AN ANALYSIS OF ALTERNATIVE FARM RISK MANAGEMENT PROGRAMS IN OKLAHOMA

By

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AN ANALYSIS OF ALTERNATIVE FARM RISK

MANAGEMENT PROGRAMS IN OKLAHOMA

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CHAPTER I

INTRODUCTION

Agricultural producers face many natural risks such as weather, disease, insects, and other pests over which they have little or no control. Because of the inherent nature of agricultural production, these producers face more risk in their operations than do many other types of businessmen.

Natural phenomena can create low and variable income for both individual farm firms and the agricultural industry. Low yields reduce cash returns to the farm reducing the farmer's ability to meet creditor demands or plant a crop for the coming year. Weather and other natural phenomena affect the supply of crops resulting in instability in crop prices.

Other sources of income variability in the agricultural industry include general business conditions, inflation, livestock and commodity cycles, and domestic and foreign government actions, such as export embargoes, price controls, environmental restrictions, commodity price support and production controls. Government actions may be designed to buffer the risks associated with natural phenomena, however unexpected program changes often add to the uncertainty that agricultural producers face (Tweeten). Information on government programs is frequently not available until after farmers have made planting decisions. Subsequent program changes often create costly

changes in production organization or confusion over the proper or best action.

Many government programs have been enacted to solve farm problems, or at least remedy their symptoms. Farm programs have typically supported farm income and reduced farm income variability. In recent years, policymakers have become concerned about the large government outlays associated with the "low yield" Disaster Payments Program. The government paid an estimated $750 million in direct disaster payments to producers in 1980 (Benjamin). To share the costs of low yield protection, the Federal Crop Insurance Program has been greatly expanded. As with other types of insurance, the producer pays a relatively small certain premium per acre rather than bearing the risk of a large loss should crop failure occur. If premiums are so high that the farmer pays more into the program than is received as indemnities, premiums are reduced. With the Federal Crop Insurance Program the farmer receives a premium subsidy so that the producer and the government share the risk of adverse yields at the farm level.

The Problem

Currently only two government programs are available to agricultural producers, the Deficiency Payments Program and the FCIC's "All Risk" Crop Insurance Program. Also, the Disaster Payments Program may be available if the producer cannot participate in the "All Risk" Crop Insurance Program because of uninsurability. The availability of these programs and the transition from the Disaster Payments Program to the "All Risk" Crop Insurance Program as the major production risk aversion program establishes the basis for this study.

Farmers currently face excess supplies of grains and low commodity prices. Land values are declining. Interest rates remain at relatively high levels. These factors increase the vulnerability of farm firms, particularly those that are highly leveraged or low equity operations. Uncertainty over the benefits and costs of All-Risk crop insurance and government commodity programs simply compound these problems. With more information concerning the implications of participating in each of these programs and alternative program combinations, producers will be better prepared to make efficient decisions.

Despite continual expansion of FCIC insurance coverage, participation in this program has not been extensive. Less than 13 percent of the eligible crop acreage has been insured in any one year since 1948 (Miller). The FCIC expects participation to increase as the program is expanded to cover more crops in more counties during the next few years. Nevertheless, low rates of participation in the Federal Crop Insurance Program present a problem. Many factors may contribute to the producer's decision not to participate in this program. Perhaps premium rates need be adjusted downward to encourage participation. If premiums are lowered to attract participants, the balance between premiums and indemnities may be disturbed requiring further subsidy. Also, high-risk areas may be drawn into cultivation that would normally be in non-crop uses.

Federal Crop Insurance Program participation may be low only in certain program crops. For instance, cotton producers may be better off by participating in this program while wheat producers become worse off. The opposite may be true in other geographical locations.

Wheat producers in Oklahoma's Panhandle may find it advantageous to purchase Federal Crop Insurance while southwest Oklahoma wheat producers may not. Perhaps premium rates need only be selectively adjusted to encourage program participation.

With knowledge of the possible effects of these farm programs legislators can better determine whether the programs are accomplishing the objectives for which they were designed. The potential effects on the economic success of the farm firm of participation in each government farm program may be of interest to many. In addition, the other effects of commodity programs on government costs may be of interest. With a policy objective of reducing government costs associated with providing farm programs, decision makers are interested in comparisons of the costs of government farm programs analyzed in this study.

Hypotheses

The structure, cost and operation of each of the government farm programs may reduce the long-run viability of farm firms. The acreage reduction or set-aside requirement for participation in the Deficiency Payments and Disaster Payments Programs may impose such a large cost on producers that the payments received by the producer will be less than the value of foregone production. The set-aside requirement for participating in the Deficiency Payments and Disaster Payments Programs may reduce the economic viability of farmers in some areas who participate in these programs. If low commodity yields are more prevalent than low commodity prices, the Disaster Payments Program may be more appealing to the producer, even with the set-aside

requirement. If low commodity prices are more prevalent, the Deficiency Payments Program may produce more desirable results. However, the set-aside requirement for these programs may put the farm in a worse position than a nonparticipation option.

Similar effects may be prevalent under the Federal Crop Insurance Program. It is hypothesized that FCI premium rates for at least some crops are too high for the level of risk in some or all areas. Premium rates for some insurance options may be appropriate while premium rates of other FCI options for the same crop may be too high or too low. High premium rates relative to indemnities paid reduce incentives for farmers to participate in "All-Risk" Federal Crop Insurance. Each of these programs may be established correctly for certain geographical areas but not for others because of differences in prices and yields for various areas.

A farm producer making decisions concerning the participation in government farm programs may make different decisions than other farmers. There may be several explanations (in addition to program structural problems) as to the reasons farmer decisions differ. Managers of farm firms are generally concerned first with the survivability of their firms and then with the level of firm growth, income, and the stability of income. A farm manager with very little risk of failure may pay more attention to the level of income and firm growth. This farmer may be able or willing to accept a large year to year variance in income in order to attain a higher level of firm growth and mean income.

Bankruptcy is not a major problem among farmers who have a small amount of liability relative to the value of their assets. Farmers

who have very little equity in their assets may find they have very little capacity to borrow. In years of low prices or low yields these farmers may find it difficult or impossible to meet previous loan or credit commitments. Firm failure is a potential problem among low equity farms. The level of farmer equity may be a basis for selection of different government farm programs. Farmers with low equity may be helped more by government farm programs than high equity operators. These low equity farmers may select different government risk management programs from farmers in a high equity position.

Another basis for different decisions concerning selection of government farm programs may be differing farm production organizations. Farmers in different geographic regions may be affected differently by alternative government farm programs. Farms who have diversified well may need very little more protection against risk. Geographic location affects the farm managers ability to diversify. Farmers in one area may have only a few enterprise alternatives while in another area farmers may have many. Many factors, such as production expenses and investment in machinery, may be very different across different production organizations. A farm manager with a riskier production organization may find that he needs protection against both yield and price fluctuations, while another farmer may only need help in averting risks due to price variability.

The costs to the government of providing agricultural producers with risk management programs have historically been very high. Policymakers have, in recent years, become concerned with the large government outlays associated with providing these programs. The reduction of these costs is an important reason for the enactment of

the Federal Crop Insurance Program. Producers who choose to participate in this program must pay a premium for each acre of the insured crop, therefore sharing the expense of providing the government farm programs. The cost to the government of providing yield and price programs may be lower for deficiency payments and All-Risk crop insurance than for deficiency payments and disaster payments.

Objectives

The primary objective of this study is to analyze the effects of participation in alternative government farm programs, and combinations of these programs on the economic measures of the firm's growth and viability. Secondary objectives of this study are:

1. To develop a set of whole-farm scenarios typical of various areas of the state of Oklahoma, and to simulate the activities of each farm scenario in a stochastic, inflation free environment,
2. To determine the importance of the beginning firm equity level on the outcomes resulting from the participation in each government farm program and combinations of government farm programs,
3. To determine if effects on economic measures of the farm scenario and farm survivability, resulting from participation in government farm programs and their combinations, vary due to differing production organizations characterized by different geographic locations of the subject areas,
4. To determine if the per acre Federal Crop Insurance premium

rates are set correctly for each insurable crop in the study areas, and to evaluate possible adjustments in these premiums rates, and

5. To evaluate the government costs associated with providing government farm programs to agricultural producers in the study areas.

The objectives of this study are achieved through the use of the whole-farm simulation model developed by Hardin. This model, entitled "A Simulation Model for Analyzing Farm Capital Investment Alternatives", incorporates correlated, stochastically generated prices and yields based on historical series of prices and yields observed in the subject area and simulates the activities of a whole-farm scenario over a specified planning horizon. The model then replicates the simulation a stipulated number of times creating the information necessary to calculate statistics for each economic measure.

The simulation model must be modified to incorporate information concerning the government farm programs. The model must compute costs and returns associated with participation in the various programs. In cases such as the Deficiency Payments Program or the Disaster Payments Program or their combinations, the production acreage of the participation crops must be reduced to meet any set-aside or acreage diversion requirements. This information as well as other important information such as premium rates and target prices must be incorporated into the model.

Scenarios will be developed for each of the three subject areas within the state of Oklahoma through the aggregation of information

obtained from Oklahoma State University, Agricultural Experiment Station, Crop and Livestock Enterprise Budgets and other publications relating to each subject area. Certain assumptions must be made about the size and production organization of the farm scenarios. Other assumptions such as expected investments, family living expenses, age of existing assets and the inflation rate (in this study held at zero) must be made. Each farm scenario is simulated a number of times each assuming a different government program option.

The Locations of Study

Three locations, within the state of Oklahoma, were chosen to develop a set of realistic data for this study. The shaded areas in Figure 1 identify each of the study locations. Jackson, Texas and Wagoner Counties in Oklahoma are the specific county locations chosen for this study. Each location was chosen to represent a somewhat different production organization, characteristic of the particular geographic area. Production techniques may also vary from location to location, even on crops common to more than one location.

Jackson County

Jackson County, bordering with the state of Texas on the Red River, was chosen as a study area in southwest Oklahoma. Approximately 470,000 acres are used in farming operations. This represents approximately 90.0 percent of the total land area of the county. Nearly 70.0 percent of this farm land is in crop enterprises, mostly dryland. Total irrigated acreage is approximately 50,000 acres

Figure 1. Map of Oklahoma Showing the Areas of Study

using wells and surface irrigation water from the Altus-Lugert Project reservoir in Kiowa County Oklahoma.

Major crops produced in Jackson County are wheat and cotton. However, many other crops are grown in the area. Grain sorghum, alfalfa hay, peanuts and oats are examples of these crops. Livestock enterprises including cow-calf, stocker and dairy production are also common in Jackson County. Three thousand seven hundred acres of irrigated wheat were harvested in 1980. Also in that year 239,300 acres of dryland wheat, 6,300 acres of alfalfa, 47,000 acres of irrigated cotton and 15,500 acres of dryland cotton were harvested.

Texas County

In the Oklahoma panhandle, Texas County farm producers must irrigate much of their crop acreages. Most of this water comes from wells at least 350 feet deep. Irrigated crops produced in Texas County include wheat, grain sorghum, alfalfa and corn. These crops are also produced on dryland acreages in this area. In 1980 Texas County producers harvested 65,000 acres of irrigated grain sorghum and 46,000 acres of dryland grain sorghum for grain, 101,000 acres of irrigated wheat and 247,000 acres of dryland wheat. Wheat stocker cattle and cow-calf operations are also somewhat common in Texas County.

Texas County is a somewhat dry, almost arid land composed of 1,319,680 acres of which approximately 1,170,000 acres are used in farming. About 500,000 acres of this farmland is engaged in crop production. Of the land engaged in crop production about one-half is irrigated.

Wagoner County

Wagoner County, in northeast Oklahoma, has a more humid climate than both Texas and Jackson Counties. Annual rainfall in this area is considerably higher than the annual rainfall in Texas County and hence, more suitable to the production of such crops as soybeans and hay. Total land area in Wagoner County is 360,320 acres. Approximately 68.0 percent of this land is involved in farming operations. With about 245,000 acres used in farming, approximately 135,000 acres are used in crop production. Crops commonly produced in Wagoner County are wheat, grain sorghum, soybeans, alfalfa hay and native hay. Cattle, both beef and dairy, are common enterprises in this area, as are hogs and some poultry.

In 1980 Wagoner County producers harvested 26,000 acres of wheat, 7,500 acres of alfalfa hay and 15,500 acres of other hay. Soybeans harvested totaled 41,000 acres and grain sorghum acres harvested for grain were 1,600. Generally, there are very few if any crop acres irrigated in Wagoner County.

Organization of the Remaining Chapters

Chapter II contains a complete description of the simulation model used to analyze the effects on each farm scenario in a "before and after" comparative context. Also, a detailed discussion and description of the mathematical computations of the costs and returns associated with participation in government farm programs is addressed here. The third chapter contains a description of each farm scenario and other required input data. A description of the experiments used in the actual analysis and the simulation results for each experiment

are presented in Chapter IV. These results present the decision maker with a set of expected outcomes and also distribution information about those outcomes. Chapter V summarizes and presents concluding statements about this study.

CHAPTER II

MODEL DEVELOPMENT AND PROGRAM ALTERNATIVES

Risk and uncertainty, whether it be production, marketing or financial risk, present many problems for both individual farm producers and the agricultural industry. Because of the risk prevalent in agricultural production and marketing the farm producer is faced with a host of risk management decisions in addition to normal production and marketing decisions.

Previous Research

Studies by Hazell, Hardin, and Richardson and Nixon have revealed models useful in analyzing farm risk management techniques. The models reviewed and researched in these studies involve such methods as Monte Carlo techniques, simulation, quadratic risk programming, and MOTAD.

In 1971 Hazell proposed a linear programming method (Minimization of Total Absolute Deviations; MOTAD) as an alternative to quadratic and semivariance programming for farm planning under uncertainty. He states that the conventional linear programming model ignores uncertainty. Hazell's study is concerned with uncertainties in activity costs, yields, and prices that affect the objective function of the conventional linear programming model and which may be summarized as gross returns net of variable costs.

The model developed by Hardin was designed to analyze the effects of alternative capital investment expenditures on a whole-farm scenario in an uncertain environment. The model incorporates enterprise data, with trended, correlated prices and yields and simulates the activities of the firm iteratively to develop balance sheet and cash flow information. The model determines the chances of firm survival given the specified data and based on a specified minimum equity level. The model developed by Richardson and Nixon, similar to the model developed by Hardin, is also a simulation model incorporating stochastically generated prices and yields as a method of incorporating risk and uncertainty.

The analytical techniques described in these and other studies have been extensively used in analyzing the effects (both on the farm level and the agricultural structure) of previously available and currently available government commodity programs. In an early study Gisser (1969) constructed a model in which he analyzed the effects that certain government commodity programs would have on the farm labor market. He stated that the major goal of agricultural policies is to relieve farm poverty and that the programs considered by the government are price support, acreage control, subsidizing inputs and production control.

Halcrow's early paper discussed the assumptions of three basic types of crop insurance. These forms of crop insurance are 1) all-risk crop insurance, 2) area-yield insurance and 3) weather-crop insurance. Halcrow presented special problems unique to each type of insurance and the necessary conditions to make each type a viable, effective program. The insurance programs suggested in Halcrow's

paper are 1) all-risk crop insurance in areas of low risk, 2) area-yield insurance in high risk crop regions and 3) weather-yield insurance in the ranching areas of the western United States provided the specific relationship between weather phenomena and range or forage yields can be determined. Halcrow also expresses that the major reason for failures in insurance programs is that they have been based on a "faulty conception of the actuarial problems involved."

Many studies, in recent years, have concerned themselves with the farm level effects of government farm programs. With the expansion of the Federal Crop Insurance Program has come a large, intense series of studies in an attempt to analyze the effects of this program. Casler performed a study comparing Federal "All-Risk" Crop Insurance, Crop-Hail Insurance and these two programs combined with the Disaster Payments Program. Casler's study compares gross income and returns over variable costs per acre with each program option and with no government programs. Casler's study was designed to provide a framework by which the crop producer can make a decision as to which alternative to choose. He suggested a payoff matrix which utilizes the producer's subjective probabilities about yields. Casler also prepared a worksheet which the producer can use to help make decisions concerning these commodity programs.

Oamek et al. produced a similar study comparing each of the Federal All-Risk Crop Insurance options with a no insurance option. This study also suggests a payoff matrix and a worksheet as an aid to producers in making participation decisions. The major difference between this payoff matrix and the one suggested by Casler is that individual producer's historical yields rather than subjective

probabilities of yields are used as the events that determines possible outcomes. This payoff matrix consists of net cash revenues and are shown for each action/event combination. Oamek et al. also provide a programmable calculator program which can be used to calculate the net cash revenues for the payoff matrix.

Many studies analyzing the Federal Crop Insurance Program and other commodity programs have been made in a simulation framework (Dean; King and Oamek; Lemieux et al.). Dean developed a whole-farm scenario typical of Jackson County in southwest Oklahoma and used the model developed by Hardin to analyze various commodity programs. Dean simulated the scenario with each program alternative, including the Deficiency Payments Program, the Disaster Payments Program, the Crop-Hail Insurance Program and the various options of the Federal Crop Insurance Program and compared them with a "no program" alternative. Program alternatives including the Deficiency Payments Program or Disaster Payments Program provide the scenario with the greatest level of firm growth and also enhance the chances of firm survival above the level of other program alternatives. Program alternatives including both types of insurance put Dean's Jackson County farm scenario in worse condition at the end of the simulation. Here the firm showed no growth and survival rates above those resulting from a no commodity program option. Dean also analyzed the per acre government costs of providing farmers with the risk management strategies. He found that the expected per acre government costs are greater with the expanded FCI Program than with the early FCI Program because the premium rates with the expanded FCI Program are subsidized by the government.

A similar study by Lemieux et al. simulated a typical Texas High Plains cotton farm over a 10-year planning horizon assuming participation in the FCI Program, Disaster Payments Program or nonparticipation. The authors of this study found that the 75 percent guarantee level with the highest price elective option provided a level of risk coverage about equal to that of the Disaster Program. The study by King and Oamek evaluated the same programs in a similar context for Colorado dryland wheat producers. The King and Oamek study produced similar results to the Lemieux et al. study.

The Model

The model used in this study is a whole-farm simulation model developed by Hardin to analyze capital investments in a stochastic environment. The model was specifically designed to ascertain the profitability, chances of survival, solvency and liquidity of a farm firm under alternative capital investments. By making certain modifications within the model it gained the ability to calculate the costs and returns associated with participation in government farm programs. The model is designed to replicate the "n" year simulation a specified number of times to generate distributions of cash flows (both inflows and outflows), net worth and profitability for each farm scenario. The simulation model also determines average (across replications) income statement information, average (across replications) balance sheet information, and a summary of annual borrowing. Analysis of the outcomes of simulations assuming participation in each government farm program or combinations of the programs and a base run with no participation in government farm

programs allows the potential gains of participation in each program alternative to be compared along with the potential enhancement of firm survival.

A major advantage of this type of analysis is that it allows the direct comparison of outcomes "with and without" government farm programs and permits comparisons among alternative government farm programs. Identical firm organizations can be simulated under identical price and yield distributions but using different government farm programs. Outcomes can then be compared across alternative government farm program options and the effects of each noted. The analysis focuses on changes in the government farm program alternatives and their accumulative effects on the economic viability of the farm.

A General Model Description

A brief overview of the model, the modifications and figure 2 will provide an understanding of the basic operations of the model. The model can be divided into two sections. The first section establishes the basic appearance and structure of the farm scenario and the second section executes the actual simulation and iterative loop. In the first section the model reads and calculates that information which does not change with each replication. The first section also reads information concerning the beginning inventory and valuation of machinery and buildings. Liability information including, loan values, repayment schedules and loan lives are all required inputs for the first section. Other required information includes beginning cash reserves, length of planning horizon, desired

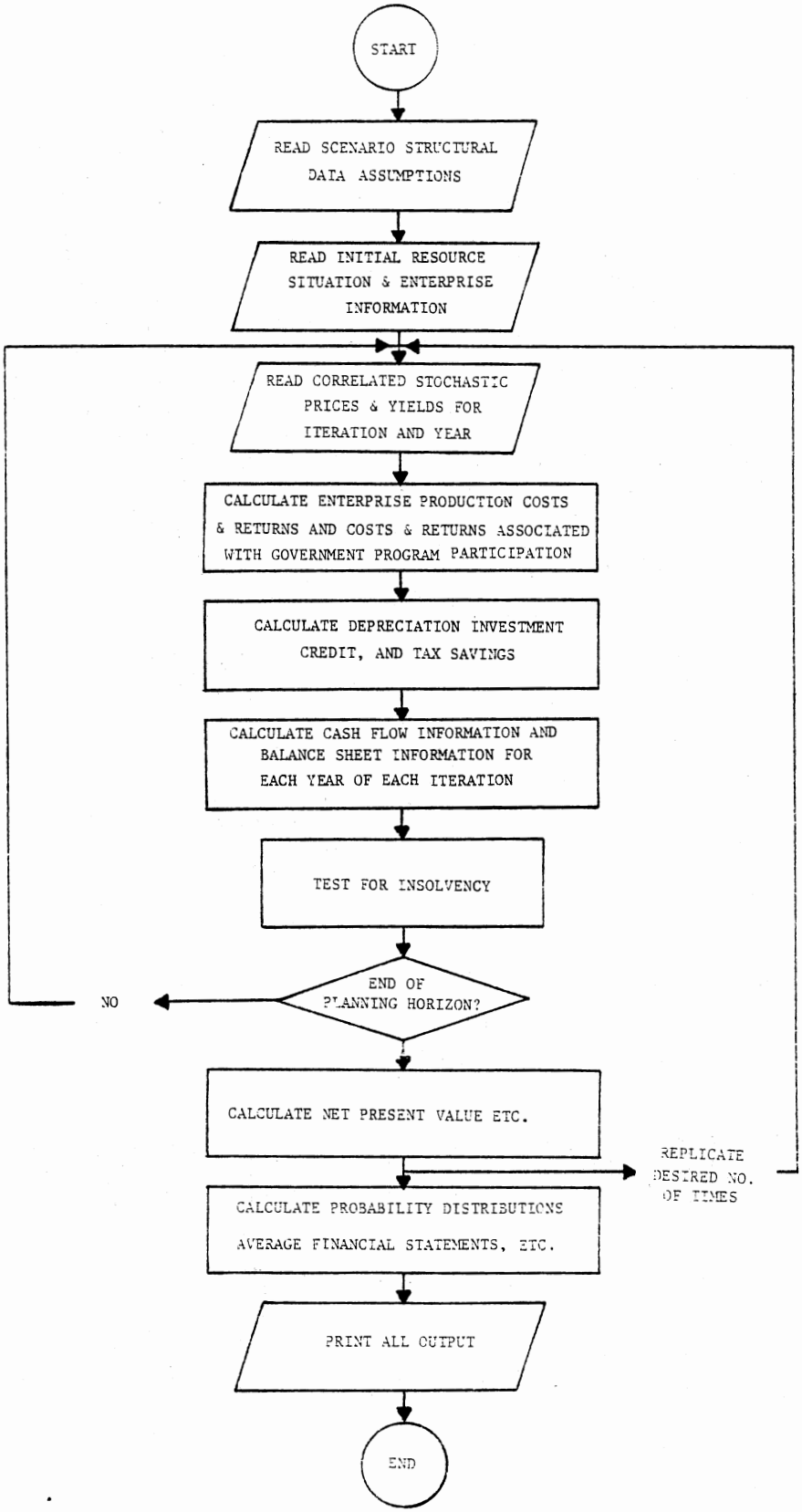

Figure 2. Flow Chart of the Simulation Model.

number of replications, tax rates, minimum equity ratios, farm acreages, enterprise patterns and future capital expenditures. This first section also amortizes existing liabilities and depreciates existing assets for the planning horizon and stores the values in arrays for later use. The model summarizes the initial balance sheet and financial information before proceeding to the simulation section of the model.

The next section reads the stochastically generated random correlated prices and yields. These prices and yields are used along with the base information to calculate costs and returns of the enterprises and costs and returns of the specified commodity program. (The costs and returns from participation in government farm programs and the stochastic generation of the random correlated prices and yields will be discussed later in this chapter.) These costs and returns are used to determine income taxes, repayment of existing debt and net returns. This information is then used to revise the balance sheet information, calculate net worth, test for insolvency and derive annual net cash flows.

The model determines the firms ability to repay debt in each year, thus evaluating the firm's stability. If cash flows are positive in a particular year of the simulation the model accumulates the funds in cash reserves to be drawn on in the future. If cash flows are negative the debt is financed through any existing cash reserves. If these reserves are not sufficient to meet the deficit the model compares the current equity situation with the specified minimum equity level. If the current equity level is below the

minimum equity level the firm fails the survival test.[1] If the firm fails the survival test and the bankruptcy is recorded the iteration is continued assuming that the firm can borrow funds to meet the cash flow deficit. By continuing the iteration, the estimates of net worth and other results for this simulation can be compared with the results of other simulations. If the iteration is not allowed to continue the estimates of variables, such as net worth and present value of cash flows, would be biased upward. Also, some variation in these estimates would be omitted. If the firm can survive this test a loan is made and the simulation is continued until the end of the planning horizon at which time the next replication is initiated.

After the model has replicated the simulation the desired number of times, it calculates the statistical information for cash flows, ending net worth, net present value, and annual borrowing. Probability distributions and average financial information are calculated and printed along with the statistical information. Other information calculated and printed includes the summary of annual borrowing, the probability of firm survival, the probability of refinance, and the number of bankrupt iterations which occurred during the analysis. Virtually all of the detailed financial accounting data for each replication and year of the analysis, and for the entire

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[1] Rather than declaring bankruptcy once the firm's equity level has fallen below the minimum the firm could perhaps liquidate some assets and reduce the deficit. This may allow the firm to continue operation for an additional year or, perhaps even "survive" to the end of the simulation. Not permitting a partial liquidation of assets probably biases the results toward slightly too many bankrupt iterations. However, the implications of alternative government farm program strategies may not be altered.

analysis, are summarized by the model. Only information pertinent to this study will be summarized in the context of this analysis.

Stochastic Prices and Yields

This model allows the user to specify a set of fixed incomes and expenses for the length of the simulation or stochastically generated prices and yields. Stochastically generated prices and yields allow the user to incorporate risk due to price and yield variability into the analysis. The stochastically generated prices and yields may be allowed to display either a normal distribution or a triangular distribution. The triangular distribution option allows the user to incorporate his subjective evaluation of the historical variation in product prices and yields when specifying the distributions of the prices and yields. Under this option of the user specifies a minimum possible yield (price), a maximum possible yield (price) and the most likely value for yields (prices). The stochastic prices and yields generated for this analysis are based on a subjective interpretation of historical series of Oklahoma prices and county yields. These yield and price series are collected for the commodities produced on the farm scenario and are detrended. A matrix of correlation coefficients for the yields and prices must be developed as a first step in preparing input for the computer procedure used to generate the stochastic observations. Separate matrices are drawn for yields and prices to portray no relationship between farm level yields and the price distributions the farmer must face. A procedure developed by Clements et al. is used for factoring these matrices into unique upper triangular matrices.

A trend factor can be specified for the generated price and yield distributions. Assumptions made in specifying trend factors for price and yield distributions may be very difficult to justify. Factors effecting trends in prices, yields, costs of production, and prices of future investments may include changes in supply and demand factors, technological changes, and inflation rates. Improper specification of trends in prices and costs of production may unrealistically cause increased or decreased profitability. Improper inflation of machinery and equipment purchase prices may result in unsatisfactory machinery compliments. Uncertainty about actual trend factors, even in the near future, makes their specification difficult. Rather than specifying unrealistic trend factors, perhaps it may be more realistic to attempt holding the current situation constant. In this study inflation is assumed to be constant at a rate of zero for all input data and hence, the prices are not trended. The yields are also not trended as technological developments are assumed to not increase yields a significant amount over the planning horizon of the simulation. The procedure combines the trend and distribution information and multiplies the upper triangular matrices by a vector of random deviates to determine a set of trended, correlated and triangularly distributed observations.

Government Farm Programs

The following discussion reviews the basic assumptions of each of the government farm program options analyzed in this study. Also, the mathematical equations used to calculate the costs and returns unique to each government farm program option are explained. These equations

are used to incorporate the effects of commodity programs. Payments and costs associated with participation in these government farm programs are based on certain criterion specified by each program's administration. These assumptions and criterion as well as definitions of terms important to each commodity program are discussed in this section.

Deficiency Payments Program

The Agricultural Act of 1970 provided for a type of deficiency payment for upland cotton, wheat and feed grains. This deficiency payment was tied to a parity ratio. The Agricultural and Consumer Protection Act of 1973 dropped the parity calculation and introduced the target price. To participate in the Deficiency Payments Program the producer generally was asigned an allotment. Several significant modifications were introduced in the Food and Agricultural Act of 1977 although this act maintained the same basic structure of the 1973 legislation. The 1977 legislation did away with the allotment system and tied the target prices to changes in the variable cost of production, and tied changes in the loan rates to excess supplies. The deficiency payments are based on the difference between the target price and the average market price for the first five months of the marketing year or the difference between the target price and the loan rate, whichever is the smallest.

The major purpose of the Deficiency Payments Program is to reduce the adverse effects of low commodity prices on farm income. Publicly financed technological advances may be another source of farm income reductions. Since the aggregate demand for agricultural products is

price inelastic, advances in production technology increase output less than the resulting price declines, one results is a reduction in farm income. Deficiency payments are triggered by low commodity prices and somewhat offset the impact of these low prices on income.

Administration of the Deficiency Payments Program falls under the authority of the Agricultural Stabilization and Conservation Service (ASCS) and the Secretary of Agriculture. Agricultural producers choosing to participate in this program are subject to certain requirements specified under the 1982 Agriculture and Food Act (P.L. 97-98) To participate in the Deficiency Payments Program the producer must:

1. Sign an intention of participation previous to a specified date.
2. Reduce acreage for harvest by a stipulated amount.
3. Place at least the acreage reduction in a soil conserving use (Nelson et al.).

Table 1 indicates the specified acreage reduction factors, under the 1982 program for program crops produced on the farm scenarios in this study. Strengthening of prices for the program commodities is the major purpose of the required acreage reduction or set-aside.

The target price concept provides the basis for computing income payments to participating producers. Target prices do not actually increase the price farmers receive for their products but provide an income supplement when low commodity prices are prevalent. By means of the target price mechanism farmers more nearly realize prices equal to the target prices (Ray). The legislation also provides loan rates at which the producer may use his produce as collateral in obtaining a

Commodity Credit Corporation non-recourse loan. The basic computation of the deficiency payment rate is the difference between the target price and the price farmers receive for their crop or the loan rate, whichever is smaller. Computationally, the deficiency payment rate is determined by the following equations.

$$DPR_{ct} = TP_{ct} - P_{ct} \quad (1)$$

or

$$DPR_{ct} = TP_{ct} - LR_{ct} \quad (2)$$

where:

DPR_{ct} = the deficiency payment rate for the particular crop in year t, in dollars per crop unit

TP_{ct} = the target price for the crop in year t.

P_{ct} = the five-month average price (in this study the stochastic price) for the crop in year t, in dollars per crop unit.

LR_{ct} = the loan rate for the crop in year t, in dollars per crop unit.

Table 1. Announced Acreage Reductions Required for Each Crop

Wheat	Corn	Grain Sorghum	Cotton
15.0%	10.0%	10.0%	15.0%

Source: Nelson, et al.

Farmers can always receive the loan rate as a price for their crops so, they are not compensated for market prices which fall below this loan rate. To make the deficiency payment rate operational payments are not computed based on each price each farmer receives for his crop but, on the average price received by all farmers during the first five months of the marketing year. In this study the market price is the stochastically generated price for the crop in the given year. In cases where the actual price is above the target price the deficiency payment rate will be zero. Table 2 presents the minimum target prices and loan rates, authorized under the 1982 program, for program crops produced on the farm scenarios of this study.

Table 2. Minimum Target Prices and Loan Rates

Item	Wheat	Corn	Cotton	Grain Sorghum
	$/bu	$/bu	$/lb.	$/bu
Target Prices	4.05	2.70	0.71	2.60
Loan Rates	3.55	2.55	0.55	2.42

Source: Nelson, Et al.

The farm yield for the crop, generally called the normal farm yield (NFY), is specified by the county ASCS office for the specific farm. The NFY is based on an average of historical farm yields and determined by the county ASCS Board. A farmer may, provided he supplies solid documentation, petition the county ASCS office to raise the NFY of the farm. The acreage covered by deficiency payments on a specific farm is based on acreages planted for harvest by the producer and the ASCS desired total U.S. crop acreage harvested for the commodity. The farm program acreage covered by deficiency payments is determined by the formula:

$$FPA_{ct} = AP_{ct} \times AF_{ct} \qquad (3)$$

where:

FPA_{ct} = Farm Program Acreage for the crop in year t.

AP_{ct} = acreage planted for harvest on the specific farm for the crop in year t.

AF_{ct} = nationally applied Allocation Factor for the crop in year t.

The allocation factor is designed to penalize U.S. crop producers for harvesting acreages above the level desired by the program administration. This factor, which is the same for all farm producers, is computed as the ratio of the announced desired harvested acreage of the crop to the total U.S. acreage actually harvested. This desired level of harvested acreage is the level of harvested acres, assuming normal yields, required to meet estimated domestic and net export needs plus any adjustments in ending year stocks (Ray). The Secretary of Agriculture is required to determine the desired harvest acreages in time to aid farmers in developing their production

plans. Allocation factors must be between 0.8 and 1.0 and is assumed to be 1.0 for this study.

The equation for computing the farmer's actual deficiency payment is:

$$DP_{ct} = DPR_{ct} \times NFY_{ct} \times FPA_{ct} \quad (4)$$

where:

DP_{ct} = the deficiency payment for the crop in year t, in dollars.

DPR_{ct} = the deficiency payment rate for the crop in year t, in dollars per crop unit.

NFY_{ct} = the normal farm yield for the crop in year t, in crop units per acre.

FPA_{ct} = the farm program acres for the crop in year t.

No out-of-pocket costs are incurred for participating in the Deficiency Payments Program; however, the set-aside acreage reduction requirement will frequently reduce the level of net returns. The normal pattern for participation in the wheat program is to plant the entire wheat acreage and graze-out the set aside acreage, since the program allows such a practice. The acreage reduction can not be mechanically harvested but, may be grazed or cut for hay at any time before the County Destruction Date (hard dough stage), assumed to be May 15 in this study.

Disaster Payments Program

The Disaster Payments Program was designed to reduce income variability by compensating the producer when crop yields were substantially below normal. The Disaster Payments Program was

originally a feature of the Agricultural and Consumer Protection Act of 1973 and provided payments to producers who were prevented from planting any portion of their allotment because of drought, flood or natural disaster or any other condition beyond their control (Tweeten). The Food and Agriculture Act of 1977 provided for disaster payments based on "prevented planting" and "low yields". The 1982 program contains no provisions for low yield disaster payments (under normal conditions) due to its replacement by the FCI program. This analysis is based on the 1977 Act in determining low yield payments since it is the most recent program of this type.

The Disaster Payments Program is also administered by ASCS and requires the acreage reduction or set-aside factors. Acreage reductions stipulated under the 1982 Deficiency Payments Program are assumed to be required under the Disaster Payments Program for this study. For wheat and feed grains the disaster payments are based on yields below 60 percent of normal farm yields (using the same NFY as under the Deficiency Payments Program) and one-half of the appropriate wheat or feed grain target price. Cotton program yields are tested against 75 percent of the NFY and computed with one-third of the cotton target price. If crop yields produced by the farmer are below the specified levels the producer is compensated for the difference between this yield and the producers actual harvested yield. The computational equation is:

$$LYDP_{ct} = [\alpha_c (AP_{ct} \times NFY_{ct}) - (AP_{ct} \times Y_{ct})] \beta_c TP_{ct} \qquad (5)$$

where:

$LYDP_{ct}$ = the low yield disaster payment for the crop in year t, in dollars.

α_c = the yield test coefficient for the crop (0.60 for wheat and feed grains, 0.75 for cotton).

AP_{ct} = the acreage planted for harvest for the crop in year t.

NFY_{ct} = the normal farm yield for the crop in year t, in crop units per acre.

Y_{ct} = the actual stochastic yield for the crop in year t, in crop units per acre.

β_c = the target price adjustment coefficient for the crop 0.50 for wheat and feed grains, 0.33 for cotton).

TP_{ct} = the target price for the crop in year t, in dollars per crop unit.

As with the Deficiency Payments Program there are no out-of-pocket costs associated with participation in the Disaster Payments Program except that which is implied by the acreage reduction requirement. The same graze-out assumptions are made as under the Deficiency Payment Program.

The basic ASCS requirements are much the same as with the Deficiency Payments Program. Requirements in addition to the acreage reduction or set-aside include:

1. A Normal Crop Acreage (NCA) for the farm must be established by the county ASCS office.
2. To participate the farmer must "sign-up" at the county ASCS office during the announced sign-up period.

3. The total acreage plus the set-aside must not exceed the NCA for the farm.
4. The farm must be in compliance with acreage reductions for all other crops grown on the farm for which an acreage reduction has been announced.

The set-aside acreage must be land which has been used for crops in at least one of the past three years and not harvested for the entire year (Nelson and Scearce).

Federal Crop Insurance Program

The Federal Crop Insurance Program is designed to give producers a management tool that will help to reduce crop production risk due to yield fluctuations and to replace the ASCS Disaster Payments Program in providing production risk assistance. Rather than incurring an irregular and perhaps large damaging loss, the producer pays a much smaller, but regular annual premium. When low yields occur, the producer collects an indemnity for a portion of the value of the lost production.

In 1922 a bill concerning a federal "all risk" type insurance was introduced in Congress. The first Federal Crop Insurance Act was passed in 1938 and covered only wheat but, in 1939 a bill was passed to extend the program to cover the 1942 cotton crop (Tweeten). The program was intended to cover cash production costs associated with the crop, however, the indemnities were tied to crop yields. The farmer had to pay insurance premiums, the coverage was not designed to guarantee a profit to the producer, only the lost production costs.

The Federal Crop Insurance Act, approved in February 1938, was

the original law initiating the Federal Crop Insurance Program. This act created the Federal Crop Insurance Corporation (FCIC) as an executive agency of the United States Department of Agriculture. Through the years, the program has been modified by a number of new acts and amendments. The latest law, the Federal Crop Insurance Act of 1980 (P.L. 96-365), was approved by President Carter in September 1980. This law is designed to eventually build the Federal Crop Insurance Program into an "all-risk" crop insurance program for virtually all major crops in all producing counties of the country.

The administration of the program is handled through the manager of the Corporation (FCIC) and a five-member board of directors (of which the manager is a member) appointed by the Secretary of Agriculture.

On the local level operations are handled a number of ways. The Corporation may set up local offices staffed by federal employees to serve a group of counties. Arrangements may be made for service through private agents on a commission basis or through another USDA agency (such as county ASCS offices) to sell and service the insurance and provide an office. The law authorizes an appropriation to cover operating and administrative expenses. Thus, the premium does not include a charge for this purpose.

Only owners of crops may purchase insurance. Those purchasing insurance may be individuals, partnerships, corporations or other legal entities. Landlords and tenants may apply for insurance individually. Co-owners and co-operators of a crop may insure their shares together or each may insure his or her separate share.

Each type of insurance contract has a closing date established

after which new applications for insurance for that year will not be accepted. These dates are usually set in advance of the normal planting period for the crop. The closing dates are set so that an initial decision on participation can be made before much is known about the prospects of the crop. The purpose of the closing dates is to prevent producers from taking insurance in the years in which there is less than a normal chance for a crop.

After an owner has had a contract accepted, the insurance remains in effect until it is cancelled. The insured producer simply reports the acreage he has planted in the county each year. If the producer wishes to cancel his insurance coverage for subsequent years, he must notify the FCIC through the county office in writing on or before the cancellation date of that particular crop year. The Corporation may also cancel the insurance coverage on any crop in any year with a written notice to the producer. If an unpaid overdue premium for a previous year exists past a specific date, the insurance will be automatically terminated.

Each crop insurance unit (the insurance unit can be a producer's entire acreage or a specific field or group of fields) is considered separately for loss purposes. In this way, very good production on one unit will not offset severe losses on another unit. The producer must insure the total acreage for the specific crop within the county location if the producer chooses to participate in the FCI Program.

An insured producer may assign the indemnity to a creditor as collateral for loans or credit. If and when a loss occurs, the indemnity is paid by joint check to the producer and the creditor who has the assignment. The insured producer may transfer his right to an

indemnity along with a transfer of any part of his share of the insured crop. The producer, as long as it is practical, is expected to replant the crop in order to produce a satisfactory stand. Any time a loss or damage to the crop has occurred, the insured producer is required to promptly report the incident to the Corporation's county office.

The Federal Crop Insurance Act states that the FCIC shall set rates for premiums at a level the Board of Directors feels is sufficient to cover claims for losses and to establish as expeditiously as possible a reasonable reserve to protect the Corporation against unforeseen losses. In determining the premium rates, the Actuarial Division of the Corporation sets an average premium level for the county. The field underwriting offices adjust the premium rates according to the classified risk areas in the county. These field underwriting offices may have one or more rates per county depending on the number of areas with different levels of risk.

The producer has nine basic options in deciding how to insure a crop. The producer may choose one of three price elections which are coupled with one of three yield guarantee levels. Price elections (currently $2.50, $3.50 and $4.50 per bushel for wheat) are set by the Corporation and are the same throughout the nation. The guarantee levels are 50, 65 and 75 percent of the average crop yield (established by the FCIC and not the same Normal Farm Yield established by the ASCS for Deficiency Payments and Disaster Payments Programs) for the farming unit. Table 3 presents an example of actuarial rates and coverages for Jackson County Oklahoma wheat

Table 3. Wheat Actuarial Table for Jackson County Oklahoma 1982 and Succeeding Crop Years

Classification	Production Guarantee Per Acre	Price Election Per Bu. $2.50	$3.50	$4.50
		Premium Per Acre		
	(Bu.)	(Dol)	(Dol)	(Dol)
Level 1				
Risk Class 1	8.4	1.80	2.50	3.30
Risk Class 2	9.6	1.90	2.65	3.45
Risk Class 3	6.7	1.75	2.40	3.10
Level 2				
Risk Class 1	11.0	3.00	4.20	5.40
Risk Class 2	12.5	3.15	4.35	5.60
Risk Class 3	8.70	2.80	3.90	5.05
Level 3				
Risk Class 1	12.5	4.50	6.30	8.10
Risk Class 2	14.5	4.85	6.85	8.80
Risk Class 3	10.0	4.30	6.00	7.75

Source: United States Department of Agriculture, Federal Crop Insurance Corporation, County Actuarial Rates and Coverages, Jackson County, Oklahoma, 1982.

producers. Classification refers to the guarantee level and the risk class of specific farm groups. Level 1, 2 and 3 categories refer to the 50, 65 and 75 percent guarantee levels, respectively. The risk class of specific farm groups are covered under each of the guarantee level. The average crop yield is based on the county average of the county in which the farming unit is located. A higher average yield can be established if the producer can present proof for at least three of the most recent consecutive years that the unit produces higher yields than the county average.

A producer's premiums will be reduced as much as 5 percent per year, up to a 50 percent reduction, as long as the producer has a continuous insurance contract and has paid more in premiums than this producer has received in indemnities (i.e. the producer has a loss ratio less than one). Premium rate adjustment factors for wheat, grain sorghum and soybeans are contained in Table 4 and those for cotton and corn are contained in Table 5. Premiums for an insured cotton or corn crop shall be reduced as indicated in Table 5 for consecutive years of insurance without a loss year (a loss year in the cotton or corn program occurs when the indemnities received in a particular year are greater than the total premiums paid in that year). The premium rate adjustment factors for cotton and corn still apply even though the producer has received an indemnity payment, as long as the indemnity is not larger than the premiums paid in that year.

If a loss year occurs on a producer's cotton crop, the number of consecutive insurance years is reduced by three, with a couple of exceptions. If a loss year occurs when the producer has more than

Table 4. Percent Adjustment Factors for Continuous Federal Crop Insurance Experience for Wheat, Soybeans and Grain Sorghum

% Adjustments for Favorable Continuous Insurance Experience

	Numbers of Years Continuous Experience Through Previous Year															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15 or more
Loss Ratio[1] Through Previous Crop Year	Percentage Adjustment Factor For Current Crop Year															
.00-.20	100	95	95	90	90	85	80	75	70	70	65	65	60	60	55	50
.21-.40	100	100	95	95	90	90	90	85	80	80	75	75	70	70	65	60
.41-.60	100	100	95	95	95	95	95	90	90	90	85	85	80	80	75	70
.61-.80	100	100	95	95	95	95	95	95	90	90	90	90	85	85	85	80
.81-1.09	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

% Adjustments for Unfavorable Insurance Experience

	Number of Loss Years Through Previous Year[2]															
	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Loss Ratio[1] Through Previous Crop Year	Percentage Adjustment Factor For Current Crop Year															
1.10-1.19	100	100	100	102	104	106	108	110	112	114	116	118	120	122	124	126
1.20-1.39	100	100	100	104	108	112	116	120	124	128	132	136	140	144	148	152
1.40-1.69	100	100	100	108	116	124	132	140	148	156	164	172	180	188	196	204
1.70-1.99	100	100	100	112	122	132	142	152	162	172	182	192	202	212	222	232
2.00-2.49	100	100	100	116	128	140	152	164	176	188	200	212	224	236	248	260
2.50-3.24	100	100	100	120	134	148	162	176	190	204	218	232	246	260	274	288
3.25-3.99	100	100	105	124	140	156	172	188	204	220	236	252	268	284	300	300
4.00-4.99	100	100	110	128	146	164	182	200	218	236	254	272	290	300	300	300
5.00-5.99	100	100	115	132	152	172	192	212	232	252	272	292	300	300	300	300
6.00-Up	100	100	120	136	158	180	202	224	246	268	290	300	300	300	300	300

Source: U.S. Department of Agriculture. An Inside Look at All-Risk Crop Insurance. U.S. Government Printing Office: Federal Crop Insurance Corporation, 1980.

[1] Loss Ratio means the ratio of indemnity(ies) paid to premium(s) earned.

[2] Only the most recent 15 crop years will be used to determine the number of "Loss Years". (A crop year is determined to be a "Loss Year" when the amount of indemnity for the year exceeds the premium for the year.)

Table 5. Percent Adjustment Factors for Favorable Continuous Federal Crop Insurance Experience for Cotton and Corn

Premium Reduction	Consecutive Years with no loss
5 percent after	1 year
5 percent after	2 years
10 percent after	3 years
10 percent after	4 years
15 percent after	5 years
20 percent after	6 years
25 percent after	7 or more years

Source: United States Department of Agriculture, Federal Crop Insurance Corporation, Federal Crop Insurance Policy, Continuous Contract, M8-Cotton.

seven years without a loss, a reduction to four will be made. If a loss year occurs when the producer has three or less consecutive years of insurance experience without a loss year, a reduction to zero will be made.

The producer is entitled to a subsidy equal to 30 percent of the premium cost up to the 65 percent coverage level. If the producer wishes to have 75 percent coverage, the government will pay 30 percent of the 65 percent coverage premium and the producer will pay the remainder of the 75 percent coverage premiums. This subsidy is already incorporated in the actuarial table presented (Table 3).

A producer may receive a discount on the premium if hail and fire protection is deleted from the FCIC policy. If the producer chooses to delete the hail and fire protection from the FCIC policy at least as much hail and fire protection must be purchased from a private insurance company. All acreage insured by the FCIC policy must be covered and the purchase must be reported to the FCIC within 72 hours after purchase of the private hail and fire insurance. The amount of the discount is equal to 40 percent of the average county hail and fire premium, but not less than 15 percent and not more than 30 percent of the FCIC premium. This study assumes the hail and fire protection will be provided in the FCIC policy and that no hail and fire insurance will be purchased in simulations that do not assume participation in the Federal Crop Insurance Program.

An indemnity will be paid to the insured producer whenever the actual production falls below the guarantee yield level of production. The guarantee level of production is 50, 65 and 75 percent, as selected by the insured producer, of the average yield. The amount of

loss is the difference between the guarantee level of production and the actual production. This loss is multiplied by the price election, chosen by the producer at the onset, to calculate the value of the program indemnity. The following formula is used to calculate the program indemnity payments.

$$FCI_{ct} = (GY_{ct} - Y_{ct}) \times AP_{ct} \times PE_{ct} \quad (6)$$

where:

FCI_{ct} = the total indemnity paid to the producer for the crop in year t, in dollars.

GY_{ct} = the FCIC guaranteed yield for the crop in year t, in crop units per acre.

Y_{ct} = the actual stochastic yield for the crop in year t, in crop units per acre.

AP_{ct} = the acreage planted for harvest for the crop in year t.

PE_{ct} = the FCIC price elective selected by the producer for the crop in year t, in dollars per crop unit.

The total premiums paid are calculated using the following equations.

$$IPR_{ct} = AP_{ct} \times PPR_{ct} \times PRA_{ct} \quad (7)$$

where:

IPR_{ct} = total insurance premiums paid for the crop acreage in year t, in dollars.

AP_{ct} = the acreage planted for harvest for the crop in year t.

PPR_{ct} = per acre premium rate for the crop in year t, in dollars per acre.

PRA_{ct} = per acre premium rate adjustment factor for the crop in year t.

The producer does not have to harvest the crop to receive an indemnity. However, the FCIC must be notified through the county office so that they may inspect the farming unit or field and make an appraisal of the actual production on the farming unit. This actual production appraisal is used to calculate the indemnity.

Program Combinations

During the 1981 crop year, the year after the initiation of the 1980 Act, all three programs were available for some crops. This presents an opportunity to analyze the programs in combination. Under the assumptions of this study the producer may participate in any of the program alternatives or in any of the four possible program combinations. However, certain adjustments must be made in the program costs and returns calculations. If the producer participates in either the Deficiency Payments Program or the Disaster Payments Program, the acreage reduction requirement must be met. If participation in both programs is assumed, only one acreage reduction is assumed and double payment is not allowed. If the producer receives disaster payments for a portion of the potential production, the quantity of the crop covered by disaster payments must be excluded from the quantity covered by deficiency payments. This means that a producer cannot be paid a disaster and a deficiency payment on the same bushel of production. The calculation for the disaster payment remains the same as described earlier however, the deficiency payment is calculated as follows:

$$DP_{ct} = DPR_{ct} [(NFY_{ct} \times FPA_{ct}) - ((\alpha_c NFY_{ct}) - (AP_{ct} \times Y_{ct}))] \quad (8)$$

where:

DP_{ct} = the deficiency payment for the crop in year t, in dollars.

DPR_{ct} = the deficiency payment rate for the crop in year t, in dollars per crop unit.

NFY_{ct} = the normal farm yield for the crop in year t, in crop units per acre.

FPA_{ct} = the farm program acres for the crop in year t.

α_c = the yield test coefficient for the crop (0.60 for wheat and feed grains, 0.75 for cotton).

AP_{ct} = the acreage planted for harvest for the crop in year t.

Y_{ct} = the actual stochastic yield for the crop in year t, in crop units per acre.

In the 1981 crop year, program combinations including the Disaster Payments Program and Federal Crop Insurance were allowed. Under this alternative the producer was not allowed to take advantage of the 30 percent FCI premium subsidy. If the producer chose to participate in both programs, the government would not pay the 30 percent premium subsidy. The premium rates must be increased to incorporate this alternative into the study. With participation in program combinations including either or both of the Disaster Payments Program and the Deficiency Payments Program and the Federal Crop Insurance Program the producer must still meet the set-aside requirements.

In the next chapter required input data for the model is presented. This data provides a detailed description of each of the four farm scenarios used to analyze the implications of the government farm program alternatives.

CHAPTER III

INPUT DATA FOR FARM SITUATIONS

The four whole-farm situations analyzed are designed to represent typical, full-time, commercial farming operations in three different areas of Oklahoma. Two farm situations are developed for Jackson County, one a high equity and the other a low equity situation. Scenarios for the other two study areas are designed to represent recently established, low equity farming situations similar to the low equity situation in Jackson County. Basic differences in the scenarios of each county are total farm acreages, machinery complements, beginning inventories of machinery and equipment, cropping patterns and stochastic yields. The high equity and low equity farm scenarios for Jackson County are referred to as Farm 1 and Farm 2, respectively. Farm scenarios for Wagoner and Texas Counties are referred to as Farm 3 and Farm 4, respectively.

Farm Situations

Land Ownership

The two Jackson County farm scenarios are assumed to have identical land holdings. However, differences exist in the timing of land purchases and the value of the land at the time of the purchases. These differences are important because they are critical determinant factors in the level of liability against the farm land owned by the

farm operator. Each farm operator is assumed to own 800 acres of cropland and rent an additional 320 acres of cropland for a total of 1,120 acres of cropland. Cropland is rented at an annual cash rental rate of $35 per acre. The average current value of owned farm land is about $1,000 per acre. Land acquisitions for Farm 1 were made in 1970 (160 acres), 1973 (400 acres), and 1977 (240 acres). Farm 2 land acquisitions were made in 1976 (160 acres), 1978 (240 acres), and 1980 (400 acres). Table 6 and Table 7 summarize the land loans for Farm 1 and Farm 2, respectively. Farm 1 has an equity ratio in land of 73.64 percent and Farm 2 has an equity ratio in land of 44.14 percent.

The land purchases for Farm 3, in Wagoner County, were made in 1976 (120 acres), 1978 (140 acres) and 1980 (200 acres) and are summarized in Table 8. The operator of this farm scenario is assumed to own 560 acres of cropland and native hay meadow and rent 160 acres of cropland. Cropland in Wagoner County is assumed to be rented at an annual rate of $50 per acre. The beginning value of the owned land is $560,000. The owners equity in land at the beginning of the simulation is 43.67 percent.

The Texas County farm scenario, Farm 4, is assumed to operate a total of 1,600 acres, 1,200 of which are owned with the remaining 400 rented at an annual rate of $20 per acre. Owned land was acquired through purchases in 1976 (240 acres), 1978 (360 acres) and 1980 (600 acres) and has a current beginning average value of about $1,000 per acre. Table 9 summarizes the land purchases and outstanding land loans for this farm. The owner's equity in land for this farm is 44.14 percent.

Table 6. Summary of Land Purchase and Outstanding Land Loan Balances for Jackson County Farm Scenario - Farm 1

Year Purchased	Acres	Interest Rate	Loan Life	Purchase Price Per Acre[A]	Total Purchase Price	Down Payment[B]	Loan Amount[C]	1982 Outstanding Principle
		(%)	(Yrs.)	($)	($)	($)	($)	($)
1970	160	8	30	261	41,760	10,440	31,320	26,073
1973	400	8	30	340	136,000	34,000	102,000	90,756
1977	240	8	30	551	132,240	33,060	99,180	94,044

[A]The purchase price per acre is taken from Farm Real Estate Market Developments, National Economic Analysis Division, USDA.

[B]The down payment is equal to 25 percent of the total purchase price.

[C]The loan amount is equal to the total purchase price minus the down payment.

Table 7. Summary of Land Purchases and Outstanding Land Loan Balances for Jackson County Farm Scenario - Farm 2

Year Purchased	Acres	Interest Rate	Loan Life	Purchase Price Per Acre[A]	Total Purchase Price	Down Payment[B]	Loan Amount[C]	1982 Outstanding Principle
		(%)	(Yrs.)	($)	($)	($)	($)	($)
1976	160	8	30	521	83,360	20,840	62,520	58,471
1978	240	9	30	680	163,200	40,800	122,400	118,293
1980	400	10	30	912	364,800	91,200	273,600	270,107

[A]The purchase price per acre is taken from Farm Real Estate Market Developments, National Economic Analysis Division, USDA.

[B]The down payment is equal to 25 percent of the total purchase price.

[C]The loan amount is equal to the total purchase price minus the down payment.

Table 8. Summary of Land Purchases and Outstanding Land Loan Balances for Wagoner County Farm Scenario - Farm 3

Year Purchased	Acres	Interest Rate	Loan Life	Purchase Price Per Acre[A]	Total Purchase Price	Down Payment[B]	Loan Amount[C]	1982 Outstanding Principle
		(%)	(Yrs.)	($)	($)	($)	($)	($)
1976	120	8	30	521	62,520	15,630	46,890	43,854
1978	140	9	30	680	95,200	23,800	71,400	69,005
1980	300	10	30	912	273,600	68,400	205,200	202,580

[A]The purchase price per acre is taken from Farm Real Estate Market Developments, National Economic Analysis Division, USDA.

[B]The down payment is equal to 25 percent of the total purchase price.

[C]The loan amount is equal to the total purchase price minus the down payment.

Table 9. Summary of Land Purchases and Outstanding Land Loan Balances for Texas County Farm Scenario - Farm 4

Year Purchased	Acres	Interest Rate	Loan Life	Purchase Price Per Acre[A]	Total Purchase Price	Down Payment[B]	Loan Amount[C]	1982 Outstanding Principle
		(%)	(Yrs.)	($)	($)	($)	($)	($)
1976	240	8	30	521	125,040	31,260	93,780	87,707
1978	360	9	30	680	244,800	61,200	183,600	177,440
1980	600	10	30	912	547,200	136,800	410,400	405,161

[A]The purchase price per acre is taken from Farm Real Estate Market Developments, National Economic Analysis Division, USDA.

[B]The down payment is equal to 25 percent of the total purchase price.

[C]The loan amount is equal to the total purchase price minus the down payment.

Machinery, Equipment and Building Inventories

The machinery and equipment complements are based on Oklahoma Crop and Livestock Enterprise Budgets. The purchase prices of the machinery and equipment are consistent with the year in which they were purchased. Current year market values for the specific machinery items are calculated by subtracting depreciation accumulated since purchase from the purchase price. Depreciation on machinery, equipment and buildings is calculated using a straight line method assuming a salvage value of 10 percent of the purchase price. Table 10 presents a detailed description of the machinery and equipment as well as the building inventory for Farm 1. The total 1982 market value of the machinery and equipment on Farm 1 is $45,143 and the current market value of buildings is $29,325.

Farm 2 has a current (1982) market value of machinery and equipment of $66,565 and the market value of buildings is $35,846 (Table 11). The 1982 market value of machinery and equipment, and buildings for the Wagoner County farm scenario, Farm 3, are $44,964 and $29,655, respectively (Table 12). Machinery and equipment on Farm 4 has a current market value of $153,174. Buildings on Farm 4 have a 1982 market value of $45,537. The description of the inventories for the Texas County scenario are presented in Table 13.

Machinery, equipment and building loan balances are based on their respective dates of purchase, interest rates, and loan lives. The loan life for each inventory item is determined by the item's respective purchase price. The outstanding loan balances on Farm 1 machinery, equipment and buildings are presented in Table 14 and total $31,338. Farm 1 has equity in these assets of 57.92 percent. Table

15 summarizes the machinery, equipment and building outstanding loan balances of Farm 2. These total $55,325 and the equity in these assets is 45.98 percent of their 1982 market value. Table 16 and Table 17 provide the summary of outstanding machinery, equipment and building loans for Farm 3 and Farm 4, respectively. Farm 3 has equity in machinery, equipment and buildings of 40.19 percent. The equity in these assets for Farm 4 is 45.75 percent.

The beginning balance sheet information for the farm scenarios is summarized in Table 18. Farm 1 has a total asset value of $879,468, liabilities of $260,938 (including an outstanding operating loan of $18,727) and a beginning net worth of $618,530. This farm scenario has a beginning equity to asset ratio of approximately 70.33 percent and a debt to equity ratio of 42.19 percent. Farm 1 has a very good leverage status and will have little chance of firm failure. The equity to asset ratio for Farm 2 is 39.49 percent and its leverage ratio is 153.23 percent. Farm 2 has an outstanding operating loan of $46,878 and liabilities of this scenario total $549,074. Total assets and net worth for Farm 2 are $907,411 and $358,337, respectively. This farm scenario will be subjected to a greater chance of bankruptcy due to the limited risk bearing ability implied by the operator's low equity in the firm.

Farm 3 has a total asset value of $639,619, total liabilities of $386,970, and a net worth of $252,649. The liabilities include an operating loan of $26,902. This scenario has an equity to asset ratio of 39.50 percent and a liability to equity ratio of 153.17 percent. The Texas County farm scenario, Farm 4, has an equity to asset ratio of 38.97 percent and a leverage ratio of 156.63. The total asset

Table 10. Machinery, Equipment and Building Inventory Specifications and Market Values for Jackson County Farm Scenario - Farm 1

Inventory	Size	Year Purchased	Purchase Price	Useful Life	1982 Market Value[A]
			($)	(Yrs.)	($)
Machinery and Equipment:					
Springtooth	24.0 ft.	1974	1,243	10	348
Electric Fence	2.0 Mi.	1974	216	10	43
Water Tank	250.0 Gal.	1974	149	10	30
6 Row Cultivator	20.0 ft.	1975	2,651	10	981
6 Row Planter	20.0 ft.	1975	3,489	10	1,291
Rotary Mower	14.0 ft.	1975	2,678	10	991
Offset Disk	18.0 ft.	1976	4,493	10	2,067
Drill	26.6 ft.	1976	4,964	10	2,283
Tractor	125.0 HP.	1977	21,523	7	7,687
Sprayer	20.0 ft.	1977	3,600	10	1,980
Tractor	150.0 HP.	1978	28,401	7	13,795
Rollover M.B. Plow (5-18)	7.5 ft.	1978	4,649	10	2,975
7R 2Bar Lister	23.3 ft.	1978	1,014	10	649
Electric Fence	3.0 Mi.	1978	441	10	282
3 Water Tanks	250.0 Gal.	1978	606	10	388
Pickup	0.5 TN.	1979	7,303	6	4,017
Chisel	23.0 ft.	1980	6,507	10	5,336
Buildings:					
Machine Shed	3,500 sq. ft.	1975	24,500	30	19,355
Barn	2,000 sq. ft.	1977	3,295	30	2,746
Corral	10,000 sq. ft.	1979	7,938	30	7,224

Source: Inventory specifications and purchase prices are from Oklahoma Crop and Livestock Enterprise Budgets, Southwest Oklahoma.

[A]The 1982 market vlaues are equal to the purchase price minus the total of yearly depreciation since the item's purchase. Yearly depreciation is calculated by subtracting the 10 percent salvage value from the purchase price and dividing the remainder by the useful life.

Table 11. Machinery, Equipment and Building Inventory Specifications and Market Values for Jackson County Farm Scenario - Farm 2

Inventory	Size	Year Purchased	Purchase Price	Useful Life	1982 Market Value[A]
			($)	(Yrs.)	($)
Machinery and Equipment:					
Springtooth	24.0 ft.	1976	1,449	10	667
Electric Fence	2.0 Mi.	1976	252	10	116
Water Tank	250.0 Gal.	1976	173	10	80
6 Row Cultivator	20.0 ft.	1977	3,092	10	1,701
6 Row Planter	20.0 ft.	1977	4,070	10	2,239
Rotary Mower	14.0 ft.	1977	3,124	10	1,718
Offset Disk	18.0 ft.	1978	5,241	10	3,354
Drill	26.6 ft.	1978	5,791	10	3,706
Tractor	125.0 HP.	1978	23,245	7	11,290
Sprayer	20.0 ft.	1978	3,888	10	2,488
Tractor	150.0 HP.	1979	30,674	7	18,843
Rollover M.B. Plow (5-18)	7.5 ft.	1979	5,201	10	3,665
7R 2Bar Lister	23.3 ft.	1980	1,183	10	970
Electric Fence	3.0 Mi.	1980	514	10	421
3 Water Tanks	250.0 Gal.	1980	707	10	580
Pickup	0.5 TN.	1981	9,200	6	7,820
Chisel	23.0 ft.	1981	7,590	10	6,907
Buildings:					
Machine Shed	3,500 sq. ft.	1977	28,577	30	24,290
Barn	2,000 sq. ft.	1979	3,843	30	3,497
Corral	10,000 sq. ft.	1980	8,573	30	8,059

Source: Inventory specifications and purchase prices are from Oklahoma Crop and Livestock Enterprise Budgets, Southwest Oklahoma.

[A]The 1982 market values are equal to the purchase price minus the total of yearly depreciation since the items purchase. Yearly depreciation is calculated by subtracting the 10 percent salvage value from the purchase and dividing the remainder by the useful life.

Table 12. Machinery, Equipment and Building Inventory Specifications and Market Values for Wagoner County Farm Scenario - Farm 3

Inventory	Size	Year Purchased	Purchase Price	Useful Life	1982 Market Value[A]
			($)	(Yrs.)	($)
Machinery and Equipment:					
Springtooth	20.0 ft.	1976	1,260	10	580
Spike Harrow	18.0 ft.	1976	504	10	232
Electric Fence	2.5 Mi.	1976	315	10	145
Water Tank	250.0 Gal.	1976	173	10	80
6 Row Cultivator	16.0 ft.	1977	2,586	10	1,422
6 Row Planter	18.0 ft.	1977	5,309	10	2,920
Tractor	80.0 HP.	1978	18,008	7	8,747
Tandem Disk	16.0 ft.	1978	4,410	10	2,822
Tractor	100.0 HP.	1979	24,323	7	14,941
M.B. Plow (5-16)	6.6 ft.	1980	4,973	10	4,078
Rotary Mower	7.0 ft.	1980	2,143	10	1,757
Pickup	0.75 TN.	1981	8,518	6	7,240
Buildings:					
Machine Shed	2,500 sq. ft.	1979	23,809	30	21,666
Barn	2,000 sq. ft.	1977	3,402	30	2,892
Corral	4,000 sq. ft.	1980	5,422	30	5,097

Source: Inventory specifications and purchase price are from Okahoma Crop and Livestock Enterprise Budgets, Northeast Oklahoma.

[A]The 1982 market values are equal to the purchase price minus the total of yearly depreciation since the item's purchase. Yearly depreciation is calculated by subtracting the 10 percent salvage value from the purchase price and dividing the remainder by the usefullife.

Table 13. Machinery, Equipment and Building Inventory Specifications and Market Values for Texas County Farm Scenario - Farm 4

Inventory	Size	Year Purchased	Purchase Price	Useful Life	1982 Market Value[A]
			($)	(Yrs.)	($)
Machinery and Equipment:					
Rod Weeder	20.0 ft.	1976	3,088	10	1,420
Sweep	24.0 ft.	1976	5,672	10	2,609
Electric Fence	3.5 Mi.	1976	441	10	203
2 Water Tanks	250.0 Gal.	1976	347	10	160
Surface Irrigation System		1976	28,344	10	13,038
Land Plane	12.0 ft.	1977	4,764	10	2,620
Offset Disk	16.0 ft.	1977	4,900	10	2,695
Sprayer	36.0 ft.	1977	2,858	8	1,250
Planter	20.0 ft.	1978	5,733	10	3,669
Row Cultivator	20.0 ft.	1978	3,744	8	2,607
Lister	20.0 ft.	1978	3,161	10	2,023
Horse		1978	588	8	323
Surface Irrigation System		1978	33,870	10	21,677
Tractor	100.0 HP.	1979	24,323	7	14,941
Spike Harrow	20.0 ft.	1979	972	10	710
Drill w/o Fert.	13.0 ft.	1979	3,175	10	2,318
Springtooth	30.0 ft.	1979	2,382	10	1,739
Tractor	125.0 HP.	1980	32,836	7	24,392
Chisel	20.0 ft.	1980	7,287	10	5,974
Stalk Shredder	13.3 ft.	1980	4,715	8	3,654
Electric Fence	4.0 Mi.	1980	686	10	563
2 Water Tanks	50.0 Gal.	1980	707	10	580

Table 13. (Continued)

Inventory	Size	Year Purchased	Purchase Price	Useful Life	1982 Market Value[A]
			($)	(Yrs.)	($)
Pickup	0.5 TN.	1981	7,870	6	6,690
Field Cultivator	20.0 ft.	1981	4,259	10	3,876
Surface Irrigation System		1981	37,333	10	33,973
Buildings:					
Machine Shed	4,750 sq. ft.	1977	38,753	30	32,940
Barn	2,000 sq. ft.	1979	3,843	30	3,497
Corral	12,750 sq. ft.	1980	9,681	30	9,100

Source: Inventory specifications and purchase prices are from Oklahoma Crop and Livestock Enterprise Budgets, Panhandle Oklahoma.

[A]The 1982 market values are equal to the purchase price minus the totalof yearly depreciation since the item's purchase. Yearly depreciation is calculated by subtracting the 10 percent salvage value from the purchase price and dividing the remainder by the useful life.

Table 14. Summary of Outstanding Loan Balances for Machinery, Equipment and Buildings for Jackson County Farm Scenario - Farm 1

Item	Size	Loan Life	Years Remaining On Note	Loan Interest Rate	1982 Outstanding Principle[A]
		(Yrs.)	(Yrs.)	(%)	($)
Machinery and Equipment:					
Tractor	125.0 HP.	8	3	8	7,239
Tractor	150.0 HP.	8	4	9	12,468
Rollover M.B. (5-18)	7.5 ft.	5	1	9	822
Pickup	0.5 TN.	4	1	10	1,570
Chisel	23.0 ft.	6	4	10	3,552
Buildings:					
Machine Shed	3,500 sq. ft.	8	1	8	2,961
Corral	10,000 sq. ft.	5	2	10	2,726

[A]The operator was required to make a 25 percent down payment on all machinery, equipment and building purchases.

Table 15. Summary of Outstanding Loan Balances for Machinery, Equipment and Buildings for Jackson County Farm Scenario - Farm 2

Item	Size	Loan Life	Years Remaining On Note	Loan Interest Rate	1982 Outstanding Principle[A]
		(Yrs.)	(Yrs.)	(%)	($)
Machinery and Equipment:					
Offset Disk	18.0 ft.	5	1	9	927
Drill	26.6 ft.	5	1	9	1,024
Tractor	125.0 HP.	8	4	9	10,205
Tractor	150.0 HP.	8	5	10	16,347
Rollover M.B. Plow (5-18)	7.5 ft	5	2	10	1,724
Pickup	0.5 TN.	4	3	11	5,435
Chisel	23.0 ft.	6	5	11	4,973
Buildings:					
Machine Shed	3,500 sq. ft.	8	3	8	9,612
Barn	1,000 sq. ft.	4	1	10	827
Corral	10000 sq. ft.	5	3	11	4,251

[A]The operator was required to make a 25 percent down payment on all machinery, equipment and building purchases.

Table 16. . Summary of Outstanding Loan Balances for Machinery, Equipment and Buildings for Wagoner County Farm Scenario - Farm 3

Item	Size	Loan Life	Years Remaining On Note	Loan Interest Rate	1982 Outstanding Principle[A]
		(Yrs.)	(Yrs.)	(%)	($)
Machinery and Equipment:					
Tractor	80.0 HP.	8	4	9	7,906
Tandem Disk	16.0 Ft.	5	1	9	780
Tractor	100.0 HP.	8	5	10	12,962
M.B. Plow (5-16)	6.6 ft.	5	3	10	2,447
Rotary Mower	7.0 ft.	3	1	10	588
Pickup	0.75 TN.	4	3	11	5,032
Buildings:					
Machine Shed	2,500 sq. ft.	8	5	10	12,688
Corral	4,000 sq. ft.	4	2	10	2,226

[A]The operator was required to make a 25 percent down payment on all machinery, equipment and building purchases.

Table 17. Summary of Outstanding Loan Balances for Machinery, Equipment and Buildings for Texas County Farm Scenario - Farm 4

Item	Size	Loan Life	Years Remaining On Note	Loan Interest Rate	1982 Outstanding Principle[A]
		(Yrs.)	(Yrs.)	(%)	($)
Machinery and Equipment:					
Surface Irrigation System		8	2	8	6,597
Planter	20.0 ft.	5	1	9	1,014
Surface Irrigation System		8	4	9	14,869
Tractor	100.0 HP.	8	5	10	12,962
Drill w/o Fert.	13.0 ft.	5	2	10	1,090
Tractor	125.0 HP.	8	6	10	20,105
Chisel	20.0 ft.	6	4	10	3,978
Stalk Shredder	13.3 ft.	5	3	10	2,320
Pickup	0.5 TN.	4	3	11	4,649
Field Cultivator	20.0 ft.	4	3	11	2,516
Surface Irrigation System		8	7	11	25,639
Buildings:					
Machine Shed	4,750 sq. ft.	8	3	8	13,034
Barn	2,000 sq. ft.	4	1	10	827
Corral	12,750 sq. ft.	5	3	11	4,801

[A] The operator was required to make a 25 percent down payment on all machinery, equipment and building purchases.

Table 18. Beginning Balance Sheet Information for the Four Farm Scenarios

	Farm 1	Farm 2	Farm 3	Farm 4
ASSETS				
Land	$800,000	$800,000	$560,000	$1,200,000
Buildings	29,325	35,846	29,655	45,537
Machinery and Equipment	45,143	66,565	44,964	153,174
Cash Reserves	5,000	5,000	5,000	5,000
Total Assets	$879,468	$907,411	$639,619	$1,403,711
LIABILITIES				
Land	$210,873	$446,871	$315,439	$670,308
Buildings	5,687	14,690	14,914	18,662
Machinery and Equipment	25,651	40,635	29,715	95,739
Other	18,727	46,878	26,902	72,019
Total Liabilities	$260,938	$549,074	$386,970	$856,728
EQUITY				
Operators Net Worth	$618,530	$358,337	$252,649	$546,983
Leverage Ratio (L/E)	0.4219	1.5323	1.5317	1.5663
Equity Ratio (E/A)	0.7033	0.3949	0.3950	0.3897

value of Farm 4 is $1,403,711, total liabilities equal $856,728 and the operator's net worth is $546,983. Total liabilities include an outstanding operating loan of $72,019. These two farm scenarios are in a leverage position similar to that of Farm 2 in Jackson County. Their chances of firm failure will be much greater than that of a farm scenario in the same study area with a much lower leverage ratio.

Expected Capital Replacement Expenditures

To take into account machinery inventory obsolescence due to machinery use and depreciation, a set of expected capital replacement expenditures are supplied as input data for the farm simulation model. Machinery replacement is based on the useful lives of the beginning machinery inventory. During the simulation, when the useful life of a piece of machinery has passed, a new, like piece of machinery is purchased. In this analysis, inflation is assumed to be zero. Thus, purchase prices for future replacement expenditures will be the same as prices for machinery at the beginning of the planning horizon (1982). The 1981 Economic Recovery Tax Act allows the owner of a farm to write off as an expense up to $5000 of machinery expenditures in the year of purchase. Investment tax credit is allowed on these purchases except for the amount expensed in the year of purchase. The amount eligible for investment tax credit is equal to 10 percent of the purchase price except for pickup trucks which investment tax credit is equal to 6 percent of the purchase price.

The 1981 legislation provides for a method of depreciation for capital expenditures of this type. This method is referred to as Accelerated Cost Recovery System (ACRS). Another method of

depreciation allowed under the 1981 legislation is a straight line method with no salvage value and a five year useful life. Since this method fits the simulation model better than the ACRS method the straight line method was selected for use in this analysis. Depreciation can only be calculated on that portion of the purchase price which is not elected as part of the $5000 first year expense.

Each of these capital expenditures is assumed to be financed through a loan established in the year of purchase. The loan lives for the expected capital replacement expenditures are determined by the value of the purchase prices of the assets. A real interest rate of 6 percent per year is assumed for each loan. By using real interest rates for future capital expenditures and uninflated asset and product prices the results can be reported in 1982 real dollars. Tables 19, 20, 21 and 22 summarize the expected capital replacement expenditures for farm scenarios 1, 2, 3 and 4, respectively. These tables specify the machinery or equipment item, its year of purchase and the purchase price of the item. Also summarized are the depreciable lives, loan lives, loan interest rates, amount expensed in the year of purchase and the amount eligible for investment tax credit.

Enterprises

Both farm scenarios in Jackson County produce the same enterprises and the same acreages (or head) of each enterprise. These enterprises are dryland wheat, dryland cotton, irrigated cotton, alfalfa hay and stocker steers. Seven hundred twenty acres of wheat are produced on dryland acreages at a cost of $71.16 per acre. The per

Table 19. Summary of Expected Capital Replacement Expenditures for Jackson County Farm Scenario - Farm 1

Item	Size	Year of Purchase	Dep. Life	Loan Life	Int. Rate	Expected Expenditure[A]	Amount Expensed First Year[B]	Eligible For Invest. Tax Credit
			(Yrs.)	(Yrs.)	(%)	($)	($)	($)
Springtooth	24.0 ft.	1984	5	3	6	2,300		230
Electric Fence	2.0 Mi.	1984	5	1	6	400		40
Water Tank	250.0 Gal	1984	5	1	6	275		28
Tractor	125.0 HP.	1984	5	8	6	31,625	5,000	2,663
6 Row Cultivator	20.0 ft.	1985	5	4	6	4,543		454
6 Row Planter	20.0 ft.	1985	5	4	6	5,980	5,000	98
Rotary Mower	14.0 ft.	1985	5	4	6	4,590		459
Pickup	0.5 TN.	1985	5	4	6	9,200		552
Offset Disk	18.0 ft.	1986	5	5	6	7,130	5,000	213
Drill	26.6 ft.	1986	5	5	6	7,878		788
Tractor	150.0 HP.	1986	5	8	6	38,640		3,864
Sprayer	20.0 ft.	1987	5	4	6	5,290	5,000	29
Rollover M.B. Plow (5-18)	7.5 ft.	1988	5	4	6	6,325	5,000	133
7R 2Bar Lister	23.3 ft.	1988	5	2	6	1,380		138

Table 19. (Continued)

Item	Size	Year of Purchase	Dep. Life	Loan Life	Int. Rate	Expected Expenditure[A]	Amount Expensed First Year[B]	Eligible For Invest. Tax Credit
			(Yrs.)	(Yrs.)	(%)	($)	($)	($)
Electric Fence	3.0 Mi.	1988	5	1	6	600		60
3 Water Tanks	250.0 Gal.	1988	5	1	6	825		83
Chisel	23.0 ft.	1990	5	5	6	7,590	5,000	259

Source: The expected expenditures and size specifications are from Oklahoma Crop and Livestock Enterprise Budgets, Southwest Oklahoma.

[A]Assuming no inflation, the expected expenditure in each year is equal to the purchase price of a like piece of Machinery in the beginning year.

[B]The Economic Recovery Act of 1981 allows a maximum of $5000 of asset purchases to be expensed, in addition to regular depreciation, in any particular year.

Table 20. Summary of Expected Capital Replacement Expenditures for Jackson County Farm Scenario - Farm 2

Item	Size	Year of Purchase	Dep. Life	Loan Life	Int. Rate	Expected Expenditure[A]	Amount Expensed First Year[B]	Eligible For Invest. Tax Credit
			(Yrs.)	(Yrs.)	(%)	($)	($)	($)
Tractor	125.0 HP.	1985	5	8	6	31,625	5,000	2,663
Springtooth	24.0 ft.	1986	5	3	6	2,300		230
Electric Fence	2.0 Mi.	1986	5	1	6	400		40
Water Tank	250.0 Gal.	1986	5	1	6	275		28
Tractor	150.0 HP.	1986	5	8	6	38,640	5,000	3,364
6 Row Cultivator	20.0 ft.	1987	5	4	6	4,543		454
6 Row Planter	20.0 ft.	1987	5	4	6	5,980	5,000	98
Rotary Mower	14.0 ft.	1987	5	4	6	4,590		459
Pickup	0.5 TN.	1987	5	4	6	9,200		552
Offset Disk	18.0 ft.	1988	5	5	6	7,130	5,000	213
Drill	26.6 ft.	1988	5	5	6	7,878		788
Sprayer	20.0 ft.	1988	5	4	6	5,290		529

Table 20. (Continued)

Item	Size	Year of Purchase	Dep. Life	Loan Life	Int. Rate	Expected Expenditure[A]	Amount Expensed First Year[B]	Eligible For Invest. Tax Credit
			(Yrs.)	(Yrs.)	(%)	($)	($)	($)
Electric Fence	3.0 Mi.	1988	5	1	6	600		60
3 Water Tanks	250.0 Gal.	1988	5	1	6	825		83
Chisel	23.0 ft.	1990	5	5	6	7,590	5,000	259

Source: The expected expenditures and size specifications are from Oklahoma Crop and Livestock Enterprise Budgets, Southwest Oklahoma.

[A]Assuming no inflation, the expected expenditure in each year is equal to the purchase price of a like piece of Machinery in the beginning year.

[B]The Economic Recovery Act of 1981 allows a maximum of $5000 of asset purchases to be expensed, in addition to regular depreciation, in any particular year.

Table 21. Summary of Expected Capital Replacement Expenditures for Wagoner County Farm Scenario - Farm 3

Item	Size	Year of Purchase	Dep. Life	Loan Life	Int. Rate	Expected Expenditure[A]	Amount Expensed First Year[B]	Eligible For Invest. Tax Creidt
			(Yrs.)	(Yrs.)	(%)	($)	($)	($)
Tractor	80.0 HP	1985	5	8	6	18,008	5,000	1,301
Tractor	100.0 HP.	1986	5	8	6	24,323	5,000	1,932
Springtooth	20.0 ft.	1986	5	3	6	1,260		126
Spike Harrow	18.0 ft.	1986	5	2	6	504		50
Electric Fence	2.5 Mi.	1986	5	1	6	315		32
Water Tank	250.0 Gal.	1986	5	1	6	173		17
6 Row Cultivator	16.0 ft.	1987	5	3	6	2,586		259
6 Row Planter	18.0 ft.	1987	5	4	6	5,309	5,000	31
Pickup	0.75 TN.	1987	5	4	6	8,518		511
Tandem Disk	16.0 ft.	1988	5	5	6	4,410	4,410	0
M.B. Plow (5-16)	6.6 ft.	1990	5	5	6	4,973	4,973	0
Rotary Mower	7.0 ft.	1990	5	3	6	2,143	27	212

Source: The expected expenditures and size specifications are from Oklahoma Crop and Livestock Enterprise Budgets, Northeast Oklahoma.

[A]Assuming no inflation, the expected expenditure in each year is equal to the purchase price of a like piece of machinery in the beginning year.

[B]The Economic Recovery Act of 1981 allows maximum of $5000 of asset purchases to be expensed, in addition to regular depreciation, in any particular year.

Table 22. Summary of Expected Capital Replacement Expeditures for Texas County Farm Scenario - Farm 4

Item	Size	Year of Purchase	Dep. Life	Loan Life	Int. Rate	Expected Expenditure[A]	Amount Expensed First Year[B]	Eligible For Invest. Tax Credit
			(Yrs.)	(Yrs.)	(%)	($)	($)	($)
Sprayer	36.0 ft.	1985	5	4	6	4,200	4,200	0
Sweep	24.0 ft.	1986	5	6	6	9,000	5,000	400
Rod Weeder	20.0 ft.	1986	5	4	6	4,900		490
Electric Fence	3.5 Mi.	1986	5	1	6	700		70
2 Water Tanks	250.0 Gal.	1986	5	1	6	550		55
Row Cultivator	20.0 ft.	1986	5	4	6	5,135		514
Horse		1986	5	1	6	800		80
Tractor	100.0 HP.	1986	5	8	6	30,640		3,064
Tractor	125.0 HP.	1987	5	8	6	38,300	5,000	3,330
Land Plane	12.0 ft.	1987	5	5	6	7,000		700
Offset Disk	16.0 ft.	1987	5	5	6	7,200		720
Pickup	0.5 TN.	1987	5	4	6	8,500		510
Planter	20.0 ft.	1988	5	5	6	7,800	5,000	280
Lister	20.0 ft.	1988	5	4	6	4,300		430
Stalk Shredder	13.3 ft.	1988	5	4	6	5,500		550
Drill w/o Fert.	13.0 ft.	1989	5	4	6	4,000	4,000	0
Spike Harrow	20.0 ft.	1989	5	2	6	1,225	1,000	23

Table 22. (Continued)

	Size	Year of Purchase	Dep. Life	Loan Life	Int. Rate	Expected Expenditure[A]	Amount Expensed First Year[B]	Eligible For Invest. Tax Credit
			(Yrs.)	(Yrs.)	(%)	($)	($)	($)
Springtooth	30.0 ft.	1989	5	3	6	3,000		300
Chisel	20.0 ft.	1990	5	5	6	8,500	5,000	350
Electric Fence	4.0 Mi.	1990	5	1	6	8,000		80
2 Water Tanks	250.0 Gal	1990	5	1	6	825		83
Field Cultivator	20.0 ft.	1991	5	4	6	4,600	4,600	0

Source: The expected expenditures and size specifications are from Oklahoma Crop and Livestock Enterprise Budgets, Panhandle Oklahoma.

[A]Assuming no inflation, the expected expenditure in each year is equal to the purchase price of a like piece of machinery in the beginning year.

[B]The Economic Recovery Act of 1981 allows a maximum of $5000 of asset purchases to be expensed, in addition to regular depreciaiton, in any particular year.

acre production costs for the enterprises are based on Oklahoma Crop and Livestock Enterprise Budgets and include operating inputs, and taxes and insurance for machinery items. Expenses for operating inputs for the crop enterprises include charges for seed, fertilizer, chemicals, interest on operating capital, labor, fuel, lubricants, repairs and custom harvesting. Fixed charges such as depreciation on machinery is excluded from the per acre costs of production and computed by the model. Stocker steers are grazed on winter wheat pasture at a rate of two acres per head from November 1 to March 15. When participation in either the Deficiency Payments Program or the Disaster Payments Program is elected, the producer is assumed to graze out the set-aside wheat acreage from November 1 to May 15. This practice is assumed for on all farm scenarios. Farm 1 and Farm 2 produce 120 acres of dryland cotton and 240 acres of irrigated cotton at per acre cost of $160.16 and $298.03, respectively. The producer is assumed to use canal irrigation from the Altus-Lugert Project to irrigate cotton. Forty acres of alfalfa hay are produced at a cost of $142.31 per acre. These farm scenarios graze a total of 360 head of stocker steers on the wheat acreage. The production cost per head for the stocker steers (excluding the purchase cost of the steers which is computed by the model) is $55.93. The per head production cost for the stocker steer enterprises was determined in the same fashion as the per acre production costs for the crop enterprises. Operating inputs for the stocker steer enterprises include such items as starter feed, salt, mineral, trucking, sales commissions, medications and labor.

The Wagoner County scenario, Farm 3, is assumed to produce 170

acres of dryland wheat at a cost of $88.78 per acre and 45 acres of grain sorghum at $121.93 per acre. Other crops produced are soybeans (330 acres), alfalfa hay (40 acres) and native hay (135 acres) at per acre costs of $89.29, $197.06 and $51.07, respectively. Eighty-five stocker steers are grazed on wheat pasture each year at a cost of $67.30 per head.

Farm 4, in Texas County, produces dryland wheat, irrigated wheat, dryland grain sorghum, irrigated grain sorghum, irrigated corn and stocker steers. Dryland wheat is produced on 640 acres and costs $57.24 per acre to produce and harvest. Irrigated wheat is produced on 280 acres and costs $156.94 per acre to produce. The irrigation systems used to irrigate wheat, as well as grain sorghum and corn, are gated pipe flood irrigation systems. Per acre costs of production include variable irrigation costs. This farm scenario produces dryland grain sorghum (340 acres) and irrigated grain sorghum (200 acres) at costs of $47.71 and $180.74 per acre, respectively. Irrigated corn is produced on 140 acres at a cost of $280.89 per acre. The 460 head of stocker steers cost $63.20 per head to graze on winter wheat pasture. The units produced and per unit costs of production for each farm scenario are presented in Table 23.

Table 24 contains a summary of information common to all four farm scenarios. The inflation rate, as discussed earlier, is zero percent per year and sets the basis for the interest rates. The after-tax discount rate of 4 percent represents the real rate of return based on a riskless investment and is used in calculating present values of cash inflows, cash outflows, etc. The intermediate-term interest rate is two percentage points above the

Table 23. Enterprises, Units Produced and Production Costs for Each Farm Scenario

Enterprise	Units	Units Produced	Per Unit Production Cost[A]
			($)
Jackson County Farm Scenario - Farm 1 and Farm 2			
Dryland Wheat	(Acres)	720	71.16
Dryland Cotton	(Acres)	120	160.16
Irrigated Cotton	(Acres)	240	298.03
Alfalfa Hay	(Acres)	40	142.31
Stocker Steers	(Head)	360	55.93
Wagoner County Farm Scenario - Farm 3			
Dryland Wheat	(Acres)	170	88.78
Dryland Grain Sorghum	(Acres)	45	121.93
Dryland Soybeans	(Acres)	330	89.29
Alfalfa Hay	(Acres)	40	197.06
Native Hay	(Acres)	135	51.07
Stocker Steers	(Head)	85	67.30
Texas County Farm Scenario - Farm 4			
Dryland Wheat	(Acres)	640	57.24
Irrigated Wheat	(Acres)	280	156.94
Dryland Grain Sorghum	(Acres)	340	47.71
Irrigated Grain Sorghum	(Acres)	200	180.74
Irrigated Corn	(Acres)	140	280.89
Stocker Steers	(Head)	460	63.20

Source: The per unit costs of production are taken from Oklahoma Crop and Livestock Enterprise Budgets, Southwest, Northeast and Panhandle, Oklahoma.

Table 24. Additional Input Data Common to All Farm Scenarios

Number of Replications	100
Length of Planning Horizon	10 yrs.
After-tax discount rate	4%
Intermediate-term interest rate	6%
Long-term interest rate	5%
Minimum long-term equity to asset ratio	30%
Minimum intermediate-term equity to asset ratio	30%
Inflation rate, per year	0%
Beginning cash reserves	$5,000
Number of personal tax exemptions	4
Annual family living expenses	$16,000

assumed discount rate and the long-term interest rate is one point above the discount rate. The minimum equity ratios of 30 percent are used to determine the firms solvency. When the firm's equity level falls below 30 percent in a particular replication of the simulation, the firm is considered bankrupt. Each farm is assumed to have $5000 in cash reserves at the onset of each replication. The firms may retain and invest in a savings account additional cash reserves as economic conditions allow. Each family is assumed to have four members and require to $16,000 per year to purchase food, housing, clothing and other family necessities.

Federal Crop Insurance Rates and Coverages

In establishing premium rates the Actuarial Division of the FCIC determines the average premium rate for the county. Two kinds of yield data are used in establishing the county average premium rates: (1) yield records for individual farms, which are seldom available or usually cover only a few years; (2) Department of Agriculture estimates, which reflect losses per acre due to all causes. From the county average crop loss the Actuarial Division can establish premium rates covering all risks. The field underwriting offices adjust the rate to the classified risk areas in the county. The underwriting office may establish more than one premium rate for a particular crop in a county depending on the number and type of risk areas. Final approved coverages and premium rates for areas are listed in the county actuarial table which, together with the official maps and lists of the area, becomes an official record of insurance terms for land in the county. These documents are kept on file in the FCIC

office of the county and are available for inspection by the insured producers. The premium rates and yield coverages for the insurable crop enterprises produced on each farm analyzed are presented in Tables 25 through 34.

Tables 25, 26, and 27 present the per acre premium rates and coverages for the Jackson County farm scenarios. Wheat, dryland cotton and irrigated cotton are produced on these farms and these crops are all insurable in Jackson County. Under the heading "classification", levels 1, 2 and 3 refer to the 50, 65 and 75 percent of average yield guarantee levels, respectively. The producer chooses the guarantee level and the price election, and the premium rate is selected from the corresponding row and column within the table. The first set of premiums presented in each table are applicable when both the FCI Program and the Disaster Payments Program are analyzed together. Premium rates in the second section are applicable under all other government farm program alternatives and are reduced for the government subsidy.

Crop damage may occur during one of three growth and production stages under the cotton and irrigated cotton programs. The production guarantee and hence, the amount of the indemnity depends on the growth stage in which the damage occurred. The first stage begins after it is too late to plant cotton and lasts until the first blooms are shed. Stage two occurs from the time the first blooms are shed until the acreage qualifies for the third stage. The third stage begins after harvest of at least 20 percent of the pound guarantee per acre for this stage has taken place and lasts to the end of the insurance

period. It is assumed, in this study, that no specific crop damage occurs in the first two growth stages.

Tables 28, 29 and 30 present the per acre actuarial rates and coverages for the FCIC insurable crops produced by the Wagoner County farm scenarios, wheat, grain sorghum and soybeans. Dryland grain sorghum is produced in Texas County, however, the FCIC Crop Insurance Program will not provide coverage for dryland grain sorghum in Texas County. Irrigated grain sorghum as well as dryland wheat, irrigated wheat and irrigated corn are insurable crops in Texas County under the FCIC program and are produced on the farm scenario for this area. Per acre actuarial rates and coverages for these crops are presented in Tables 31, 32, 33 and 34.

Each county selected as part of the study area contains several risk areas for each insured crop. The tables presented provide only rates and coverages for the specific risk area in which the farm situations are assumed to be located.

Stochastically Generated Prices and Yields

A major share of the income variability associated with agricultural production is due to the high level of variability in agricultural prices and yields. Not all price and yield variations produce adverse effects on firm growth and net farm income. Positive variations in prices or yields will produce favorable, above average net farm income and hence will allow above average firm growth. When prices or yields are low, net income received by the producer will be adversely affected. The government farm programs analyzed in this

Table 25. Federal Crop Insurance Program Per Acre Actuarial Rates and Coverages for Jackson County Winter Wheat

Classification	Production Guarantee Per Acre	Price Elections Per Bu. $2.50	$3.50	$4.50	Price Elections Per Bu. $2.50	$3.50	$4.50
		Base FCI Per Acre Premium			Per Acre Premium Reduced for 30% Subsidy		
	(Bu)	($)	($)	($)	($)	($)	($)
Level 1 (50%)	9.6	2.70	3.80	4.90	1.90	2.65	3.45
Level 2 (65%)	12.5	4.50	6.20	8.00	3.15	4.35	5.60
Level 3 (75%)	14.5	6.20	8.70	11.20	4.85	6.85	8.80

Source: The rates and coverages are taken from County Actuarial Rates and Coverages, Jackson County, Oklahoma. United States Department of Agriculture, Federal Crop Insurance Corporation.

Table 26. Federal Crop Insurance Program Per Acre Actuarial Rates and Coverages for Jackson County Dryland Cotton

Classification	Production Guarantee Per Acre STG1	STG2	STG3	Price Elections Per Lb. $0.35	$0.45	$0.50	Price Elections Per Lb. $0.35	$0.45	$0.50
	(Lbs.)	(Lbs.)	(Lbs.)	($)	($)	($)	($)	($)	($)
				Base FCI Per Acre Premium			Per Acre Premium Reduced for 30% Subsidy		
Level 1 (50%)	68	101	135	3.70	4.80	5.30	2.60	3.35	3.70
Level 2 (65%)	88	131	175	5.90	7.60	8.40	4.15	5.30	5.90
Level 3 (75%)	100	150	200	8.10	10.40	11.60	6.35	8.10	9.10

Source: The rates and coverages are taken from County Actuarial Rates and Coverages, Jackson County, Oklahoma. United States Department of Agriculture, Federal Crop Insurance Corporation.

Table 27. Federal Crop Insurance Program Per Acre Actuarial Rates and Coverages for Jackson County Irrigated Corn

Classification	Production Guarantee Per Acre STG1	STG2	STG3	Price Elections Per Lb. $0.35	$0.45	$0.50	Price Elections Per Lb. $0.35	$0.45	$0.50
	(Lbs.)	(Lbs.)	(Lbs.)	($)	($)	($)	($)	($)	($)
				Base FCI Per Acre Premium			Per Acre Premium Reduced for 30% Subsidy		
Level 1 (50%)	138	206	275	6.50	8.40	9.30	4.55	5.90	6.50
Level 2 (65%)	180	270	360	10.50	13.50	15.00	7.35	9.45	10.50
Level 3 (75%)	208	311	415	14.50	18.70	20.80	11.35	14.65	16.30

Source: The rates and Coverages are taken from County Actuarial Rates and Coverages, Jackson County, Oklahoma. United States Department of Agriculture, Federal Crop Insurance Corporation.

Table 28. Federal Crop Insurance Program Per Acre Actuarial Rates and Coverages for Wagoner County Winter Wheat

Classification	Production Guarantee Per Acre	Price Elections Per Bu. $2.50	$3.50	$4.50	Price Elections Per Bu. $2.50	$3.50	$4.50
		Base FCI Per Acre Premium			Per Acre Premium Reduced for 30% Subsidy		
	(Bu)	($)	($)	($)	($)	($)	($)
Level 1 (50%)	14.5	1.40	2.00	2.50	1.00	1.40	1.75
Level 2 (65%)	19.0	2.30	3.20	4.20	1.60	2.25	2.85
Level 3 (75%)	22.0	3.10	4.40	5.60	2.40	3.45	4.35

Source: The rates and coverages are taken from County Actuarial Rate and Coverages, Wagoner County, Oklahoma. United States Department of Agriculture, Federal Crop Insurance Corporation.

Table 29. Federal Crop Insurance Program Per Acre Actuarial Rates and Coverages for Wagoner County Grain Sorghum

Classification	Production Guarantee Per Acre	Base FCI Per Acre Premium Price Elections Per Bu. $1.70	$2.00	$2.40	Per Acre Premium Reduced for 30% Subsidy Price Elections Per Bu. $1.70	$2.00	$2.40
	(Bu)	($)	($)	($)	($)	($)	($)
Level 1 (50%)	21.0	2.10	2.40	2.90	1.45	1.70	2.05
Level 2 (65%)	27.5	3.30	3.90	4.70	2.30	2.75	3.30
Level 3 (75%)	32.0	4.60	5.40	6.50	3.60	4.25	5.10

Source: The rates and coverages are taken from County Actuarial Rates and Coverages, Wagoner County, Oklahoma. United States Department of Agriculture, Federal Crop Insurance Corporation.

Table 30. Federal Crop Insurance Program Per Acre Actuarial Rates and Coverages for Wagoner County Soybeans

Classification	Production Guarantee Per Acre	Price Elections Per Bu. $4.50	$6.00	$7.00	Price Elections Per Bu. $4.50	$6.00	$7.00
		Base FCI Per Acre Premium			Per Acre Premium Reduced for 30% Subsidy		
	(Bu)	($)	($)	($)	($)	($)	($)
Level 1 (50%)	11.0	3.90	5.10	6.00	2.75	3.55	4.20
Level 2 (65%)	14.0	6.00	8.10	9.40	4.20	5.65	6.00
Level 3 (75%)	16.0	8.30	11.00	12.90	6.50	8.55	10.10

Source: The rates and coverages are taken from County Actuarial Rates and Coverages, Wagoner County, Oklahoma. United States Department of Agriculture, Federal Crop Insurance Corporation.

Table 31. Federal Crop Insurance Program Per Acre Actuarial Rates and Coverages for Texas County Dryland Winter Wheat

Classification	Production Guarantee Per Acre	Price Elections Per Bu. $2.50	$3.50	$4.50	Price Elections Per Bu. $2.50	$3.50	$4.50
		Base FCI Per Acre Premium			Per Acre Premium Reduced for 30% Subsidy		
	(Bu)	($)	($)	($)	($)	($)	($)
Level 1 (50%)	7.7	3.30	4.60	5.90	2.30	3.20	4.15
Level 2 (65%)	10.0	5.20	7.30	9.40	3.65	5.10	6.60
Level 3 (75%)	11.5	7.40	10.30	13.20	5.85	8.10	10.40

Source: The rates and coverages are taken from County Actuarial Rates and Coverages, Texas County, Oklahoma. United States Department of Agriculture, Federal Crop Insurance Corporation.

Table 32. Federal Crop Insurance Program Per Acre Actuarial Rates and Coverages for Texas County Irrigated Winter Wheat

Classification	Production Guarantee Per Acre	Price Elections Per Bu. $2.50	$3.50	$4.50	Price Elections Per Bu. $2.50	$3.50	$4.50
		Base FCI Per Acre Premium			Per Acre Premium Reduced for 30% Subsidy		
	(Bu)	($)	($)	($)	($)	($)	($)
Level 1 (50%)	17.5	3.30	4.70	6.00	2.30	3.30	4.20
Level 2 (65%)	22.5	5.30	7.40	9.50	3.70	5.20	6.65
Level 3 (75%)	26.0	7.50	10.50	13.50	5.90	8.30	10.65

Source: The rates and coverages are taken from County Actuarial Rates and Coverages, Texas County, Oklahoma. United States Department of Agriculture, Federal Crop Insurance Corporation.

Table 33. Federal Crop Insurance Program Per Acre Actuarial Rates and Coverages for Texas County Irrigated Grain Sorghum

Classification	Production Guarantee Per Acre	Price Elections Per Bu. $1.70	$2.00	$2.40	Price Elections Per Bu. $1.70	$2.00	$2.40
		Base FCI Per Acre Premium			Per Acre Premium Reduced for 30% Subsidy		
	(Bu)	($)	($)	($)	($)	($)	($)
Level 1 (50%)	39.0	2.40	2.80	3.40	1.70	1.95	2.40
Level 2 (65%)	51.0	3.80	4.50	5.40	2.65	3.15	3.80
Level 3 (75%)	59.0	5.30	6.30	7.50	4.15	4.95	5.90

Source: The rates and coverages are taken from County Actuarial Rate and Coverages, Texas County, Oklahoma. United States Department of Agriculture, Federal Crop Insurance Corporation.

Table 34. Federal Crop Insurance Program Per Acre Actuarial Rates and Coverages for Texas County Irrigated Corn

Classification	Production Guarantee Per Acre	Price Elections Per Bu. $1.70	$2.00	$2.70	Price Elections Per Bu. $1.70	$2.00	$2.70
		Base FCI Per Acre Premium			Per Acre Premium Reduced for 30% Subsidy		
	(Bu)	($)	($)	($)	($)	($)	($)
Level 1 (50%)	49.0	4.30	5.00	6.80	3.00	3.50	4.75
Level 2 (65%)	64.0	6.80	8.10	10.90	4.75	5.65	7.65
Level 3 (75%)	74.0	9.50	11.20	15.10	7.45	8.75	11.85

Source: The rates and coverages are taken from County Actuarial Rates and Coverages, Texas County, Oklahoma. United States Department of Agriculture, Federal Crop Insurance Corporation.

study are designed to at least partially offset the unfavorable effects of low prices and yields.

The stochastically generated prices and yields are based on a subjective interpretation of historical price and yield data in an attempt to reflect realistic variability within the distributions. The historical price series for each study area are seasonal average prices for Oklahoma from 1965 through 1980 and are presented in Table 35. This table includes price series for enterprises produced by each of the four farms analyzed. The yield data collected are county average yields per harvested acre from 1975 through 1980 for each of the three counties. These data are presented in Tables 36, 37 and 38 for Jackson, Wagoner and Texas Counties, respectively. The forage yields presented are derived from clipping samples of wheat test plots from Oklahoma State University experiment station locations near each study area. These yields are used to correlate stocker steer rates of gain with the yields of the other crops. A study by Walker and Plaxico showed that stocker steer rates of gain and wheat pasture production were positively correlated and that this relationship provided evidence of an imperfect stocking rate adjustment to grazing availability. This study assumes that stocker steer rates of gain and forage production are nearly perfectly correlated (positively) when assuming a constant stocking rate. The stocking rate assumed in this study is two acres per head and applies in each study area.

Correlation Matrices

The yields of the farm commodities produced are not independent at the farm level. Low levels of summer rain will cause low yields of

grain sorghum, soybeans, alfalfa hay and other summer crops. Wheat yields and wheat pasture yields are related with summer crop yields since lack of summer rains may mean too little soil moisture to produce an adequate stand of wheat at planting time. Prices are also assumed to be correlated in some manner however, the logic of this relationship may not be as clear as the yield relationships. Prices and yields are assumed to be independent at the farm level. The stochastically generated prices and yields should possess the appropriate correlation relationships so that they will more nearly reflect realistic income variations. Separate correlation coefficient matrices were constructed for the price and yield series to portray an independent relationship between prices and yields. Before the correlation coefficient matrices were constructed the price series were deflated using the GNP Implicit Price Deflator. The matrices of correlation coefficients for Oklahoma deflated prices and county yields were derived using the Statistical Analysis System (SAS) and are presented in Tables 39, 40, 41, 42, 43 and 44. These correlation coefficient matrices must be factored into unique upper and lower triangular matrices to generate the triangularly distributed and appropriately correlated prices and yields (Clements, et al.). Only the upper right triangular correlation matrices are needed and these are presented in Tables 45, 46, 47, 48, 49 and 50 for Jackson, Wagoner and Texas counties, respectively. Assuming the trend values for both prices and yields are zero, only the distribution parameters remain to be developed.

Table 35. Historical Oklahoma Price Series Used in Developing Stochastic Price Distributions

Year	Wheat	Cotton	Grain Sorghum	Soybeans	Corn	Alfalfa Hay	Native Hay	November Steers	March Steers
	($/Bu)	(c/Lb)	($/Bu)	($/Bu)	($/Bu)	($/TN)	($/TN)	($/CWT)	($/CWT)
1965	1.36	27.07	1.02	2.32	1.29	23.86	17.02	27.12	21.41
1966	1.66	17.96	1.08	2.68	1.40	26.31	18.47	27.81	28.56
1967	1.47	21.17	1.00	2.37	1.27	26.44	18.41	28.50	24.98
1968	1.25	19.67	0.95	2.29	1.15	26.36	17.71	30.11	26.52
1969	1.23	19.73	1.09	2.17	1.21	27.03	19.19	33.78	29.95
1970	1.33	20.00	1.15	2.67	1.32	31.31	21.09	35.81	35.08
1971	1.42	28.40	1.06	2.83	1.21	34.49	23.13	42.80	33.32
1972	1.70	25.90	1.41	4.23	1.47	33.24	23.38	49.74	38.33
1973	3.56	49.50	2.29	5.31	2.59	44.08	31.62	59.30	53.15
1974	3.95	29.90	2.86	6.48	3.22	54.96	38.71	29.06	42.26
1975	3.43	47.20	2.36	4.44	2.63	54.98	39.66	38.10	27.16
1976	2.78	61.10	2.00	6.45	2.29	62.60	44.05	38.40	39.57
1977	2.32	46.60	1.86	5.35	2.15	63.41	45.73	26.04	39.68
1978	3.03	53.90	2.06	6.35	2.48	56.55	48.75	75.68	53.35
1979	3.95	59.50	2.32	5.56	2.70	58.94	49.19	92.14	89.73
1980	3.85	77.40	3.16	7.75	3.55	72.28	51.53	79.38	77.96

Source: The price series are seasonal average prices received by Oklahoma producers. Oklahoma Agricultural Statistics, Oklahoma Crop and Livestock Reporting Service, Oklahoma Department

Table 36. Historical Yield for Jackson County Oklahoma Used in Developing Stochastic Yield Distributions

Year	Wheat	Cotton	Irrigation Cotton	Alfalfa Hay	Forage[A]
	(Bu/Acre)	(Lbs/Acre)	(Lbs/Acre)	(Tns./Acre)	(Lbs/Acre)
1975	23.1	257.1	412.0	2.94	2434.0
1976	20.0	196.6	461.0	2.12	2011.0
1977	22.0	334.1	627.0	3.30	1547.0
1978	21.6	247.7	544.0	2.33	1953.0
1979	32.0	401.1	795.0	2.37	2279.0
1980	25.8	123.1	607.0	2.22	1870.0

Source: County average yields for wheat, cotton, irrigated cotton and alfalfa hay are from Oklahoma Agricultural Statistics. Oklahoma Crop and Livestock Reporting Service, Oklahoma Department of Agriculture. Various Issues.

[A]Forage yield series was derived from Oklahoma State Experiment Station. Results from the Mangum, Oklahoma Test Station.

Table 37. Historical Yield Series for Wagoner County Oklahoma Used in Developing Stochastic Yield Distributions

Year	Wheat	Grain Sorghum	Soybeans	Alfalfa Hay	Native Hay	Forage[A]
	(Bu/Acre)	(Bu/Acre)	(Bu/Acre)	(Tns/Acre)	(Tns/Acre)	(Lbs/Acre)
1975	17.7	48.5	26.5	3.33	1.64	1436
1976	35.0	54.0	24.3	4.29	1.34	3467
1977	37.1	38.9	24.6	3.25	1.33	4053
1978	28.9	31.3	22.1	2.71	1.79	2439
1979	35.7	51.5	22.2	3.29	1.78	4907
1980	34.2	24.4	10.0	2.68	1.13	5200

Source: County Average yields for wheat, grain sorghum, soybeans alfalfa hay, and native hay are from Oklahoma Agricultural Statistics, Oklahoma Crop and Livestock Rreporting Service, Oklahoma Department of Agriculture. Various Issues.

[A]Forage Yield series was derived from Oklahoma State Experiment Station. Results from the Haskell, Oklahoma Test Station.

Table 38. Historical Yield Series for Texas County Oklahoma Used in Developing Stochastic Yield Distributions

Year	Dryland Wheat	Irrigated Wheat	Dryland Grain Sorghum	Irrigated Grain Sorghum	Irrigated Corn	Forage[A]
	(Bu/Acre)	(Bu/Acre)	(Bu/Acre)	(Bu/Acre)	(Bu/Acre)	(Lbs/Acre)
1975	13.6	33.1	23.0	65.9	88.6	7336
1976	13.9	37.5	18.3	67.0	110.6	7595
1977	19.6	41.7	29.3	67.7	103.3	7846
1978	15.3	33.3	23.6	64.0	76.4	6003
1979	31.1	49.4	28.7	79.7	123.0	8527
1980	29.5	40.8	23.8	64.6	88.1	8817

Source: County average yields for dryland wheat, irrigated wheat, dryland grain sorghum, irrigated grain sorghum and irrigated corn are from Oklahoma Agricultural Statistics, Oklahoma Crop and Livestock Reporting Service, Oklahoma Department of Agriculture. Various Issues.

[A]Forage yield series was derived from Oklahoma State Experiment Station. Results from the Goodwell, Oklahoma Test Station.

Table 39. The Correlation Coefficient Matrix Used in Developing the Triangularly Distributed Prices for Jackson County Farm Scenarios - Farm 1 and Farm 2

	Wheat Price	Cotton Price	Alfalfa Hay Price	November Steer Price	March Steer Price
Wheat Price	1.0000	0.4792	0.6213	0.0234	0.3187
Cotton Price	0.4792	1.0000	0.5524	0.2414	0.1837
Alfalfa Hay Price	0.6213	0.5524	1.0000	-0.3728	-0.1144
November Steer Price	0.0234	0.2414	-0.3728	1.0000	0.7671
March Steer Price	0.3187	0.1837	-0.1144	0.7671	1.0000

Table 40. The Correlation Coefficient Matrix Used in Developing the Triangularly Distributed Yields for Jackson County Farm Scenarios - Farm 1 and Farm 2

	Wheat Yield	Dryland Cotton Yield	Irrigated Cotton Yield	Alfalfa Hay Yield	Forage Yield
Wheat Yield	1.0000	0.4792	0.8112	-0.1618	0.3801
Dryland Cotton Yield	0.4792	1.0000	0.5768	0.4542	0.1446
Irrigated Cotton Yield	0.8112	0.5768	1.0000	-0.0595	-0.1729
Alfalfa Hay Yield	-0.1618	0.4542	-0.0595	1.0000	-0.2355
Forage Yield	0.3801	0.1446	-0.1729	-0.2355	1.0000

Table 41. The Correlation Coefficient Matrix Used in Developing the Triangularly Distributed Prices for Wagoner County Farm Scenario - Farm 3

	Wheat Price	Grain Sorghum Price	Soybean Price	Alfalfa Hay Price	Native Hay Price	November Steer Price	March Steer Price
Wheat Price	1.0000	0.9269	0.7455	0.6213	0.6361	0.0234	0.3187
Grain Sorghum Price	0.9269	1.0000	0.8029	0.6812	0.6079	-0.1351	0.2116
Soybean Price	0.7455	0.8029	1.0000	0.7726	0.7523	-0.0191	0.2456
Alfalfa Hay Price	0.6123	0.6812	0.7726	1.0000	0.9020	-0.3728	-0.1144
Native Hay Price	0.6361	0.6079	0.7523	0.9020	1.0000	-0.1226	0.0376
November Steer Price	0.0234	-0.1351	-0.0191	-0.3728	-0.1226	1.0000	0.7672
March Steer Price	0.3187	0.2116	0.2456	-0.1144	0.0376	0.7672	1.0000

Table 42. The Correlation Coefficient Matrix Used in Devloping the Triangularly Distributed Yields for Wagoner County Farm Scenario - Farm 3

	Wheat Yield	Grain Sorghum Yield	Soybean Yield	Alfalfa Hay Yield	Native Hay Yield	Forage Yield
Wheat Yield	1.0000	-0.1039	-0.3310	0.1208	-0.4036	0.8465
Grain Sorghum Yield	-0.1039	1.0000	0.7361	0.8405	0.3438	-0.2368
Soybean Yield	-0.3310	0.7361	1.0000	0.5529	0.5372	-0.6507
Alfalfa Hay Yield	0.1208	0.8405	0.5529	1.0000	-0.1125	-0.1283
Native Hay Yield	-0.4036	0.3438	0.5372	-0.1125	1.0000	-0.4648
Forage Yield	0.8465	-0.2368	-0.6507	-0.1283	-0.4648	1.0000

Table 43. The Correlation Coefficient Matrix Used in Developing the Triangularly Distributed Prices for Texas Conty Farm Scenario - Farm 4

	Wheat Price	Grain Sorghum Price	Corn Price	November Steer Price	March Steer Price
Wheat Price	1.0000	0.9269	0.9429	0.0234	0.3187
Grain Sorghum Price	0.9269	1.0000	0.9768	-0.1351	0.2116
Corn Price	0.9429	0.9768	1.0000	-0.1725	0.1912
November Steer Price	0.0234	-0.1351	-0.1725	1.0000	0.7672
March Steer Price	0.3187	0.2116	0.1912	0.7672	1.0000

Table 44. The Correlation Coefficient Matrix Used in Developing the Triangularly Distributed Yields for Texas County Farm Scenario - Farm 4

	Dryland Wheat Yield	Irrigated Wheat Yield	Dryland Grain Sorghum Yield	Irrigated Grain Sorghum Yield	Corn Yield	Forage Yield
Dryland Wheat Yield	1.0000	0.8436	0.5592	0.5887	0.3921	0.7792
Irrigated Wheat Yield	0.8436	1.0000	0.6322	0.8467	0.7927	0.7529
Dryland Grain Sorghum Yield	0.5592	0.6322	1.0000	0.5324	0.2670	0.3014
Irrigated Grain Sorghum Yield	0.5887	0.8467	0.5324	1.0000	0.8379	0.4646
Corn Yield	0.3921	0.7927	0.2670	0.8379	1.0000	0.5761
Forage Yield	0.7792	0.7529	0.3014	0.4646	0.5761	1.0000

Table 45. The Upper Right Triangular Correlation Matrix Usesd in Developing the Triangularly Distributed Prices for Jackson County Farm Scenarios - Farm 1 and Farm 2

	Wheat Price	Cotton Price	Alfalfa Hay Price	November Steer Price	March Steer Price
Wheat Price	0.6703	0.0887	0.5680	-0.3446	0.3187
Cotton Price	0.0	0.6465	0.7237	0.1566	0.1837
Alfalfa Hay Price	0.0	0.0	0.8885	-0.4443	-0.1144
November Steer Price	0.0	0.0	0.0	0.6415	0.7671
March Steer Price	0.0	0.0	0.0	0.0	1.0000

Table 46. The Upper Right Triangular Matrix Used in Developing the Triangularly Distributed Yields for Jackson County Farm Scenarios - Farm 1 and Farm 2

	Wheat Yield	Dryland Cotton Yield	Irrigated Cotton Yield	Alfalfa Hay Yield	Forage Yield
Wheat Yield	0.0440	-0.2461	0.8874	-0.0744	0.3801
Dryland Cotton Yield	0.0	0.5305	0.6673	0.5024	0.1446
Irrigated Cotton Yield	0.0	0.0	0.9795	-0.1031	-0.1729
Alfalfa Hay Yield	0.0	0.0	0.0	0.9719	-0.2355
Forage Yield	0.0	0.0	0.0	0.0	1.0000

Table 47. The Upper Right Triangular Correlation Matrix Used in Developing the Triangularly Distributed Prices for Wagoner County Farm Scenario - Farm 3

	Wheat Price	Grain Sorghum Price	Soybean Price	Alfalfa Hay Price	Native Hay Price	November Steer Price	March Steer Price
Wheat Price	0.3080	0.5395	0.2530	0.1315	0.5589	-0.3447	0.3187
Grain Sorghum Price	0.0	0.5506	0.3452	0.2506	0.5051	-0.4637	0.2116
Soybean Price	0.0	0.0	0.5370	0.2743	0.6866	-0.3235	0.2456
Alfalfa Hay Price	0.0	0.0	0.0	0.3291	0.8235	-0.4444	-0.1144
Native Price	0.0	0.0	0.0	0.0	0.9710	-0.2361	0.0376
November Steer Price	0.0	0.0	0.0	0.0	0.0	0.6414	0.7672
March Steer Price	0.0	0.0	0.0	0.0	0.0	0.0	1.0000

Table 48. The Upper Right Triangular Correlation Matrix Used in Developing the Triangualrly Distributed Yields for Wagoner County Farm Scenario - Farm 3

	Wheat Yield	Grain Sorghum Yield	Soybean Yield	Alfalfa Hay Yield	Native Hay Yield	Forage Yield
Wheat Yield	0.0128	-0.4302	0.2087	0.2336	-0.0115	0.8465
Grain Sorghum Yield	0.0	0.2884	0.0801	0.8858	0.2640	-0.2368
Soybean Yield	0.0	0.0	0.4683	0.5357	0.2651	-0.6507
Alfalfa Hay Yield	0.0	0.0	0.0	0.9725	-0.1944	-0.1283
Native Hay Yield	0.0	0.0	0.0	0.0	0.8854	-0.4648
Forage Yield	0.0	0.0	0.0	0.0	0.0	1.0000

Table 49. The Upper Right Triangular Correlation Matrix Used in Developing the Triangularly Distributed Prices for Texas County Farm Scenario - Farm 4

	Wheat Price	Grain Sorghum Price	Corn Price	November Steer Price	March Steer Price
Wheat Price	0.2730	-0.0031	0.8397	-0.3447	0.3187
Grain Sorghum Price	0.0	0.2114	0.8340	-0.4637	0.2116
Corn Price	0.0	0.0	0.8461	-0.4976	0.1912
November Steer Price	0.0	0.0	0.0	0.6414	0.7672
March Steer Price	0.0	0.0	0.0	0.0	1.0000

Table 50. The Upper Right Triangular Correlation Matrix Used in Developing the Triangularly Distributed Yields for Texas County Farm Scenario - Farm 4

	Dryland Wheat Yield	Irrigated Wheat Yield	Dryland Grain Sorghum Yield	Irrigated Grain Sorghum Yield	Corn Yield	Forage Yield
Dryland Wheat Yield	0.0063	0.3608	0.0571	0.5045	-0.0695	0.7792
Irrigated Wheat Yield	0.0	0.2757	0.2055	0.3494	0.4392	0.7529
Dryland Grain Sorghum Yield	0.0	0.0	0.7533	0.5733	0.1142	0.3014
Irrigated Grain Sorghum Yield	0.0	0.0	0.0	0.5454	0.6977	0.4646
Corn Yield	0.0	0.0	0.0	0.0	0.8174	0.5761
Forage Yield	0.0	0.0	0.0	0.0	0.0	1.0000

Price and Yield Distribution Parameters

When triangular probability distributions are used for the prices and yields of each commodity, they can be completely specified by the minimum, maximum and modal values. The price distributions constructed for this study are based on the deflated historical data series and converted to current dollars. The mode or most likely values are the historical averages of the current dollar series. The maximums and minimums are based on the variance of the deflated historical series. The crops eligible for deficiency payment coverage are assumed to have less price variation below the modal value than other crops as the loan rate and set-aside has historically provided some support to program crop prices. The maximum value for each commodity price is set at two standard deviations above the modal value and the minimum value is set at two standard deviations below the mode except for those crops which are eligible for deficiency payments. The minimum values for Deficiency Payments Program crops are set at one standard deviation of each crops respective historical price series below their respective modal value.

The yield parameters are based on the historical series and knowledge of on farm yield variation in each area. The modal values are the historical county average yields for each crop. Actual farm level yields are expected to reflect more variability than do the county yields. For example, the county yield for a particular commodity would never be zero. However, at the farm level, a commodity yield would have a reasonable possibility of being zero, particularly on dryland crops. The entire farm acreage of a crop planted would rarely have a zero yield but, in certain instances, the

yield could be substantially below the county average. The maximum farm yields are likely to be considerably above the county average. The maximum value for each commodity yield distribution is set at approximately 2.5 standard deviations above the modal value. The minimum values are placed at least 2.5 standard deviations below the mode. For some crops, such as wheat, the minimum possible yield was placed lower to reflect the possibility of crop damage due to phenomena such as hail, fire or flood. The price and yield parameters for each study area are presented in Tables 51, 52 and 53. This price and yield data and all the other data presented in this chapter are combined in a comprehensive format to complete the specific experiments of this analysis. These experiments are described in detail in the next chapter.

Table 51. Triangular Distributions Used in Developing Stochastic Yield and Price Distributions for Jackson County Farm Scenarios- Farm 1 and Farm 2

Yields	Units	Minimum	Mode	Maximum
Wheat	(Bu./Acre)	4.00	25.00	36.00
Cotton	(Lbs./Acre)	63.00	260.00	451.00
Irrigated Cotton	(Lbs./Acre)	211.00	575.00	894.00
Alfalfa Hay	(Tns./Acre)	1.09	2.50	3.70
Stocker Gain	(Lbs./Day)	0.50	1.50	3.00
Prices				
Wheat	($/Bu.)	2.80	4.00	6.35
Cotton	($/Lb.)	0.46	0.62	0.94
Alfalfa Hay	($/Tn.)	52.10	73.10	94.10
Nov. 4-5 CWT. Cho. Strs.	($/CWT.)	42.15	77.50	112.85
Mar. 6-7 CWT. Cho. Strs.	($/CWT.)	38.50	69.85	101.20

Table 52. Triangular Distributions Used in Developing Stochastic Yield and Price Distributions for Wagoner County Farm Scenario - Farm 3

Yields	Units	Minimum	Mode	Maximum
Wheat	(Bu./Acre)	4.00	32.00	50.50
Grain Sorghum	(Bu./Acre)	11.00	41.50	72.00
Soybeans	(Bu./Acre)	7.00	22.00	37.00
Alfalfa Hay	(Tns./Acre)	1.80	3.30	4.80
Native Hay	(Tns./Acre)	0.80	1.50	2.20
Stocker Gain	(Lbs./Day)	0.50	1.50	3.00
Prices				
Wheat	($/Bu.)	2.80	4.00	6.35
Grain Sorghum	($/Bu.)	2.15	2.90	4.30
Soybeans	($/Bu.)	3.80	7.20	10.60
Alfalfa Hay	($/Tns.)	52.10	73.10	94.10
Native Hay	($/Tns.)	35.70	52.60	69.50
Nov. 4-5 CWT. Cho. Strs.	($/CWT.)	42.15	77.50	112.85
Mar. 6-7 CWT. Cho. Strs.	($/CWT.)	38.50	69.85	101.20

Table 53. Triangular Distributions Used in Developing Stochastic Yield and Price Distributions for Texas County Farm Scenario - Farm 4

Yields	Units	Minimum	Mode	Maximum
Dryland Wheat	(Bu./Acre)	4.00	21.00	41.00
Irrigated Wheat	(Bu./Acre)	16.00	39.50	55.00
Dryland Grain Sorghum	(Bu./Acre)	5.00	25.00	36.00
Irrigated Grain Sorghum	(Bu./Acre)	33.00	69.00	84.00
Irrigated Corn	(Bu./Acre)	37.00	98.50	142.00
Stocker Gain	(Lbs./Day)	0.50	1.50	3.00
Prices				
Wheat	($/Bu.)	2.80	4.00	6.35
Grain Sorghum	($/Bu.)	2.15	2.90	4.30
Corn	($/Bu.)	2.60	3.40	4.95
Nov. 4-5 CWT. Cho. Strs.	($/CWT.)	42.15	77.50	112.85
Mar. 6-7 CWT. Cho. Strs.	($/CWT.)	38.50	69.85	101.20

CHAPTER IV

GOVERNMENT FARM PROGRAM EVALUATION RESULTS

When each option of the three government farm programs analyzed in this study and the no government farm program alternative are considered the farm producer has a total of forty program alternatives from which to choose. It is assumed that the producer may participate in each of the programs (the Deficiency Payments Program, Disaster Payments Program and the Federal Crop Insurance Program) independently or in any combination or the producer may choose not to participate in any of the programs. In analyzing participation in the Federal crop Insurance Program, three yield guarantee levels and three price elective options are included for a total of nine options to be considered. In this study all insurable crops are assumed to be insured at the same level under each option of the Federal Crop Insurance Program. Results from the various evaluation experiments conducted on the government farm programs are presented in this chapter. All results presented are in 1982 dollars.

Farm Situation Results

The results of simulations of each farm scenario assuming participation in each of the government farm program alternatives and their combinations are reported in this section. The two Jackson County farm scenarios are studied to determine the impact of

government risk management programs on high and low equity farms in the same geographic area. Low equity farms in Jackson County (Farm 2), Wagoner County (Farm 3) and Texas County (Farm 4) are evaluated to test the hypothesis that differing production organizations in different geographic areas of the state will result in a different "best" government farm program alternative. The "best" program alternative for each scenario are based on the average level and variance of present value of net cash income and nominal ending net worth and the number of bankrupt iterations for each 100 replication simulation. The simulation results presented in this section include information about the average (across replications) present value of net cash flow and the average (across replication) nominal ending net worth. The results include the means, medians, maximums, minimums and ranges or coefficients of variations for present value of net cash flow and nominal ending net worth. The number of bankrupt iterations which occurred during the 100 repetitions is also presented.

Jackson County

The implications of the results of the two Jackson County Farm simulations are very similar. These results are presented in Tables 54, 55, 56 and 57. Tables 54 and 56 contain present value of net cash flows for Farm 1 and Farm 2, respectively, under assumptions of participation in each of the forty government farm program options. Nominal ending net worth and the resulting number of bankruptcies for the two situations are presented in Tables 55 and 57.

No Government Programs. Initial simulations of the two Jackson County situations assume no participation in the government farm

Table 54. Net Cash Flow Information for the Jackson County High Equity Situation - Farm 1

	Present Value of Net Cash Flow ($000)					
Program Option	Mean	Median	Max	Min	Std. Dev.	C.V.(%)
No Governement Programs	214.31	219.77	620.18	-187.61	160.25	74.77
Disaster Payments	168.01	197.65	562.86	-129.63	145.14	78.03
Deficiency Payments	228.69	233.78	581.80	-82.33	139.80	61.13
Disaster & Deficiency Payments	241.12	252.38	583.03	-37.09	134.21	55.66
Federal Crop Insurance						
Level 3 - High P.E.	178.64	187.96	575.31	-161.95	156.72	87.73
Level 2 - High P.E.	188.26	193.85	591.30	-178.86	159.49	84.72
Level 1 - High P.E.	194.09	201.74	602.03	-211.23	162.12	83.53
Level 3 - Med P.E.	184.98	191.81	583.08	-163.56	157.11	84.93
Level 2 - Med P.E.	192.74	197.55	596.23	-181.21	159.53	82.77
Level 1 - Med P.E.	197.50	204.98	605.33	-207.90	161.82	81.93
Level 3 - Low P.E.	192.83	196.90	592.91	-169.45	157.67	81.76
Level 2 - Low P.E.	198.14	203.28	602.22	-183.61	159.65	80.57
Level 1 - Low P.E.	201.80	208.99	609.14	-202.99	161.39	79.98
Disaster Payments & Federal Crop Insurance						
Level 3 - High P.E.	138.30	148.86	511.72	-199.30	146.63	106.02
Level 2 - High P.E.	147.59	159.89	525.99	-190.24	148.08	100.33
Level 1 - High P.E.	159.20	173.09	540.15	-177.69	148.49	93.27
Level 3 - Med. P.E.	146.74	157.58	520.34	-187.35	146.04	99.53
Level 2 - Med. P.E.	154.18	166.69	532.20	-180.19	147.45	95.64
Level 1 - Med. P.E.	163.63	177.57	543.93	-169.61	147.95	90.41
Level 3 - Low P.E.	157.13	168.72	531.31	-172.04	145.52	92.61
Level 2 - Low P.E.	162.18	175.03	539.86	-167.48	146.82	90.53
Level 1 - Low P.E.	169.44	182.99	548.86	-158.86	147.23	86.89

Table 54. (Continued)

Program Option	Present Value of Net Cash Flow ($000)					
	Mean	Median	Max	Min	Std. Dev.	C.V.(%)
Deficiency Payments & Federal Crop Insurance						
Level 3 - High P.E.	197.93	209.54	540.92	-71.87	136.06	68.74
Level 2 - High P.E.	206.39	217.60	554.86	-75.04	138.51	67.11
Level 1 - High P.E.	211.73	221.45	565.17	-96.01	140.54	66.38
Level 3 - Med. P.E.	203.29	215.95	547.53	-68.19	136.53	67.16
Level 2 - Med. P.E.	210.15	221.25	559.37	-77.02	138.70	66.00
Level 1 - Med. P.E.	214.57	223.23	567.98	-94.32	140.41	65.44
Level 3 - Low P.E.	210.05	221.63	556.06	-67.72	137.21	65.32
Level 2 - Low P.E.	214.80	225.95	565.00	-79.06	138.93	64.68
Level 1 - Low P.E.	218.19	225.80	571.55	-91.75	140.25	64.28
Deficiency Payments, Disaster Payments & Federal Crop Insurance						
Level 3 - High P.E.	197.00	208.96	531.15	-73.56	132.60	67.31
Level 2 - High P.E.	205.54	220.00	545.15	-62.07	134.69	65.53
Level 1 - High P.E.	216.21	229.09	559.25	-59.33	135.70	62.77
Level 3 - Med. P.E.	204.67	216.81	539.53	-63.49	132.68	64.83
Level 2 - Med. P.E.	211.54	226.48	551.24	-52.77	134.55	63.61
Level 1 - Med. P.E.	220.33	233.00	563.20	-55.71	135.43	61.47
Level 3 - Low P.E.	214.24	227.15	550.38	-48.38	132.91	62.04
Level 2 - Low P.E.	218.91	234.53	558.94	-45.14	134.42	61.40
Level 1 - Low P.E.	225.75	238.02	568.36	-50.90	135.08	59.84

Table 55. Ending Net Worth Information for the Jackson County High Equity Situation - Farm 1

	Nominal Ending Net Worth ($000)						
Program Option	Mean	Median	Max	Min	Std. Dev.	C.V.(%)	Number of Bankrupt Iterations
No Government Program	1031.17	1025.36	1663.17	533.25	240.12	23.29	0
Disaster Payments	983.28	1057.21	1600.44	635.38	212.52	20.31	0
Deficiency Payments	1046.42	989.99	1570.51	560.24	218.17	22.19	0
Disaster & Deficiency Payments	1063.29	1072.30	1602.46	679.62	206.44	19.42	0
Federal Crop Insurance							
Level 3 - High P.E.	975.90	977.61	1590.15	513.41	233.46	23.92	0
Level 2 - High P.E.	991.33	995.45	1616.12	514.73	237.41	23.95	0
Level 1 - High P.E.	1001.28	999.00	1634.04	501.33	240.82	24.05	0
Level 3 - Med. P.E.	985.56	988.65	1602.81	523.11	234.38	23.78	0
Level 2 - Med. P.E.	998.13	1003.14	1624.18	523.36	237.75	23.82	0
Level 1 - Med. P.E.	1006.30	1003.58	1639.00	505.94	240.72	23.92	0
Level 3 - Low P.E.	997.62	1000.99	1618.80	534.15	235.60	23.62	0
Level 2 - Low P.E.	1006.35	1008.99	1633.93	530.14	238.28	23.68	0
Level 1 - Low P.E.	1012.63	1009.22	1645.19	512.51	240.54	23.76	0
Disaster Payments & Federal Crop Insurance							
Level 3 - High P.E.	912.57	911.74	1487.24	470.56	216.21	23.69	0
Level 2 - High P.E.	926.85	925.66	1510.45	484.04	218.72	23.60	0

Table 55. (Continued)

Program Option	Nominal Ending Net Worth ($000) Mean	Median	Max	Min	Std. Dev.	C.V.(%)	Number of Bankrupt Iterations
Level 1 - High P.E.	944.34	948.91	1533.52	501.09	220.16	23.31	0
Level 3 - Med. P.E.	924.90	925.91	1501.29	485.80	216.18	23.37	0
Level 2 - Med. P.E.	936.43	936.982	1520.56	496.68	218.50	23.33	0
Level 1 - Med. P.E.	950.70	956.02	1539.67	511.04	219.88	23.13	0
Level 3 - Low P.E.	940.18	941.54	1519.14	505.46	216.41	23.02	0
Level 2 - Low P.E.	948.08	950.64	1533.05	512.64	218.41	23.04	0
Level 1 - Low P.E.	959.08	965.30	1547.70	524.25	219.50	22.89	0
Deficicency Payments & Federal Crop Insurance							
Level 3 - High P.E.	998.23	1005.69	1534.01	622.58	205.86	20.62	0
Level 2 - High P.E.	1011.82	1018.76	1556.70	634.42	209.48	20.70	0
Level 1 - High P.E.	1020.90	1029.90	1573.44	618.82	212.26	20.79	0
Level 3 - Med. P.E.	1006.51	1013.82	1544.80	633.97	206.96	20.55	0
Level 2 - Med. P.E.	1017.62	1024.41	1564.03	633.77	209.96	20.63	0
Level 1 - Med. P.E.	1025.17	1034.80	1578.01	620.94	212.31	20.71	0
Level 3 - Low P.E.	1017.01	1024.20	1558.68	643.05	208.12	20.46	0
Level 2 - Low P.E.	1024.82	1033.06	1573.17	633.43	210.57	20.55	0
Level 1 - Low P.E.	1030.60	1040.90	1583.81	623.99	212.36	20.61	0

Table 55. (Continued)

Program Option	Nominal Ending Net Worth ($000) Mean	Median	Max	Min	Std. Dev.	C.V.(%)	Number of Bankrupt Iterations
Deficiency Payments, Disaster Payments & Federal Crop Insurance							
Level 3 - High P.E.	995.60	1001.95	1518.12.	615.23	201.34	20.23	0
Level 2 - High P.E.	1009.15	1018.22	1540.91	633.82	204.64	20.28	0
Level 1 - High P.E.	1025.85	1034.39	1563.86	652.31	206.63	20.14	0
Level 3 - Med. P.E.	1007.18	1014.83	1531.94	630.03	202.06	20.06	0
Level 2 - Med. P.E.	1018.18	1027.78	1550.83	646.36	204.90	20.12	0
Level 1 - Med. P.E.	1032.02	1040.08	1570.28	657.30	206.59	20.02	0
Level 3 - Low P.E.	1021.73	1030.80	1549.45	649.89	203.07	19.88	0
Level 2 - Low P.E.	1029.35	1040.10	1563.36	655.60	205.28	19.94	0
Level 1 - Low P.E.	1040.13	1047.55	1578.66	663.21	206.54	19.86	0

Table 56. Net Cash Flow Information for the Jackson County Low Equity Situation - Farm 2

	Present Value of Net Cash Flow ($000)					
Program Option	Mean	Median	Max	Min	Std. Dev.	Range
No Government Programs	1.99	12.60	448.53	-539.40	198.25	987.93
Disaster Payments	-32.06	-11.21	390.67	-479.05	184.99	869.72
Deficiency Payments	21.96	49.20	409.78	-416.64	172.86	826.42
Disaster & Deficiency Payments	38.45	64.93	411.00	-353.66	163.61	764.66
Federal Crop Insurance						
Level 3 - High P.E.	-42.37	-20.97	403.94	-513.69	198.88	917.63
Level 2 - High P.E.	-30.28	-13.26	419.67	-531.51	200.75	951.18
Level 1 - High P.E.	-22.96	-7.16	430.60	-563.84	202.86	994.44
Level 3 - Med. P.E.	-34.38	-12.88	411.59	-516.05	198.41	927.64
Level 2 - Med. P.E.	-24.64	-10.02	424.54	-533.73	200.21	958.27
Level 1 - Med. P.E.	-18.74	-3.51	433.63	-560.39	202.09	944.02
Level 3 - Low P.E.	-24.56	-7.54	421.20	-521.78	198.17	942.98
Level 2 - Low P.E.	-17.92	-4.92	430.52	-535.99	199.65	966.51
Level 1 - Low P.E.	-13.45	1.25	437.38	-555.33	201.10	992.71
Disaster Payments & Federal Crop Insurance						
Level 3 - High P.E.	-93.20	-73.78	339.01	-552.46	192.46	891.47
Level 2 - High P.E.	-81.18	-55.34	353.88	-542.95	193.16	896.83
Level 1 - High P.E.	-66.44	-39.03	368.17	-529.89	192.15	898.06
Level 3 - Med. P.E.	-82.39	-60.75	348.01	-540.20	191.05	888.21
Level 2 - Med. P.E.	-72.79	-45.81	360.17	-532.66	191.72	892.83
Level 1 - Med. P.E.	-60.76	-33.44	371.93	-521.66	190.98	893.59
Level 3 - Low P.E.	-69.09	-44.50	359.24	-524.49	189.27	883.73
Level 2 - Low P.E.	-62.59	-35.52	367.88	-519.67	189.98	887.55
Level 1 - Low P.E.	-53.33	-26.51	376.83	-510.72	189.50	887.55

Table 56. (Continued)

Program Option	Present Value of Net Cash Flow ($000)					
	Mean	Median	Max	Min	Std. Dev.	Range
Deficiency Payments & Federal Crop Insurance						
Level 3 - High P.E.	-16.41	14.02	370.68	-399.30	173.41	769.98
Level 2 - High P.E.	-5.96	19.41	384.82	-411.88	174.83	796.70
Level 1 - High P.E.	.56	25.24	394.41	-438.52	176.54	832.93
Level 3 - Med. P.E.	-9.62	18.08	377.37	-398.93	173.00	776.30
Level 2 - Med. P.E.	-1.16	23.72	389.04	-413.58	174.44	802.62
Level 1 - Med. P.E.	4.10	29.30	397.00	-435.48	175.97	832.48
Level 3 - Low P.E.	-1.06	23.71	385.95	-403.30	172.68	789.25
Level 2 - Low P.E.	4.65	28.55	394.26	-415.10	174.02	799.36
Level 1 - Low P.E.	8.68	34.37	400.26	-430.95	175.17	831.21
Deficiency Payments, Disaster Payments & Federal Crop Insurance						
Level 3 - High P.E.	-17.07	11.01	360.89	-406.74	169.33	767.63
Level 2 - High P.E.	-6.30	20.80	375.10	-378.20	170.19	753.30
Level 1 - High P.E.	7.17	37.07	389.08	-391.20	169.66	780.28
Level 3 - Med. P.E.	-7.21	21.07	369.46	-390.77	168.02	760.23
Level 2 - Med. P.E.	1.47	29.33	381.24	-374.30	168.95	755.54
Level 1 - Med. P.E.	12.38	42.31	392.70	-385.60	168.68	778.30
Level 3 - Low P.E.	5.05	34.53	380.33	-370.14	166.59	750.47
Level 2 - Low P.E.	10.84	38.45	388.80	-369.72	167.56	758.52
Level 1 - Low P.E.	19.11	47.79	397.43	-377.56	167.38	774.99

Table 57. Ending Net Worth Information for the Jackson County Low Equity Situation - Farm 2

Program Option	Nominal Ending Net Worth ($000) Mean	Median	Max	Min	Std. Dev.	C.V.(%)	Number of Bankrupt Iterations
No Government Program	521.75	542.89	1154.98	-108.42	267.17	51.21	38
Disaster Payments	468.96	488.80	1061.47	-78.98	247.77	52.83	41
Deficiency Payments	540.95	559.58	1091.74	17.63	235.62	43.56	31
Disaster & Deficiency Paymeents	561.22	576.33	1093.76	86.70	225.81	40.24	26
Federal Crop Insurance							
Level 3 - High P.E.	459.76	481.50	1082.51	-113.91	265.42	57.73	44
Level 2 - High P.E.	477.80	495.84	1108.02	-110.14	267.71	56.03	43
Level 1 - High P.E.	488.59	507.21	1125.78	-139.76	270.67	55.40	43
Level 3 - Med. P.E.	471.16	492.52	1094.94	-102.99	265.00	56.24	43
Level 2 - Med. P.E.	485.39	504.08	1115.95	-110.75	267.49	55.11	43
Level 1 - Med. P.E.	494.17	513.95	1130.71	-135.21	270.09	54.66	43
Level 3 - Low P.E.	484.77	505.84	1110.57	-98.44	265.23	54.71	42
Level 2 - Low P.E.	494.48	514.03	1125.67	-111.05	267.38	54.07	42
Level 1 - Low P.E.	501.18	521.97	1136.83	-128.70	269.32	53.74	43
Disaster Payments & Federal Crop Insurance							
Level 3 - High P.E.	387.58	404.33	977.60	-167.71	252.17	65.06	50
Level 2 - High P.E.	404.56	427.18	1001.68	-154.99	253.41	62.64	49

Table 57. (Continued)

Program Option	Nominal Ending Net Worth ($000) Mean	Median	Max	Min	Std. Dev.	C.V.(%)	Number of Bankrupt Iterations
Level 1 - High P.E.	423.72	444.18	1024.91	-138.60	253.86	59.91	44
Level 3 - Med. P.E.	402.00	420.98	992.18	-152.97	251.09	62.46	48
Level 2 - Med. P.E.	415.11	435.13	1011.90	-142.75	252.64	60.86	47
Level 1 - Med. P.E.	431.02	452.00	1031.01	-128.98	253.03	58.70	44
Level 3 - Low P.E.	419.32	438.41	1010.41	-134.04	250.17	59.66	46
Level 2 - Low P.E.	428.17	448.15	1024.44	-127.33	251.69	58.78	44
Level 1 - Low P.E.	440.71	460.66	1038.97	-116.21	251.82	57.14	43
Deficiency Payments & Federal Crop Insurance							
Level 3 - High P.E.	487.65	501.74	1028.15	-1.44	233.20	47.82	35
Level 2 - High P.E.	502.76	514.32	1051.11	13.59	235.55	46.85	36
Level 1 - High P.E.	512.43	529.85	1066.72	-10.69	238.13	46.47	35
Level 3 - Med. P.E.	496.97	510.37	1039.03	12.71	233.27	46.94	34
Level 2 - Med. P.E.	509.28	522.58	1058.00	13.30	235.51	46.24	35
Level 1 - Med. P.E.	517.16	534.54	1070.92	-6.63	237.76	45.97	33
Level 3 - Low P.E.	508.78	522.07	1052.98	23.78	233.59	45.91	34
Level 2 - Low P.E.	517.18	532.41	1066.49	13.60	235.53	45.54	35
Level 1 - Low P.E.	523.20	540.50	1076.26	-0.74	237.25	45.35	33

Table 57. (Continued)

Program Option	Nominal Ending Net Worth ($000) Mean	Median	Max	Min	Std. Dev.	C.V.(%)	Number of Bankrupt Iterations
Deficiency Payments, Disaster Payments & Federal Crop Insurance							
Level 3 - High P.E.	485.29	507.03	1012.25	-11.34	228.25	47.03	34
Level 2 - High P.E.	500.75	515.63	1035.32	12.72	230.06	45.94	34
Level 1 - High P.E.	519.42	532.20	1058.08	39.80	230.60	44.40	33
Level 3 - Med. P.E.	498.67	514.83	1026.20	7.91	227.53	45.63	31
Level 2 - Med. P.E.	511.10	522.38	1045.32	28.21	229.28	44.86	33
Level 1 - Med. P.E.	526.29	538.56	1063.98	46.91	229.92	43.69	31
Level 3 - Low P.E.	515.23	525.64	1043.87	32.80	226.91	44.04	29
Level 2 - Low P.E.	523.65	534.56	1057.63	47.35	228.49	43.63	31
Level 1 - Low P.E.	535.31	546.93	1071.67	56.97	228.88	42.76	29

programs. Both scenarios experienced substantial growth over the 10 year planning horizon. Nominal ending net worth of Farm 1 increased an average of 67 percent from an initial value of $618,530 to an average ending value of $1,031,710 (in 1982 dollars). The average net worth for Farm 2 (the low equity situation) increased from $358,337 to $521,750 over the planning period, an average increase of approximately 46 percent. The mean of present value of net cash flow is positive for both situations however, this value is substantially higher for the high equity scenario (Farm 1). Thirty-eight bankrupt iterations occurred in this simulation of the low equity Farm 2. In other words, 38 percent of the time, the equity to asset ratio dropped below the 30 percent minimum for this situation. No bankruptcies occurred in any of the Farm 1 simulations. Since the two Jackson County scenarios are very similar except for the beginning equity level, the results indicate (as expected) that for equal levels of risk, the percent equity is a critical determinant of the economic viability of the farm. As the level of debt is increased the chances of firm survival is reduced.

Disaster Payments Program. The addition of the Disaster Payments Program (not currently available), which is designed to reduce the risk resulting from low commodity yields, resulted in a reduction of the nominal ending net worth for both of these farm situations. This result, which may be surprising to some, occurs because of the set-aside requirement which reduces the effective production acreage. The reduction in revenues resulting from a smaller production acreage is, on the average, of greater importance than any revenues received in the form of disaster payments.

The average value of nominal ending net worth decreased from the base run average to $983,280 for Farm 1 (Table 55) and to $468,960 for Farm 2 (Table 57). Both farm situations however, experienced growth over the planning horizon. The effects of the Disaster Payments Program on variability of net worth and survival of the firm are somewhat mixed. For the high equity farm, expected net worth and the coefficient of variation for net worth are both reduced. However, the coefficient of variation of nominal ending net worth for Farm 2 increased somewhat due to the relatively larger decrease in the average value of ending net worth. Forty-one bankruptcies occurred in this simulation of Farm 2, an increase of 3 from the no government program option.

Income was also reduced substantially when participation in the Disaster Payments Program was assumed, as indicated by means of present value of net cash flow for the two situations. This value became negative (-$32,060) for Farm 2 but, remained positive for Farm 1 ($168,010).

Deficiency Payments Program. The Deficiency Payments Program is designed to reduce the adverse effects of low commodity prices. When participation in this program is assumed, both Jackson County farm situations appear better off than they are under the no government program option. The mean nominal ending net worth increased over the no program option to $1,046,420 for Farm 1 and to $540,950 for Farm 2. The variance in nominal ending net worth was reduced as indicated by the standard deviations and coefficients of variation. The number of bankrupt iterations in the Farm 2 (low

equity) simulations was reduced by approximately 18 percent from 38 bankruptcies to 31.

Present value of net cash flow was substantially increased with the addition of the Deficiency Payments Program. The average present value of net cash flow increased to $228,690 for Farm 1 and $21,960 for Farm 2. The standard deviations of income were reduced for the two situations indicating a favorable reduction in the variance of income.

These results indicate that for the yield and price distributions simulated low commodity prices maybe a more serious problem than low commodity yields. Also, the Deficiency Payments Program, which increases expected ending net worth and reduces relative variability, is considerably more desirable than the Disaster Payments Program in this area.

Federal Crop Insurance Program. As with the Disaster Payments Program, the Federal Crop Insurance Program was designed to reduce the adverse effects on low commodity yields. However, the producer must pay an insurance premium for each acre of the insured crop rather than reducing crop acreages according to the set-aside requirements. All nine of the Federal Crop Insurance options evaluated for both Jackson County Farm situations reduced mean ending net worth when compared to the no programs option. The 50 percent or level 1 yield guarantee produced the highest ending net worth under each price elective. For the high equity farm situation, Federal Crop Insurance reduces mean ending net worth. For the low equity farm situation, Federal Crop Insurance also reduces ending net worth, but increases relative variability of ending net worth by a greater amount. The number of

bankrupt iterations increases from 38 under no government programs to 42-44 under Federal Crop Insurance.

The 50 percent yield guarantee level with the low price elective is the single most favorable of the Federal Crop Insurance options in Jackson County. Under this option, Farm 1 experienced a 64 percent increase in net worth over the 10 year planning horizon to an average value of $1,012,630. The level of average nominal ending net worth for Farm 2 is $501,180, an increase from the beginning net worth of approximately 40 percent. This level of coverage also results in the highest level of income. The present value of net cash flow is $201,800 for the Farm 1 situation and -$13,450 for the Farm 2 situation. The low guarantee level - low price elective Federal Crop Insurance option results in higher ending net worth than any other FCI option. In addition, relative variability of ending net worth is reduced slightly for Farm 1 and more significantly for Farm 2 under this option.

Even the most favorable of the Federal Crop Insurance Program options does not produce results as favorable as either the no program option or the Deficiency Payments Program option. All FCI options except for the 75 percent yield guarantee - high price elective option produce a higher mean of ending net worth and mean of present value of net cash flow than does the Disaster Payments Program.

Disaster Payments and Deficiency Payments. The most favorable of all the program options analyzed for the Jackson County farms is the combination of the Disaster Payments Program with the Deficiency Payments Program. This alternative results in the highest level of nominal ending net worth and present value of net cash flow for both

Farm 1 and Farm 2. This program combination provides a level of growth in net worth of approximately 72 percent for Farm 1 and approximately 57 percent for Farm 2. The mean of present value of net cash flow under this option is $241,120 and $38,450 for Farm 1 and Farm 2, respectively, significantly higher than the values for any other government farm program option.

The coefficients of variation of ending net worth are 19.42 percent and 40.24 percent for Farm 1 and Farm 2, respectively. The standard deviations of present value of net cash flow are $134,210 for Farm 1 and $163,610 for Farm 2. The level of variability for nominal ending net worth and for present value of net cash flow for both farm situations are lower for this program combination than for any program alternative discussed thus far. The number of bankruptcies which occurred on Farm 2 is 26, the lowest value for any analyzed government farm program.

The combination of programs produces better results than either of the programs individually for several reasons. Both programs have the acreage reduction or set-aside requirement. However, this requirement must only be met once when the programs are analyzed in combination. One program is essentially cost-free under this assumption. That is, if the producer is participating in the Deficiency Payments Program, there are no costs involved to become eligible for the Disaster Payments Program's low yield coverage. The producer can receive coverage or benefits from both programs at the same "cost" (income foregone due to the set-aside acreage) as required by individual program coverage.

Also, the cumulative effects of off setting both low yields and

low prices at various times during the 10 - year simulation period contributes to the increased level and stability of net cash flow and ending net worth under this program combination.

Disaster Payments and Federal Crop Insurance. As indicated earlier, in years prior to 1982 the Disaster Payments Program was available to producers of wheat, cotton and feed grains. Producers, in 1981, could participate in both the Disaster Payments Program and the FCI Program, however, the producer was not entitled to receive the 30 percent FCI premium subsidy. Simulating the two Jackson County farm scenarios assuming participation in this program combination produces results less favorable than any of the options previously discussed. The average ending net worth and the average present value of net cash flows are significantly lower for this program combination than for FCI alone, no government programs, disaster payments, deficiency payments or the Disaster-Deficiency combination. Relative variability of ending net worth is not changed perceptibly for the high equity farm, but is increased for the low equity farm under this combination.

Deficiency Payments and Federal Crop Insurance. Since the Disaster Payments Program is no longer available to producers, this program combination could prove to be the most important alternative for Jackson County farmers. This program combination produces more favorable results for both Jackson County farm scenarios than does the Disaster Payments and FCI Program combination. This result occurs, in part because the firms gain some protection from both low prices and low yields. As with other alternatives involving the Federal Crop

Insurance Program the 50 percent yield guarantee level - low price elective option provides the highest level of firm growth and income for both high and low equity scenarios. Relative variability of ending net worth is also slightly lower under this option.

Average nominal ending net worth under the level 1 yield guarantee - low price elective option is $1,030,600 for Farm 1 and $523,200 for Farm 2. This represents an average growth of approximately 67 percent and 46 percent in ending net worth over the 10 - year period for the two situations, respectively. The coefficients of variation of net worth are 20.61 percent and 45.35 percent for Farm 1 and Farm 2, respectively. Relative variability of ending net worth is about the same (varies from 20.55 to 20.79) for the nine FCI options for Farm 1 and is only slightly more variable (from 45.35 to 47.82) for Farm 2.

Implications for program participation are slightly different for the high equity and low equity farm situations. For the high equity situation (Farm 1) participation in the Deficiency Payments Program alone is clearly superior to the no government program option and Federal Crop Insurance because it offers higher ending net worth and net cash flow with lower levels of relative variability. The poorest alternative is participation in the Federal Crop Insurance program. Even under the most favorable option (50 percent yield guarantee and low price elective), FCI offers the lowest ending net worth and net cash flow with the highest relative variability of net worth and income. For the high equity situation, the choices between no government programs and participation in the combination of the Deficiency Payments Program and Federal Crop Insurance at the 50

percent yield guarantee and low price elective depends on the producers attitude toward risk. A risk averse producer might prefer the combination of the Deficiency Payments Program and the most favorable FCI option because the expected ending net worth is only slightly below that without government programs while net worth variability is considerably less with the program combination.

For the low equity situation (Farm 2) participation in the Deficiency Payments Program is clearly superior to no government programs, Federal Crop Insurance or the most favorable Deficiency Payments - FCI combination. The Deficiency Payments Program has higher ending net worth and net cash flows coupled with lower relative variability of income and net worth. Once again, the best FCI option is clearly inferior to any analyzed program because it has the lowest expected net worth and net cash flow with the highest relative variability. The low equity operator would be better off with no government program than with FCI alone. However, slightly higher expected ending net worth and net cash flow and lower relative variability would be achieved by participation in the Deficiency Payments Program and the FCI 50 percent yield guarantee - low price elective option than avoiding government programs entirely.

Deficiency Payments, Disaster Payments and Federal Crop Insurance. For a couple of years prior to the 1982 program year the producers could have chosen to participate in all three of these government farm programs in combination. The producer must have then fulfilled the set-aside requirement for the Deficiency Payments and Disaster Payments Programs. The producer was also required to pay the full, unsubsidized premium for Federal Crop Insurance coverage

however, that coverage would apply to a smaller number of acres due to the set-aside. Generally, for the Jackson County situations, this program combination produces more favorable results than does any other alternative involving the Federal Crop Insurance Program.

The most favorable option for these two scenarios, assuming participation in this program combination, based on the level of ending net worth, the level of income and the number of bankrupt iterations appears to be the level 1 (50 percent) yield guarantee with the low price elective. The level 1 yield guarantee - low price elective option resulted in a growth in net worth, over the 10 year planning horizon, for Farm 1 and Farm 2 of 68 percent and 49 percent, respectively. The average of nominal ending net worth under this option is $1,040,130 for Farm 1 and $535,310 for Farm 2. If this combination of three programs were available, it would be a favorable alternative, only the Deficiency Payments Program alone has a higher ending net worth than the most favorable Deficiency, Disaster and FCI combination. However, the relative variability of the Deficiency Payments Program is considerably greater than the most favorable option of this combination.

Wagoner County

The Wagoner County scenario (Farm 3) is a relatively low equity situation somewhat like the low equity situation in Jackson County (Farm 2). The results of the simulations of this scenario are presented in Tables 58 and 59. Table 58 summarizes present value of net cash flow information generated from participation in each of the

government farm program alternatives. Nominal ending net worth and bankruptcy information for Farm 3 is presented in Table 59.

No Government Programs. The initial simulation of the Wagoner County farm scenario is made assuming no participation in any government farm programs. The average value of nominal ending net worth is $202,290, representing a negative growth in net worth of about 20 percent over the 10 year period. The coefficient of variation of nominal ending net worth is 62.18 percent, the lowest value under any government farm program assumptions. Forty-nine bankruptcies occurred under the no program assumption. This is also the lowest value recorded in the Wagoner County simulations. Average present value of net cash flow equals -$127,960. The standard deviation and range of present value of net cash flow is $100,890 and $535,200, respectively.

Disaster Payments Program. The addition of the Disaster Payments Program places the scenario in a somewhat less favorable situation. Fifty-four bankruptcies occurred under this program alternative, an increase of 10 percent over the no program alternative. Average nominal ending net worth was further reduced to $176,900. The coefficient of variation of ending net worth is 70.60 percent, significantly higher than the coefficient when no participation is assumed. Apparently the lost income from set-aside acres exceeds the payments received under the Disaster Payments Program. When these reductions in income are accumulated for the low equity operator, mean net cash flow and ending net worth are both reduced and relative variability of ending net worth is increased.

Table 58. Net Cash Flow Information for the Wagoner County Situation - Farm 3

Program Option	Present Value of Net Cash Flow ($000)					
	Mean	Median	Max	Min	Std. Dev.	Range
No Government Programs	-127.96	-113.32	99.72	-435.48	100.89	535.20
Disaster Payments	-147.02	-132.72	82.73	-449.94	100.81	532.67
Deficiency Payments	-144.54	-129.82	81.36	-439.52	99.75	520.88
Disaster & Deficiency Payments	-141.82	-125.87	82.73	-434.80	99.11	517.53
Federal Crop Insurance						
Level 3 - High P.E.	-140.39	-125.40	85.84	-432.10	99.97	517.94
Level 2 - High P.E.	-137.43	-119.60	90.02	-435.21	100.91	525.23
Level 1 - High P.E.	-139.26	-126.11	91.47	-445.14	102.11	536.61
Level 3 - Med. P.E.	-138.70	-122.62	87.98	-433.38	100.12	521.35
Level 2 - Med. P.E.	-137.65	-122.33	90.56	-437.73	101.14	528.29
Level 1 - Med. P.E.	-137.51	-124.04	92.83	-443.89	101.93	536.73
Level 3 - Low P.E.	-136.62	-120.95	90.88	-434.59	100.29	525.47
Level 2 - Low P.E.	-135.15	-119.94	92.93	-437.39	101.05	530.32
Level 1 - Low P.E.	-135.37	-121.57	94.47	-442.23	101.72	536.70
Disaster Payments & Federal Crop Insurance						
Level 3 - High P.E.	-162.70	-150.36	65.69	-451.03	100.42	516.72
Level 2 - High P.E.	-159.38	-142.86	70.07	-435.64	101.31	523.71
Level 1 - High P.E.	-159.83	-146.40	72.80	-461.50	102.20	534.30
Level 3 - Med. P.E.	-160.29	-145.59	68.39	-451.28	100.46	519.67
Level 2 - Med. P.E.	-158.93	-145.03	71.09	-455.13	101.40	526.22
Level 1 - Med. P.E.	-157.79	-144.26	74.44	-459.86	101.98	534.30
Level 3 - Low P.E.	-167.43	-155.61	65.13	-463.95	101.71	529.08
Level 2 - Low P.E.	-155.92	-142.94	74.01	-454.04	101.22	528.05
Level 1 - Low P.E.	-155.34	-141.66	76.38	-457.77	101.71	534.14

Table 58. (Continued)

Program Option	Present Value of Net Cash Flow ($000)					
	Mean	Median	Max	Min	Std. Dev.	Range
Deficiency Payments & Federal Crop Insurance						
Level 3 - High P.E.	-158.01	-144.34	65.73	-438.05	98.91	503.77
Level 2 - High P.E.	-154.62	-140.93	70.17	-440.52	99.82	510.69
Level 1 - High P.E.	-156.06	-141.72	72.19	-449.55	100.93	521.74
Level 3 - Med. P.E.	-156.11	-142.43	68.11	-438.88	99.03	506.99
Level 2 - Med. P.E.	-154.77	-141.23	70.79	-442.75	100.02	513.54
Level 1 - Med. P.E.	-154.27	-139.86	73.67	-448.20	100.75	521.88
Level 3 - Low P.E.	-153.45	-141.05	71.23	-439.66	99.19	510.90
Level 2 - Low P.E.	-152.14	-138.27	73.49	-442.11	99.92	515.60
Level 1 - Low P.E.	-152.11	-137.59	75.45	-446.45	100.52	521.90
Deficiency Payments, Disaster Payments & Federal Crop Insurance						
Level 3 - High P.E.	-157.39	-143.53	65.69	-435.89	98.67	501.58
Level 2 - High P.E.	-154.12	-137.98	70.07	-438.50	99.56	508.58
Level 1 - High P.E.	-154.57	-139.17	72.80	-446.36	100.48	519.16
Level 3 - Med. P.E.	-155.01	-139.94	68.39	-436.14	98.71	504.53
Level 2 - Med. P.E.	-153.66	-139.12	71.09	-440.00	99.67	511.09
Level 1 - Med. P.E.	-152.53	-137.03	74.44	-444.72	100.27	519.16
Level 3 - Low P.E.	-162.12	-149.76	65.13	-448.81	99.99	513.94
Level 2 - Low P.E.	-150.65	-135.74	74.01	-438.90	99.50	512.91
Level 1 - Low P.E.	-150.10	-134.47	76.38	-442.63	100.00	519.01

Table 59. Ending Net Worth Information for the Wagoner County Situation - Farm 3

Program Option	Nominal Ending Net Worth ($000) Mean	Median	Max	Min	Std. Dev.	C.V.(%)	Number of Bankrupt Iterations
No Government Program	202.29	220.55	521.41	-168.68	125.79	62.18	49
Disaster Payments	176.90	193.77	498.87	-185.96	124.89	70.60	54
Deficiency Payments	180.16	192.95	496.75	-173.69	123.63	68.62	53
Disaster & Deficiency Payments	183.31	196.91	498.87	-168.51	123.00	67.10	52
Federal Crop Insurance							
Level 3 - High P.E.	184.93	199.95	503.43	-166.77	124.47	67.30	53
Level 2 - High P.E.	189.32	207.59	509.79	-169.95	125.71	66.40	53
Level 1 - High P.E.	187.60	205.17	510.95	-180.33	126.93	67.66	53
Level 3 - Med. P.E.	187.15	202.73	506.12	-167.88	124.75	66.66	53
Level 2 - Med. P.E.	189.21	206.82	510.31	-172.54	125.95	66.57	52
Level 1 - Med. P.E.	189.74	207.63	512.69	-178.77	126.84	66.85	53
Level 3 - Low P.E.	190.78	207.12	509.91	-168.83	124.97	65.50	52
Level 2 - Low P.E.	192.80	209.94	513.20	-171.80	125.85	65.28	52
Level 1 - Low P.E.	192.43	210.93	514.78	-176.73	126.71	65.85	52
Disaster Payments & Federal Crop Insurance							
Level 3 - High P.E.	157.42	171.88	475.89	-189.05	123.66	78.56	58
Level 2 - High P.E.	161.76	178.00	482.69	-191.64	124.94	77.24	57

Table 59. (Continued)

Program Option	Nominal Ending Net Worth ($000) Mean	Median	Max	Min	Std. Dev.	C.V.(%)	Number of Bankrupt Iterations
Level 1 - High P.E.	161.65	177.80	485.80	-199.70	125.89	77.88	56
Level 3 - Med. P.E.	160.51	174.94	479.49	-189.00	123.83	77.15	57
Level 2 - Med. P.E.	162.37	178.26	483.92	-193.08	125.06	77.02	56
Level 1 - Med. P.E.	164.06	180.28	487.98	-197.71	125.73	76.64	54
Level 3 - Low P.E.	151.76	168.06	475.22	-203.19	125.07	82.41	60
Level 2 - Low P.E.	166.00	182.06	487.67	-191.51	124.98	75.29	54
Level 1 - Low P.E.	166.96	183.29	490.53	-195.20	125.53	75.19	55
Deficiency Payments & Federal Crop Insurance							
Level 3 - High P.E.	162.91	173.15	475.66	-173.81	122.03	74.91	57
Level 2 - High P.E.	167.22	180.75	482.54	-176.26	123.35	73.77	54
Level 1 - High P.E.	165.99	178.31	484.68	-185.67	124.51	75.01	55
Level 3 - Med. P.E.	165.25	175.15	478.83	-174.43	122.28	74.00	55
Level 2 - Med. P.E.	167.15	179.44	483.23	-178.54	123.58	73.93	55
Level 1 - Med. P.E.	168.11	180.23	486.64	-184.02	124.40	74.00	54
Level 3 - Low P.E.	168.54	178.25	483.04	-174.94	122.60	72.74	54
Level 2 - Low P.E.	170.37	181.86	486.68	-177.50	123.58	72.54	54
Level 1 - Low P.E.	170.68	182.98	488.98	-181.90	124.24	72.79	54

Table 59. (Continued)

Program Option	Nominal Ending Net Worth ($000) Mean	Median	Max	Min	Std. Dev.	C.V.(%)	Number of Bankrupt Iterations
Deficiency Payments, Disaster Payments & Federal Crop Insurance							
Level 3 - High P.E.	163.55	175.35	475.89	-171.60	121.79	74.47	56
Level 2 - High P.E.	167.69	183.51	482.69	-174.20	123.07	73.39	53
Level 1 - High P.E.	167.63	182.50	485.80	-182.26	124.05	74.00	54
Level 3 - Med. P.E.	166.45	178.76	479.49	-171.55	121.96	73.27	55
Level 2 - Med. P.E.	168.34	183.08	483.92	-175.63	123.22	73.19	53
Level 1 - Med. P.E.	170.05	184.27	487.98	-180.26	123.91	72.87	54
Level 3 - Low P.E.	158.40	169.29	475.22	-185.74	123.15	77.75	57
Level 2 - Low P.E.	172.02	186.02	487.67	-174.06	123.16	71.60	53
Level 1 - Low P.E.	172.93	186.67	490.53	-177.75	123.72	71.54	54

Income was also reduced substantially with the addition of this program. Average present value of net cash flow is -$147,020 under this program. The standard deviation and range of present value of net cash flow was reduced from the no program values to $100,810 and $532,670, respectively. However, the minimum level of income is significantly lower (or more negative).

Deficiency Payments Program. This program alternative is somewhat more favorable than the Disaster Payments Program alternative for the Wagoner County situation. Net worth decreased from $252,649 to $180,160 over the planning horizon. The coefficient of variation of nominal ending net worth is 68.82 percent and 53 bankruptcies were logged. Mean present value of net cash flow is $144,540, slightly higher than under the Disaster Payments Program but, still a reduction from the no program alternative.

The results indicates that, as in Jackson County, low commodity prices present a more serious problem than do low commodity yields. Recall that wheat and grain sorghum are the only program crops produced on Farm 3. Soybeans, the most important crop for this scenario, are not a program crop under the Deficiency Payments and Disaster Payments Programs. Participation in the Deficiency Payments Program increases expected ending net worth slightly while reducing variability of ending net worth slightly. Even so, no participation in government programs in Wagoner would be the best alternative.

Federal Crop Insurance Program. Every option of the Federal Crop Insurance Program provides a higher level of ending net worth and income than does either the Disaster Payments Program or the

Deficiency Payments Program. However, participation in the FCI Program does not appear as favorable as the no government farm program alternative.

In Wagoner County, two Federal Crop Insurance options give nearly identical results. The level 2 (65 percent) yield guarantee with the low price elective option results in a mean nominal ending net worth of $192,800 and a coefficient of variation of ending net worth of 65.28 percent. The 50 percent yield guarantee - low price elective option results in ending net worth of $192,430 with a coefficient of variation of 65.85 percent. Thus, the level 2 guarantee - low price elective generates slightly better results.

This option also yields the highest level of average income for any program alternative except for the initial, no government program, simulation. Average present value of net cash flow has a value of -$135,150. The standard deviation and range of present value of net cash flow is $101,050 and $530,320, respectively. This option provides only slightly better coverage than either of the other low price elective options, but the difference between this option and the higher guarantee options are significant.

If the producer preferred to participate in some type of program the level 2 yield guarantee - low price elective option may be the most significant. The reason this option is more favorable than the other government programs could be because of the limited crop coverage of the Disaster Payments and Deficiency Payments Programs. Neither of these programs provide any coverage for the soybean enterprise (Wagoner County's most important crop). Federal Crop Insurance does provide low yield coverage for the soybean enterprise.

Disaster Payments and Deficiency Payments. The Disaster Payments and Deficiency Payments Program combination, which proved to be the most favorable program alternative for the Jackson County situations, is not as favorable for the Wagoner County situation. This combination does (as it did in Jackson County) produce more favorable results than either of the component programs individually. In combination these programs produce higher income and ending net worth with lower variation in income and ending net worth than either of the individual programs. These results however, are less favorable than either the no government program option or the most favorable of the FCI options.

Farm 3 experienced a negative growth in net worth of approximately 27 percent over the planning horizon to a value of $183,310. The number of bankrupt iterations is 52 under this option. Variability in nominal ending net worth is lower with this combination than with either of the component programs as indicated by the 67.10 percent coefficient of variation. Present value of net cash flow has an average value of -$141,820, a standard deviation of $99,110 and a range of $517,530.

Disaster Payments and Federal Crop Insurance. Under the assumption of a Disaster Payments and Federal Crop Insurance Program combination the results are less favorable than under either of these programs individually. Once again, the 65 and 50 percent yield guarantees with the low price elective generate very similar results and are the most favorable options. However, in both cases the mean ending net worth is lower and the coefficient of variation higher than

for Disaster Payments or the corresponding Federal Crop Insurance options individually.

Deficiency Payments and Federal Crop Insurance. The combination of Deficiency Payments and Federal Crop Insurance is more favorable than the Disaster Payment - FCI options, but less favorable than Deficiency Payments or FCI individually. Imposing the set-aside requirement accompanying participation in the Disaster Payments Program apparently causes this result. Farm 3 experienced an average reduction in net worth of approximately 32 percent to an average value of $170,680 and 54 bankrupt iterations under the 50 percent yield guarantee and low price elective option. The coefficient of variation of ending net worth is 72.79 percent under this option, a figure that is higher than for Deficiency Payments or Federal Crop Insurance Programs individually.

Deficiency Payments, Disaster Payments and Federal Crop Insurance. As in Jackson County, the combination of all three government farm programs produces results that are more favorable than the other combination alternatives evaluated for the Wagoner County situation. However, even this combination is less favorable than any of the individual programs. Once again, the set-aside requirements associated with participation in government programs appears to cause this result when the programs are combined. The level 1 (50 percent yield guarantee) and level 2 yield guarantee with the low price elective generate nearly identical results for this farm situation, under this program alternative, and generate average nominal ending net worth of approximately $172,000 with coefficients of variation of

nominal ending net worth about 71.60 percent. Average present value of net cash flow is about -$150,000 assuming either of these options of the program combination.

Texas County

The results of the Texas County analysis are presented in Tables 60 and 61 and are very similar to the Wagoner County results. Table 60 presents the present value of net cash flow information and Table 61 presents the nominal ending net worth information and the number of bankrupt iterations which occurred in each program assumption. Farm 4, in Texas County, is a low equity situation similar to the low equity situations in Jackson County and Wagoner County. This farm experiences substantial difficulty surviving through the 10 year planning horizon. The major reason for this difficulty is due to the firms low equity level and low levels of profitability projected into the future based on 1982 conditions.

No Government Programs. This is the only program alternative which provides for net worth growth over the 10 year planning horizon for the Texas County scenario. Nominal ending net worth has an average value of $564,720, representing a growth of approximately 3 percent over the 10 year period. The coefficient of variation for nominal ending net worth is 66.04 percent and 59 bankruptcies occurred in this initial simulation. The average present value of net cash flow is negative (-$159,470). For the Texas County situation the no government program alternative is the most favorable of the government programs analyzed in this study. All Disaster, Deficiency and Federal

Table 60. Net Cash Flow Information for the Texas County Situation - Farm 4

Program Option	Present Value of Net Cash Flow ($000)					
	Mean	Median	Max	Min	Std. Dev.	Range
No Government Program	-159.47	-131.11	425.27	-996.70	287.46	1421.97
Disaster Payments	-241.51	-207.97	356.69	-1064.57	285.92	1421.27
Deficiency Payments	-223.68	-195.41	352.48	-995.90	277.89	1348.38
Deficiency & Disaster Payments	-217.30	-187.30	356.69	-992.95	274.97	1349.64
Federal Crop Insurance						
Level 3 - High P.E.	-219.37	-188.89	386.68	-1072.40	291.47	1459.08
Level 2 - High P.E.	-204.83	-175.48	399.19	-1054.97	292.62	1454.16
Level 1 - High P.E.	-193.18	-162.36	406.06	-1044.85	294.01	1450.91
Level 3 - Med. P.E.	-205.58	-176.34	395.14	-1053.37	395.14	1448.50
Level 2 - Med. P.E.	-194.38	-165.57	405.11	-1041.32	291.32	1446.43
Level 1 - Med. P.E.	-185.45	-154.24	410.41	-1033.96	292.53	1444.38
Level 3 - Low P.E.	-192.35	-164.17	403.07	-1035.25	288.70	1438.32
Level 2 - Low P.E.	-184.82	-156.00	410.67	-1028.30	290.03	1438.97
Level 1 - Low P.E.	-178.83	-148.73	414.19	-1024.53	291.25	1438.71
Disaster Payments & Federal Crop Insurance						
Level 3 - High P.E.	-319.31	-286.39	313.82	-1152.61	292.63	1466.43
Level 2 - High P.E.	-306.10	-278.71	322.71	-1141.78	294.23	1464.49
Level 1 - High P.E.	-286.98	-264.58	332.71	-1123.88	294.04	1456.59
Level 3 - Med. P.E.	-301.35	-271.56	323.40	-1132.46	290.96	1455.86
Level 2 - Med. P.E.	-291.44	-267.09	330.28	-1124.08	292.32	1454.36
Level 1 - Med. P.E.	-276.79	-251.99	338.01	-1110.69	292.28	1448.70
Level 3 - Low P.E.	-284.66	-257.52	332.30	-1111.63	288.95	1443.93
Level 2 - Low P.E.	-278.13	-253.84	337.34	-1107.37	290.42	1444.71
Level 1 - Low P.E.	-267.80	-240.80	342.71	-1098.97	290.70	1441.68

Table 60. (Continued)

Program Option	Present Value of Net Cash Flow ($000)					
	Mean	Median	Max	Min	Std. Dev.	Range
Deficiency Payments & Federal Crop Insurance						
Level 3 - High P.E.	-277.41	-253.69	321.84	-1055.98	280.18	1377.82
Level 2 - High P.E.	-265.13	-242.13	330.02	-1044.83	281.90	1374.85
Level 1 - High P.E.	-254.77	-234.77	335.64	-1037.85	283.60	1373.49
Level 3 - Med. P.E.	-265.02	-240.89	328.75	-1041.93	279.42	1370.67
Level 2 - Med. P.E.	-255.62	-234.12	335.10	-1033.32	280.90	1368.42
Level 1 - Med. P.E.	-247.72	-225.80	339.43	-1030.83	282.41	1370.27
Level 3 - Low P.E.	-253.16	-228.40	335.43	-1026.79	278.31	1362.22
Level 2 - Low P.E.	-246.93	-223.55	339.88	-1022.30	279.86	1362.18
Level 1 - Low P.E.	-241.60	-218.01	342.71	-1021.97	281.26	1364.69
Deficiency Payments, Disaster Payments & Federal Crop Insurance						
Level 3 - High P.E.	-293.65	-269.23	313.82	-1081.42	281.84	1395.24
Level 2 - High P.E.	-280.84	-260.12	322.71	-1070.60	283.45	1393.31
Level 1 - High P.E.	-262.05	-242.39	332.71	-1052.69	283.27	1385.40
Level 3 - Med. P.E.	-276.06	-254.70	323.40	-1061.28	280.10	1384.67
Level 2 - Med. P.E.	-266.42	-245.07	330.28	-1052.89	281.48	1383.17
Level 1 - Med. P.E.	-252.11	-231.19	338.01	-1039.51	281.49	1377.51
Level 3 - Low P.E.	-259.67	-237.59	332.30	-1040.45	278.04	1372.75
Level 2 - Low P.E.	-253.32	-231.49	337.34	-1036.19	279.53	1373.53
Level 1 - Low P.E.	-243.20	-219.99	342.71	-1027.79	279.84	1370.50

Table 61. Ending Net Worth Information for the Texas County Situation - Farm 4

Program Option	Nominal Ending Net Worth ($000) Mean	Median	Max	Min	Std. Dev.	C.V.(%)	Number of Bankrupt Iterations
No Government Program	564.72	592.57	1371.67	-494.79	372.96	66.04	59
Disaster Payments	452.97	470.67	1234.59	-576.43	365.03	80.59	67
Deficiency Payments	475.77	497.38	1250.58	-493.20	354.92	74.60	67
Deficiency & Disaster Payments	483.20	498.19	1250.58	-490.16	351.63	72.77	66
Federal Crop Insurance							
Level 3 - High P.E.	485.73	503.70	1296.44	-587.46	374.82	77.17	65
Level 2 - High P.E.	504.75	520.86	1323.89	-565.44	377.85	74.86	64
Level 1 - High P.E.	519.97	542.80	1341.63	-550.37	380.58	73.19	62
Level 3 - Med. P.E.	503.08	517.92	1313.05	-566.34	374.49	74.44	64
Level 2 - Med. P.E.	517.87	536.91	1334.61	-549.02	377.08	72.81	63
Level 1 - Med. P.E.	532.09	553.64	1348.42	-537.80	377.32	70.92	62
Level 3 - Low P.E.	522.21	538.09	1327.84	-544.51	371.74	71.19	64
Level 2 - Low P.E.	530.02	549.38	1344.11	-533.59	376.19	70.98	62
Level 1 - Low P.E.	540.40	563.34	1354.31	-526.91	376.22	69.62	62
Disaster Payments & Federal Crop Insurance							
Level 3 - High P.E.	353.11	370.77	1161.80	-684.60	368.68	104.410	78
Level 2 - High P.E.	371.81	392.20	1176.90	-668.43	371.64	99.96	77

Table 61. (Continued)

Program Option	Nominal Ending Net Worth ($000) Mean	Median	Max	Min	Std. Dev.	C.V.(%)	Number of Bankrupt Iterations
Level 1 - High P.E.	395.72	411.89	1197.31	-644.74	372.69	94.18	69
Level 3 - Med P.E.	376.83	393.41	1177.03	-660.17	367.52	97.53	76
Level 2 - Med. P.E.	389.70	411.84	1188.73	-647.57	370.19	94.99	71
Level 1 - Med. P.E.	408.06	423.01	1205.54	-629.66	371.17	90.96	68
Level 3 - Low P.E.	397.31	418.99	1190.78	-635.50	366.20	92.17	71
Level 2 - Low P.E.	405.98	425.64	1200.13	-628.07	368.75	90.83	69
Level 1 - Low P.E.	420.15	434.27	1212.85	-616.25	369.48	87.94	68
Deficiency Payments & Federal Crop Insurance							
Level 3 - High P.E.	405.53	413.38	1185.01	-569.02	355.32	87.62	72
Level 2 - High P.E.	422.49	429.02	1208.95	-552.37	358.25	84.79	70
Level 1 - High P.E.	435.71	444.85	1224.40	-541.22	361.14	82.89	68
Level 3 - Med. P.E.	421.89	428.30	1199.44	-551.53	354.91	84.12	68
Level 2 - Med. P.E.	434.48	441.67	1218.25	-538.59	357.63	82.31	68
Level 1 - Med. P.E.	444.57	456.46	1230.30	-530.55	360.01	80.98	68
Level 3 - Low P.E.	436.63	442.78	1212.25	-533.37	354.45	81.18	68
Level 2 - Low P.E.	444.93	452.52	1226.46	-525.61	357.03	80.24	67
Level 1 - Low P.E.	451.92	466.63	1235.39	-521.17	359.09	79.46	67

Table 61. (Continued)

Program Option	Nominal Ending Net Worth ($000) Mean	Median	Max	Min	Std. Dev.	C.V.(%)	Number of Bankrupt Iterations
Deficiency Payments, Disaster Payments & Federal Crop Insurance							
Level 3 - High P.E.	384.77	389.28	1167.31	-598.40	356.35	92.60	75
Level 2 - High P.E.	402.32	409.87	1191.25	-582.23	359.29	89.31	70
Level 1 - High P.E.	425.39	429.79	1213.30	-558.54	360.47	84.74	68
Level 3 - Med. P.E.	407.26	417.28	1185.57	-574.00	355.14	87.20	71
Level 2 - Med. P.E.	420.90	427.97	1204.37	-561.37	357.38	84.90	69
Level 1 - Med. P.E.	438.71	444.20	1221.52	-543.46	358.45	81.71	68
Level 3 - Low P.E.	428.25	436.15	1201.91	-549.30	353.44	82.53	68
Level 2 - Low P.E.	437.16	442.48	1216.11	-541.87	355.87	81.40	68
Level 1 - Low P.E.	449.70	457.13	1228.84	-530.05	357.04	79.40	67

Crop Insurance alternatives reduce expected ending net worth and increase the coefficient of variation of ending net worth.

Disaster Payments Program. Participation in the Disaster Payments Program for this farm scenario (Farm 4) reduces its chances of survival. The level of average ending net worth is reduced substantially to $452,970. The coefficient of variation of nominal ending net worth was increased to 80.59 percent and 67 bankrupt iterations were logged. Average income was reduced to -$241,510, substantially below that of the no program alternative. The standard deviation of present value of net cash flow ($285,920) and it's range ($1,421,270) are slightly lower for this government farm program. The Disaster Payments Program provides low yield coverage for every crop produced on the Texas County farm situation simulated. The reduction in income due to the set-aside requirements appears substantially greater than the additional income provided by the disaster payments. Thus, the Disaster Payments Program results in lower mean ending net worth and greater net worth variability than the no government option.

Deficiency Payments Program. Participation in the Deficiency Payments Program produces results somewhat more favorable than those produced by the Disaster Payments Program. As in the other two county situations, low commodity prices appear to present more of a problem to this farm situation than do low yields. With the Deficiency Payments Program average nominal ending net worth is $475,770, a reduction in net worth of approximately 13 percent. Nominal ending net worth is less variable with this program alternative than with the Disaster Payments Program, as indicated by the 74.60 percent

coefficient of variation however, the same number of bankrupt iterations occurred. Average present value of net cash flow is -$223,680, slightly higher than the average income generated with the Disaster Payments Program. Deficiency Payments increase the mean ending net worth and reduce relative variability when compared with the Disaster Payments Program. However, the no government program option is more attractive than either of the above government program alternatives.

Federal Crop Insurance Program. If the Texas County producer preferred to participate in a government farm program to reduce risk, the Federal Crop Insurance Program may prove to be best alternative. Every option of this program provides for a higher level of average ending net worth and a lower number of bankrupt iterations than does any other program alternative with the exception of the no government program alternative. The most favorable option of the Federal Crop Insurance Program for the Texas County situation is the level 1 (50 percent) yield guarantee - low price elective option. Although this option does not, on the average, provide for any growth in net worth, it does nearly maintain the beginning level of net worth. The coefficient of variation of nominal ending net worth is 69.62 percent, lowest among the FCI options.

The 60 and 75 percent yield guarantee with high price elective options yield expected ending net worth higher than for deficiency payments, however, the relative variability is also higher. Thus, some producers may wish to choose the lower ending net worth, lower variability Deficiency Payments Program. Other FCI options result in

higher ending net worth and lower relative variability of net worth than Deficiency Payments.

Disaster Payments and Deficiency Payments. When the Disaster Payments Program is combined with the Deficiency Payments Program the Jackson County situation results prove to be more favorable than participation in either program individually. These results are not unlike those produced with this program combination in the other county situations. Nominal ending net worth has an average value of $483,200 and a coefficient of variation of 72.77 percent for the Texas County Situation. This program combination resulted in 66 bankrupt iterations, one less than either the Disaster Payments Program or the Deficiency Payments Program individually. The average level of present value of net cash flow under this program combination is -$217,300. Relative variation in ending net worth appears to have been reduced slightly from the other Disaster and Deficiency program alternatives, as indicated by the coefficient of variation.

Disaster Payments and Federal Crop Insurance. Participation in a combination of the two low yield programs produces less favorable results than any of the government farm program alternatives discussed thus far. The increase in the FCI premium rates, due to the loss of the 30 percent government subsidy, seems to reduce any benefits that the Federal Crop Insurance Program (participated in individually) might have afforded. Level 1 yield guarantee - low price elective coverage provides the most favorable results under this program alternative. Average income or present value of net cash flow is -$267,800, substantially lower (more negative) than any other program

alternative. Net worth declined over the 10 years an average of approximately 23 percent to a value of $420,150. The coefficient of variation for nominal ending net worth is 87.94 percent and 68 bankrupt iterations occurred.

Deficiency Payments and Federal Crop Insurance. This program combination places the Texas County farm scenario in a somewhat worse situation than either of the Deficiency Payments Program or the Federal Crop Insurance Program alternatives because of the set-aside requirement for the Deficiency Payments Program crops. This set-aside is a normal requirement of the Deficiency Payments Program however, individual participation in the FCI Program has no such requirement. Every crop produced on the Texas County farm situation is subject to the set-aside requirement. This reduces the total number of acres insurable under this program combination and hence, reduces the level of income generated by the crops produced. As with the other Federal Crop Insurance Program alternatives, the level 1 yield guarantee - low price elective option provides the most favorable level of coverage. Ending net worth has an average value of $451,920 and a coefficient of variation of 79.46 percent and sixty-seven bankrupt iterations were registered. Average present value of net cash flow is significantly lower than with either of the component programs (-$241,600).

Deficiency Payments, Disaster Payments and Federal Crop Insurance. This program combination proves more favorable than the other two program alternatives in which the Federal Crop Insurance Program is combined with another government farm program. The differences are somewhat slight with respect to both ending net worth

and present value of net cash flow. These more favorable results occur because acreage is already reduced in the two program combination (such as the Disaster Payments - FCI Program combination), and the addition of another program (Deficiency Payments Program) is essentially cost-free to the farm producer. There were 67 bankruptcies with the level 1 yield guarantee - low price elective option. Average nominal ending net worth is $449,700, representing an average decline in net worth of approximately 18 percent from it's beginning value. The coefficient of variation for this option is 79.40 percent and is the lowest coefficient of variation under this combination. The average present value of net cash flow is -$243,200.

Evaluation of Federal Crop Insurance Options by Crops

The results dealing with the Federal Crop Insurance Program and presented in the previous section of this chapter are derived assuming each crop is insured by the same FCI option (e.g., level 1 (50 percent) yield guarantee - low price elective) for each crop. Also, every insurable crop produced by the farm scenarios is assumed insured under each of the Federal Crop Insurance Program alternatives. In actual practice the producer may choose to insure each crop with a different FCI option. To determine the implications of selecting alternative options for each crop, an analysis was made to determine which option provided the "best" level of coverage for each crop produced by the low equity Jackson County farm scenario (Farm 2).

In this portion of the analysis the level 3 yield guarantee - high price elective option was applied to the cotton enterprises and held constant while the yield guarantees and price electives for wheat

were varied to determine the "best" level of coverage for the wheat enterprise. The low equity Jackson County farm situation was simulated once for each of the nine wheat options. The results of these simulations are presented in Tables 62 and 63. Table 62 presents information concerning the present value of net cash flow generated with these FCI options. Nominal ending net worth information and the number of bankrupt iterations is presented in Table 63. Based on the most favorable results of these simulations, the Federal Crop Insurance option which provides the most desirable coverage for wheat can be determined because the dryland cotton and irrigated cotton options were not changed. This option appears to be the level 1 yield guarantee - low price elective option. Assuming this option for wheat and the level 3 yield guarantee - high price elective option for cotton provides for the highest level of firm growth, income and chances of firm survival of any of these simulations. Variation in nominal ending net worth appears to be the lowest recorded at a value of 54.63 percent.

The study by Lemieux, Richardson and Nixon determined that for a typical Texas High Plains cotton farm the level 3 yield guarantee - high price elective Federal Crop Insurance option provided the most desirable coverage for cotton. In the same study, this level of coverage was also found to provide benefits similar to that of the low yield Disaster Payments Program. It might be suspected that this option would also provide the most favorable coverage for the Jackson County situation. The "best" Federal Crop Insurance Program option for the cotton enterprises can be determined in much the same way as was the "best" wheat option. The FCI option for wheat was held

Table 62. Net Cash Flow Information for the Jackson County Situation - Farm 2; 75% Guarantee Level and $0.50 per lb. Price Elective for the Cotton Enterprises with the FCI Wheat Enterprise Options Varied

	Present Value of Net Cash Flow ($000)					
Program Option	Mean	Median	Max	Min	Std. Dev.	
Federal Crop Insurance						
Level 3 - High P.E.	-42.37	-20.97	403.94	-513.69	198.88	917.63
Level 2 - High P.E.	-33.95	-11.81	413.18	-517.97	199.18	931.15
Level 1 - High P.E.	-29.04	-7.44	419.36	-537.51	199.87	956.87
Level 3 - Med. P.E.	-36.36	-15.18	409.59	-515.29	198.46	924.88
Level 2 - Med. P.E.	-29.76	-7.39	416.77	-520.64	198.76	937.41
Level 1 - Med. P.E.	-25.90	-4.87	421.66	-535.62	199.36	957.28
Level 3 - Low P.E.	-30.11	-8.16	415.34	-519.19	198.14	934.53
Level 2 - Low P.E.	-25.84	-3.73	420.22	-523.72	198.43	943.94
Level 1 - Low P.E.	-22.93	-2.59	423.81	-534.12	198.82	957.93

Table 63. Ending Net Worth Information for the Jackson County Situation - Farm 2, 75% Guarantee Level and $0.50 per lb. Price Elective for the Cotton Enterprises with the FCI Wheat Enterprise Options Varied

	Nominal Ending Net Worth ($000)						
Program Options	Mean	Median	Max	Min	Std. Dev.	C.V.(%)	Number of Bankrupt Iterations
Federal Crop Insurance							
Level 3 - High P.E.	459.76	481.50	1082.51	-113.91	265.42	57.73	44
Level 2 - High P.E.	472.07	493.85	1097.54	-102.69	265.83	56.31	45
Level 1 - High P.E.	479.03	500.65	1107.59	-115.48	266.93	55.72	43
Level 3 - Med. P.E.	468.45	490.14	1091.70	-106.25	264.93	56.55	44
Level 2 - Med. P.E.	477.69	499.68	1103.39	-99.45	265.65	55.61	43
Level 1 - Med. P.E.	483.26	505.28	1111.33	-112.83	266.51	55.15	43
Level 3 - Low P.E.	476.97	498.93	1101.05	-98.10	264.90	55.54	42
Level 2 - Low P.E.	483.01	505.36	1109.00	-101.44	265.52	54.97	43
Level 1 - Low P.E.	487.17	509.78	1114.83	-110.63	266.12	54.63	42

constant at it's most desirable level (level 1 yield guarantee - low price elective) and the simulations were reproduced for the various levels of coverage for the cotton enterprises. Although the dryland cotton and irrigated cotton enterprises have a different set of yield guarantees and premiums they are assumed to be insured under the same FCI option for this evaluation. In other words, it was assumed that the option which provides the most desirable results for the dryland cotton enterprise also provides the most desirable results for the irrigated cotton enterprise. The results for this part of the analysis are presented in Tables 64 and 65. The level 1 (50 percent) yield guarantee - low price elective option, here again produces the most favorable results. This level of coverage provides for the highest level of average nominal ending net worth ($501,180) and the highest level of average present value of net cash flow (-$13,450). The coefficient of variation of nominal ending net worth for this option is 53.74 percent, the lowest value for these simulations.

For the Jackson County situation the level 1 yield guarantee - low price elective proved to be the most favorable option for both the wheat enterprise and the cotton enterprises. These results parallel the results of the initial simulations of the two Jackson County situations which were presented in the earlier section of this chapter. However, this discovery is quite different from the results of the Texas High Plains study where the level 3 yield guarantee - high price elective option was determined most favorable for cotton enterprises. Apparently, the premiums charged Texas High Plains cotton producers are significantly lower relative to the level of coverage provided, than for Jackson County, Oklahoma. Lemieux, et.

Table 64. Net Cash Flow Information for the Jackson County Situation - Farm 2; 50% Guarantee Level and $2.50 per bu. Price Elective for the Wheat Enterprise with the FCI Cotton Enterprise Options Varied

	Present Value of Net Cash Flow ($000)					
Program Option	Mean	Median	Max	Min	Std. Dev.	Range
Federal Crop Insurance						
Level 3 - High P.E.	-22.93	-2.59	423.81	-534.12	198.82	957.93
Level 2 - High P.E.	-19.31	-5.03	430.27	-547.66	200.48	977.93
Level 1 - High P.E.	-16.94	-2.31	435.02	-560.45	201.84	995.47
Level 3 - Med. P.E.	-20.99	-2.51	425.80	-534.88	198.80	960.68
Level 2 - Med. P.E.	-17.88	-3.91	431.55	-547.22	200.35	978.77
Level 1 - Med. P.E.	-15.86	-1.20	435.75	-558.89	201.62	994.64
Level 3 - Low P.E.	-17.37	-2.55	429.65	-536.71	198.84	966.36
Level 2 - Low P.E.	-15.07	-1.70	434.10	-546.39	200.11	980.49
Level 1 - Low P.E.	-13.45	1.25	437.38	-555.33	201.10	992.71

Table 65. Ending Net Worth Information for the Jackson County Situation - Farm 2, 50% Guarantee Level and $2.50 per bu. Price Elective for the Wheat Enterprise with the FCI Cotton Enterprise Options Varied

	Nominal Ending Net Worth ($000)						
Program Options	Mean	Median	Max	Min	Std. Dev.	C.V.(%)	Number of Bankrupt Iterations
Federal Crop Insurance							
Level 3 - High P.E.	487.17	509.78	1114.83	-110.63	266.12	54.63	42
Level 2 - High P.E.	492.77	512.41	1128.08	-122.83	268.17	54.42	42
Level 1 - High P.E.	496.56	517.15	1132.99	-134.91	269.93	54.36	43
Level 3 - Med. P.E.	489.86	512.32	1118.06	-110.78	266.24	54.35	42
Level 2 - Med. P.E.	494.73	514.53	1127.35	-121.93	268.13	54.20	42
Level 1 - Med. P.E.	497.99	518.67	1134.18	-133.01	269.75	54.17	43
Level 3 - Low P.E.	494.91	516.98	1124.31	-111.47	266.57	53.86	42
Level 2 - Low P.E.	498.57	518.62	1131.48	-120.24	268.06	53.77	42
Level 1 - Low P.E.	501.18	521.97	1136.83	-128.70	269.32	53.74	43

al. indicate that the ratio of indemnities received by the Texas producer to premiums paid is, on the average, always greater than one. In other words, the producer generally receives more in indemnities than the amount of premiums paid by the producer. The opposite appears to be the case for the Jackson County situations used in this analysis.

Federal Crop Insurance Per Acre Premium Adjustments

The Federal Crop Insurance Corporation provides for an adjustment of the per acre premium rates based on the total dollar amount of indemnities received by the individual producer, the total dollar amount of premiums paid by the individual producer and the number of continuous year of Federal Crop Insurance experience in the specific crop. For most crops the premium rates may either be adjusted upward or downward, however, premium rates for cotton or corn can only be adjusted downward from their original value, remain unchanged or be adjusted back upward toward their original value. This adjustment process was built into the simulation model, and occurred throughout the 10 year analysis.

Jackson County

Wheat, dryland cotton and irrigated cotton produced on the Jackson County farms all experienced a substantial reduction in their respective FCI per acre premium rates. Table 66 presents the average per acre premium rate, for each crop in each year, that resulted from the simulations of these farm situations. The premium rates are the average of the 100 values generated in each year of the simulation for

the subsidized (30 percent) level 1 yield guarantee - low price elective option. Since this option produced the most favorable results of any FCI option on the Jackson County situations it was chosen for this evaluation.

Figure 3 presents the average per acre FCI premium rates in each year, resulting from these simulations, as a percentage of the original (1982) premium rate for each crop. Premium rates for all other FCI options (including the unsubsidized options) were analyzed and experienced similar adjustments. The level 1 yield guarantee - low price elective option resulted in smaller adjustments than for any other option. Although the premium rate for wheat adjusted the smallest dollar amount, it experienced the largest percentage change. It would be difficult to determine if the complete adjustments in the premium rates had been made by the end of the 10 year period. In other words, if the simulations were made over a longer planning horizon these premium rates may be reduced further. According to the adjustment process provided for by the FCIC the premium rates for wheat, grain sorghum and soybeans could have been reduced by a maximum of 35 percent of their 1982 value by the end of 10 years of continuous experience and a maximum of 50 percent is possible in later years (Table 4). Cotton premiums can only be reduced, according to the FCIC, by 25 percent of their original value (Table 5). Based on these figures, it appears that little additional adjustment in premiums would occur after the 10 year period.

Table 66. Average Federal Crop Insurance Per Acre Premium Rates for Years 1982 - 1991 for Insurable Crops Produced on the Jackson County Farm Scenarios - Farm 1 and Farm 2

Year	Wheat	Dryland Cotton	Irrigated Cotton
	($/Acre)	($/Acre)	($/Acre)
1982	1.90	2.60	4.55
1983	1.81	2.48	4.32
1984	1.81	2.48	4.32
1985	1.73	2.37	4.11
1986	1.73	2.37	4.10
1987	1.64	2.26	3.89
1988	1.58	2.17	3.70
1989	1.49	2.07	3.48
1990	1.40	2.06	3.47
1991	1.40	2.03	3.46

Premium rates represent subsidized per acre premium rates for the "best" FCI option analyzed on the farm scenaios; 50% Guarantee Level with the Low Price Elective.

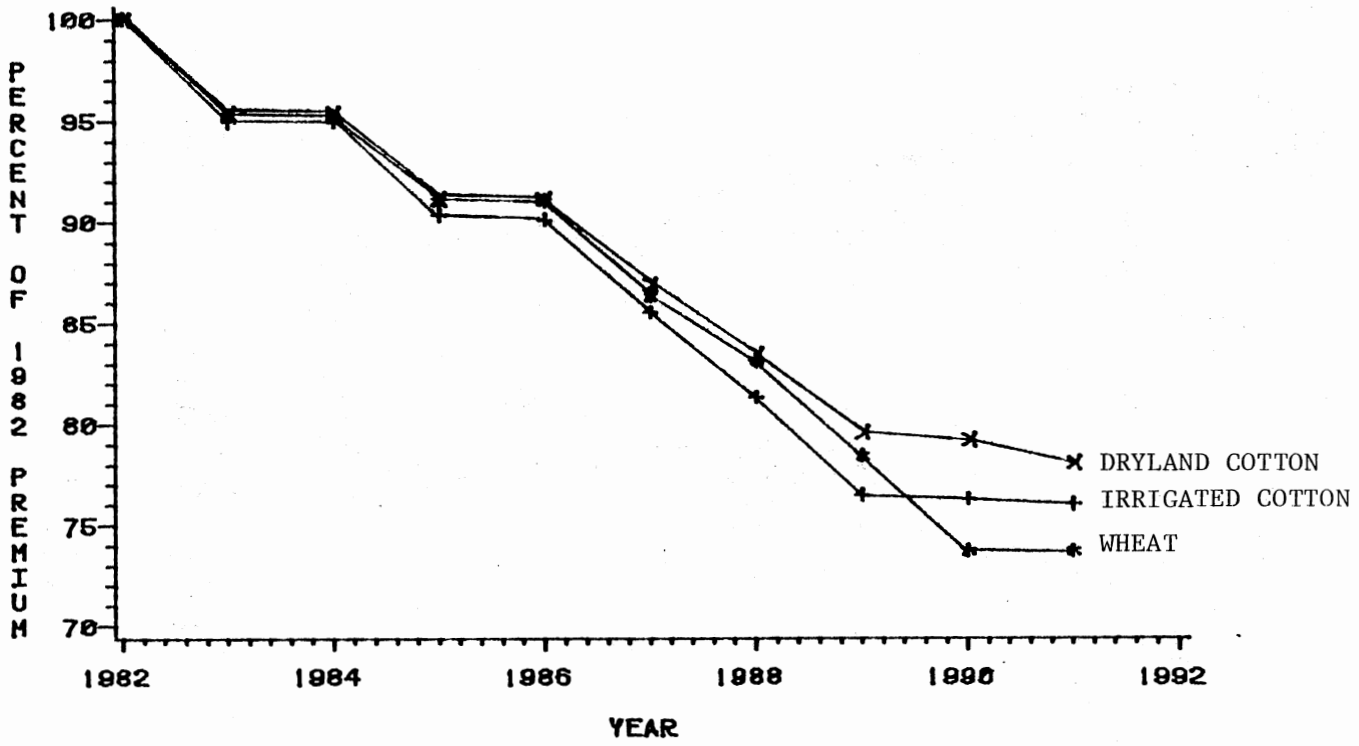

Figure 3. Average Federal Crop Insurance Per Acre Premium Rates as a Percent of the 1982 Premium Rates for Insurable Crops Produced by the Jackson County Farm Scenarios - Farm 1 and Farm 2.

Wagoner County

The adjustments in per acre premium rates for Wagoner County crops are somewhat different than those for the Jackson County enterprises. Premium rates evaluated for the Wagoner County situation are those for the level 2 yield guarantee - low price elective option. Table 67 presents the average per acre FCI premium rates for each year of the Wagoner County simulations assuming the most favorable FCI option. Figure 4 presents these premium rates as a percentage of their 1982 value.

The premium rate for wheat was reduced only a slight amount over the planning horizon. This may indicate that this premium rate is set at a nearly "correct" level. Small reductions in the premium rates indicate that (on the average) slightly more had been paid in premiums than had been received as indemnity payments over the planning horizon. Setting the premium rates at a level at which they will automatically adjust downward to the proper level may allow for the FCIC to build up its reserve to cover unexpected losses. (This reserve is an objective of the FCIC in setting premium rates.) The premium rate for grain sorghum in Wagoner County was reduced significantly from it's original value. The soybean premium rate was reduced by more than 20 percent over the 10 year period, a reduction very similar to the adjustments made in the premium rates for the Jackson County crops.

Texas County

The premium rates for the Texas County crops generally experienced a greater downward adjustment than did the premium rates

Table 67. Average Federal Crop Insurance Per Acre Premium Rates for Years 1982 - 1991 for Insurable Crops Produced on the Wagoner County Farm Scenario - Farm 3

Year	Wheat	Grain Sorghum	Soybeans
	($/Acre)	($/Acre)	($/Acre)
1982	1.60	2.30	4.20
1983	1.54	2.20	4.02
1984	1.57	2.22	4.02
1985	1.53	2.15	3.87
1986	1.54	2.17	3.91
1987	1.53	2.10	3.73
1988	1.50	2.03	3.59
1989	1.49	1.97	3.42
1990	1.48	1.94	3.28
1991	1.51	1.95	3.27

Premium rates represent subsidized per acre premium rates for the "best" FCI option analyzed on the farm scenario; 65% Guarantee Level with the Low Price Election.

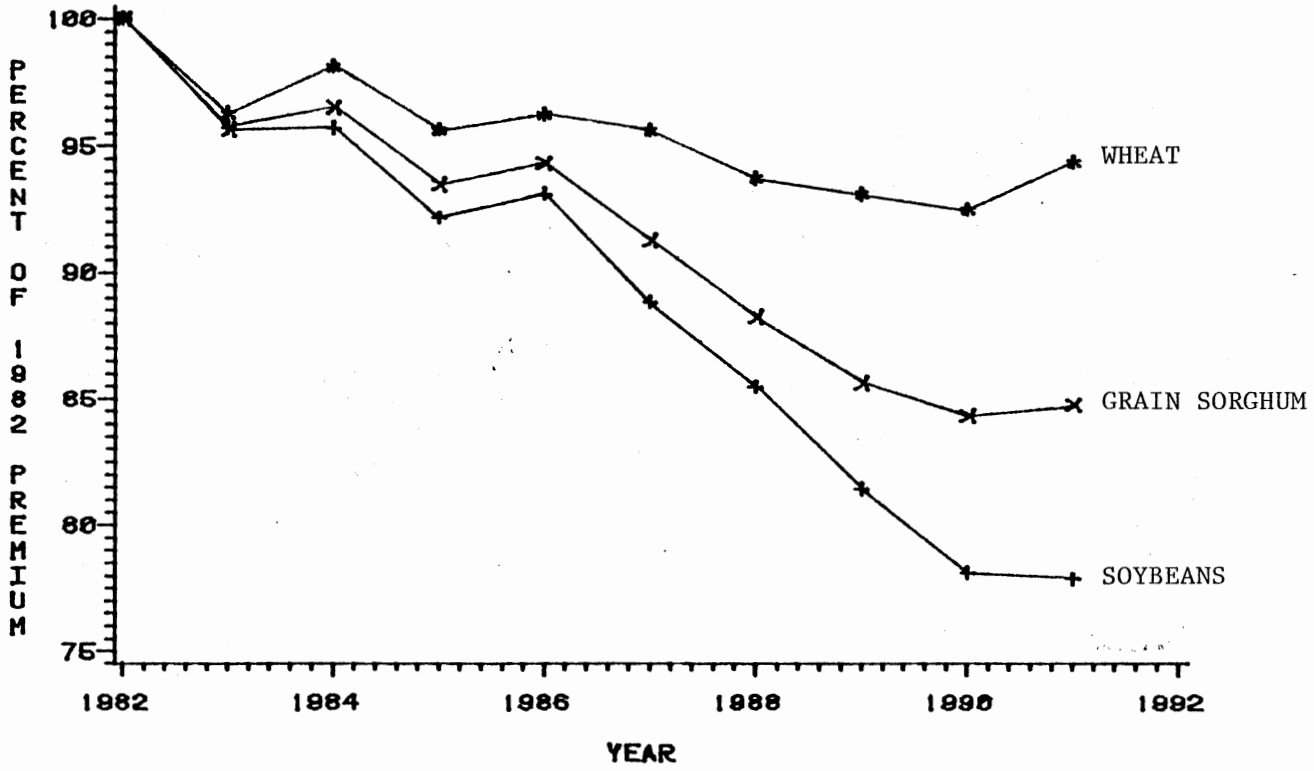

Figure 4. Average Federal Crop Insurance Per Acre Premium Rates as a Percentage of the 1982 Premium Rates for Insurable Crop Produced by the Wagoner County Farm Scenario - Farm 3.

for the other two county situations. Table 68 presents the average values of the per acre premium rates for each insurable Texas County crop in each year of the simulation. Figure 5 illustrates the reductions in these premium rates as a percentage of their 1982 value. These premium rates represent the most favorable (subsidized) Federal Crop Insurance option, the level 1 yield guarantee - low price elective.

The irrigated wheat premium rate was reduced slightly more than was the rate for dryland wheat. Both of these premium rates were reduced by almost 30 percent over the 10 year period, the largest percentage reductions of any of the premiums analyzed in this section. The premium rate for irrigated grain sorghum was reduced almost as much as were the wheat premiums (dryland grain sorghum is produced on the Texas County scenario but is not insurable with the FCIC). The irrigated corn premium rate was reduced by almost 25 percent.

Government Costs

Most of this analysis has dealt with benefits of government commodity and insurance programs from the producer's perspective. However, the costs of providing assistance to agricultural producers have been a topic of recent debate and deserves attention. Concern for government costs is probably a major reason for the implementation of the Federal Crop Insurance Program. The costs and benefits associated with providing assistance to these producers are difficult to measure, perhaps because the costs and benefits may be different for different crops and geographical areas. To measure differences in government costs, estimates are made of costs (or surpluses)

Table 68. Average Federal Crop Insurance Per Acre Premium Rates for Years, 1982 - 1991 for Insuranble Crops Produced on the Texas County Farm Scenario - Farm 4

Year	Dryland Wheat	Irrigated Wheat	Irrigated Grain Sorghum	Irrigated Corn
	($/Acre)	($/Acre)	($/Acre)	($/Acre)
1982	2.30	2.30	1.70	3.00
1983	2.19	2.19	1.62	2.85
1984	2.19	2.19	1.62	2.85
1985	2.08	2.07	1.54	2.70
1986	2.08	2.07	1.54	2.70
1987	1.96	1.96	1.46	2.56
1988	1.85	1.84	1.38	2.43
1989	1.74	1.73	1.29	2.29
1990	1.62	1.61	1.21	2.28
1991	1.63	1.61	1.21	2.27

Premium rates represent subsidized per acre premium rates for the "best" FCI option analyzed on the farm scenario; 50% Guarantee Level with the Low Price Election.

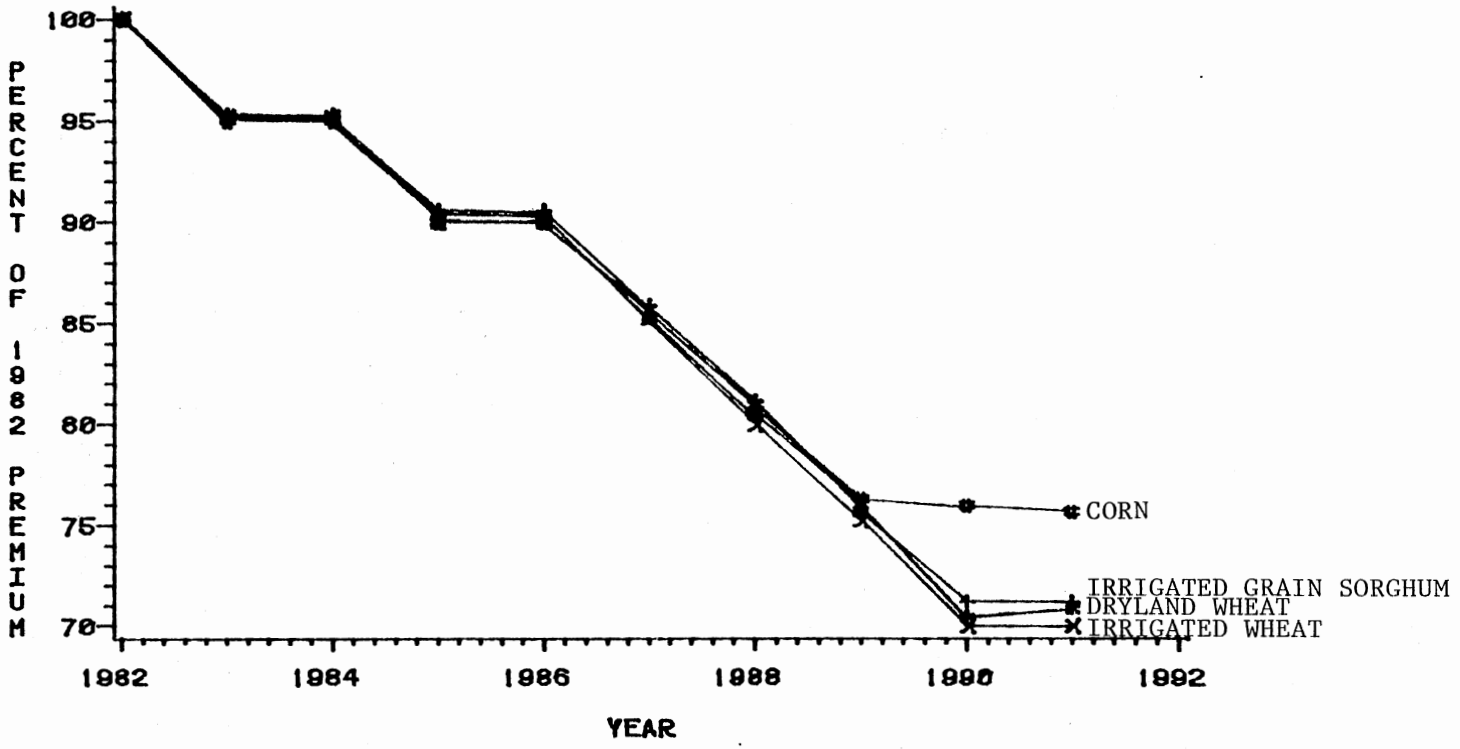

Figure 5. Average Federal Crop Insurance Per Acre Premium Rates as a Percentage of the 1982 Premium Rates for Insurable Crops Produced by the Texas County Farm Scenario - Farm 4.

associated with providing assistance to farm producers in the form of low yield disaster payments, deficiency payments and all-risk crop insurance.

It is assumed that the administrative cost of these programs is essentially a sunk cost or at least is uniform across government farm programs. With this assumption, the only difference in government costs are the differences in the levels of payments made to producers. By constructing a set of probabilities for various price and yield levels, an expected per acre cost or surplus for each crop in each county can be determined for each government farm program alternative. Each of the price and yield levels is assigned a probability based on the stochastic yields and prices generated by the model. The disaster payments for each yield level are calculated according to equation (5) in Chapter II and converted to a per acre basis. The disaster payment for each yield level is multiplied by its respective probability and the results are summed to determine the expected per acre government cost for the specific crop. The expected per acre government cost for the Deficiency Payments Program is calculated in the same manner based on equation (4) in Chapter II and the probability of each price level. Government costs or surpluses could result with the Federal Crop Insurance Program because of the premium which must be paid by the participating producer. With this program, the indemnity payment for each yield level is calculated according to equation (6) in Chapter II and expressed on a per acre basis. The per acre premium rate is then subtracted from the indemnity payment for each yield level (for higher yield levels the indemnity payment may be equal to zero). This will result in either a net government surplus or net government cost at

each yield level. The net surplus and net costs are then multiplied by their respective probabilities and summed to arrive at the expected per acre government cost or surplus. In this analysis these costs and surpluses are computed based on the 1982 premium rates. If these premiums are reduced as indicated in the previous section the expected per acre government costs will be increased and the expected per acre government surpluses will be reduced. To show this effect the per acre government cost and surpluses for the FCI Program are calculated based on the average value of the adjusted premium rates presented in the previous section and discussed in the following text along with the government costs and surpluses based on the 1982 premium rates.

Jackson County

The expected per acre government costs for providing the Jackson County production situations with the Deficiency Payments Program and the Disaster Payments Program are presented in Figure 6. These estimates of government costs are presented as per acre costs for each crop and are restricted to this subject area. Although these costs are based on the normal farm yields assumed for the specific farm situations, they may also represent a county average expected per acre government cost because the normal farm yields are the county average yields and the yield distributions are based on a subjective interpretation of historical county yield series. Slight differences may occur because the variability in farm level yields may differ from farm to farm.

The expected costs of both cotton programs are considerably higher than for wheat with both the Deficiency Payments Program and

the Disaster Payments Program. The costs associated with providing these programs are higher for irrigated cotton than for dryland cotton. The estimated government costs per acre for the Deficiency Payments Program are $2.99, $11.82 and $29.00 for wheat, dryland cotton and irrigated cotton, respectively. For the Disaster Payments Program the estimated per acre government costs are $1.28, $3.59 and $9.22 for wheat, dryland cotton and irrigated cotton, respectively. There is a substantial difference in the cost associated with providing each of these programs. The Deficiency Payments Program costs for each crop are considerably higher than the costs associated with the Disaster Payments Program. But, since one of these programs is a low yield program and the other is a low price program perhaps, it would be more appropriate to compare the costs of the Disaster Payments Program with the costs (or surpluses) of the Federal Crop Insurance Program.

All of the options of the Federal Crop Insurance Program produced expected per acre government surpluses in Jackson County. These surpluses are presented in Figures 7 and 8. Figure 7 presents the expected per acre government surpluses for each option assuming the subsidized premium rates, and Figure 8 presents the expected per acre government surpluses for each option assuming the base or non-subsidized premium rates. The surpluses are generally 30 to 40 percent higher with the non-subsidized premiums. This effect should be expected since, in effect, the government is paying part of the premiums when the premiums are reduced for the 30 percent subsidy. These surpluses are reduced each time the yield guarantee level is reduced. This reduction also occurs as the price elective is reduced.

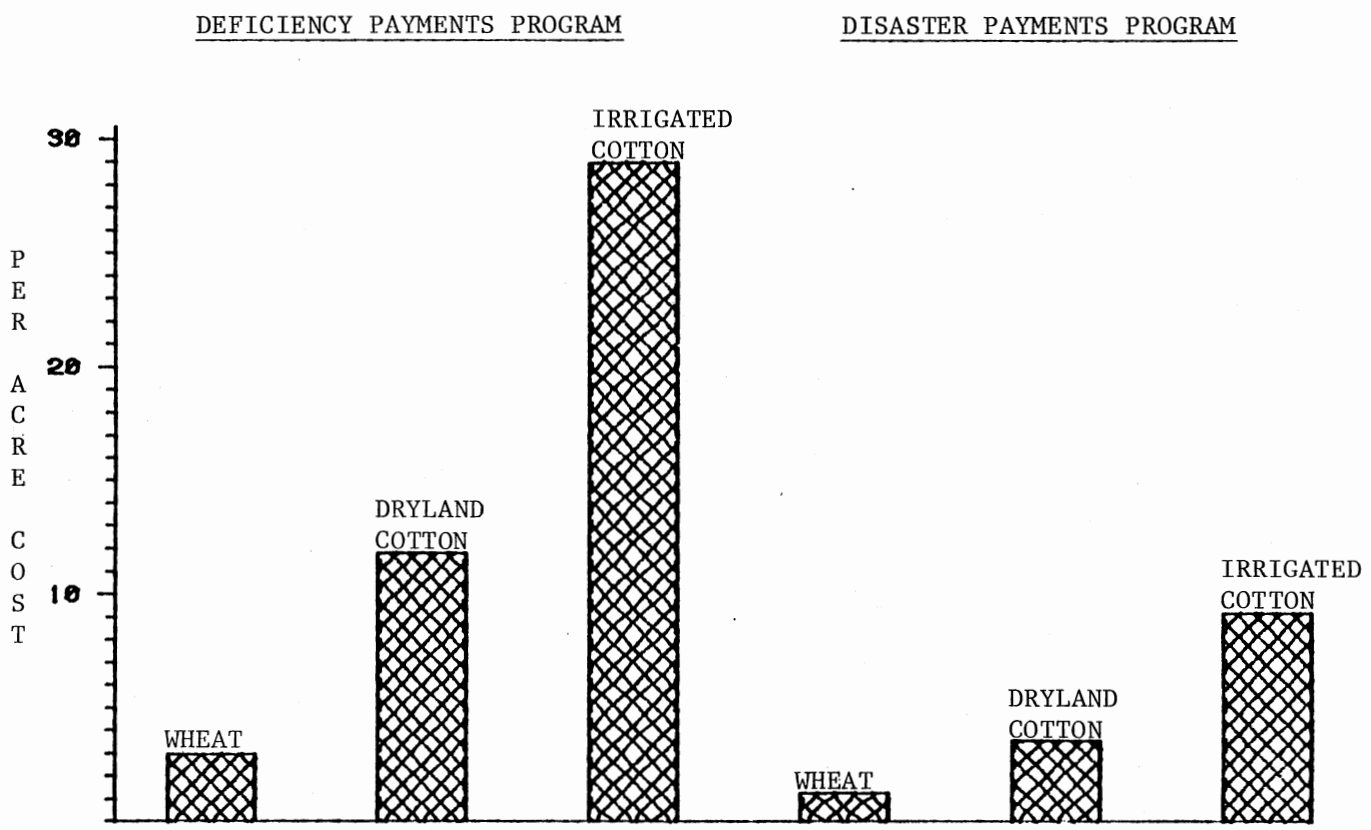

Figure 6. Per Acre Government Costs Under the Deficiency Payments Program and the Disaster Payments Program for Jackson County Crops.

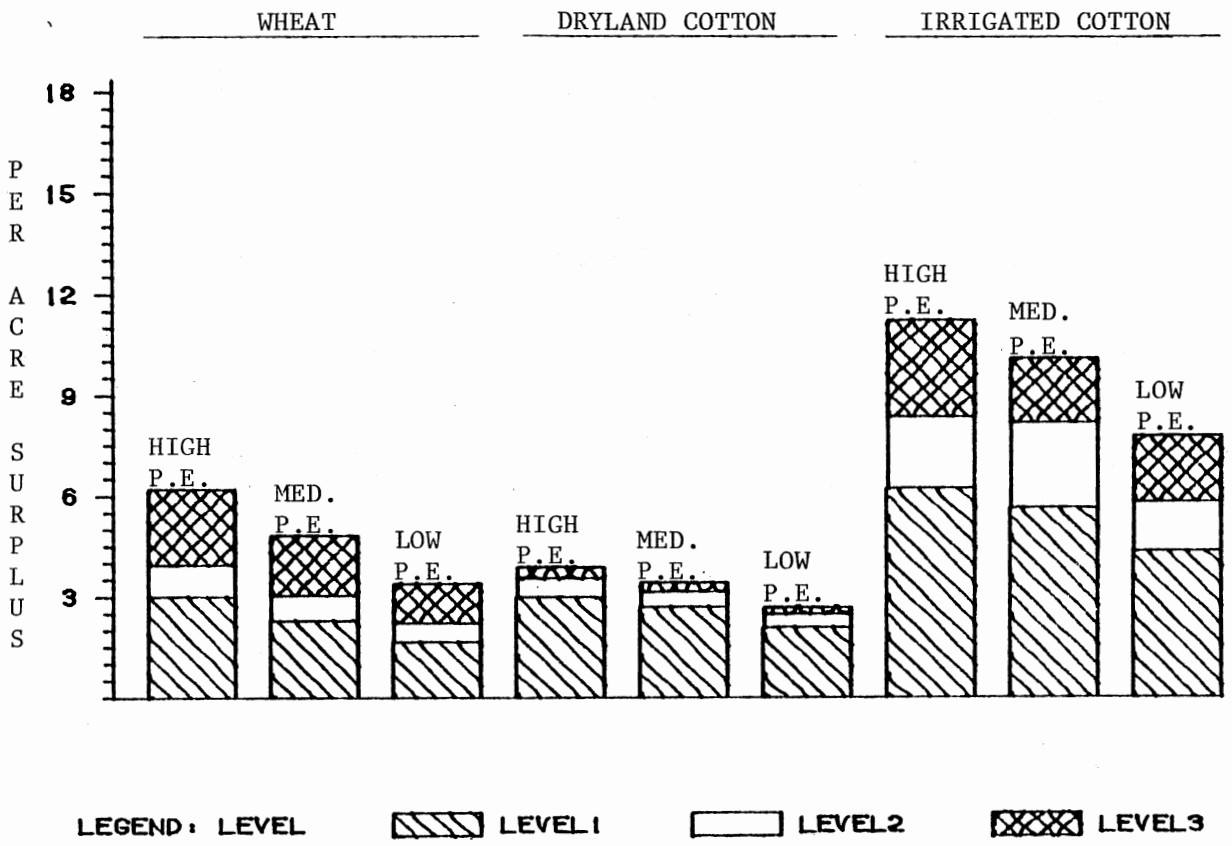

Figure 7. Per Acre Government Surpluses Under the Federal Crop Insurance Program for Insurable Jackson County Crops Assuming Subsidized Premiums.

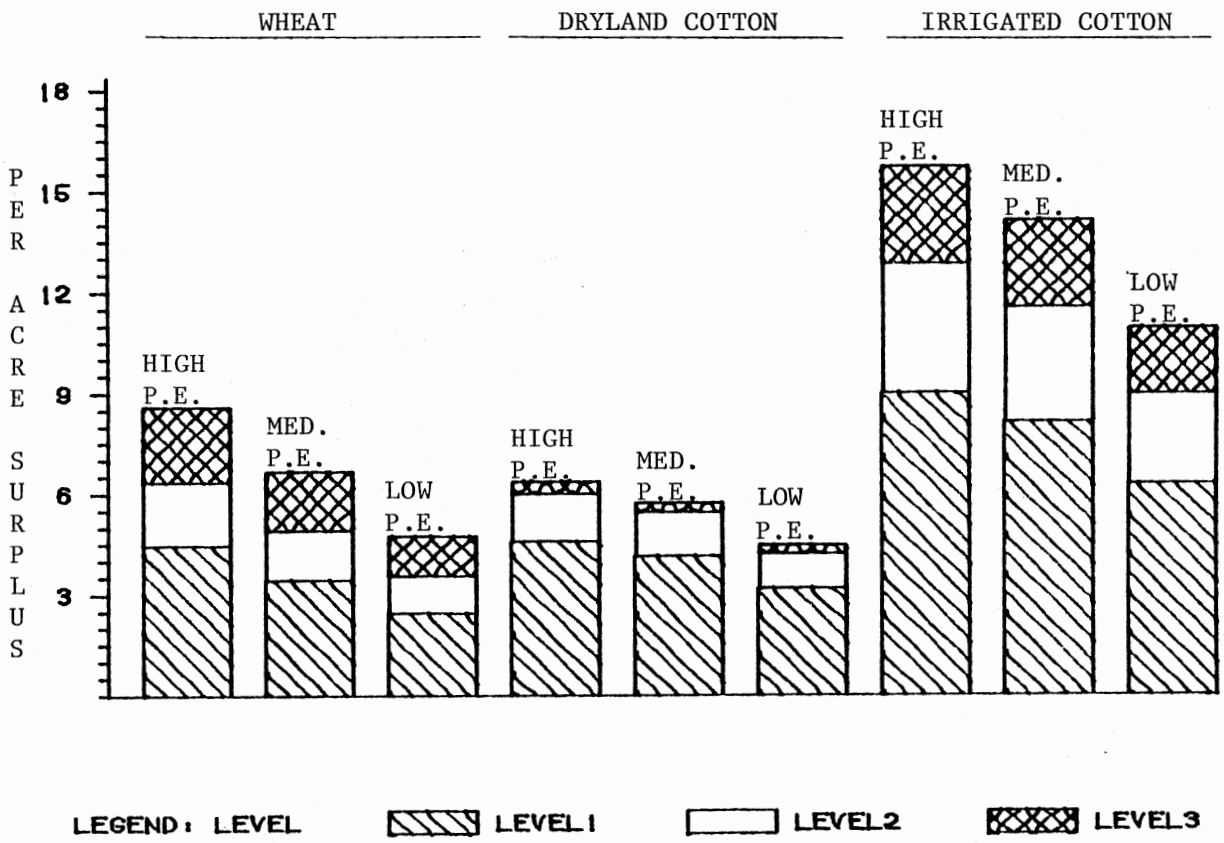

Figure 8. Per Acre Government Surpluses Under the Federal Crop Insurance Program for Insurable Jackson County Crops Assuming Nonsubsidized Premiums.

The most favorable FCI option yields the lowest level of surpluses generated to the government for each crop. The level 1 yield guarantee - low price elective results in surpluses of $1.66, $2.11 and $4.36 with the subsidized premiums, and $2.46, $3.21 and $6.31 with the non-subsidized premiums for wheat, dryland cotton and irrigated cotton, respectively. When the average of the adjusted subsidized premium rates for the level 1 yield guarantee - low price elective option are incorporated into this analysis the per acre government surpluses become $1.41, $1.80 and $3.75 for wheat, dryland cotton and irrigated cotton, respectively. One objective of the FCI program is to reduce the government costs associated with providing a low yield assistance program. For this area, Federal Crop Insurance not only reduces costs but generates revenues for the government.

Wagoner County

The expected per acre government costs for wheat are slightly higher in Wagoner County than in Jackson County for both the Deficiency Payments Program and the Disaster Payments Program. These higher costs are probably due to the slightly higher normal farm yields used in the calculations of the payments. The estimates of the expected costs for wheat are $3.49 and $1.89 per acre for the Deficiency Payments Program and the Disaster Payments Program, respectively. With the grain sorghum enterprise the expected costs is higher for the Disaster Payments Program ($0.58) than for the Deficiency Payments Program ($0.26). These costs are presented in Figure 9 and could indicate that low grain sorghum yields are more common than low grain sorghum prices in Wagoner County.

Figures 10 and 11 present the estimates of the per acre government costs and surpluses from participating in the Federal Crop Insurance Program. The costs and surpluses presented in Figure 10 represent those resulting when the per acre premiums are reduced for the 30 percent subsidy. Figure 11 presents the costs and surpluses of providing the FCI Program with the base or non-subsidized premiums. Some of the FCI options produce net expected government costs for the Wagoner County wheat enterprise. This is considerably different from the Jackson County results in which all FCI options resulted in surpluses. The level 2 yield guarantee - low price elective produces an expected government surplus of $0.04 per acre with the non-subsidized premiums and an expected government cost of $0.67 per acre with the subsidized premiums. The level of expected government cost is highest with the level 3 (75 percent) yield coverage at each price elective and changes from a net cost to a net surplus as the level of yield coverage is reduced. The net expected costs are reduced and are changed to surpluses as the price electives are reduced.

All of the FCI options result in net expected per acre government surpluses for the grain sorghum enterprise under both the subsidized and non-subsidized premiums. The level 2 (65 percent) yield coverage produces the highest surpluses and the level 1 (50 percent) yield coverage produces the lowest surpluses at each price elective. These surpluses are reduced as the price electives are changed to lower values. The FCI Program also generates government surpluses for soybean coverage in Wagoner County under all options. The highest surplus for soybean coverage is produced under the level 3 yield

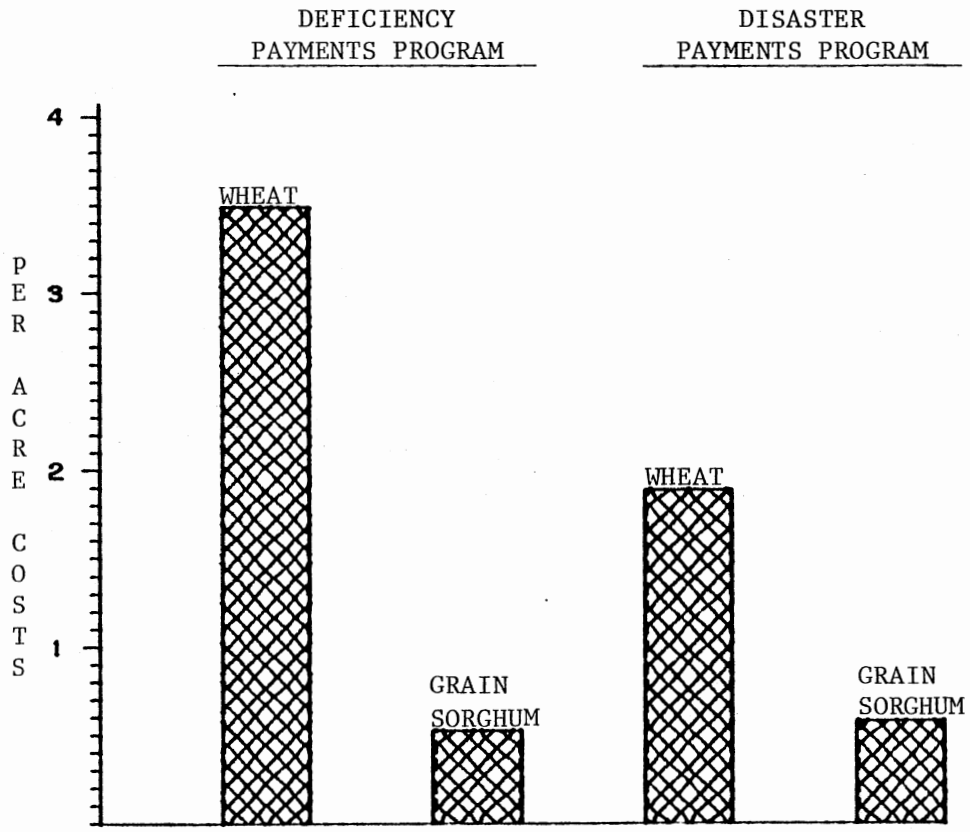

Figure 9. Per Acre Government Costs Under the Deficiency Payments Program and the Disaster Payments Program for Wagoner County Crops.

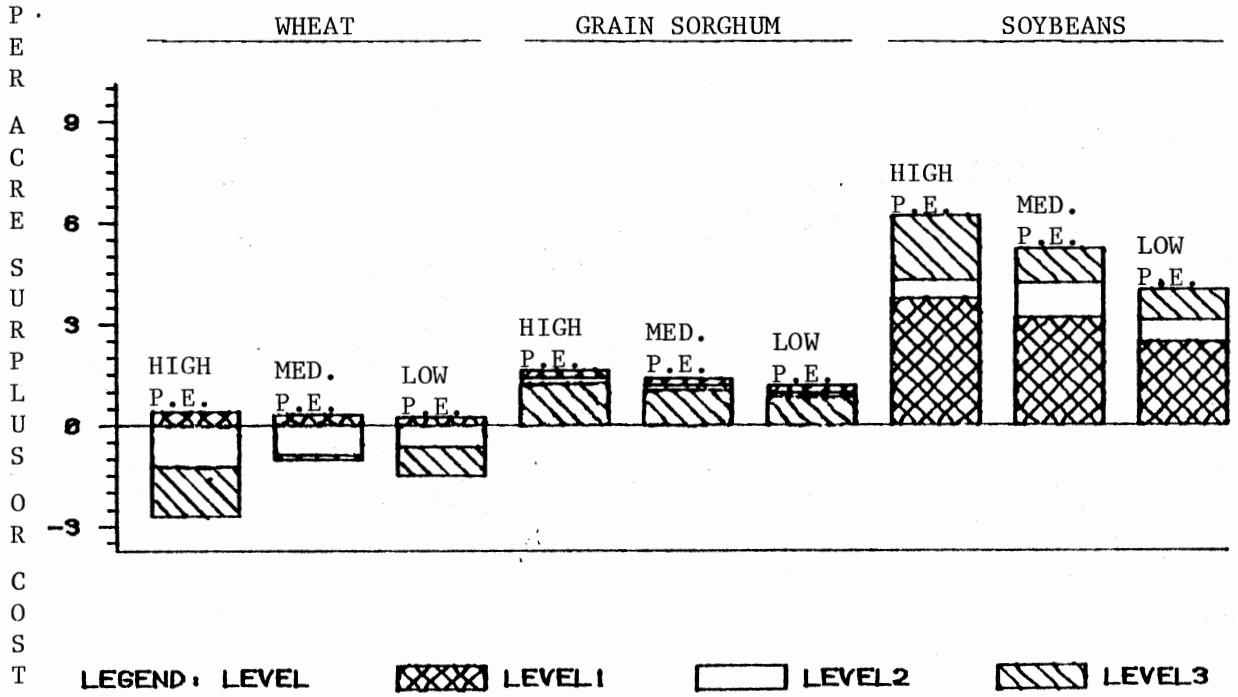

Figure 10. Per Acre Government Surpluses and Costs Under the Federal Crop Insurance Program for Insurable Wagoner County Crops Assuming Subsidized Premiums.

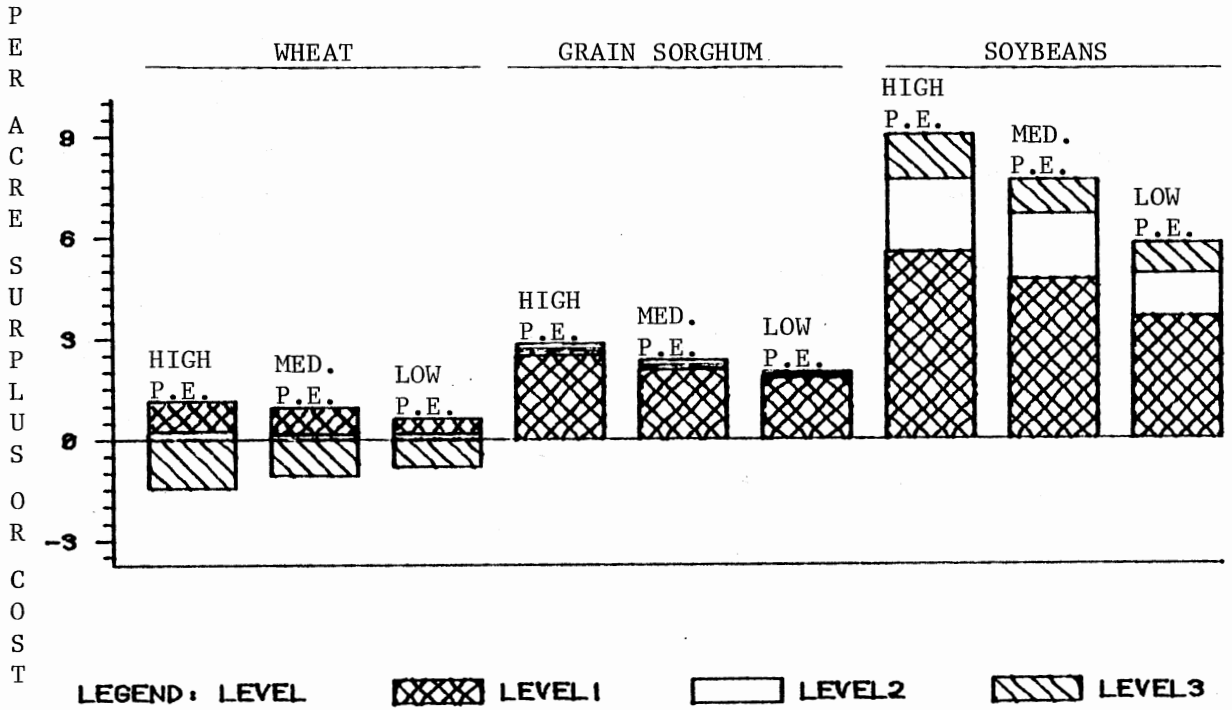

Figure 11. Per Acre Government Surpluses and Costs Under the Federal Crop Insurance Program for Insurable Wagoner County Crops Assuming Nonsubsidized Premiums.

guarantee - low price elective. As the guarantee level is reduced these surpluses are also reduced, and the same effect occurs as the price elective is reduced. The adjusted premium rates produce the expected changes in the per acre government costs and surpluses for the level 2 yield guarantee - low price elective option. With these premium rates the per acre government cost for wheat coverage is higher ($0.77). The surpluses for grain sorghum and soybeans are lower, at levels of $0.77 and $2.63, respectively.

Texas County

The analysis of Disaster Payments and Deficiency Payments Program government costs for the Texas County situation produces results very similar to the Wagoner County analysis. The estimated expected per acre government costs of providing the Deficiency Payments Program and Disaster Payments Program for each crop produced on the Texas County farm scenario are presented in Figure 12. The cost of providing the Deficiency Payments Program is significantly higher for irrigated wheat than for dryland wheat, and likewise for the grain sorghum enterprises. This effect was expected because the normal farm yields for the irrigated corps are higher than the normal farm yields for the dryland crops. These expected per acre government costs are $2.26, $4.25, $0.35, $0.97 and $0.02 for dryland wheat, irrigated wheat, dryland grain sorghum, irrigated grain sorghum and irrigated corn, respectively. The costs for providing the Disaster Payments Program are higher for the dryland crops than for the respective irrigated crops, possibly because there is a greater variability in the dryland yields. For both wheat enterprises and for the irrigated grain

sorghum enterprise the costs of providing the Deficiency Payments Program are substantially higher than for providing the Disaster Payments Program.

All of the Federal Crop Insurance Program options produce surpluses for dryland wheat, irrigated wheat, and irrigated corn. Dryland grain sorghum is an uninsurable crop in Texas County. Figures 13 and 14 illustrate the levels of these costs and surpluses assuming the subsidized premiums and non-subsidized premiums, respectively.

The resulting surpluses for dryland wheat, irrigated wheat and irrigated corn are very similar to the surpluses resulting from the Jackson County analysis. In other words, as the guarantee level is reduced the level of the surpluses is also reduced. The same effect occurs as the price electives are reduced. The most favorable option, the level 1 yield guarantee - low price elective option, produces the lowest level of expected per acre government surplus for each of these crops. Analyzing these per acre government surpluses for this option with the average adjusted subsidized premium rates shows that the surpluses are reduced as the premium rates are adjusted downward. These surpluses are $1.80, $1.96, $1.29 and $2.42 for dryland wheat, irrigated wheat, irrigated grain sorghum and irrigated corn, respectively.

Some of the FCI options produce expected per acre government costs for the irrigated grain sorghum enterprise. These costs are always associated with the level 3 (75 percent) yield guarantee options and the highest costs occur with the high price electives. The level 1 yield guarantee options result in the highest level of government surpluses.

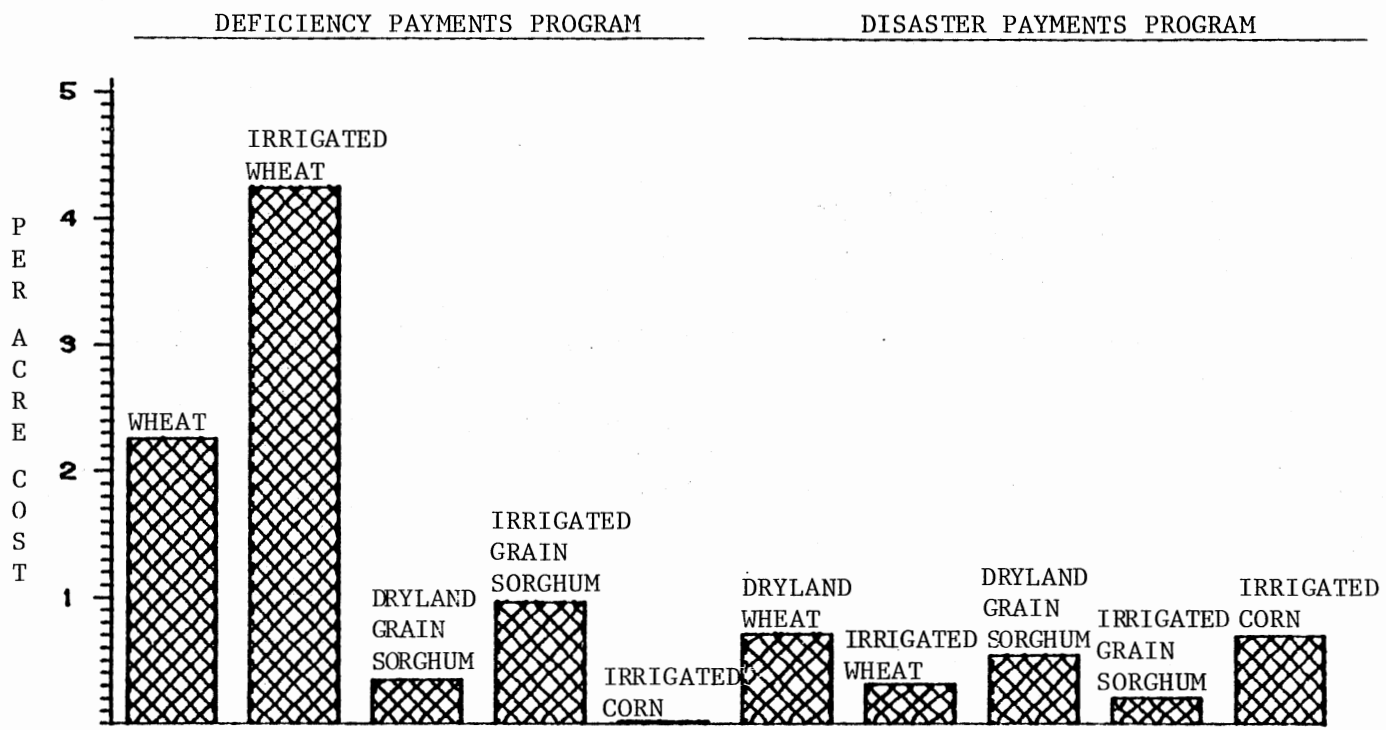

Figure 12. Per Acre Government Costs Under the Deficiency Payments Program and the Disaster Payments Program for Texas County Crops.

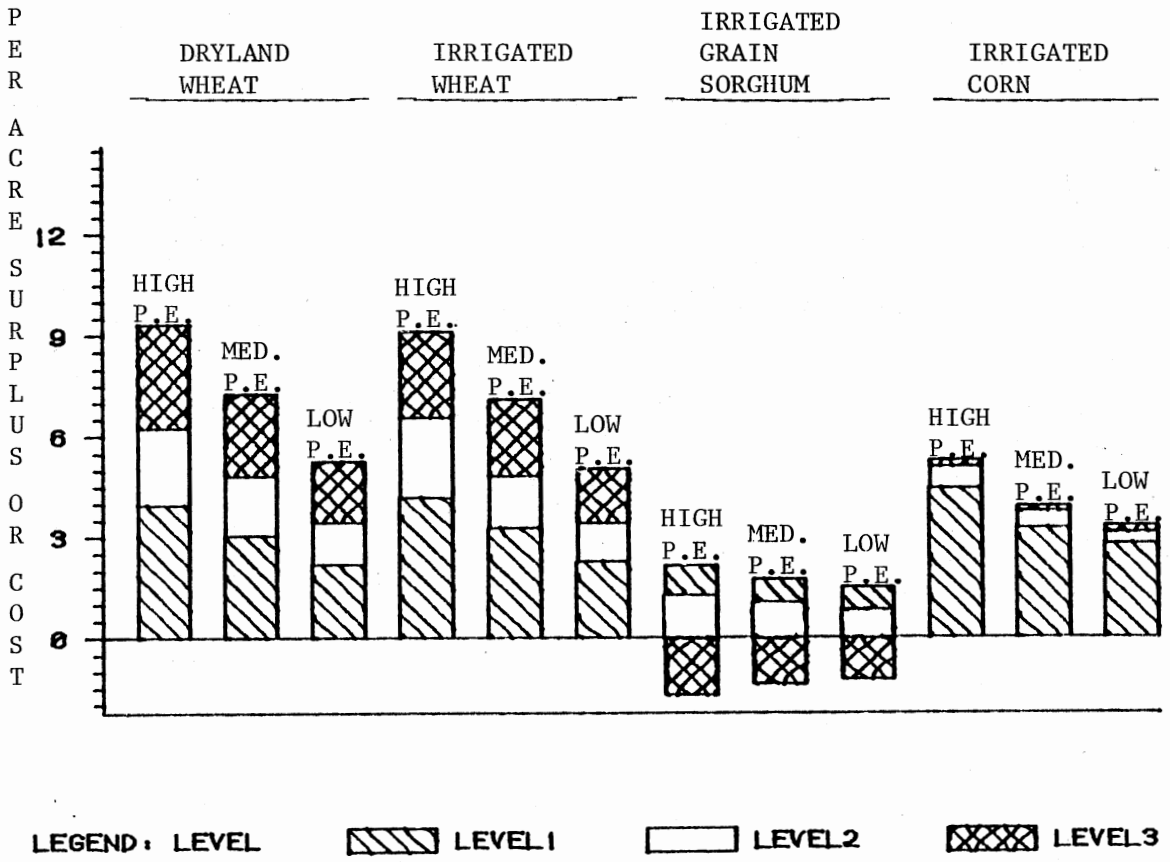

Figure 13. Per Acre Government Surpluses and Costs Under the Federal Crop Insurance Program for Insurable Texas County Crops Assuming Subsidized Premiums.

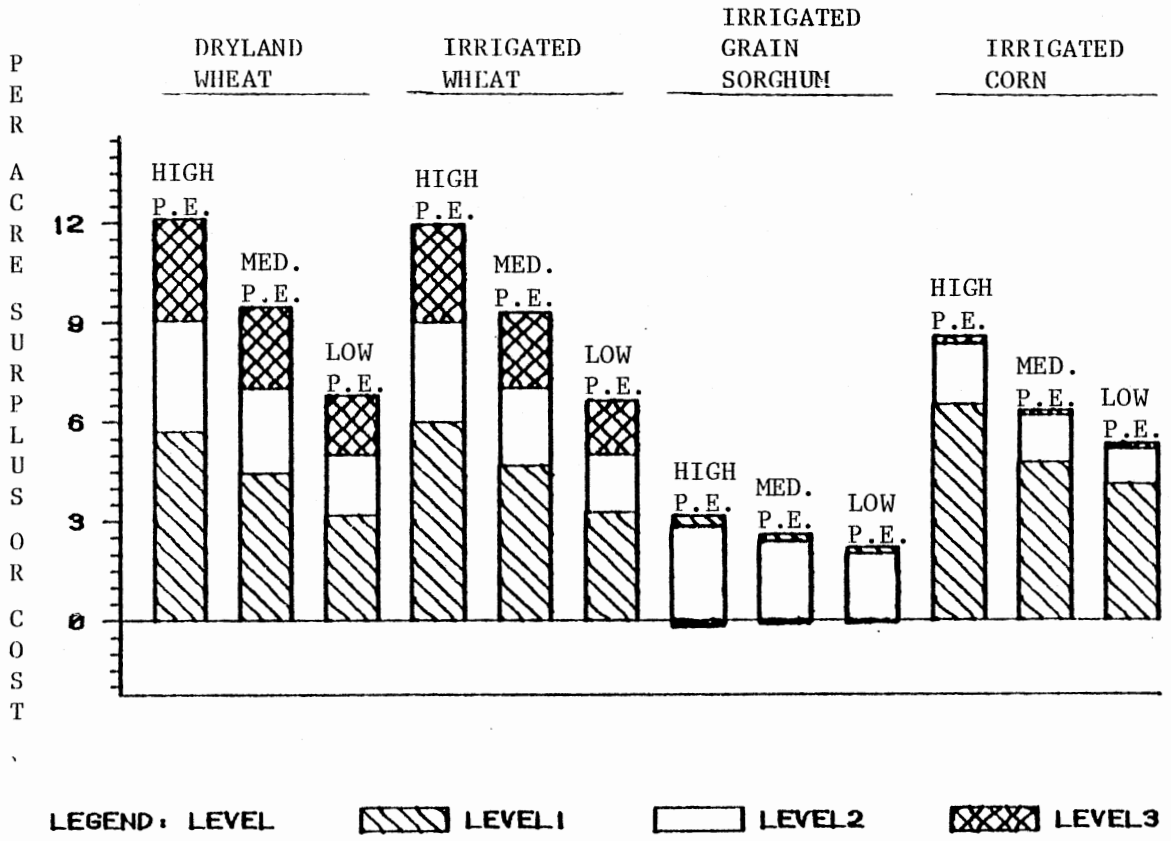

Figure 14. Per Acre Government Surpluses and Costs Under the Federal Crop Insurance Program for Insurable Texas County Crops Assuming Nonsubsidized Premiums.

In all cases where surpluses are produced, the level of the surplus is less than the premium rate for the specific option. But, in some cases of the FCI program (those in which expected per acre government costs are produced) the costs are greater than the costs associated with providing the Disaster Payments Program. In these cases the objective of reducing government costs of providing a low yield program is not fulfilled. In general though, this objective is more than fulfilled with the FCI Program.

The following chapter provides a summary of the problem analyzed in this study and the procedures used in completing the analysis. This chapter also presents a summary of the results generated by the analysis and draws the information together to make conclusions about the government farm programs analyzed in this study. The conclusions presented are made with respect to public and producer objectives concerning the provision of and participation in government farm risk management programs such as the ones dealt with in this study.

CHAPTER V

SUMMARY AND CONCLUSIONS

Agricultural producers have long been subjected to a high degree of variability in both prices and yields of agricultural commodities resulting in a high level of variability in the income levels of agricultural producers. Natural phenomena are generally the major causes of yield instability. Commodity price variability is the result of many factors including business cycles, commodity cycles, exports, commodity price supports and worldwide weather events. Government farm risk management programs have historically been designed to buffer the instability in agricultural producer income levels caused by the variability in commodity prices and yields.

Throughout, the history of American agriculture the U.S. government has enacted many policies and programs designed to support and, to a lesser extent, stabilize the level of income for farm producers. In recent years, concern has been voiced over high government costs associated with providing these programs. Many policymakers now feel that farm policy objectives include supporting farm income, reducing farm income variability, maintaining low, stable food costs and reducing the costs of government programs. The three programs analyzed in this study are the Disaster Payments Program, the Deficiency Payments Program and the Federal Crop Insurance Program. The Federal Crop Insurance Act of 1980 was designed to make "all risk"

crop insurance available on virtually all major crops in all producing areas of the country. The replacement of the Disaster Payments Program by the FCI Program is an attempt to meet the new farm policy objectives.

The major objective of this study is to analyze the effects of participation in alternative government farm programs and combinations of these programs on the economic measures of the firm's growth and viability. A detailed analysis of each government farm program alternative and it's impacts on the firm growth and income levels and on the firm's chances of survival is made in a simulation context. To make these analyses, a simulation model which incorporates stochastically generated prices and yields was used under differing government farm program assumptions. This model simulates a specified farm scenario for a specified planning horizon and replicates the simulations to produce summary statistics for relevant financial variables. This model calculates balance sheet and net cash flow information and determines the number of bankrupt iterations occurring in each simulation. The model was modified to incorporate the effects of the analyzed government farm programs.

Four farm scenarios were designed to represent typical, full-time, commercial farming operations in three different Oklahoma counties. Two farm situations were developed for Jackson County. These two scenarios are very similar, but differ in beginning equity levels. One farm situation has assets of approximately $879,468 and a beginning equity to assets ratio of approximately 70.33 percent. The other Jackson County farm is a lower equity situation with total assets of $907,411 and a beginning equity to asset ratio of 39.49

percent. Based on the results for Jackson County, a decision was made to focus on only low equity situations in Wagoner County and Texas County. The Wagoner County scenario has a total asset value of $639,619 and a beginning equity to asset ratio of 39.50 percent. Total assets of the Texas County scenario have a beginning value of $1,403,711 and a beginning equity to asset ratio of 38.97 percent. The low beginning equity levels for farms in three geographical areas permits an analysis of the impacts of alternative risk management programs on farm survival and growth.

The data required by the model for each farm situation includes a complete description of the firm's beginning financial situation, the organization of production, the expected future investments in machinery and equipment and the government farm program to be analyzed. For each county situation, a set of randomly generated, correlated and triangularly distributed price and yield series were generated based on a subjective interpretation of historical series of prices and yields. An effort was made to represent the variability in the prices and yields that farm producers face in these different geographical locations within the state. The 1982 target prices, loan rates, costs of participation and each farm situation's normal farm yields for the crops produced, where appropriate, are specified for each government farm program analyzed. These scenarios are simulated over a 10 year planning horizon and the simulations are replicated 100 times under each government farm program alternative.

The government farm programs analyzed in this study are the Disaster Payments Program, the Deficiency Payments Program and the Federal Crop Insurance Program. Under the FCI Program the producer

may choose one of three yield guarantee levels (50, 65 or 75 percent of the normal crop yield) and one of three crop price electives. These producer choices provide the participating farmer with nine FCI coverage options. When no participation and combinations of the alternative government programs are considered, a total of 40 alternatives are evaluated. Some of these alternatives do not currently represent real program choices to agriculture producers. All of the alternatives do, however, represent program choices that are currently available or that have been available within the past few years. When program combinations are evaluated certain adjustments are made in participation requirements. For example, the FCI premium rates are increased when participation is assumed in the FCI Program in combination with the Disaster Payments Program because the producer is ineligible for the 30 percent FCI premium subsidy.

Government Farm Risk Management Strategies

This section summarizes the resulting effects of participation in the various government farm program alternatives. The programs are analyzed assuming the current (1982) situation remains constant. In other words, the only effects desired are those created by the government farm programs, random prices and yields and their accumulative effects on the farm firm. These results are compared based on the level and variability of present value of net cash flow and nominal ending net worth. The number of bankruptcies that occurred in the simulation of the scenarios is also used as a basis of comparison.

Jackson County

The analyses of the two Jackson County scenarios reveal that the firms are subject to the adverse effects of low commodity prices and yields in the absence of an income stabilization program. By comparing the two scenarios it is apparent that a lower equity position significantly increases the chances of firm failure. Analysis of the low equity Jackson County situation assuming no participation in government farm programs indicates that there is a 38 percent chance of firm failure. Agricultural producers with low equity positions should analyze the feasibility of participation in the government farm programs in an attempt to relieve the chances of firm failure associated with low prices and yields. However, high equity farm situations with little chance of firm failure may still find participation in government farm programs advantageous.

The results of simulations assuming individual participation in each of the government farm programs are considerably varied from program to program for producers in this area. The Disaster Payments Program tends to result in decreases in net worth and income from that which occurs with no program participation and increases the chances of firm failure. However, the level of variability in net worth, and income is reduced below the levels of variability resulting with no participation. These lower levels of income and firm growth are due, at least in part, to the set-aside requirement for participation in this program. The loss in revenue due to the acreage reduction is apparently much greater than the average total disaster payments received by these producers.

With participation in the Deficiency Payments Program both the

low equity and the high equity situations experienced substantial increases in the levels of ending net worth and income. This program also greatly reduces the probability of bankruptcy. For Jackson County situations the Deficiency Payments Program is probably the most effective program in supporting net farm income, net worth and firm viability and reducing income and net worth variability of any of the individual program alternatives evaluated.

Individual participation in the Federal Crop Insurance Program produces results very similar to the Disaster Payments Program for Jackson County situations. However, with proper selection of the FCI Program option the producer can realize significantly higher expected ending net worth than would be realized by individual participation in the Disaster Payments Program. However, the relative variability in net worth, as measured by the coefficient of variation, is lower for the Disaster Payments Program. Many variables such as the level of coverage, the price elective chosen by the producer and the premium the producer must pay for FCI coverage have significant impacts on the outcomes from participation in the Federal Crop Insurance Program. The level 1 (50 percent) yield guarantee results in a higher level of income and firm growth under each price elective. However, this guarantee level produces a higher degree of variability in both income and net worth than do the higher yield guarantee levels. The level 1 yield guarantee - low price elective option appears to produce the most favorable results for the Jackson County situations but may result in a slightly higher chance of firm failure than participation in the Disaster Payments Program. This may imply that the higher returns generated by higher levels of coverage are not worth the

increase in premiums the producer must pay for this coverage.

The combination of the Deficiency Payments Program with the Disaster Payments Program produces the most favorable effect of any program alternative analyzed in the Jackson County study area. The highest levels of ending net worth and income, the lowest levels of income variability and net worth variability and the lowest number of bankruptcies are all favorable results produced by this program combination. Both of these programs require a set-aside acreage however, this acreage reduction must only be met once for dual participation. By spreading this "implied" cost of participation over the two programs, essentially both programs produce more favorable results. With the discontinuation of the Disaster Payments Program, this option is no longer available to farm operators.

During the 1981 crop year participation in the Disaster Payments Program in combination with the Federal Crop Insurance Program was an option. Under this program combination the producer was required to set-aside acres and was not eligible for the 30 percent FCI premium subsidy. This is probably the worst option the Jackson County producer could select. Relatively low levels of net worth growth and income are generated and the probability of firm survival for low equity situations is greatly reduced.

With the absence of the Disaster Payments Program as an option for crop producers the combination of the Deficiency Payments Program with the Federal Crop Insurance Program may prove to be the most realistic and favorable program option for Jackson County producers. This program combination allows the producer to greatly reduce the probability of firm failure and to increase the level of income and

growth in net worth above that of the no program participation option. This program combination also provides for a significant reduction in variability of net worth and income when compared to no participation. However, participation in the Deficiency Payments Program alone is superior to no participation or the Deficiency Payments Program - Federal Crop Insurance Program combination.

Wagoner County

The most favorable alternative for Wagoner County producers appears to be no participation in government farm programs. Analysis of this situation indicates that producers in a low equity position experience a high probability of failure. Participation in any of the government program options tends to decrease the probability of farm success. The worst single program alternative for the Wagoner County producer is the Disaster Payments Program. Although only a small percentage of the total crop acreage is covered by the Disaster Payments Program (or the Deficiency Payments Program) the reduction in income due to the set-aside requirement is significant.

Participation in the Deficiency Payments Program also tends to reduce the level of income and ending net worth. But, these reductions are slightly less extreme as the Disaster Payments Program. The levels of variation in ending net worth and income are slightly reduced from those resulting with the low yield program. With a combination of Deficiency and Disaster Payments Programs the economic measures are improved. This improvement occurs because, even though both programs require a set-aside acreage, the set-aside for one program meets the requirement for both programs. The producer can

then receive payments from both programs while incurring only the "cost" that one program requires.

If the Wagoner County producer elected to participate in a government farm program the most favorable alternative would be individual participation in the Federal Crop Insurance Program. This program option produces more favorable results for the Wagoner County situation than any other program alternative, including any program combinations. FCIC insurance for soybeans (Wagoner County's most important crop) at favorable premiums makes All-Risk crop insurance more attractive than other government program alternatives analyzed. The level 2 (65 percent) or level 1 (50 percent) yield guarantee - low price elective not only provides for higher average levels of ending net worth and income than any of the Disaster Payments Program or Deficiency Payments Program alternatives but, it also decreases the level of variation in ending net worth and produces the smallest chance of firm failure. In the Wagoner County, the combination of the Deficiency Payments Program and the Federal Crop Insurance Program is less favorable than crop insurance alone and much less favorable than no program participation.

Texas County

The analysis of the Texas County situation produced results very similar to the Wagoner County analysis however, the number of bankrupt iterations was somewhat higher for the Texas County situation. Although the standard deviations of ending net worth and income are higher than with many of the other alternatives, the Texas County producer could expect much higher levels of income and net worth

growth and smaller probability of firm failure if the no government program alternative was elected.

As with the other county situations, the Deficiency Payments Program yields more favorable results than the Disaster Payments Program. This option produces significantly higher levels of income and net worth growth and lower levels of variation in these economic measures than does the Disaster Payments Program. However, the chances of firm failure are about the same with these two programs. Here again, the combination of these two programs seems to be more favorable than individual participation in either program.

Proper selection of the Federal Crop Insurance Program option will produce more favorable results than any other government farm program. The level 1 (50 percent) yield guarantee - low price elective option is the most favorable option for the Texas County situation. With the exception of the no program alternative, there are no other program alternatives which produce a higher level of average ending net worth or income or that produce lower levels of variation in these economic measures.

When the Federal Crop Insurance Program is combined with the Deficiency Payments Program and the Disaster Payments Program in any of the three possible combinations the resulting income and net worth levels are substantially hampered as are the levels of variation in these values. If the Texas County producer wished to participate in one of these program combinations this producer may find the FCI - Deficiency Payments Program combination to be the most favorable. This result is somewhat different from the other two county situations

where the three programs were found to produce the most favorable results of the FCI Program combinations.

Strategy Comparison Across Farm Situations

Specific farm situations have an obvious effect on risk management strategy selection. Such factors as the variability of commodity prices and yields, the average levels of commodity prices and yields or even the specific crops produced on the farm may place the farm organization in a very risky situation. These same factors may, on the other hand, be a reason for relative economic stability. The equity level or level of operator ownership seems to have no bearing on the strategy which the producer should select. This is indicated by the analysis of the two Jackson County situations. Generally, the options which produce the highest levels of income and net worth also produce the lowest levels of relative variation in these economic measures and the lowest chance of firm failure. In other words, whichever economic measure the producer chooses to optimize the other economic measures tend to follow, no matter the producer's equity situation.

Producers in Jackson County will generally find the Deficiency Payments Program a very favorable alternative but, producers in Wagoner County and Texas County may find it more favorable to forgo any coverage against low commodity prices. Differences in the relative variability of prices of program crops unique to each area account for this result. For instance, if cotton prices are more variable than grain sorghum and corn prices, the Jackson County

producer will be subjected to a greater probability of low prices than will Wagoner County or Texas County producers.

The levels at which the target prices and loan rates are set for each crop have an effect on the occurrence and level or size of deficiency payments. Target prices for wheat and cotton are set at levels above the average or most likely prices for these crops, however the target prices for grain sorghum and corn are set below the average prices for these crops. Thus, wheat and cotton producers are more likely to receive deficiency payments than are grain sorghum and corn producers. Wheat and cotton producers may receive relatively higher per crop unit deficiency payments than grain sorghum and corn producers because the maximum deficiency payments are based on the loan rates. Loan rates for wheat and cotton are placed at approximately 88 percent and 77 percent of their respective target prices, but the loan rates for grain sorghum and corn are placed at approximately 93 percent and 94 percent of their respective target prices.

The normal farm yields also have an effect on the feasibility of participating in the Deficiency Payments Program. If the normal farm yield of a particular crop is higher for one farm than for another, the producer with the higher normal farm yield will receive larger per acre deficiency payments. However, if the per acre cost of production for the crop is about the same for both producers, the producer with the higher normal farm yield may find it costs more to participate (in terms of foregone net income due to the set-aside requirement) than it does for the producer with the lower normal farm yield.

Many of the same factors that affect the feasibility of

participation in the Deficiency Payments Program also affect the feasibility of participation in the Disaster Payments Program. Perhaps, the most important of these factors is the relative variability in crop yields and the specific crops covered by the programs. All of the major crops produced in Jackson County are eligible for the Disaster Payments and Deficiency Payments Programs coverage but Wagoner County's most important crop, soybeans, is not. Thus, Jackson County producers may find the Disaster Payments Program (or the Deficiency Payments Program) a more favorable option than Wagoner County producers. If yields of program crops are less variable, the producer may find the Disaster Payments Program unfavorable because of a small probability of receiving disaster payments. In Texas County a fairly large portion of the program crops are irrigated and yields are less variable.

The Federal Crop Insurance Program is not as complementary to the Deficiency Payments Program as is the Disaster Payments Program in any county area because producers must in effect incur two sets of costs to participate in the Federal Crop Insurance Program - Deficiency Payments Program combination. With the Deficiency Payments - Disaster Payments Program combination the producer must only meet the set-aside requirement. In this respect, the Federal Crop Insurance Program is not a very good replacement for the no longer available Disaster Payments Program in any of the study areas.

As a general statement, producers in any of the study areas would be best off if they chose not to participate in any of the programs, with the exception of the Deficiency Payments Program and it's combinations in Jackson County. The loss in revenue due to the

set-aside requirement and the added expense of the FCI premium are more than any payments (on the average) the farmer would receive by participating in the programs. While a program may be favorable for one crop in a particular area but not favorable for other crops, this study compared results based on participation in all program crops for a specific study area. Thus, implications could differ somewhat on a crop by crop basis in the study counties.

Federal Crop Insurance Program Options For Specific Crop Enterprises

The analysis of Federal Crop Insurance participation in this study assumed that every insurable crop on a particular farm situation would be insured at the same FCI option. The producer may however, choose to elect different FCI options for different insurable crops or choose to insure one crop and not another. Thus, an analysis was made to determine the most favorable FCI option for each insurable Jackson County crop. By holding the cotton coverage constant at the level 3 yield guarantee - high price elective option and analyzing the nine wheat options, the level 1 yield guarantee - low price elective option provided the most favorable coverage for the wheat enterprise. Holding the wheat coverage constant at this level and analyzing the nine FCI cotton options showed that the level 1 yield guarantee - low price elective option is the most favorable for cotton enterprises in Jackson County.

The FCI option which produces the most favorable results in these study areas seems to always be the option with the lowest premium rates. However, this option may not be the most favorable for all crops in Wagoner County as evident from the simulation results for

Wagoner County where the level 2 yield guarantee - low price elective option and the level 1 yield guarantee - low price elective option produce almost indistinguishable results. If in fact the FCI option with the lowest premium rate is generally the most favorable for all crops it may be that the premium rates for most coverage levels are set too high to provide any benefits of coverage against low yields. In other words, based on the level of crop yields and the variability of these crop yields the premium rates are set so high that the farmer will never (on an average) receive indemnity payments in low yield years equal to the total premiums paid. The fact that the producer would generally be better off not to participate in any program than to participate in the FCI Program seems to support this hypothesis.

Federal Crop Insurance Premium Adjustments

An adjustment of the per acre premium rates for each crop based on the dollar amount of indemnities received by the producer, the dollar amount of premiums paid by the producer and the number of continuous years of FCI participation is provided for by the Federal Crop Insurance Corporation. This adjustment was incorporated into the analysis of the government farm programs as described in Chapter II. The average premium rate for each crop in each year that occurred in the simulations of the most favorable FCI option are reported in Chapter IV.

Premium rates in all three counties experienced reductions over the 10 year planning horizon. Premium rates in Texas County were generally reduced more than premium rates in the other counties and premium rates in Wagoner County were generally reduced the least.

Generally the premium rates were reduced by 20 to 30 percent of their original or 1982 values. These large reductions indicate that the premium rates are currently too high, and in some cases, substantially so. The Federal Crop Insurance Act states that the FCIC shall set premiums at a level the Board of Directors feels is sufficient to cover claims for losses and establish as expeditiously as possible a reasonable reserve to protect the Corporation against unforeseen losses. In these counties and for these crops, it appears that the reserve generated to protect the Corporation is established too rapidly and at the expense of the producer. It appears that near the end of the 10 year planning horizon, the premium rates have made most of their reduction. A longer planning horizon would be needed to fully determine the extent of the reductions.

The premium rate for wheat in Wagoner County was reduced the least (approximately 5.6 percent). It appears that this premium rate is at about the appropriate level at the beginning of the analysis. Because the producer is receiving approximately the amount paid in premiums as indemnity payments in low yield years, this producer is probably receiving significant benefits from participation in the Federal Crop Insurance Program for wheat production. Producers in all three counties appear to be receiving some benefits from participation in this program for their crops in years close to the end of the planning horizon because the premium rates have been reduced to levels low enough to provide benefits.

Government Costs

The U.S. Government has traditionally borne the entire cost of providing income stabilization for agricultural producers. The cost of government programs has grown quite large in recent years. The Federal Crop Insurance Program was implemented to provide protection to crop producers from low commodity yields while sharing the cost of this program. This study presents an analysis of the expected per acre government costs or surpluses from providing disaster payments, deficiency payments and All-Risk crop insurance. Expected per acre costs or surpluses over time are based on the probabilities of specific price or yield levels from the stochastically generated price and yield series used in the earlier section of the analysis. These costs do not include any administrative costs for the programs because it is assumed that these costs are approximately the same from program to program.

The Deficiency Payments Program and the Disaster Payments Program are costly programs for the government for most of the crops produced in these study areas. These costs have been of major political concern in recent years. In these counties and for these crops, the Deficiency Payments Program costs the government significantly more per acre than the Disaster Payments Program. Thus, either structural differences exist in the programs that provide the producer with greater compensation for low prices than for low yields or low commodity prices present the producer with greater problems than do low yields. In other words, low commodity prices may be more prevalent than are low commodity yields for these study areas.

The Federal Crop Insurance Program, on the other hand, is

substantially less costly than the Disaster Payments Program. In fact, the FCI Program typically generates government surpluses. The calculation of the expected per acre government surpluses under the FCI Program is based on the initial unadjusted premiums. If premium adjustments were incorporated into the evaluation, the "overtime" expected per acre surpluses would be reduced.

The expected per acre government surpluses are lower with subsidized premiums than when the non-subsidized premiums are assumed. However, for options that generate costs, the costs are slightly higher when the premiums are subsidized. This is the case with wheat in Wagoner County and Irrigated Grain Sorghum in Texas County. These expected per acre government costs may indicate that the premium rates are set at a more nearly correct level, at least from the producers perspective. Again, because of the premium rate adjustment process, high costs would not prevail because the premium rates would soon be adjusted upward to cover the costs. On the other hand, if the premiums were truly subsidized, the government would be expected to incur some cost in providing this program.

Policy Implications

The program alternatives analyzed in this study are designed to reduce many of the risks associated with agricultural production and each of these program alternatives has unique influences on the growth, income and viability of agricultural firms. If producers were only considering participation in a low yield program the replacement of the Disaster Payments Program by the Federal Crop Insurance Program has apparently been an improvement. However, this may not be too

realistic as the Deficiency Payments Program is currently available for producer participation to reduce the adverse effects of low commodity prices. In two areas, the combination of Deficiency Payments Program and the FCI Program, currently being promoted by the government, is the worst alternative to producers. Participation in price and yield programs today (Deficiency Payments and Federal Crop Insurance Programs) is not as attractive as the combination of the Deficiency Payments and Disaster Payments Programs was. This implication should be given careful consideration during the maturing stages of the Federal Crop Insurance Program as crop producers are subjected to high degrees of variation in both crop prices and crop yields. The loss of stability that could be provided for with efficient low yield and low price programs in combination may cause a large number of low equity producers to become insolvent. For low equity farmers who likely have to borrow to purchase Federal Crop Insurance, participation reduces the mean ending net worth and increases the coefficient of variation when compared with other options, including no government program participation. With the inability of young or beginning farmers to become viable agricultural producers the agricultural sector may suffer dramatic structural changes.

The premium rate structure of the Federal Crop Insurance Program should also be given careful consideration as this program is developed. At their current levels these premium rates do not seem to allow the program to yield any significant benefits to agricultural producers until after the producer has participated in the program for several years. These seemingly high premium rates may be a reason for

historically low rates of participation in the FCI Program. But, much thought should be placed on land use impacts that may occur if the program becomes too attractive. If this program becomes too liberal and provides excess coverage, land in high-risk areas may be brought into cultivation when it should be used for other purposes such as grazing.

Variability of normal or average crop yields from farm to farm within an area may also indicate that Federal Crop Insurance yield coverage should be tied more closely to individual farm producer's historical yields and the variability within these yields. But, attention should be given to the possibility of low yields resulting from the producer's own poor management practices. Without this attention the program could be subject to abuse and misuse by participants.

Research Limitations

This study was designed to determine the "best" program alternative for a specific set of farming scenarios in a specific set of geographical locations within the state of Oklahoma. The stochastically generated price and yield series are based on a subjective interpretation of historical series of prices and yields for these specific study areas and are not transferable to other areas. The price series used are seasonal average prices received by producers across the state but, the specific scenario places limitations on their use in other areas of the state.

Other variables such as inflation rates and price and yield trends which were held at a constant rate of zero throughout the

analysis and future interest rates which were assumed to be in real terms may have significant impacts on program feasibility if they were to take on different values. Variables such as cropping patterns, specific crops produced, firm size and the portion of rental use may generate a completely unique set of results.

Although this study does point out areas within the structure of the government farm programs that may be adjusted to make these programs more feasible to the farm scenario used in the analysis it does not indicate specific adjustments that should be made to make these programs more beneficial to agricultural producers. Of major concern is the costs of participation in these programs, whether they be out-of-pocket costs or in the form of implied costs; specifically the premium rates for FCI Program participation and the set-aside requirement for participation in the Deficiency Payments Program and the Disaster Payments Program.

The government costs and surpluses described in this study are expected per acre costs and surpluses from providing these programs to the specific scenarios used in this analysis and are not transferable to other situations. Distributions of stochastically generated prices and yields and the FCI premium rates make these costs and surpluses unique to these specific situations. These costs and surpluses also do not include any allowances for program administration costs. These administration costs are difficult to determine and are not within the scope of this study.

Even though these limitations may restrict the use of the results of this study to some extent, the analysis does provide a base for evaluating these government farm programs with specific respect to

producer benefits from participation in each program. Based on these specific scenarios, basic assumptions can be made about the financial stability and impacts on firm viability provided by these government farm programs.

Need For Additional Research

Several unanswered questions remain following this evaluation of government farm programs. This research has not dealt with the structural implications of alternative government farm programs. Additional research is needed to determine if these programs promote a specific farm structure. Current programs do not appear to offer adequate protection to low equity producers and participation may increase the chances of firm failure in this group. With regard to farm sector structure, it may also be important to determine the correlation between program benefits and firm size. Program adjustments may be needed to insure a uniform distribution to farmers.

Additional research is needed to more accurately determine the level of government costs and surpluses resulting from providing these government farm programs. This research should also focus on the commissions paid to the private insurance sector for their sales of Federal Crop Insurance. With an accurate estimate of these costs and surpluses the currently available programs might be made more suitable with respect to producer benefits. The compatibility of programs in combination is a major area of concern. This evaluation would require extensive research aimed at determining optimal premium rates and levels of coverage in both the low yield program and the low price program.

Broad questions such as the ones presented here provide a solid base for future research in the area of farm risk management programs provided by the government. With the answers to these and other related questions policymakers and legislator may better be able to formulate risk management programs to benefit both agricultural producers and the national economy.

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