

**Title:** Using a Cotton Futures Options Contract Strategy to Enhance Price and Revenues

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**Abstract** (50 words maximum):

Government program changes and increased price volatility are causing cotton farmers to manage more price risks. A “harvest strategy” which sells cotton at harvest, purchases an at-the-money July call options and exercises this contract eight months later is a strategy which takes advantage of potential future price increases.

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## **Using a Cotton Futures Options Contract Strategy to Enhance Price and Revenues**

### *SCOPE OF THE PROBLEM*

A sea change in U.S. farm commodity programs was witnessed by the passage of the 1996 Federal Agriculture Improvement and Reform (FAIR) Act which has caused dramatic changes in American agriculture. With support payments being reduced and decoupled from production decisions, farmers in the U.S. are attempting to manage a harsh environment of production risks and price volatility as these factors affect farm level profits. Efforts to provide revenue assurance to farmers has been attempted through different forms of crop insurance, but these products have not proved very successful in the cotton sector. This analysis suggests using a futures options technique, described in this study as a “harvest strategy,” can reduce price risk and increase farm revenues. While this paper illustrates how a specific options trading strategy can be used to potentially enhance cotton price and increase grower revenues, a similar technique could also be developed and used for other crops and commodities.

### *THE “HARVEST STRATEGY”*

The “Harvest Strategy” consists of selling cotton at harvest on the cash or spot market and simultaneously buying an at-the-money July call options. Using this technique, cotton is sold during the harvest period which eliminates storage costs. Sale at harvest also protects the grower from the risk of future price declines and provides crop revenues soon after harvesting, thereby; increasing financial liquidity and reducing interest payments on borrowed operating capital. Because cotton prices are usually at or near seasonal lows during the time of harvest, the farmer may wish to have an opportunity to realize additional revenues from an expected increase in cotton prices after the conclusion of the harvest period. Purchasing a call option contract

provides the grower with the right to participate in any anticipated increases in cotton prices in the months after harvest. As cotton prices increase after harvest, the value of the call option will appreciate which increases farm revenues. If cotton prices decline in the months after harvest, the call option will decrease in value but the maximum amount of the grower's loss is limited to cost of purchasing the call option (or premium). This options trading procedure is a simple price risk management technique which cotton growers can use to have the possibility to reap the additional revenues of any price increases that may occur after harvest.

This options strategy has several advantages when compared to other cotton marketing alternatives. First, and most importantly; this technique reduces price risks by eliminating the downside potential of lower cash prices while providing the grower with the capability of benefitting from any future increases in cash prices. Second, this marketing technique eliminates storage costs of cotton after harvest. Third, the "harvest strategy" provides the grower with crop revenues as the cotton is sold during harvest. Fourth, options contracts can be "rolled over" to a more distant futures options month contract and provide the grower with the flexibility of exercising, or terminating the options contract, any time on or before the expiration date. Fifth, options contracts have several strike prices and related premiums that allow growers to select the combination of these factors which correspond to their marketing goals and revenue needs. Sixth, options are not subject to margin calls when prices move against a trader market position as are futures contracts. Last, this analysis was preformed to illustrate that options allow growers to benefit in the form of increased revenues from any potential future upward movements in cotton prices greater than the options contract strike price.

Options trading also have several disadvantages that must be considered by growers. First, the costs of option premiums and brokerage fees incurred when buying an options contract.

Second, cotton options have fixed dates for a call option to expire and a fixed size of options contracts (100 bales). Last, a multitude of fundamental and technical market forces directly and indirectly influence daily futures and options contract prices which often cause volatile and wide swings in the cotton market.

### *HARVEST STRATEGY ANALYSES*

Analysis of the Harvest Strategy required data to be gathered on spot, futures, and option prices in November and June of the following year to reflect price changes in the beginning and the end of the crop year. The cash or spot prices were collected from “Daily Spot Cotton Quotations” published by the USDA, Agricultural Marketing Service, Cotton Division (daily publication, various issues). The cotton options and futures prices were collected from “Cotton Options, Daily Market Report” published by the New York Cotton Exchange (various issues).

Estimated cash flows resulting from the use of the harvest strategy were analyzed using a spreadsheet program. In order to simulate the use of the Harvest Strategy, it was assumed that cotton was sold on the spot market on November 1 (to correspond to the conclusion of harvest). Receipts from this cash market sale are the first cash inflows from using the Harvest Strategy and are recorded in the first column of Table 1. The second step of this strategy is to determine the strike price of the option contract that will be purchased in order to take advantage of any possible future price increases. The procedure of selecting this strike price is described in Table 2. First, the prices of July futures contract on the day of the sale (November 1) of the “cash” cotton is recorded and then a strike price is selected that will provide an “at-the-money” call, which means that the options contract strike price should be equal or slightly higher than the futures contract price.

The next step of the Harvest Strategy is to purchase an “at-the-money” July call options

contract at the pre-determined strike price. The cost of purchasing the call options contract, which is called the options premium, resulting in a negative cash flow that is reflected in column 2 of Table 1. (No contracts with 78 strike price were available for trading on November 1, 1994, therefore the call options premium was estimated on the basis of available contracts.) At this point, the minimum net return from using the Harvest Strategy is equal to the sale price of cotton on the spot market less the options contract premium. The net return or cotton price using the Harvest Strategy return cannot be any lower than column 3 of table 1. because when and if market prices decrease after the call options contract is purchased, the grower will simply not choose to exercise the option to take a position in the futures market. In the years when cotton prices do increase after November 1, the options contract can be sold at any time before if the grower believes that market prices have reached a peak or on the call options expiration date.

The Harvest Strategy was simplified to avoid the subjectivity of choosing a date to sell the option contract and assumes that each July call options contract is to be held until its expiration date. If cotton prices increase above the options strike price between November 1 and the July call options contract expiration date, the value of the call options will increase and the options contract can be sold at a premium. Conversely, a decrease in cotton prices below the strike price during this eight-month time span will cause the value of the call options contract to fall to zero. Column 4 of table 1. shows the options value on the contract's expiration date and demonstrates that the Harvest Strategy options contract appreciated in value in four of eight years examined in this study. The net gains in the options contract found in column 5 of table 1. and is equal to the appreciation in the options contract value minus the options premium, which amounted to a total of 61.25 cents or an average of 7.66 cents per pound over the selected study period. Adding the options gain to the minimum net return (column 3 of table 1.) results in the Harvest Strategy net

return that is illustrated in column 6 of table 1. and shows that the consequences of utilizing this options strategy generated an average cotton price of 71.37 cents per pound. If a grower used this Harvest Strategy, gross revenues would have been 9.3 percent greater than the average November 1 spot market cotton price of 65.31 cents per pound.

### *COMPARATIVE ANALYSIS*

A common cotton marketing scheme used by cotton growers is commonly referred to as the “store and sell later” alternative and will be used in this study as a basis of comparison to evaluate the effectiveness of the Harvest Strategy. To make sure that these two marketing alternatives are comparable, the “store and sell later” strategy assumes that the cotton crop will be stored until the expiration date of the July call options contract and then sold on the spot or cash market. However, the farmer will incur storage and other carrying charges for the eight months between November and July.

Storage and carrying charges were estimated at 80 points (where 100 points represents one cent), or 0.8 cents, per pound per month for the purposes of this study. Carrying charges include \$2.25 per bale for interest and \$1.75 per bale for storage that leads to a \$4.00 per bale per month of total holding costs. This \$4.00 per bale costs is then divided by 500 pounds (which is the amount of cotton in an average bale) which yields the 80 points per pound per month carrying charges used in this analysis. The net cotton price resulting from a June spot market sale is estimated by subtracting the carrying charges of 6.4 cents per pound (0.8 cents per month times eight months) from the gross June cash sale price. Estimated net cotton prices and revenues resulting from the “store and sell later” strategy are illustrated in Table 3 and shows that the average net cotton price was 70.54 cents per pound during the analysis period.

Another way to evaluate the Harvest Strategy is to compare the average net cotton prices realized to the often used but rather naive technique of selling cotton at harvest, described as “sale at harvest” in this study. The November 1 cash or spot market cotton price is used to represent the “sale at harvest” alternative. The average cotton price using this naive technique was 65.31 cent per pound over the selected study period, or averaging 6.06 cents less per year than the Harvest Strategy price of 71.37 cents per pound.

### *SUMMARY AND CONCLUSIONS*

The effect of utilizing the Harvest Strategy options marketing technique can be reviewed and compared to the “store and sell later” and the “sale at harvest” alternatives in table 4. First, the total net increases in the value of the July call options contract used in the Harvest Strategy over the eight years amounted to 61.25 cents, or an average annual increase of 7.66 cents per pound. Second, the net cash prices resulting from using the Harvest Strategy were higher than the “store and sell later” cotton prices in six of the eight years reviewed and greater than the “sale at harvest” technique in four of the eight years examined in this study. Over this eight-year period, the cumulative gain of using the Harvest Strategy compared to “store and sell later” technique was 6.64 cents (or 0.83 cents per year) per pound versus a total of 48.5 cents (6.06 cents per year) greater than the returns received from the “sale at harvest” alternative. Finally, the Harvest Strategy was also found to decrease the variance of cotton prices and farmer returns by approximately 10 percent compared to the “store and sell later” marketing technique. Specifically, the variance of cotton prices under the Harvest Strategy was 226.99 compared to the “store and sell later” variance of 248.54.

In summary, this Harvest Strategy of utilizing a specific futures options contract technique can be used by growers to increase the net price and farm revenues received from the sale of their

cotton crop. There are several advantages of using this marketing alternative which are in addition to any potential gains realized in the value of the call options contract. This analysis demonstrates that cotton growers could have enhanced the price received for their cotton and increased farm revenues during the 1990/91 through 1997/98 crop years by adopting a call options contract described in this study as the Harvest Strategy.



Table 1. Cash Cotton Prices and Harvest Strategy Option Premiums, Values and Net Returns, in cents per pound, 1990/91 through 1997/98 .

	Col. 1	Col. 2	Col. 3	Col. 4	Col.5	Col. 6
Year	Cash Sale at Harvest	Options Premium	Options Minimum Net Return	Change in Option Value	Net Gain in Option Value	Net Cotton Prices of Strategy
1990/91	68.29	1.95	66.34	11.82	9.87	78.16
1991/92	55.83	2.70	53.13	0.00	0.00	53.13
1992/93	49.93	3.90	46.03	6.34	2.44	52.37
1993/94	56.67	2.65	54.02	17.80	15.15	71.82
1994/95	68.94	1.62	67.32	35.41	33.79	102.73
1995/96	82.33	3.60	78.73	0.00	0.00	78.73
1996/97	70.22	3.69	66.53	0.00	0.00	66.53
1997/98	70.27	2.76	67.51	0.00	0.00	67.51
Total Returns	523.43	22.87	499.61	71.37	61.25	570.98
Average	65.31	2.86	62.45	8.92	7.66	71.37

Table 2. July Futures Contract Prices on November 1 and the Corresponding At-The-Money Options Contract Strike Prices, in cents per pound, 1990/91 - 1997/98.

Year	Futures Contract Price on November 1 July	Selected Harvest Strategy At-the-Money Strike Price
1990/91	75.01	75.00
1991/92	64.50	65.00
1992/93	54.10	54.00
1993/94	60.90	62.00
1994/95	75.50	78.00
1995/96	84.62	88.00
1996/97	76.05	77.00
1997/98	74.68	75.00

Table 3. Estimated Cotton Prices and Carrying Charges of a “Store and Sell Later”  
Marketing Strategy, in cents per pound, 1990/91 through 1997/98

Year	Cash Price on Expiration Date of July Call Options	Cotton Carrying Charges	Net Cotton Price of a Store and Sell Later Strategy
1990/91	85.31	6.40	78.91
1991/92	56.07	6.40	49.67
1992/93	57.08	6.40	50.68
1993/94	79.30	6.40	72.90
1994/95	108.40	6.40	102.00
1995/96	84.29	6.40	77.89
1996/97	72.15	6.40	64.75
1997/98	72.94	6.40	66.54
Total Returns			564.34
Average	76.94		70.54

Table 4. Comparison of the Net Cotton Prices, Total and Average Returns of the “Sale at Harvest”, “Store and Sell Later” and “Harvest Strategy” Cotton Marketing Alternatives, in cents per pounds, 1990/91 through 1997/98

Year	Sale at Harvest	Store and Sell Later	Harvest Strategy	Harvest Strategy versus Sale at Harvest	Harvest Strategy versus Store and Sell Later
1990/91	68.29	78.91	78.16	9.87	-0.75
1991/92	55.83	49.67	53.13	-2.70	3.46
1992/93	49.93	50.68	52.37	2.44	1.69
1993/94	56.67	72.90	71.82	15.15	-1.08
1994/95	68.94	102.00	102.73	33.79	0.73
1995/96	82.33	77.89	78.73	-3.60	0.84
1996/97	70.22	65.75	66.53	-3.69	0.78
1997/98	70.27	66.54	67.51	-2.76	0.97
Total Returns	523.43	564.34	570.98	48.50	6.64
Average	65.31	70.54	71.37	6.06	0.83
Variance	95.19	248.54	226.99		