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Analysis of the Effects of Short Corn Crop Scenarios on the Likelihood of Meeting the Renewable Fuel Standard

Briefing Paper 08-2

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Agricultural and Food Policy Center

Department of Agricultural Economics
Texas AgriLife Research
Texas AgriLife Extension Service
Texas A&M University

College Station, Texas 77843-2124
Telephone: (979) 845-5913
Fax: (979) 845-3140
http://www.afpc.tamu.edu

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Henry L. Bryant
Joe L. Outlaw
David P. Anderson
James W. Richardson
George M. Knapek

Agricultural and Food Policy Center
Department of Agricultural Economics
Texas AgriLife Research
Texas AgriLife Extension Service
Texas A&M University

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Agricultural and Food Policy Center
Department of Agricultural Economics
Texas A&M University
College Station, TX 77843-2124

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Analysis of the Effects of Short Corn Crop Scenarios on the Likelihood of Meeting the Renewable Fuel Standard

This research was undertaken at the request of the Office of the Texas Governor Rick Perry to update the renewable fuel standard (RFS) research contained in the April 2008 AFPC report entitled "The Effects of Ethanol on Texas Food and Feed". Specifically, this analysis was undertaken to determine the effects on corn prices and use, ethanol production and prices, and the ethanol industry's ability to meet the RFS of 9 billion gallons if, as expected, there is a corn production shortfall occurs due to flooding in the U.S. Midwest. Wet weather in the Midwest has put some of the U.S. corn crop at risk, due to flooding and planting being delayed past optimal dates. Corn prices have increased to over $7.00 per bushel in Texas and to over $8.00 per bushel in deferred futures contracts. In light of these developments, this report analyzes the mean (average) crop scenario, and two short crop scenarios; 5 percent lower production and 10 percent lower production.

The model utilized in this effort was updated significantly to incorporate the most current data available. The energy futures market data used to develop oil, natural gas, gasoline, and ethanol price forecasts were updated as of the Monday, June 16th, market close. The expected corn production of 12,125 million bushels reported in the May 9th World Agricultural Supply and Demand Estimates (WASDE), is slightly lower than the 12,910 million bushel production we utilized for 2008/09 in our previous report. Our previous analysis utilized the FAPRI March 2008 Baseline which contained very low (compared to current market realizations) projected corn prices. These market realizations, used as the point of departure for the equilibrium displacement analysis were considered to be significantly low to an extent that they could unduly influence the results. The current model uses the most recent USDA data for the 2007/08 marketing year as the equilibrium. The volumetric ethanol excise tax credit (blender's credit) was reduced to $0.45 per gallon beginning January 1, 2009 as specified in the 2008 Farm Bill. In addition, all of the demand elasticities used in the model were updated to reflect current information.

Model

A mathematical programming and stochastic equilibrium displacement model was used for this analysis. In this model, ethanol demand is determined by ethanol's value as a gasoline substitute (estimated using June 16, 2008, settlement prices for NYMEX crude oil futures contracts), and the minimum level of aggregate ethanol use (the maximum of either the government-mandated level of use or the level required for producing reformulated and oxygenated blended fuels). Ethanol supply is determined by the optimizing behavior of a representative ethanol producer, whose level of corn consumption feeds back into the corn market. Corn market equilibrium is determined by displacing the previous year's corn market equilibrium using specified or randomly drawn changes in supply, altering levels of feed and export use based on historical behavior, and interaction with the representative ethanol production sector.

Results

The results presented in Table 1 are for the 2008/09 corn crop that has just recently been planted. It is assumed that the one-half (50 percent) waiver would be implemented during the marketing year beginning September 2008 and ending August 2009. All results presented here are based on stochastic simulations consisting of two thousand possible realizations of corn production. Corn production for 2008 is assumed to be normally distributed in each of three production scenarios, with means of 12,140, 11,524, and 10,909 million bushels, and a standard deviation of 910 million bushels in all three cases. The results in each column of Table 1 are expected levels for the indicated variables for that particular policy and corn production scenario -- i.e., the average values for those variables over the two thousand realizations of corn production.

Using the updated data and corn production situation discussed previously changes the outcome for the mean corn crop full RFS scenario relative to our report released in April. Higher corn prices are offset somewhat by higher ethanol prices so the probability that the RFS would be binding is 42.45 percent. A one-half RFS waiver would decrease expected corn prices by $0.24 per bushel. The RFS binding means that the industry would be required to produce a volume of ethanol equal to the mandated level, and greater than amount it would have produced in the absence of a mandate.

The short crop scenarios both result in significantly higher expected corn and ethanol prices than the mean corn crop scenario. For the 5% lower corn crop scenario, relaxing the RFS results in $0.73 per bushel lower expected corn prices. The results are similar, but more dramatic for the 10% lower corn crop scenario. The probabilities of the full RFS binding in the 95% and 90% of mean corn crop scenarios are 67.15 percent and 87.8 percent, respectively. Obviously, a short corn crop would likely result in the full RFS binding and ethanol production would be forced higher than otherwise warranted.

Conclusions

It appears that if the corn crop is of average size, the RFS would not likely be binding which would not lead to higher ethanol production than can be justified by economics. This is not the case for the two short corn crop scenarios. The probability is very high that the RFS would bind regardless of whether there was a 5 or 10 percent reduction in the mean size of the corn crop. Relaxing the RFS by one-half would result in significantly lower ethanol prices, production, and corn prices.

Table 1. Expected Impacts of a Short Corn Crop on Ethanol Production and Prices, Corn Use, and the Probability of the RFS Binding, 2008/09 corn marketing year.

	2008/09 Mean Corn Crop[1]			95% of Mean Corn Crop			90% of Mean Corn Crop	
RFS (Full = no waiver, one-half = 50% waiver)	**Full**	**One-half**		**Full**	**One-half**		**Full**	**One-half**
Expected ethanol price ($/gallon)	$2.89	$2.76		$3.04	$2.77		$3.27	$2.80
Expected ethanol production (mil. gallons)	10,776	10,051		10,427	8,749		10,176	7,467
Expected corn price ($/bushel)	$6.70	$6.36		$7.28	$6.55		$7.96	$6.69
Expected corn production (mil. bushels)	12,140	12,140		11,524	11,524		10,909	10,909
Expected corn feed use (mil. bushels)	5,318	5,439		5,116	5,371		4,875	5,324
Expected corn ethanol use (mil. bushels)	4,036	3,765		3,905	3,277		3,811	2,796
Expected corn exports (mil. bushels)	1,390	1,544		1,132	1,457		825	1,397
Probability of RFS Binding	42.45%	1.05%		67.15%	6.3%		87.8%	17.95%

[1]2008/09 Mean corn crop is defined as 86 million acres reported in the planting intentions report (less about 7 million acres normally not harvested for grain) multiplied by trend corn yield of 153.9 bushels/acre.