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Cash Wheat Marketing: Strategies for Real People

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Abstract: *A new paradigm is needed in extension marketing programs. Attempts to help producers time the market, either through cash sales or futures trading, appear to be of little benefit. Marketing extension programs need to place less emphasis on outlook and futures trading and more emphasis on simple marketing strategies that people really use. An empirical example of strategies for Oklahoma wheat producers shows selling cash wheat at harvest and participating in government programs as the preferred marketing strategy. Implications for extension programs in other states are that extension programs can help producers decide whether to store their grain and whether to participate in farm programs.*

Key Words and Phrases: *Economics, Efficient markets, Extension, Forward contracts, Hedging, Price analysis, Risk, Stochastic dominance.*

A producer's choice of marketing strategy can have considerable effect on income in a given year. Patrick *et al.* found crop producers ranked crop prices just behind weather in terms of importance as a source of risk in their farming operations. Thus, it is easy to see why considerable research resources have been devoted to developing optimal marketing strategies. For example, the May, 1990, issue of the *American Journal of Agricultural Economics* lists eight dissertations devoted to hedging strategies or more general marketing strategies. Much past research on optimal marketing strategies suggests marketing strategies are available that can both increase income and reduce risk over cash sales at harvest (e.g. Rich; Purcell, Hague and Holland).¹

Considerable resources have been devoted to educating producers about hedging strategies. Yet only a small portion of producers' crops are hedged (Schroeder and Goodwin). Patrick *et al.* (p. 235) found small-grain producers ranked "hedging" as tied for last place in importance among twenty-two alternative management responses to risk. The small-grain producers also ranked "spreading sales" and "participating in government programs" as more important marketing strategies than "forward contracting." Farmers use marketing strategies such as hedging much less than most research says they should.

Batte, Schnitkey and Jones found the Cooperative Extension Service was ranked twelfth out of nineteen among information sources useful for marketing decisions—behind radio, television, farm magazines and commercial newsletters. This suggests that the marketing information that extension has been providing is not highly valued.

For the many producers who do not use futures markets, what can we teach in extension marketing? If restricted to cash marketing, the two primary tools available are forward contracting and spreading the timing of sales. The purpose of this paper is to argue that extension marketing programs need to place less emphasis on outlook and futures and options trading and more emphasis on simple marketing strategies that people really use. The arguments are supported by an empirical section which seeks to determine marketing strategies for hard red winter wheat that can be used for extension education in Oklahoma. But the contribution of the paper is more in terms of the philosophy of what marketing strategies agricultural economists should teach than it is the specific empirical results. The paper does go beyond much, but perhaps not all, previous research on marketing strategies by considering forward contracts, farm programs, and yield risk. Also, we conduct hypothesis tests about whether one marketing strategy yields a higher mean or a lower variance than another.

Economic Theory

Farmers want to know when to sell their wheat. The two most relevant economic theories are the efficient market hypothesis and the law of one price. Both theories say that it should not make any difference on average when wheat is sold. The law of one price says prices over time should, on average, differ only by storage costs. The efficient market hypothesis, as defined by Fama, says the best predictor of tomorrow's price is today's price plus an adjustment for storage costs. Empirical research (e.g., Spriggs, Kaylen and Bessler) consistently shows small positive autocorrelations in daily prices. Thus the efficient market hypothesis in the extreme form of Fama has been rejected. Current thinking tends to support a noisy rational expectations equilibrium. As Grossman and Stiglitz argued, information is costly and markets will trade sufficiently far from equilibrium that an informed trader will earn a normal return on investment. Farmers do not have access to any unique information and thus they are uninformed traders. But, just as Malkiel argued for individual investors in stocks, the deviations from efficient markets are so small that an uninformed producer should treat markets as if they were efficient.

Many extension marketing economists provide forecasts to aid producers in making market timing decisions. The ability of agricultural economists

to forecast prices is limited (Irwin and Gerlow) just as the efficient market hypothesis and law of one price would suggest. Therefore, we proceed under the assumption that farmers cannot forecast prices well enough to earn economic profits from a marketing strategy. But, if our arguments are correct, then why do so many people come to outlook meetings? By the same arguments that support efficient markets, farmers must benefit from attending outlook meetings or else they would not attend. Eales *et al.* have shown that producers have unbiased expectations but that their estimate of their forecast variance is biased downward. Thus, producers consistently overestimate their ability to forecast prices. Outlook may be providing a service by simply explaining why current prices make sense.

The law of one price across time suggests that prices after harvest should increase to cover the cost of storage and interest. Benirschka argues that grain is stored farthest from terminal markets because of lower interest costs. Thus, producers relatively close to the port should sell at or soon after harvest, but producers relatively far from the port should have incentives to store for longer periods.

The law of one price across time should also hold for forward contract prices. But forward contracting is costly, and the law of one price can hold either for prices received by farmers or prices paid by elevators. Empirical research by Elam for cattle and by Brorsen, Coombs and Anderson for wheat suggests the law of one price holds for prices paid. Brorsen, Coombs and Anderson found that a farmer who always forward contracts should average receiving a few cents less per bushel of wheat than a farmer who always sells at harvest. Further, in the presence of government programs, forward contracting should be riskier than cash sales since deficiency payments are based on prices received in the first five months after harvest.

Spreading cash sales in a manner corresponding to the way deficiency payments are computed should be the risk-minimizing strategy. Since the correlation between prices and yields of an individual producer are likely to be small,² adding yield risk should have little effect other than reducing the benefits of the marketing strategies.

Finally, efficient markets ideas have direct implications for optimal marketing strategies. Assuming that farmers attempt to maximize utility and that farmers are not stupid, then the strategies that farmers currently use should be the optimal strategies. The fact that farmers use a variety of marketing strategies suggests that it must not make much difference which marketing strategy is used.

Procedure

Four different marketing strategies are considered: 1) forward contracting half of expected yield on April 1 and selling the rest after harvest; 2) selling all wheat after harvest on June 20; 3) selling all wheat on November 1; and 4) spreading the timing of sales by selling one-third at harvest, one-third on September 15, and one-third on November 1. Most Oklahoma wheat is harvested by June 20 and 80 to 85 percent of the wheat is sold by December. Wheat held past December 1 is usually held by financially secure farmers. Simulated returns from the four marketing strategies are calculated using three different measures: 1) prices, 2) prices plus deficiency payment, and 3) income per acre. The income per acre is what really matters since it includes yield risk and costs of diverted acres, but comparing results to prices alone will allow determining the effect of farm programs on the preferred marketing strategy.

The cash wheat prices are obtained by taking gulf wheat prices from *Oklahoma Market Report* (Oklahoma Department of Agriculture) and subtracting the margin charged by a central Oklahoma elevator. To compute forward contract prices, Texas Gulf forward basis bids from Farmland Industries were added to July Kansas City futures prices and then central Oklahoma elevator margins were subtracted (Oklahoma Department of Agriculture). Storage and interest costs were subtracted from cash prices to determine the net price. Production loan interest rates were obtained from a lender in central Oklahoma.³ Storage rates were obtained from a commercial elevator in central Oklahoma. Storage and interest costs averaged about five cents per bushel per month.

The government-direct payments to farmers were obtained from *Wheat Situation and Outlook Yearbook* (U.S. Department of Agriculture). The eleven-year period, 1981 through 1992, was selected because the 1981 wheat crop was the first crop after implementation of the 1980 farm program. Average annual per acre yields for Canadian County in Oklahoma were obtained from Oklahoma Agricultural Statistics Service. Canadian County was selected because it is in the market area of the central Oklahoma elevator whose margins were used. County program yields were obtained directly from the Agricultural Stabilization and Conservation Service.

Hypothesis tests about differences between means of the various marketing strategies are conducted with paired t-tests. Hypothesis tests about differences between variances are conducted using the ratio of variances F-test (Steel and Torrie, p. 83).

The efficient sets were also computed using first-degree stochastic dominance (FSD), second-degree stochastic dominance (SSD), and

stochastic dominance with respect to a function (SDWRF). The calculations were performed using Cochran and Raskin's microcomputer program. FSD efficient sets include all marketing strategies that would be preferred by any individual who prefers more money to less money. The SSD efficient sets are more restrictive and include all marketing strategies that would be preferred by any individual who prefers more to less and is also risk averse. SDWRF is even more restrictive and places bounds on the degree of risk aversion. Raskin and Cochran show that risk aversion coefficients are sensitive to the units of measurement. Since the units here produce smaller numbers than those in past studies, which used annual income, we use larger risk aversion coefficients than were used in most of the studies reviewed by Raskin and Cochran.

Results

The means and standard deviations of each of the four marketing strategies are presented in Table 1 for the net price, net price plus payment, and gross income per acre. None of the means or standard deviations of one marketing strategy are significantly different from those of another marketing strategy. The mean net price plus payment, however, is significantly higher than the net price, and the standard deviation of the net price plus payment is significantly lower than the net price with forward contracting and selling at harvest. Selling cash on November 1 is the least risky strategy without government programs, but becomes the most risky strategy when government programs are included. Thus, considering government programs is important when evaluating marketing strategies.

Even though the means and standard deviations are not significantly different, they generally show the patterns expected. The highest price is received at harvest which is consistent with Benirschka's findings that producers in locations such as Oklahoma that are relatively close to the port will have little incentive to store grain. Spreading sales, however, has the second lowest standard deviation of gross income rather than the lowest as expected. The riskiness of forward contracting relative to cash sales at harvest increases when government programs are considered.

Even though results are not statistically significant, extension still needs to make recommendations. Selling cash at harvest is the mean-variance dominant strategy when government programs are included. The stochastic dominant efficient sets in Table 2 all contain selling cash at harvest. Theory supports that selling cash wheat at harvest in Oklahoma should have the highest mean.⁴ Thus, the recommendation that extension can make is that farmers should participate in farm programs and that selling cash wheat at harvest seems to be at least as good as anything else.

Table 1.

Mean and Standard Deviation of Prices and Income From Four Alternative Marketing Strategies, 1981-1991

	Marketing Strategy			
	Forward Contract	Cash at Harvest	Cash on 11/1	Spreading Sales
Net Price (\$/bu.)	3.08 (0.58) ^a	3.10 (0.57)	2.96 (0.55)	3.02 (0.55)
Net Price & Payment (\$/bu.)	4.20 (0.28)	4.21 (0.25)	4.08 (0.47)	4.13 (0.33)
Gross Income w/ Participation (\$/acre)	110.64 (12.87)	111.01 (10.79)	107.11 (13.72)	108.68 (11.39)

^aThe numbers in parentheses are standard deviations, not standard errors. No mean in a given row is significantly different from any other mean in that row. No standard deviation in a given row is significantly different from any other standard deviation in that row.

Conclusions

In this paper, we have argued that the efficient market hypothesis and the law of one price should be the cornerstone of extension marketing education programs. We have also argued that extension marketing programs should place less emphasis on outlook and hedging and instead place more emphasis on marketing strategies that people really use. For Oklahoma wheat producers, the recommended marketing strategy is: 1) sell cash wheat at or soon after harvest, and 2) participate in farm programs. Assuming that farmers are rational, then it should not be a surprise that the best marketing strategy is a simple one that many people already use.

Extension was designed to bring the latest new research findings to producers. We have oversold our ability to forecast prices and oversold the benefits of hedging and forward contracting.⁵ Extension does have something to offer to producers. We can tell producers that expense and effort spent in forecasting prices is of limited value. We can help them decide whether to store their grain. We can (and do) help them decide whether to participate in farm programs.

The empirical section of the paper is only a case study. The results are not necessarily applicable to other states or crops. But, the weakness of the case study approach need not detract from the strength of the argument that

Table 2.

Stochastic Dominance Efficient Sets for Alternative Marketing Strategies of Hard Red Winter Wheat

			Stochastic Dominance With Respect to a Function ^c	
	First-Degree Stochastic Dominance ^a	Second-Degree Stochastic Dominance ^b		
	All	Forward Contract Cash at Harvest	0.005 - 0.2	0.2 - 0.4
Net Price			Cash at Harvest	Cash at Harvest
Net Price & Payment	All	Cash at Harvest	Cash at Harvest	Cash at Harvest
Gross Income w/ Participation	Forward Contract Cash at Harvest	Cash at Harvest Scaling	Cash at Harvest	Cash at Harvest Scaling

^aIndividuals who prefer more to less.^bIndividuals who prefer more to less and are risk averse.^cIndividuals who prefer more to less and have risk aversion coefficients in the specified ranges.

the emphasis of extension marketing programs should not be outlook and hedging. Instead, we should emphasize cash marketing strategies with which producers are comfortable, especially since one strategy seems to be about as good as another.

For those who disagree with us, we relate the story of the undergraduate student who said all his neighbors sold their crop at harvest and he had chosen to study agricultural economics because he knew there had to be something better. Our response is, "Are those neighbors still in business?"

Notes

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1. The problem with much of this past research is that it is in-sample and thus does not represent returns that could really be achieved. Also, statistical tests of hypotheses are rarely presented.
2. In the example considered here, correlation between county yields and price is insignificant. The correlation is even positive instead of negative. Individual producer yields should have even less correlation with price than county yields do.
3. We use borrowing rates as the interest rate. Deposit interest rates would be appropriate for a producer with no debt. A producer with no debt would have more incentive to store than shown here.
4. Benirschka's arguments suggest that expected net cash prices would be highest at harvest in Oklahoma since Oklahoma is close to the port. Barkley and Schroeder's arguments suggest forward contract prices would be below expected cash prices at harvest.
5. Researchers have spent considerable effort developing optimal hedging and marketing strategies that people never use. Implications for research are that researchers need to explain the gap between what their models say producers should do and what producers really do. Castle argues that there is a communication gap between practitioners and agricultural economists in general. Brorsen and Irwin, however, simply argue that our models of optimal hedging are wrong because of erroneous assumptions.

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