University of Nebraska - Lincoln

DigitalCommons@University of Nebraska - Lincoln

Cornhusker Economics | Agricultural Economics Department

9-5-2018

The Evolution of Nebraska Corn Basis

Jessica J. Groskopf
University of Nebraska-Lincoln

Amanda Silva
University of Nebraska-Lincoln

AGRICULTURAL ECONOMICS

September 5, 2018

agecon.unl.edu/cornhuskereconomics

Cornhusker Economics

The Evolution of Nebraska Corn Basis

Market Report	Year Ago	4 Wks Ago	8-31-18
Livestock and Products, Weekly Average			
Nebraska Slaughter Steers, 35-65% Choice, Live Weight.	*	112.00	*
Nebraska Feeder Steers, Med. & Large Frame, 550-600 lb.	168.72*	*	176.47
Nebraska Feeder Steers, Med. & Large Frame 750-800 lb.	150.91	156.05	163.87
Choice Boxed Beef, 600-750 lb. Carcass.	191.65	204.26	212.03
Western Corn Belt Base Hog Price Carcass, Negotiated	62.21	53.08	36.84
Pork Carcass Cutout, 185 lb. Carcass 51-52% Lean.	84.19	72.20	64.72
Slaughter Lambs, wooled and shorn, 135-165 lb. National.	166.77	151.29	145.99
National Carcass Lamb Cutout FOB.	414.52	374.05	382.78
Crops, Daily Spot Prices			
Wheat, No. 1, H.W. Imperial, bu.	3.09	5.20	4.80
Corn, No. 2, Yellow **Columbus**, bu.	3.15	3.55	3.28
Soybeans, No. 1, Yellow **Columbus,** bu.	8.67	8.02	7.28
Grain Sorghum, No.2, Yellow Dorchester, cwt.	5.27	5.55	5.09
Oats, No. 2, Heavy Minneapolis, Mn, bu.	2.77	3.04	2.90
Feed			
Alfalfa, Large Square Bales, Good to Premium, RFV 160-185 Northeast Nebraska, ton.	*	175.00	185.00
Alfalfa, Large Rounds, Good Platte Valley, ton.	92.50	*	100.00
Grass Hay, Large Rounds, Good Nebraska, ton.	97.50	100.00	102.50
Dried Distillers Grains, 10% Moisture Nebraska Average.	105.00	118.50	139.00
Wet Distillers Grains, 65-70% Moisture Nebraska Average.	39.00	39.00	41.50
*** No Market**			

In 2018 Nebraska farmers planted 9.7 million acres of corn, the most of any crop in the state. The primary uses for corn in the state are cattle feed and ethanol production. Nebraska currently has 25 ethanol plants producing around 2 billion gallons of ethanol annually. This capacity consumes approximately 40% of Nebraska's annual corn production.

Ethanol became widely produced in the state after the introduction of the Renewable Fuels Standard (RFS) in 2005, which mandates that a percentage of renewable fuels, mainly ethanol, be blended into transportation fuels. This article explores the changes in corn basis since the implementation of the RFS for five locations across Nebraska.

Changes in basis are important to Nebraska corn farmers' financial wellbeing. Changes in the average basis value directly impact the farmer's bottom line. The more negative the average basis value is, the less revenue the farmer is receiving. Furthermore, more volatile basis values result in greater basis risk.

Data

Basis is the difference between the cash price and the futures price. Basis is essentially the fee that grain buyers charge farmers for handling their grain. Many factors influence basis values, including the local supply and demand, transportation costs, quality of the grain, and the cost of doing business. The basis values used for this analysis were calculated using the United States Department of Agriculture's Agricultural Marketing Service (USDA AMS) Cash Grain Bids report for Nebraska (WH_GR111). Reports were collected

Thursday of each week. Locations shown in this discussion must have had cash prices consistently reported since 1993, and are no closer than 50 miles from one another. The locations that have met these criteria are Beatrice, Greenwood, Grand Island, Lexington and Superior as shown in Figure 1. To obtain the basis, the cash price for each location was subtracted from the closing price of the nearby futures contract for that day. If there were missing observations, these values were interpolated using a simple average of the previous and subsequent basis values around the gap.

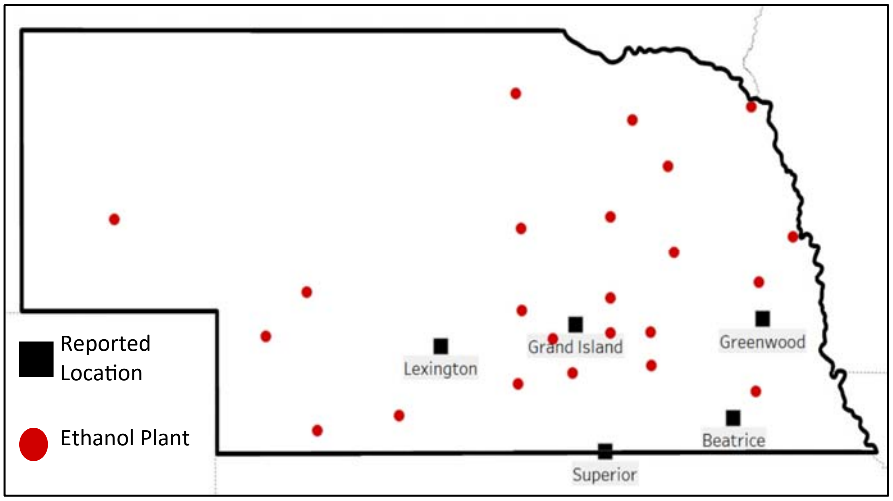

Figure 1. Nebraska Ethanol Facilities and Reported Basis Locations

Analysis

Two periods of basis values were selected for comparison: (1) February 25, 1993 to August 4, 2005 and (2) August 11, 2005 to December 28, 2017. These two periods are divided by the RFS mandate, which was implemented August 8, 2005. Many changes to the corn market occurred during the span of these data. This analysis does not separate factors such as the increase in acreage, genetic advancements, or additional uses for corn that have influenced its demand or supply since 1993. Thus, the analysis will focus on the long-term adjustments in basis values rather than pinpointing the specific causes of these changes.

The summary statistics and coefficient of variation are reported for each location and period in Table 1. The summary statistics show that in all five locations, the average basis value was $0.05 to $0.09 per bushel lower from August 11, 2005 to December 28, 2017 than it was from February 25, 1993 to August 4, 2005.

This lower average basis value indicates that farmers have experienced a larger discount from the futures market price after the implementation of the RFS. This may seem counter-intuitive to farmers, as an increased demand brought about by the expansion of ethanol production would strengthen the corn basis or make it less negative. However, a recent study of North Dakota corn basis values by Fausti et al. (2017) would suggest that the increased corn production during the latter period of this study would outweigh the demand created by increased ethanol production.

The second portion of this analysis measures the differences in basis volatility between the two periods. There are two specific measures of volatility that can be discussed from the summary statistics. The first measure of volatility is the standard deviation (Std. Dev). Normally, the higher the standard deviation, the greater the basis volatility. All five locations experienced standard deviations from $0.03 to $0.08 per bushel larger in the second period. This means that the normal range of basis values for each location would be the average basis ± the standard deviation. For example, the normal basis range for Beatrice before RFS would have been $0.00 to -$0.44 per bushel. After the RFS, the normal basis range for Beatrice is -$0.06 to -$0.54 per bushel.

The second measure of volatility is the coefficient of variation (Coef. Var.). It is a measure of relative volatility and is expressed as a percentage. To calculate coefficient of variation, divide the standard deviation by the mean. The higher the coefficient of variation, the greater the price volatility. The coefficient of variation does not have a consistent result across all five locations. The coefficient of variation was smaller for Beatrice and Superior but was almost equal in Grand Island and Greenwood, and was much larger in Lexington.

Table 1: Summary Statistics: Basis for Selected Nebraska Cities

	February 25, 1993 to August 4, 2005						**August 11, 2005 to December 28, 2017**					
	Obs.	**Avg.**	**Std. Dev.**	**Min.**	**Max**	**Coef. Var. %**	**Obs.**	**Avg.**	**Std. Dev.**	**Min.**	**Max**	**Coef. Var. %**
Beatrice	650	-0.21	0.207	-0.94	1.34	98	645	-0.30	0.236	-0.68	1.5	80
Grand Island	650	-0.18	0.163	-0.50	1.09	90	645	-0.26	0.234	-0.73	1.50	91
Greenwood	650	-0.24	0.175	-0.60	1.29	73	645	-0.33	0.241	-0.75	1.45	74
Lexington	650	-0.15	0.184	-0.53	1.59	119	645	-0.21	0.269	-0.71	1.76	130
Superior	650	-0.16	0.175	-0.58	1.2	113	645	-0.21	0.229	-0.58	1.60	107

Research by McNew and Griffith (2005) found that the farther one is from an ethanol facility, the lower the impact that facility will have on the price. This may hold true for the reported locations in this analysis. The two reported locations where the coefficient of variation improved, Beatrice and Superior, had the fewest number of ethanol facilities in a 50-mile radius. Grand Island and Greenwood experienced a slight increase in volatility. Grand Island has nine facilities with a 280 million bushel crush capacity in a 50-mile radius, and Greenwood has three facilities with a 114 million bushel crush capacity. Lexington has three plants in a 50-mile radius, one of which is located in Lexington itself.

This analysis shows that basis values have changed between the two periods of this study. Structural changes in the market have decreased the average basis value at the reported locations $0.03 to $0.08 per bushel. Basis has also become more volatile, but the amount of variability depends on the relative distance of reported location to an ethanol facility. Overall, these results indicate that farmers who are close to an ethanol facility have greater basis risk.

Increases in basis volatility can influence the effectiveness of a farmer's hedging strategy. Imagine a corn farmer who takes a short position in the futures market during the growing season for grain he or she plans to deliver at harvest. When farmers place a hedge in the futures market, they do so assuming a specific basis value for harvest. The hedge locks in the futures prices, but leaves the farmer vulnerable to changes in the basis value. This vulnerability is referred to as "basis risk." The larger the volatility measure is, the more basis risk a farmer has. However, greater volatility does not always imply a more negative outcome for the farmer. The basis at harvest could be stronger (less negative) than the basis value they had assumed when they placed the hedge. This stronger basis would result in a higher net price received. Farmers need to adjust their hedging strategies to account for lower average basis values, and a wider range of basis possibilities in order to account for the structural changes that have taken place in the corn market.

References

Fausti, S. B. Qasmi, K. Mc Daniel, (2017) "Does ethanol production affect corn basis volatility?", Agricultural Finance Review, Vol. 77 Issue: 4, pp.506-523.

McNew, K. and D. Griffith (2005), "Measuring the impact of ethanol plants on local grain prices", *Applied Economics Perspectives and Policy*, Vol. 27 No. 2, pp. 164-180.

Jessica Groskopf
Extension Educator
Department of Agricultural Economics
Panhandle Research and Extension Center
308-632-1247
jjohnson@unl.edu

Amanda Silva
Intern
Panhandle Research and Extension Center