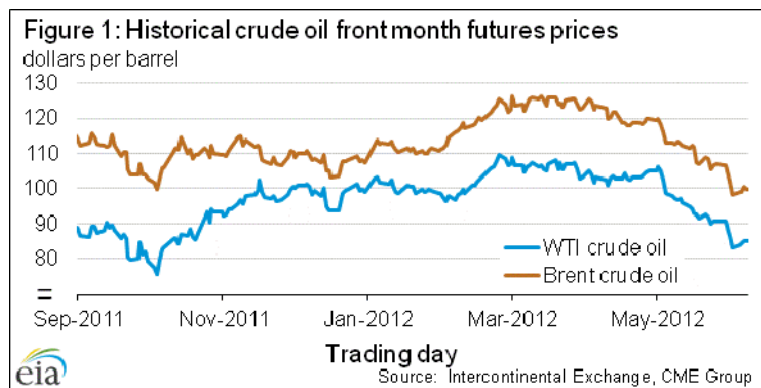




## Short-Term Energy Outlook Market Prices and Uncertainty Report<sup>1</sup>

### Crude Oil

**Prices:** Crude oil futures prices decreased in the month of May with both Brent and WTI currently more than 20 percent below their year to date 2012 peaks. Brent settled at \$99.93 per barrel and WTI settled at \$84.82 per barrel on June 7 (**Figure 1**). The Brent front month contract fell below \$100 per barrel on June 1 for the first time since October 2011. June 1 was only the second trading day that the front Brent month contract settled below \$100 since February of 2011.

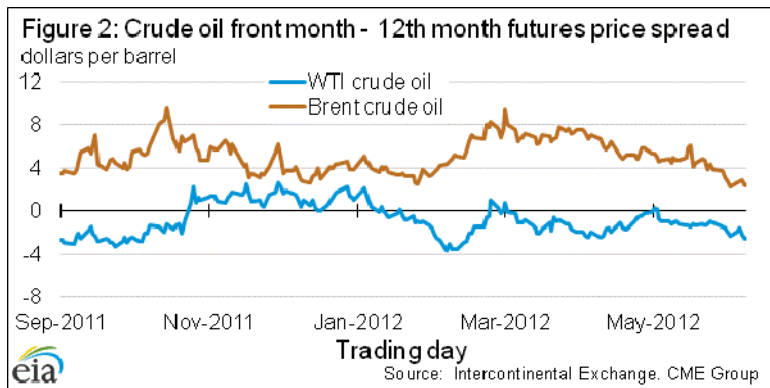


Several factors are currently contributing to lower crude oil prices. Increased oil production from non-OPEC countries, particularly the U.S., have helped offset the ongoing supply disruptions in Sudan, South Sudan, Syria, and Yemen. EIA estimates that global commercial crude oil inventories will end up building by nearly 1.2 million barrels per day in the second quarter of 2012. Falling crude oil prices also reflect increased uncertainty over future global economic growth, particularly for the Eurozone, China, and the U.S., the world's three largest economies.

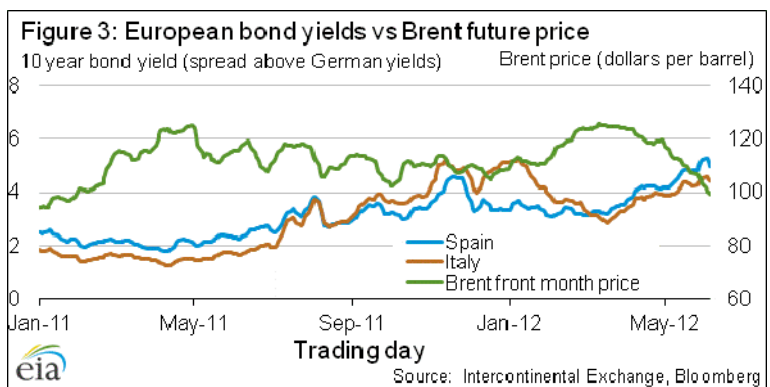
<sup>1</sup> This is a regular monthly companion to the EIA Short-Term Energy Outlook (<http://www.eia.gov/forecasts/steo/>)

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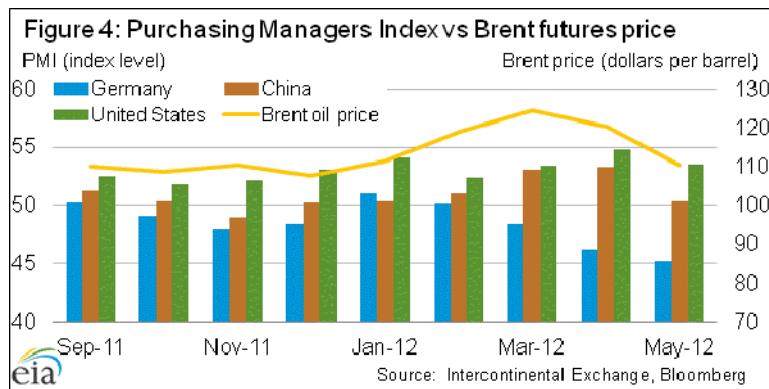
The Brent futures curve remained in backwardation, but the spread between the price of the Brent front month contract and the 12<sup>th</sup> month contract continued its recent downward trend in May. As of market close on June 7, the difference between the two contracts is now \$2.36 per barrel, a decrease of \$3 per barrel since May 1 and breaching the 2012 low reached in January (Figure 2). The increase in price of the 12<sup>th</sup> month contract relative to the front month contract provides less of an incentive for crude oil to be drawn out of inventories now and is a signal that markets are less tight when compared to earlier this year. The WTI futures curve was briefly flat at the beginning of May but has since moved back into contango. The front month – 12<sup>th</sup> month spread for WTI is currently -\$2.56 per barrel.



**Crude Oil and Economic Growth:** The uncertainty created from issues surrounding the economic and financial situation in Europe has lowered expectations for world economic growth, and with that, estimates of future demand for crude oil and petroleum products. One indicator of this uncertainty is the difference in yields of 10 year bonds issued by Germany compared to those issued by Spain and Italy. A wider spread suggests increased concerns over the ability of Spain and Italy to fulfill their debt obligations. The difference between the borrowing costs for Spain and Germany reached a record high of 5.39 percent on May 30, while Italian borrowing costs were 4.67 percent above Germany's on that day, an increase of 0.8 percentage points since May 1 (Figure 3).

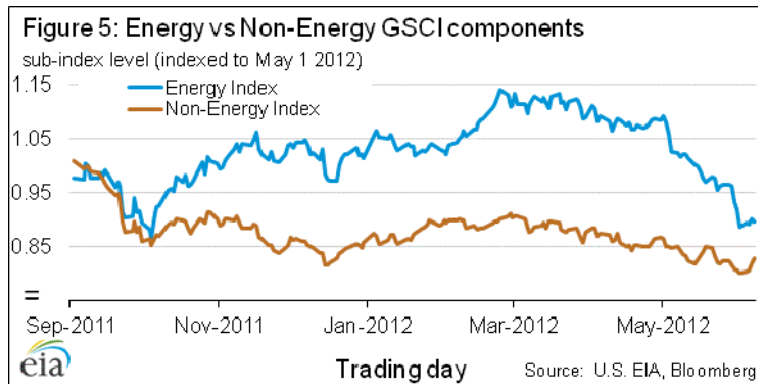


Another concern surrounding the European debt crisis is that a significant slowdown in the European economy could dampen growth in other major economies around the world. The manufacturing Purchasing Managers Index (PMI) is a leading economic indicator that measures whether or not the manufacturing sector for a country is expanding or contracting (a level above 50 indicates expansion and a level below 50 indicates contraction). The manufacturing PMI reading for Germany, the largest economy in the Eurozone, has now contracted every month since March. The latest manufacturing PMI for China showed a decrease of 2.9 points from April to May to 50.4. This may suggest that a slowdown in Europe could be spreading to China and other emerging market economies, which could in turn, significantly affect demand for crude oil and petroleum products (**Figure 4**). In fact, the PMI levels for the U.S., Germany and China were all lower from April to May, the first time this has occurred since September to October of 2011, and has recently put downward pressure on crude oil prices.

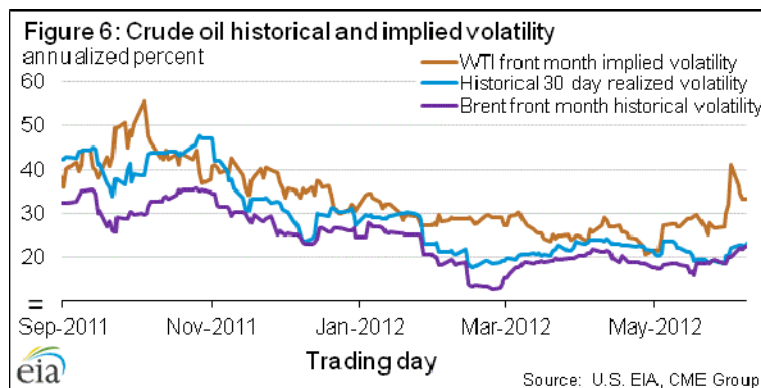


**Crude Oil and other Commodities:** The Goldman Sachs Commodity Index (GCSI) is an index composed of various commodities, weighted by futures market trading volumes and spot market size. It can be broken up into various sub-indices, two of which are energy and non-energy. From May 1 to June 7, the energy portion of the commodity index decreased by 19 percent. Over the same time period, the non-energy sub-index declined by 4 percent (**Figure 5**). The move lower by both energy and non-energy commodities is consistent with the effect of expectations for lower future global economic growth, which would tend to lower demand and prices for all commodities.

Lower growth expectations are likely to affect the energy sub-index more than the non-energy sub-index. The energy portion is heavily weighted toward crude oil, which has a low price responsiveness to supply and demand compared to other commodities, and is also less diversified than the non-energy sub-index. Both factors tend to make the energy sub-index more sensitive to expected changes in demand than the non-energy sub-index. More favorable conditions related to crude oil supplies and inventories may have also contributed to the larger drop in the prices of energy commodities.



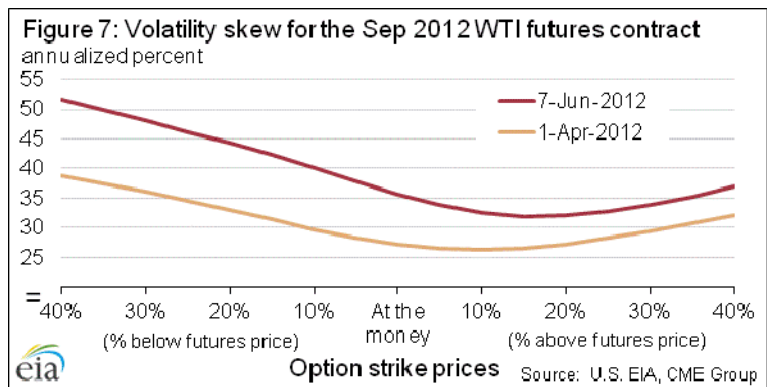
**Volatility:** Implied volatility for WTI increased during the month of May largely due to the rising uncertainty over expectations for future global economic growth. Implied volatility increased from 21.6 percent on May 1 to 33.3 percent on June 7 (**Figure 6**). Historical volatility for both Brent and WTI also increased towards the end of May and into June. Larger daily price movements recently, compared to the daily price movements seen earlier this year, were responsible for pushing up Brent and WTI historical volatility by 2.7 and 5.7 percentage points, respectively, compared to levels on May 1.



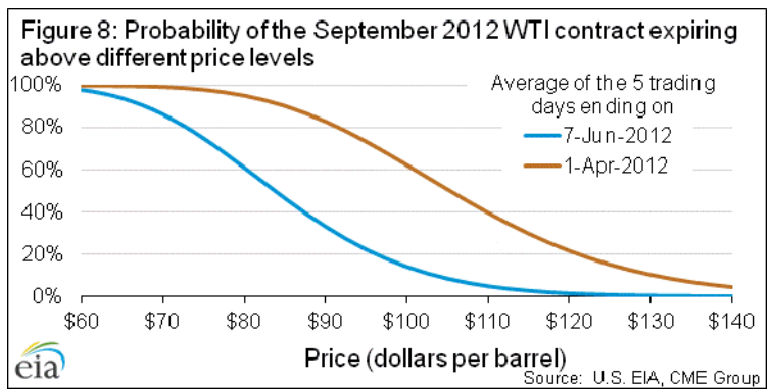
With the increase in implied volatility, the whole volatility skew shifted up but implied volatility, and therefore prices, for out-of-the-money put options, those with strike prices less than the futures price, increased more than out-of-the-money call options. The larger increase in premiums for put options implies that market participants are more concerned with potential future downside price movements compared to conditions on April 1 (**Figure 7**).

When oil prices experience large moves, one must adjust the volatility skew since options that trade close to the futures price, also known as “at the money”, or slightly above will have a lower implied volatility when compared to options that are further away from the futures price. For the five days ending April 1, the September WTI contract averaged \$106.71 dollars per barrel, compared to averaging \$84.87 per barrel for the five days ending June 7. In order to make a better comparison in this situation,

option strike prices were expressed as percent differences from the price of the futures contract.



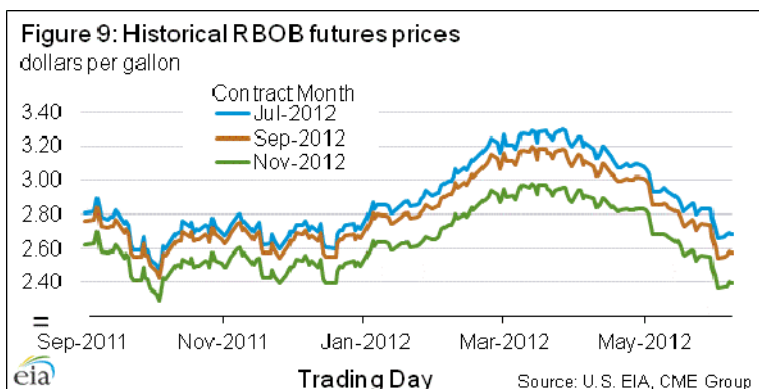
**Market Derived Probabilities:** The probability of the September 2012 WTI futures contract expiring above \$110 per barrel is now 5 percent, a 34 percentage point decrease from the five day period ending April 1 (**Figure 8**)<sup>2</sup>. The average price of WTI crude oil for September delivery for the five days ending June 7 has decreased by \$22 per barrel since May 1, while implied volatility for that contract has increased by 8.5 percentage points. Given the higher absolute level of Brent prices relative to WTI prices, the probabilities that the September Brent contract will exceed specified dollar thresholds are higher.



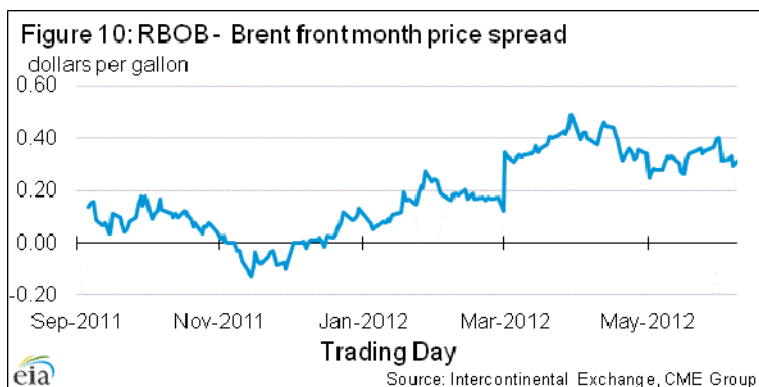
<sup>2</sup> These probabilities are based on the cumulative normal densities derived from market expectations using futures and options prices. (See Appendices I and II of EIA's October 2009 [Energy Price Volatility and Forecast Uncertainty](#) article for discussion on how these probabilities are derived.)

## Gasoline

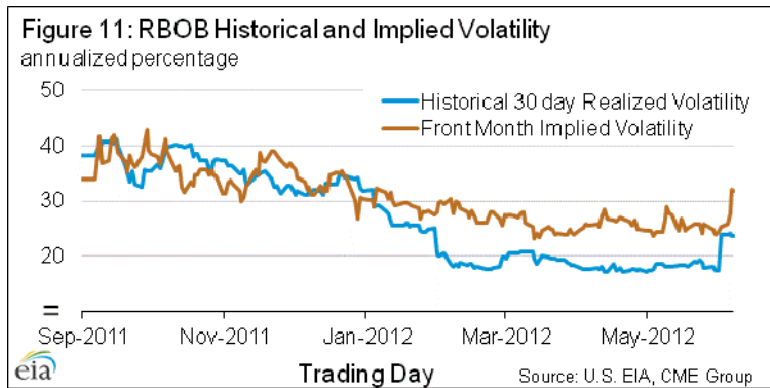
**Prices:** Futures prices for New York Harbor Reformulated Blendstock for Oxygenate Blending (RBOB) gasoline moved lower in May. The front month futures price settled at \$2.69 per gallon on June 7, a decrease of \$0.41 per gallon since May 1 (**Figure 9**). The front month contract settled at \$2.66 per gallon on June 1, a new low for 2012.



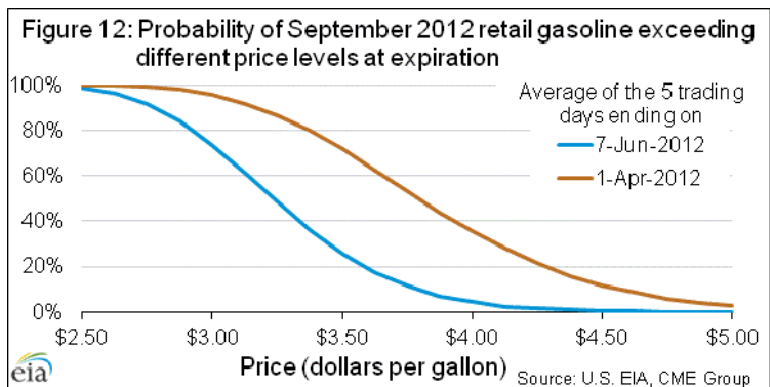
The RBOB – Brent crack spread (calculated by subtracting the Brent front month futures price from the RBOB front month futures price) increased from \$0.25 per gallon on May 1 to \$0.31 per gallon on June 7 (**Figure 10**). Although this is a reversal of the declining trend seen in the month of April, the RBOB – Brent crack spread is still \$0.18 per gallon below its 2012 high of \$0.49 per gallon set on March 29.



**Volatility:** Similar to crude oil volatility, both implied and historical volatility for the front month RBOB contract increased in the week leading up to June 7 after being flat for most of May. Implied volatility for the front month contract closed at 30.3 percent on June 7, an increase of 6.7 percentage points since May 1, and historical volatility closed at 23.6 percent, an increase of 6 percentage points over the same time period (**Figure 11**). Even so, both volatility measures remained lower than in the fourth quarter of 2011.

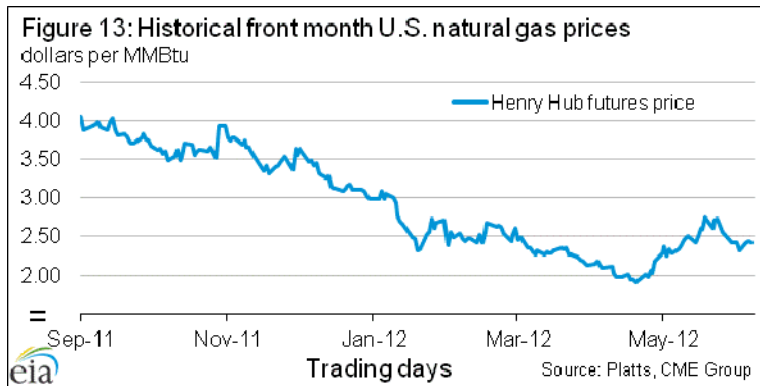


**Market Derived Probabilities:** The September 2012 RBOB futures contract averaged \$2.56 for the five trading days ending June 7 and has a probability of exceeding \$2.85 per gallon (\$3.50 retail) at expiration of approximately 26 percent, and a probability of exceeding \$3.35 per gallon (\$4.00 retail) of about 4 percent. The same contract as of the five trading days ending April 1 had a probability of exceeding \$3.50 retail of 71 percent, and a probability of exceeding \$4.00 retail of 35 percent. A combination of lower crude oil prices and decreased time to expiration contributed to a lower probability of the September contract exceeding these price levels (**Figure 12**).

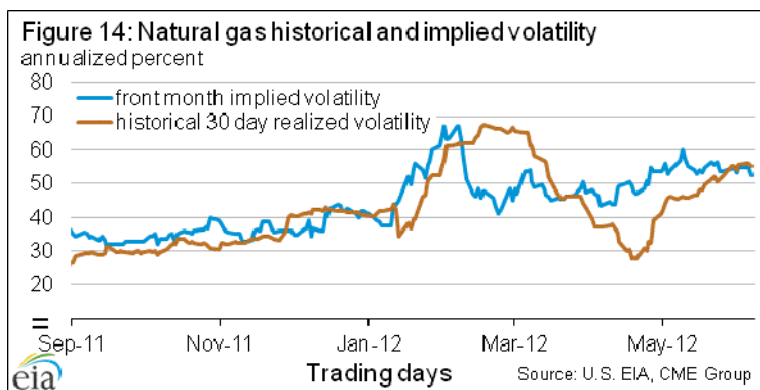


## Natural Gas

**Prices:** Natural gas prices moved higher in the first half of May but have since declined. The front month futures price for delivery of natural gas at Henry Hub in Louisiana settled at \$2.27 per MMBtu on June 7, a decrease of \$0.10 from May 1 but still about \$0.37 per MMBtu above the decade low prices set in April (**Figure 13**). Lower production over the last few months and increased natural gas use for electric power generation has contributed to less natural gas being injected into storage than the seasonal average during April and May.



**Volatility:** Natural gas front month futures contract implied volatility is relatively unchanged since May 1 and settled at 52.7 percent on June 7 (**Figure 14**). Historical volatility continued to move higher during May and is now at the same level as implied volatility, erasing the gap that developed between these two volatility measures during the low price period in April.



**Market Derived Probabilities:** The probability that the September contract will settle higher than \$3.00 per MMBtu fell by 3 percentage points from 24 to 21 percent when compared to market conditions on the five trading days ending April 1 (**Figure 15**)<sup>3</sup>. The average price over the five trading days ending on June 7 for the September 2012 natural gas futures contract was relatively unchanged, having fallen by \$0.02 per MMBtu since April 1. Despite an increase in implied volatility of 8 percentage points for that contract, the decreased time to expiration was responsible for the small decrease in the probability of natural gas prices exceeding different price levels compared to market conditions two months ago.

<sup>3</sup> These natural gas probabilities are cumulative normal densities generated using market-based inputs provided by futures and options markets, i.e., futures prices and implied volatilities. (See Appendices I and II of EIA's October 2009 [Energy Price Volatility and Forecast Uncertainty](#) article for additional discussion).



