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**Interaction of Price Variation and Price Levels in the
Evaluation of Optimal Marketing Strategies
for Illinois Corn Producers**

by

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INTERACTION OF PRICE VARIATION AND PRICE LEVELS IN THE EVALUATION OF OPTIMAL MARKETING STRATEGIES FOR ILLINOIS CORN PRODUCERS

Keith D. Rogers and Sharon K. Rich*

Increased price volatility in agricultural markets has resulted in attempts to develop marketing strategies that transfer part or all of the price risk from the producer to other sectors of the industry. 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), corn (Greenhall, Tauer, & Tomek, Kenyon & Cooper), and soybeans (Eberle, Harrel, & Solverson), 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 nine strategies for hedging corn produced an average price greater than the unhedged harvest delivery 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.

The common theme of these and other studies is that the primary objective of the producer in performing the marketing function is aversion of risk, and the commonly accepted criterion to measure effectiveness of risk aversion is minimization of price variance. Many of the studies imply, if not conclude, that efforts by the producer to transfer price risk and reduce price variation through some form of hedging or forward pricing will result in lower average prices than unhedged marketing strategies. It follows that researchers have accepted that most or all hedging strategies have an equal probability of denying high prices as they have of protecting against low prices. In fact, it appears that the objective should be to raise the average price by reducing exposure to low prices, and not necessarily to reduce price variance. This is a significant restatement of what is of primary importance in applied price analysis for operational decision making.

Well established markets for corn across most of the upper Midwest provide producers with several contractual choices and opportunities on a regular basis to execute marketing decisions that would transfer some or all of the price risk from the producer. Few of the potential marketing strategies have been consistently evaluated over time to document performance. If the basic objective of the marketing function at the

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producer level is to obtain the highest net realized price for the product while minimizing risk of prices below some average or standard, then it is important to consider both price level and price variance in the evaluation and performance of marketing strategies, not just price variance.

OBJECTIVES

This paper has three major objectives. The first objective is to review a comprehensive list of marketing strategies for Illinois corn producers that have the potential to increase net realized price and reduce exposure to price risk by using instruments or techniques which are commonly available in commercial trade. The second objective is evaluate the potential performance of the marketing strategies over a historical optimization period. The third objective is to evaluate the performance of the previously specified marketing strategies over an out-of-sample test period, with specific attention to the interaction between risk and price levels.

METHODOLOGY

Identification of unique marketing strategies requires specification of three components: a place and time of delivery, a pricing instrument, and a pricing signal. Eighteen strategies were defined by Drinka and Rogers (1985) for harvest delivery of corn at local elevators in Central Illinois. The pricing instruments include spot bids, forward cash contracts, basis contracts, and futures contracts. The pricing signals are derived from equal monthly sales, seasonal basis patterns, seasonal patterns of forward cash contract bids, seasonal patterns of futures contracts, cost of production, scaling-up techniques, and technical analysis of the futures markets. The eighteen strategies are listed in Table 1, and then each strategy is defined briefly.

Table 1. Harvest Delivery Marketing Strategies for Central Illinois

1. Harvest Delivery with No Forward Pricing
 2. Cash Contract Based on Equal Monthly Sales
 3. Cash Contract Based on Seasonal Contract Pattern
 4. Cash Contract Based on Cost of Production
 5. Cash Contract Based on Seasonal Basis Pattern
 6. Cash Contract Based on Technical Analysis
 7. Cash Contract with Scaling-up Based on Cost of Production
 8. Cash Contract with Scaling-up Based on Technical Analysis
 9. Basis Contract Based on Seasonal Contract Pattern
 10. Futures Contract Based on Equal Monthly Sales
 11. Futures Contract Based on Seasonal Contract Patterns
 12. Futures Contract Based on Cost of Production
 13. Futures Contract Based on Seasonal Basis Patterns
 14. Futures Contract Based on Technical Analysis
 15. Futures Contract with Scaling-up Based on Cost of Production
 16. Futures Contract with Scaling-up Based on Technical Analysis
 17. Selective Hedging Based on Seasonal Basis Pattern
 18. Multiple Hedging Based on Technical Analysis
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Strategy 1 - Harvest Delivery with No Forward Pricing: No action is taken to forward price corn prior to harvest delivery. November 15th serves as the delivery date for all eighteen strategies. Cash prices for local delivery are representative of elevator bids in Central Illinois.

Strategy 2 - Cash Contract Based on Equal Monthly Sales: A cash contract is used to forward price an equal amount of the estimated production each month starting in December before the crop season.

Strategy 3 - Cash Contract Based on Seasonal Contract Pattern: A cash contract is used to forward price all of the estimated production during the month with the highest historical average for cash contract bids.

Strategy 4 - Cash Contract Based on Cost of Production: A cash contract is used to forward price all of the estimated production on the first opportunity that the contract price covers the cost of production, including desired profit. Review of pricing opportunities starts in December before the crop season.

Strategy 5 - Cash Contract Based on Seasonal Basis Pattern: A cash contract is used to forward price all of the estimated production during the month with the strongest historical basis.

Strategy 6 - Cash Contract Based on Technical Analysis: A cash contract is used to forward price all of the estimated production when a selected technical indicator gives the first sell signal during December before the crop season or subsequent months. If no sell signal is produced, the effective price is the harvest delivery price as stated in Strategy 1.

Strategy 7 - Cash Contract with Scaling-up Based on Cost of Production: A cash contract is used to forward price twenty percent of the estimated production on the first opportunity that the contract price covers the cost of production, including desired profit. As in Strategy 4, the review of pricing opportunities starts in December before the crop season. Forward pricing is increased in twenty percent increments each time the market covers twenty-five cent increments above the original cost. For any increment that is not forward priced, the effective price is the harvest delivery price.

Strategy 8 - Cash Contract with Scaling-up Based on Technical Analysis: A cash contract is used to forward price twenty percent of the estimated production when a selected technical indicator produces the first sell signal during December before the crop season or subsequent months. Forward pricing is increased in twenty percent increments each time the market rallies and the technical indicator produces another sell signal. If the market fails to rally four times after the initial sale, the remaining increments are priced at the harvest delivery price.

Strategy 9 - Basis Contract Based on Seasonal Contract Pattern: A contract for a fixed basis at harvest delivery is established in the month with the strongest historical average basis. The effective price at harvest

is the price of the December corn contract on the Chicago Board of Trade minus the fixed basis.

Strategy 10 - Futures Contract Based on Equal Monthly Sales: A futures contract is used to forward price an equal amount of the estimated production each month starting in December before the crop season.

All of the remaining strategies utilize short positions in the December futures market as the pricing instrument. With the exception of Strategies 17 and 18, the contracts are offset at harvest when the corn is delivered to the local market. Charges have been deducted in all cases for commission charges and interest on deposits for margin accounts. Therefore, for all of the remaining strategies, the net realized price is the cash delivery price at harvest plus the gain or loss on the futures transactions after trading costs have been deducted.

Strategy 11 - Futures Contract Based on Seasonal Contract Patterns: A futures contract is used to forward price all of the estimated production during the month with the highest historical average futures contract price.

Strategy 12 - Futures Contract Based on Cost of Production: A futures contract is used to forward price all of the estimated production on the first opportunity that the contract price covers the cost of production, desired profit, expected basis at delivery, and futures trading charges. Review of pricing opportunities begins in December before the crop season.

Strategy 13 - Futures Contract Based on Seasonal Basis Patterns: A futures contract is used to forward price all of the estimated production during the month with the weakest historical basis.

Strategy 14 - Futures Contract Based on Technical Analysis: A futures contract is used to forward price all of the estimated production when a selected technical indicator gives the first sell signal during December before the crop season or subsequent months. If no sell signal is produced, the effective price is the harvest delivery price as stated in Strategy 1.

Strategy 15 - Futures Contract with Scaling-up Based on Cost of Production: A futures contract is used to forward price twenty percent of the estimated production on the first opportunity that the contract price covers the cost of production, desired profit, expected basis at delivery, and futures trading charges. Review of pricing opportunities begins in December before the crop season. Forward pricing is increased in twenty percent increments each time the market covers twenty-five cent increments above the original cost. For any increment that is not forward priced, the effective price is the harvest delivery price.

Strategy 16 - Futures Contract with Scaling-up Based on Technical Analysis: A futures contract is used to forward price twenty percent of the estimated production when a selected technical indicator produces the first sell signal during December before the crop season or subsequent months. Forward pricing is increased in twenty percent increments each time the

market rallies and the the technical indicator produces another sell signal. If the market fails to rally four times after the initial sale, the remaining increments are priced at the harvest delivery price.

Strategy 17 - Selective Hedging Based on Seasonal Basis Pattern: A futures contract is used to forward price all of the estimated production during the month of the weakest historical basis, and the contract is offset during the month of the strongest historical basis. As with the other strategies, the corn is delivered to the local market at harvest.

Strategy 18 - Multiple Hedging Based on Technical Analysis: A futures contract is used to forward price all of the estimated production when a selected technical indicator produces a sell signal, and is offset when the technical indicator produces a buy signal. The producer never holds a long position in the futures market.

The four strategies involving cost of production (4, 7, 12, and 15) were each evaluated at five cost levels to reflect alternative production conditions. The strategies were evaluated at \$1.50, \$2.00, \$2.50, \$3.00, and \$3.50 per bushel. The multiple cost level of these four strategies add sixteen additional sub-strategies, for a total of thirty-four strategies and sub-strategies. As a point of reference, the average cost of corn production in this region is reported at approximately \$2.90 per bushel in the Summary of Illinois Farm Business Records.

The empirical analysis of the optimal marketing strategies is based on data for the five crop years including 1979 to 1983, and the analysis of the test period is based on data for the 1984 and 1985 crop years. The optimization period includes three large crop years and two short crop years, providing a wide range of marketing conditions and high price volatility for evaluation.

Some of the eighteen strategies required optimization techniques to specify the timing of the signal used to activate the strategy, while other strategies had pre-specified signals such as marketing equal amounts each month. Where optimum parameters were necessary, the parameters were developed based on the five-year data set for 1979-1983, and then applied consistently to every year in the study to determine the effective price that could have been received. All of the strategies were evaluated with a consistent set of assumptions, and the net realized prices are directly comparable among strategies.

RESULTS

Level of premium and consistency of performance are two key issues in evaluating the effectiveness of a marketing strategy. The quantitative performance of each of the thirty-four strategies and sub-strategies is summarized in Table 2. The prices listed for Strategy 1 are the cash prices for harvest delivery, and are used as the base for standard comparison. The net realized prices and premiums or discounts for each of the other strategies and sub-strategies provide a direct measure of relative performance of each of the strategies. The average performance for the

TABLE 2. Net Realized Prices Under Alternative Marketing Strategies For Harvest Delivery Of Corn In Illinois By Marketing Year (dollars per bushel)

| MARKETING STRATEGY | 79/80 | 80/81 | 81/82 | 82/83 | 83/84 | 84/85 | 85/86 | 5-Yr Ave. | 2-Yr Ave. | 7-Yr Ave. | s.d. |
|---------------------------------------------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 1. CASH DELIVERY AT HARVEST (NOV. 15) NET REALIZED PREMIUM OR DISCOUNT | 2.56 **** | 3.44 **** | 2.54 **** | 2.35 **** | 3.47 **** | 2.66 **** | 2.38 **** | 2.87 **** | 2.52 **** | 2.77 **** | .479 **** |
| 2. CASH CONTRACT, EQUAL MONTHLY SALES | 2.58 .02 | 2.92 -.52 | 3.20 .66 | 2.48 .13 | 2.93 -.54 | 2.73 .07 | 2.39 .01 | 2.82 -.05 | 2.56 .04 | 2.75 -.02 | .287 .411 |
| 3. CASH CONTRACT, SEASONAL CONTRACT PATTERN | 2.91 .35 | 3.08 -.36 | 3.30 .76 | 2.49 .14 | 2.81 -.66 | 2.74 .08 | 2.29 -.09 | 2.92 .05 | 2.52 .01 | 2.80 .03 | .342 .464 |
| 4. CASH CONTRACT, COST OF PRODUCTION | | | | | | | | | | | |
| A. 1.50 COST-PLUS-PROFIT | 2.30 -.26 | 2.88 -.56 | 3.37 .83 | 2.61 .26 | 2.49 -.98 | 2.66 0.00 | 2.52 .14 | 2.73 -.14 | 2.59 .07 | 2.69 -.08 | .348 .588 |
| B. 2.00 COST-PLUS-PROFIT | 2.30 -.26 | 2.88 -.56 | 3.37 .83 | 2.61 .26 | 2.49 -.98 | 2.66 0.00 | 2.52 .14 | 2.73 -.14 | 2.59 .07 | 2.69 -.08 | .348 .588 |
| C. 2.50 COST-PLUS-PROFIT | 2.51 -.05 | 2.88 -.56 | 3.37 .83 | 2.61 .26 | 2.67 -.80 | 2.66 0.00 | 2.52 .14 | 2.81 -.06 | 2.59 .07 | 2.75 -.02 | .302 .537 |
| D. 3.00 COST-PLUS-PROFIT | 2.56 0.00 | 3.08 -.36 | 3.37 .83 | 2.35 0.00 | 3.41 -.06 | 2.66 0.00 | 2.38 0.00 | 2.95 .08 | 2.52 0.00 | 2.83 .06 | .452 .365 |
| E. 3.50 COST-PLUS-PROFIT | 2.56 0.00 | 3.44 0.00 | 3.51 .97 | 2.35 0.00 | 3.53 .06 | 2.66 0.00 | 2.38 0.00 | 3.08 .21 | 2.52 0.00 | 2.92 .15 | .548 .364 |
| 5. CASH CONTRACT, SEASONAL BASIS PATTERN | 2.67 .11 | 3.30 -.14 | 2.61 .07 | 2.11 -.24 | 3.41 -.06 | 2.74 .08 | 2.12 -.26 | 2.82 -.05 | 2.43 -.09 | 2.71 -.06 | .510 .155 |
| 6. CASH CONTRACT, TECHNICAL ANALYSIS | 2.79 .23 | 2.88 -.56 | 3.51 .97 | 2.77 .42 | 2.81 -.66 | 2.66 0.00 | 2.38 0.00 | 2.95 .08 | 2.52 0.00 | 2.83 .06 | .342 .562 |
| 7. CASH CONTRACT, SCALE-UP, COST OF PRODUCTION | | | | | | | | | | | |
| A. 1.50 COST-PLUS-PROFIT | 2.34 -.22 | 2.88 -.56 | 3.37 .83 | 2.61 .26 | 2.49 -.98 | 2.66 0.00 | 2.52 .14 | 2.74 -.13 | 2.59 .01 | 2.70 -.07 | .341 .586 |
| B. 2.00 COST-PLUS-PROFIT | 2.48 -.08 | 2.90 -.54 | 3.37 .83 | 2.50 .15 | 2.65 -.82 | 2.67 .01 | 2.46 .08 | 2.78 -.09 | 2.56 .04 | 2.72 -.05 | .326 .527 |
| C. 2.50 COST-PLUS-PROFIT | 2.59 .03 | 3.09 -.35 | 3.39 .85 | 2.40 .05 | 3.03 -.44 | 2.68 .02 | 2.41 .03 | 2.90 .03 | 2.54 .02 | 2.80 .03 | .378 .416 |
| D. 3.00 COST-PLUS-PROFIT | 2.56 0.00 | 3.33 -.11 | 3.06 .52 | 2.35 0.00 | 3.45 -.02 | 2.66 0.00 | 2.38 0.00 | 2.95 .08 | 2.52 0.00 | 2.83 .06 | .451 .209 |
| E. 3.50 COST-PLUS-PROFIT | 2.56 0.00 | 3.44 0.00 | 2.73 .19 | 2.35 0.00 | 3.48 .01 | 2.66 0.00 | 2.38 0.00 | 2.91 .04 | 2.52 0.00 | 2.80 .03 | .471 .071 |
| 8. CASH CONTRACT, SCALE-UP, TECHNICAL ANALYSIS | 2.64 .08 | 3.29 -.15 | 3.28 .74 | 2.57 .22 | 3.24 -.23 | 2.69 .03 | 2.38 0.00 | 3.00 .13 | 2.54 .02 | 2.87 .10 | .387 .319 |
| 9. BASIS CONTRACT, SEASONAL CONTRACT PATTERN | 2.54 -.02 | 3.59 .15 | 2.51 -.03 | 2.07 -.28 | 3.34 -.13 | 2.66 0.00 | 2.35 -.03 | 2.81 -.06 | 2.50 -.02 | 2.72 -.05 | .545 .131 |

Table continued next page

TABLE 2. Net Realized Prices Under Alternative Marketing Strategies (Continued)

| MARKETING STRATEGY | 79/80 | 80/81 | 81/82 | 82/83 | 83/84 | 84/85 | 85/86 | 5-Yr Ave. | 2-Yr Ave. | 7-Yr Ave. | s.d. |
|---------------------------------------------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|
| 1. CASH DELIVERY AT HARVEST (NOV. 15) NET REALIZED PREMIUM OR DISCOUNT | 2.56 **** | 3.44 **** | 2.54 **** | 2.35 **** | 3.47 **** | 2.66 **** | 2.38 **** | 2.87 **** | 2.52 **** | 2.77 **** | .479 **** |
| 10. FUTURES CONTRACT, EQUAL MONTHLY SALES | 2.50 -.06 | 2.78 -.66 | 3.14 .60 | 2.60 .25 | 2.93 -.54 | 2.85 .19 | 2.44 .06 | 2.79 -.08 | 2.65 .12 | 2.75 -.02 | .250 .445 |
| 11. FUTURES CONTRACT, SEASONAL CONTRACT PATTERN | 2.93 .37 | 3.01 -.43 | 3.30 .76 | 2.59 .24 | 2.82 -.65 | 2.81 .15 | 2.33 -.05 | 2.93 .06 | 2.57 .05 | 2.83 .06 | .309 .480 |
| 12. FUTURES CONTRACT, COST OF PRODUCTION | | | | | | | | | | | |
| A. 1.50 COST-PLUS-PROFIT | 2.27 -.29 | 2.70 -.74 | 3.22 .68 | 2.82 .47 | 2.57 -.90 | 2.75 .09 | 2.65 .27 | 2.72 -.16 | 2.70 .18 | 2.71 -.06 | .286 .603 |
| B. 2.00 COST-PLUS-PROFIT | 2.27 -.29 | 2.70 -.74 | 3.22 .68 | 2.82 .47 | 2.57 -.90 | 2.75 .09 | 2.65 .27 | 2.72 -.16 | 2.70 .18 | 2.71 -.06 | .286 .603 |
| C. 2.50 COST-PLUS-PROFIT | 2.76 .20 | 2.70 -.74 | 3.22 .68 | 2.82 .47 | 2.70 -.77 | 2.75 .09 | 2.38 0.00 | 2.84 -.03 | 2.56 .04 | 2.76 -.01 | .247 .558 |
| D. 3.00 COST-PLUS-PROFIT | 2.56 0.00 | 2.97 -.47 | 3.22 .68 | 2.35 0.00 | 3.38 -.09 | 2.66 0.00 | 2.38 0.00 | 2.90 .02 | 2.52 0.00 | 2.79 .02 | .408 .339 |
| E. 3.50 COST-PLUS-PROFIT | 2.56 0.00 | 3.44 0.00 | 3.41 .87 | 2.35 0.00 | 3.47 0.00 | 2.66 0.00 | 2.38 0.00 | 3.05 .17 | 2.52 0.00 | 2.90 .13 | .520 .329 |
| 13. FUTURES CONTRACT, SEASONAL BASIS PATTERN | 2.20 -.36 | 2.49 -.95 | 3.30 .76 | 2.85 .50 | 2.72 -.75 | 2.69 .03 | 2.60 .22 | 2.71 -.16 | 2.65 .12 | 2.69 -.08 | .338 .636 |
| 14. FUTURES CONTRACT, TECHNICAL ANALYSIS | 2.78 .22 | 2.73 -.71 | 3.40 .86 | 2.98 .63 | 2.80 -.67 | 2.61 -.05 | 2.34 -.04 | 2.94 .07 | 2.47 -.05 | 2.81 .04 | .328 .596 |
| 15. FUTURES CONTRACT, SCALE-UP, COST OF PRODUCTION | | | | | | | | | | | |
| A. 1.50 COST-PLUS-PROFIT | 2.29 -.27 | 2.66 -.78 | 3.18 .64 | 2.78 .43 | 2.54 -.93 | 2.71 .05 | 2.56 .18 | 2.69 -.18 | 2.63 .11 | 2.67 -.10 | .273 .593 |
| B. 2.00 COST-PLUS-PROFIT | 2.56 0.00 | 2.69 -.75 | 3.18 .64 | 2.72 .37 | 2.73 -.74 | 2.75 .09 | 2.47 .09 | 2.78 -.10 | 2.61 .09 | 2.73 -.04 | .224 .526 |
| C. 2.50 COST-PLUS-PROFIT | 2.68 .12 | 2.92 -.52 | 3.22 .68 | 2.55 .20 | 3.09 -.38 | 2.73 .07 | 2.38 0.00 | 2.89 .02 | 2.55 .03 | 2.80 .03 | .298 .394 |
| D. 3.00 COST-PLUS-PROFIT | 2.65 .09 | 3.23 -.21 | 2.97 .43 | 2.35 0.00 | 3.38 -.09 | 2.66 0.00 | 2.38 0.00 | 2.92 .04 | 2.52 0.00 | 2.80 .03 | .402 .199 |
| E. 3.50 COST-PLUS-PROFIT | 2.56 0.00 | 3.42 -.02 | 2.71 .17 | 2.35 0.00 | 3.47 0.00 | 2.66 0.00 | 2.38 0.00 | 2.90 .03 | 2.52 0.00 | 2.79 .02 | .465 .066 |
| 16. FUTURES CONTRACT, SCALE-UP, TECHNICAL ANALYSIS | 2.59 .03 | 3.31 -.13 | 3.07 .53 | 2.74 .39 | 3.22 -.25 | 2.72 .06 | 2.35 -.03 | 2.99 .11 | 2.54 .02 | 2.86 .09 | .352 .279 |
| 17. SELECTIVE HEDGE, SEASONAL BASIS PATTERN | 2.28 -.28 | 2.98 -.46 | 3.27 .73 | 3.05 .70 | 2.86 -.61 | 2.61 -.05 | 2.83 .45 | 2.89 .02 | 2.72 .20 | 2.84 .07 | .320 .556 |
| 18. MULTIPLE HEDGE, TECHNICAL ANALYSIS | 2.53 -.03 | 3.48 .04 | 3.17 .63 | 2.93 .58 | 4.13 .66 | 3.11 .45 | 2.37 -.01 | 3.25 .38 | 2.74 .22 | 3.10 .33 | .591 .318 |

NOTE: Premiums or discounts against Strategy 1 appear below net realized price.

five-year optimization period is listed in Table 2 under the "5-Yr Ave." column.

Eighteen of the thirty-three strategies and sub-strategies produced a higher average price over the five-year historical period than the harvest delivery base strategy, with the average premiums for the successful strategies ranging from two to thirty-eight cents per bushel per year. While several of the strategies were successful in producing an average premium, none of the strategies produced a premium every year of the study.

Each of the thirty-four strategies were evaluated for the two-year test period (1984-1985) using the predetermined parameters from the historical base study to implement the strategies. A grading system was developed by Rogers and Rich (1987) to group the strategies by consistency of performance. The grading system is based on the performance for the previous five years, the current two years, and all seven years.

Strategies were assigned an "A" rating if a premium was produced for the previous five years, a premium was produced for the two-year period, and a premium was produced for the overall seven-year period. A "B" rating was assigned if the strategy produced a premium for the five-year period, a discount for the two-year period, but maintained a premium for the seven-year period. A "C" rating was assigned if the strategy produced a premium for the five-year period, a discount for the two-year period, and no premium or discount for the seven-year period. A "D" rating was assigned if the strategy produced a premium for the five-year period, a discount for the two-year period, and a discount for the seven-year period. An "F" rating was assigned if the strategy produced a discount for the initial five-year period.

Seventeen of the strategies and sub-strategies received an "A" rating, one received a "B" rating, and fifteen received an "F" rating. Thus, only one of the eighteen strategies that produced a premium over the initial five-year period produced a discount during the two-year test period. The strategies that failed to produce a premium during the initial period and received an "F" rating were equally consistent. None of this group produced a premium during the two-year test that was sufficient to bring the seven-year average up to a premium price.

Standard deviations were calculated for the prices and for the premiums for each strategy, and are shown in the last column of Table 2. Twenty-eight of the strategies and sub-strategies have a smaller price variance than the base strategy, and five strategies have a larger variance. Approximately half of the strategies with a reduced variance produced a premium price over the seven years, and the other half produced a discount price. Likewise, half the strategies that increased the price variance produced a premium price, and the other half produced a discount.

SUMMARY and CONCLUSIONS

Most of the previous marketing strategy studies have focused on the naive approach to marketing by initiating forward pricing at some fixed

period of time prior to expected marketing. This approach implies that no information can be obtained about market trends, and that expected prices are a random event at all times. Many of the strategies in this study imply that information can be obtained from the market that increases the probability at a given point that the price trend is known. Consistent price premiums indicate that price movements in the market were correctly anticipated, and consistent discounts indicate that price movements were not correctly anticipated.

Five of the eighteen strategies in the study failed to produce an average price equal to or greater than harvest delivery price. Two of them (2 and 10) are based on equal monthly sales. These naive strategies do not draw any information from the market about trends or anticipated price movements. The strategies did reduce the annual price variance, but at the expense of a lower price. The other three strategies that failed to produce an average price equal to harvest delivery price all involve use of basis or basis contracts. Two of the three basis strategies increased price variation.

Twelve of the eighteen strategies in the study produced an average price greater than the harvest delivery price in Strategy 1, and eight of the twelve also reduced the annual price variance. However, it should be noted that many of the sub-strategies that reduced price variance also reduced the average realized price.

Many of the other marketing studies imply that price variation is always below some target or acceptable level, and specification of naive strategies has produced results to support that hypothesis. If a producer's marketing strategy consistently generates price discounts, it would follow that minimizing price variation would maximize producer welfare. In contrast, if the producer's marketing strategy consistently generates price premiums, it would follow that minimizing price variation would not maximize producer welfare. Thus, much of the support for minimizing price variance rests with an implicit assumption that marketing strategies can not be defined to produce consistent premiums over time.

Results of this study indicate that it is possible to define marketing strategies for corn in Illinois that do increase the net realized price and reduce risk of low prices by taking advantage of pricing opportunities which are unexpected from an overall industry standpoint. Variance of the prices is not an adequate measure of risk aversion for a marketing strategy that is effective in increasing the net realized price substantially.

All three of the strategies that produced an average price large enough to cover the average cost of production of \$2.90 in the region increased the price variance, and the highest average price in the study is associated with the highest price variance. On closer examination, the increase in price variance was almost entirely due to increasing the prices received, not by prices below the standard base. The greatest deviation below harvest delivery price was three cents. From a management standpoint, it is hard to

see what problems the high variance causes when the variance is due to high prices.

It appears that there is substantial need for greater research in two related areas. Most of the studies in the literature are based on some form of naive decision making, despite the fact that a large number of marketing economists are engaged in sophisticated price analysis and price projection systems. Studies based on naive decisions are not representative of the true marketing potential, and future studies need to incorporate more of the information base that is available.

In addition, a standard variance test appears to not be appropriate for testing significance of the marketing strategies. Using a standard variance test, none of the average prices in this study are statistically different from the average base price, but several of the strategies produced consistent premiums that presumably could have been realized by corn producers, and that were large enough to be of economic significance. The intent of the statistical test is to detect deviations below some base or average price, not to penalize strategies that produce premium prices. It has been suggested that a semivariance test would be a more accurate statistical measure of marketing risk than variance, because semivariance can be used to test for deviations below the mean or base strategy.

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