FARM REVENUE INSURANCE: AN ALTERNATIVE RISK-MANAGEMENT OPTION FOR CROP FARMERS

The Congress of the United States
Congressional Budget Office

PREFACE

In the years ahead, crop farmers are likely to face greater financial risks and long-term income instability than in the past. This is because their dependence on export markets exposes them to other nations' farm, economic, trade, and foreign policies, and to the vagaries of global weather. Although the public has long shared some of the risks in crop farming through commodity programs and federal crop insurance, commodity policy has undergone a long-term transition that has made farmers more dependent on markets. Moreover, beyond their expense, current programs are not very effective in reducing the income instability caused by international events and conditions.

This special study, requested by the Senate Agriculture, Nutrition, and Forestry Committee, examines the role that revenue insurance could play in agriculture policy. The principal author is James G. Vertrees. The study was prepared in the Natural Resources and Commerce Division under the supervision of David L. Bodde and Everett M. Ehrlich. The author wishes to acknowledge the contribution of Andrew S. Morton who provided many constructive comments and suggestions. Francis Pierce edited the manuscript, with the assistance of Nancy H. Brooks. The author owes special thanks to Kathryn Quattrone for typing the several drafts and preparing the manuscript for publication. In keeping with the Congressional Budget Office's mandate to provide an objective and nonpartisan analysis of issues before the Congress, no recommendations are offered.

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SUMMARY

Farmers' incomes are subject to wide swings from year to year. Farm revenue insurance has been suggested as a way of stabilizing incomes at less cost to the taxpayer than present programs. Its purpose would be to reduce the variability of farmers' incomes, not to raise the average level. This paper reviews the conditions that have given rise to the concern over farm income instability, and the options currently available to farmers for dealing with it. The paper then analyzes a hypothetical revenue insurance program.

The Changing Policy Perspective

Public policy has long acknowledged the risk and uncertainty facing grain and cotton farmers that arise from weather, biological processes, and the relative insensitivity of supply and demand to price changes. Federal programs since the 1930s have sought to assist crop farmers by transferring some of their price and income risks to the public sector through agricultural price support programs.

But these commodity programs have, over time, transferred risks back to farmers and made them more dependent on the markets for their crops. These markets, in turn, have grown increasingly international in character, especially in the last decade. In the 1970s, U. S. agricultural exports grew at an extraordinary rate--20 percent per year, increasing from about $7 billion in fiscal year 1970 to nearly $41 billion in fiscal year 1980. This growth was driven by an expanding world population, rising real per capita incomes in many nations, production limitations in food-deficit nations, the emergence of the Soviet Union as a major grain importer, favorable shifts in exchange rates, and U. S. farm policies that generally encouraged exports. Today, exports take the production from about two of every five acres, and generate about one-fourth of gross farm income. Producing for export markets has allowed farmers to make fuller use of the land and capital resources available to them: virtually all of the one-third increase in crop output in the 1970s was for export.

While the expansion of world trade benefited U. S. agriculture, it forged links that were to prove troublesome for farm income in the early 1980s. Farm prices and incomes have become highly sensitive to global weather and crop production, population changes, and economic growth. Perhaps more significantly, they have also become sensitive to the farm, economic, trade,

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and foreign policies of other nations. Changes in foreign crop production and the policies of other nations are rapidly transmitted to the U. S. crop sector through the international financial system and through flexible exchange rates. The United States, because of its relatively open agricultural markets, bears most of the burden of adjustment to changes in world trade. The result has been to increase farmers' uncertainty as to the prices they will receive for their crops.

Present price support programs have the disadvantage of being unable to stabilize farm income sufficiently, and are also burdensome to the taxpayer. Farmers' incomes are far more variable than incomes of nonfarmers. Although crop farmers' incomes are less variable than would be the case without commodity programs, adjustments in these programs can do little to reduce income instability caused by unexpected changes in export markets. Equally important, these programs, which mainly finance farmers' inventories, expose taxpayers to large outlays: in fiscal year 1983, crop program outlays are estimated at $13.1 billion, or about two-thirds of total price support outlays of $21.3 billion. And even though crop program outlays are projected to decline to $7 to $8 billion annually in 1984-1988, they will still be roughly four times historical levels. The attempt to stabilize both prices and supplies in order to stabilize incomes is very costly to taxpayers.

Farm Revenue Insurance

Revenue insurance, provided by the federal government, would aim directly at stabilizing crop farmers' incomes. It would guarantee a farmer that revenue per acre of each crop would not fall below some proportion of expected revenues. For example, a corn farmer might insure 75 percent of average revenues per acre based upon recent experience. If revenue from the corn crop was less than the insured level--due to either low yields or low prices--the farmer would receive an indemnity equal to the difference. There would be no indemnity if revenue levels were inside the normal range of variation.

In this manner, revenue insurance would protect farmers against precipitous declines in gross income regardless of whether price or production variability was the cause. In exchange for this protection, farmers would ideally pay an annual premium that reflected their individual risks. This would minimize the possibility that farm revenue insurance would encourage inefficient farming.

As compared to the present system of commodity programs for stabilizing prices, and federal crop insurance for protecting against produc-

tion losses, revenue insurance might provide crop farmers more effective protection against volatile incomes. A reduction in risk and income instability could contribute to a more efficient allocation of resources; the dampening of sharp swings in farm incomes would benefit farmers, rural communities, and agricultural supply industries. Furthermore, under a revenue insurance program, the federal government would not have to intervene as frequently in markets to stabilize prices as is now the case. This would reduce direct government influence on prices, production, and the allocation of supplies. Moreover, unanticipated changes in commodity programs would no longer be a source of market uncertainty. In the absence of commodity programs, however, prices most likely would be more unstable than they are now since nonrecourse loans and the farmer-owned reserves would not act to set either a price floor or a price ceiling. A special grain reserve could be set up to protect consumers against the adverse consequences of commodity shortages.

From a federal budget viewpoint, the costs of a revenue insurance program would depend upon the specific insurance provisions, the level of coverage, the premiums charged, and farmer participation. Revenue insurance could probably be provided at a smaller cost than that of continuing current programs. This tentative conclusion is based upon several considerations. First, under current programs 30 to 40 percent of price support outlays are for price stabilization activities that would not be necessary under farm revenue insurance. Second, the administrative and operating expenses of a farm revenue insurance program would probably be no more than the same expenses for continuing current programs. Third, under revenue insurance some share of costs would be paid by farmers through insurance premiums.

There would be some important constraints to a workable program. First, the principle of revenue insurance assumes random variation about an acceptable average level of income. The Congress would have to accept the mean level of farm income over time and adhere to the income stabilization objective of revenue insurance. For this reason, revenue insurance seems most applicable to a situation in which farmers produce for export markets that grow at an average rate sufficient to utilize U. S. production capacity, and in which average incomes provide adequate returns to resources, despite wide swings. For the same reason, revenue insurance seems less applicable in a long-term situation of sluggish export growth, excess production capacity, and low but stable incomes.

Second, there is a set of insurance problems to be addressed: measuring risks and predicting losses; determining premiums that reflect individual farm risks so that high-risk farmers are not encouraged to participate to the exclusion of others; encouraging, perhaps requiring, farmers to stay in the

program for a multiyear period; and reducing the possibilities that farmers can take actions that directly influence insurance indemnities.

Third, there is a related problem of inducing sufficient farmer participation over time to have a large enough pooling of risks to make a workable program. Farmers' participation would depend upon their perceptions of the need for insurance, on insurance costs, and on expected net returns from insurance. Those most vulnerable to farm income variability would be most likely to participate. Among them would be farmers most dependent upon farm income; farmers with large debt-to-asset ratios; and new entrants. One way of increasing participation would be to subsidize the premiums. This would be consistent with the view that society would benefit from sharing farming risks. The larger the premium subsidy, however, the more farm revenue insurance would encourage inefficiency and tend to become simply an income transfer program.

Revenue insurance is worth further exploration as an alternative to current programs, despite the many difficulties in making such a significant policy shift. To obtain a better understanding of how revenue insurance might work, the Congress could take two initiatives. First, it could authorize studies of program design and implementation schemes. Second, if such studies provided evidence that revenue insurance could be workable, it could authorize a pilot revenue insurance program in selected areas or crops. Evaluation of a pilot program would help to determine the feasibility of revenue insurance.

CHAPTER I. INTRODUCTION

Agricultural production has always been an inherently risky business, partly because of the vagaries of weather and of biological processes. Once planting decisions are made, farmers have little opportunity to influence the size of their crops. This makes agricultural production susceptible to relatively large fluctuations. These abrupt changes on the supply side of the equation can cause highly unstable prices and incomes.

Today, however, crop farmers face even greater hazards from external forces. Agricultural exports, which grew at a rate of 20 percent per year in the 1970s, are now the single most important factor in crop farmers' incomes. They take the production from about two of every five acres, and generate one-fourth of farm cash receipts. As producers have grown increasingly dependent on volatile export markets, their incomes have become sensitive to changes in weather and crop production in other countries, as well as to shifting farm, economic, trade, and foreign policies here and abroad. Nations today are closely linked through international financial markets, and the system of flexible exchange rates rapidly transmits economic fluctuations from one country to another.

The position of the United States in world agricultural markets is such that its farmers are especially vulnerable to changes in world trade. When world markets expand, as they did in the 1970s, U. S. farmers are likely to capture the largest share of the increase because of their productive capacity and large stocks. Conversely, they have difficulty in maintaining their share when world markets contract. Their leverage is determined by worldwide economic and financial conditions, crop conditions, and foreign exchange rates. International politics--most important, U. S.-Soviet relations--have also exerted a strong influence, first boosting grains sales in the early 1970s and then causing them to decline at the end of the decade.

Other nations' trade policies also play a major part. By subsidizing exports and providing more favorable terms of trade, they are able to sell their relatively much smaller agricultural surpluses at prices that undercut U. S. exports. Most nations that import farm products also have protectionist policies that cushion their producers and consumers from the impacts of fluctuations in world market prices. As a result, the United States, because of its relatively free trade practices and open agricultural markets, bears most of the burden of adjusting to changes in world trade.

In short, the internationalization of U. S. agriculture, while allowing crop farmers to utilize their resources more fully and to earn higher average incomes, exposes them to new and pervasive sources of instability. In the 1970s farm prices and incomes were more variable from year to year than in the previous two decades, reflecting in part the growing influence of international events and conditions. If the United States maintains relatively open agricultural markets, farmers will continue to face greater uncertainty because of the dependence of the U. S. crop economy on volatile export markets. Their incomes are already more variable than nonfarmers' (see Figure 1), and thus instability is likely to increase.

POLICY PERSPECTIVE

The federal government shares part of farmers' risk, through agricultural price support programs and crop insurance. These programs expose taxpayers to large outlays in years of market surplus when prices are low. In 1983, outlays for crop programs reached a record $13.1 billion. 1/ Over the next several years they are projected at $7 to $8 billion, substantially higher than the long-term historical average of $2 billion per year.

Present farm programs have evolved over a long period of time, and in recent years the level of risk assumed by the public sector has decreased, leaving crop farmers more dependent on markets. The programs have also tended to focus less on increasing prices and incomes and more on stabilizing prices. They have never directly focused on stabilizing incomes. Now that farmers have become more fully integrated into the domestic and international economies, commodity programs have less capacity to achieve any of these purposes.

The objectives of farm policy have not been explicitly defined by the Congress. In its legislation and in executive branch program administration, however, these sometimes conflicting purposes have been emphasized:

- To achieve a reasonable degree of stability in farm prices and incomes;

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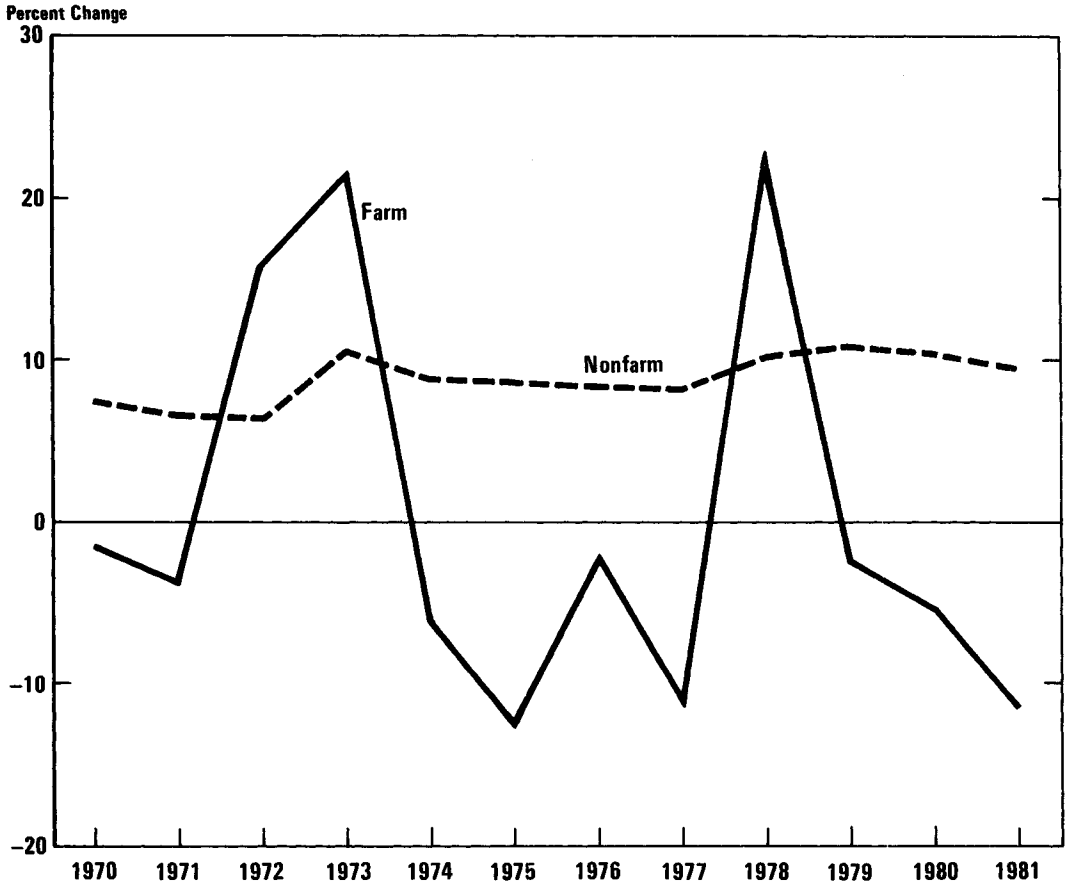
1. In fiscal year 1982, the wheat, feed grain, rice, and upland cotton programs accounted for $9 billion of the total $11.6 billion outlay for agricultural price support programs. For fiscal year 1983, crop program outlays are estimated at $13.1 billion, about two-thirds of the $21.3 billion outlay for all price support programs.

Figure 1.
Income per Capita for Farm Operator Families and for the Nonfarm Population, 1970-1981.
(Percent change from previous year)



SOURCE: U.S. Department of Agriculture, *Economic Indicators of the Farm Sector, 1981,* ECIFS 1-1 (August 1982).

NOTE: Farms are those with $40,000 or more of annual gross sales, which produce most of U.S. agricultural output. Income of farm operator families is from both farm and nonfarm sources. Income of nonfarm population is disposable personal income, based on the National Income Accounts.

- To provide a rate of return to farm assets comparable to returns on investment in other sectors;
- To provide an adequate and stable supply of food and fiber for U. S. consumers at reasonable prices;
- To improve the ability of U. S. agriculture to compete in international markets; and
- To keep the taxpayer costs of farm programs relatively low.

Implicit in these objectives is a public concern with how farmers adjust to risk and income instability. Economists believe that a reduction of risk and uncertainty can promote investment and the adoption of new technology, resulting in lower average costs and a higher level of output. Second, farm families can benefit from a reduction in year-to-year variability in farm income, and so also might rural communities and agriculture-related industries. A third consideration is that current farm programs expose taxpayers to large outlays.

A basic issue is whether any alternative approach to farm income stabilization can help farmers better manage risk and at less cost to taxpayers. Present commodity policies place farmers in a position of increased dependence on market forces, but also involve large expenditures.

FARM REVENUE INSURANCE: AN ALTERNATIVE

The purpose of this paper is to examine revenue insurance as a way of assisting crop farmers in adjusting to income instability. The option evaluated in this paper would aim to reduce the year-to-year variability in farmers' incomes about some average level, but not to increase the average level. It implicitly assumes that the average level of income over time will be sufficient to maintain resources in agriculture.

Chapter II discusses the major shortcomings of present policy and sets the stage for examining alternatives. Chapter III describes how a farm revenue insurance program might work, and its potential consequences and problems. The Appendix discusses forward pricing in futures markets, including commodity futures options.

CHAPTER II. HOW FARMERS MANAGE THEIR RISKS AT PRESENT

Before examining farm revenue insurance in the next chapter, this chapter discusses the ways in which crop farmers now manage their production, price, and income risks. Basically, they have three options: (1) they can bear risks directly; (2) they can transfer risks to others in the private sector through the insurance and futures markets; or (3) they can transfer risks to the public sector through commodity programs and federal crop insurance.

DECISIONMAKING UNDER RISK AND UNCERTAINTY

Unlike most businessmen, farmers must invest their capital with relatively little influence over the prices they receive for their products or the prices they pay for materials and services. The amount of risk a farmer perceives and is willing (or able) to accept is largely determined by his knowledge, temperament, spending plans, enterprise combination (an enterprise being the production of a specific crop or livestock product), and financial reserves. For these reasons, farmers differ considerably in how they perceive risk. Most appear to be risk-averse. A risk-averse farmer will value a risky alternative--that is, one with a large variance around its expected value--at less than that value. As a result, he will use fewer resources in agricultural activities than he would if the same expected returns were certain or if he were less risk-averse.

Most economists believe that measures to reduce uncertainty tend to free venture capital for the pursuit of new activities, leading to an increase in net investment and economic growth. As applied to farming, either through government programs or through private-sector arrangements, such measures tend to increase the level of investment and current input expenditure for any given level of average price and income expectations. 1/ They also encourage the adoption of new technology, resulting in lower average costs and a higher level of output.

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1. See Peter M. Emerson, Public Policy and the Changing Structure of American Agriculture (Congressional Budget Office, 1978), pp. 42-45.

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BEARING RISKS DIRECTLY

Farmers may bear income risks directly through such strategies as diversifying their enterprises and investing in land, buildings, and machinery that allow more flexibility. The possibility of diversification may be limited, however, if there are only a few enterprises available that offset one another in their returns; also, there may be a loss of economic efficiency from diversification. Alternatively, farmers may adjust to risks by operating with less borrowed capital or by increasing their financial reserves, but doing so reduces the opportunity to expand. Moreover, many farmers cannot draw upon accumulated wealth in periods of adversity, as their reserves are in the form of real estate and therefore not liquid.

Farm families have increasingly relied upon income from nonfarm employment to help them bear the risk of variable income from farming. Nonfarm income averaged about 55 percent of total farm income in 1975-1979. Some farm families draw most of their income from nonfarm sources (see Table 1). In fact, in 1981 families on farms with sales of less than $40,000 had negative incomes from farming. This group, representing about 72 percent of all farms, produces only about 12 percent of total farm output (as measured by cash receipts from farming) and accounts for more than 80 percent of total nonfarm income earned by farm families. On larger farms the picture is different: the 12 percent of all farms with gross sales of $100,000 and over, which produce about two-thirds of farm output, earn more than 80 percent of total family incomes from farming. They account for about 90 percent of the total net income from farming. An important middle group--the approximately 16 percent of farms with gross sales of $40,000 to $99,999, which produce about 20 percent of farm output--earned about a third of their family income from farming in 1981.

In sum, nonfarm employment is the main source of income for most of the nation's farm families, and not unimportant to the rest. It smooths out the year-to-year swings in farm income. Although farms with annual gross sales of $100,000 and over generate far larger incomes per family, these families experience greater year-to-year income variability than those who are more dependent upon nonfarm income.

TRANSFERRING RISKS TO OTHERS IN THE PRIVATE SECTOR

Farmers transfer price and income risks to others in the private sector, primarily through forward contracting in cash or futures markets. To some extent, financial institutions and insurance companies also bear some of the risks.

TABLE 1. FARM INCOME BY VALUE OF SALES CLASS, CALENDAR YEAR 1981

Annual Gross Sales (In dollars)	Number of Farms	Percent of All Farms	Percent of Total Cash Receipts from Farming	Net Farm Income per Farm (In dollars)		Average Income per Farm Family (In dollars)
500,000 and Over	25,000	1.0	30.4	518,635		
200,000 to 499,999	87,000	3.6	18.9	45,666	66,790 a/	80,562 b/
100,000 to 199,999	186,000	7.6	19.1	15,867		
40,000 to 99,999	396,000	16.3	19.0	3,813		12,356
20,000 to 39,999	278,000	11.4	6.1	-880		9,285
10,000 to 19,999	286,000	11.7	3.2	-1,022		12,999
5,000 to 9,999	335,000	13.8	1.9	-988		17,430
Less than 5,000	843,000	34.6	1.4	-1,142		21,137
Total or All-Farm Average	2,436,000	100.0	100.0	8,042		24,187

SOURCE: Congressional Budget Office from U. S. Department of Agriculture, Economic Indicators of the Farm Sector: Income and Balance Sheet Statistics, 1981, ECIFS 1-1 (August 1982).

a. Average net farm income per farm family of all farms with more than $100,000 in gross sales.

b. Average income per farm-operator family for all farms with more than $100,000 in gross sales.

Forward Contracting

Forward contracting permits a farmer to lock in a price for his crop before it is harvested. It is accomplished by a contract between the farmer and buyer, typically specifying quantity, quality, and delivery date. The contract may specify either a cash price or a "basis" price tied to the futures price but adjusted to the cash price at local markets. Forward pricing through delivery contracts reduces price risks, but subjects the farmer to the risk of not being able to make full delivery of the contract amount. For this reason, forward cash sales are usually for less than expected production.

Forward pricing is facilitated by well-developed futures markets for major agricultural commodities. These bring farmers and commodity users wanting to hedge against adverse price movements together with speculators wanting to gain from price movements. The Appendix describes the futures hedging transaction by which a farmer locks in a specific price. It also discusses options on agricultural commodity futures, which have recently been legalized. Commodity futures options may provide farmers with an additional tool for transferring risks to the private sector.

Farmers' use of futures markets to hedge price risks is not extensive. The major participants seem to be large commercial farmers with gross annual sales of $100,000 or more. Most others do not trade in futures because (1) they lack information, time, and expertise; (2) their crops are small relative to the size of futures contracts; (3) they face transaction costs, including uncertain margin calls; (4) futures contracts rule out the chance to gain from price increases; (5) government price support programs, which set minimum floor prices, offer a better opportunity for risk sharing; and (6) they distrust futures markets. 2/

Forward pricing in cash or futures markets can usually reduce price risks no more than one year ahead. In comparison, federal commodity programs reduce price risks for a longer period since farmers are generally assured that minimum prices for future crops will be no less than current levels of price support. Farmers making capital investments generally prefer the kind of long-term certainty provided by government programs.

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2. John W. Helmuth, Grain Pricing (Commodity Futures Trading Commission, September 1977).

Banking and Insurance

Financial institutions also share risks with farmers by providing credit for capital purchases and current operating expenses, and through emergency lending or refinancing. Indeed, in today's highly capitalized agriculture, the risk of inadequate incomes to repay loans is a major factor influencing farmers' production and expansion decisions, and lenders' willingness to extend credit. Increasingly, lenders are encouraging prospective borrowers to reduce income risks as a condition for credit extension.

To some extent, farmers transfer risks to insurance companies. By pooling risks among farmers and over regions, insurance permits farmers to protect themselves against production losses, although private insurance companies limit their coverage to insurable single perils--mainly hail and fire.

SHARING RISKS WITH THE FEDERAL GOVERNMENT

The federal government shares some of the risks in crop farming through two types of programs: (1) commodity programs to support and stabilize prices and incomes; and (2) crop insurance to reduce income variability from production losses. Commodity programs help to reduce market uncertainty while crop insurance helps to reduce production uncertainty.

Commodity Programs

Since the 1930s, farm legislation has pursued the objectives of increasing and stabilizing farm prices and incomes through a variety of programs, changing slowly over time to meet new conditions. The key elements of current policy are described below.

Non-Recourse Loans. The basic purpose of the loan program is to allow a farmer to defer marketing his crop when prices are low in expectation of higher prices in the future. When market prices are low, eligible farmers can put their crops in storage at their own expense and use them as collateral for nonrecourse loans from the Commodity Credit Corporation (CCC). The amount of loan per bushel is termed the "loan rate"; acceptance of the loan provides the farmer with immediate cash while he waits for prices to firm. If they do not, and the farmer elects not to repay his loan, the CCC agrees to accept the commodity as full satisfaction of the debt. In that case, however, the farmer would bear the cost of shipment to a location prescribed by the government. Alternatively,

a farmer may choose to repay the loan with interest on or before its maturity date (usually nine months) and take over the storage and marketing of the commodity himself. In this way farmers are guaranteed cash for their crops at a minimum price--the loan rate--without losing the opportunity to gain from future price increases. Loan rates are set below expected average market prices to keep U.S. farm products competitive in the world market and to minimize the loan rates' influence on production. Thus, nonrecourse loans provide a relatively low level of price support.

Farmer-owned Grain Reserve. Under this program a farmer contracts with the government to store grain for a three-year period. He may enter grain directly into the reserve, or transfer grain already in storage under a nonrecourse loan into the reserve. In either case, the farmer receives a loan equal to the reserve loan rate multiplied by the quantity entered into the reserve. To encourage reserve entry, farmers are reimbursed annually for the expenses they incur in storage, and interest on loans may be waived or adjusted. Financial penalties deter a farmer from repaying the loan before market prices reach a predetermined release price. Storage payments terminate when the market price reaches the trigger release price. At the trigger release price or above, farmers can repay their loans, plus unearned storage payments, and sell the grain.

Deficiency Payments. Producers of wheat, feed grains, rice, and upland cotton who comply with all program provisions are eligible for deficiency payments if the national average market price for a crop for a specified period falls below a target price. Target prices are set by the Secretary of Agriculture based, in part, on a cost-of-production formula, but minimum levels are set by the Agriculture and Food Act of 1981. The payment rate is the difference between the target price and the average market price, or between the target price and nonrecourse loan rate, whichever is smaller.

Acreage Controls. To reduce supplies and budget outlays, the Secretary has the authority to require farmers to reduce planted acreages in order to be eligible for these program benefits. In addition, farmers may be offered payments in cash or in kind to divert acreage from production. In 1983, producers of wheat, feed grains, upland cotton, and rice were offered both cash and in-kind payments for additional acreage diversion if they first reduced acreage as a condition for program benefits. Because payment-in-kind rates were so attractive--95 percent of normal production per acre for wheat and 80 percent for the other crops--farmers diverted a total of 77 million acres under these programs. This was roughly equivalent to a third of the acreage planted to those crops in 1982.