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Extension's Role in Commodity Marketing Education: Past, Present, and Future

John M. Riley

Historically, market situation and outlook has often included some form of price forecast. Recent volatility in agricultural commodity markets is making price forecasts challenging and at times less reliable. In addressing this price volatility, changes in agricultural markets are highlighted along with price forecasts: pre- and postincreased market volatility. Given these recent challenges, the future of Extension agricultural commodity marketing is discussed.

Key Words: agricultural prices, commodity markets, price forecasting

JEL Classifications: Q11, Q13

Extension marketing economists are often called on to provide market situation and outlook information to stakeholders in their respective states. Historically, the outlook component of this has often included some form of price forecast. Producers, commodity groups, policymakers, and others, therefore, have come to rely on this information when making decisions. Past market conditions were more conducive to forecasting in this manner. Recently, however, agricultural commodity markets have become increasingly volatile. This has made forecasting market prices more challenging and sometimes less reliable. The purpose of this article is to highlight the changes in agricultural markets that have led to the current challenges for agricultural economists and others who formulate commodity market forecasts. Second, I will compare price forecasts: pre- and postincreased market volatility. To conclude, I will discuss the future of Extension agricultural commodity marketing in light of the recent challenges.

Paradigm Shift in Agricultural Commodity Markets

Markets have become more volatile. Higher price levels have dampened the impact when using traditional metrics like coefficient of variation or relative price change, but from an absolute standpoint, evidence suggests prices are more volatile. This phenomenon is depicted in Figure 1 where panel A shows the relative daily price change and panel B shows the absolute daily price change of individual futures contracts for corn. From Figure 1, the average absolute percentage price change of individual corn futures contracts from 160 days before expiration up to the date of expiration has remained mostly stable. On the other hand, the absolute price change has increased from approximately \$0.02 per bushel per day before 2007 to approximately \$0.11 per bushel per day since that time. Similar results exist for other crop and livestock futures contracts. This is important given the potential for severe adverse

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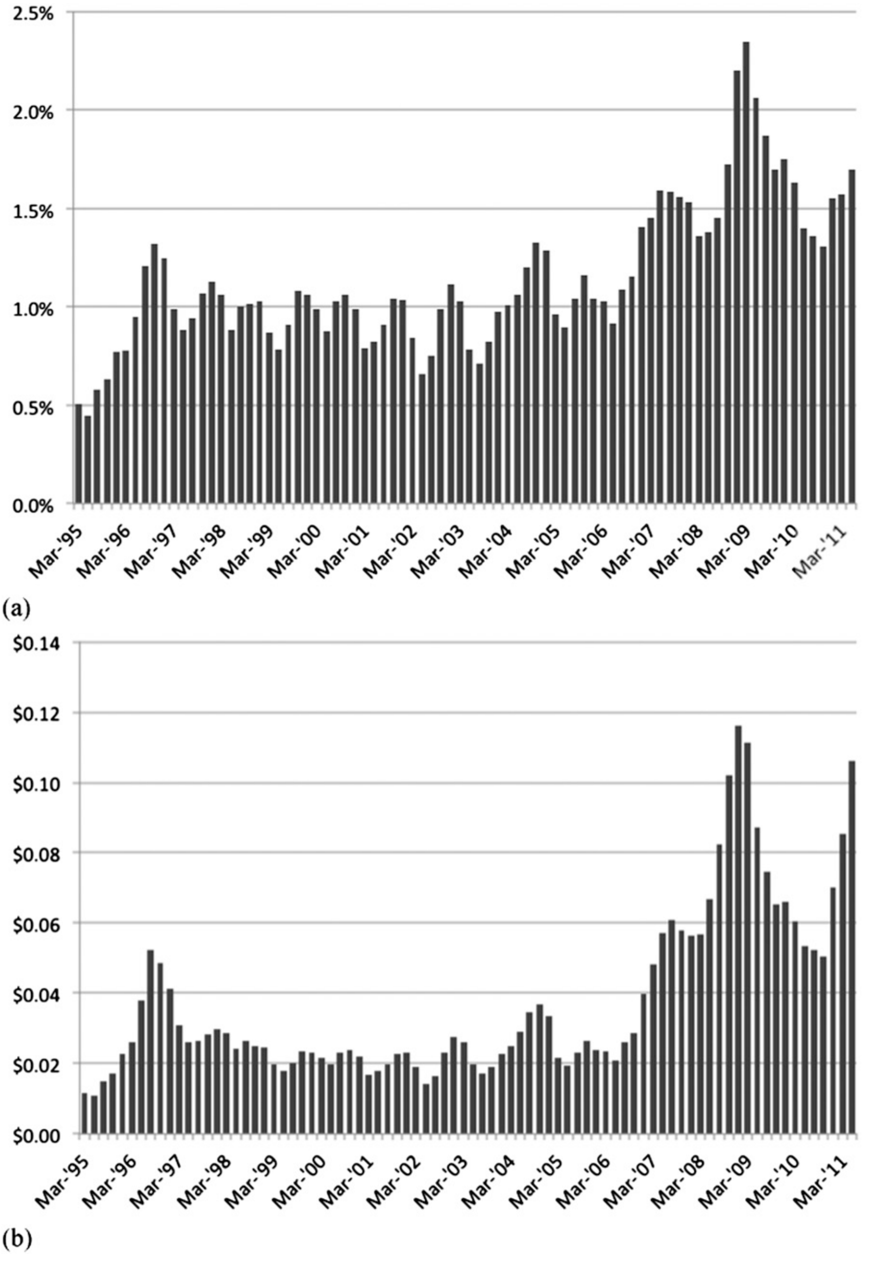

Figure 1. Average Absolute Percent Price Change (A) and Average Absolute Raw Price Change (B) of Individual Corn Futures Contracts, 160-day Average

price moves over the course of a growing season or finishing period. Although the higher price levels have masked the overall risk from a relative perspective, they have also increased the capital requirements of producers, whether small or large. An adverse price move in this environment could threaten the financial viability of these individuals or firms, especially small firms that lack the ability to absorb a large loss.

Excluding isolated incidences that have had a short-term impact on prices—for example, the floods that occurred in 1993 and the first confirmed case of bovine spongiform encephalopathy in December 2003—few long-term

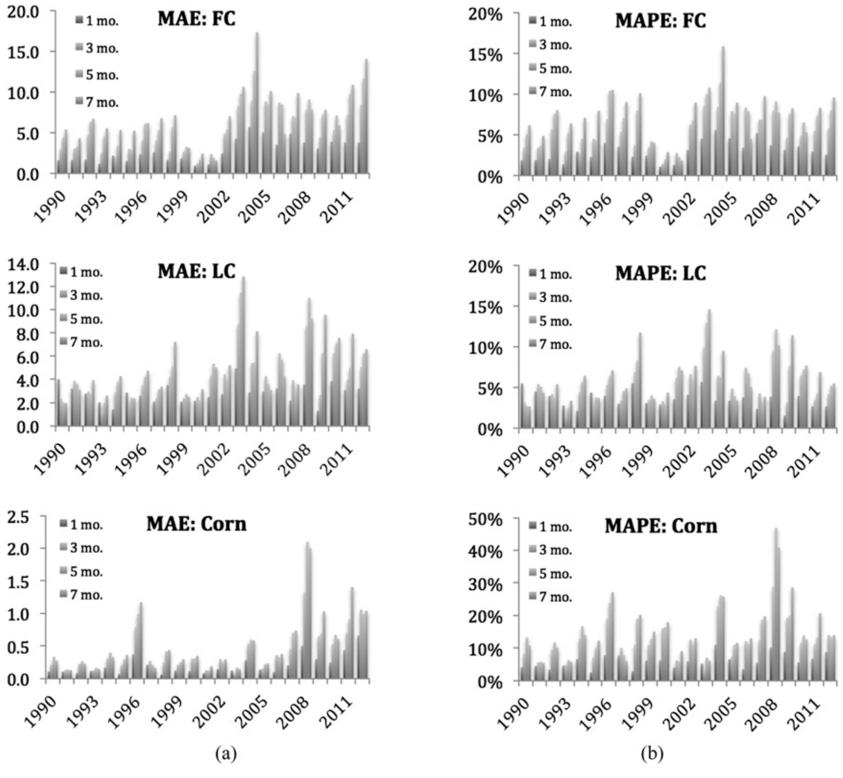

Figure 2. Mean Absolute Error (A) and Mean Absolute Percentage Error (B) for Feeder Cattle (FC), Live Cattle (LC), and Corn

market events have been experienced.[1] Again from Figure 2, both the percentage change and raw price change follow similar paths, but the magnitude of the price change in relative terms is dampened. Still, both paths indicate an increase in price volatility beginning in the mid-2000s. This higher degree of price volatility has remained in place since then, becoming more elevated at certain times than others but higher than previous periods of time.

Paradigm Shift in Agricultural Commodity Market Forecasting

Kastens, Schroeder, and Plain (1998) provide an extensive discussion of Extension's role in providing forecasts for various clienteles at the time the study was produced. In the 14 years since this study was conducted, vast improvements in technology and communication have altered the format in which information is made available and shared. Whereas Extension's role has likely become one of many resources agricultural stakeholders rely on, it has remained a relevant part of the decision-making. For example, the U.S. Department of Agriculture (USDA) APHIS reported that 64.2% of beef producers rated the Extension as somewhat or very important for information, ranking third behind veterinarians and other producers, respectively. Fourth in this survey were publications (industry magazines, journals, etc.), which university and Extension personnel often contribute. Furthermore, as Kastens et al. (1998) point out, many of the USDA or other private forecasts use Extension input.

Extensive research has been devoted to evaluating the performance of forecasts made by statistical or mathematical models, expert

[1] Sumner (2009) provides a thorough historical perspective of inflation adjusted grain prices depicting the recent increases in price as minor and shows a general down trend in real prices. Still, he recognizes the recent changes have been dramatic and states that the increase in 2007 was the fourth largest percent deviation from the prior 3-year moving average going back to 1869.

Table 1. Summary Statistics of Forecast Error for the CME Group Feeder Cattle Futures Contract ($/cwt)

		Mean	Standard Deviation	Minimum	Maximum
All Contracts, by Year	1990	3.01	1.92	0.64	5.69
	1991	2.40	3.20	−1.96	7.37
	1992	3.68	4.10	−4.11	9.68
	1993	1.56	3.04	−3.65	6.44
	1994	−1.70	2.61	−5.88	0.86
	1995	−1.92	3.82	−7.34	3.55
	1996	−0.07	5.03	−5.88	8.68
	1997	2.04	3.92	−4.24	5.95
	1998	−2.50	3.19	−9.35	0.71
	1999	1.29	2.65	−2.65	4.30
	2000	0.18	1.54	−1.23	2.60
	2001	−1.78	2.65	−6.61	1.26
	2002	−0.96	5.82	−9.22	5.28
	2003	6.94	8.09	−4.93	17.05
	2004	6.00	9.54	−7.60	20.24
	2005	7.33	7.12	−4.87	17.68
	2006	−4.53	9.55	−18.88	9.64
	2007	−0.94	7.73	−9.32	8.43
	2008	−7.69	7.99	−19.86	0.51
	2009	−1.23	5.41	−9.43	6.11
	2010	3.56	6.29	−3.31	13.26
	2011	4.98	7.47	−7.32	17.53
	2012	−4.19	9.71	−18.29	7.50
All Years, by Contract	Jan	0.00	6.34	−14.08	17.53
	Mar	1.36	5.57	−9.13	12.12
	Apr	0.14	6.55	−11.47	13.26
	May	1.23	7.45	−8.94	20.24
	Aug	2.45	6.81	−18.29	15.65
	Sep	2.06	6.35	−16.27	17.05
	Oct	−0.35	6.49	−16.90	14.57
	Nov	−1.52	7.74	−19.86	14.14

opinion, and government agencies. The Agricultural Marketing Advisory Service project at the University of Illinois has spearheaded much of the more recent research in this vein (for example Irwin, Good, and Martines-Filho, 2006). These efforts have centered on paid services and not Extension-related outlook information. Kastens, Schroeder, and Plain (1998) evaluate the performance of the annual Extension outlook survey. A number of studies have compared forecast model performance, but few have been conducted in the current volatile market environment.

All of these studies have quantified the performance of forecasts; whether they are tested against an aggregate prediction market (i.e., futures markets to test the efficient market hypothesis) or against other forecasting methods, the outcomes have been a comparison within the same timeframe. This article determines the accuracy of forecasts in the current period to those of previous years.

Kastens, Jones, and Schroeder (1998) report that as a whole (average of all survey responses), Extension forecasts are more accurate for ten out of 12 livestock related predictions than USDA forecasts.[2] When compared with futures markets

[2] The authors note the dismal performance of Extension broiler forecasts but chalk this up to a lack of overall competency in the subject matter.

Table 2. Summary Statistics of Forecast Error for the CME Group Live Cattle Futures Contract ($/cwt)

		Mean	Standard Deviation	Minimum	Maximum
All Contracts, by Year	1990	−1.38	2.95	−5.48	2.79
	1991	−2.06	4.04	−7.51	2.78
	1992	−0.89	3.84	−7.17	2.65
	1993	−0.24	1.63	−2.10	2.74
	1994	−2.43	4.19	−9.67	1.27
	1995	−1.39	3.61	−8.55	1.60
	1996	0.05	4.57	−4.97	7.14
	1997	2.36	2.40	0.30	6.27
	1998	−2.69	4.73	−9.97	2.82
	1999	2.37	2.74	0.36	7.50
	2000	1.51	3.93	−1.26	9.14
	2001	−2.23	5.45	−9.94	6.29
	2002	−0.53	5.82	−10.05	5.73
	2003	8.40	8.81	−0.98	24.48
	2004	1.87	7.38	−9.54	12.07
	2005	1.53	5.06	−4.83	7.39
	2006	−1.26	8.27	−15.02	8.89
	2007	−1.36	4.97	−7.40	3.96
	2008	−5.50	9.79	−17.54	7.68
	2009	−1.88	2.91	−5.11	1.97
	2010	4.97	4.94	−3.84	9.39
	2011	3.78	2.88	−0.59	7.48
	2012	−1.28	6.33	−8.92	5.09
All Years, by Contract	Feb	0.62	4.85	−9.54	7.48
	Apr	−0.81	5.76	−15.02	9.39
	Jun	−0.67	5.00	−9.67	12.07
	Aug	1.41	4.56	−9.97	11.06
	Oct	0.80	7.49	−15.68	24.48
	Dec	−0.87	5.82	−17.54	9.14

for livestock products, Extension forecasts for eight of 15 prices were more accurate. With respect to crops, Extension forecasts become less accurate because these were better predictors for only eight of the 15 forecasts when compared with USDA price and production estimates.[3]

Irwin, Good, and Martines-Filho (2006) report that paid market advisory services did not perform well for corn from 1995 to 2003, providing minimal and insignificant gains to producers. Soybean market information from private services did fare well and gains of approximately $0.15 per bushel above a baseline level were reported. Using a Bayesian approach, Cabrini, Irwin, and Good (2010) report that even skeptical farmers could increase their prices received for corn and soybeans by 1% and 5%, respectively, by using the recommendations of the highest-ranked market service.

Testing Forecast Accuracy: Past versus Present

The efficient market hypothesis provides a conceptual framework for determining the forecast accuracy of futures markets. Fama (1970) states that the futures price is an unbiased estimate of the price for an underlying commodity. This framework implies that expert or modeled forecasts should not be more accurate than futures forecasts based on currently available information. Futures are not efficient

[3] No comparison is reported between Extension forecasts and futures markets for crops.

when alternative forecasts produce smaller errors than futures-based forecasts (this being a necessary, but not sufficient, condition to reject futures market efficiency).

Instances occur in the literature in which futures were outperformed by other forecast instruments, but for the most part, futures markets are the most reliable predictor. As an example of the former, Bessler and Brandt (1992) found that futures market forecasts for cattle were inferior to a vector autoregression predictor model. On the other hand, Irwin, Gerlow, and Liu (1994) found no significant difference between the forecast accuracy of live hog and live cattle futures prices compared with USDA forecasts.

In support of the efficient market hypothesis, Kastens and Schroeder (1996) found that Kansas City July wheat futures outperformed models. Kastens, Schroeder, and Plain (1998) determined the forecast accuracy of grain and livestock futures plus basis forecast was more accurate than other prediction models.

Methods

In light of the body of literature supporting futures market efficiency, I test whether futures price forecasts before contract expiration have been altered in the recent market volatility for three futures commodities: feeder cattle, live cattle, and corn. To do this, the price change, or error, is calculated by subtracting the price forecast at time $t-i$ from the final contract price at expiration, where t is the date of expiration and i is the number of weeks from expiration. Although weekly data are used,

Table 3. Summary Statistics of Forecast Error for the CME Group Corn Futures Contract ($/bushel)

		Mean	Standard Deviation	Minimum	Maximum
All Contracts, by Year	1990	0.03	0.30	−0.38	0.45
	1991	−0.10	0.18	−0.37	0.08
	1992	−0.15	0.22	−0.38	0.20
	1993	0.10	0.22	−0.07	0.49
	1994	−0.31	0.21	−0.53	−0.06
	1995	0.21	0.12	0.13	0.42
	1996	0.42	0.87	−0.71	1.29
	1997	0.01	0.39	−0.64	0.39
	1998	−0.20	0.22	−0.44	0.11
	1999	−0.21	0.17	−0.46	−0.03
	2000	−0.15	0.39	−0.61	0.18
	2001	−0.06	0.14	−0.19	0.17
	2002	−0.01	0.39	−0.41	0.59
	2003	−0.02	0.09	−0.13	0.08
	2004	−0.36	0.57	−0.99	0.43
	2005	−0.09	0.17	−0.29	0.10
	2006	0.21	0.57	−0.37	1.15
	2007	−0.09	0.53	−0.56	0.66
	2008	−0.03	1.60	−2.31	1.45
	2009	−0.21	0.84	−1.46	0.56
	2010	0.33	0.67	−0.48	1.08
	2011	−0.13	1.10	−1.78	1.30
	2012	1.03	1.12	−0.05	2.55
All Years, by Contract	Mar	0.21	0.44	−0.48	1.45
	May	0.06	0.38	−0.56	1.19
	Jul	−0.06	0.54	−0.78	1.29
	Sep	−0.12	0.78	−1.46	2.55
	Dec	−0.09	0.79	−2.31	1.15

Table 4. Forecast Error for the CME Group Feeder Cattle Futures Contract (mean absolute error in $/cwt)

	Mean Absolute Error (Month out)				Mean Absolute Percentage Error (Month out)			
Year	One	Three	Five	Seven	One	Three	Five	Seven
1990	1.63	3.01	4.41	5.38	1.88%	3.45%	5.05%	6.16%
1991	1.65	3.03	3.25	4.31	1.89	3.40	3.65	4.86
1992	1.67	4.71	6.32	6.71	2.02	5.68	7.57	8.03
1993	1.19	2.53	4.52	5.55	1.38	2.93	5.24	6.40
1994	2.17	2.00	3.40	5.33	2.91	2.69	4.52	7.08
1995	1.52	3.01	2.84	5.24	2.26	4.49	4.34	7.93
1996	2.34	4.10	6.13	6.16	4.01	6.90	10.39	10.50
1997	2.60	4.01	5.29	6.76	3.50	5.36	7.04	9.00
1998	1.65	2.68	5.69	7.15	2.29	3.78	7.99	10.08
1999	1.83	2.60	3.24	3.15	2.42	3.43	4.19	4.01
2000	0.94	1.23	1.67	2.43	1.10	1.44	1.95	2.87
2001	1.12	2.37	1.91	1.60	1.29	2.75	2.23	1.86
2002	2.44	4.85	5.37	7.01	3.12	6.21	6.76	8.95
2003	4.23	8.28	9.76	10.61	4.52	8.54	9.93	10.76
2004	5.70	8.93	12.59	17.30	5.57	8.41	11.39	15.86
2005	5.03	8.82	8.45	10.10	4.57	7.89	7.53	8.95
2006	3.53	8.70	8.46	4.87	3.40	8.32	7.86	4.49
2007	4.87	7.02	6.87	9.85	5.20	6.84	6.84	9.74
2008	3.79	7.82	9.06	7.83	3.69	7.91	9.10	7.73
2009	3.06	4.44	7.18	7.80	3.16	4.64	7.53	8.24
2010	3.87	5.30	7.11	5.90	3.58	4.87	6.52	5.32
2011	3.81	7.17	9.74	10.87	2.94	5.50	7.33	8.30
2012	3.78	8.41	11.65	14.04	2.55	5.77	8.01	9.56

to simplify the results, changes in price are reported as months from expiration. Because cattle futures expire on the last business day of the month, for feeder cattle and live cattle futures, the forecasted price from the third week of the month is subtracted from the final weekly average price for the month of contract expiration.[4] Corn futures expire on the business day nearest but not exceeding the 15th of the month, so the price from the first week of each month is compared with the final weekly average price at expiration. The calculations to determine the price were:

$$(1) \qquad \Delta FP_{l,m,t} = FP_{l,m,t} - FP_{l,m,t-i},$$

where FP is the futures price at time t, l specifies the contract (feeder cattle, live cattle, corn), m denotes the contract maturity month, and i is the number of weeks before expiration.

Accuracy of i-step ahead forecast was measured using two common penalty functions: mean absolute error and mean absolute percentage error. To determine whether current price forecasts in i weeks preceding contract expiration were different for the current marketing environment, these error measures are compared across different time periods as opposed to other methods of forecasting as has been done in previous studies. The error calculations used are:

$$(2) \qquad \text{Mean absolute error (MAE)} = \frac{1}{n}\sum\nolimits_{t=1}^{n}\left|e_{l,mt}\right|,$$

$$(3) \qquad \text{Mean absolute percentage error} = \frac{1}{n}\sum\nolimits_{t=1}^{n}\left|\frac{e_{l,m,t}}{A_{l,m,t}}\right|,$$

where e_t in each equation is the error of the forecast, final futures price minus forecasted price, and A_t is the final price at expiration, both

[4] Given that the final weekly average price for the November feeder cattle futures contract would often include the Thanksgiving holiday, November contract forecasts are compared with the weekly average price preceding the holiday.

Table 5. Forecast Error for the CME Group Live Cattle Futures Contract (MAE in $/cwt)

Mean Absolute Error (Month out)				Mean Absolute Percentage Error (Month out)			
One	Three	Five	Seven	One	Three	Five	Seven
4.01	2.33	2.00	1.97	5.48%	3.18%	2.71%	2.67%
3.20	3.87	3.61	3.11	4.46	5.38	5.07	4.35
2.77	2.96	2.74	3.93	3.93	4.16	3.75	5.39
2.04	1.16	1.97	2.62	2.77	1.50	2.48	3.37
1.43	2.90	3.79	4.29	2.12	4.41	5.66	6.43
2.87	1.95	2.43	2.38	4.35	2.99	3.74	3.67
2.59	3.49	4.23	4.75	3.95	5.32	6.39	7.08
2.08	2.36	3.15	3.38	2.97	3.40	4.55	4.88
3.51	4.23	5.11	7.24	5.49	6.90	8.31	11.71
2.08	2.37	2.75	2.49	3.08	3.45	4.00	3.62
2.14	2.48	2.15	3.17	2.87	3.30	2.90	4.35
2.48	4.33	5.35	5.00	3.54	6.13	7.52	7.06
2.73	4.44	3.93	5.21	4.10	6.60	5.81	7.66
4.94	8.73	11.45	12.84	5.66	9.89	12.93	14.57
2.89	5.41	5.44	8.14	3.34	6.40	6.26	9.47
2.95	4.27	3.61	3.08	3.37	4.84	3.93	3.38
3.23	6.23	5.67	4.29	3.78	7.42	6.72	5.03
2.19	3.93	2.87	3.58	2.37	4.27	3.05	3.82
3.57	8.57	11.00	9.21	3.83	9.47	12.13	10.16
1.30	2.64	6.29	9.55	1.53	3.15	7.61	11.40
3.84	6.26	7.08	7.57	3.95	6.42	7.17	7.67
3.09	3.98	4.99	7.93	2.67	3.44	4.26	6.86
3.22	5.07	6.24	6.60	2.66	4.20	5.19	5.48

at time, t, which are weekly from 1990 to 2012 for all contract months.

These measurements are then used to test the hypothesis that error before the current market environment is statistically different from error currently being experienced. More specifically, for feeder cattle and live cattle futures contracts, the reliability of futures price predictions before expiration are compared from 1990–2002 versus 2003–2012. These two time periods are compared using a nonpooled t test in which the null hypothesis is that the two periods are equal (H_0: $mu_{1990–2002} - mu_{2003–2012} = 0$). Similarly, the reliability of the corn prediction i number of weeks out is tested in the same manner only the break occurs from 2005 to 2006. The determination of the breaks for these three contracts resulted from visual appraisal of each series. The point in time that the error began to spread was the determinant of the break.

Forecasts of cash prices can stem from multiple sources. A common resource is to the use the futures price plus a historical basis value (basis at time t equals a local cash price at time t minus the futures price at time t). In this manner, a predicted cash price can be derived by using the current futures price for the contract month nearest the expected time of marketing plus the historical basis.[5]

Following the work of Kastens, Jones, and Schroeder (1998), I test the accuracy of the basis for four different commodities (feeder cattle, fed cattle, corn, and cotton) to determine the accuracy of current forecasts to previous forecast accuracy. Accuracy is measured in three ways: MAE, mean absolute percentage error, and root mean squared error. Each of these measures are found using equations (2) and (3) as well as:

$$(4) \qquad \text{Root mean squared error} = \frac{\left(\sqrt{\frac{1}{n}\sum_{t=1}^{n} e^2}\right)}{\left(\frac{1}{n}\sum_{t=1}^{n} A_t\right)},$$

where e_t is the error, actual basis minus forecasted basis, and A_t is the actual price of the

[5] Barring a contract month that expires before the time of the cash transaction.

commodity, both at time, t, which are weekly for 1990 to 2012 for all commodities excluding cotton, which was monthly.

Forecasts are made for 700- to 799-pound medium and large #1 feeder cattle at Oklahoma City; the five-area regional fed steer price (i.e., slaughter steer); #2 yellow corn in Omaha, Nebraska; and the Cotlook "A" Index cotton price. Price forecast for these four commodities was derived using a historical basis where basis is cash price minus futures price. For feeder cattle and fed cattle basis, a 3-year and 4-year average basis was used, respectively, following the findings of Tonsor, Dhuyvetter, and Mintert (2004). A 5-year average basis was used for both corn and cotton following the work of Dhuyvetter and Kastens (1998).

Data

Feeder cattle prices for Oklahoma City were from various USDA Agricultural Marketing Service (AMS) *Oklahoma City Weekly Feeder Cattle Weighted Average Summary* and compiled by the Livestock Marketing Information Center (LMIC). Fed cattle prices were from various USDA AMS *Five Area Weekly Weighted Average Direct Slaughter Cattle Summary* reports and compiled by the LMIC. Omaha, Nebraska corn prices were from USDA AMS *Omaha-Council Bluffs Grain Summary.* Monthly Cotlook "A" index cotton prices were compiled by the National Cotton Council (National Cotton Council). Feeder cattle, live cattle, and corn futures prices were from the CME Group and cotton futures prices were from the Intercontinental Exchange and all were compiled by the Commodity Research Bureau. Feeder cattle futures, live cattle futures, OKC feeder steers, five-area fed steers, and Omaha corn prices were weekly from January 1990 to November 2012 (prices during 1989 for futures contracts expiring in 1990 were also used). The "A" Index cotton price was monthly from January 1990 to November 2012. For simplicity in discussing the results, errors of futures price changes are framed as "months" prior to expiration even though the changes are based on weekly data.

Table 6. Forecast Error for the CME Group Corn Futures Contract (MAE in $/bu)

	Mean Absolute Error (Month out)				Mean Absolute Percentage Error (Month out)			
Year	One	Three	Five	Seven	One	Three	Five	Seven
1990	0.11	0.22	0.34	0.28	4.14%	8.32%	13.25%	10.82%
1991	0.11	0.13	0.14	0.13	4.51	5.67	5.88	5.47
1992	0.08	0.23	0.27	0.23	3.40	9.46	11.75	10.12
1993	0.12	0.13	0.17	0.15	4.64	4.79	6.36	5.86
1994	0.17	0.31	0.40	0.33	6.66	12.81	16.73	14.06
1995	0.07	0.21	0.29	0.36	2.59	7.17	10.06	12.31
1996	0.37	0.79	1.00	1.17	7.81	18.97	23.87	27.14
1997	0.21	0.27	0.21	0.17	7.62	10.07	7.81	6.02
1998	0.06	0.25	0.42	0.44	2.88	11.04	19.03	20.21
1999	0.12	0.21	0.25	0.30	6.18	10.98	12.81	15.10
2000	0.12	0.31	0.31	0.35	6.27	16.10	16.33	17.95
2001	0.08	0.13	0.12	0.19	4.00	6.25	5.94	9.08
2002	0.15	0.30	0.25	0.29	5.96	12.61	10.82	13.03
2003	0.12	0.08	0.17	0.15	5.22	3.21	7.12	6.15
2004	0.28	0.53	0.60	0.59	11.03	22.92	26.18	25.85
2005	0.14	0.15	0.22	0.23	6.56	7.44	11.01	11.61
2006	0.10	0.36	0.33	0.38	3.51	12.17	11.21	13.03
2007	0.20	0.46	0.71	0.74	5.52	12.46	18.66	19.82
2008	0.50	1.32	2.10	2.00	10.11	28.82	46.90	40.85
2009	0.30	0.65	0.70	1.03	8.85	19.25	20.03	28.59
2010	0.25	0.53	0.67	0.61	5.65	11.52	13.93	12.66
2011	0.44	0.70	0.91	1.40	6.72	11.18	13.29	20.69
2012	0.66	1.06	0.99	1.04	8.79	14.02	13.29	13.99

Table 7. Feeder Cattle Futures Contract Forecast Error Changes, by Contract Expiration Month ($/cwt)

	MAE: 1990–2002	MAE: 2003–2012	*p* Value
	one month out		
January	2.29	4.35	7.0%
March	1.52	3.94	8.7
April	2.06	6.43	6.4
May	2.27	4.27	32.6
August	1.69	3.55	4.2
September	1.46	3.84	11.8
October	1.01	4.26	1.0
November	1.70	2.69	27.1
Aggregate MAE	1.75	4.17	0.0
	three months out		
January	2.89	6.55	12.0
March	3.04	6.50	4.3
April	3.58	7.28	7.3
May	4.04	8.04	11.6
August	3.72	6.90	29.6
September	2.46	7.51	3.9
October	2.40	7.77	1.3
November	2.56	9.37	1.4
Aggregate MAE	3.09	7.49	0.0
	five months out		
January	3.81	10.61	2.5
March	3.57	5.90	30.8
April	4.04	9.29	5.4
May	4.90	7.95	17.9
August	4.92	9.89	21.0
September	4.85	10.06	14.1
October	3.59	8.96	8.2
November	3.57	10.04	3.5
Aggregate MAE	4.16	9.09	0.0
	seven months out		
January	4.71	10.10	10.9
March	4.87	8.07	26.3
April	5.50	10.36	14.8
May	5.49	6.94	54.3
August	5.86	11.37	18.0
September	5.47	11.78	11.2
October	4.35	10.51	10.2
November	4.84	10.21	9.5
Aggregate MAE	5.14	9.92	0.6

MAE, mean absolute error.

Results

Summary statistics are provided for the change in futures price at expiration from price forecasted three months before expiration.[6] These are located in Tables 1–3 for feeder cattle futures, live cattle futures, and corn futures, respectively. There is little intuitive information to glean from mean reported in Tables 1–3 given that positive errors will tend to cancel out the

Table 8. Live Cattle Futures Contract Forecast Error Changes by Contract Expiration Month ($/cwt)

	MAE: 1990–2002	MAE: 2003–2012	*p* value
	one month out		
February	3.47	2.86	57.4%
April	2.65	3.39	54.5
June	2.19	3.29	20.6
August	2.09	3.19	32.4
October	2.48	3.48	58.6
December	2.77	2.43	73.1
Aggregate MAE	2.61	3.12	15.4
	three months out		
February	3.10	5.16	12.7
April	3.29	5.61	28.9
June	3.00	5.06	21.5
August	2.43	4.36	32.0
October	3.15	7.08	23.0
December	2.97	5.88	23.7
Aggregate MAE	2.99	5.51	0.4
	five months out		
February	2.67	6.24	20.6
April	3.15	6.48	11.9
June	3.12	4.65	50.0
August	3.39	5.45	31.7
October	3.47	7.45	23.1
December	4.14	8.77	15.0
Aggregate MAE	3.32	6.46	0.9
	seven months out		
February	3.27	7.84	16.5
April	4.02	8.51	5.9
June	2.94	5.44	17.9
August	3.83	5.56	42.4
October	4.22	7.74	30.5
December	4.58	8.79	16.3
Aggregate MAE	3.81	7.28	0.9

MAE, mean absolute error.

[6] Other periods before expiration are available, but for the sake of space only, the statistics for three months out are shown.

impact of negative errors. Of note, for feeder cattle futures, as the length of time away from contract expiration grows, there is a slight increase in the standard deviation of forecast errors for more current years compared with more distant years.

Tables 4–6 denote the accuracy of futures price predictions in months before expiration for four time horizons (one month out, three months out, five months out, and seven months out). Figure 2 may better depict these results. On the left side of Figure 2 are the MAE results for the three futures commodities measured. It is noticeable that the MAE is smaller from 1990–2002 for the cattle futures and from 1990–2005 for corn futures. Following these periods, the error increases (quite dramatically for corn). On the other hand, the raw increase in prices apparent in the left-hand side of Figure 2 is less noticeable when adjusted for price level. In other words, the mean absolute percentage error is muted, especially for the two cattle contracts.

Tests to determine the statistical significance of current prediction errors of futures in months before expiration are provided in Tables 7–9. Table 7 provides the nonpooled *t* test results for each feeder cattle futures contract at multiple periods before contract expiration. Predictions one and three months out from 2003–2012 are shown to be statistically different at the 10% confidence interval or higher for five of the eight contract months. As the forecast horizon lengthens, the significance of pre- and post-2003 time periods becomes less prevalent. For a 5-month prediction of feeder futures, four of the eight contracts are significantly different from 1990 to 2002.

Table 9. Corn Futures Contract Forecast Error Changes by Contract Expiration Month ($/bushel)

	MAE: 1990–2002	MAE: 2003–2012	*p* value
	one month out		
March	0.09	0.15	40.9%
May	0.17	0.08	0.5
July	0.26	0.76	10.2
September	0.13	0.33	2.2
December	0.07	0.38	2.3
Aggregate MAE	0.14	0.35	3.1
	three months out		
March	0.17	0.64	5.3
May	0.23	0.28	72.0
July	0.37	0.49	48.5
September	0.31	1.00	7.4
December	0.25	1.26	1.5
Aggregate MAE	0.26	0.73	1.0
	five months out		
March	0.17	0.98	3.8
May	0.29	0.71	10.9
July	0.39	0.64	30.9
September	0.37	0.90	5.3
December	0.39	1.39	18.4
Aggregate MAE	0.32	0.91	3.4
	seven months out		
March	0.26	1.37	3.6
May	0.28	0.87	12.2
July	0.38	0.95	13.3
September	0.35	0.78	8.8
December	0.41	1.20	11.5
Aggregate MAE	0.33	1.03	1.3

MAE, mean absolute error.

Table 10. Summary Statistics of Basis Forecast Error for Oklahoma City 700–799 lb Steers ($/cwt)

	Mean	Standard Deviation	Minimum	Maximum
1993	0.09	1.36	−3.61	2.79
1994	0.29	1.21	−2.77	2.50
1995	0.23	1.54	−4.40	4.57
1996	−0.73	1.32	−3.52	2.53
1997	−0.27	1.35	−3.33	2.75
1998	−1.05	1.35	−4.05	1.73
1999	−0.08	1.63	−5.53	5.62
2000	1.27	1.51	−2.59	3.98
2001	1.42	1.93	−3.62	6.35
2002	0.21	1.42	−2.90	3.64
2003	0.74	1.79	−4.93	6.29
2004	1.80	1.93	−3.21	7.13
2005	0.39	2.58	−5.31	8.51
2006	−1.41	2.31	−6.97	2.89
2007	−1.87	2.20	−8.17	1.59
2008	−1.38	1.80	−6.36	2.38
2009	0.01	1.62	−3.11	4.40
2010	0.07	1.76	−3.44	4.90
2011	0.21	1.83	−3.27	4.26
2012	−0.76	2.87	−7.24	5.31

Seven-month forecasts are not different across the two time periods for any contract month but the aggregated mean absolute error (combining all contract months for each time period) was significantly different from each other.

Not surprisingly based on the visual depiction in Figure 2, for the MAE of the live cattle contract, only one of the six of contract months (the 7-month forecast) was significantly different than the period from 1990 to 2002.

Corn futures prediction accuracy from 2006 to 2012 was shown to have decreased compared with 1990–2005. Two of the five contract months for 1-, 5-, and 7-month ahead absolute forecast errors were statistically larger from 2006 to 2012 compared with 1990–2005. The 3-month forecast error was larger for three of the five contract months. Surprisingly, the May corn contract revealed a smaller absolute error for the 1-month out forecast in the more recent time period.

Tables 10–13 provide the summary statistics of basis prediction error for the four commodities/locations measured. Table 14 shows the results of the accuracy measures used in this analysis for these basis forecasts (MAE, mean absolute percentage error, and root mean squared error). The results of the basis forecast for Oklahoma City steers, fed steers, and Omaha

Table 11. Summary Statistics of Basis Forecast Error for Five-Area Fed Steers ($/cwt)

	Mean	Standard Deviation	Minimum	Maximum
1994	−1.32	1.84	−7.22	2.58
1995	0.26	1.65	−3.25	4.03
1996	−0.71	2.97	−7.25	5.09
1997	−0.53	1.72	−5.51	2.22
1998	−0.90	2.25	−7.12	3.24
1999	−0.03	1.82	−4.07	4.36
2000	0.20	2.05	−4.07	4.55
2001	0.50	2.23	−5.88	5.13
2002	−0.62	2.35	−4.60	6.19
2003	2.45	3.30	−4.40	12.48
2004	0.79	3.05	−6.60	10.22
2005	0.06	1.86	−3.75	4.17
2006	−0.35	2.54	−5.96	4.30
2007	−1.90	2.39	−8.40	1.92
2008	−0.59	2.95	−4.63	8.03
2009	−0.14	1.84	−5.51	3.83
2010	0.58	2.37	−4.07	5.56
2011	0.61	2.48	−4.82	6.81
2012	0.79	2.50	−5.27	8.00

Table 12. Summary Statistics of Basis Forecast Error for Omaha, NE, Corn ($/bushel)

	Mean	Standard Deviation	Minimum	Maximum
1995	−0.01	0.05	−0.11	0.11
1996	0.15	0.37	−0.53	1.40
1997	−0.10	0.10	−0.45	0.09
1998	−0.12	0.14	−0.50	0.04
1999	−0.15	0.16	−0.72	0.12
2000	−0.11	0.12	−0.46	0.16
2001	−0.06	0.09	−0.30	0.11
2002	0.09	0.08	−0.02	0.32
2003	0.13	0.05	0.00	0.25
2004	0.02	0.12	−0.21	0.26
2005	−0.14	0.12	−0.37	0.03
2006	−0.09	0.08	−0.24	0.12
2007	0.02	0.11	−0.24	0.26
2008	−0.02	0.19	−0.59	0.36
2009	0.08	0.13	−0.23	0.29
2010	0.01	0.15	−0.38	0.26
2011	0.12	0.21	−0.35	0.67
2012	0.28	0.19	−0.12	0.62

Table 13. Summary Statistics of Basis Forecast Error for ‘A’ Index Cotton (cents/lb)

	Mean	Standard Deviation	Minimum	Maximum
1995	3.02	2.45	−0.61	9.00
1996	0.01	2.26	−2.92	3.62
1997	4.56	1.23	1.90	6.47
1998	−7.10	5.66	−12.99	3.64
1999	−4.90	2.75	−7.82	−0.11
2000	−2.80	2.98	−10.00	1.05
2001	4.52	1.67	1.97	7.94
2002	3.64	2.60	−1.08	6.32
2003	2.95	2.11	−0.65	6.63
2004	4.49	2.00	1.02	8.06
2005	1.11	1.74	−2.31	3.56
2006	1.38	2.37	−1.68	5.44
2007	2.14	1.25	−0.91	3.36
2008	2.82	3.13	−1.52	7.16
2009	−0.92	3.67	−6.23	4.28
2010	4.19	7.48	−3.90	21.09
2011	8.50	10.34	−3.98	23.12
2012	0.13	3.20	−5.88	6.31

corn error follow closely with the measures for feeder cattle, live cattle, and corn futures. The mean absolute and root mean squared errors tend to be smaller in previous years compared with more recent errors. On the other hand, the percent error changes overtime are more noticeable than those reported for futures contracts.

Cotton basis error is similar to corn basis. The major difference is that the error associated with corn basis spiked in 1996, whereas cotton error spiked in 1998; however, both data series once again spiked in the late 2000s.

Tables 15–18 report the *p* values associated with the nonpooled *t* test comparing the mean absolute basis error across all years. For example, the value at the intersection of the first row and second column of Table 15 (row 1993 and column 1995) reveal a *p* value of 0.9%, indicating that the mean basis error in the two years was statistically different from each other at the 0.9% level.

In contrast, the basis error for Oklahoma City feeder steers showed little consistency in being different for recent years compared with prior years; the five-area fed price does depict a more consistent trend in this regard. The columns for 2009, 2011, and 2012 in Table 16 reveal that, respectively, 12, 11, and 12 of the 18 total years are statistically different from previous years at the 10% or higher level. However, a closer examination of these results, referring to Table 16, indicates that all of the statistically different basis error measures are larger in previous years as compared with 2009. This result is mixed for 2010 and 2012, which indicate six of 11 error measures are smaller in 2010 and six of 12 are smaller in 2012. The basis error present in 2003 tended to trump most other years but keep in mind this was a period of strong basis values in the industry leading up to the discovery of bovine spongiform encephalopathy (BSE) in the United States.

From Table 17, the statistical difference of corn basis at Omaha is shown to be more consistently different post-2007 compared with years prior. Basis error in 2007, 2008, 2010,

Table 14. Basis Forecast Error for Various Commodities

	OKC Feeder Steers			Five-Area Fed Steers			Omaha Corn			'A' Index Cotton		
	MAE	MAPE	RMSE	MAE	MAPE	RMSE	MAE	MAPE	RMSE	MAE	MAPE	RMSE
1993	1.03	1.17%	1.32									
1994	0.98	1.24	1.25	1.77	2.61%	2.26						
1995	1.23	1.80	1.54	1.34	2.02	1.66	0.04	1.54%	0.05	3.15	3.21%	3.48
1996	1.18	1.95	1.50	2.33	3.65	3.05	0.21	4.90	0.40	1.91	2.38	2.16
1997	1.08	1.40	1.36	1.29	1.97	1.80	0.11	4.39	0.14	4.56	5.76	4.71
1998	1.39	1.93	1.69	1.86	2.99	2.43	0.13	6.73	0.18	7.72	11.83	8.93
1999	1.01	1.32	1.43	1.47	2.25	1.82	0.16	9.15	0.22	4.90	9.22	5.56
2000	1.67	1.89	1.95	1.73	2.48	2.05	0.13	7.62	0.17	2.98	5.04	4.00
2001	1.88	2.07	2.38	1.70	2.34	2.23	0.08	4.32	0.11	4.52	9.43	4.80
2002	1.11	1.37	1.42	1.96	2.92	2.42	0.09	4.02	0.12	3.85	8.47	4.21
2003	1.42	1.52	1.92	3.06	3.51	4.09	0.13	5.63	0.14	3.05	4.82	3.57
2004	2.06	1.90	2.62	2.29	2.71	3.13	0.10	4.63	0.12	4.49	7.24	4.88
2005	2.03	1.79	2.59	1.54	1.78	1.84	0.15	8.64	0.19	1.68	3.04	2.01
2006	2.10	1.91	2.68	2.14	2.52	2.56	0.10	4.72	0.12	2.01	3.42	2.66
2007	2.16	1.98	2.87	2.42	2.63	3.07	0.09	2.58	0.11	2.29	3.55	2.45
2008	1.79	1.69	2.25	2.40	2.59	3.01	0.14	2.94	0.19	3.27	4.53	4.12
2009	1.26	1.31	1.60	1.40	1.68	1.85	0.13	3.69	0.15	3.20	5.10	3.64
2010	1.36	1.23	1.74	1.97	2.08	2.43	0.12	3.07	0.15	5.20	4.94	7.92
2011	1.52	1.13	1.82	2.04	1.76	2.55	0.18	2.68	0.24	9.80	6.29	12.46
2012	2.37	1.59	2.93	2.03	1.66	2.59	0.29	4.12	0.33	2.24	2.47	3.03

Note: OKC steer and 5-area fed error are in $/cwt; Omaha corn error is in $/bushel; cotton error is in cents/lb.
OKC, Oklahoma City; MAE, mean absolute error; MAPE, mean absolute percentage error; RMSE, root mean square error.

Table 15. Probability Values Comparing Weekly Mean Absolute Error of Oklahoma City 700- to 799-lb Steer Basis Across Years

	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1993	72.6%	**0.9%**	**0.4%**	25.4%	**0.2%**	52.6%	**0.1%**	**0.1%**	32.6%	13.6%	**0.4%**	**1.6%**	**0.5%**	**0.6%**	**2.4%**	48.9%	76.4%	82.3%	**6.2%**
1994		2.1	**0.8**	42.7	0.5	73.3	**0.3**	**0.2**	52.1	23.6	**0.9**	**3.2**	**1.2**	**1.2**	**5.3**	72.5	96.5	55.2	12.1
1995			60.8	11.3	62.9	**8.3**	71.4	35.8	**9.1**	30.7	71.6	98.2	71.0	55.9	69.7	**5.1**	**2.1**	**0.4**	44.1
1996				**4.6**	95.5	**3.5**	83.2	69.7	**3.7**	14.5	87.1	60.8	89.0	91.6	37.7	**2.0**	**0.8**	**0.2**	21.6
1997					**3.8**	73.3	**3.2**	**1.7**	89.1	63.5	**5.4**	14.2	**6.2**	**5.4**	23.0	67.0	41.0	15.6	42.1
1998						**2.9**	87.1	64.2	**3.0**	13.7	91.0	62.9	92.9	87.1	38.1	**1.5**	**0.5**	**0.1**	21.0
1999							**2.6**	**1.3**	82.8	46.0	**4.1**	10.3	**4.6**	**4.0**	16.4	97.3	70.9	40.1	29.9
2000								51.5	**2.4**	14.1	97.1	71.1	95.4	75.6	42.4	**1.1**	**0.3**	**0.0**	22.3
2001									**1.3**	**6.5**	57.1	36.7	59.6	79.6	19.8	**0.7**	**0.2**	**0.0**	10.1
2002										55.3	**4.3**	11.6	**5.0**	**4.4**	18.9	77.6	50.0	21.2	35.6
2003											17.5	34.3	18.4	14.6	51.4	39.3	22.7	**8.3**	77.7
2004												71.2	98.3	79.5	45.3	**2.3**	**0.9**	**0.1**	26.2
2005													70.6	56.0	72.8	**7.0**	**3.1**	**0.8**	47.9
2006														81.5	45.7	**2.8**	**1.1**	**0.2**	27.0
2007															35.6	**2.6**	**1.2**	**0.3**	21.2
2008																11.4	**5.1**	**1.1**	70.0
2009																	69.7	34.4	23.2
2010																		59.2	11.7
2011																			**3.2**

Values in bold indicate significance at the 10% level or higher.

Table 16. Probability Values Comparing Weekly Mean Absolute Error of Five-Area Fed Steer Basis Across Years

	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1994	12.6%	**6.5%**	13.2%	43.0%	37.2%	72.9%	53.3%	48.2%	**7.7%**	84.0%	**2.4%**	82.9%	95.5%	96.7%	**1.7%**	16.3%	**2.3%**	**1.2%**
1995		**0.1**	87.5	**2.0**	47.1	14.1	37.0	**1.5**	**0.1**	10.0	37.1	12.5	**9.2**	10.9	25.5	85.9	35.1	20.6
1996			**0.3**	25.8	**0.9**	**2.5**	**1.9**	18.5	82.6	11.1	**0.0**	3.5	**6.8**	**5.5**	**0.0**	**0.3**	**0.0**	**0.0**
1997				**2.5**	44.0	15.8	35.1	**2.1**	**0.2**	10.5	56.8	13.9	10.2	11.9	41.9	75.8	53.9	36.7
1998					**9.0**	22.4	16.0	87.9	32.2	58.0	**0.3**	28.5	44.6	38.7	**0.2**	**2.9**	**0.3**	**0.1**
1999						49.8	81.2	**8.3**	**0.7**	29.3	11.0	43.4	31.6	36.3	**7.6**	57.7	10.7	**5.6**
2000							71.5	23.4	**2.3**	58.3	**1.5**	88.6	66.6	74.6	**1.0**	19.2	**1.5**	**0.6**
2001								16.6	**1.7**	42.8	**9.5**	63.5	47.9	53.7	**6.6**	45.4	**9.2**	**5.1**
2002									22.7	65.3	**0.1**	30.8	50.0	43.0	**0.1**	**2.2**	**0.1**	**0.1**
2003										13.4	**0.0**	**3.7**	**7.8**	**6.2**	**0.0**	**0.2**	**0.0**	**0.0**
2004											**2.2**	67.3	87.6	80.2	**1.6**	13.2	**2.1**	**1.2**
2005												**1.4**	**1.2**	**1.5**	72.1	27.3	93.7	63.7
2006													77.1	85.3	**1.0**	16.9	**1.5**	**0.7**
2007														91.8	**1.0**	12.4	**1.3**	**0.7**
2008															**1.1**	14.5	**1.6**	**0.8**
2009																18.7	78.6	92.7
2010																	26.2	14.7
2011																		70.5

Values in bold indicate significance at the 10% level or higher.

Table 17. Probability Values Comparing Weekly Mean Absolute Error of Omaha, NE, Corn Basis Across Years

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1995	**0.1%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**0.1%**	**0.1%**	**0.0%**	**0.0%**	**0.1%**	**0.0%**
1996		65.3	22.3	**1.2**	**6.3**	62.1	42.5	50.1	81.4	**1.2**	87.1	**3.2**	**7.6**	26.3	**8.9**	**4.2**	47.4
1997			**5.2**	**0.1**	**0.5**	93.3	57.4	**4.7**	75.5	**0.0**	63.5	**0.2**	**2.4**	25.3	**2.6**	**0.5**	67.2
1998				15.9	55.4	**5.4**	**2.4**	34.4	**9.2**	21.0	**9.6**	**0.1**	**0.2**	**1.0**	**0.2**	**0.1**	**2.7**
1999					36.5	**0.1**	**0.0**	**1.3**	**0.3**	76.3	**0.3**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.1**
2000						**0.7**	**0.2**	**7.5**	**1.3**	49.2	**1.3**	**0.0**	**0.0**	**0.1**	**0.0**	**0.0**	**0.2**
2001							66.4	**5.3**	70.7	**0.0**	59.5	**0.7**	**4.5**	33.9	**5.2**	**1.3**	76.5
2002								**0.4**	39.1	**0.0**	27.2	**0.6**	6.1	55.2	**6.9**	**1.3**	85.2
2003									13.5	**0.7**	12.5	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.4**
2004										**0.1**	90.1	**0.2**	**1.5**	16.0	**1.7**	**0.4**	46.0
2005											**0.1**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**	**0.0**
2006												**0.0**	**0.4**	**8.0**	**0.4**	**0.1**	32.5
2007													42.7	**1.0**	21.4	80.5	**0.1**
2008														13.5	78.9	58.9	**2.7**
2009															15.7	**2.8**	39.1
2010																36.1	**2.6**
2011																	**0.3**

Values in bold indicate significance at the 10% level or higher.

Table 18. Probability Values Comparing Weekly Mean Absolute Error of 'A' Cotton Basis across Years

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
1995	19.9%	10.7%	**0.6%**	54.0%	46.9%	14.2%	79.6%	67.2%	**2.9%**	50.0%	19.9%	57.5%	89.2%	77.7%	31.8%	**0.9%**	78.2%
1996		**0.0**	**0.0**	**1.2**	52.2	**0.0**	**4.7**	22.0	**0.0**	37.5	90.0	16.9	17.6	13.8	13.2	**0.3**	37.9
1997			**4.4**	21.7	**0.2**	94.3	**8.5**	**0.3**	23.8	**0.1**	**0.0**	**0.0**	**3.1**	**0.4**	66.3	**2.4**	**5.6**
1998				**2.4**	**0.3**	**7.0**	**1.5**	**0.5**	26.0	**0.4**	**0.2**	**0.4**	**0.8**	**0.6**	56.6	15.8	**0.8**
1999					12.3	31.2	68.3	20.9	**6.0**	11.9	2.5	12.9	40.6	26.9	44.0	**1.3**	38.0
2000						**1.0**	25.7	68.3	**0.1**	90.7	50.9	73.4	51.7	55.6	19.2	**0.4**	71.1
2001							14.8	**1.5**	26.8	**0.6**	**0.1**	**0.5**	**6.5**	**2.2**	65.4	**2.5**	**8.6**
2002								41.5	**2.6**	26.5	7.0	30.1	66.1	51.1	36.1	**1.0**	58.6
2003									**0.2**	74.3	24.6	88.7	75.6	84.7	23.5	**0.6**	94.2
2004										**0.2**	**0.0**	**0.2**	**1.3**	**0.5**	96.2	**5.2**	**1.8**
2005											38.6	80.7	55.1	59.4	20.0	**0.5**	76.2
2006												22.2	19.0	17.0	12.8	**0.3**	36.9
2007													64.0	70.5	21.6	**0.5**	86.4
2008														88.2	28.6	**0.7**	86.6
2009															25.7	**0.6**	95.0
2010																11.2	28.8
2011																	**2.1**

Values in bold indicate significance at the 10% level or higher.

and 2011 was statistically different for 14, 13, 13, and 14 of the 17 years, respectively. Furthermore, for 2008, 2010, and 2011, basis was typically larger by comparison (the results were mixed for 2007).

Cotton basis error is shown to have periods of large basis error. The years that are most prevalent are 1998, 2001, 2004, and 2011. Referring to Table 18, 1998 and 2011 are shown to have the highest level of basis error since 1990 ($0.0772 and $0.980 cents per pound, respectively, for the MAE). Furthermore, 2001 and 2004 recorded the sixth and seventh highest basis error measures according to Table 18.

Implications for Extension Marketing Education

The environment that agricultural producers operate in today is one marked by higher price levels placing increased strains related to capital requirements for agricultural industry participants as well as other business-related issues. Furthermore, the market environment has become more volatile, which adds to the complexity of the situation. Still, academia and, more specifically, Extension agricultural economists are often a source of information for these producers as well as policymakers, industry stakeholders, and many others. Traditionally, the information that Extension provided has been outlook-related. Unfortunately, this message has become difficult to disseminate with a high degree of reliability given the current market environment. For example, this study has shown that feeder cattle and corn futures prices are less reliable as price predictors today than five or ten years ago. When decisions are made based on this information at the producer level, the results could be detrimental. Based on this, further research for other commodities is warranted.

Beyond this point, it should be noted that a change in the message from Extension marketing specialists, and all agricultural economists in academia, is warranted as well. Predicting prices has always been difficult. Today this rings ever more true. In light of the current market environment, the message should be one of evolving as managers to become better aware of the challenges in the business of agriculture, more adept at managing risks, and more cognizant of seizing opportunities that are present as opposed to trying to predict the highs in the market.

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