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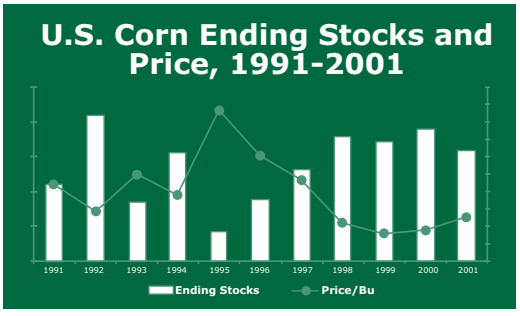
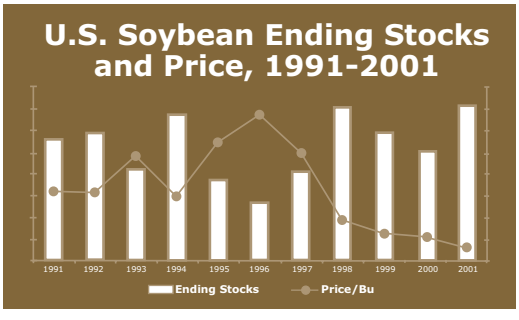
Marketing Alternatives for Tennessee Farmers

A Historical Perspective on Corn and Soybeans





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A Historical Perspective on Corn and Soybeans

Delton C. Gerloff
Professor, Agricultural Economics

Introduction

Prices received by Tennessee farmers directly impact gross and net returns to farming, and as such, are an important factor in farm decision-making. Several marketing alternatives are available to price crops. These alternatives include selling at harvest, cash-forward contracting, hedging in the futures market, hedging using the futures options market, storing past harvest and others.

To help understand these various marketing alternatives, and which ones might better suit Tennessee farmers, 10 marketing alternatives[1] were evaluated over an 11-year period, from 1990 to 2000. These 10 alternatives were evaluated for both returns and risk. The results presented in this publication cover a time period in which there were significant changes in price levels, yields and government policy. While it is not assumed that the time period represents the entire range of production, price and policy possibilities, it does reflect a time period during which many changes occurred in U.S. agriculture.

Method

Data were collected from Northwest Tennessee local grain prices paid by elevators to farms, as reported by the USDA-Tennessee Department of Agriculture Market News. Futures prices were also collected from the Chicago Board of Trade closings, as reported in the Tennessee Market Highlights, a weekly newsletter. Option premium data were purchased from a private company for the 1990-2000 time period. The pricing alternatives analyzed are presented in Table 1.

Expected production was assumed to be 50,000 bushels for corn and 30,000 bushels for soybeans. According to the Tennessee Agricultural Statistics Service, May has the highest monthly average price for both corn and soybeans over the past 20 years. Based on those higher prices, May 15 was used as a date of forward pricing and storage sales. Futures and option contract months were November and December for soybeans and corn, respectively.

Interest, at a rate of 9 percent, was charged on option premiums and on margin calls in hedging accounts. Negative returns to hedging were charged interest, at a rate of 9 percent of the final loss in the hedging account over half the total time period from May to harvest. When production was less than that contracted, a 10 percent premium was added to harvest prices that a farmer would have to pay to honor the contract. Storage costs of $0.04 per bushel per month were assessed to stored corn and soybeans. Commission on options and futures transactions were assessed at $0.02 per bushel.

Results

Table 1 contains returns for the 10 corn marketing alternatives. These returns are adjusted for marketing expenses. Dyer (Northwest Tennessee) County yield data were used to adjust the expected yields for year-to-year variations. For example, if the year had higher than the 11-year average county yield, more than 50,000 bushels would be produced. If the year had less than the 11-year average yield, less than 50,000 bushels would be produced. In 1993, for example, the Dyer County corn yield was 90 bushels per acre, well below the 11-year average of 113.9 bushels per acre. While an expected production of 50,000 bushels was used in the alternatives, returns were calculated using an actual production of 39,505 bushels, corresponding with the percentage reduction in the county yield that year. For the 100

[1]Originally 16 alternatives were evaluated, but six out-of-the-money and in-the-money put option alternatives were omitted because their results were very similar to the at-the-money put option alternatives.

percent forward-contracting alternative, for example, the difference between the expected production of 50,000 bushels and the actual production of 39,505, or 10,495 bushels, would have to be purchased at the harvest price, plus a 10 percent price premium, to fulfill the contract.

For corn, forward-contracting 100 percent of expected production had the highest average annual return of the 10 alternatives, at $127,530 (Table 2). The next two highest-ranking alternatives, 100 percent hedge and 50 percent put option and 50 percent forward-contracting, had similar annual average returns at $123,163 and $122,665, respectively. The lowest annual average return was for the sell-at-harvest alternative, generating $111,754.

In general, over the 11-year period, forward pricing gave a higher return than pricing at harvest time or storing for sale after harvest. The top two alternatives, as ranked by average returns, each had two years when they were in the bottom three in annual returns. For example, the 100 percent forward-contract alternative was in the top three during nine out of the 11 years of the time period studied. But in two out of the 11 years, it was ranked in the bottom three in returns. While it would be expected that the alternatives with the higher returns would be in the top three more often, the variation of returns reflects that in any one year, any given alternative could perform very well or very poorly in relation to the other alternatives.

Variability is also captured in Table 2. It would be expected that using options would tend to decrease the variability of returns. However, while the 100 percent put-option alternative never had a top three year, it did have four years in the bottom three. And even though selling at harvest was ranked last according to average annual returns, three years out of the 11 it was ranked in the top three.

Table 3 contains return and variability data for soybeans. The same assumptions were used for soybeans as for corn, with the exception that

Table 1. Marketing Strategies

Put Option Strategies	1 - Buy an at-the-money put option for 100 percent of expected production on May 15. 2 - Buy an at-the-money put option for 50 percent of expected production on May 15, and forward-contract 50 percent of expected production on May 15. 3 - Buy an at-the-money put option for 50 percent of expected production on May 15, forward-contract 50 percent of expected production on May 15, and buy an at-the-money call option on 50 percent of expected production on May 15.
Hedging Strategies	1 - Hedging 100 percent of expected production on May 15. 2 - Hedging 50 percent of expected production on May 15, selling the remained at harvest.
Storage Strategies	1 - Storing 100 percent of production, selling on May 15 of the following year. 2 -Storing 50 percent of production, selling on May 15 of the following year, and selling the remainder at harvest.
Forward-contracting Strategies	1 - Forward-contracting 100 percent of expected production on May 15. 2 - Forward-contracting 50 percent of expected production on May 15, and selling the remainder at harvest.
Sale at Harvest Strategy	Sell all the production at harvest: September 30 for corn, October 15 for soybeans.

expected production was assumed at 30,000 bushels per year. The highest two marketing alternatives gave virtually the same average annual return — 100 percent hedge and 100 percent forward contract, with returns of $182,842 and $182,210, respectively. The 50 percent put option and 50 percent forward-contracting alternative gave average returns of $179,067. Selling at harvest was the lowest of all alternatives evaluated.

Storage performed poorly for soybeans, similar to the results for corn. The variability in those returns was also evident. Storing 100 percent of production was in the top three returns in five years and also in the bottom three of returns in five years. Hedging was in the top three returns eight of the 11 years, and only in the bottom three returns in one year. Similarly, forward-contracting 100 percent of expected production was in the top three returns in seven years, and in the lowest three returns in two years. Buying put options for the expected production did not perform well for soybeans based on returns, but, as expected, the put-option alterna-

Table 2. Marketing Alternatives for Corn, Average Annual Returns, Ranked From Highest to Lowest, 1990-1999

Marketing Alternative	Average Returns ($)	Number of Years in Top 3 in Average Returns	Number of Years in Bottom 3 in Average Returns	Highest Annual Return ($)	Lowest Annual Return ($)
Forward-contract 100 percent of EP[1]	$127,530	9	2	$215,061	$86,025
Hedge 100 percent of EP	$123,163	7	2	$205,061	$90,522
ATM[2] put option on 50 percent of EP; Forward-contract 50 percent of EP	$122,665	8	0	$201,870	$87,721
Forward-contract 50 percent of EP	$119,958	2	0	$195,311	$91,272
ATM put option on 50 percent of EP; Forward-contract 50 percent of EP; ATM call option on 50 percent of EP	$118,977	0	2	$192,873	$86,135
Hedge 50 percent of EP	$117,458	1	2	$190,311	$87,051
ATM put option on 100 percent EP	$117,116	0	4	$188,678	$86,919
Store 100 percent of production	$115,421	1	6	$267,964	$78,668
Store 50 percent of production	$113,587	2	8	$219,216	$76,860
Sell all production at harvest	$111,754	3	7	$175,561	$75,051

Footnotes:
[1]EP = Expected production
[2]ATM = At-the-money

tive appeared only once in the top three and once in the bottom three of returns. As in corn, selling at harvest had both good and bad years, but on average gave the lowest return.

Financial investments are assumed to vary in relation to their return and risk performance. Generally, the higher the risk, the higher the anticipated return. Likewise, the lower the risk, the lower the anticipated return. Soybean returns in Table 3 generally exhibit this risk return relationship. For example, the top three alternatives ranked on average returns have relatively high returns measured by the highest observed over the 11-year period. But the three also have some of the lowest returns observed. Likewise, the storage and sell at harvest alternatives are among the lowest in average returns, but have higher lowest observed returns.

Corn returns, however, do not reflect the anticipated risk/return relationship. For example, the lowest observed return for the 100 percent

Table 3. Marketing Alternatives for Soybeans, Average Annual Returns, Ranked from Highest to Lowest, 1990-1999

Marketing Alternative	Average Returns ($)	Number of Years in Top 3 in Average Returns	Number of Years in Bottom 3 in Average Returns	Highest Annual Return ($)	Lowest Annual Return ($)
Hedge 100 percent of EP	$182,842	8	1	$266,110	$89,140
Forward-contract 100 percent of EP[1]	$182,210	7	2	$263,410	$86,234
ATM[2] put option on 50 percent of EP; Forward-contract 50 percent of EP	$179,067	4	2	$255,856	$87,901
Forward-contract 50 percent of EP	$177,714	1	0	$250,510	$91,690
Hedge 50 percent of EP	$177,605	1	1	$251,860	$90,790
ATM put option on 100 percent EP	$175,074	0	5	$248,301	$84,863
Store 100 percent of production	$174,878	5	5	$284,575	$98,006
ATM put option on 50 percent of EP; Forward-contract 50 percent of EP; ATM call option on 50 percent of EP	$174,816	0	5	$246,704	$85,418
Store 50 percent of production	$173,624	3	6	$261,093	$95,223
Sell all production at harvest	$172,369	4	6	$237,610	$92,440

Footnotes:
[1]EP = Expected production
[2]ATM = At-the-money

forward-contract and hedge alternatives is $86,025 and $90,522, respectively (Table 2). The storage and sell at harvest alternatives, which were lowest in average returns, had lowest observed returns below $80,000. So not only were the storage and sell at harvest alternatives among the lowest in average returns, but they also exhibited greater risk, as measured by the lowest return observed over the 11-year time period.

Another interesting observation can be made by comparing hedging and options. It was anticipated that hedging would generate higher returns over time and options would exhibit lower risk. From these results, however, it appears that hedging not only generates higher returns, but also exhibits lower risk, as measured by the lowest observed return.

Applications to Tennessee Corn and Soybean Producers

From these results, it appears that forward-contracting and hedging should be strongly considered in marketing plans for corn and soybeans in Tennessee. Storage and selling at harvest were among the lowest alternatives ranked by average returns. To maximize returns over time, marketing plans should rely more heavily on hedging and forward-contracting.

For higher-leveraged farms, where financial risk may be higher, storage and selling at harvest does appear to limit lower returns for soybeans. For corn, storage and selling at harvest actually had lower observed returns than the higher returning alternatives. Even for higher-leveraged farms, therefore, hedging and forward-contracting corn production should be considered. For both corn and soybeans, hedging performed better than options, both in average returns and in limiting downside risk. Put options should be considered in combination with forward-contracting as a way to increase returns and limit risk.

Conclusions

Ten marketing alternatives regarding impact on returns and variability of those returns were evaluated over an 11-year period. Of the alternatives evaluated, forward-contracting and hedging all expected production performed well, with relatively higher returns for corn and soybeans and a combination of higher returns and less variability for corn. A combination of put options and forward-contracting performed well for both corn and soybeans also.

Storing and selling at harvest performed poorly, as ranked by average returns. Storing and selling at harvest limited downside financial risk in soybeans. Using put options to price 100 percent of the crop did not perform well in either corn or soybeans, ranked by either average returns or downside risk exposure. In general, it appears that for the 11-year time period, a marketing plan that priced a larger percentage of the crop pre-harvest gave relatively better results.

This study is limited to the May 15 decision date. Other dates could have given different results. Also, because the data on which this study was based came from Northwest Tennessee, some caution should be used in applying the results to all areas of Tennessee. However, assuming price movements are positively correlated across the state, it is expected that other areas of the state would generate similar results. Correlation coefficients ranged from .97 to .99 for reported prices between Northwest Tennessee and other Tennessee reporting districts for the 11-year period.

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