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FORWARD PRICING STRATEGIES FOR THE SOUTH CENTRAL ILLINOIS CORN PRODUCER

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ABSTRACT

Price volatility, coupled with current agricultural economic conditions, has induced a need for grain farmers to develop pricing strategies that take advantage of favorable pricing opportunities when they occur rather than being "price takers" at harvest delivery. This paper identifies eighteen pricing strategies, evaluates them over a four-year historical optimization period, and compares the average price received to the cash delivery price at harvest. Twelve of the strategies resulted in an average net price higher than the harvest delivery base.

The strategies were then tested with a fifth year of data to evaluate their effectiveness outside the optimization period. Only one of the twelve optimum strategies from the historic period produced a lower net price in the 1984 test period than the harvest delivery price. The strategy with the highest four-year average price resulted in a premium of at least 50 cents per bushel every year in the historical optimization period, and produced a premium of 43 cents again in the test period.

Key Words: Marketing strategies, Hedging, Forward pricing, Price optimization

INTRODUCTION

For years Midwestern corn and soybean farmers have faithfully planted seed in the spring and reaped the harvest in the fall. At or following harvest they have taken their grain to the local elevator and accepted the price offered that day. In accordance with basic economic principles concerning a purely competitive industry, the farmer has traditionally performed as a price taker. Today, economic pressures are forcing producers to take a second look at the price they receive for their products, and to determine what is and is not acceptable. Within the last five years alone, weather-driven markets, coupled with government programs, have caused the cash delivery market price of corn in South Central Illinois to range from $2.05 to $3.82 per bushel. Such price volatility increases the difficulty for a producer to lock-in a profit, and yet, increases the

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need to do so. If the producer does not have storage available and is constrained to harvest delivery, then some type of forward pricing or hedging strategy is the only alternative to being a price taker, normally at or near the lowest level for the season. This paper evaluates several pricing alternatives for the prudent corn producer who wishes to price his crop for harvest delivery.

PROBLEM STATEMENT

Stating that corn producers need to have a marketing strategy is much easier than clearly defining strategies that will achieve the desired objectives. Several studies have identified and analyzed alternative marketing strategies for hogs (Leuthold & Peterson, Irwin & Uhrig, Peterson & Leuthold), cattle (McCoy & Price, Purcell, Hague, & Holland, Irwin & Uhrig), and corn (Greenhall, Tauer, & Tomek), but have generally been limited in number of alternative pricing signals used. Peterson and Leuthold concluded in their 1982 study that the hog futures market between 1973 and 1977 failed the weak form test of market efficiency for all twenty trading strategies, implying there is a nonrandom price movement. Researchers have often concluded that routine hedging reduces price variability, but often does not increase net price. Only two of Kenyon and Cooper's (1980) nine strategies for hedging corn produced an average price greater than the unhedged harvest price which was used as a base. Purcell, Hague, and Holland concluded in 1972 that hedging strategies can be developed to decrease price risk without costly decreases in the mean value of net returns. Peterson and Leuthold demonstrated in 1982 that mechanical trading strategies could produce consistent profits. Irwin and Uhrig (1984) point out that increasing emphasis is being placed on technical trading systems for producer hedging.

There are a number of pricing tools available to the producer, but few of them have been consistently evaluated over time to document which methods will produce the best results, and when the best time is to use each instrument. Faced with contradicting recommendations in the popular press, producers often turn to those in academia or commercial consulting firms for assistance. The purpose of this paper is to focus on the evaluation of a comprehensive list of marketing strategies for corn in South Central Illinois.

OBJECTIVES

There were three major objectives for this study. The first objective was to identify marketing strategies that would increase the average net price received by a South Central Illinois corn producer, utilizing pricing opportunities available in that area. The focus of the study is on actions which managers can take as an independent producer to hedge corn prior to delivery, and thus obtain a premium price for the commodity.

The second objective was to evaluate these marketing strategies over a historical optimization period to select the parameters and price patterns that would maximize the average net price for each strategy. The third objective was to select those strategies that produced a premium net realized price to an

unhedged harvest delivery price, and to test these strategies for performance in an out-of-sample year. Performance of the strategies is measured by the ability to yield a net price equal to or greater than the unhedged harvest delivery price.

METHODOLOGY

Identification of marketing strategies requires specification of three components: a place and time of delivery, a pricing instrument, and a pricing signal. For this study, harvest delivery at a river terminal representative of the area in South Central Illinois was used as the time and place of delivery for all strategies. The pricing instruments selected for review in this study were forward cash contracts, fixed basis contracts, and futures contracts. Pricing signals included the seasonal pattern of forward contract bids, seasonal pattern of basis, cost of production, a scaling-up technique (20% increments), seasonal pattern of futures contracts, and technical analysis of the futures market.

Technical analysis in this study involves the use of rigid mechanical trading systems to evaluate the futures market. A technical indicator is a formula to calculate specific price changes or price relationships using the high, low, and settlement prices of a particular futures contract. The index value obtained by the calculation is an indication of the direction the market is expected to move based on the historical data. The technical indicators screened were Variable Oscillator, HI/LO Oscillator, Williams' Percent R, Wilder's Relative Strength Index, two Moving Averages, and three Moving Averages.

The pricing signals and instruments were combined to specify eighteen corn marketing strategies. Following is a list of those strategies evaluated in the study, with a brief description of each.

1. Cash Delivery at Harvest - This is the November 15 cash delivery price, the base strategy with which all subsequent strategies are compared.

2. Cash Contract, Equal Monthly Sales - Forward contract equal portions of estimated production the 15th of each month throughout the eleven month pricing period.

3. Cash Contract, Seasonal Contract Pattern - Forward contract 100% of estimated production during the month that the average cash contract price is the highest for the season.

4. Cash Contract, Cost of Production - Forward contract 100% of estimated production at the first opportunity cost of production is covered.

5. Cash Contract, Seasonal Basis Pattern - Forward contract 100% of production when basis is seasonally the strongest (narrowest).

6. Cash Contract, Technical Analysis - Forward contract 100% of estimated production when a sell signal is produced by a technical indicator.

7. Cash Contract, Scale-up, Cost of Production - Forward contract 20% of estimated production the first time cost of production is covered, then contract for additional 20% portions each time a price rally

covers another 25 cent increment.

8. Cash Contract, Scale-up, Technical Analysis - Forward contract 20% of estimated production each time the selected technical indicator produces a sell signal.

9. Basis Contract, Seasonal Basis Pattern - Enter a basis contract agreement when the average basis is the strongest for the season.

10. Futures Contract, Equal Monthly Sales - Sell a mini-contract on the MidAmerican Exchange in Chicago the 15th of each month within the pricing period. All of these contracts are offset at the November 15 futures price and the actual corn crop delivered at the fall cash delivery price. The net revenue is then discounted for brokerage fees and interest on the margin money used to trade. (All strategies using futures contracts as the pricing instrument were discounted in this manner.)

11. Futures Contract, Seasonal Contract Pattern - Sell a December corn futures contract on the Chicago Board of Trade when the average futures contract price is seasonally the highest.

12. Futures Contract, Cost of Production - Sell a December corn futures contract when it covers cost of production.

13. Futures Contract, Seasonal Basis Pattern - Sell a December corn futures contract on the Board of Trade when basis is seasonally the weakest (widest).

14. Futures Contract, Technical Analysis - Sell a futures contract when the selected indicator produces a sell signal.

15. Futures Contract, Scale-up, Cost of Production - Sell a futures contract on the MidAmerican Exchange for 20% of estimated production when the producer's cost of production is covered, then additional 20% portions at 25 cent increments thereafter.

16. Futures Contract, Scale-up, Technical Analysis - Sell a futures contract for 20% of production each time a sell signal is produced by the selected technical indicator.

17. Selective Hedge, Seasonal Basis Pattern - Sell a futures contract when the average basis is seasonally the weakest and offset the contract when the average basis is the strongest.

18. Multiple Hedge, Technical Analysis - Sell a futures contract every time the selected indicator produces a sell signal and offset when the indicator produces a buy signal. The producer may be in and out of the market on the short side several times throughout the pricing period.

The historical optimization period for this study was the four crop years from 1980 to 1983. This period includes a wide range of prices and high price volatility because there were two very short crops, the drought of 1980 and the drought combined with the government PIK program of 1983, and two normal crops in 1981 and 1982. The test year was the 1984 crop, which was a normal crop size for this region. The pricing period for each year was started on December 15 of the previous year and concluded on November 15 of the production year. The November 15

cash price is used as the base harvest delivery price. If 100 percent of the crop was not priced by November 15, it was assumed that the producer accepted the November cash delivery price for the unpriced portions.

Weekly Thursday cash and forward contract prices for the years under examination were collected from a river terminal in South Central Illinois. When Thursday prices were not available, the previous Wednesday's prices were secured. Daily futures prices were obtained for the December corn contracts traded on the Chicago Board of Trade. From these prices, basis was calculated.

One of the criticisms of price optimization studies is that the resulting prices are a function of the parameters selected in the optimization process, and that the pricing strategies often do not perform consistently in out-of-sample tests. In this study, the strategies were evaluated over the historic optimization period to identify significant seasonal and technical patterns that maximized the net average price. The marketing strategies were then divided into two groups, those that increased net average price above the average harvest delivery price, and those that reduced the net average price. The strategies reducing the average net realized price were eliminated because the focus of the study is on increasing net price. Therefore, only the strategies that increased net average price during the optimization period were tested for performance in 1984.

RESULTS

Strategies 1, 2, and 10 have pricing signals which were specified independently of the historical evaluation period. Strategies 4, 7, 12, and 15 are based on cost of production. Since the actual cost of production varies from producer to producer, four cost levels were pre-specified for the study ($2.00, $2.50, $3.00, and $3.50).

Strategies 3, 5, 6, 8-9, 11, 13-14, and 16-18 involve the selection of optimization parameters based on patterns of the data from the historic period. For Strategy 3, the mid-month average forward contract price was highest during the month of April. For Strategies 5, 9, 13, and 17, average basis was weakest (widest) in January at 26 cents under, and strongest (narrowest) in June at 17 cents under the December corn futures contract price. The best technical indicator and parameter set for Strategy 6 was a six-day Variable Oscillator with a sell index of fifteen. The best indicator for Strategy 8 was a sixteen-day Variable Oscillator with parameters set to sell at fifteen and offset at negative five. For Strategy 11, the mid-month average futures contract price was highest during the month of April. Strategy 14 worked best using Wilder's Relative Strength Index at parameters of six days and sell at sixty-five. Strategy 16 worked best with a sixteen-day Variable Oscillator, sell signal at fifteen and offset at negative five. Optimal results for Strategy 18 were obtained by using HI/LO Oscillator, selling at an index of 1.8 and offsetting at an index of -0.4.

The eighteen identified strategies and results of these price optimization efforts over the 1980-83 optimization period are summarized in Table 1. The

first four columns indicate the net realized price received for the respective strategy with the net premium or discount relative to the harvest cash delivery price (Strategy 1) directly beneath it. The fifth column indicates the average prices received for the historical optimization period, with the premiums or discounts as well. With the four substrategies in Strategies 4, 7, 12, and 15, a total of thirty strategies and substrategies were evaluated. Of the thirty strategies and substrategies evaluated over the historical optimization period, eighteen either increased the average net price, or did no worse than the cash delivery price received November 15.

These optimal strategies were tested with the out-of-sample data, and the results are listed in column six. A new five-year average is calculated in column seven for the strategies selected in the optimization period. Only one (Strategy 17) of the optimal strategies failed to generate at least the fall delivery price in the out-of-sample test year. Nine of the optimal strategies produced a net price in excess of the unhedged cash price at harvest delivery, ranging from six to forty-three cents. The remaining optimized strategies, with the exception of Strategy 6, are all based on cost of production levels which were not achieved, and harvest delivery was the resulting price. The strategy that yielded the highest average premium during the optimization period did not lose money in any year with respect to the fall delivery price, including the 1984 test period.

Many producer oriented marketing studies focus on reducing price variation, and much of the marketing literature implies that the objective of hedging is reduction of price variation. Many producers and agricultural lenders readily accept the implication that forward pricing will probably reduce average price, and the results of many of the studies cited earlier in this paper confirm this outcome. In this study, all of the strategies that increased net price in the optimization period also reduced variance except Strategy 18.

CONCLUSION

Eighteen specific strategies, thirty including substrategies, for harvest delivery of corn in South Central Illinois were identified by combining pricing instruments with pricing signals. Each strategy was evaluated by calculating the net realized price for each year of the four-year historical base period 1980-83, and the resulting average price. The strategies were then compared to the harvest delivery price on November 15 as a standard base to identify those strategies which produced a higher average price than the price the producer would have received if no hedging action was taken to price the commodity prior to delivery. Eighteen of the thirty strategies and substrategies produced an average price equal to or greater than the average fall delivery base price.

When the eighteen optimized strategies were tested with prices from the 1984 test period, only one produced a net realized price lower than the 1984 harvest delivery price. Nine of the remaining optimized strategies produced price premiums.

The critical corn producer

TABLE 1. NET REALIZED PRICE UNDER MARKETING STRATEGIES FOR HARVEST DELIVERY OF CORN

		1980	1981	1982	1983	AVE-4	1984	AVE
1. CASH DELIVERY AT HARVEST								
		3.27	2.58	2.46	3.56	2.97	2.74	2.92
		****	****	****	****	****	****	****
2. CASH CONTRACT, EQUAL MONTHLY SALES								
		2.95	3.20	2.49	2.96	2.90		
		-.31	.62	.04	-.60	-.07		
3. CASH CONTRACT, SEASONAL CONTRACT PATTERN								
		2.70	3.53	2.75	2.96	2.98	2.91	2.97
		-.56	.95	.29	-.60	.01	.17	.05
4. CASH CONTRACT, COST OF PRODUCTION								
	2.00	2.88	3.47	2.60	2.38	2.84		
		-.38	.89	.15	-1.18	-.13		
	2.50	2.88	3.47	2.60	2.60	2.89		
		-.38	.89	.15	-.96	-.08		
	3.00	3.13	3.47	2.46	3.43	3.12	2.74	3.04
		-.14	.89	0.00	-.13	.15	0.00	.12
	3.50	3.27	3.53	2.46	2.59	3.21	2.74	3.12
		0.00	.95	0.00	.03	.24	0.00	.20
5. CASH CONTRACT, SEASONAL BASIS PATTERN								
		2.69	3.29	2.54	2.78	2.83		
		-.58	.71	.09	-.78	-.14		
6. CASH CONTRACT, TECHNICAL ANALYSIS								
		2.88	3.46	2.79	2.90	2.97	2.74	2.92
		-.39	.88	.33	-.67	.04	0.00	.03
7. CASH CONTRACT, SCALE-UP, COST OF PRODUCTION								
	2.00	2.93	3.47	2.60	3.63	3.16	3.04	3.14
		-.33	.89	.15	.07	.19	.30	.22
	2.50	3.09	3.29	2.54	3.63	3.14	2.92	3.09
		-.18	.71	.09	.07	.17	.18	.17
	3.00	3.24	3.12	2.46	3.60	3.10	2.80	3.04
		-.02	.54	0.00	.04	.13	.06	.12
	3.50	3.27	2.76	2.46	3.57	3.01	2.74	2.96
		0.00	.18	0.00	.01	.04	0.00	.04
8. CASH CONTRACT, SCALE-UP, TECHNICAL ANALYSIS								
		3.21	3.26	2.63	3.30	3.10	2.81	3.04
		-.06	.68	.17	-.26	.13	.07	.12
9. BASIS CONTRACT, SEASONAL BASIS PATTERN								
		3.55	2.51	2.21	3.50	2.94		
		.28	-.07	-.25	-.06	-.03		

TABLE 1. NET REALIZED PRICE (CONTINUED)

	1980	1981	1982	1983	AVE-4	1984	AVE
10. FUTURES CONTRACT, EQUAL MONTHLY SALES							
	2.61	3.18	2.71	3.02	2.88		
	-.66	.60	.25	-.54	-.09		
11. FUTURES CONTRACT, SEASONAL CONTRACT PATTERN							
	2.42	3.59	3.02	3.04	3.02	2.95	3.00
	-.05	1.01	.57	-.52	.05	.21	.08
12. FUTURES CONTRACT, COST OF PRODUCTION							
2.00	2.53	3.26	2.93	2.66	2.85		
	-.74	.68	.47	-.90	-.12		
2.50	2.53	3.26	2.93	2.66	2.85		
	-.74	.68	.47	-.90	-.12		
3.00	2.53	3.26	3.02	3.47	3.07	2.74	3.01
	-.74	.68	.57	-.09	.10	0.00	.09
3.50	2.95	3.39	2.46	3.56	3.09	2.74	3.02
	-.32	.81	0.00	0.00	.12	0.00	.10
13. FUTURES CONTRACT, SEASONAL BASIS PATTERN							
	2.35	3.46	2.96	2.82	2.90		
	-.92	.88	.50	-.74	-.07		
14. FUTURES CONTRACT, TECHNICAL ANALYSIS							
	2.59	3.44	3.01	3.00	2.97	2.86	2.92
	-.67	.86	.55	-.56	.05	.12	.06
15. FUTURES CONTRACT, SCALE-UP, COST OF PRODUCTION							
2.00	2.49	3.21	2.79	2.75	2.81		
	-.77	.63	.34	-.81	-.16		
2.50	2.66	3.23	2.62	3.08	2.90		
	-.60	.65	.17	-.48	-.07		
3.00	2.98	3.17	2.46	3.49	3.02	2.74	2.97
	-.28	.59	0.00	-.07	.05	0.00	.05
3.50	3.22	2.73	2.46	3.56	2.99	2.74	2.94
	-.04	.15	0.00	0.00	.02	0.00	.02
16. FUTURES CONTRACT, SCALE-UP, TECHNICAL ANALYSIS							
	2.99	3.23	2.77	3.29	2.97	2.80	2.92
	-.28	.65	.31	-.27	.10	.06	.09
17. SELECTIVE HEDGE, SEASONAL BASIS PATTERN							
	3.41	2.63	2.61	3.58	2.97	2.61	2.97
	.15	.05	.16	.02	.10	-.13	.05
18. MULTIPLE HEDGE, TECHNICAL ANALYSIS							
	3.82	3.14	2.96	4.13	2.97	3.17	2.92
	.56	.56	.51	.57	.55	.43	.53

may look past the averages and notice that only one strategy yields a net premium every year. The producer may also argue that every year is different and that continued success of any one strategy cannot be guaranteed. Indeed, every year is different and a strategy that worked well in the past is not guaranteed to work in the future. However, several useful conclusions can be drawn from this optimization analysis.

Examination of the years within the historical optimization period clearly reveals that those years of short crops were the most difficult to find strategies that did better than the high harvest delivery prices. This study did not make subjective judgements about individual years, such as using knowledge of a developing drought. If the plan was to sell any or all of the anticipated production at a given time or on a given signal, the sale was assumed to be made. At any rate, a corn producer does not plant in anticipation of a drought, and neither should a marketing program be designed in anticipation of a drought. Adjustments to one's marketing strategy could be made when change in fundamentals is imminent.

Strategy 18 performed well in both bearish and bullish markets. This strategy resulted in a premium of at least 50 cents per bushel every year in the historical optimization period, and produced a premium of 43 cents again in the test period. A 53 cent five-year average premium for corn results in an additional $50 to $100 return per acre for a good marketing program.

The marketing function is a management practice that is continuing to receive attention in regard to its increasing economic importance. Eighteen forward pricing strategies have been identified, optimized within a four-year data set, and tested on a fifth year of data. Corn producers are the obvious beneficiaries of this study. However, this study also provides people from academia and consulting firms with empirical results as they advise and aid corn producers in the development of a marketing plan for their personal production unit. Producers may still be price takers, but the results of this study indicate that it is within their capacity to realize premium prices consistently if effective marketing strategies are developed.

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