



## MARCH 2015 NEWSLETTER

Dear Investor,

The Global Volatility Summit ("GVS") brings together volatility and tail hedge managers, institutional investors, thought provoking speakers, and other industry experts to discuss the volatility markets and the roles volatility can play in institutional investors' portfolios.

The 6<sup>th</sup> annual GVS took place on March 11<sup>th</sup> at Pier 60, Chelsea Piers in New York City and was a huge success thanks to our dedicated managers, sponsors, and the high caliber investors that participated. The 2015 event was attended by some of the world's largest pensions, endowments, foundations, sovereign wealth funds and banks. Sponsors included top hedge funds in the volatility and tail hedging space, as well as some of the largest investment banks and exchanges from across the globe. We appreciate everyone's continued support and look forward to another great event in 2016.

NationsShares has authored the latest report in our newsletter series for the GVS community, titled 'The Volatility Risk Premium across Energy Market Sectors. An Opportunity During Periods of Higher Realized Volatility?'

Stay tuned for more newsletters, educational materials and updates on the next event!

Cheers,  
Global Volatility Summit

## 2015 EVENT RECAP

The theme of the event was innovation and technology, focusing on how technology and science augment the way we live, work and trade.

Kevin Slavin, Algoworld expert from MIT gave a keynote address on how algorithms shape the world. Brad Katsuyama, President and CEO of IEX, shared his story behind pioneering trading technologies.

The following managers participated in the 2015 event in New York City:

BlueMountain Capital  
Capstone Investment Advisors  
Capula Investment Management  
Dominicé & Co. – Asset Management  
Fortress Investment Group  
Ionic Capital Management  
JD Capital Management  
Parallax Volatility Advisors  
Pine River Capital Management  
Saiers Capital

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## The Volatility Risk Premium Across Energy Market Sectors. An Opportunity During Periods of Higher Realized Volatility?

On June 25, 2014, the February crude oil futures contract closed at \$100.14 a barrel. That was the last time it closed above \$100 a barrel. Five months later the price had dropped by more than 25 percent. Just two months after that the price had dropped by 50 percent. By nearly any definition the oil market had crashed as you can see in Figure 1.

Figure 1. February 2015 Crude Oil



Source: Bloomberg

As we would expect, implied volatility for crude oil options rose dramatically, from below 14.5 during the summer of 2014, to well above 60.0 when crude oil was making its closing low of 44.73 on 1/29/2015 (we've used USO, the United States Oil Fund ETF as a proxy for crude oil in order to avoid using options with different underlying instruments as when options on crude oil futures settle to different futures contracts). You can see this in Figure 2.

Figure 2. USO VolDex



Source: NationsShares

During this period the average daily closing 30-day implied volatility was 26.96 percent and realized volatility for USO, the crude oil ETF, was 37.01 percent.

Implied volatility is usually higher than the subsequent realized volatility for the time period measured as sellers of options demand a premium to compensate for issues like jump risk. But option traders historically perform poorly in maintaining this relationship (implied volatility over subsequent realized volatility) when markets are experiencing substantial realized volatility. This is true despite heuristic and empirical research proving that realized volatility is heteroscedastic – the volatility of volatility is unequal across time meaning option traders understand that elevated realized volatility is likely to persist since realized volatility tends to stay high for a period of time before it drops and stays low for a period of time.

But how good or bad are option market makers at keeping option prices at appropriate levels, meaning implied volatility is above subsequent realized volatility, across different but related asset classes? We examine the ability of option market makers to price options appropriately for USO, the United States Oil Fund, an ETF that holds crude oil futures contracts; XLE, the Energy Select Sector SPDR® Fund; and XOM, ExxonMobil Corp., from the period when crude oil futures last traded above \$100 bbl to the middle of February, a period when crude oil prices fell by more than half and realized volatility increased substantially.

During this period, June 25, 2014 to February 13, 2015, crude oil prices declined dramatically and prices for energy producers and affiliated companies declined as well.

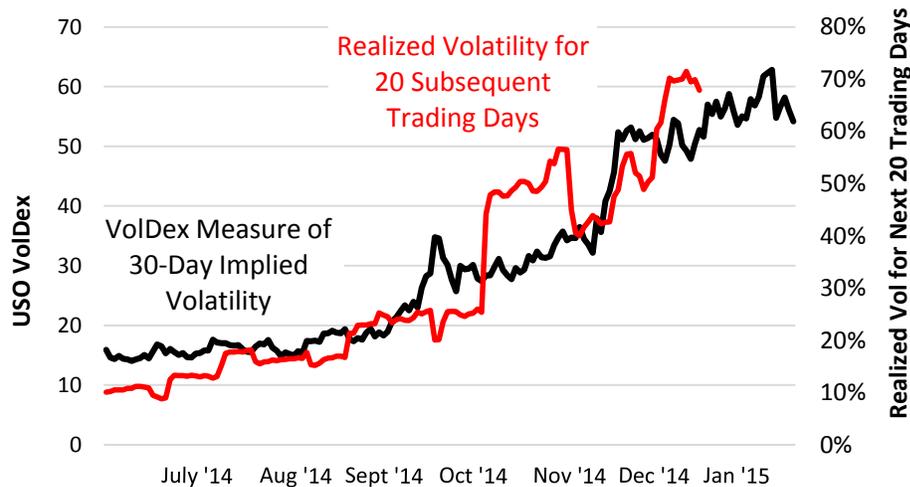
Asset	Price Change (in Percent)	Annualized Realized Volatility
Feb 2015 Crude Oil Futures	-48.05%	37.01%
USO (Crude Oil ETF)	-50.06%	36.07%
XLE (Select SPDR Energy ETF)	-17.89%	24.18%
XOM (ExxonMobil Corp.)	-6.58%	19.89%

Given that crude oil prices declined so much more than prices for XLE and XOM and given that the volatility of the move in crude oil was so much greater, one would think that market makers in crude oil futures would have been hard pressed to effectively price options by charging an implied volatility that was closer to the ultimate realized volatility in crude oil during the period covered by the options.

We've used the Nations VolDex® as our measure of implied volatility for USO, XLE and XOM. VolDex measures the implied volatility of precisely at-the-money options with precisely 30 days to expiration. It does this by interpolating a strike price equal to the forward price for the two expiration dates that bracket a constant 30 day period and by interpolating an option with precisely 30 days to expiration. It then uses a closed-form solution to calculate implied volatility.

You can see the daily VolDex for USO options and the realized volatility of each subsequent 20 trading day period in Figure 3.

**Figure 3. USO VolDex and Realized Volatility**

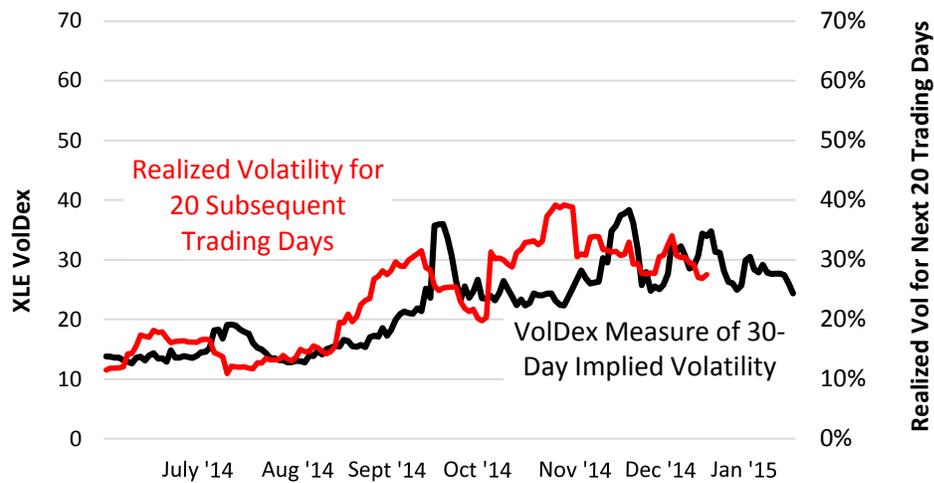


Source: Bloomberg and NationsShares

Implied volatility of USO options generally remained above the subsequent realized volatility from the beginning of the break in crude oil prices until the middle of September when subsequent realized volatility briefly moved above implied volatility before falling back. But at the end of October subsequent realized volatility spiked dramatically. Even when option traders raised prices realized volatility remained above implied.

One would expect similar action in XLE options and you can see that in Figure 4.

**Figure 4. XLE VolDex and Realized Volatility**

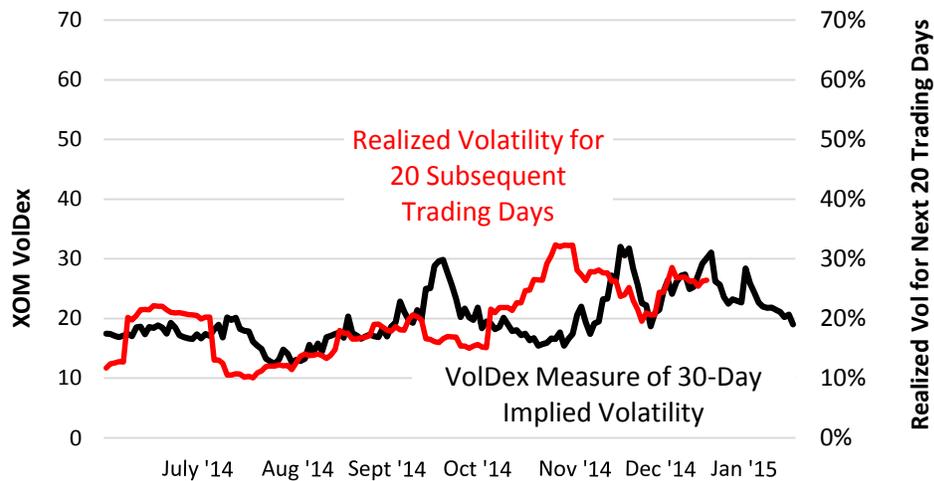


Source: Bloomberg and NationsShares

It would appear that subsequent realized volatility was greater than implied volatility for the same period more often than was the case for USO and that this pricing regime was more persistent.

We look at the same data for XOM in Figure 5.

**Figure 5. XOM VolDex and Realized Volatility**



Source: Bloomberg and NationsShares

It would appear that XOM option market makers did a better job of pricing options than market makers in XLE, as measured by the volatility risk premium.

Let's examine the volatility risk premium for each asset during this period. Again, we calculate the closing 30 calendar day implied volatility and for the same date we calculate the subsequent realized volatility for the next twenty trading days.

	USO	XLE	XOM
Average Implied Volatility	26.96%	21.41%	19.64%
Average 20-Day Realized Volatility	30.51%	24.18%	19.66%
Average Daily Volatility Risk Premium (VRP)	-372 BPS	-209 BPS	-10 BPS
Median VRP	-93 BPS	-201 BPS	+20 BPS
Maximum VRP	1471 BPS (Oct 14, 2014)	1111 BPS (Oct 14, 2014)	1365 BPS (Oct 14, 2014)
Minimum VRP	-2275 BPS (Nov 20, 2014)	-1685 BPS (Nov 24, 2014)	-1682 BPS (Nov 24, 2014)
Days Implied Vol was Below Subsequent Realized Vol (in Percent)	55.71%	64.29%	47.14%

Row one, the Average Implied Volatility, is the daily closing VolDex measurement of implied volatility for options on the relevant ETF. Row two, the Average 20-Day Realized Volatility, is the annualized realized volatility for the next twenty trading days at each day's close. Row three, the Average Daily Volatility Risk Premium, is the average of the volatility risk premium for each day. Because of this, the Average Daily Volatility Risk Premium isn't equal to row one minus row two.

While the average volatility risk premium (the difference between what the options cost and what they were ultimately worth) was higher for USO options, the median VRP for USO options was substantially lower than the median VRP of XLE options and USO implied volatility was below subsequent realized volatility fewer days than it was for XLE. This is despite the fact that USO realized volatility was substantially higher and increased 612 percent from June 25, 2014 to its highest level (71.5 percent on January 9, 2015) while XLE realized volatility increased by just 241 percent during that period.

The average volatility risk premium for XOM options was substantially higher than for USO or XLE and the median VRP was actually positive (implied volatility was greater than realized volatility). Why were option market makers so much better at pricing options in XOM and why were they better at pricing options in USO than in XLE?

The absolute level of either realized or implied volatility doesn't seem to be the answer. The most volatile vehicle (USO) had option prices that were more appropriate than a vehicle that was less volatile (XLE) and the least volatile vehicle (XOM) had options prices that were more appropriate than a vehicle that was more volatile (XLE).

XLE is the only diversified vehicle among the three we're examining. Are option market makers fooled by hoped-for diversification in a product like XLE which contains 44 different stocks in a variety of energy related roles including production, refining, oilfield services, and exploration and development across both crude oil and natural gas? It would seem they are. The seven largest components of XLE make up just over 50 percent of its market capitalization. From June 25, 2013 to February 13, 2014, the year-

earlier period to the period we’re examining, the weighted correlation of these seven stocks to USO was 30.23 percent. During the year-later period we’re examining the weighted correlation was 56.66 percent. The correlation of XLE’s components to changes in the price of crude oil had nearly doubled. And the correlation of XLE itself to changes in crude oil prices had climbed from 44.41 percent to 66.00 percent.

Stock	Correlation to USO From June 25, 2013 to February 13, 2014	Correlation to USO From June 25, 2014 to February 13, 2015	Increase in Correlation
ExxonMobile (XOM)	23.68%	54.53%	130.27%
Chevron (CVX)	32.52%	58.67%	80.42%
Schlumberger (SLB)	37.88%	63.61%	67.92%
Kinder Morgan (KMI)	11.11%	37.00%	233.00%
EOG Resources (EOG)	44.19%	57.07%	29.15%
ConocoPhillips (COP)	38.88%	62.81%	61.55%
Occidental Petroleum (OXY)	34.74%	61.84%	78.00%

The diversification promised by an index seems to disappear during times of stress as the correlation of changes in asset prices approach one. This seems to make it difficult for option market makers to appropriately price options as they’re accustomed to the volatility dampening effect of diversification. In vehicles like crude oil and single stocks, option market makers have no such expectations and thereby are better able to price options appropriately.

This provides a lesson for all users of options on “diversified” instruments since these instruments tend to lose the advantage of diversification during times of stress as historic correlation regimes end. It specifically offers an opportunity to potential buyers of options on diversified vehicles, whether put buyers for speculation or hedging or call buyers for stock replacement.

## Important Disclosures

Data sources: Bloomberg and NationsShares.

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