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TWO BASIC OPTIONS STRATEGIES FOR PRODUCERS:
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Beginning in the Fall of 1984, agricultural producers and agri-businesses will be confronted with another dimension of the deregulation trend in American Industry. Options on domestically produced agricultural commodities once again can be traded. As the country debates the 1985 Farm Bill, producers and agribusinesses must be making every effort to be prepared for the possibility of greater dependence on the market oriented policies in agriculture. In a free market environment, options, and their associated strategies must be considered as part of producer and agribusiness market strategies. This paper describes the basic terms and types of options, examines two option trading strategies and discusses where commodity options fit in the alternative marketing strategies available to producers.

Background on Which Commodity Options Might be Traded

The options on domestically produced agricultural commodities will probably be traded in the fall of 1984. Expectations are for the following options to be traded: live cattle and live hogs on the Chicago Mercantile Exchange, corn and soybeans on the Chicago Board of Trade, spring wheat at the Minneapolis Grain Exchange, hard red winter wheat options at Kansas City Board of Trade, and soybeans on the Mid-American Commodity Exchange. The CFTC pilot program specifies that the option must be traded on the same exchange as the underlying commodity futures contract. Each exchange will be limited to two agricultural options and the options will be only on the futures contracts not the physicals (9, p. 1).

The current rule of only two options per exchange has a distinct disadvantage for producers. The Mid-American Commodity Exchange contract sizes are more consistent with the needs of agricultural producers. The smaller size of these options would enable producers to have more flexibility in the formation of their option trading strategies. The Chicago Board of Trade also has a broader range of grain commodity futures contract than the other exchanges. The desire for equality of treatment of the exchanges may deny a number of producers the use of very important risk transfer mechanism for their crop.

How Are Options Different from Futures Contracts

An option conveys the right but not the obligation to buy or sell a given amount of a commodity at a pre-determined price on or before a specific date. Three basic differences exist between futures contracts and commodity options.

First the buyer of the option has the option to exercise his right not the obligation. If the exercising of the right is unprofitable, the buyer can make the decision not to exercise. Futures contracts create a promise of future delivery or acceptance of delivery. The buyer of a futures contract must accept delivery if he does not offset his position in the futures market. Second, the option will involve a specific predetermined price or strike price. This strike price is stated explicitly on the option and is essential to determination of the value of the option. Futures contracts do not have an explicitly stated price, but rather the price of commodity is determined in trading pit by open outcry (1).

Finally, the options involve the delivery of a futures contract not

the physical commodity. Futures contracts specify the delivery of a physical commodity at a set of specified delivery points (1, pp. 57).

Two Types of Options

Two types of commodity options will exist. A "call" option refers to the right to buy at a pre-determined price, while a "put" option refers to the right to sell at a pre-determined price. In many ways these two types of options are the exact opposites. Because of their differences, they provide producers the ability to develop strategies for a broad range of market conditions.

If the producer purchases an $8.50 soybean call option, s/he has purchased the right to buy the soybean futures contract at $8.50 until the option expires. The $8.50 price is the pre-determined price or the "strike price". This is the price at which the call option buyer can buy the futures contract if s/he elects to exercise the right contained in the option. In contrast an $8.50 soybean put option enables the producer to purchase the right to sell the soybean futures contract at $8.50 until the option expires.

To purchase an option, the buyer of the option must pay an option premium to the seller of the option. The seller of the option can also be referred to as the writer of the option. For example, if a buyer of a put option is willing to pay 50 cents per bushel to sell the soybean futures contract at $8.50, s/he would buy a put option for 50 cents per bushel.

The size of the option premium is determined by the relationship between the strike price and futures market price, the number of days before the expiration of the option, price volatility of the futures contract and interest rates. The size of the option premium coupled

with the producer's expectations for future price changes are the essential determinants of whether the producer should buy a put option or sell a call option. In the remaining part of the paper, the selling or writing of a put option will be referred to as "shorting the call".

The Relationship Between the Strike Price and the Futures Contract Price

Presented on Table 1 is a sample of premium quotations for a "class" of calls and puts. A "class" of option refers to all the puts or calls for a specific commodity i.e. all soybean futures contracts. A "series" of options refers to those options in the "class" that have the same expiration date and strike price. The put and call options having a strike price of $8.00 expiring in February is an example of a series. The "March 1985" is in reference to the Chicago Board of Trade March 1985 soybean futures contract. The option rights refer to the buying and selling of this specific contract. Important: this date does not refer to when this option will expire as is the case with stock options. The options traded on the "March 1985" futures contract will be expiring in February 1985 i.e. the month prior to the delivery month.

Below "March 1985" is a price quote of "$8.00". The quote will refer to the close or settle for the futures contract. Remember this is the price established for the futures contract during the close of the trading day. This settle price is used in the calculation of gains and losses in the futures market. However, its importance in options trading is its use as a reference point for the examination of the option premiums.

The strike price is the pre-determined price specified on the option contract for a specified right. An $8.00 strike price for a call refers to the right to buy at the March 1985 soybean futures contract at $8.00. The $8.00 strike price for put refers to the right to sell at that strike price. At any specified time a number of options may exist

for a specified commodity futures. For the example, the number of strike prices was assumed to be five, this implies five call options and five put options. An essential dimension of option strategies is the selection of the "correct" option for a specific strategy.

The premiums for the calls and puts are quoted underneath their respective headings. Each .01 can be perceived as being representative of 1 cent per bushel. However, each .01 has a value equal to .01 times 5,000 bushel or $50.00. Remember that the Chicago Board of Trade soybean futures contract has a size of 5,000 bushel. For example, an $8.00 put will cost the buyer 21 cents per bushel or $1050 to purchase the right to sell the March 1985 futures contract at $8.00.

Intrinsic Value of Option Premiums

Any option premium has two components i.e. intrinsic value and time value. Intrinsic value of the option is the dollar value of the option if the option was exercised immediately with the specified futures contract price and option premium.

Intrinsic value of a call option is calculated as follows:

(1) Call Intrinsic Value = Current Futures   —   Option Strike
                            Contract Price   Price

If and only if the "Current Futures Contract Price" is greater than
the "Option Strike Price", otherwise the call's intrinsic value
equals zero.

The meaning of the above becomes more clear if we look at two examples. The first example is where a call has positive intrinsic value and the second example is a call where the intrinsic value is zero.

The $7.75 call option has a option strike price less than the current futures contract price of $8.00. If the buyer of the call option exercised his right to buy the futures contract at $7.75, s/he takes the futures contract and sells at the current price of $8.00. If

we do the required calculation we see that the intrinsic option value is 25 cents.

(2) Call Intrinsic Value = $8.00 – $7.75 = $ .25

Thus, the call option has value if exercised.

In contrast the $9.00 call option has a option strike price less than the current futures contract price of $8.00. If the buyer would exercise his option he would have to pay $9.00 to buy the futures contract. But what is the market value of the futures contract? The current futures exchange price is only $8.00 and if he sold the contract at this price he would experience a loss of $1.00 per bushel. So rather than enter into this unprofitable transaction, the option buyer would not exercise the option. If the option is not exercised, its value is zero. Therefore, the intrinsic value of the $9.00 call is zero.

The intrinsic value of put option is computed in the following manner:

(3) Put Intrinsic Value =   Option Strike   –   Current Futures
                                    Price   Contract Price

    If and only if the "Current Futures Contract Price" is less than
    the "Option Strike Price", otherwise the put's intrinsic value
    equals zero.

Because a put involves the right to sell the conditions required for the put to have intrinsic value are the opposite of the call. Let us consider the case of the $9.00 put. The put buyer could purchase the March 1985 futures contract for $8.00 and then exercise his right to sell the futures contract at $9.00. This transaction would result in a profit of $1.00 before commissions.

(4) Put Intrinsic Value = $9.00 – $8.00 = $1.00

If we exercise the $7.75 put, we would receive $7.75 in our sales of the futures contracts to the put option seller. This transaction would result in a $.25 loss and the best decision is not to exercise the

put. Again, if we do not exercise the right contained in the option its value is zero.

Time Value in Option Premiums

Time value of an option is the dollar value of the expectations of future price movements. The most important word in the definition is "expectations." Only if the futures contract price moves in the appropriate direction will this time value become intrinsic value for the option. Time value is representative of speculation on future price movements and the payment to the seller for accepting the price risk contained in the option.

The time value of an option is defined as

(5) Time Value of   =   Option Premium   -   Intrinsic Value
     the Option

In our example, the $7.75 call has 10 cents in time value or 35 cents minus 25 cents, while the $9.00 call has 2 cents of time value or 2 cents minus zero. Table 2 presents the intrinsic values and time values of the options given on Table 1. Again the reader can see how the puts and calls are the opposites of each other. When call options have intrinsic value, the put options will not have intrinsic value and visa versa.

Additional Terms Based on Intrinsic Value and Time Value

An additional classification scheme of options is based upon the relationship between the strike price and the futures contract price. If an option has intrinsic value, the option is said to be "in-the-money". For a put to be "in-the-money" the current futures price must be less than the strike price of the put, while a call is the exact opposite.

If the futures contract price equals the strike price, the option is said to be "at-the-money". In this case the required relationship is

Table 1: Sample of Put and Call Option Premiums for the Chicago
          Board of Trade March 1985 futures Contract on February 1, 1985.

                                    March 1985
                                     $8.00

Strike Price	Call Premium	Put Premium
$9.00	.02	1.01
$8.50	.05	.55
$8.00	.21	.21
$7.75	.35	.10
$7.50	.54	.05

Each .01 premium = $50.00

Table 2: Sample of Put and Call Option Premiums for the Chicago Board
          of Trade March 1985 futures Contract on February 1, 1985.

March 1985
$8.00

	Call Option			Put Option		
Strike Price	Option Premium	Intrinsic Value	Time Value	Option Premium	Intrinsic Value	Time Value
$9.00	.02	0	.02	1.02	1.00	.02
$8.50	.05	0	.05	.55	.50	.05
$8.00	.21	0	.21	.21	0	.21
$7.75	.35	.25	.10	.10	0	.10
$7.50	.54	.50	.05	.05	0	.05

Each .01 premium = $50.00 on a 5,000 bushel contract.

identical for puts and calls. An important characteristic of "at-the-money" options is that this is when the time premium is the maximum for an option "class." Remember time premiums represent the expectations for a favorable price change. "At-the-money" options have the greatest probability of a favorable change in the futures price, that will convert the time value into intrinsic value.

Like the "at-the-money" options the "out-of-the-money" options have no intrinsic value. If they were exercised immediately they would have zero value. Their value is entirely based on the expectations for a favorable price movement.

What Determines Time Value?

The size of the time premium is a function of the number of days before the expiration of the option, the price volatility of the futures contract, interest rates and the relationship between the futures price and the strike price. Time value decreases as the option approaches expiration. The farther the option is from expiration the larger the time premium. The time premium does not decline in a straight line fashion, rather the closer the option is to expiration the larger the rate of decline in the option's time value (see Figure 1). The reason for this is the probability of a large favorable price movement declines. If we are nine months from the expiration of a soybean option, the possibility of a one dollar increase or decline in the soybean futures contract is larger than the possibility of a one dollar increase when there is only 10 days until the option's expiration.

One of the most important factors in determining option time value is the price volatility of the futures contract. As the price volatility increases the greater the potential for a large favorable price movement for any of the options. Price volatility can be measured by a number of

FIGURE 1: HYPOTHETICAL DECLINE IN THE

TIME VALUE AS EXPIRATION APPROACHES

NUMBER OF DAYS TO EXPIRATION
□ OPTION TIME VALUE
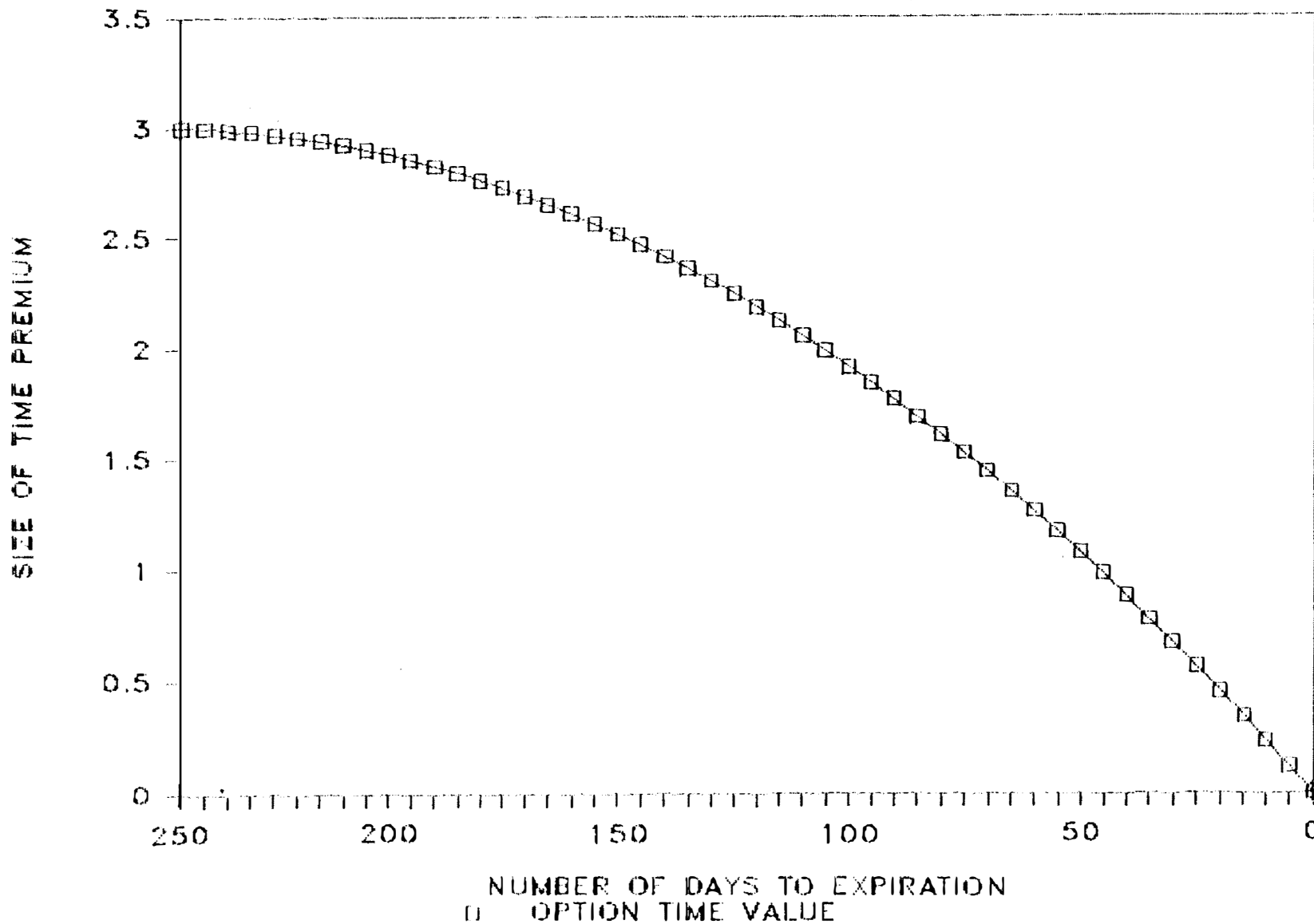
statistical measurement techniques (12). For the present discussion we will use the annual percentage change we can expect about the futures contract price. The subraction and addition of this annual percentage change from the current futures prices gives a range of prices. This range of prices represents our expectation for price changes in the futures contract on an annual basis. Our expectation is that 68 percent of the futures contract prices will be contained in this range. If the futures price is $8.00 and we indicate the price volatility is 10 percent, the implication is that we are 68 percent confident that the soybean futures contract price will be in a range of $7.20 to $8.80 during a year period.

There is a direct relationship between the level of price volatility and the size of the time premium for a specific options contract. The greater the price volatility, the greater the time premium contained in an option (see Table 3). For an at-the-money options we see an almost quadrupling of the time value in the put from 16 cents to 80 cents per bushel. It has been argued that put options represent a form of price insurance. But as is readily evident the cost of the price insurance becomes more expensive when prices become more volatile. The very time a producer would want to buy price insurance. But remember that if time premiums are increasing on puts, the time premiums are also increasing on calls. During a volatile price period, a producer can receive large time premium payments if he sells a call.

Recognition must be given to the fact that price volatility on futures contracts changes during the marketing year. For example, the November 1983 soybean futures contract price ranged between 23 percent to 51 percent during the period of June 1 to September 1 (see Table 4). This variation in price volatility implies there will be opportunities

Table 3: Hypothetical Put Option Values for a Soybean Futures Contract
Trading at $8.00 Per Bushel When Price Volatility of the
Futures Contract is Varied to Specified Levels. a/

Strike Price of The Option	Price Volatility Levels Expressed as a Percentage of the Futures Contract Price of $8.00		
	50%	25%	10%
$9.00	1.42	1.07	1.00
$8.50	1.09	.70	.51
$8.00	.80	.40	.16
$7.75	.67	.28	.06
$7.50	.55	.19	.02

a/ This table is based on the Black options pricing model for commodity
futures options. The additional assumptions of the table are that
the interest rate is 14 percent and 100 days exist before the put
options expire.

Table 4: Price Volatility for the November 1983 Soybean Futures
Contract Based on Closing Prices During the Specified
Month. a/

	Description of Terms	June	July	August	September
				Date	
a.	Price Volatility of Month	23%	31%	51%	42%
b.	Closing Soybean price on the first of Following Month	$6.37	$7.55	$8.81	$8.29

a/ Price volatility of the month was based on the closing prices of
November 1983 soybean futures contract during the month. Plus or
minus this percentage of price volatility from the current closing
price would approximate that we would expect 68 percent of the
observed prices would be contained in this range during the year.

for producers to generate additional revenues through selling calls.

Interest rates increase the carrying costs of owning an option. If interest rates increase the expectation is for the time premium on the option to decline. Among the four factors being discussed as determining the size of the time premium, this factor has the weakest impact.

The final factor is the relationship between the strike price and futures contract price. The maximum time premium occurs when an option is at-the-money. As we move to any other strike prices the time premium declines. This condition holds for both calls and puts. With this basic understanding of the pricing of options let us examine put options as a marketing strategy relative to forward contracting and cash marketing.

Comparison of Alternative Marketing Strategies:

Put options represent an alternative method of establishing a forward price for a producer's soybeans. Producers can establish a forward price for soybeans by either signing a forward pricing contract with a local elevator or hedging the commodity on the futures market. The current discussion will concentrate upon how put options compare to cash marketing and forward pricing of grain at the local elevator.

Assume that on June 1 a producer is considering the possibility of pricing 5,000 bushels of soybeans that he plans to harvest in the fall. If the producer decides to wait until November 1 to price the soybeans, he has selected a cash marketing strategy. Reasons for selecting this strategy are the expectations of higher prices for soybeans in the fall and a producer not knowing for sure on June 1 his fall production level.

Forward pricing at a local elevator locks the producer in at a specific price. If prices go down and the producer has forward contracted at a higher price, the forward pricing decision would have been profitable. However, if cash prices increase significantly, the producer would be

unable to benefit from the price increases.

Further, if a producer has a short crop that has been contracted at the lower price, he might have to buy soybeans to meet the delivery requirements of the contract. This potential loss is extremely unattractive from a risk management perspective, because when the producer has a short crop his net profit is likely to be either very very small or negative. To pay an elevator for every contracted bushel not produced could mean serious financial problems. To control this type of financial risk, producers often limit the percentage of future production that they forward contract.

Put options are an attractive marketing alternative because they have the ability to partially overcome both of these limitations to forward contracting. First, a put option establishes a basement price, but leaves open the possibility for a producer to benefit from upward price movements. Also, if the producer has a crop shortfall, he can sell his put option. His maximum loss would be the put option premium-- not the price for an entire bushel of grain.

Let us examine how a decrease or an increase in soybean prices would affect the consequences of each of the following marketing alternatives. Case 1: Soybeans Decrease in Price

On June 1, the producer is confronted with three marketing strategies: cash marketing in the fall, forward contracting at the local elevator and purchasing a put option. Table 5 summarizes the prices and revenues of the producer under each alternative. With the cash marketing alternative, the producer does nothing to establish a price. While in forward contracting he signs a contract with a local elevator for $7.50 for delivery on November 1. If the producer selects the put option alternative, he could buy a put option on the January futures contract that is traded on

Table 5: Comparison of Cash Marketing, Forward Contracting and Put
          Option Marketing Strategies When Soybean Prices Increase
          or Decline

Marketing Strategy

	Cash Marketing	Forward Contracting	Put Options
THE SOYBEAN PRICE DECREASES FROM $7.50 ON JUNE 1 TO $6.00 ON NOVEMBER 1:			
1. Cash Price received on November 1	$6.00	$7.50 A/	$6.00
2. Plus Premium for Put Option Sold on November 1	n/a	n/a	+ $1.60
3, Minus Premium for Put Option Bought on June 1	n/a	n/a	− $ .70
4. Total Revenue Per Bushel	$6.00	$7.50	$6.90
THE SOYBEAN PRICE INCREASES FROM $7.50 ON JUNE 1 TO $9.00 ON NOVEMBER 1:			
1. Cash Price received on November 1	$9.00	$7.50	$9.00
2. Plus Premium for Put Option Sold on November 1	n/a	n/a	+ .10
3. Minus Premium for Put Option Bought on June 1	n/a	n/a	− $ .70
4. Total Revenue Per Bushel	$9.00	$7.50	$8.40

A/ Producer forward contracted with elevator for November 1 delivery
    for a price of $7.50 per bushel.

the Chicago Board of Trade. The January futures contract on June 1 is trading for $8.00 per bushel. This is the price the futures contract buyer must pay for a contract specifying the delivery of 5,000 bushel of soybeans during the delivery month of January.

Assume the producer must pay 70 cents for a $8.00 January put option. This means the producer has paid 70 cents to have the right to sell the January soybean futures contract at $8.00. In buying the put option it is important to realize the producer is not buying price protection on the physical commodity. Rather the price protection is indirect through the futures market. This relationship between the futures market and local cash market must be understood if options are going to be used effectively.

Now let us assume it is November 1. The producer had a good crop and has the soybeans to sell or deliver. Cash soybean prices dropped to $6.00 a bushel and the January futures contract now is only selling for $6.50. There has been a drop of $1.50 in both the cash and futures market. The success of the alternative strategies can now be evaluated.

The worst strategy would be cash marketing. The producer would only receive $6.00 per bushel. The best strategy would be forward contracting at the local elevator with a received price of $7.50.

The put option strategy would require the producer to sell his soybeans for $6.00 at the local elevator. Offsetting the drop in the cash market, however, in the profit from his put purchase. Assume the producer was able to obtain a $1.60 for his $8.00 January put option. Why the price increase in the put option? Remember the put option represents the right to sell the January futures contract for $8.00. If the January soybean futures contract is selling for $6.50 on November 1, the right to sell the contract at $8.00 definitely has increased in

value. The profit from the put option transaction would equal the $1.60 put option premium minus the 70 cents that the producer paid for the put option. The net price received by the producer with a put option, therefore would be $6.90. This is an intermediate price and is between the prices received from cash marketing and forward contracting.

Case 2: Soybeans Increase in Price

Assume the producer's marketing activities and the prices in the various markets are the same on June 1 as in Case 1. But instead of declining, cash soybean prices increase in the local cash market to $9.00 per bushel and the January futures contract price increases to $9.50 on November 1. The best strategy in this case was cash marketing-- with the producer selling his beans at $9.00 at the local elevator.

The former preferred strategy, forward contracting, would involve a price of only $7.50. This is the worst strategy in case II.

Our option trading producer would deliver his soybeans to the local elevator for $9.00. But offsetting this price is a loss in the put option transaction. With the January futures contract trading for $9.50, the right to sell the January futures contract at $8.00 would not be attractive. If you would sell a January futures contract for $9.50, why would you pay for the right to sell the contract at $8.00? You would if you felt that the January futures contract might drop below the $8.00 strike price before the expiration of the put option.

Assume that a put options buyer would be willing to buy the producer's put option for 10 cents. The net price received by the producer would equal $8.40. The loss in the options market was 60 cents (the 70 cents paid for the option minus the 10 cent selling price). Unlike the forward contracting, the put option would let the producer benefit from the price rise. However, again the option strategy was second best.

Can a put option strategy ever be the worst marketing alternative? Yes, this would happen if soybean prices do not change or the price change is small. An illustration would be soybean prices staying at $7.50 in the cash market and being $8.00 for the January soybean futures contract. Both the cash marketing and forward contracting strategies would have resulted in prices of $7.50. The option strategy would have resulted in the producer receiving $7.50 a bushel in the cash market, but the put option would have probably been sold for less than what was originally paid. This loss would have decreased the price received by the producer to a level below $7.50 or below the two other marketing alternatives. In the final analysis, however, all of the other factors can impact on puts rank as a strategy.

Additional Factors Affecting the Ranking of Puts as a Marketing Strategy

In the above cases we have only varied the absolute level of prices in the futures and cash markets. Among the other factors to consider are the basis, transaction costs and "insurance" premiums. The basis is the difference between the local cash market and a specified futures contract i.e. the cash price minus the futures contract price. In the analysis the basis was assumed to be constant at -50 cents or "50 cents under" the futures contract. For example, during the initial decision period of June 1 the cash market price was $7.50 and the futures market price was $8.00. The basis equaled $7.50 minus $8.00 or - 50 cents.

In order to use commodity options effectively, the producer must understand the commodity futures basis for his marketing locations. If a basis "widens", the local cash market has become weaker relative to a specific futures contract. For example, the basis widens if the local cash prices falls and the futures price remains constant. A narrowing basis implies that the local cash price has become stronger relative to

the futures contract. For example, a narrowing basis occurs if cash market price increases and the futures contract price does not change.

Since cash marketing and put options do not establish a cash price for a future delivery date, these marketing strategies suffer a decline in revenues when the basis widens but gain revenues when the basis narrows. A forward pricing contract does establish a future cash price so the producer's cash price is not impacted by a change in the local basis. But with forward contracting a producer does not benefit from the "narrowing" of the local cash basis.

The transaction costs associated with the three marketing strategies varies. To use the put option strategy the user must pay commissions to a broker to trade the put options. In a forward pricing contract, the elevator will have commission costs if the elevator uses the futures market to hedge the forward contract. These commission costs will be reflected in the bid price offered by the elevator. Because price protection transactions are not taken either by the producer or elevator in cash marketing, the transaction costs of cash marketing are zero.

In cash marketing, the producer bears all the price risk and therefore does not have to compensate anyone for carrying the price risk. But in cash marketing, the producer carries all the risk of an adverse downward price movement.

In forward contracting and put options, the downward price risk has been transferred away from the producer to another party. The grain producer transfers the price risk to the elevator with forward contracting, If the grain elevator hedges the grain contracted, the elevator is confronted with the risk of margin calls on their futures market position as well as adverse changes in the basis. A producer buying a put option transfers the downward price risk to the seller of the put option. The

put seller has accepted the risk that the futures market price could decline.

Producers must realize that the elevator and the put seller must be compensated for accepting this price risk. Elevators will lower their forward contract prices if they perceive their local basis risk to be too high and put sellers will require higher time premiums in the option premiums if prices become more uncertain.

In review, the producer must know his local basis to determine which strategy has the potential to be the most effective. In knowing the expected basis for the delivery date of the forward pricing contract, he can calculate how much the elevator is charging to carry the price risk. If this risk premium is too large the producer may want to hedge on the futures market or buy a put option. But the producer may also find put options to have "too" high of risk premium reflected in the time premium. If this is the situation, the producer may want to examine the potential of selling or "shorting" a call option.

Selling or "Shorting" a Call Option

In selling the call option, the producer has sold the right to buy the futures contract at a specific price. The producer would receive the option premium rather than paying a premium. However, "shorting" a call is more risky than buying a put. With this strategy, the producer limits his upside potential and leaves himself exposed to downward price movements. But this strategy is appropriate when the expectations are for prices to be relatively stable or increasing.

The reader should realize that this section will address in greater detail how one selects among different options when using option strategies. Although the material may appear to be complex on the surface, the underlying logic is based on the basic concepts in the previous sections.

In selling calls, several basic points must be remembered. Because
of the risk of this type of transaction, the producer will be required
to have a margin account and be subject to margin calls. The original
margin equals the option premium plus the margin required on the futures
contract. If the option premium increases, the producer will be required
to put forth additional margin money. This aspect is not attractive
because of the requirement for additional capital beyond the capital
already invested in the crop. Hopefully, an institutional innovation
will be forth coming that will make call writing more attractive to
producers (10, p. 1718).

As was mentioned, this strategy has unlimited risk because there is
no protection against a large downward price movement. Do not view this
strategy as a "hedge". The futures contract price changes will not be
fully reflected in the option premiums. For example, live cattle prices
may drop $1.00 on the June 1985 futures contract, but the call option
premium may decline only 60 cents. But selling calls can be profitable
under the correct conditions and with proper planning. Let us examine
how this strategy might work for a cattle rancher.

Selling Calls for a Cattle Rancher

Assume we have a cattle rancher, who has a lot of fed cattle he
feels will be ready to deliver in May. He is considering using an
option strategy. In this example, we will assume the basis for his
local market is $1.00 under the Chicago Mercantile Exchange's June
futures contract. He is confronted with the option prices specified on
Table 6. He notes that the time values of the puts are as follows:
$1.80 for the $64.00 put, $2.60 for the $66.00 put and $2.20 for the
$68.00 put. Since he is planning for delivery of the cattle at the end
of May, he expects to suffer the loss of the majority of the time premium.

Table 6: Sample of Put and Call Option Premiums for the Chicago Mercantile Exchange of Trade June 1985 futures Contract on March 1, 1985.

	June 1985 $66.50	
Strike Price	Call	Put
$64.00	4.20	1.80
$66.00	3.15	2.60
$68.00	2.25	3.70

Each .01 premium = $40.00 on 40,000 pound Chicago Mercantile Exchange futures contract for live cattle.

Remember, time premiums disappear rapidly once the option approaches expiration. He feels this price insurance is too expensive because the loss of the time premium is an expense to the put owner.

Instead he makes the decision that he will short or sell a call. In selling the call, he will receive the premium and will be required to place the premium in the margin account, plus margin money in the account for the underlying futures contract. If the option increases in value, he will have to place additional money in his margin account. However, if the option premium declines, he will be able to withdraw funds from his margin account. When he wants to liquidate his option position, he will have to buy the call option back. If the option is going to expire, worthless, the best strategy is to let the option expire rather than buying the call option back.

The rancher must now make a decision on which call option to sell. To assist in his decision on which call to short, he completed a set of calculations given in Table 7. He has estimated that the futures contract could trade in a range of $58.00 to $73.50. After subtracting out the expected basis of $1.00 under the June futures contract, he established the cash price for his cattle for five price levels. The cash prices were projected to range from $57.00 to $72.50.

The next step was to establish the profits and losses for each of the call options at the different futures contract prices. The revenues will equal what he will be able to sell the call for to a call option buyer. The cost of a call option in each transaction equals the option premium he must pay to buy back the option. His gross profit or loss on the call option transaction equals the revenue from selling the option minus the cost of buying the option back.

If the option strike price is greater than the market price, the call option will expire worthless. No one will exercise an option that

Table 7: Calculation of Total Revenue Received When Shorting Different Calls When Futures Prices Change between the Selling of Calls and Their Repurchase.

| Description | Futures Market Price When Call Option is Repurchased | | | | |
	$58.00	$63.00	$66.50	$70.00	$73.50
A. Futures Price at Repurchase	$58.00	$63.00	$66.50	$70.00	$73.50
B. Adjust for the Basis	$ 1.00	$ 1.00	$ 1.00	$ 1.00	$ 1.00
C. Local Cash Price	$57.00	$62.00	$65.50	$69.00	$72.50
ANALYSIS OF SELLING $68.00 CALL					
D. Revenue from Selling Call	$ 2.25	$ 2.25	$ 2.25	$ 2.25	$ 2.25
E. Cost of Buying Call Back	.00	.00	.00	$ 2.10	$ 5.55
F. Total Revenue From Strategy	$59.25	$62.25	$67.75	$69.15	$69.20
ANALYSIS OF SELLING $66.00 CALL					
G. Revenue from Selling Call	$ 3.15	$ 3.15	$ 3.15	$ 3.15	$ 3.15
H. Cost of Buying Call Back	.00	.00	$ .65	$ 4.05	$7.53
I. Total Revenue From Strategy	$60.15	$65.15	$68.00	$68.10	$68.12
ANALYSIS OF SELLING $64.00 CALL					
J. Revenue from Selling Call	$ 4.20	$ 4.20	$ 4.20	$ 4.20	$ 4.20
K. Cost of Buying Call Back	.00	.00	$ 2.60	$ 6.05	$ 9.53
L. Total Revenue From Strategy	$61.20	$66.20	$67.10	$67.15	$67.18

requires the buyer to pay a higher price than the futures contract price at the futures exchange. For example, if the futures contract price is $60.00, the $66.00 call option will expire worthless. It will expire worthless because it would be cheaper to buy the futures contract on the exchange than to exercise the call option at the specified strike price. On Table 6 he entered in a zero for the situations where the option would expire worthless.

On the remaining options he calculated the intrinsic value of the call option at a specific futures contract price and added in some expected time value. Even though he is planning to buy the call option back on the day prior to expiration, he expects the options to have some time value when he buys these in-the-money call options back. If the futures contract price is $70.00 and we are looking at the $66.00 call, this call will have $4.00 of intrinsic value or $70.00 minus $66.00. The rancher assumed there would be $.05 of time value when he bought the $66.00 call option back. The option premium would equal $4.05. Remember that the option premium equals the time value plus the intrinsic value.

His total revenue from the strategy would equal the projected cash price for the cattle sold, plus the gross profit or loss in the call option transactions. This figure represents the total revenues he would have available to offset transaction costs, margin account expenses and the cost of production. To simplify the example, the transaction costs, margin expenses and production expenses were not included in the example.

The Best Option to Use Depends on the Change in the Futures Contract Price

In examining Table 6, he notices that no single call option is the best strategy in all the price senarios. The $68.00 call would be the best option when futures prices run up to $73.50, since his total revenue is $69.20. But this total revenue is less than the projected cash price

of $72.50. If the future contract price would drop to $58.00, his best strategy would be the $64.00 call with a total revenue of $61.20, which is greater than an estimated cash price of $57.00. Why do these specific rankings happen?

In the upward price movement, the $68.00 call allowed the rancher to benefit from the fact that the strike price was higher than the futures contract price when he sold the call. This difference of $1.50 was not offset by an increase in the intrinsic value of the call option. In addition, the producer was able to benefit from the $2.25 of time value contained in the $68.00 call option whe he sold the call. This time value became intrinsic value as the futures price went above the strike price. Only after the intrinsic value of the option became greater than the time value of the option did the rancher have to pay more for the option in May than what he sold the option for in March.

In the unfavorable price movement, the $64.00 call allowed the rancher to benefit from the fact that the strike price was lower than the futures contract when he sold the call. The option had $2.50 of intrinsic value and $1.70 of time value. As the futures price dropped, the level of intrinsic value also decreased. In this case, only after decline in the futures price totally offset the total premium received by the rancher did his total revenue begin to fall below the $65.50.

The selection of the correct call option to sell is based on what is expected to happen to the futures contract prices. Producers must establish a marketing plan based on a specific price expectation and have plans for situations when prices move gainst their position. As was evident in this discussion, the size of the time premium is an important factor in determining strategies. Large time premiums make the selling of calls attractive, while small time premiums increase the

attractiveness of puts. There is a systematic scheme to the ranking of
these basic marketing alternatives confronting producers.

The Ranking of Alternatives

A producer soon will have to select among the eight strategies
discussed in this paper. The two current marketing alternatives are
cash marketing and forward contracting. With calls and puts, the producer
must select between using in-the-money, at-the-money, and out-of-the-
money options. Each of these options represents a distinct strategy
based on a specific price expectation. Presented on Table 8 are the
rankings of the eight strategies in five basic price senarios: major
price decline, moderate price decline, no change in price, moderate
price increase, and major price increase. For each price senario, a
ranking is given to the eight different strategies with the first being
the best strategy and the eighth strategy being the worst.

An implicit assumption of the table is that there is no production
uncertainty in the producer's production and total production in the
industry. If prices and the production level of the producer are
uncertain, the ranking of the marketing alternatives may be different
from those present on Table 8. For example, if the producer's crop
production is below what is planned and a significant number of producers
experience this decline in production, the price of the commodity will
rise. Such a situation makes the put option more attractive because of
its ability to benefit from upward price movements. In the same manner,
a production increase implies lower prices and the downward price protection
of the put becomes more important (10, pp. 1821). Keep in mind that
Table 8 deals only with changes in the price level, not changes in both
price and production levels.

An important conclusion of the chart involves the competitiveness
of puts as a strategy. In none of the price senario's would the buying

Table 8: Ranking of Alternative Marketing Strategies Under Five Basic
Price Change Senarios.

Ranking of Specific Strategy	CHANGE IN FUTURES PRICE				
	Major Price Decline	Moderate Price Decline	No Change in the Price	Moderate Price Increase	Major Price Increase
First	Forward Contracting	In-the-Money Call	At-the-Money Call	Out-of-the-Money Call	Cash Marketing
Second	In-the-Money Call	At-the-Money Call	Out-of-the Money Call	Cash Marketing	Out-of-the Money Call
Third	In-the-Money Put	Out-of-the Call	In-the-Money Call	At-the-Money Call	Out-of-the Put
Fourth	At-the-Money Call	Forward Contracting	Cash Marketing	In-the-Money Call	At-the-Money Call
Fifth	At-the-Money Put	Cash Marketing	Forward Contracting	Out-of-the Money Put	At-the-Money Put
Sixth	Out-of-the Call	In-the-Money Put	Out-of-the Put	At-the- Money Put	In-the-Money Call
Seventh	Out-of-the Put	At-the-Money Put	In-the-Money Put	Forward Contracting	In-the-Money Put
Eighth	Cash Marketing	Out-of-the Money Put	At-the-Money Put	In-the-Money Put	Forward Contracting

of a put be the best strategy and the highest rank achieved by any put strategy was third. Why? Time value is a wasting asset, i.e. as the option approaches expiration, its time value declines. The decline in time value is a cost to the buyer of a put option. If the expectation is for a major price decline, the best strategy is forward contracting. However, if time premiums are large on the options, the selling of call options may provide a significant source of price protection. Table 8 clearly indicates that the task of price risk management by producers will require careful consideration of price outlook. But the most important aspect of the options is their ability to provide producers a middle ground in marketing. One does not have to trade away all the potential of improved prices to avoid some of the price risk associated with agricultural marketing.

Additional Readings on Options

In the reference section is cited a number of articles and books that the producer or other interested parties may consider. The literature on stock options and their trading can be useful to a reader. However, differences do exist between stock options and the commodity options. The underlying distributions of prices for commodity futures contracts are probably different from common stocks. There are certain periods of the year when agricultural commodity prices are more unstable and these periods are well known, i.e. spring planting. Also, futures contracts do not pay dividends like common stocks. There will be considerable need for research to develop models for the pricing of agricultural commodity options to assist decision making (4).

Computer Models for Options

South Dakota State University is currently developing a computer program that will evaluate commodity options based on the Black-Scholes option pricing model (2, 11, 12, 13). WARNING: THIS MODEL SHOULD NOT

BE USED AS AN ESTIMATOR OF ACTUAL OPTION PREMIUM LEVELS OR USED IN
TRADING STRATEGIES TO DETERMINE WHAT OPTION PREMIUMS WILL BE OR SHOULD
EXIST AT A FUTURE DATE. BEFORE USING THE MODEL, THE USER SHOULD READ
ABOUT BOTH THE POSITIVE AND NEGATIVE ASPECTS OF USING THE MODEL IN THE
TRADING OF OPTIONS. The model should only be one, among many tools to
be used to establish a trading strategy.

Realize the validity of the model has, as yet, to be tested on
actual commodity option prices. Previous reseach on the stock market
options has found the model to overestimate the option premium of in-
the-money options and underestimate the option premium of out-of-the-
money options (4). Previous research has found cash and futures prices
to have price patterns that may not be totally consistent with the
probability distribution assumed by this model (8, 14, 15). A source of
discussing the limitations of the model in its application to stock
options is Copeland and Weston.

Rather than concentrating on the Black-Scholes model, the user of
the program may want to concentrate on gaining a perspective on the
price volatility of the futures contracts. Remember that price volatility
is an important factor in the determination of time value of an option
premium. For example, the purchaser of a put will want to buy puts
during periods of low price volatility if the put strategy appears to be
appropriate.

Current plans are for the placement of the model on the AGNET
system. Hopefully this model will have the ability to access AGNET's
futures contract price files. This will enable the user to establish
the historical price volatility of the futures contracts during previous
time periods.

Some individuals may be interested in having their own microcomputer

option valuation models. A three article sequence by John Labuszewski

in the Commodities Futures magazine can provide assistance in this

effort. The program is written in Microsoft M-Basic. He did not write

his BASIC program in double percision. The option values provided in

the article should be viewed with some skeptism. Option values calculated

in other papers and on our mainframe using a FORTRAN program did not

agree with his estimates. Do not spend long hours attempting to duplicate

his numbers if your are confident you have entered the model correctly.

This advice is based on some very frustrating hours experienced by the

author in attempting to accomplish that task. However, the estimates of

the neutral hedge ratio do appear to be correct (11, 12, 13).

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