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Department of Agricultural and Consumer Economics, University of Illinois Urbana-Champaign

Do Falling Gasoline Prices Threaten the Competitiveness of Ethanol?

Scott Irwin and **Darrel Good**

Department of Agricultural and Consumer Economics
University of Illinois

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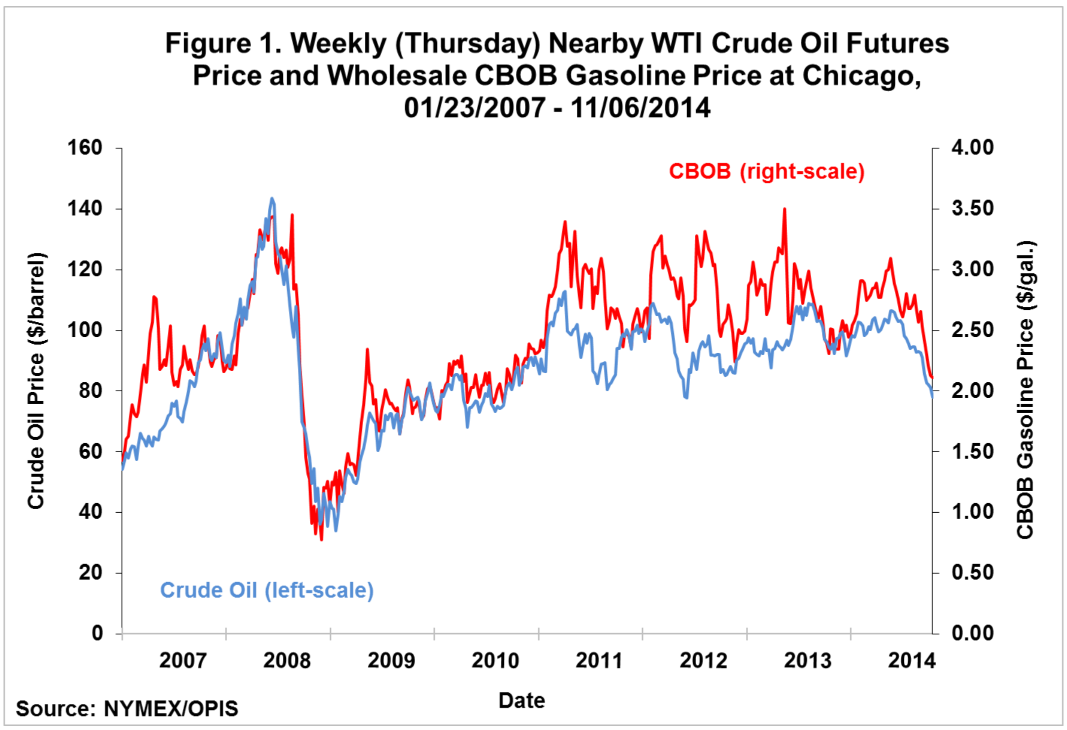
Wholesale (CBOB) gasoline prices in the U.S. have declined by about a dollar per gallon, or one-third, since June (see Figure 1). The CBOB price last week was $2.11 per gallon, the lowest level since autumn 2010. This decline was mainly due to the drop in crude oil prices from around $105 per barrel to $80 over the same time period. The question addressed in today's article is whether the decline in gasoline prices has been large enough to threaten the competiveness of ethanol in gasoline blends. The answer to that question depends on the assumed breakeven price of ethanol relative to the price of gasoline and that is a major focus of the analysis.

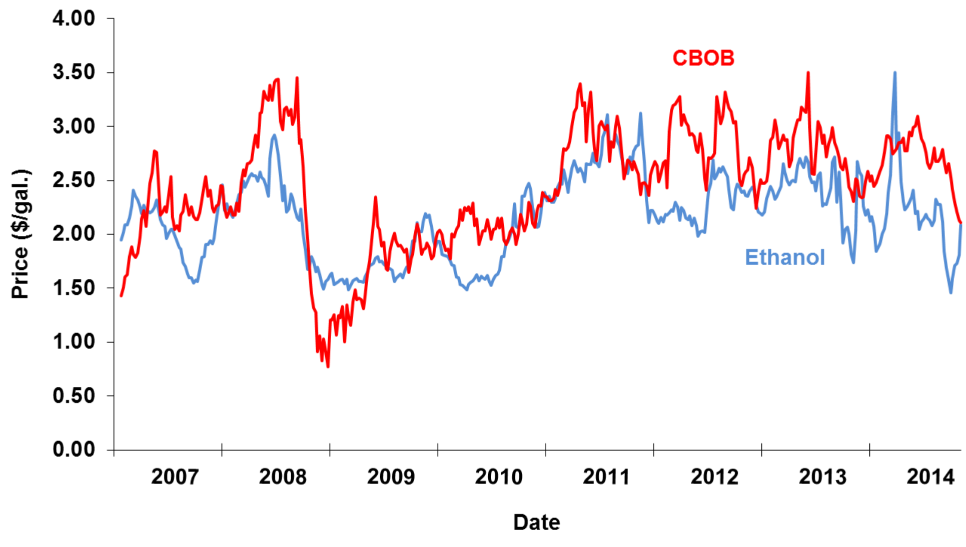


Alternative Breakeven Measures

Like earlier *farmdoc daily* articles (April 24, 2013; May 23, 2014), we begin with a direct comparison of wholesale ethanol and CBOB gasoline prices. This is the conventional approach to computing the ethanol blending margin because virtually all of the gasoline sold in the U.S. contains 10 percent ethanol and CBOB is the feedstock for about two-thirds of the finished gasoline used in the U.S. With this approach, it is assumed that the "breakeven" ethanol price is simply the CBOB price. So, positive ethanol blending margins result from ethanol prices that are below the price of CBOB gasoline and vice versa. Positive (negative) margins result from blenders purchasing ethanol at a lower (higher) price per gallon than CBOB and selling the blend at the retail level at an equivalent price to CBOB. Additional assumptions include: i) E10 at the retail level does not have to be priced at a discount to reflect the lower fuel efficiency of ethanol since ethanol is such a small portion of the blend and the loss of efficiency is not easily discernible by consumers, and ii) there are no differential costs (e.g., higher transportation costs) associated with ethanol in comparison to CBOB.

As shown in Figure 2, the wholesale price of ethanol and CBOB gasoline have essentially converged to the same level in recent weeks. The price of ethanol at Chicago last Thursday, November 6, 2014, was $2.09 per gallon, just two cents less than the price of CBOB. The convergence has been driven by the drop in CBOB prices as well as the sharp recovery of ethanol prices in recent weeks. The net result, from a conventional standpoint, is that ethanol blending margins are basically at the breakeven level and any further declines in CBOB or increases in ethanol will drive margins into the red. It is interesting to observe how infrequently negative blending margins have occurred since 2011—only a total of seven weeks.

Figure 2. Weekly (Thursday) Wholesale CBOB Gasoline and Ethanol Prices at Chicago, 01/25/2007 - 11/06/2014



Source: OPIS

An alternative measure of the breakeven price of ethanol assumes that ethanol has a competitive advantage over other alternatives for enhancing octane levels in finished gasoline blends. Most prominently, an engineering analysis by the U.S. Department of Energy in November 2012 calculated a "breakeven price of ethanol, above which it is more economic for the refiner to reduce ethanol volumes and alternatively produce more octane within the refinery." That analysis indicated the breakeven ethanol price is about 10 percent higher than the price of CBOB gasoline. In other words, if the price of ethanol is less than 1.1 times the price of CBOB gasoline, there are positive economic returns to blending E10 for octane enhancement rather than producing octane from other petroleum processes in the refinery. We have incorporated this measure of breakeven ethanol prices into an ethanol demand model used in several previous *farmdoc daily* articles on RINs pricing and the RFS (e.g., April 3, 2013; July 19, 2013; October 31, 2013)

A potential problem with using 1.1 as the breakeven ethanol/CBOB price ratio is that important offsetting costs of adding ethanol to gasoline blends are ignored. First, as noted earlier, ethanol blends have lower fuel efficiency than conventional gasoline because a gallon of ethanol contains roughly two-thirds of the energy content of conventional gasoline. This was confirmed in a recent study by the EIA that found the average fuel efficiency of the U.S. car and truck fleet declined about three percent due to the rising ethanol content of gasoline blends. If this loss in efficiency is fully reflected in consumer demand it would feedback to a lower wholesale price of ethanol, with the discount as large as 33 percent. Second, ethanol entails higher transportation costs than conventional gasoline because ethanol generally cannot be shipped via pipelines but must instead be shipped via truck and rail. The latter are more expensive methods of transporting fuel from production to consuming locations. Additional ethanol distribution costs include such items as terminal holding tanks, blending facilities, and rail modifications (see this IEA study for further details). While there is considerable uncertainty about the impact of fuel efficiency discounts and extra transportation and distribution costs on the marginal valuation of ethanol by blenders, it certainly seems plausible that the overall impact is non-negligible. For this reason, we are persuaded that a breakeven ratio of 1.0 is more likely to be an accurate representation of the true breakeven than 1.1.

Figure 3 presents the ratio of wholesale ethanol to CBOB prices at Chicago over same period shown in Figures 1 and 2, January 25, 2007 through November 6, 2014. The ratio has exceeded 1.0, but the occurrences have been relatively infrequent, especially after 2011. The recent drop in CBOB prices and rise in ethanol prices has pushed the ratio up to 0.99, right at the assumed breakeven level. The price of ethanol now has almost no cushion before ethanol blending margins turn negative. Figure 3 also shows that the average value of the ratio of ethanol and CBOB prices during the eight-year sample period is 0.92, somewhat less than the assumed 1.0 breakeven level. This is an especially interesting result, because it shows that the market, on average, has not valued ethanol at the assumed breakeven level. There are several possible explanations for this apparent contradiction. First, the difference may be a function of market conditions that are unique to the selected location of Chicago. We checked one other location, the Gulf, and found that the ratio averaged 0.99, very close to the assumed breakeven level. Second, the wholesale ethanol market may not be fully competitive given the concentration of buyers on the blending side. The lack of competition may result in ethanol prices bid to producers that are less than breakeven levels, on average. Third, ethanol production capacity since 2007 has generally exceeded the ability of the domestic market to absorb ethanol in gasoline blends. For example, the E10 blend wall is currently estimated to be about 13.5 billion gallons annually, while ethanol production capacity is at least 15 billion gallons. Resembling the situation for biodiesel (*farmdoc daily*, October 30, 2014), ethanol prices don't have to cover the variable and fixed costs of production for this slack capacity to be brought online; but, instead only have to cover variable costs because the capacity is already in place. In essence, gasoline blenders don't have to pay ethanol producers the full marginal value of ethanol because of the excess capacity in the industry.Careful inspection of Figure 3 suggests we can make two further refinements to our analysis of the relative prices of ethanol and CBOB. The first is to eliminate the extremely high values of the ratios that occurred during the heart of the Great Recession, from about November 2008 through March 2009. These are clearly outliers related to the extreme plunge in crude oil prices that occurred during this period. The second is to split the sample at the end of 2011, when the ethanol blenders tax credit expired (VEETC). This could have conceivably changed the marginal value of ethanol to gasoline blenders. Figure 4 incorporates these two modifications, and the effects are startling. The 2007-2011 average ratio is 0.92, the same as the overall sample average, but the 2012-2014 average ratio falls to 0.83. The difference between the two means is not only statistically significant (t-statistic = 7.25), but also economically significant. Given that the average CBOB price over 2012-2014 was $2.68 per gallon, the nine percentage point drop in the mean ratio translates into a $0.24 drop in the average ethanol price. The bottom-line is that there was an unmistakable drop in the marginal valuation of ethanol relative to CBOB after the tax credit expired at the end of 2011 (this is also apparent at the Gulf, where the average ratio dropped to 0.90). This also implies there was less than full pass through of the tax credit from blenders to producers when the credit was in place. Finally, it is interesting to note that the downward shift in the marginal valuation of ethanol occurred during a period of historically high corn prices, driven by the severe drought that occurred in the summer of 2012.

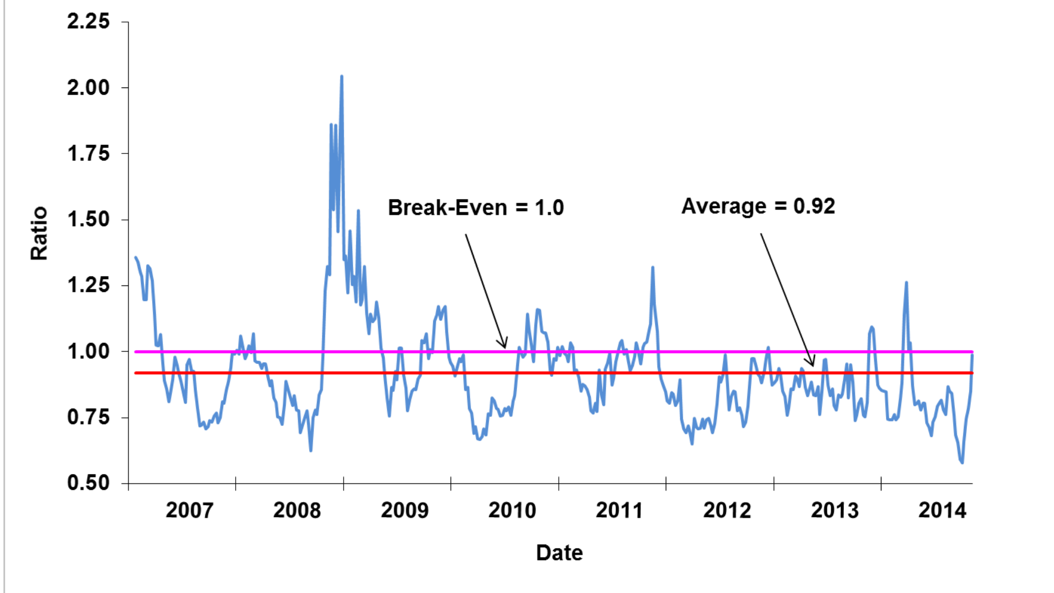


Figure 3. Weekly (Thursday) Ratio of Wholesale Ethanol and CBOB Gasoline Prices at Chicago, 01/25/2007 - 11/06/2014

Source: OPIS

Implications

So, what are the implications of the analysis for the competitiveness of ethanol in gasoline blending? In answering this question, it is important to emphasize that the marginal value of ethanol to blenders is the key, not necessarily what blenders have paid recently for ethanol relative to gasoline. We take the position that the best estimate of the marginal value to blenders is given by a ratio of 1.0, which is substantially higher than average market ratio (0.83) for what they have actually paid in recent years. A logical implication is that gasoline blenders have made substantial profits blending ethanol, likely due to some combination of a wholesale ethanol market that is not fully competitive and excess capacity in the ethanol production industry.

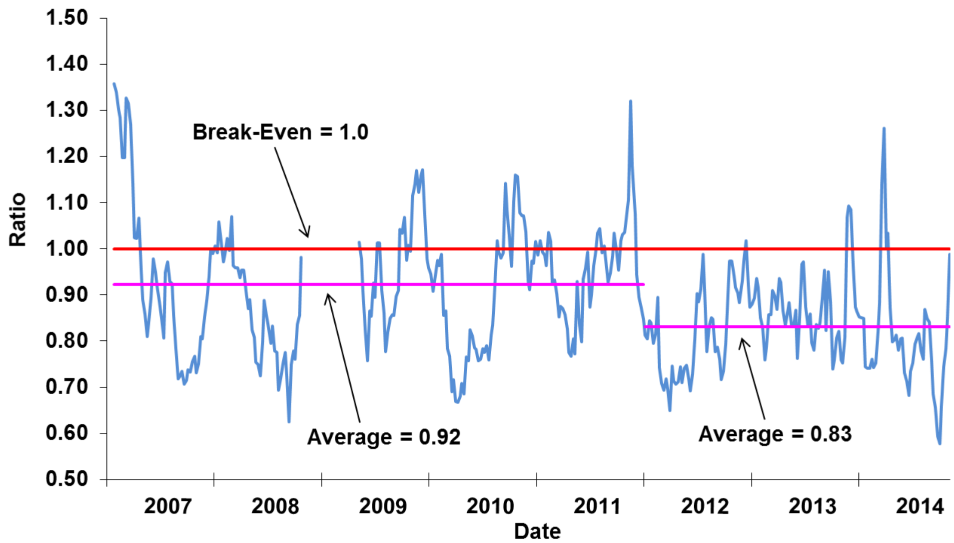
Looking forward, the movement of the ethanol/CBOB ratio is likely to have important implications for both the ethanol and RINs markets. The ratio of wholesale ethanol and CBOB prices has recently increased and is currently near what is believed to be a breakeven ratio (1.0). One possibility is that the ratio will stabilize or decline from the current level in order to keep ethanol competitive in the motor fuel blend. That could happen with stable prices for both commodities or by a combination of higher CBOB and lower ethanol prices. CBOB prices are difficult to forecast, but there is room for ethanol prices to decline since ethanol plant margins are currently profitable. Based on our previous competition and excess capacity arguments, it is more likely that the price ratio would adjust lower, if needed, by way of lower ethanol prices.

A second possibility is that the ratio will continue to increase and move above the breakeven level of 1.0 for ethanol. If that happens, the expected response would be higher RINs prices as physical blending becomes uneconomic and/or a reduced rate of physical blending since the current pace exceeds the preliminary RFS for renewable fuels for 2014. A decline in the pace of physical blending, however, would be risky since the final RFS for 2014 has not yet been announced by the EPA. That announcement is expected soon.

A third possibility is that the ratio will continue to increase and move above a breakeven level for ethanol, but without a measurable response in either RINs prices or the rate of domestic blending. A lack of response would imply that the actual breakeven ratio is higher than assumed here or that a price ratio exceeding the breakeven value for ethanol is expected to be short-lived.

Some insight into the likely response may be available from the market history available since the end of the tax credit in 2011. As indicated in Figure 4, there have been only two periods of the ethanol/CBOB price ratio exceeding 1.0 since 2011. Both of those periods were extremely brief. The first extended only 3 weeks from November 21, 2013 to December 5, 2013 and the second was only four weeks from March 20, 2014 to April 10, 2014. Interestingly, D6 ethanol RINs prices rose in the first period but actually fell in the second, and weekly ethanol production increased in both periods. This suggests the ethanol/CBOB price ratio is not likely to move above 1.0 for any length of time and that market adjustments to maintain the competitive position of ethanol likely will be rapid.

Figure 4. Weekly (Thursday) Ratio of Wholesale Ethanol and CBOB Gasoline Prices at Chicago, 01/25/2007 - 10/23/2008 and 05/07/2009 - 11/06/2014



Source: OPIS

Summary

The recent drop in gasoline prices has been large enough to potentially threaten the competiveness of ethanol in gasoline blends. Whether ethanol is close to or has become uncompetitive depends on the assumed breakeven price of ethanol relative to the price of gasoline. We are persuaded that the conventional breakeven price ratio of 1.0 is the most accurate measure, which, interestingly, is substantially higher than average market ratio (0.83) for ethanol relative to gasoline in recent years. A logical implication is that gasoline blenders have made substantial profits blending ethanol, likely due to some combination of a wholesale ethanol market that is not fully competitive and excess capacity in the ethanol production industry. Recent market history also suggests the ethanol/CBOB price ratio is not likely to move above 1.0 for any length of time and that market adjustments to maintain the competitive position of ethanol are likely to be rapid. Higher ethanol production and lower ethanol prices have proven quite effective in the past at maintaining ethanol's place in gasoline blends and are likely to continue to do so in the future.

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