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"Formula for success: rise early, work hard, strike oil."
— J. Paul Getty

Currently, oil prices are reacting to risk of a new war in the Middle East. Each headline calling for action against Syria results in increased trading.

Oil futures and options react to news and events as they happen and both markets have been extremely active recently. Despite the risk of a new Middle East conflict, oil futures prices have risen only slightly in August. The oil options market, however, tells a completely different side of the story that cannot be ignored. Market participants express specific views through options that are not possible with futures alone. When used together, the futures and options markets paint a more complete picture of investors' expectations of the unfolding situation.

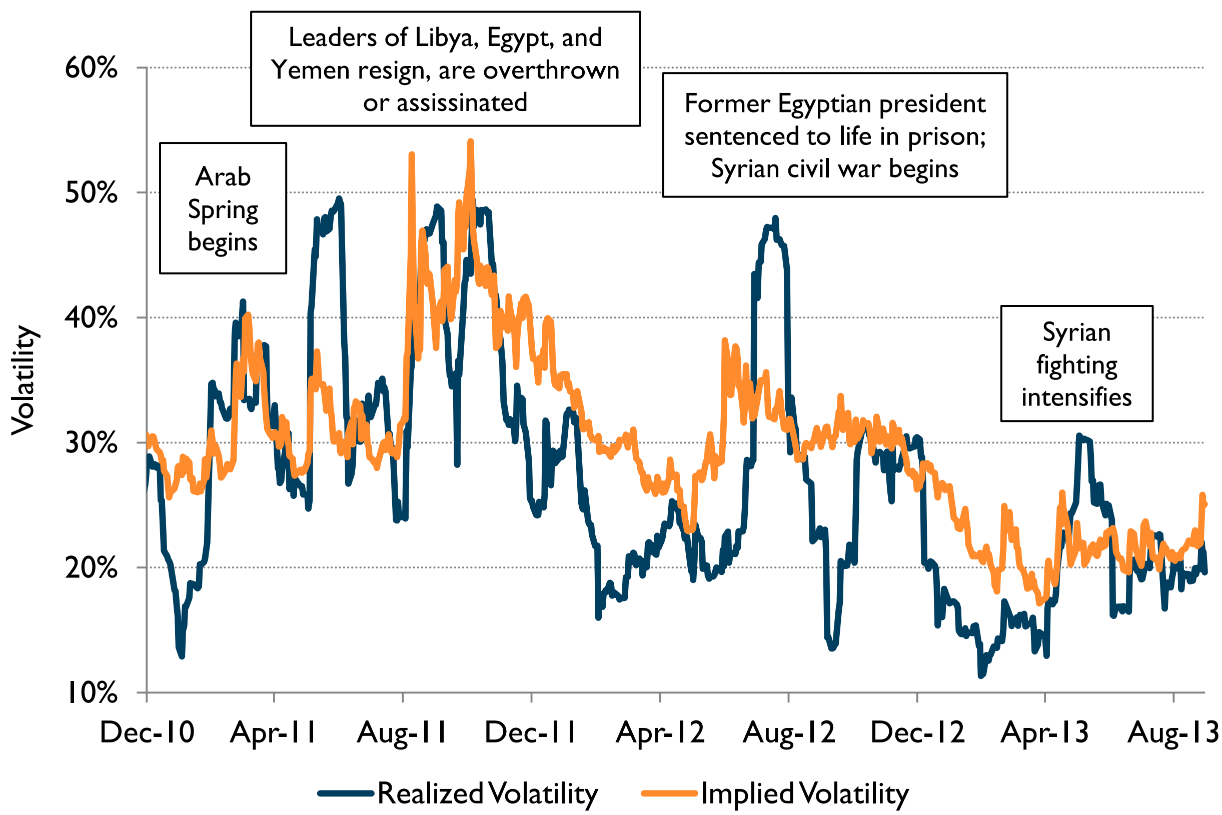

Figure 1: Realized volatility of crude oil front month futures returns using a 21-day window and 2-mo at-the-money (ATM) implied volatility of oil options.

Realized and implied volatility are often used to broadly identify crisis periods. However, despite the real risk of military action against Syria, these volatility measures of crude oil do not yet show signs of panic. Figure 1 above illustrates the spikes in volatility of oil related to the timeline of the Arab Spring. Although volatility has risen slightly in August on the recent news, deeper analysis is required to see how fearful the market truly is.

Options can shed light on the market's psychology of an underlying asset. In the same way that S&P 500 options (and the VIX) reflect market sentiment of the U.S. equity market, oil option prices can provide a "fear gauge" for oil investors. It is important, however, to consider the entire volatility curve and not simply the at-the-money (ATM) options.

Supply and demand imbalances, driven by hedgers and speculators, affect prices of out-of-the-money (OTM) options as well as ATM options. These price dynamics can be monitored by looking at the volatility "skew."

A basic measure of skew is calculated using the implied volatility difference between upside calls and downside puts. *Current oil skew levels are signaling maximum risk, high hedging activity and increased risk transfer.* This is a very different message than either the realized volatility or ATM implied volatility seems to indicate.

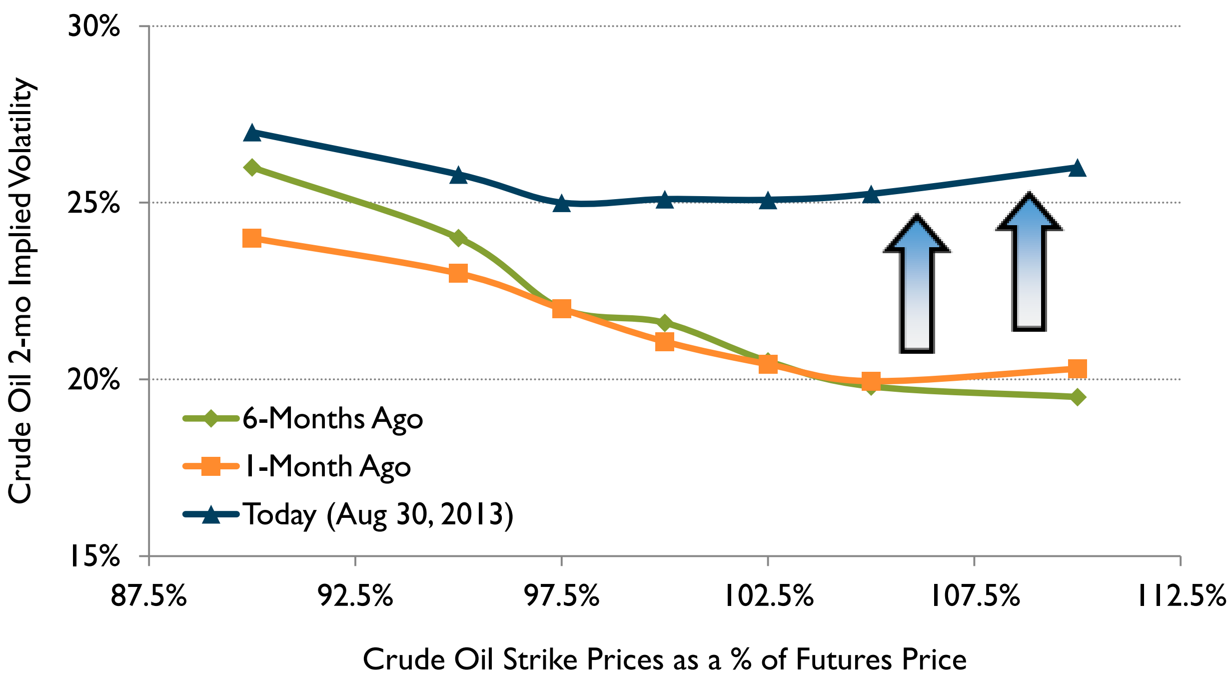

Figure 2: Crude oil option skew snapshots. We look at the implied volatility of oil options at different points in time and across different strike prices.

We know that investors are concerned that the onset of a U.S.-led war in Syria could have repercussions across the globe that could bleed into other asset classes, *but how afraid are they?* And at what cost are they willing to insure against this concern? By measuring the increase of short-dated upside call option prices in oil, we find that the market is betting heavily on an increased risk of a price shock. Figure 2 above illustrates the recent jump in implied volatility of the upside calls due to this increased demand.

This figure indicates the market believes a spike in oil is more probable than it was a month ago. Is the market correctly estimating this increased likelihood? In other words, even if there is a spike in oil, *are the option prices fairly valued?*

Opportunities often present themselves when investors are fearful. While the risk of a price shock in oil remains heightened, investors may be inclined to overbid for upside calls. At the same time, they are *underpricing* the risk that oil could fall by ignoring the downside puts.

We believe options are analogous to insurance policies. Calls and puts at different strike prices represent insurance policies with different deductibles and premiums. One could construct a relative-value trade to attempt to capitalize on the current environment, by selling the expensive insurance (upside call options) and reinsuring it by buying the cheap insurance (downside put options). It is essential to remember, though counterintuitive, that buying puts and delta hedging them can have a similar payoff to buying calls and vice versa. Each payoff can be replicated with the other.

A simplified version of this relative-value trade in oil might look like:

Type	Oil Future	Oil Put Option	Oil Call Option
Side	Long	Long	Short
Multiplier	1,000	1,000	1,000
Quantity	32	100	-100
Expiration	Oct 2013	Oct 2013	Oct 2013
Strike	-	$100	$120
% of Future	100%	91%	109%
Price	$110	$0.80	$0.89
Delta	100%	-15%	-17%
Implied Volatility	-	27%	26%
Vega per Option	-	8.4c	9.2c
$ Vega	-	$8,400	-$9,200
$ Premium	$3,520,000	$80,000	-$89,000
$ Delta Notional	$3,520,000	-$1,650,000	-$1,870,000

Figure 3: An example of a simple skew trade in oil futures options hedged with oil futures.

A critical element of this trade is the long oil futures position. This is the delta hedge, and it must be managed daily in order to "realize" the difference between the cheap and expensive options. We have discussed delta hedging, also known as replication, in prior letters.[1]

What would an investor root for by constructing such a trade? A few outcomes can make this profitable.

1. Fear could subside and the oil option curve may return to its earlier shape like the ones shown in Figure 2. In this case, one might expect the calls sold to decrease in price more than the puts bought.

2. Oil could continue to rally or waffle around in the interim. By delta hedging every day, the investor might profit if the replication cost is less than the net insurance premiums sold versus bought.

3. Oil could collapse or shock downward. The long positions in the underpriced puts could explode in value and the underpriced insurance bought would pay off more than the loss from the underwriting exposure.

What could go wrong with this trade?

1. Fear could intensify and the skew might grow steeper. In this scenario, the calls sold could increase while the puts bought could decrease resulting in a mark-to-market loss. However, delta hedging and offsetting positions keep the risk constrained.

2. Oil could gap higher beyond the market's inflated expectations and the underwritten insurance may underperform the delta-hedging replication.

The stylized example described above illustrates one opportunity in the oil options market. While we do not make trade recommendations, it is important to know that such options strategies are dynamic, requiring frequent hedging and risk management. Option trading necessitates a disciplined process where the risks are well understood before making an investment.

[1] http://lakehillgroup.com/files/Lake_Hill_Capital_Management_September_2012_blog.pdf

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