

June 5, 2014

## The "Message from Markets"

### ENERGY ADVISORY

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In their well-known MBA textbook "Principles of Corporate Finance," Richard Brealey, Stewart Myers and Franklin Allen write:

*"If [financial markets are] efficient, prices impound all available information. Therefore, if we can only learn to read the entrails, security prices can tell us a lot about the future."*

Financial markets in general, and derivative markets in particular, are highly informative. The challenge is:

*What is the "Message from Markets"?  
What are markets telling us about the future?  
How do we use that "message" to make better business decisions?*

In this report, we will seek to interpret what energy markets are telling us about prices, risk and uncertainty in these critical financial markets. We present our quarterly analysis of the risk-return tradeoff in the oil and natgas markets below.

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#### I. The Role of Financial Markets

Financial markets serve numerous roles, amongst them of course the uncoerced exchange of securities. However, in addition to that role, they inadvertently serve a very useful function of conveying to market observers information about the future, the challenge being our ability to elicit and interpret that information.

This "Message from Markets" addresses that latter function regarding the markets for WTI (West Texas Intermediate) and Brent crude-oil futures and option contracts, as well as the markets for natural-gas, traded on the New York Mercantile Exchange (NYMEX). In particular, we focus on the informational content of the futures curves for these contracts as well as their implied volatility (across time and strike price) and their correlation with the equity market. This results in the forecast we produce for oil prices over the next two years.

#### II. Predicting Future Oil Prices

One of the most oft-cited, and frequently hotly debated, questions in financial markets pertains to the spot price of oil: Whither Crude Oil Prices? While there are almost as many answers to this as there are crude-oil analysts, in principle the economic answer revolves around issues of supply and demand.

##### *On the Demand side,*

- *In normal times: Strong demand growth from the developing world, especially Eastern (China) and Southern (India) Asia, combined with economic growth in Europe, Japan and North America*
- *Over the more-recent period, we have experienced severe recessionary conditions in 2008 -- 2009, esp. in the developed world, followed by a still-ongoing recovery*

##### *Conversely, on the Supply side, there exist sources of uncertainty:*

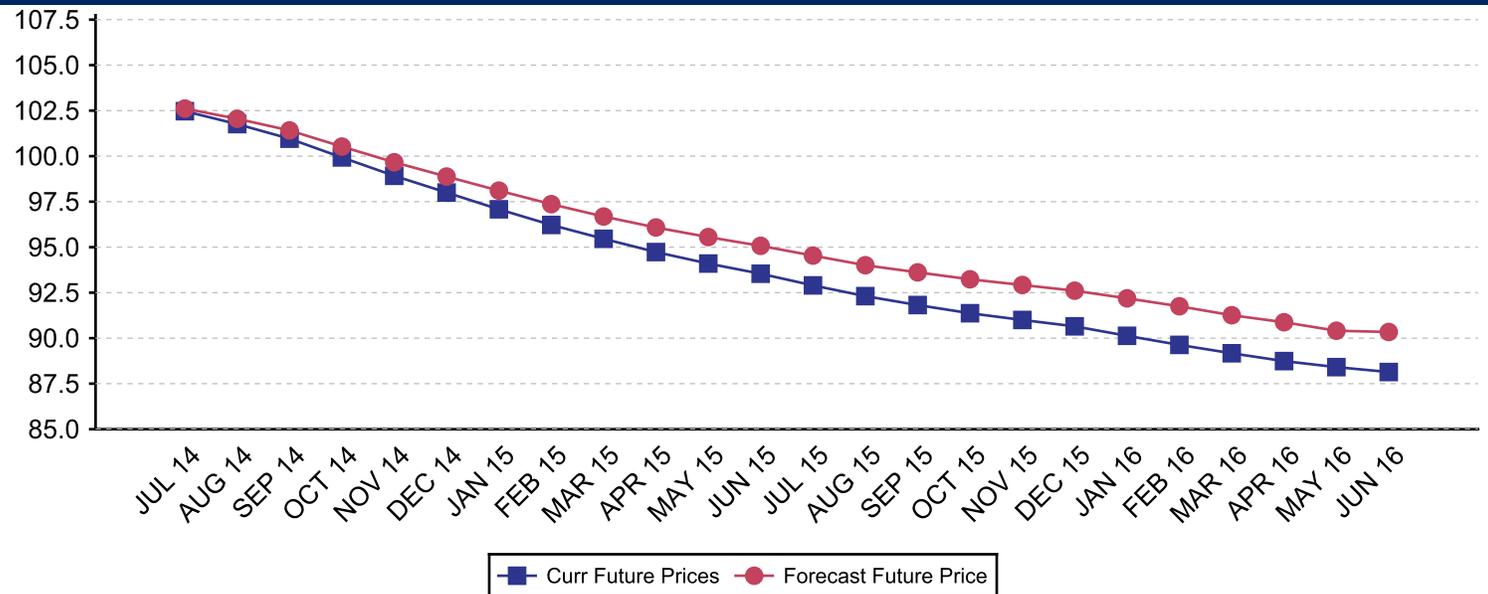
- *Geopolitical: Middle East (Iraq, Iran, North Africa, Eastern Mediterranean), Nigeria, Venezuela*
- *Meteorological: Gulf of Mexico*

To address the issue of future oil prices, we use a proprietary model, based on financial-markets inputs, to generate a "market-based forecast of oil prices."

## OIL PRICE FORECAST

Using a proprietary Guzman model, our market-based forecasts of oil prices, by maturity, are depicted below. In past reports, the quantitative estimate of the risk premium we added to the futures curve essentially caused our price forecasts to “flatten” the curve and resulted in expected future prices approximately equal the spot price. Since July 2013, the futures curve has displayed a strong degree of backwardation not observed since March 2003. Thus, notwithstanding the model-specific risk premium we are adding to the futures curve, our model now predicts a decline in the spot price of oil.

Forecast WTI Prices by Maturity



Source: Bloomberg, Guzman Energy

Crude Price Forecast		
Contract Month	Futures	Forecast Price
JUL 14	102.47	102.61
OCT 14	99.93	100.53
JAN 15	97.08	98.11
APR 15	94.73	96.08
JUL 15	92.90	94.54
OCT 15	91.37	93.23
JAN 16	90.13	92.19
APR 16	88.74	90.88

Crude Price Forecast		
Contract Month	Futures	Forecast Price
AUG 14	101.76	102.05
NOV 14	98.92	99.66
FEB 15	96.22	97.36
MAY 15	94.10	95.55
AUG 15	92.31	94.01
NOV 15	91.00	92.92
FEB 16	89.63	91.75
MAY 16	88.41	90.41

Crude Price Forecast		
Contract Month	Futures	Forecast Price
SEP 14	100.96	101.41
DEC 14	98.00	98.88
MAR 15	95.46	96.68
JUN 15	93.54	95.07
SEP 15	91.82	93.62
DEC 15	90.65	92.61
MAR 16	89.17	91.26
JUN 16	88.14	90.34

Source: Bloomberg, Guzman Energy

## IMPLIED VOLATILITY FROM THE EQUITY MARKET

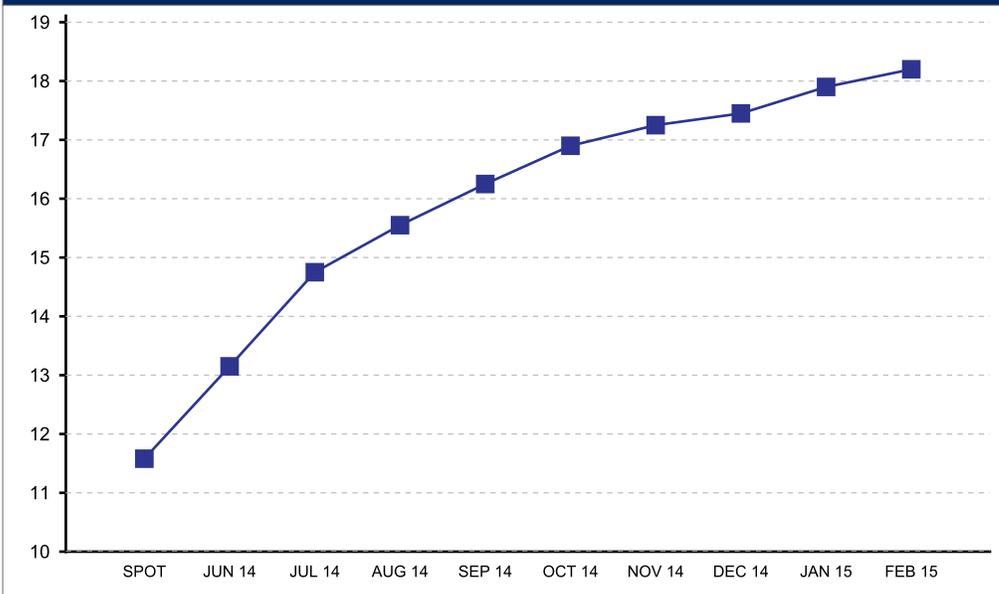
After reaching multi-year lows of 11.30% on 3/14/13, VIX increased as the stock-market exhibited greater turbulence during the recent crisis in Ukraine. As that crisis appears to have abated, VIX closed on 5/27 at the nearby value of 11.51%. The S&P implied-vol term structure by maturity remains upward-sloping, consistent with a market not under duress.

VIX Index Historical Price



Source: Bloomberg, Guzman Energy

VIX Futures Price



Source: Bloomberg, Guzman Energy

VIX Index Term Structure

Ticker	Description	Last Price
VIX Index	SPOT	11.58
UXM4 Index	JUN 14	13.15
UXN4 Index	JUL 14	14.75
UXQ4 Index	AUG 14	15.55
UXU4 Index	SEP 14	16.25
UXV4 Index	OCT 14	16.90
UXX4 Index	NOV 14	17.25
UXZ4 Index	DEC 14	17.45
UXF5 Index	JAN 15	17.90
UXG5 Index	FEB 15	18.20

## IMPLIED VOLATILITY FROM THE OIL MARKET

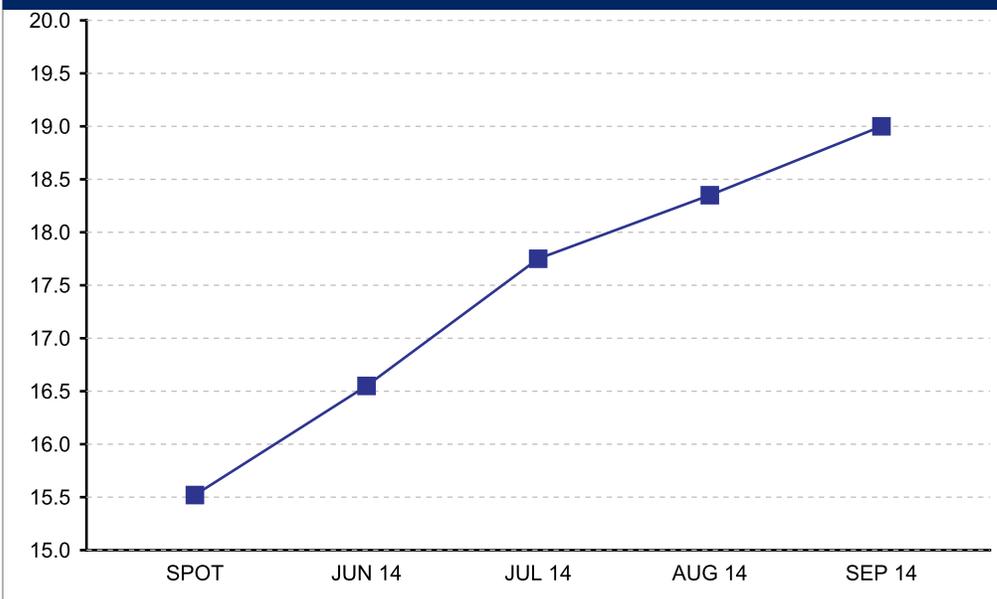
The OVX market itself reached multi-year lows of 15.2% on 12/26/13 and closed marginally higher at 16.1% on 5/27/14. The OVX term structure, its plot by maturity, remains upward-sloping, consistent with a market that is not under duress. Note: In light of the traditional “Samuelson effect” attributed to commodity markets, whereby the vol curve is downward-sloping, this OVX futures market should be interpreted with care: The OVX futures address the forward 30-day vol, not the current vols-to-maturity of oil futures options with increasing time to maturity.

### OVX Index Historical Price



Source: Bloomberg, Guzman Energy

### OVX Futures Price



Source: Bloomberg, Guzman Energy

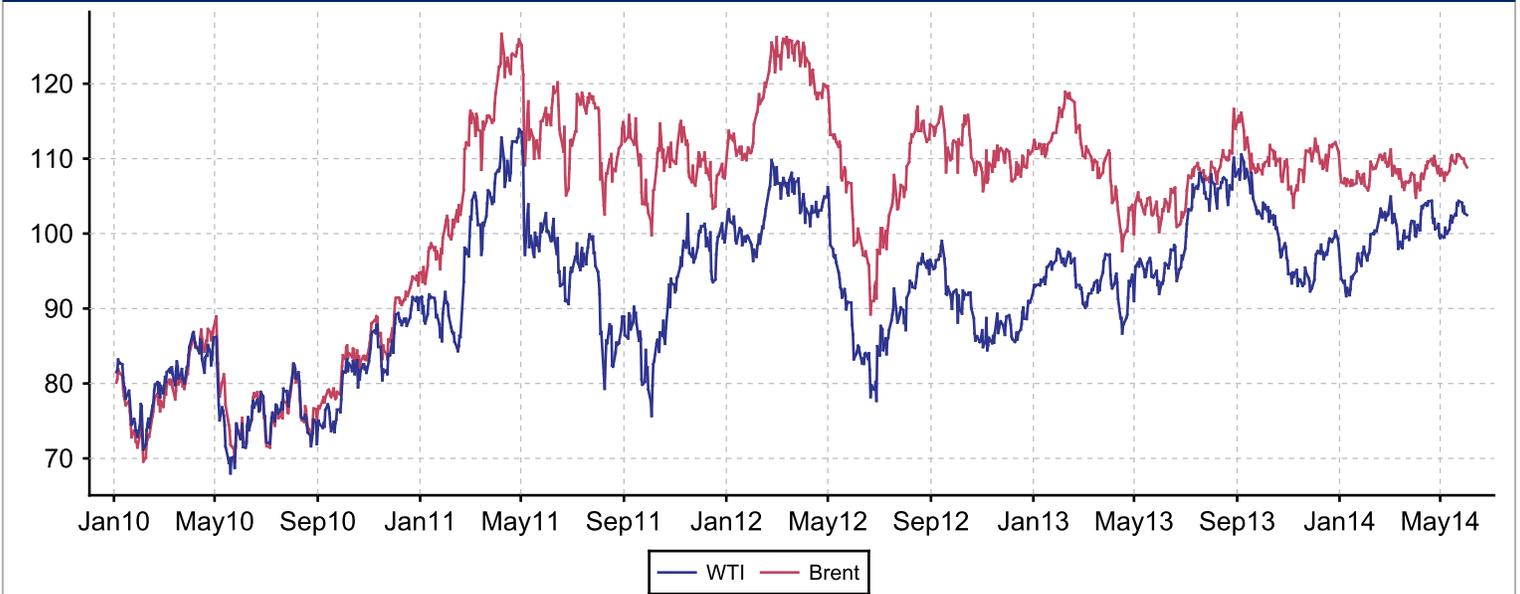
### OVX Index Term Structure

Ticker	Description	Last Price
OVX Index	SPOT	15.52
OVWM4 Index	JUN 14	16.55
OVWN4 Index	JUL 14	17.75
OVWQ4 Index	AUG 14	18.35
OVWU4 Index	SEP 14	19.00

## CRUDE OIL COMMODITY PRICES

Since Sep. 2013, WTI and Brent continue to be relatively range-bound, with Brent in the \$105 - \$110 price range, and WTI \$95 to \$105. See our Forecast Oil Price for our views on future spot prices in the WTI market. Since Feb. 2014, the Brent – WTI spread has declined to single digits, but the market appears to be pricing a widening of the spread to \$10 by April 2015, and \$12 by April 2016. We see the spread between Brent and WTI as an implicit market predictor of the effectiveness of future pipelines in alleviating (outbound pipelines) / exacerbating (inbound pipelines) the current and predicted oil congestion at Cushing.

WTI vs Brent Historical Prices



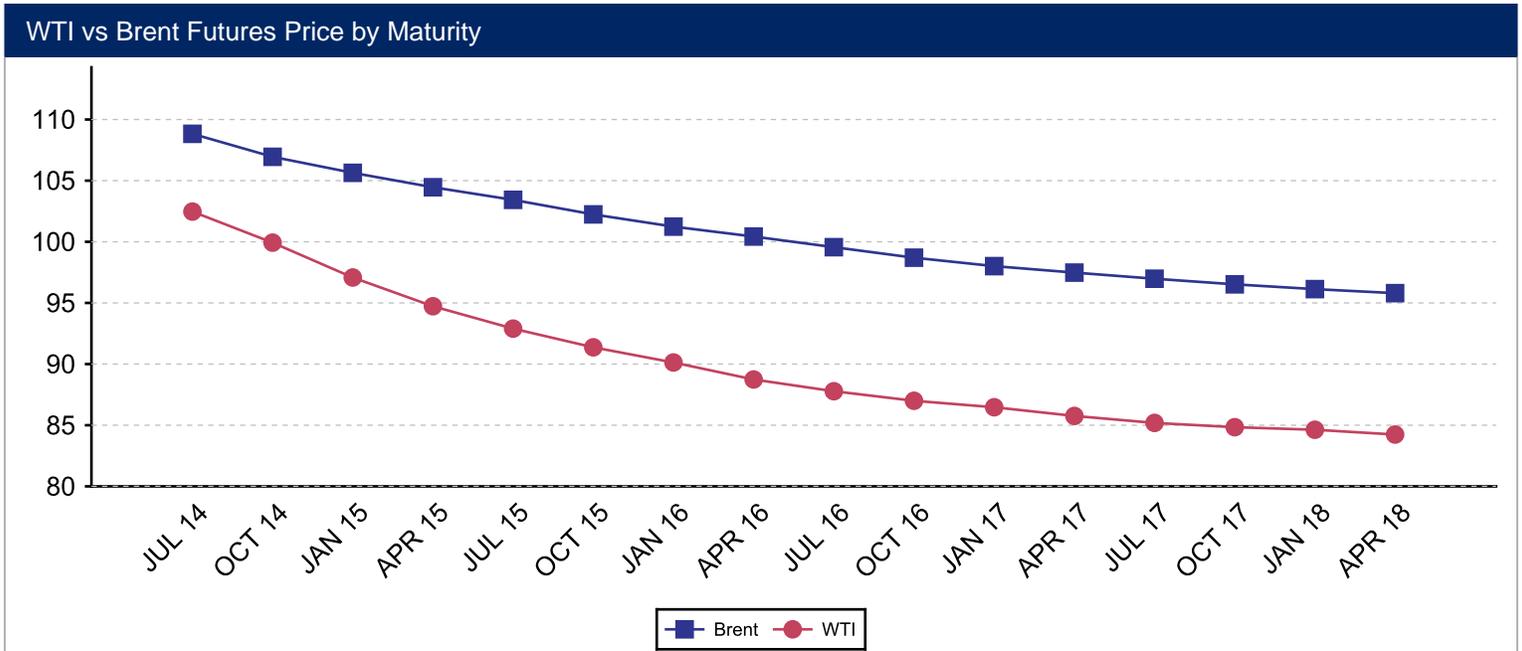
Source: Bloomberg, Guzman Energy

WTI vs Brent Price Spread

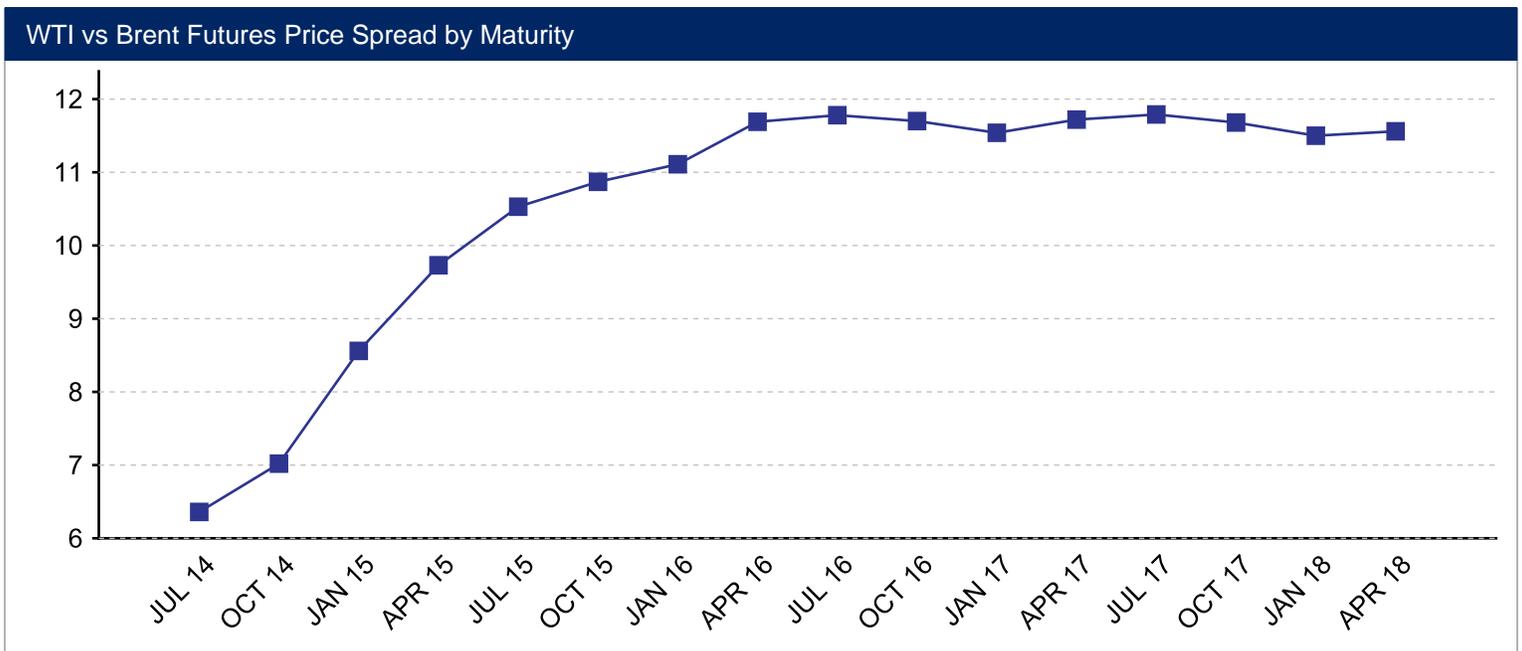


Source: Bloomberg, Guzman Energy

## CRUDE OIL COMMODITY PRICES - TERM STRUCTURE



Source: Bloomberg, Guzman Energy



Source: Bloomberg, Guzman Energy

## WTI vs. SPX

The correlation between rates of return on WTI and the U. S. stock market (S&P 500) is indicative of whether the current drivers are demand-side (positive correlation) or supply-side (negative correlation). The two recent supply-side effects were the Syrian crisis of the Fall of 2013 and the recent Ukrainian crisis. The Arab Spring of 2011 was another episode of negative correlations signaling a supply-side crisis. With the apparent passage of the Ukrainian crisis, for the time being, the positive correlation, which has predominated since the onset of the financial crisis in mid-2008, resumed in mid-May 2011. We believe the implication of a positive correlation is spot oil prices will come in above the current prices of their futures contracts.



Source: Bloomberg, Guzman Energy

## REFINING SPREAD

We proxy for the refining spread in NY harbor by computing the difference between refined gasoline in NY and the price of Brent (rather than WTI). Accordingly, the refining spread has stabilized at \$15 effective 2/20/14.

Refining Spread = HUCL - ( Brent - WTI ) = Refined Gasoline - WTI - ( Brent - WTI ) = Refined Gasoline - Brent



Source: Bloomberg, Guzman Energy

## NATURAL GAS PRICE

Natural gas spot prices have been buffeted by the “polar vortex” winter of 2013 – 2014:

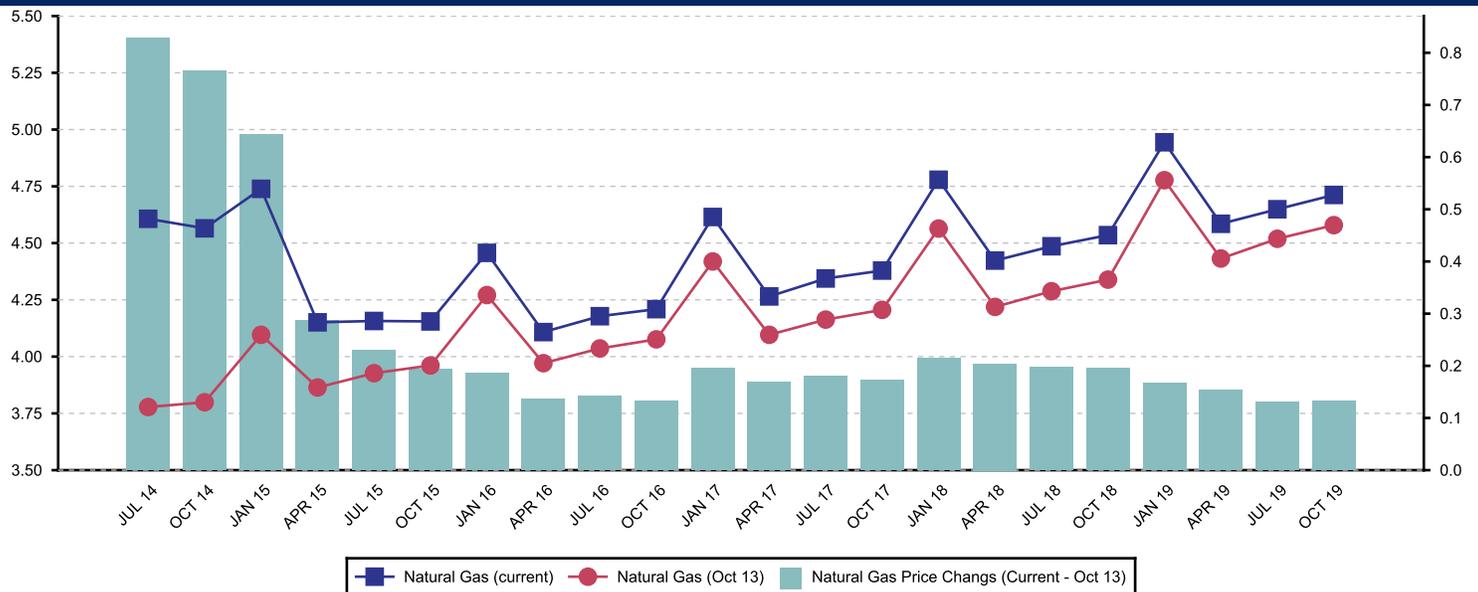
- Prompt-month futures prices spiked to \$6.149 in Feb. they have now restabilized at \$4.50, which is a full dollar above their levels in the early part of last fall.
- The futures curve has undergone a pronounced transformation since last Oct.: Whereas the sharp winter and natgas storage depletions have unsurprisingly brought the short end of the curve up by as much as 75 cents, the long end has declined by roughly the same magnitude. As a result, the natgas futures curve remains upward-sloping, but at a significantly lower slope.

### Natural Gas Historical Price



Source: Bloomberg, Guzman Energy

### Natural Gas Futures Price by Maturity



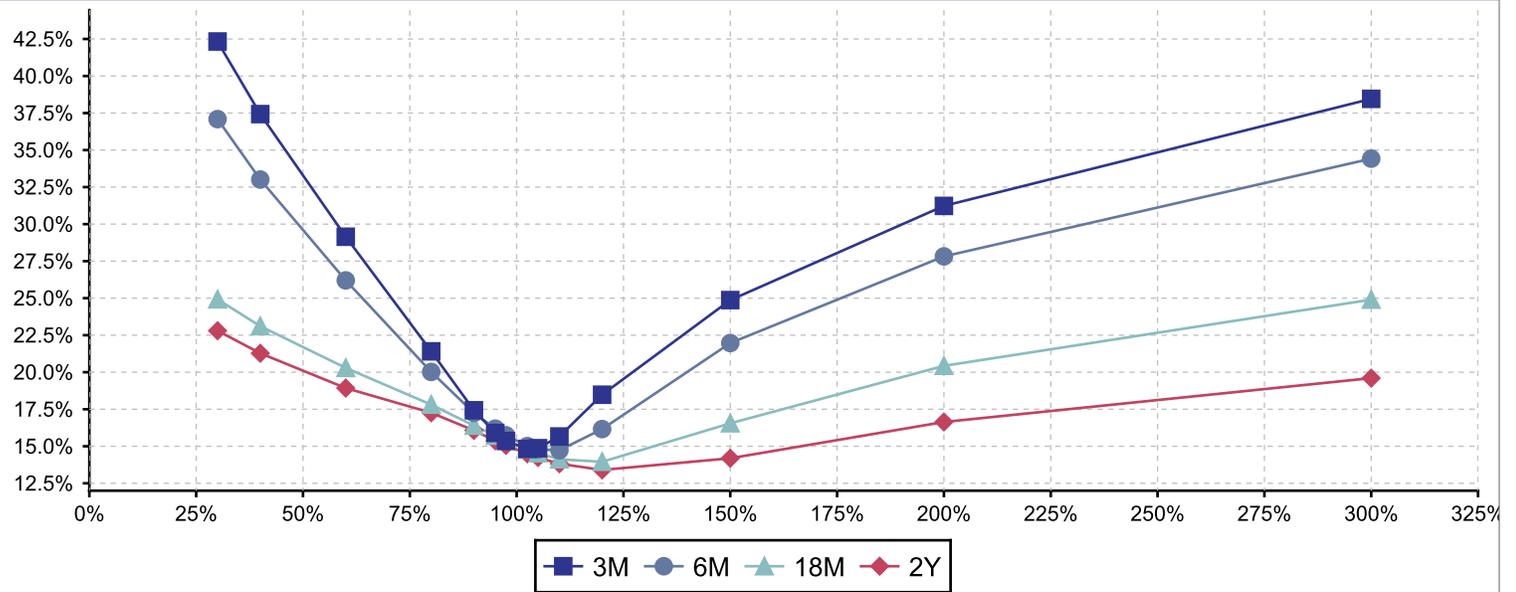
Source: Bloomberg, Guzman Energy

## VOLATILITY SMILES OF CRUDE-OIL AND NATGAS PRICES

Volatility smiles depict for a given expiration date, the Black (1976) implied-volatility by strike price. Known as the vol “skew,” for short and intermediate-term expirations for crude oil or natural gas, the volatility smiles reflect market concerns regarding price spikes or crashes.

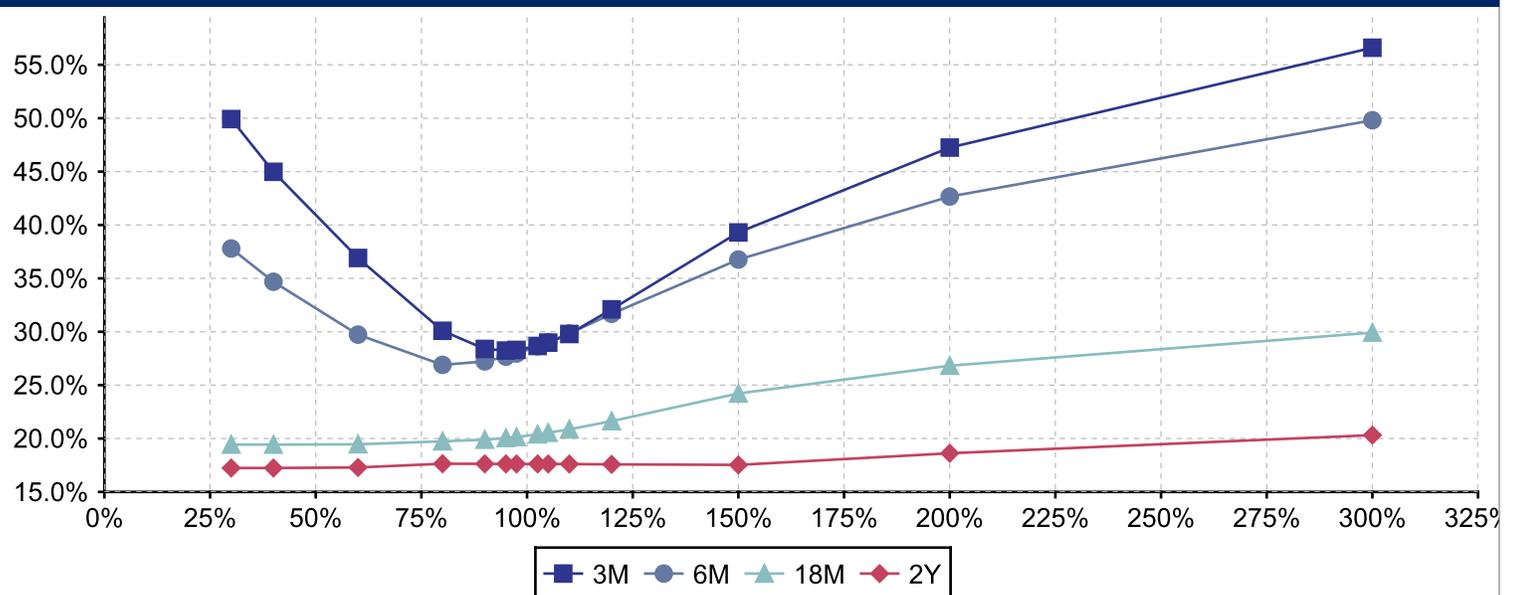
Note at the two-year expiration, the natgas vol skew “flattens out” significantly more than the comparable-expiration oil skew.

### Volatility Smiles of Crude Oil



Source: Bloomberg, Guzman Energy

### Volatility Smiles of Natural Gas



Source: Bloomberg, Guzman Energy

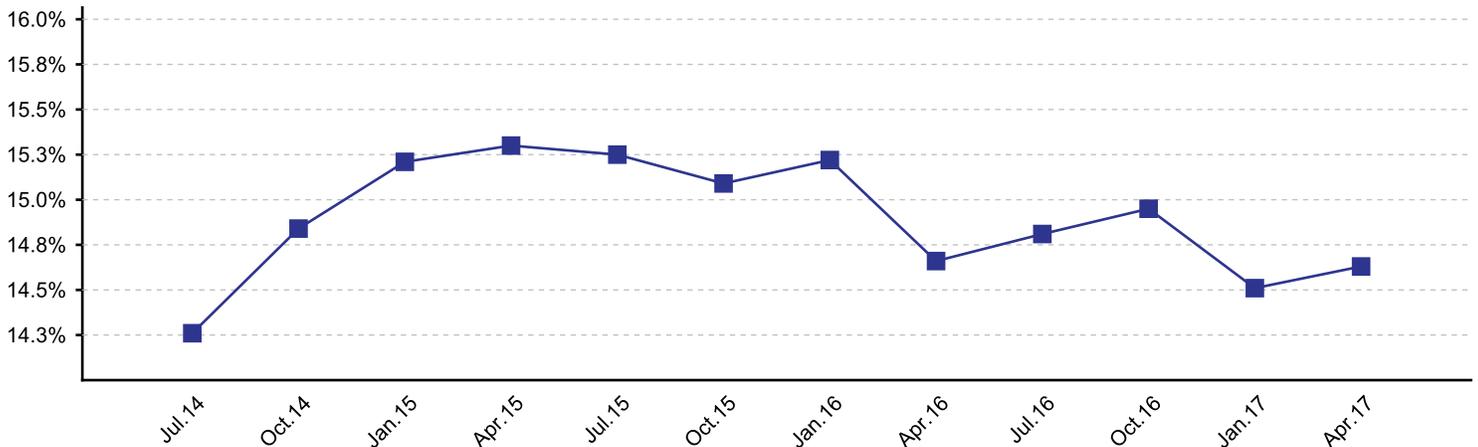
## VOLATILITY TERM STRUCTURES OF CRUDE-OIL AND NATGAS PRICES

The term structure of volatility (TSOV) for oil depicts the annualized volatility, by maturity, implicit in options on crude-oil futures contracts. At this point in time, it is not monotonically downward-sloping, as there is an initial rise for the first twelve months. This is a phenomenon we occasionally observe during periods of low volatility. Subsequently, beyond Oct. 2015, we observe a manifestation of the so-called “Samuelson effect”: The vols for short-dated maturities exceed those of longer-dated options. Intuitively, there is less information on longer-dated futures contracts, and so those tend to be less volatile than short-dated futures on which there is an abundance of market-moving information.

While the results are magnified due to the relatively short span of vols depicted in this graph, we observe a sharp decline until May 2016 before a “return” to a smoother vol TSOV.

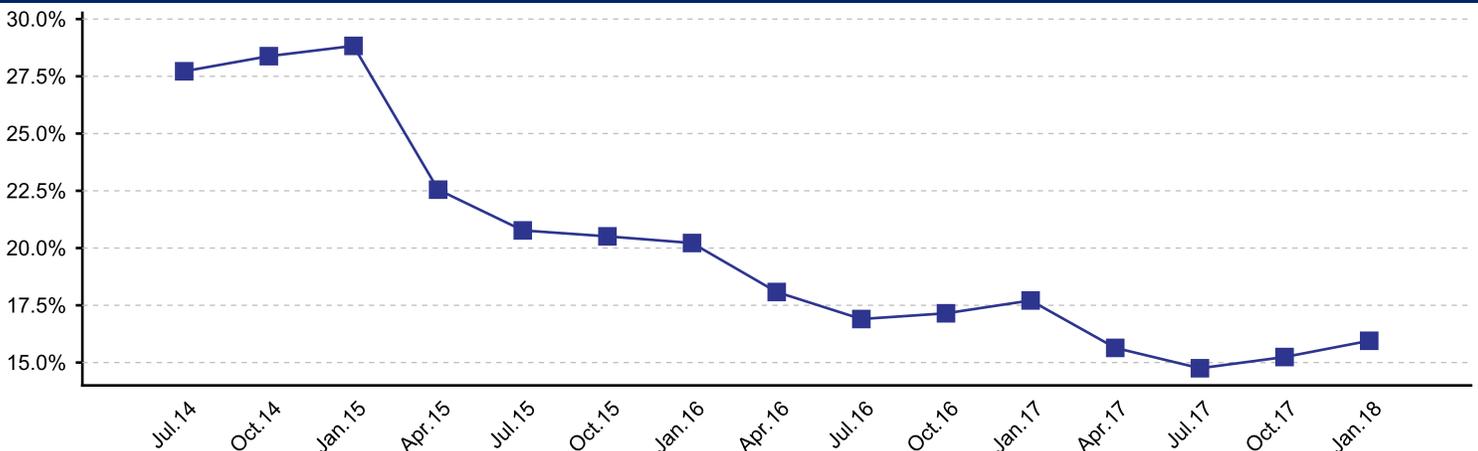
Possibly reflecting concerns over a repeat of last-year’s harsh winter, we see a similar rise in the natgas TSOV until March 2015. Beyond that point, the Samuelson effect kicks in. In addition to the Samuelson effect, the natgas term structure of volatility displays some seasonality effects as well as the critical March – April separation. The latter is the transition point between the last winter consumption month (March) and the first next-winter injection month (April), and has important volatility-reducing effects for April relative to its preceding March.

### Volatility Term Structures of Crude Oil



Source: Bloomberg, Guzman Energy

### Volatility Term Structures of Natural Gas



Source: Bloomberg, Guzman Energy

## ABOUT GUZMAN ENERGY

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Guzman Energy was formed as a result of the merger of Guzman Financial Engineers and Guzman Power Markets, both portfolio operating businesses of Guzman, Inc. Guzman Energy is designed to leverage the unmatched analytical and quantitative capabilities of Guzman Financial Engineers with the practical energy market knowledge and expertise of Guzman Power Markets. Around this premise we have built a world class team whose focus is to provide practical and useful advice based on the most sophisticated analysis, using a wide range of analytical approaches and available financial instruments, in a way that is clear and executable for a wide range of clients.

Guzman Energy conducts its business through four practice areas: Energy & Environmental Trading, Energy Marketing & Origination, Energy Hedging & Risk Management, and Project Finance & Advisory. We are registered with FERC as a wholesale public utility and are registered as Scheduling Coordinators & equivalent in CAISO, ERCOT, PJM & MISO.

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