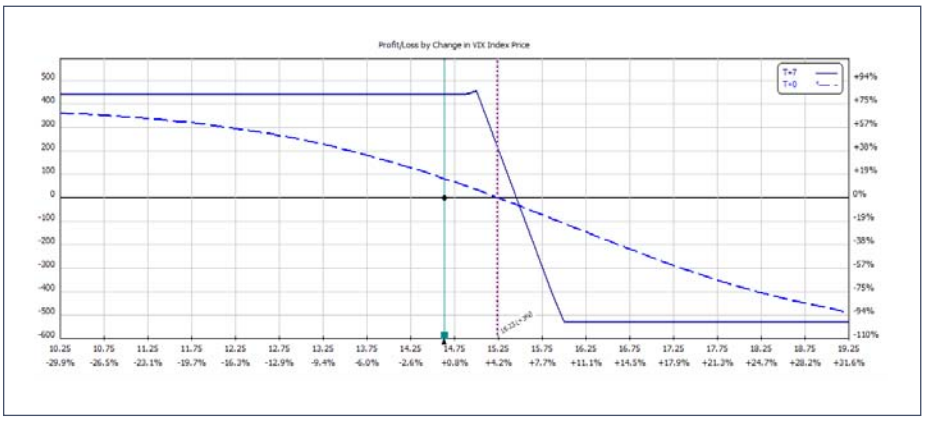

FIGURE 1 *Profit/Loss by Change in VIX Index Price*

Notice that if the VIX expired that day, the trade would be fully in the money. However, if one looks at the VIX futures curve from August 15's close (source: www.vixcentral.com) we can clearly see that the futures are trading at a nice premium, 16.20 to be exact.

FIGURE 2 *Historical Prices, 8/15/12*

Almost a 2 point premium to the cash VIX. This is why we can buy the spread for .40, even though, one might argue that we shouldn't be able to. As the VIX stands still we see that the futures slowly decay down closer the level the cash VIX is trading. By Friday close VIX is below 14, but the VIX future has actually lose more value falling to 15.10.

Our put spread has expanded to .70 from .40, and we have almost doubled our money.

FIGURE 3 *Historical Prices, 8/17/12*

The smart trader might take the trade off a pocket the cash. We carry on through the weekend to capture more premiums shooting for 100% return. The VIX futures decay future settling at 14.65, our spread has now expanded to .80; we have returned 100% in three days, without the VIX falling drastically.

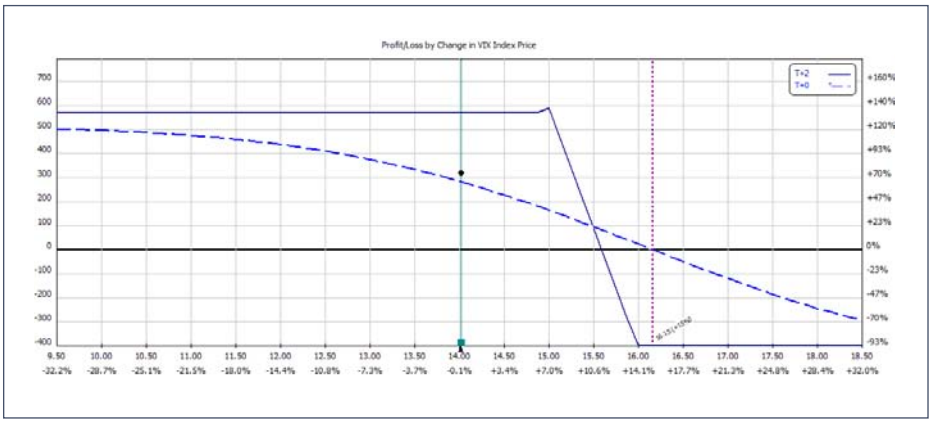

FIGURE 4 *Profit/Loss by Change in VIX Index Price*

We, much like a short spread simply waited out, the big difference is because we have a clear understanding of VIX futures we received a much better risk reward odds. **EM**