

III. EMERGING AGENDA

Alternative Tools and Concepts

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ABSTRACT

A moving average of past prices allows loan rates to adjust to changes in market trends, yet provides a safety net for farmers. The development of options markets and the legalization of trade options would be important to the commercial viability of revenue insurance for individual crop producers. Revenue insurance would not necessarily involve income transfers to producers. However, income transfers could be linked to transactions dealing with insurance of individual producers' revenue. An alternative could be joint producer and Government activities providing income "assurance" to a group of producers as contrasted to insurance for individual producers.

KEYWORDS: Agricultural policy, commodity options markets, moving-average loan rates, price and income support, revenue insurance.

INTRODUCTION

It is apparent that the blend of farm programs now in place has worked with mixed results. That should come as no surprise considering the diverse character of the farm sector and the dramatic changes that have taken place in both our domestic economy and world markets for agricultural products.

Proposals for new commodity legislation often fall into three categories: (1) finetuning or modifying existing programs, (2) adapting new ideas within the framework of current programs, or (3) drafting new concepts with new goals. This article offers examples of proposals currently being discussed which fall into each category. The first is a suggestion to implement price support based on a moving average of past market prices--a moving-average loan rate. In a different thrust altogether, the second example describes a support structure based on trading options, an idea that explicitly transfers risk to willing participants in the market. And, in an attempt to preserve the existing program framework, the last example blends a new concept of revenue insurance with the constraints and guidelines offered by the crop insurance program and a similar concept used by the Canadian Western Grain Stabilization Board. All of the proposals have their pros and cons; their value lies in shedding new light on perennial policy questions.

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MOVING-AVERAGE LOAN RATES

Several criteria have been used over the years to establish nonrecourse commodity loans, such as parity, cost of production, and, more recently, minimum levels set by the Congress. Since relatively inflexible loan levels set in legislation can easily fall out of line with eventual market trends (as with the loan rates specified in the 1981 act), interest has grown towards establishing a flexible rule that would be used to announce loan rates before each crop year. One such rule receiving increased attention is basing loan rates on past movements in market prices.

Rationale for a Moving-Average Loan Rate

The rationale for basing loan rates on a moving average of past market prices is that the marketplace represents the most efficient means of sending farmers the proper production and resource allocation signals. Loan rates should serve as a price floor only in those instances when prices fall substantially below expected longrun market trends. Supporting farm commodity prices above market-clearing levels over a period of years often leads to an accumulation of stocks with the subsequent need for additional policy tools to limit production, such as acreage diversion programs. Another major problem of relatively high and rigid loan rates set above market prices is that they place an implicit tax on U.S. exports, causing the U.S. export market share to be reduced. In raising the price that foreign consumers must pay to acquire U.S. commodities and thereby reducing the quantity they purchase, foreign producers are provided an incentive to increase production. These outcomes can involve increased U.S. consumer and Government expenditures.

If loan rates are to be announced in advance of farmers' production decisions, one way to avoid domestic and foreign market interference is to set loan levels in accordance with long-term market-clearing levels. But, it is not always possible to correctly anticipate future price trends because of the uncertainties associated with production and international markets. A moving average has been suggested as a method of following long-term movements in farm prices. While this article concentrates on setting nonrecourse loan rates according to an historical moving average, the principle could also be applied to direct purchase and other types of price and income supports.

In general, a moving-average loan rate for a particular crop equals a specified percentage of an average of past market prices. Qualifications include the specified percentage, the number of past annual or seasonal market prices to be covered, and how the average should be computed. For example, the loan rate could be based on 75 percent, 85 percent, or some other percentage of a moving average of past market prices. The past 3 or 5 years of season-average prices, or 5 years excluding the prices of the highest and lowest years might be used. Thus, the concept of a moving-average loan is highly flexible, depending on the time period used, the weight or percentage applied to past prices, and the decision to include all or some prices during the specified period. Furthermore, the concept can be applied to individual commodities on a national or regional basis. Some people also suggest that a lower limit be specified to restrict how low a moving average loan rate could fall.

Compared to relatively higher, more rigid loan levels, setting loan rates using a moving average of prices can have several advantages:

- o Loan rates are more market oriented.

- o Support rates are less likely to hinder U.S. competitiveness in export markets.
- o Loan rates are available to eligible producers as a safety net and yet are less likely to act as a rigid floor for extended periods of time.
- o The tendency for relatively high and inflexible loan rates to be capitalized into the value of fixed assets is reduced.
- o Less political influence is exercised in setting loan rates.

There are potential disadvantages as well:

- o Loan rates that react only to past market prices do not account for current or anticipated market conditions. For the moving-average rule to reflect future marketing conditions, the Government would be required to project commodity prices. If current prices were used as a basis for loan rates (for example, an average of the first 5 months of the marketing year as with deficiency payments), the loan rate could not be announced until after farmers had made their production decisions.
- o Loan rates can exceed the cost of production and long-term market prices when a period of short supplies and high commodity prices is followed by a period of excess supplies and low market prices. However, basing loan rates on some fraction of past prices and excluding price extremes would most likely minimize the extent of market interferences.

Past Experience with Moving-Average Loan Rates

The Agriculture and Food Act of 1981 includes provisions for setting loan rates for soybeans and upland cotton using past movements in market prices. Beginning with the 1982 marketing year, the loan level for soybeans is 75 percent of the simple average price of soybeans received by farmers over the preceding 5 years, excluding the high and low years. The minimum soybean loan rate is \$5.02 per bushel. However, when the market price exceeds the loan rate by 5 percent or less, the Secretary may reduce the loan level as much as 10 percent, but not below \$4.50 per bushel.

Loan rates for upland cotton are set at the lower of either 85 percent of the preceding 5-year moving average of spot market prices for upland cotton, excluding the high and low years; or, 90 percent of the average Northern Europe c.i.f. price of cotton quoted for the 15-week period beginning July 1 of the year in which the loan level is announced. The minimum is \$0.55 per pound.

The minimum loan rates for soybeans and cotton specified in the 1981 act have been above the levels determined by the formulas since 1982 for soybeans and since 1983 for cotton. Hence, the effectiveness of these formulas has not truly been tested.

Alternative Moving-Average Rules

Several forms of a moving average are possible. Figure 1 compares actual corn prices received by farmers for 1960-83 with the loan rates which would have occurred if they had been set at 100 percent of three different moving-average

loan rate formulas (3 years, 5 years, and 5 years excluding high and low prices). Figure 2 illustrates a similar set of loan rates for wheat. The corn and wheat examples of the relationship between farm prices and 100 percent of these moving-average loan rates are indicative of what the relationships would have been for other crops. However, caution should be used in interpreting the historical period, because if loan rates had been calculated as a moving average, then the market prices also would likely have been different. This is especially true during the midsixties and late seventies when 100 percent of the moving-average loan rates illustrated in figures 1 and 2 would likely have supported market prices above their actual levels for wheat and to a lesser extent for corn.

For 1960 to 1970, all three moving-average formulas gave similar results. That is, it made little difference in the loan rate if 3 or 5 years were chosen as the basis for loans. But in the seventies, the loan rates diverge. A 3-year moving average tends to overreact to sharp increases or decreases in commodity prices. Using a 5-year average with the high and low years excluded caused lower loan rates than a simple 5-year moving average following a series of unusually high prices (for example, 1975) and higher loan rates after a sharp downturn in market prices (for example, 1978). Thus, in a market characterized by highly variable prices, excluding high and low years from the moving average offers farmers more stability and hence, a slightly higher safety net during periods of a sharp decline in commodity prices. If in fact a 5-year moving average excluding high and low prices had been used from 1960 to 1983, the calculated percentage weight that would have ensured that market prices would have been equal to or above the loan rate every year was 84 percent for corn and 68 percent for wheat. The lower weight for wheat is due to a relatively low farm price in 1977. Ignoring 1977, the percentage weight for wheat would have been 87 percent. If a 3-year moving average had been used, these calculated weights would have been 79 percent for corn and 67 percent for wheat.

Potential Impacts of Moving-Average Loan Rates

Based on assumptions about yields, production, and use, the impact of a moving-average loan for corn and wheat for the 1986-90 crops can be illustrated using two examples (4). Alternative I uses a loan rate based on 75 percent of a 5-year moving average of past market prices, excluding the high and low years (table 1). Alternative II sets loan levels based on 75 percent of a 3-year moving average. No minimum is imposed in either alternative. Each alternative is compared to a situation which assumes that current programs continue until 1990. In the continuation of current programs case, loan rates for wheat and corn are fixed at \$3.30 and \$2.55 per bushel--equal to those announced for the 1985 crops--until 1990. Target prices are also maintained at their 1985 levels. Both a 20-percent acreage reduction program (ARP) and a 10-percent paid diversion program are assumed to be in effect for wheat. Corn assumes a 10-percent ARP and a 10-percent paid diversion program. Trend yields are used in each alternative.

Results presented in table 1 are an average of estimates for the 1986-90 crop years. Setting loan rates at 75 percent of a 5-year moving average excluding the high and low years or using a 3-year moving average, with no minimums imposed in either case, results in lower average loan rates for wheat and corn than if loan rates had been frozen at their 1985 level until 1990. Lower average price supports allow prices to adjust to market trends. As farmers make production decisions more in accordance with market prices than with Government loan rates, average production declines somewhat. Lower market prices also help to increase the quantity of wheat and corn exported. With lower average production and higher average exports, ending stocks also decline in the flexible price support

Figure 1

Alternative moving average loan rates for wheat

Dollars per bushel

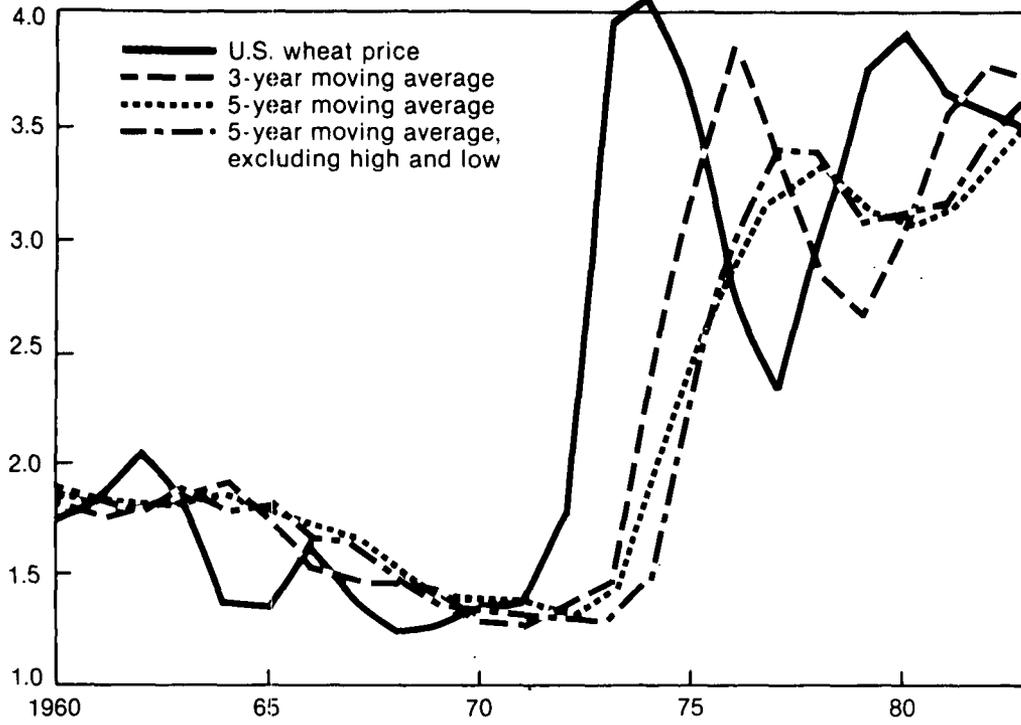
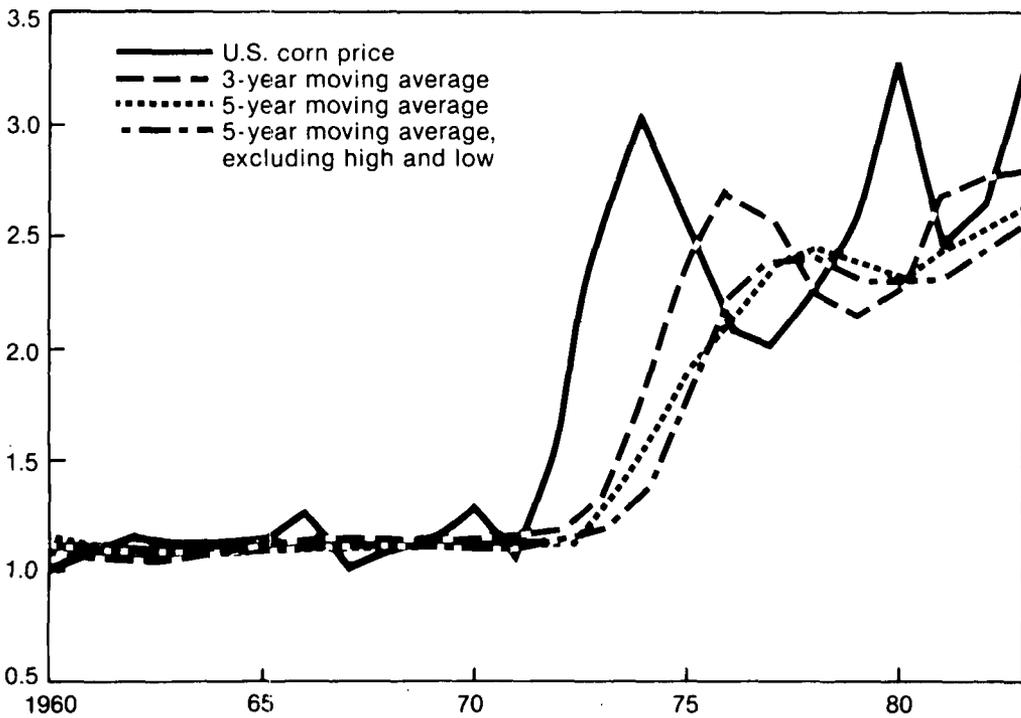


Figure 2

Alternative moving average loan rates for corn

Dollars per bushel



alternatives, compared to the base alternative that fixes loan rates at their 1985 level. Deficiency payments increase under these assumptions because target prices were fixed in this analysis. In general, a 3-year moving average formula was found in this analysis to result in lower average price supports for wheat and essentially the same for corn, compared to a 5-year average excluding the high and low.

Conclusions

These two illustrations have several implications. First, setting a lower bound under the formula-determined loan rates could have a significant effect. For example, floors above \$2.34 for wheat or \$2.02 for corn under the 3-year moving average would tend to reduce the flexibility of the moving average adjustment rule, on average.

These examples also imply that allowing the moving-average adjustment rule to operate without lower bounds would tend to help expand exports and reduce the need for Government stock accumulation. At the same time, the absence of minimum loan rates increases the likelihood of periodic large direct Government deficiency payments by widening the difference between loan rates and target prices (assumed to be fixed at their 1985 levels). Tying target prices to market trends would tend to lessen this possibility.

Closely related to the question of minimum loan rates is the percentage weight to be used in the adjustment formula. Only one weight--75 percent--was used in these examples. The assumption that acreage limitation programs would be used also was important, since if they were not in place, increased production would likely have resulted in lower market prices and, hence, the possibility that the estimated loan rate occasionally would become the effective price floor.

Table 1--Simulated results for wheat and corn, averaged over the 1986-90 crop years

Alternative	: Loan rate	: Farm price	: Production	: Exports	: Ending stocks	: Deficiency payments
	: Dollars per bushel		: Million bushels		: Million dollars	
Continuation: of 1985 programs			<u>Wheat</u>			
	3.30	3.41	2,714.2	1,499.9	2,535.7	1,282.1
5-year <u>1/</u>	2.45	3.10	2,669.5	1,573.5	2,145.7	1,755.2
3-year	2.34	3.07	2,662.4	1,582.0	2,082.6	1,817.9
Continuation: of 1985 programs			<u>Corn</u>			
	2.55	2.88	8,314.1	2,340.0	2,447.7	877.0
5-year <u>1/</u>	2.01	2.74	8,211.6	2,390.9	1,764.9	1,610.4
3-year	2.02	2.74	8,217.8	2,388.1	1,819.5	1,569.4

1/ Excludes the high and low years.

OPTIONS MARKETS FOR AGRICULTURAL COMMODITIES

Trading in options for major domestic agricultural commodities started in the fall of 1984. This trading expands a pilot program which permits trading of options on futures of world sugar, gold, and Treasury bonds. ^{1/} Among the issues raised by these developments, two are especially relevant to farming: the possible interaction between options markets and U.S. farm commodity policies, and whether arrangements will be made for "trade options" (put and call type contracts transacted by private parties, not on a licensed exchange).

Any institutional change raises questions concerning its compatibility with present institutions. Thus, it is appropriate to ask if trading in farm commodity options would be compatible with current price support programs and with transfers from the public to individual producers such as deficiency payments.

Premiums on options contracts could reflect a variety of institutional arrangements. For example, the combination of exercise prices (that is, strike prices) and premiums with the Government facilitating the withholding of 50 million acres from production would be different from the combination of exercise prices and premiums if the Government were not involved in such activities. The availability of price supports would influence the probability distributions of prices, alternatives available to producers, and therefore, the combination of exercise prices and premiums in the options markets. In fact, provision of price insurance by the public, such as with price supports, could erode interest of farm producers and commercial traders in option markets and contribute to a perceived "failure" of the pilot program.

Current Status of Options Trading

The initiation of options trading in the fall of 1984 came after nearly half a century during which trading in options was banned or limited. The impetus for the 1936 ban on trading in options on domestic agricultural commodities was an attempt in 1933 to manipulate the wheat futures market in which options were involved. This ban did not prohibit trading by Americans in options on commodities in other countries. However, scandals in the United States involving options on London futures occurred in the seventies, early in the life of the newly formed Commodity Futures Trading Commission (CFTC). In turn, practically all options trading was administratively banned. The pilot programs for sugar, gold, and T-bonds, and now domestic agricultural commodities, represent a relaxation of these earlier bans. Under these pilot programs, each organized commodity exchange in the United States will be permitted to conduct trading on futures options for two domestically produced commodities for a trial period of 3 years.

Options Markets and U.S. Farm Commodity Policy

The role of options is narrower and much more limited than the role of commodity programs. Options markets will not generate net market prices different from those warranted by supply and demand conditions. Writers of options are not in business to transfer income. They do accept risks of changing supply and demand conditions and related changes in the expected prices, but they accept these risks at a "price"--the premium they receive in compensation for writing the options. Therefore, option markets have some characteristics that are similar

^{1/} Readers unacquainted with options trading may want to see (3) or read the explanatory appendix at the end of this article.

to those we generally associate with insurance. Risks are transferred and premiums are paid and received.

Essentially, options markets deal with the intramarketing-year risk that prices at a later time will be different from current market prices. In practice, exchanges are expected to initiate trading of options with strike prices that approximate the current prices of the corresponding futures contracts. As the prices of futures contracts adjust over time in response to supply and demand conditions, exchanges are expected to initiate trading of options with correspondingly different strike prices. Thus, put options simply will not be available at strike prices inconsistent with supply and demand conditions. As supply and demand conditions change, prices may be below strike prices for currently traded put options. In such cases, the premium for the put will reflect the differences between the strike price and prices of the futures contract to which the option is linked.

Price support programs also involve transfers of price risks and as Gardner (2) points out, they essentially involve put arrangements. The public, through a government agency, accepts the risk of prices being below price support levels. However, there are two important differences between options and price supports. First, price supports are provided without cost or at a "minimal cost" to producers, such as diverting acreage from production. In contrast, options are not free and the premium of the option is a market determined value of the price insurance provided by the option.

Second, price support levels generally have not been selected to approximate market conditions. Instead, price supports have often been designed primarily to transfer income. Historically, when market conditions resulted in downward pressure on prices, steps have been taken to place stocks of the commodity under Government control, to restrain the use of resources, and to expand product demand in order to protect the levels of price support.

In times of Government stock accumulation, price support levels probably have been higher than market-determined options exercise prices would have been. Obviously, the market system could set exercise prices equivalent to current support prices. However, the premiums for such options would reflect the difference between expected market prices consistent with anticipated market supply and demand conditions and the exercise prices incorporated in the options contracts.

The operation of price support programs could have adverse effects on the operation of options markets. The volume of trading on options markets will be heavily dependent on price variability of corresponding futures markets. The greater the variability of prices, the greater the risk of price changes, and the greater will be the interest by producers and trade firms such as merchandisers of grain in seeking price risk protection. Therefore, if commodity programs substantially limit price changes, potential buyers of calls and puts have little interest in dealing in options. Similarly, producer interest in buying, say, puts would be influenced by the availability and level of price supports, as would the interest of potential writers of puts. The volume of futures trading declined significantly in the fifties and sixties as large Government stocks limited price fluctuations.

The specific rules for options trading and the selection of commodities for trading will influence the success or failure of the options pilot program for domestic agricultural products. But the success or failure will also be geared

closely to the expected variability of prices of the corresponding futures contracts.

The Importance of Trade Options

The extent to which most producers can benefit from options markets could well be related to the rules the CFTC devises for "trade options." Past scandals have created great wariness about trade options, however, and the CFTC has deferred decisions about them. Abuses and scandals developed when individual traders absconded with premiums collected from customers. The danger is that the sellers of the options may have neither offsetting positions in the options or futures markets to protect themselves financially, nor the capital to carry the risk. These are some of the reasons why the CFTC insists that the trading of options be done on a licensed exchange and that the transactions pass through clearinghouses.

However, unless arrangements can be worked out whereby intermediaries between producers and options writers can legitimately buy puts (for example) and then resell them to producers, the benefits to producers will be limited to producers who are sufficiently large that they can afford to deal in options markets through brokers. As in the futures markets, most producers seem unlikely either to devote the resources to understand options trading or to produce enough to economically deal in options on the exchanges. On the other hand, they may find it advantageous to deal in an options-type arrangement (trade options) with the local elevator or other buyer.

If and when trade options are permitted, the "use" of options by producers may be similar to the "use" of futures by producers. Some producers, but not many, trade directly in futures markets through brokers. Many more use the futures markets indirectly when they arrange forward sales contracts with their local elevators. The managers of local elevators are able to conclude the forward contracts at reasonable margins because they can hedge the purchase of the cash commodity in the futures markets.

Options may be more attractive to producers than futures because of the "known" nature of the transaction and the cost associated with it. As stated above, the purchase of an option provides a very specific right to the purchaser and for a price which is fixed at the time of the transaction. In contrast, with futures contracts, price changes can lead to margin calls even if combined price movements of the cash commodity and the futures position do not result in financial losses. Margin calls are inconvenient and disliked.

At the same time, it is important that some perspective be maintained with regard to the use of options markets. Paul (6) argued, in commenting on Gardner's paper on options (2), that conceptually the use of futures could accomplish producer objectives as well as the use of options could accomplish them. However, farmers have not used futures in the ways to which Paul refers. Also, insurance companies have not developed price insurance programs based on such techniques.

Options markets could be relevant to the possible commercial offering of revenue insurance for individual producers. There is no known way to develop actuarial standards for price changes. Consequently, even if it were legally possible to do so, insurance companies might not seek to assume the speculative role that is necessary to cover the price component of revenue insurance. On the other hand, the availability of an options market would make it possible for insurance companies to write policies for crops that would insure against price as well as yield losses. The risk of price losses could be transferred to writers of

options through the options markets, while the risk for yields could be retained by the insurance companies, as many do now.

And to repeat, trade options would facilitate producer use of options through an intermediary such as the local grain elevator. They could thus be important to the prospects for commercialization of revenue insurance. However, an insurance policy with a clause or rider on price losses, as opposed to yield losses specified at a price, is construed as a trade option and is presently illegal.

Possible Use of Options by Farm Producers

There are two types of circumstances in which producers may want to buy options as an extension of their farming activities. One would be as part of a marketing strategy for commodities produced and owned by the producer. Buying a put--the right to sell--would be an alternative way to transfer risk and might be more attractive than forward contracting or hedging the commodity in the futures market.

For example, imagine a corn producer who in April anticipates production of 10,000 bushels of corn in October, available for delivery in December. Suppose further, that in April the price for forward-contract December delivery is \$2.25 per bushel, and that a December corn futures put option has an exercise price of \$2.25 and a premium of 20 cents per bushel. These conditions implicitly say three things: (1) some people are willing to pay 20 cents for the right to sell December futures at \$2.25; (2) some others are willing to sell ("write") this option for 20 cents and undertake the responsibility to buy December corn futures at \$2.25, if buyers of the put options decide to exercise their option; and, (3) the 20-cent premium equates the number of put options demanded (purchased) with the number of put options supplied (written).

The producer could forward contract, but then would have to forgo the opportunity to sell corn above \$2.25 per bushel. Further, there is some risk as to whether the producer would actually have 10,000 bushels to sell. A producer unable to fulfill the contract for 10,000 bushels would have to make up the shortfall at the market price. In contrast, the producer might be willing to pay \$2,000 (20 cents times 10,000 bushels) for the right to sell the 10,000 bushels at \$2.25. In doing so, the risk (on 10,000 bushels) of prices going below \$2.25 is transferred in exchange for \$2,000; the opportunity to realize gains from prices going above \$2.25 is retained, and the obligation to deliver 10,000 bushels as with the forward contract is avoided.

Another circumstance in which a producer might want to buy options would be as part of a purchasing strategy for buying commodities to feed livestock. Buying a call--the right to buy--may be an attractive way to transfer the risk associated with possible price changes for the commodity. And, as with the previous example, it might be more attractive than forward buying or hedging in the futures market by buying a futures contract.

Imagine a cattle feeder in April anticipating the need for 10,000 bushels of corn in December. Assume market prices as above and a premium for a \$2.25 December futures corn call options of 20 cents per bushel. The feeder could forward contract, but then would have to forgo the opportunity to buy corn at prices below \$2.25, if they should occur. In turn, the feeder might be willing to pay \$2,000 for the right (but not the obligation) to buy the 10,000 bushels at \$2.25 per bushel.

Conclusions

There are two types of circumstances in which farm producers might want to buy options as an extension of their farming activities. Producers of farm commodities could buy a put as a way to transfer risk of price declines, or might want to buy a call to transfer the risk of price increases for feedstuffs.

The volume of trading on options markets will be heavily dependent on price variability of corresponding futures markets. The greater the variability of prices, the greater the risk of price changes, and the greater will be the interest by producers and trade entities, such as merchandisers of grain, in seeking price risk protection. Therefore, if commodity programs are operated in ways that substantially limit price changes, the risk from such changes will be limited. In turn, potential buyers of calls and puts would have little interest in dealing in options.

Unless arrangements can be worked out whereby intermediaries between producers and options writers can legitimately buy options and then resell them to producers, the benefits of options to producers will be limited. However, there is great wariness about trade options and the CFTC has deferred a decision to approve them. In addition, options markets and related trade options have great relevance to the possible commercial offering of revenue insurance for individual producers, as the risk of price losses could be transferred to speculators through the options market.

REVENUE INSURANCE

Revenue insurance for farmers is usually viewed as allowing individual farmers to pay premiums in exchange for the opportunity to receive indemnities if their individual revenues from selected crops are less than the insured amounts. Discussions often include the possibility of the Government contributing a portion of the indemnities.

Since the value of crop production of farm producers consists of two components, quantity produced and price received, there are several ways in which revenue-type insurance might be specified. For example, programs could be in terms of insurance against:

1. loss of yield at designated or selected prices as is done with the current Federal Crop Insurance Corporation (FCIC) program;
2. price shortfalls for designated or selected yields;
3. shortfalls of value of production (price times production);
4. loss of yields plus price shortfalls (1 and 2 above); or,
5. loss of yields plus value-of-production shortfalls (1 and 3 above).

The second option, price shortfalls, and the third, loss in the value of production, will be examined here.

The current crop insurance program uses prices but only to value yield losses. Prices are specifically agreed upon when the policy is written. Crop insurance is essentially for yield losses below selected percentages of the yield history

for the individual producer. Premiums are, in turn, linked to the percentage of yield protection desired and the price selected by the producer.

Suppose a corn producer chooses \$2.50 a bushel and the insurance policy calls for protection against shortfalls of yields below 90 bushels per acre. With an actual yield of 70 bushels, the payment would be \$50 per acre (20 bushels times \$2.50) regardless of the market price for corn. In contrast, the producer would receive no payment if the yield was 90 bushels or more, even if the price was below \$2.50. Thus, while the FCIC uses commodity prices, there is no price or revenue protection unless the yield falls below the insured level. And then the price and related revenue protection apply only to that portion of the crop represented by the difference between the insured level and the yield. This distinction between the way price is used in present yield insurance programs and the fact that price shortfalls would be "insured" with revenue insurance is critical.

Status of Proposals

Revenue insurance has received increased attention in recent years. In 1980, Schuh (8) proposed a subsidized income insurance program whereby individual producers of crops could select a percentage of their individual normal yield and a price for which they wish to be insured. Impressed with the balance between commodity demand and supplies in the seventies, he argued that, "The secular income problem arising from excess labor in agriculture is essentially behind us." However, he anticipated a ". . . severe problem of instability, and a problem of rural poverty associated with disadvantaged families and regional stagnation." The proposal for insurance is related to the first of these conditions, income instability (8, p. 14). The Agriculture and Food Act of 1981 directed the Secretary of Agriculture to appoint a task force to study the "concept of farm income protection insurance." The report of the task force released in the summer of 1983 recommended that a farm income insurance program not be substituted at the present time for "all Federal agricultural support programs." But, it did recommend that a pilot program providing income insurance be initiated for 3 years (9).

In the meantime, a report on "Farm Revenue Insurance" was released by the Congressional Budget Office in August 1983 (10). It concluded that, in spite of many difficulties, revenue insurance is worth exploring. It suggested that the Congress authorize studies of program design and approaches to implementation. And, based on these studies, Congress could ". . . authorize a pilot revenue insurance program in selected areas or crops."

Prospects for Commercial Revenue Insurance for Individual Producers

The prospects for the commercialization of revenue insurance relate in large part to price risks ^{2/}. Development of actuarial data for prices, as distinct from actuarial data for yields, is particularly difficult. Probability distributions for commodity prices are substantially different from probability distributions for yields. For example, probability distributions for future yields are applicable to specific geographic areas and specific crops. These distributions are sufficiently stable over time so that commercial insurance firms have

^{2/} This discussion is oriented to commercial insurance in order to point up the unique financial implications of income insurance for the entity (private or public) that writes the insurance, as well as those who are insured. See the 1983 USDA report of the Task Force for a discussion that starts from the premise that the public underwrites the program and a Government agency administers it.

translated them into actuarial standards applicable to individual crops grown by individual producers on particular parcels of land. These standards can, in turn, be used as a basis for specifying insurance premiums for selected levels of production and related indemnities.

In contrast, the probability distribution of the price of a particular commodity in the future is unique at any specific point of time. It changes over time as weather and other conditions affecting demands and supplies change. Further, since markets over wide geographic areas are closely linked together, price losses could be more widespread than is the usual case for yield losses.

In addition to the need to be able to anticipate the probability distribution of prices, potential insurers of prices would have to deal with the extent of interdependence of losses among those insured and over time. An insurer, by writing crop yield insurance over a wide area, can generally avoid risk of widespread losses. In contrast, if corn prices dropped below insured levels, price insurance policywriters would simultaneously incur claims over large market areas. In addition, prices in one time period have some influence on the following year's prices through adjustments of inventories.

The price insurability issue is also related to various institutions and their actions. For example, decisions on price supports, loan levels and related program provisions affect the behavior of prices. Further, random production outcomes and administrative events may lead to policy changes. For example, low prices typically have affected policy program decisions. State trading agencies abroad have not always responded to price changes in the expected way. The combination of these considerations could suggest that commercial insurance companies could only provide indemnities linked to market prices if there were some way for them to transfer the price risk associated with the insurance policies that they write. Unless this was possible, the risk to the insurer of widespread losses associated with prices could be quite large. These possible losses are related to the inability to predict prices, the behavior of institutions, and the effect of institutions on prices.

Compatibility of Revenue Insurance for Individual Producers and Options Markets

Effectively operating commodity options markets and legalizing trade options could facilitate the transfer of price risks from insurance companies to others. Thus, they could make important contributions to the success of revenue insurance activities by commercial insurance companies. An insurance system against price shortfalls for selected yields might work as follows: Suppose the current market price for corn is \$3.00 per bushel. Suppose, also, that producer A wishes to have insurance that the price for 20,000 bushels of grain will be at least 100 bushels per acre. Responding positively to such a producer, a commercial insurance company writes an insurance policy with the corresponding commitments.

In turn, the insurance company buys corn puts that correspond to the \$2.50 insured price. The premium paid by the producer to the insurance company for the insurance policy would reflect the actuarial standards for yields for the particular farm plus the premium for the put option plus related administrative costs. With this approach, the yield risk is transferred from the producer to the insurance company. The company "carries" the yield risk because the related premiums can be based on actuarial standards. In contrast, the price risk is shifted from the producer to the insurance company and then to the speculator who writes the put option. In the event that prices go below \$2.50, the put

would increase in value, generating profit for the insurance company which, in turn, would offset the payment of price indemnities by the company to the farmer.

This approach, as outlined, does not encompass income transfers from the public to producers. It deals with yield and price risks and the commercialization of the transfer of these risks. The U.S. insurance industry has had substantial experience with placing values on the transfer of yield risks. The premiums required by commercial companies for yield insurance are indicative of the economic value of this transfer. We are less certain about how to place values on the transfer of price risk. However, the premiums for risk of price change from then-current levels are likely to be sizable.

The premiums for combined yield and price risk may be greater than many producers would be willing to pay for the protection offered. They might prefer to carry such risks themselves and their creditors might permit them to do so.

Government Subsidies of Revenue Insurance

A variety of arrangements could be utilized to subsidize commercial revenue insurance if it were deemed appropriate to do so. Reimbursement of insurance companies for all or some portion of the indemnities associated with price shortfalls is one possible approach. Such an approach would essentially involve the merger of yield insurance with selected price protection features of present support programs.

Alternatively, government could share the costs of premiums paid by producers who buy insurance containing price protection features. Payments could also be made to those who are willing to write put contracts in options markets which, in turn, facilitates the writing of insurance policies that provide commodity price protection.

Insurance of Producers as a Group

Revenue insurance is usually thought of in terms of insuring individuals. However, it has been suggested that this concept could be extended to focus on the possibility of assuring a group of producers as a whole for a given level of total revenue or net income. The Western Grain Stabilization Program of Canada performs this function ^{3/}. The program assures participating farmers as a group that their combined net cash receipts in any one year will be at least equal to the average of the past 5 years. This assurance is the same regardless of the participation in the program. If the estimated net cash receipts indicate that a payout is necessary, individuals draw from a pool of money in proportion to their contribution to it.

For purposes of this paper, the important parts of the Canadian program are that:

- ° the assurance is to a group, not to individuals,
- ° participation is self-selecting, limited to producers who make the required contributions,

^{3/} Some features of the Canadian program and, in turn, the description in this paper of a possible revenue assurance program are similar to those developed by Norton and Working (5, 12), and by Froker in the forties (1). See also Vertrees (11).

- the Government contributes \$2 for each \$1 contributed by producers, and,
- contributions of individual producers in turn serve as the basis for distribution of benefits among producers.

Participating individual producers contribute 2 percent of their first \$60,000 of gross marketings with a maximum contribution of \$1,200. The Canadian Government also contributes to the pool at the rate of \$2 for each \$1 contributed by producers. The drawings from the pool are set so that the drawings plus the net cash receipts realized in the market are equal to the assured level of net cash receipts for the participants as a group. Producers who do not contribute do not receive payments from the pool.

It is important to recognize that the payout is tied to marketings. Production not marketed, such as when export markets for Canadian grain do not "permit" marketings of all production, is not considered in calculations; nor are the costs of producing the unmarketed grain.

In years when no payout from the pool is made, the money is carried into following years. If claims are greater than the pool, money is borrowed from the Government and repaid from pool receipts in following years. Contribution levels are adjusted over the long run to reflect the status of the pool.

From the start of the program in 1976 to January 1, 1983, the Canadian Government contributed \$568 million (Canadian) and producers \$284 million (Canadian). Distributions to producers were \$368 million (Canadian).

A similar approach to the Canadian program might be possible in the United States. If desired, it could be designed to maintain gross revenue rather than net cash flow, as it does in the Canadian program. Producers would contribute regularly to a pool according to their individual farm receipts (up to some maximum, if desired) and draw from the pool in the years in which receipts of all producers are below the targeted level. The Government, in turn, might match the producer contributions or, as the Canadian Government does, contribute \$2 for each \$1 of contributions by producers.

Several decisions would be involved in addition to the relation between producer and Government contributions. The more important ones would concern the commodity coverage and the institutional arrangement for administering the pool or pools.

Establishing separate pools for major individual or groups of commodities would appear to be most consistent with present U.S. farm programs. For example, there might be separate pools for cotton, wheat, feed grains, and rice. Alternatively, there could be a single pool covering several commodities. The more inclusive the commodity coverage, the less likely that the program would stifle adjustments among products by producers.

Producer groups, however, might be more interested in individual commodity pools. The administrative arrangements for producer contributions, procedures for distributing pool resources, and the amount of the public contribution to the pool would be important in any event. The assurance could be in terms of percentages of historic gross receipts or net incomes. For example, payments from the pool could be triggered if receipts for specific commodities dropped

below, say, 80 percent of the average of the previous 5 years ^{4/}. Boards consisting of public officials and producer and consumer representatives might oversee the administrative decisions and procedures for collecting and distributing pool resources.

With the assurance to the group as a whole, individual producers would have the incentive to be as efficient as possible in their production and marketing activities, since only the average price to all would be supported. Benefits from the program to an individual producer would not be affected significantly by actions of that individual. Self-selection through contributions by producers and tying benefits to these contributions would lead to less administrative requirements than with current price support and diversion programs. However, this type of approach would not be a convenient mechanism for directly influencing production or marketings of individual producers, as is done now by linking eligibility for direct price support to compliance with acreage diversion programs, if that was considered desirable. To administer the program to attract producers to "voluntarily" adjust production or marketing would involve many of the administrative complexities of the present programs.

Conclusions

Revenue insurance for farmers is usually assumed to involve individual farmers paying premiums in exchange for the opportunity to receive indemnities if their individual revenues from selected crops are less than the insured amounts. This need not be the case. Indemnities could be geared to revenue of a group of producers.

One of the keys to discussions of commercial revenue insurance relates to the noninsurability of the risk of price changes because price risk cannot be computed actuarially. This is the critical reason why revenue insurance for individual producers is not commercially viable without something like organized options markets and the legalization of trade options. Even if it were legal to do so, there seem to be some questions as to whether insurance companies would be willing to write insurance policies involving price protection unless it were possible to shift the risk of price changes to others such as speculators in options markets.

By allowing price risks to be transferred to speculators, well-functioning options markets and legalized trade options would facilitate in practice the commercialization of revenue insurance. The acceptability of commercial insurance to producers would depend significantly on the premiums for such insurance and the availability of comparable protection through Government commodity programs. For example, it seems unlikely that anyone would pay a premium for commercial insurance that protects producers from corn prices going below \$2.50 if the Government offered a price support at \$2.50 with no strings attached. A system of commercial revenue insurance for individuals would not intrinsically involve income transfers to producers as do price supports. One way to provide for income transfers could be a program of revenue assurance to groups of producers as a whole as contrasted to programs of specific commodity price supports or availability of revenue insurance for individuals. The Western

^{4/} See (7) for a discussion of how tax credits might be used to support the net farm income of producers as a group. That article also includes estimates for the "tax credit" costs under an assumed program covering all commodities. Such a program could be limited to selected commodities. Conceivably a system of tax credits would be utilized for distribution of pool proceeds associated with a revenue assurance program such as that outlined in this paper.

Grain Stabilization Program of Canada is such a group-based program. Several decisions would be involved with the implementation of a similar program in the United States, including the relation between producer and Government contributions, the commodity coverage, and the institutional arrangements for administering the pool or pools.

APPENDIX. WHAT ARE OPTIONS?

Options trading is a formal system that enables people to purchase a right (without the obligation) to sell an "item" at a set price or to purchase a right (without the obligation) to buy an item at a set price, regardless of what happens to prices over time. The price paid by the producer and received by the seller (option writer) is the cost of shifting the risk of price changes from the purchaser of the option to the seller (writer) of the option. The seller of a put option accepts the risk of prices being above the set strike price; the seller of a call option accepts the risk of prices being below it.

Several terms have particular meaning in options trading:

- Put option: A contract that conveys the right (without the obligation) to sell a particular commodity futures contract at a particular price until a stated expiration date.
- Call option: A contract that conveys the right (without the obligation) to buy a particular commodity futures contract at a particular price until a stated expiration date.
- Exercise or strike price: The price at which the buyer of a put option can sell the commodity futures contract and, in the case of a call option, can buy the commodity futures contract.
- Premium: The transaction price for the options contract (the amount the buyer pays and the writer receives for an options contract).
- Options seller or writer: An individual who sells the option to the buyer and therefore assumes the opposite side of the transaction if the buyer of the options chooses to exercise the option. For example, if a buyer of a put option for December corn futures at a \$3-per-bushel exercise price decided to sell a corn futures contract at \$3 per bushel, the writer of the put option would be obligated to buy a December corn futures contract at \$3 per bushel from the holder of the put option without regard to the price of December corn futures at that time. And, if a buyer of a call option for December corn futures at a \$2.50-per-bushel exercise price decided to exercise the option, the writer of the call option would be obligated to sell a December corn futures contract at \$2.50 without regard to the price of December corn futures at that time.

The way options work is illustrated by the quotations for sugar futures and related options on the Coffee, Cocoa, and Sugar Exchange in New York City. The futures contract calling for delivery in October 1984 closed on June 15, 1984, at 6.10 cents per pound. It is useful to note that: (1) "put" and "call" options are traded on four of the nine futures contracts for sugar, and (2) the

highest strike price for which October 1984 put options were traded was 11 cents per pound, which was less than 15.30 cents per pound, the highest life-of-contract price for the October futures contract. Similar relationships exist for the other options.

Trading is initiated in options with strike prices that correspond to the market price of the futures contract if the prices are maintained over a significant period of time. Over time, as the market price changes, trading at corresponding strike prices is initiated, making a range of strike prices available.

Interest rates, risk of price change, as well as the relation between the strike price of the option and the current market price, influence the premiums that writers require and purchasers are willing to pay. The difference between the strike price and the current price of the futures contract is reflected in the premium. Note the following closing prices and premiums for sugar on June 15:

	<u>Cents per pound</u>
October futures contract	6.10
Premium for October put option:	
6-cent-per-pound strike price	0.55
10-cent-per-pound strike price	4.05

The price for the October futures of 6.10 cents per pound reflects the combined judgment of those in the market as to the market value of that futures contract. Thus, any writer of an option with a strike price greater than this current price of the futures contract will need to be compensated for the difference--otherwise the option could be immediately exercised at a profit for the buyer (and loss for the writer).

With either of these examples, hedging in futures contracts could be used instead of options to transfer price risk. However, hedging with futures requires margins, and price are "locked in". Therefore, the hedger is unable to take advantage of favorable price movements of the commodity. These conditions contrast with those associated with options. In options trading, the buyer pays the initial cost of the option--the premium. But, there are no margin requirements and the options buyer can take advantage of any favorable price movements.

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