

Speculators, Ethanol, or Market Fundamentals: What's Driving Corn Prices?

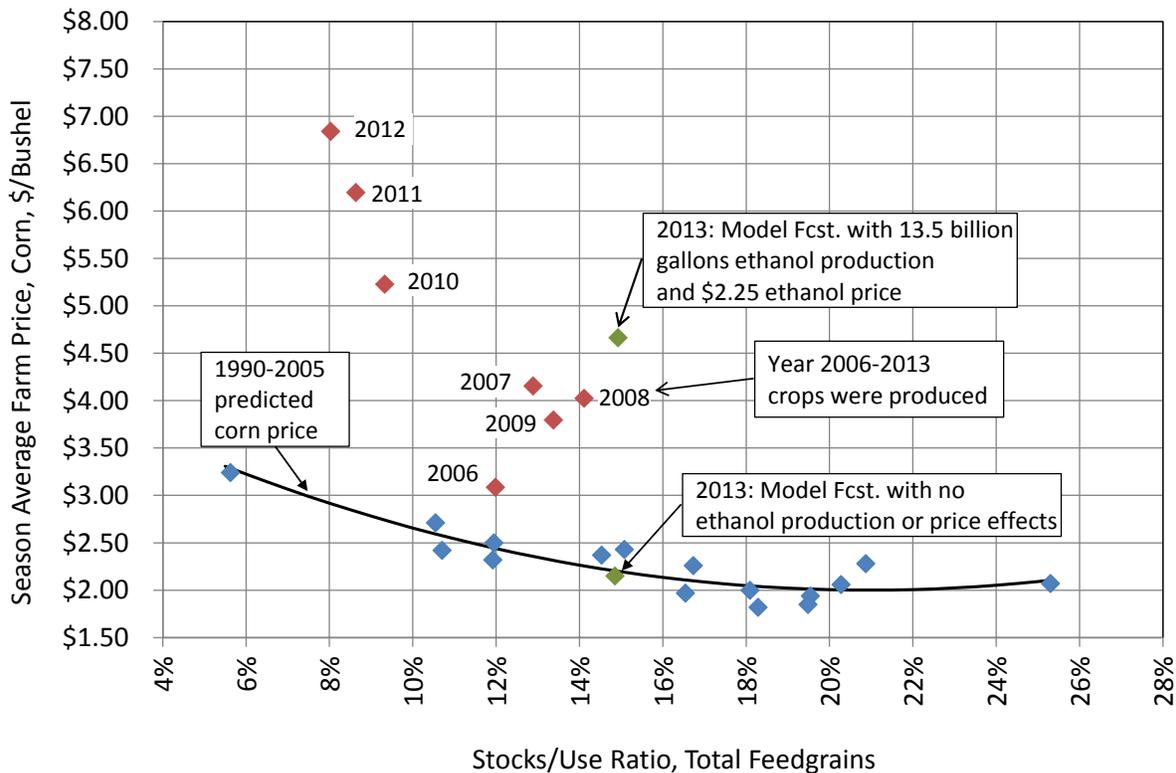
Dr. Tom Elam, President, FarmEcon LLC
11/11/2013

Introduction: A poultry industry leader recently forwarded a corn producer e-mail. The producer blamed “wealthy speculators” for lower corn prices. He was also wondering what had happened to the price boosting effects of the RFS mandate. This article will show that current corn prices are consistent with both higher corn production and strong 2014 ethanol production. “Speculation” is not required to explain current prices.

Corn Price Drivers: Since 2005 there has been a fundamental shift in the demand/price relationship of U.S. feedgrains. That shift is dominated by the increased use of U.S. corn for ethanol production and higher energy prices that have boosted the value of corn as a fuel. Absent that ethanol-induced shift, the underlying relationship between corn prices and the stocks/use ratio for total feed grains has not changed.

The corn price shift is starkly evident in the graph below that shows corn prices versus the stocks/use ratio for total U.S. feedgrains (corn, sorghum, barley and oats). The years are those in which the crops were produced and harvested.

U.S. Season Average Corn Price vs. Feedgrains Stocks/Use Ratio
Actual 1990 to Forecast 2013 (Sept. 1 Crop Years)



Data sources: USDA, World Outlook Board and model results

The graph shows that prior to the 2006 feedgrain crop there was a stable relationship between how “tight” ending stocks were and the season average farm level corn price. From a very basic supply/demand balance viewpoint this makes perfect sense. As feedgrain stocks decline relative to total usage, corn prices are bid up, providing farmers incentives to plant more feedgrains in the next year. Increasing stocks relative to total usage indicate that less feedgrain production is needed, prices fall, and plantings and production decline.

The black line in the graph represents the plot of a regression equation that best fits the corn prices and feedgrains stocks/use ratios from 1990 to 2005.

That predictable 1999-2005 relationship between the feedgrains stocks/use ratio and corn price has obviously changed dramatically. At all stocks/use ratios since 2005, the season average farm level corn price has been substantially higher than the 1990-2005 relationship shows. This change in the price vs. stocks/use ratio relationship coincides precisely with changes in federal biofuels policies, and increased use of corn to produce fuel ethanol.

While fuel ethanol has been produced from corn for well over 40 years, it was only after the RFS was created in 2005, and increased in 2007, that corn use for ethanol production became a major factor in U.S. corn demand. To estimate the impact of that increase in ethanol’s use of corn, a threshold variable was calculated as ethanol production in excess of 4 billion gallons per crop year. The 4 billion threshold is due to the fact that ethanol production first exceeded that level in 2005, the year the original RFS was created.

Higher corn use for ethanol has also made corn prices sensitive to energy prices. In recent crop years corn prices are positively correlated to ethanol and gasoline prices. From 1990 to 2005 the correlation between corn price and ethanol price was actually negative. The positive correlation between ethanol and corn prices emerged only as ethanol prices went above about \$2 per gallon.

Including data for the 1990-2011 feedgrain crops, a model was estimated to include effects of ethanol production and price effects. Results are shown in the table below. The Stocks/Use² variable is used because the relationship is not a simple straight line.

Regression for Season Average Corn Price and 1990-2011 Feedgrain Supply/Use Ratio

<i>Variable</i>	<i>Coefficient</i>	<i>Standard Error</i>	<i>t Stat</i>
Intercept	4.40	0.61	7.21
Stocks/Use Ratio	-22.9	7.99	-2.87
Stocks/Use Ratio ²	54.7	25.52	2.15
Ethanol Production, Over 4 Billion Gallons	0.21	0.029	7.16
Ethanol Price, Omaha Blender, over \$2/Gallon	1.64	0.58	2.83

Data sources: USDA, World Outlook Board, U.S. Department of Energy, and Nebraska Energy Board

The R^2 of this equation is 0.94. All coefficients have the correct theoretical sign, and all are statistically significant. **The intercept and two coefficients for stocks/use ratio are essentially identical to the “pre-ethanol” regression model estimates for 1990-2005 shown as the black line on the graph. That is, the underlying relationship between stocks/use and corn price has not changed since 2005. All of the 2006-2013 increase in corn prices above the graph’s black are due to ethanol production and price effects.**

Every billion gallons of ethanol production above 4 billion is associated with an increase in corn prices of about \$0.21 per bushel. A \$1 per gallon increase in ethanol prices over \$2 per gallon is associated with an increase in corn prices of about \$1.64 per bushel. In both cases, the effects are independent of, and additive to, any effects that increased ethanol production may have had on lowering the feedgrains stocks/use ratio.

That is, not only has increased ethanol use of corn caused feedgrains stock/use ratios to be smaller, but has also further increased corn prices beyond what those ratios would have indicated based on the historical 1990-2005 relationship.

As shown by the green dots on the graph, the equation can be used to forecast an average price for the 2013 corn crop. Using the USDA’s November, 2013 USDA feedgrains stocks/use ratio estimate of 14.7%, 2013/ 2014 crop year ethanol production of 13.5 billion gallons, and an average Omaha ethanol price of \$2.25 per gallon, the estimated season average corn price is \$4.59 per bushel. The mid-point of the current November, 2013 USDA corn price forecast is \$4.50, very close to the model forecast.

If ethanol production was under 4 billion gallons, and ethanol price was under \$2.00 per gallon, the model would forecast a 2013 corn price of \$2.17 per bushel at a 14.7% stocks use ratio, about half the forecast that includes ethanol production and price effects. How much of that ethanol effect is due to the 2007 RFS mandate, and how much would have happened anyway, is highly debatable.

Conclusions: The sharp decline in 2013 corn prices is totally attributable to a 2013 bumper crop and resulting increased grain stocks. Higher prospective stocks have reduced corn prices to levels near those seen at similar stocks/use ratios of 2007 to 2009. Continued post-2006 higher levels of ethanol production and prices are supporting 2013-2014 corn prices at about twice the level that the underlying pre-2006 relationship between stocks/use and corn price would indicate. On balance, for the 2013 corn crop, higher production and stocks have swamped the positive corn price effects of ethanol production and prices.

We do not need to resort to blaming lower corn prices on “wealthy speculators.” Neither do we need to ask what happened to the corn price effect of higher ethanol production and prices. Those ethanol effects are still with us, supporting current corn prices at about twice the level we would otherwise see at the forecast 2013/2014 marketing year ending stocks/use ratio.