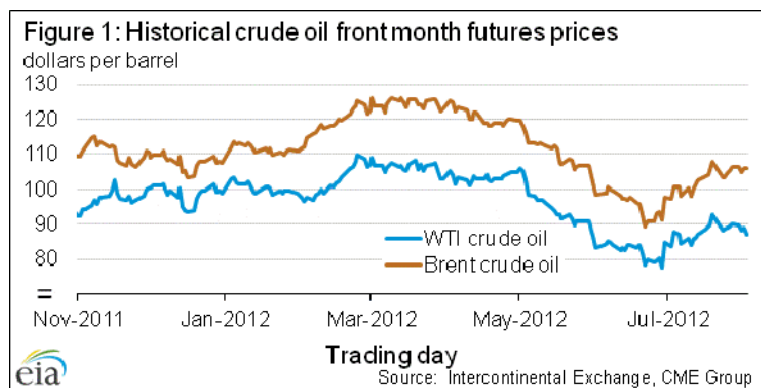


## Short-Term Energy Outlook Market Prices and Uncertainty Report<sup>1</sup>

### Crude Oil

**Prices:** July crude oil futures prices showed the largest monthly rise in prices since February of this year. The Brent and WTI crude oil benchmarks settled at \$105.90 and \$87.13 per barrel, respectively, on August 2, with Brent increasing \$8.56 per barrel and WTI increasing by \$3.38 per barrel since July 2 (**Figure 1**). Brent crude oil prices are currently just below the level that they ended the 2011 year at while WTI is \$12 below its settle price on December 30, 2011.

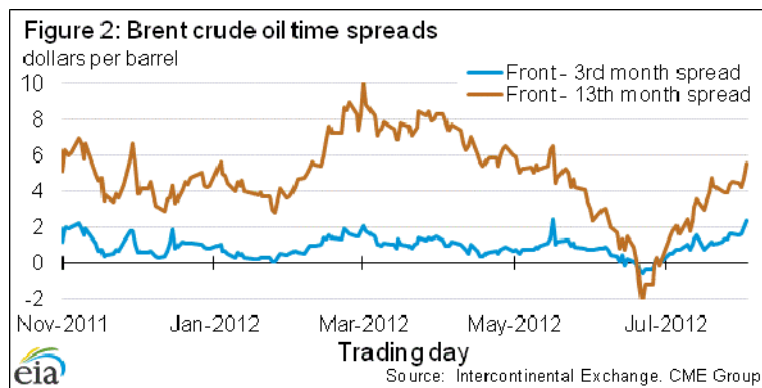


Positive news for economic growth and several supply side factors contributed to higher oil prices during July. At the beginning of the month, the Central Bank of China reduced interest rates by a quarter of a percent and lowered capital requirements for banks in order to encourage lending and spur economic growth. Additionally, the U.S. economy added 163 thousand jobs last month, likely helping to support higher year over year U.S. gasoline consumption and improving expectations for U.S. petroleum product consumption in the near future. On the supply side, Saudi Arabia has continued to produce below the 10 million barrel per day peak achieved earlier this year while economic sanctions in Iran and increased violence in Syria have also contributed to a tighter world oil market.

<sup>1</sup> This is a regular monthly companion to the EIA Short-Term Energy Outlook (<http://www.eia.gov/forecasts/steo/>)

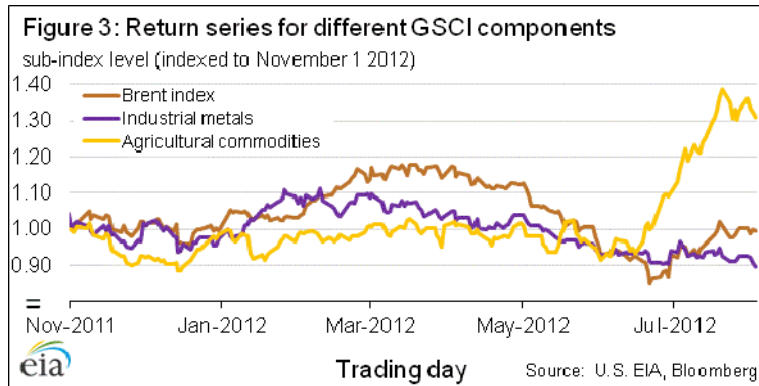
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The Brent futures curve moved further into backwardation (when current futures prices are greater than farther dated prices) during the month of July. The difference between the front and 3<sup>rd</sup> month contracts increased by \$1.91 dollars per barrel from July 2 to August 2 and the front minus 13<sup>th</sup> month spread increased by \$4.14 per barrel over the same time period (**Figure 2**). The increase in these two spreads is consistent with estimates that crude oil is currently being drawn from inventories and will continue to do so for the rest of the third quarter of 2012. The backwardation in the first three months is now steeper than the backwardation in months 4 through 13 suggesting that the tight oil market conditions may loosen during the fourth quarter of 2012.

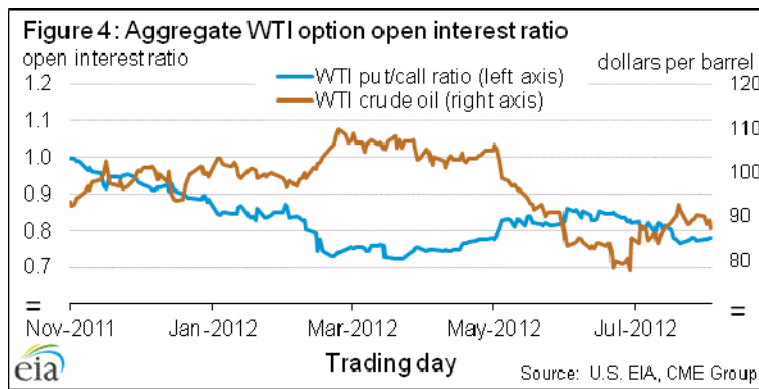


**Crude oil and other commodities:** The Brent component of the S&P Goldman Sachs Commodity Index (GSCI) increased by 8 percent from July 1 to August 2, and the non-energy component of the GSCI also increased. In the past, this report has used the Energy and Non-Energy components of the GSCI to compare crude oil price movements against changes in other commodity prices. When the two measures move similarly, it usually indicates changes in expectations for future economic growth. Over the last month, the Energy and Non-Energy components showed similar percent increases but when the returns of Brent, industrial metals and agricultural commodities are separated out, it shows that changing expectations for economic growth may not have been the driving force for prices in the last month.

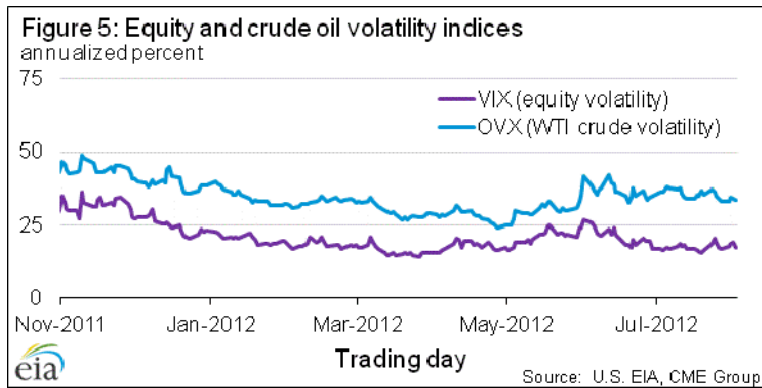
Industrial metals usually have a high correlation with crude oil prices because both are usually related to expectations of future economic growth. In July, industrial metals prices decreased by 4 percent (**Figure 3**) despite the increase in crude oil prices. The divergence between these two commodity groups likely implies that factors other than demand expectations may be influencing oil prices. Similarly, the dramatic increase in agricultural prices, due to the drought in the U.S. Midwest rather than increased demand expectations, was the main reason for the increase in the Non-Energy component of the GSCI over the last month.



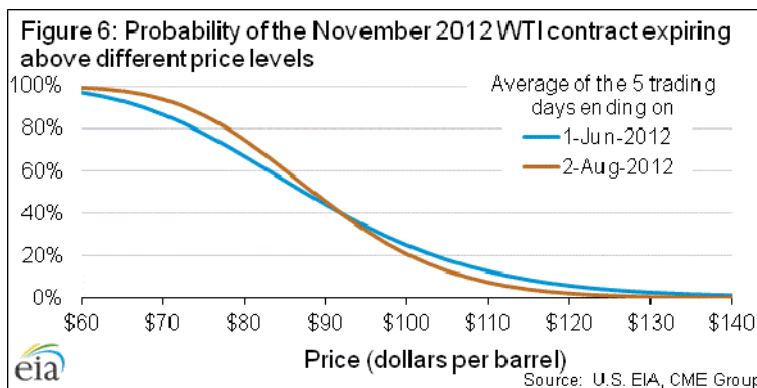
**Option open interest:** The put – call ratio is a broad crude oil market measure that takes the open interest of put options on WTI futures contracts and divides that by the open interest for call options. It provides information about how much more market participants are hedged against or speculating for downward price movements compared to upward price movements. Since July 1, the open interest for put options to call options decreased from 0.82 to 0.78 (Figure 4). The ratio can exhibit a strong negative correlation with the price of the WTI front month futures contract over short time periods because margin requirement can force traders to trade out of option positions rather than put up additional capital.



**Volatility:** The VIX and OVX are tradable indices that measure implied volatility for the S&P 500 and WTI crude oil, respectively, for 30 days in the future. The OVX index is consistently elevated compared to the VIX since, as a single commodity, crude oil price movements tend to be more volatile than the S&P 500, a diversified index of 500 stocks. From January through June of 2012, the OVX, on average, was 12.9 percentage points higher than the VIX. In the month of July, the spread averaged 17.8 percentage points (Figure 5). The elevated uncertainty in crude oil markets relative to equity markets is another sign that concerns over supplies and geopolitical risks in oil producing countries may have contributed to the rise in oil prices seen in the last month.



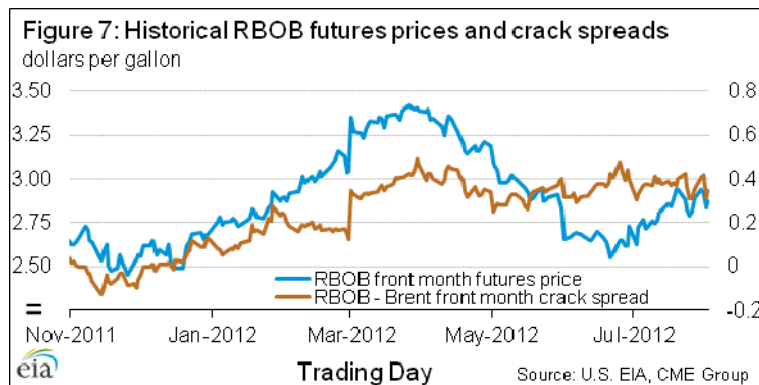
**Market Derived Probabilities:** The probability of the November 2012 WTI futures contract expiring above \$100 per barrel is now 21 percent, a 4 percentage point decrease from the five day period ending June 1 (**Figure 6**).<sup>2</sup> The average price and implied volatility of WTI crude oil for November delivery for the five days ending August 2 is relatively unchanged since June 1, meaning that the drop in the probability of exceeding \$100 per barrel at expiration was due to the decrease in time to expiration. Given the higher absolute level of Brent prices relative to WTI prices, the probabilities that the October Brent contract will exceed specified dollar thresholds are higher.



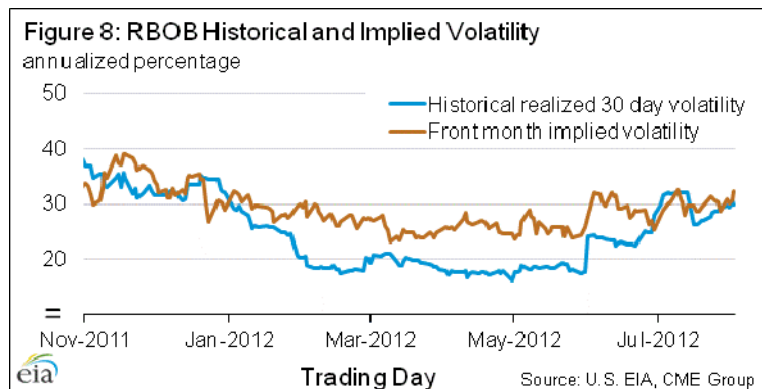
<sup>2</sup> These probabilities are based on the cumulative normal densities derived from market expectations using futures and options prices. See Appendices I and II of EIA's October 2009 [Energy Price Volatility and Forecast Uncertainty](#) article for discussion on how these probabilities are derived.

## Gasoline

**Prices:** Futures prices for New York Harbor Reformulated Blendstock for Oxygenate Blending (RBOB) gasoline moved higher during the month of July. The front month futures price increased from \$2.62 per gallon on July 2 to \$2.87 per gallon on August 2 (**Figure 7**). Over the same time period, the RBOB – Brent crack spread was relatively constant, indicating that the rise in cost of gasoline was largely due to the rise in cost of crude oil and not because of issues specifically related to the gasoline market. The crack spread settled at \$0.35 per gallon on August 2, an increase of \$0.04 per gallon since July 2.

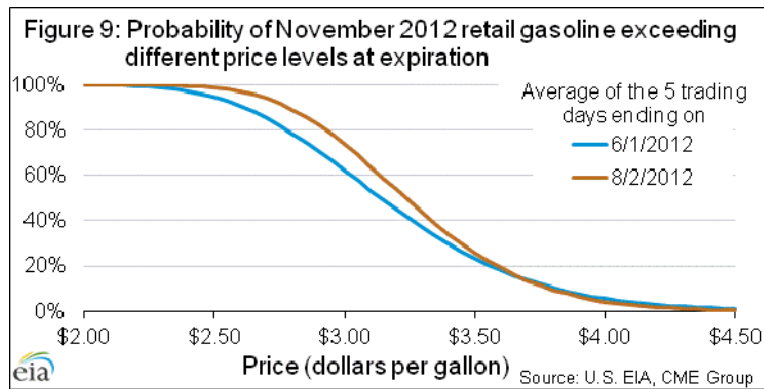


**Volatility:** Historical volatility for the front month RBOB futures contract was flat during the month of July while implied volatility increased. 30 day historical volatility was 30 percent on August 2, an increase of only 0.1 percentage points since July 2, and implied volatility settled at 32.4 percent on August 2, an increase of 4 percentage points over the last month (**Figure 8**).



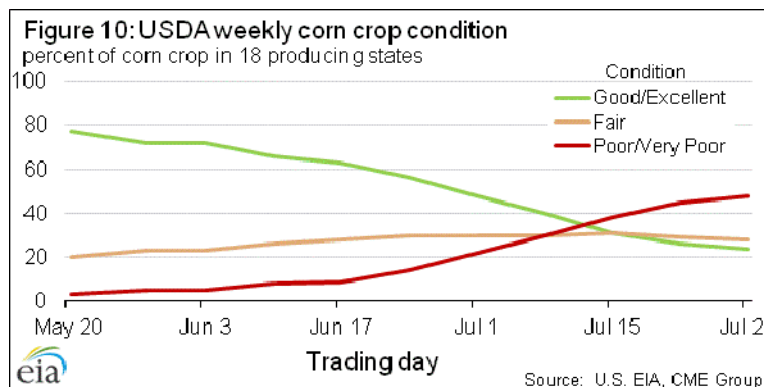
**Market Derived Probabilities:** The November 2012 RBOB futures contract averaged \$2.56 for the five trading days ending August 2 and has a probability of exceeding \$2.80 per gallon (\$3.50 retail) at expiration of approximately 26 percent. The same contract as of the five trading days ending June 1 had a probability of exceeding \$3.50 retail of 23 percent. Higher crude oil prices contributed to an increased probability of the

November contract exceeding price levels when compared to market conditions on June 1 (Figure 9).



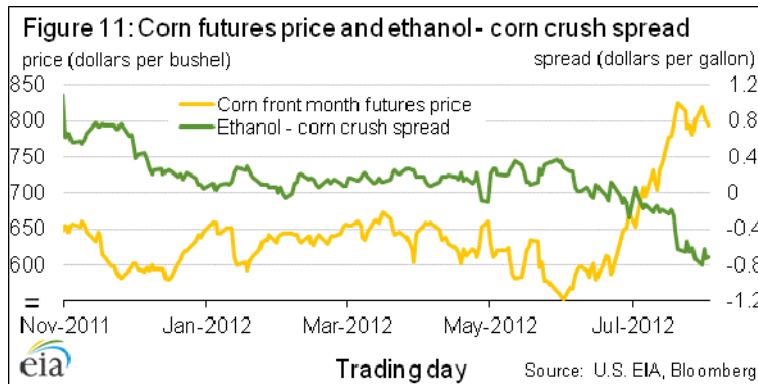
## Corn and Ethanol

**Corn crop conditions:** Drought conditions in Midwestern states have caused a reduction in expectations for the amount of corn that will be harvested in 2012. According to the United States Department of Agriculture’s (USDA) weekly Crop Progress report, the U.S. corn crop in the 18 largest corn-producing states has deteriorated rapidly since the middle of June. The percentage of corn in either poor or very poor condition was 48 percent for the week ending July 29, an increase of 39 percentage points since June 17 (Figure 10).

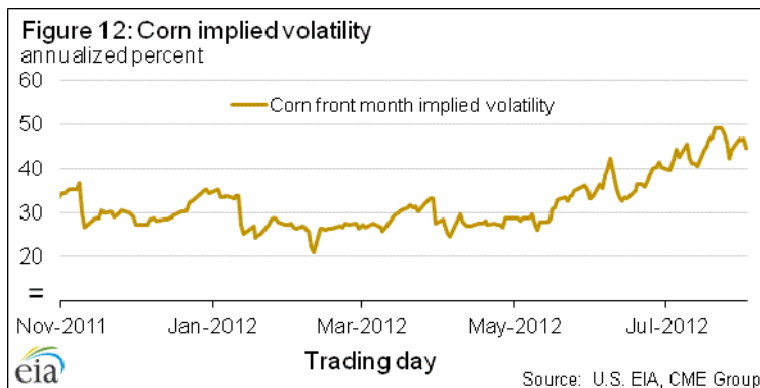


**Prices:** The result of the drought conditions has been a 32 percent increase in the price of corn from June 18 to August 2 (Figure 11). During the same time period, the spread between ethanol and corn prices (the crush spread) has moved down from \$0.01 per gallon to -\$0.71 per gallon, assuming each bushel of corn yields 2.8 gallons of ethanol. This shows how ethanol producers have not been able to pass the additional input costs to blenders. The fact that this spread is negative does not necessarily mean that producers are losing money by making ethanol since the leftover feedstock and other by-products can be sold, but the \$0.72 per gallon drop in the spread since early June has reduced profitability. Because of the decrease in the crush spread, ethanol producers

may already be cutting back on production as July was the lowest month for ethanol production in the last two years, as far back as EIA has been surveying ethanol production.



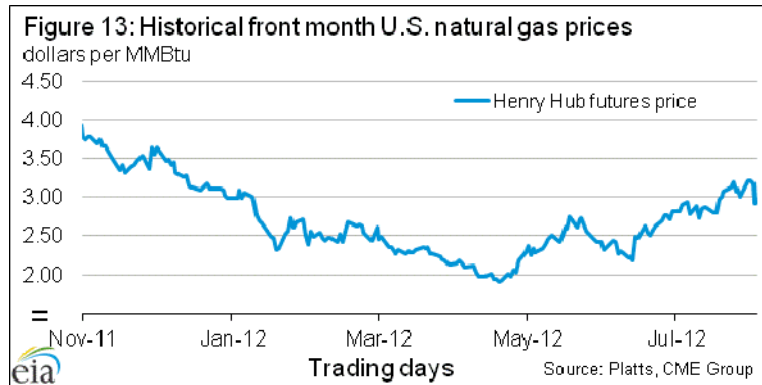
**Volatility:** Implied volatility for corn futures prices has also increased since the middle of June, fitting expectations for a sudden supply disruption. Implied volatility for the front month corn futures contract has increased by 9.8 percentage points since June 18, settling at 44.8 percent on August 2 (**Figure 12**). The increase in price and implied volatility for corn is primarily due to current drought conditions in the U.S. It is similar to the increases seen in crude oil prices and implied volatility during the first quarter of 2011, when a sudden change in supply expectations occurred as a result of the conflict in Libya and elevated geopolitical risks in other oil producing countries.



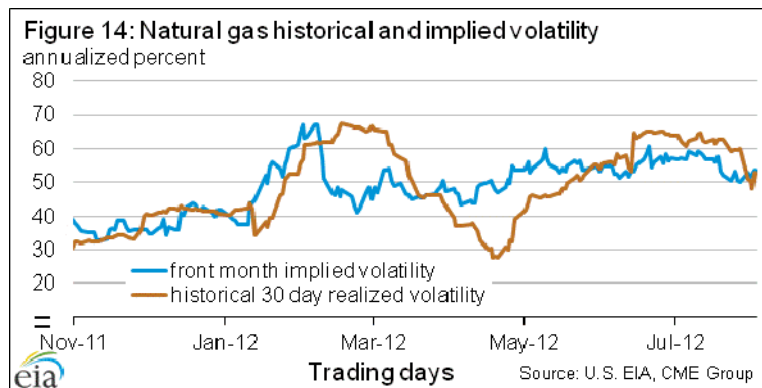
## Natural Gas

**Prices:** The front month futures contract price for delivery of natural gas to Henry Hub in Louisiana rose during the month of July, surpassing \$3.00 per MMBtu on July 20 for the first time since January 2012. The contract settled at \$2.92 per MMBtu on August 2, \$1.24 per MMBtu lower than this time last year, after reaching a 7 month high of \$3.21 per MMBtu on July 30 (**Figure 13**). The drop in price during the week from July 27 to August 2 was due in part to higher than expected inventory builds in that week. Natural

gas inventories for 2012 began to build in late March, starting 50 percent higher than when builds began in early April of last year and 56 percent higher than the five year average. The average storage level for the 5 weeks ending on July 20 was 21percent higher than the 5 week average ending on July 22 of last year. Warm weather may be leading to increased use of natural gas for electric power production, lending support to prices.



**Volatility:** Historical and implied volatility have remained close together, and settled within 1 percentage point of each other on August 2. Historical volatility for the front month natural gas futures contract fell to 53 percent on August 2 from 64 percent on July 2 (**Figure 14**). Implied volatility also moved lower, but less so than historical volatility. Implied volatility moved from 57 to 54 percent, with the majority of the change coming from the middle of the month.



**Market Derived Probabilities:** The probability that the November contract will settle higher than \$3.50 per MMBtu rose by 13 percentage points from 22 to 35 percent when compared to market conditions on the five trading days ending June 1 (**Figure 15**).<sup>3</sup> The average price over the five trading days ending on August 2 for the November 2012

<sup>3</sup>These probabilities are based on the cumulative normal densities derived from market expectations using futures and options prices. See Appendices I and II of EIA’s October 2009 [Energy Price Volatility and Forecast Uncertainty](#) article for discussion on how these probabilities are derived.



natural gas futures contract increased by \$0.39 per MMBtu since June 1. With implied volatility largely unchanged for that contract, the increase in price was mostly responsible for the higher probability of natural gas prices exceeding different price levels compared to market conditions two months ago.

