EVALUATION OF PUBLIC AND PRIVATE RISK MANAGEMENT ALTERNATIVES ON AGRICULTURAL PRODUCERS IN SOUTHWEST OKLAHOMA

By

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PREFACE

This thesis is concerned with the economic impact of public and private risk management alternatives. The primary purpose is to analyze firm growth and chance of firm survival in a stochastic environment. A whole-farm, firm-level simulation model is used to combine uncertain prices and yields with various commodity programs.

Special appreciation is expressed to Dr. Harry P. Mapp, Jr., my major adviser for his encouragement, guidance and patience during my research project and graduate program. Appreciation is also expressed to Dr. Odell L. Walker and Dr. Darrel Kletke for their knowledge and suggestions. I am extremely grateful for the financial support and academic training provided by the Department of Agricultural Economics.

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CHAPTER I

INTRODUCTION

The nature of the agricultural farm firm requires producers to make numerous decisions during the production process. These management decisions, cropping patterns, input combinations, and capital replacement expenditures have a major impact on the net returns to the farming operation.

Agricultural producers face a wide selection of established risk transfer alternatives, such as crop diversification, futures contracts, forward contracts and the flexibility in management plans. Diversification is an attempt to select crops whose prices and yields are inversely correlated. This reduces reliance on one specific crop and allows abnormal yield fluctuations to be spread between crops. The futures market provides a mechanism which enables produces to "hedge" against future price variations. Forward contracting helps remove future price uncertainty by guaranteeing a specified price through the use of legally binding contracts. Flexibility enables the producer to shift production plans to meet uncertain and unexpected price and yield variations.

Producers in the Southern Great Plains region of the U.S. may also choose from a number of government risk avoidance tools. Each of these government risk management decisions has independent effects on the returns to the operator. The "correct" program choice may improve the economic viability of the agricultural producer.

The primary purpose of this study is to analyze the ability of current and proposed government commodity programs to reduce the level of risk inherent to agricultural producers. These programs have been designed to reduce risks, stabilize equity growth trends, and increase the economic viability of individual agricultural firms. Commodity programs incorporate methods to reduce fluctuations in income caused by changes in physical production as a result of natural risks, such as weather, disease, and pestilence. Economic risk, the fluctuation in market prices caused by either domestic or foreign supply and demand shifts, is another type of adverse event faced by producers. The commodity programs are designed to shift a portion of these risks from the producer to society.

Shifting these risks in a volatile and cyclical environment provides a unique and challenging atmosphere when designing an equitable commodity program. The importance of commodity programs and their role in agricultural firm survival is constantly increasing in magnitude. Research directed at specifying the incidence of commodity program benefits and limitations will hopefully guide producers and policymakers toward a common goal, one which will benefit both groups. Providing a program equitable to all or even a majority is itself a challenging and measurable task. This type of research will serve as a management tool designed to provide an insight into the possible results of various commodity programs.

Several types of agricultural disaster assistance, risk management, and emergency relief programs, designed to provide increased stability, have evolved in recent history. The disaster payments program (DPP), the Federal Crop Insurance Program (FCI), the crop hail insurance program, and the deficiency payment program are analyzed in this study. The existing DPP and FCI programs have been the subject of recent debate because several studies have indicated that these programs have undesirable effects on the agricultural sector and the federal government (Miller and Walter; U.S. General Accounting Office; Johnson, et al.). Research which will identify and provide possible solutions to these undesirable effects is needed.

A review of the types of risks associated with the production of agriculture commodities will reveal the nature of existing risk management programs. These risks are a major reason for the existence and evolution of current commodity programs. Risks, such as hail damage, are ideally suited for insurance programs because they are random over time, independent among farms and are not within the control of the producer. The second category of risks are also meteorological in nature and include natural hazards such as drought or excessive cold. This type of risk is less independently distributed. Areas where the probability of crop failure is excessive represents a third category. These areas are subject to premium rates that prohibit any type of producer participation. The uncertainty of human nature and moral hazards, represent risks in the fourth category. These hazards are uninsurable because of the numerous personal risks which effect management decisions (Miller and Trock). These four areas of risks present the basis for the current commodity programs to be analyzed.

Problem Statement

Unstable prices and yields are a major cause of income variability for agricultural producers in Southwest Oklahoma. A long history of agricultural commodity programs has been introduced to help reduce income variability and increase the chance of firm survival. The disaster payments program, (DPP), enacted under the Agricultural and Consumer Protection Act of 1973 and controlled by the United States Department of Agriculture (USDA), is one of the current governmental commodity programs. While this program reduces income variability and increases the economic welfare of agricultural producers, it is a very costly program for the government. In addition to this cost, several inadequacies and inconsistencies exist with the current DPP program. Thus, Congress and other policy makers are examining alternative means of providing assistance to producers.

One such alternative being considered is the Federal Crop Insurance Program. Historically, this program has had a low level of participation. In 1976, only 17 percent of the eligible acreage was covered by the FCI program (Miller and Walter). If the FCI program is amended, more producers might be enticed to participate. Such amendments include subsidizing insurance premiums, altering current FCI and DPP program specifications, or completely discontinuing existing commodity programs. These possible changes lead to several questions concerning firm growth, level of farm income, chance of firm survival and structural impacts. Answers to these questions would enable legislators to take appropriate action to solve inadequacies and provide equitable assistance to agricultural producers. An example of one inadequacy which is now a primary concern of policymakers is the burdensome governmental outlay of the DPP. During 1980 the government paid an estimated $750 million in direct payments to producers enrolled in the disaster payment program (Benjamin). Alternative programs or amendments to current programs could solve existing inadequacies and make these programs more self sufficient.

To analyze these programs a whole-farm, firm-level simulation model is used. The model is designed so growth trends and survival rates can be determined in a stochastic environment. By utilizing these results producers can select the commodity program alternative which coincides with their individual goals and objectives. The producer's decision analysis will follow a more logical process if expected returns and probabilities can be determined. Legislators and policymakers can determine whether program goals parallel the results derived for individual farm settings. If these results are inconsistent with program goals, appropriate legislative action can be taken to solve existing inadequacies. A review of the public and private commodity program alternatives presents the basis for this study.

Risk Management Alternatives

Deficiency Payments Program

The Food and Agriculture Act of 1977 specified guidelines for a deficiency payments program designed to reduce the adverse price risks that producers face. Participation requirements for the 1980 program are less demanding than in previous years. No set aside acreage is required for producers of normal crop acreage (NCA) crops. Any producer of program crops can qualify for payments provided the producer completes the necessary application forms and accurately reports planted acreage. To be eligible for deficiency payments, the sum of producer's normal crop acreage must not exceed the NCA established for the farm. The deficiency payment is based on the target price and is multiplied by the established normal farm yield and the reported planted acreage. The deficiency payment acres are determined by applying an allocation factor as a ratio of the Normal Program Acreage to the National Acreage Harvested. This ratio must be between 0.8 and 1.0.

Disaster Payments Program

The disaster payments program was authorized by the Agricultural and Consumer Protection Act of 1973 and is administered by the Agricultural Stabilization and Conservation Service. The disaster program is also a direct payment program and is designed to alleviate income losses by reducing the adverse effects of yield variability resulting from natural hazards. The disaster program requirements are identical to those of the deficiency program. To be eligible for payments, producers must timely report crop losses due to disaster or other losses beyond the producer's control. An ASCS appraiser must examine crop destruction before the crop is mechanically destroyed. Presently wheat and grain sorghum payments are computed on 60 percent of the established normal farm yield times one-half of the applicable target price times the acres eligible for payment.

Crop Hail Insurance Program

Crop hail insurance is administered largely by private industry. It is designed to protect producers against crop and income losses caused by hail damage. Crop hail insurance can be purchased up to the date of harvest, giving producers complete control over the timing of the decision to participate. Premium rates depend on the risk factor for a particular area with the risk factor based on the historical amount of losses paid due to hail damage. As the losses for a particular area increase, the premium rates increase accordingly. The premium cost also depends on the amount of insurance per acre the producer selects. For wheat hail insurance in an area, two basic options are available. Producers who enroll in a crop hail insurance program during the early stages of the production process generally insure to cover production costs. Producers who defer enrollment, just prior to harvest, are generally covering the expected crop value. For the purposes of this analysis, the amount of insurance selected is based on the production cost. Payments are established by a percentage loss calculation estimated by an appraiser. This loss is multiplied by the number of acres covered and the insured amount.

Federal Crop Insurance Program

The current requirements for the all-risk insurance program were enacted under the Federal Crop Insurance Act of 1980. This voluntary insurance program is designed to cover multi-peril hazards faced by agricultural producers and is controlled by the Federal Crop Insurance Corporation (FCIC). Insurance is available to producers who are not in areas of excess risk. Some portions of the country are presently not included in the program because of excessive risks. The premium rates are based on the amount of insurance protection per acre, the risk associated with a particular area and the type of crop insured. Prior to and including the 1980 crop year there were no provisions for a premium cost subsidy. Currently the FCI program provides guarantee coverage levels of 50, 65 and 75 percent. The difference between the actual yield and the FCI guarantee is multiplied by the price elective selected. The product is then multiplied by the acres covered to derive the insurance payment. For purposes of this analysis, the title Federal Crop Insurance (FCI) and all-risk crop insurance are used interchangeably.

Program Combinations

These programs are administered so that producers may participate in several programs at once. Deficiency and disaster payments may be analyzed separately and in combination. Generally, if the producer qualifies for one of these programs, he is eligible for both. The deficiency and disaster program may also be combined with either crop hail insurance or all risk crop insurance. The deficiency and all risk program are also analyzed in combination. The deficiency program eliminates some of the exogeneous price variance while the all risk insurance guarantees against low yields due to unavoidable risks. Alternative government subsidy levels and yield guarantee levels are also evaluated.

Previous Research

Risk and uncertainty, the lack of perfect knowledge, plays a major role on the economic welfare of the agricultural sector. Intensive research has been conducted and numerous studies published concerning risk management practices (Hazell; Hardin; Mapp, et al.; Musser and Stamoulis). These studies have analyzed existing risk management models and no attempt is made to repeat these reviews. These articles have reviewed models which use such techniques as quadratic risk programming and MOTAD.

Hardin developed a simulation model that analyzes the effects of major capital purchases on firm-level situations. This simulation incorporates a whole-farm scenario and examines firm growth and chance of firm survival in a stochastic environment. Triangular, trended and correlated prices and yields are combined with enterprise data to generate balance sheet and cash flow information. These computations are used to determine chance of firm survival based on a specified minimum equity level.

In addition to risk management practices much work has centered on risk avoidance techniques. Policymakers are especially interested in ways to effectively reduce income variability by initiating equitable risk avoidance programs. The government, in struggling with this issue, has initiated many programs designed to maintain a reasonable economic balance in the agricultural sector. A historical record of these attempts was presented by Rasmussen, Baker, and Ward. Tweeten did additional work and presented the past performances for several of these commodity programs. Tweeten's discussion of the FCI program indicated that, since the creation of the FCI program, it has not been large enough to materially reduce risk in the agricultural sector. Another limitation in the FCI program involves the inability of the program to protect farmers from the unstable prices associated with an uncertain market.

The current program controlled by the Agricultural Stabilization and Conservation Service (ASCS) is the DPP. Miller and Walter described and analyzed both the current DPP and alternative combinations of programs for Kiowa County, Colorado. As a result of their analysis, they specified several major options to be considered by policymakers. These options include: continuation of existing commodity programs, subsidizing the private insurance industry for providing coverage to producers, subsidizing premium payments paid by producers with a discontinuance of the DPP, and finally, a modification of the current disaster payments program. Their recommendation for the "correct" program is based on the particular goals established by policymakers.

Casler did further analysis and compared the DPP, FCI, and crop hail insurance based on their respective return over variable cost. He developed a set of worksheets designed to help producers select the best program based on the producer's goals and needs. Casler suggested a payoff matrix which utilizes the producer's subjective probability of crop yields. Either the risk adverter or risk neutral decision maker can determine which alternative with specified probabilities will yield the possible minimum or maximum income objective.

The adequacy of current commodity programs, such as the DPP, has lead to several studies reviewing the limitations and benefits of such programs. The General Accounting Office (1976) published a report criticizing the current DPP. This report listed numerous inadequacies and inconsistencies which should be considered by Congress before any legislation is passed on commodity programs. The report presented solutions to these problems and detailed the implementation procedures which should be followed. Their analysis stated that additional consideration should be given to crop insurance as a viable alternative to the DPP.

Historically crop insurance has been a voluntary program which has been hindered by minimal participation. Early work by Halcrow dealt with three types of crop insurance: all-risk crop insurance, area-yield insurance, and weather-crop insurance. He presented the basic assumptions and necessary conditions for each program. Halcrow detailed the ideal situations necessary to make each program effective. Ray presented a text which provides detailed justification for risk avoidance techniques such as crop insurance. He described numerous types of crop insurance and listed the basic considerations and conditions for each.

Miller and Trock reviewed the major types of risk present in the agricultural sector. This analysis provided the base for presenting basic disaster assistance methods. Their analysis included a summary of governmental cost outlays in providing the existing assistance programs. Their criticism section left some important questions unanswered concerning the effectiveness of proposed legislation. Questions unsolved included the role of private industry in providing insurance and the structural issue concerning maintenance of production patterns that are economically insufficient. This issue has initiated additional research in disaster assistance programs.

Raup dealt with this issue and stated that guaranteed commodity prices do indeed cause different impacts on contrasting farm sizes. He felt that as price risks are reduced, large scale producers are able to purchase small family farming operations, thus having a large impact on the structural framework of American agriculture. Boehlje and Griffin supported this statement and found that large farms compared to smaller units have a greater capacity to expand when risks are reduced in a government price support program. They stated that this is primarily due to the higher equity levels in larger farms. Their study also indicated that participation in a price support program will improve cash flows for a larger size farming unit compared to a smaller unit. The numerical results proved that the greater majority of benefits from risk avoidance programs do indeed go to larger producers.

The issue of structural impacts of commodity programs is argued from both sides. Gardner and Pope stated that there are two possible hypotheses that explain the trend in larger farming units: technical economies of scale and government policies. The authors dismiss the hypothesis of government policies because of a lack of adequate empirical substantiation. They believe that technical change is the mechanism causing change in the structural framework in agriculture.

Johnson, et al., presented an overall view of the impact that risk avoidance tools such as income supports and direct payments have on the agricultural sector. They stated that prior knowledge of supported income or price will have an impact on planting patterns and decisions concerning expansion. They agree that this knowledge may lead to uneconomical production of certain crops and this risk avoidance may lead to fewer and larger farming units. They believe that additional research is needed so policymakers can evaluate the impact of direct payments on income distribution and resource allocation. Answers to these questions will enable legislators to make correct judgments concerning agricultural policy programs.

Objectives

The major objective of this study is to evaluate the impacts of alternative government risk management programs on the economic viability of the farm-firm. Secondary objectives of this study are:

1. establish a farm scenario which represents a typical whole farm operation and simulate returns in a stochastic environment.
2. analyze the effect on firm growth and survival rate of participation in selected alternative commodity programs.

3. compare the results of current commodity programs with those of proposed government program legislation.
4. determine the expected government cost associated with current and proposed risk management alternatives.

The remainder of this study is arranged as follows. Chapter II presents a detailed examination of the study area, simulation model, and the farm scenario analyzed. The analysis of the farm situation includes land ownership, machinery inventory, capital expenditures, enterprise data, and price and yield assumptions.

Chapter III describes the risk management alternatives analyzed. This is a detailed examination of the program assumptions and requirements. Chapter IV represents the results of the program alternatives analyzed. Chapter V presents the summary and conclusions that are drawn from the analysis.

CHAPTER II

STUDY AREA AND MODEL DEVELOPMENT

The area chosen for study is Jackson County which is located in the Southwest Oklahoma portion of the Southern Great Plains. The shaded area of Figure 1 represents the area of study. Jackson County is "typical" with respect to the crops grown in the Southern Great Plains and weather in this area has a substantial influence on crop yields. Jackson County has a warm, subhumid climate, with an annual precipitation of 27.1 inches. The months of greatest rainfall are April through October. January has the lowest average rainfall (.82 inches) while May has the highest average rainfall (4.7 inches). Dry spells of 4 to 6 weeks occur during the summer months when rainfall is erratic. These drought periods often result in crop damages to grain sorghum and cotton, two of the principal crops grown in this area. Hot temperatures and dry winds compound the problem of low rainfall. July has the highest average temperature of 84.2 degrees with a recorded high of 120 degrees, and January has the lowest average temperature of 41.1 degrees with a low of -11 degrees. Severe hailstorms generally occur somewhere in the county each year and hard red winter wheat, a primary crop in the area, receives some damage in portions of the county every year.

Jackson County has a total land area of 518,400 acres. Of this total, 91 percent or 471,085 acres, are in farm land. Over 49,236 acres are irrigated. Woodland represents only one percent of the land area

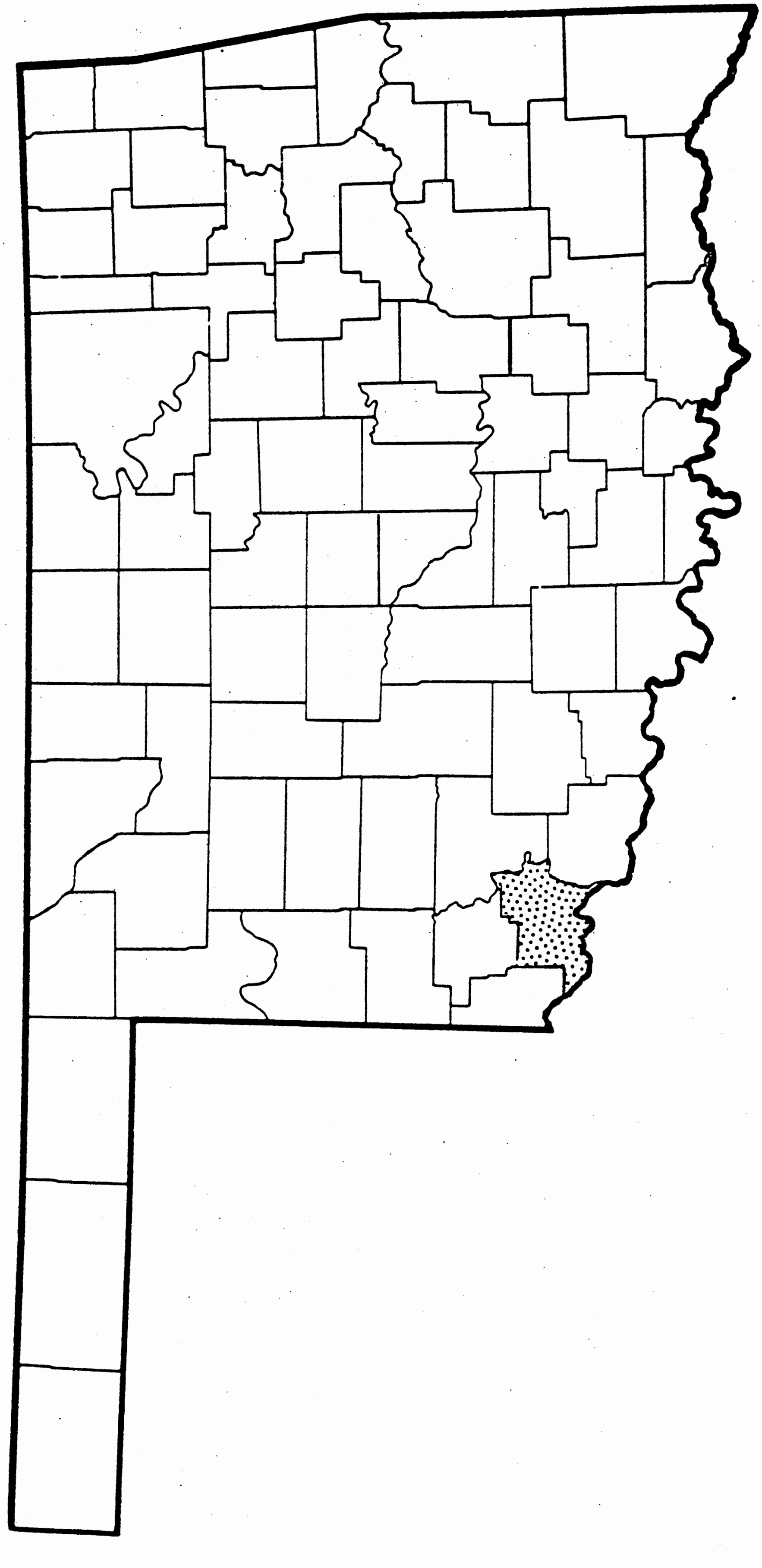

Figure 1. Map of Oklahoma Showing the Area of Study.

and the remaining 8 percent is devoted to other uses (Census of Agriculture, 1978).

The major crop enterprises are wheat and cotton. There are 274,400 acres of hard red winter wheat and 101,300 acres are planted to cotton. Grain sorghum and hay are the other two crops which are of importance. There are 13,400 acres of grain sorghum and 13,500 acres of hay, mostly alfalfa (Oklahoma Agricultural Statistics, 1979). Cow-calf and stocker cattle enterprises are also present because the wheat allows for winter grazing.

The Simulation Model

A whole-farm capital investment simulation model developed by Hardin to analyze the long-term effects of capital purchases in an uncertain environment was modified for this analysis. The model permits incorporation of stochastic prices and yields to simulate the effects of risk on the farm operation. These random, correlated, and trended prices and yields are used to generate measures of firm growth and the risk bearing ability of the farm firm.

This model is used to combine an uncertain environment with various commodity program alternatives. A typical farm operation is simulated in Jackson County. This scenario contains specific assumptions concerning levels of assets, liabilities, and net worth. The farm operation is simulated under alternative program selections and a comparison is made of the economic stability provided by each alternative.

The components of the capital investment simulator are presented in Figure 2. First the initial input data is specified. These data include

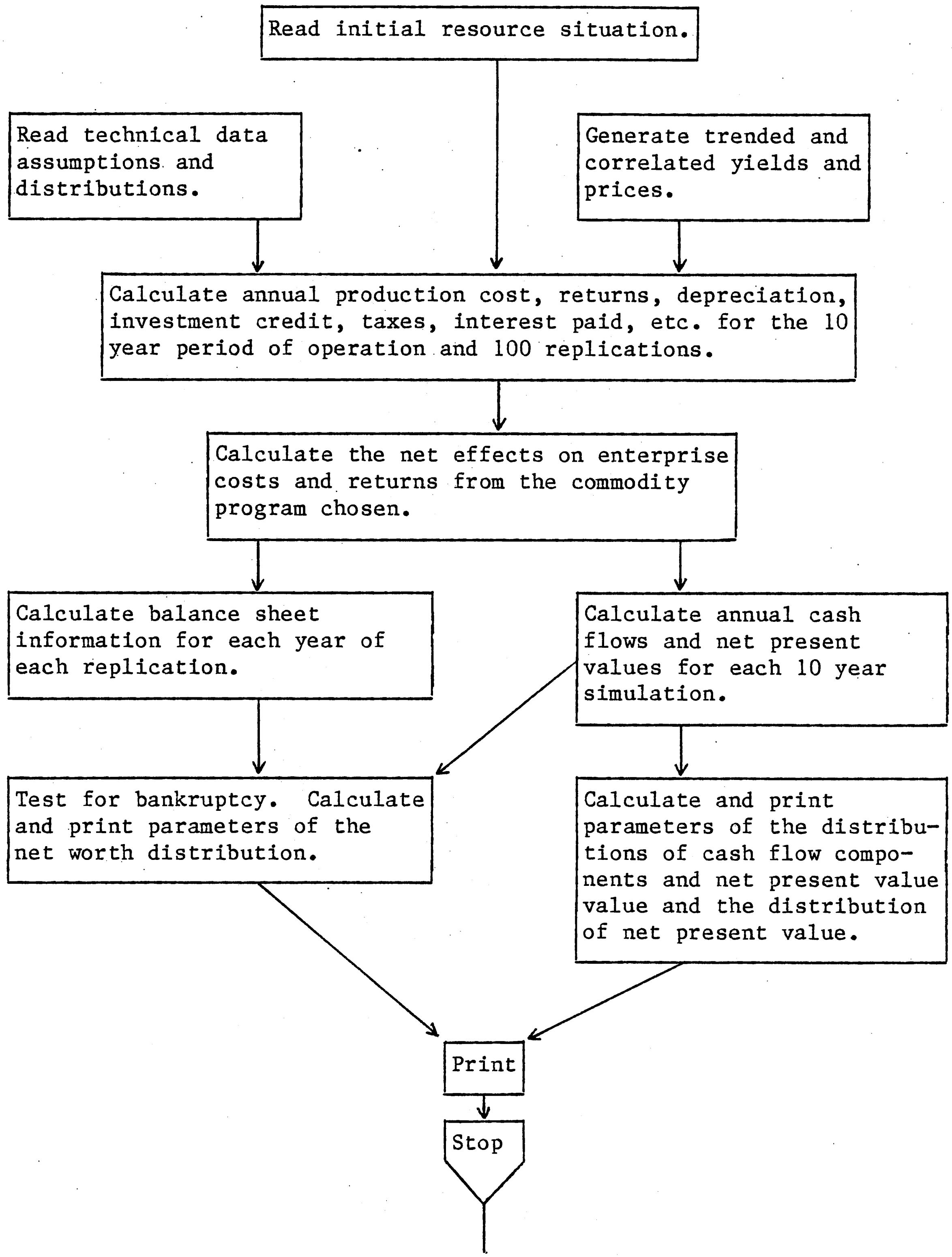

Figure 2. Flow Chart for the Capital Investment Simulator.

the current farm financial situation, the organization of production, proposed investment information and the risk management alternative to be analyzed. These data are stored and provide the initial base for each iteration. The program uses a set of prices and yields and the base information to calculate costs and returns, determine depreciation, repay existing debt, calculate income taxes and determine net returns. The effects of commodity programs are then added to net returns. These returns are used to revise the balance sheet information, calculate net worth and test for bankruptcy. The net returns are also used to derive annual net cash flow information. Balance sheet information is printed for each year along with the distribution parameters for net worth levels, cash flow, and net present value.

The model requires additional input data that remains constant during the planning horizon. This includes total farm acreage, personal income tax exemptions, minimum equity requirements, depreciation methods and interest rates for financial borrowing. Enterprise data, acres planted for each crop and animal weight gains where appropriate are specified. Additional information that affects depreciation, taxes, cash flow, investment credits or interest payments are also specified. Examples include existing loan liabilities, future capital investments and the market value of existing assets.

The ability of the firm to generate sufficient cash to repay debt is important in evaluating the firm's stability. If net cash flow is positive, the program accumulates these funds for future use. If net cash flows are negative, they are financed by any reserve which has built up. If the reserves will not meet the deficit, the program checks the minimum equity level. This study specified the minimum level of equity for both intermediate and long term assets at 30 percent. If the long term equity ratio is above the minimum, the deficit is financed through borrowing against intermediate and/or long term assets. If the equity level is below the minimum, the producer is considered bankrupt.

The long-term, intermediate-term and accumulated borrowing totals for each year and iteration are calculated and summarized by the model. The number of bankruptcies that occur during the analysis is used to calculate the probability of firm survival for each year. The model also summarizes the probability and mean of a second mortgage, and the maximum refinancing which occurred.

In addition to bankruptcies, results of the analysis are evaluated in terms of growth in net worth. The model calculates net worth each year and ending net worth at the conclusion of the planning horizon. Each scenario is simulated over a 10-year horizon and replicated 100 times. The model presents maximum and minimum ending net worth, the range between maximum and minimum net worth, expected ending net worth, and the standard deviation and coefficient of variation of ending net worth.

The program calculates the leverage ratio and percent equity for the farm scenario. The leverage ratio (ratio of debt to equity) is one measure of the risk bearing ability of the firm. This ratio is an indicator of the firm's ability to meet long-term claims against the firm. The percent equity ratio (ratio of net worth to total assets) describes the owner's claims to his assets.

Virtually all of the detailed financial accounting data for the firm are calculated by the model and could be summarized for each replication and year of each scenario. Because these data are voluminous, only selected data are summarized in this study.

Farm Situation

Land Ownership

The farm firm selected for analysis is typical of a full-time farming operation in Southwest Oklahoma. The operator is assumed to own 920 acres and lease an additional 480 acres for a total farm operation of 1,400 acres. The land, valued at about $835 per acre has a total market value of $768,000. The acquisition of land occurred in 1973 (280 acres), 1975 (320 acres), and 1979 (320 acres). Debt against the land consists of three separate loans, each with a remaining balance, number of years to maturity and interest rate. Principal and interest payments are calculated annually throughout the period of the analysis. The total debt against the land is $380,689 resulting in a 49.6 percent beginning debt/asset position in land. A loan summary of land purchases is presented in Table 1.

Machinery Inventory

The machinery inventory includes tractors and equipment needed to operate the farm and was selected based on enterprise budgets, previous studies and conversations with farm management specialists in the area. The total market value of the machinery inventory is based on a depreciated purchase price for each piece of equipment. The purchase price given corresponds with the machinery date of purchase. The depreciation method used to derive the market value was straight line with a 10

TABLE 1. Loan Summary of Land Purchases

Date	Acres	Interest Rate	Loan Life	Purchase Price/Acre[A]	Total Purchase Price	Down Payment	Remaining Balance
1973	280	8%	30 yrs.	$336	$93,976	$9,398	$76,639
1975	320	8%	30 yrs.	$463	$148,108	$14,811	$111,950
1979	320	9%	30 yrs.	$677	$216,768	$21,677	$192,100

[A]The purchase price per acre is taken from Farm Real Estate Market Developments, Economics Statistics and Cooperative Service, USDA.

percent salvage value. The total machinery complement is valued at $73,583. The farm building market value is $15,330 and is also derived using a depreciated purchase price. The machinery and building specification and market value are presented in Table 2.

Outstanding loan balances for machinery and buildings are based on the date of purchase, loan life and interest rate assumed for each item. The interest rate used to calculate principal and interest rate is correlated to the purchase date. The total remaining loan balances are $40,968 and $14,642 for machinery and buildings, respectively. This represents a beginning equity position in machinery and buildings of 62.2 percent. A summary of outstanding loan balances for machinery and buildings is presented in Table 3. Operating expenses and unsecured debts account for an additional $115,000 debt against the farming operation.

Overall, total assets have a beginning value of nearly $862,000, total liabilities equal $551,299 and beginning net worth is $310,613. The beginning percent equity is relatively low at 36.0 percent indicating limited risk bearing ability of the farm. Reductions in percent equity have large impacts on the economic viability of this scenario. Initial balance sheet information is presented in Table 4.

Capital Replacement Expenditures

Provisions are made for machinery replacement during the planning horizon. Based on the years of useful life and the purchase date, a set of machinery replacement purchases is specified. The purchase price in the expected replacement year is the price of the capital item in 1980 inflated at six percent per year. Based on this purchase price and a 10 percent salvage value, regular and accelerated depreciation and

TABLE 2. Machinery and Building Specifications and Market Values

Inventory	Size[A]	Year Purchased	Purchase Price	Useful Life	1980 Market Value
Machinery:					
Tractor	125.0 HP	1973	$13,177	12	$6,231
Tractor	225.0 HP	1977	55,500	12	38,850
Chisel	41.0 Ft.	1972	2,500	10	700
Springtooth	54.0 Ft.	1978	5,400	10	3,942
6 Row Cultivator	20.0 Ft.	1975	2,400	10	1,104
6 Row Planter	20.0 Ft.	1976	5,000	10	2,750
7R 2 Bar Lister	23.3 Ft.	1975	1,400	10	644
Rollover M.B. Plow	9.0 Ft.	1979	6,200	10	5,084
Drill	26.6 Ft.	1980	7,878	10	7,169
Offset Disk	28.0 Ft.	1974	2,300	10	851
Sprayer	20.0 Ft.	1978	4,600	10	3,358
Pickup	0.5 TN	1974	5,000	6	500
Rotary Mower	13.3 Ft.	1977	3,750	10	2,400

TABLE 2. (Continued)

Inventory	Size[A]	Year Purchased	Purchase Price	Useful Life	1980 Market Value
Building:					
Machine Shed		1975	$21,000	30	$15,330

Source: The size and purchase price specifications are from Oklahoma Crop and Livestock Budgets, Southwest Oklahoma.

[A]Market value is determined by subtracting the yearly depreciation from the purchase price for each year the implement is owned. Depreciation is derived by subtracting 10 percent salvage value from the purchase price and dividing by the useful life of the implement.

TABLE 3. A Summary of Outstanding Loan Balances for Machinery and Buildings

Inventory	Size[A]	Years Remaining on Note	Loan Interest Rate	Outstanding Principal
Machinery:				
Tractor	225. HP	4	8%	$21,975
Springtooth	54.0 Ft.	5	8	2,748
6 Row Cultivator	20.0 Ft.	2	8	341
6 Row Planter	20.0 Ft.	3	8	1,370
7R 2 Bar Lister	23.3 Ft.	2	8	199
Rollover M.B. Plow	9.0 Ft.	6	9	3,833
Drill	26.6 Ft.	7	10	5,638
Offset Disk	28.0 Ft.	2	8	327
Sprayer	20.0 Ft.	2	8	2,341
Pickup	0.5 TN	2	8	711
Mower	13.3 Ft.	4	8	1,485
Building:				
Machine Shed		15	8	$14,642

[A]The size specifications are from Oklahoma Crop and Livestock Budgets, Southwest Oklahoma.

TABLE 4. Initial Balance Sheet Information

BEGINNING YEAR 1	
Assets	
Land	$768,000
Machinery	73,583
Buildings	15,330
Cash Reserve	5,000
Total Assets	$861,913
Liabilities	
Land	$380,689
Machinery	40,968
Buildings	14,642
Other	115,000
Total Liabilities	$551,299
Net Worth	$310,613
Leverage Ratio	1.77
Percent Equity	36.04

investment tax credit are calculated. The year the investment takes place, loan life, useful life, method of depreciation, and interest rate for the expenditure are specified as data. During the appropriate year of the analysis, each purchase occurs as scheduled and the corresponding effect on the balance sheet is computed.[1] A summary of the machinery replacement specifications is presented in Table 5.

Additional Input Data

Other input data applying to this farm scenario are presented in Table 6. Family living expenses for the beginning year are $16,000 and are inflated at 10 percent per year. The beginning cash reserve, which can be used to meet deficits that occur in the cash flow, is $5,000. The number of personal income tax exemptions is specified at four. Future borrowings against intermediate-term assets and long-term assets are assumed to have an interest rate of 10 percent and nine percent, respectively.

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[1]A common risk management technique among agricultural producers is to replace machinery following a good harvest and defer expenditures during low yield years. Machinery replacement for this scenario is assumed to be spread evenly over all years. This assumption may create a bias towards increased bankruptcy risk but this bias should not significantly alter the results. Since a timely replacement of machinery is specified, the additional maintenance and repair cost associated with deferred replacement is avoided. If this deferred replacement strategy is implemented during low yield years, additional repair and maintenance cost should be specified.

TABLE 5. Summary of Expected Capital Replacement Expenditures

		Size[A]	Year to be Replaced	Expected[A] Expenditure	Salvage[B] Value	Eligible for Investment Credit	Amount Eligible For 20% Bonus Depreciation
Machinery:							
1.	Tractor	125.0 HP	1985	$ 46,468	$ 4,647	$ 4,647	$ 4,000
2.	Tractor	225.0 HP	1989	127,586	12,759	12,759	4,000
3.	Chisel	41.0 Ft.	1982	15,962	1,596	1,596	4,000
4.	Springtooth	54.0 Ft.	1988	11,494	1,149	1,149	3,218
5.	6 Row Cultivator	20.0 Ft.	1985	6,675	668	668	1,869
6.	6 Row Planter	20.0 Ft.	1986	9,490	949	949	2,657
7.	7R 2 Bar Lister	23.3 Ft.	1985	2,028	203	203	568
8.	Rollover M.B. Plow	9.0 Ft.	1989	14,253	1,425	1,425	3,991
9.	Drill	26.6 Ft.	1990	17,008	1,701	1,701	4,000
10.	Offset Disk	28.0 Ft.	1984	20,339	2,034	2,034	4,000
11.	Sprayer	20.0 Ft.	1988	9,791	979	979	2,742
12.	Pickup	0.5 TN	1980	9,200	920	920	2,576
13.	Rotary Mower	13.3 Ft.	1987	7,392	739	739	2,070

[A]The expected future expenditure is based on the 1980 purchase price, from the Oklahoma Crop and Livestock Budgets for Southwest Oklahoma, with a 8% annual inflation rate on machinery.

[B]Salvage value is 10% of the expected expenditure.

TABLE 6. Additional Input Data Specific to the Farm Scenario

Annual Inflation Rate for Land	8%
Annual Inflation Rate for Machinery	6%
Annual Inflation Rate for Buildings	6%
Number of Personal Tax Exemptions	4
Long-term Equity Minimum	30%
Intermediate-term Equity Minimum	30%
Long-term Interest Rate	9%
Intermediate-term Interest Rate	10%
Average Age of Machinery	4
Average Age of Buildings	5
Family Living Expense	$16,000
Annual Inflation Rate for Family Living Expenses	10%
Discount Rate	7.5%
Number of Iterations	100

Enterprise Data

Wheat, grain sorghum, cotton and forage enterprises are included in this analysis. Enterprise production costs per acre are based on current Southwest Oklahoma enterprise budgets (Oklahoma Crop and Livestock Budgets, 1980). The base costs include operating inputs, labor costs, annual operating capital, machinery charges and taxes. The production costs per acre for wheat, grain sorghum and cotton are $72.07, $38.46, and $144.16, respectively. These costs are inflated six percent annually. The leased land costs $30.00 per acre per year and the cost is inflated at six percent per year. The organization of production, which is held constant over the period of the analysis, includes 600 acres of wheat, which is also a forage activity for winter grazing. The cotton and grain sorghum enterprise both contain 400 acres.

Price and Yield Data

Agricultural prices and yields are characterized by high levels of variability. The competitive structure of agriculture, the inelastic demand for agricultural commodities and natural hazards are major forces contributing to this variability in prices and yields. As a result the variation in net farm income received by agricultural producers is substantial. A combination of high yields and high prices for commodities results in favorable net farm income. The reverse holds true for low prices and low yields. The adverse effects may be partially offset by participation in commodity programs or private crop insurance programs.

To simulate variability realistically, historical price and yield data are needed for the farm situation analyzed. Because actual farm level data are not reported, county average yields per harvested acre from 1966-78 for Jackson County, Oklahoma are utilized. These data for wheat, grain sorghum, cotton and forage are presented in Table 7. Commodity prices for Jackson County are not reported continously over an extended period of time. Thus, season average prices for Oklahoma are used in the analysis. Observation of the differences between annual prices for the Southwest area and for the entire state revealed those differences to be minimal. Annual prices for the four commodities included in the organization of production for the period 1960-78 are presented in Table 8.

Correlated Prices and Yields

The model uses triangular distributions of yields and prices to simulate yield and price variability. The yields of the commodities included in this analysis are not independent at the farm level. Drought conditions during the summer will likely affect cotton and grain sorghum yields adversely. In addition, poor moisture for summer crops will generally mean poor moisture at wheat planting time and a consequent decline in final yield the following year at harvest. Reasons for crop price correlations may not be as clear, however, an assumption of independence seems inappropriate. Correlations between and among yields and prices are built into the model based on the historical yield and price series.

Seasonal and cyclical variations are typical for many agricultural product prices. Using the Statistic Analysis System (SAS) to adjust the data for these variations, a first through fifth degree polynomial function of time was fit to each series. The resulting models were compared

TABLE 7. Yield Series Used to Test Long Term Trends, Jackson County, Oklahoma Yield Series

Year	Wheat Yield (BU/Acre)	Grain Sorghum Yield (BU/Acre)	Cotton Yield (Lbs./Acre)	Forage Yield[A] (Lbs./Acre)
1966	20.7	53.1	344.0	2195.0
1967	13.2	47.4	340.0	1752.0
1968	21.0	39.5	411.0	2197.0
1969	27.1	50.9	338.0	1896.0
1970	24.0	44.5	322.0	1772.0
1971	22.7	43.6	301.0	2367.0
1972	14.0	31.4	370.0	2843.0
1973	24.7	39.1	500.0	2550.0
1974	15.6	37.5	302.0	315.0
1975	23.4	51.2	352.0	3434.0
1976	20.3	36.2	349.0	2011.0
1977	22.3	36.8	508.0	1547.0
1978	21.8	45.1	417.0	1953.0

Source: The yield series is derived from the yield per harvested acre in Jackson County, Oklahoma. Oklahoma Agricultural Statistics, Oklahoma Department of Agriculture. Various issues.

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

TABLE 8. Price Series Used to Test Annual Trends, Jackson County, Oklahoma Price Series

Year	Wheat Price ($/BU)	Grain Sorghum Price ($/BU)	Cotton Price ($/lb)	Forage Price ($/TN)
1960	1.75	.80	.2753	25.04
1961	1.80	.99	.3075	23.58
1962	2.04	1.00	.2908	24.04
1963	1.90	1.00	.2993	27.46
1964	1.46	1.08	.2636	28.75
1965	1.36	1.02	.2594	24.46
1966	1.66	1.08	.1720	26.33
1967	1.47	1.00	.2117	27.67
1968	1.25	.95	.1967	26.88
1969	1.23	1.09	.1973	27.88
1970	1.33	1.13	.2000	33.13
1971	1.42	1.06	.2837	34.63
1972	1.70	1.41	.2590	33.92
1973	3.56	2.29	.4950	45.79
1974	3.95	2.86	.2990	55.92
1975	3.43	2.36	.4720	57.13
1976	2.78	2.00	.6110	63.92
1977	2.32	1.86	.4660	66.58
1978	3.00	2.02	.5390	67.08

Source: The price series are seasonal average prices received by Oklahoma producers. Oklahoma Agricultural Statistics, Oklahoma Department of Agriculture. Various issues.

to determine which model explained the most variability based on t-values and the R^2 value. The residuals from the most significant model for each commodity were used to calculate a price correlation coefficient matrix between the commodities. These price residuals are presented in Table 9.

A correlation coefficient matrix of yields is also needed for the analysis. Yields were tested for time trend and no significant yield trends were indicated. Thus, the yield correlation matrix was derived directly from the data itself. The matrices for prices and yields are presented in Table 10.

To generate triangularly distributed and appropriately correlated yields and prices, the correlation matrices must be factored into an upper and lower triangular matrix (Clements, Mapp and Eidman). Each correlation matrix has its own unique upper right triangular matrix and both are used as input in building a set of triangularly distributed prices and yields. These price and yield upper right triangular correlation matrices are presented in Table 11. An annual time trend value of four percent is specified for prices. A zero trend value is specified for yields.

The final step in generating the triangularly distributed prices and yields is to specify the parameters of the triangular distribution: the minimum, maximum and modal values of prices and yields for every commodity. The minimum yield values for wheat, grain sorghum and cotton are set equal to zero to reflect the possibility of weather or natural hazard destroying the crop. The modal values are chosen to approximate the modes of the historical yield and price series. A combination of historic data and expected yields is used to choose the maximum values for wheat, grain sorghum and cotton. The price and yield parameters for

TABLE 9. Residuals Used to Derive the Price Correlation Matrix

OBSERVATION	WHEAT	GRAIN SORGHUM	COTTON	FORAGE
1	0.07266	0.05659	0.179	2.5119
2	-0.14702	-0.00998	0.278	-2.1872
3	0.06430	-0.09861	-1.799	-3.0200
4	0.04583	-0.09591	0.918	0.3563
5	0.19977	0.03986	-0.006	2.2476
6	-0.09627	0.04887	2.443	-1.3078
7	0.36600	0.15960	-3.818	1.0110
8	0.26027	0.08896	1.767	2.1878
9	0.02323	-0.00779	0.688	0.3888
10	-0.12490	0.02299	-0.215	-0.6072
11	-0.25041	-0.10668	-2.340	1.6114
12	-0.49606	-0.39642	2.295	-0.9113
13	-0.60114	-0.29746	-5.014	-6.4985
14	0.85859	0.32735	13.018	-0.1307
15	0.89085	0.67351	-12.361	4.1941
16	0.12690	0.02494	-0.393	-0.2894
17	-0.056853	-0.35612	9.423	1.4261
18	-0.7720	-0.32900	-6.971	0.2305
19	0.56266	0.25530	1.706	-1.2135

TABLE 10. The Correlation Coefficient Matrices for Triangularly Distributed Prices and Yields, Southwest Oklahoma

	Wheat Price	Sorghum Price	Cotton Price	Forage Price	Wheat Yield	Sorghum Yield	Cotton Yield	Forage Yield
Wheat Price	1.0000	0.92545	0.05399	0.35398	0.0	0.0	0.0	0.0
Grain Sorghum Price	0.92545	1.0000	-0.16602	0.44098	0.0	0.0	0.0	0.0
Cotton Price	0.05399	-0.16602	1.0000	-0.06420	0.0	0.0	0.0	0.0
Forage Price	0.35398	0.44098	-0.0642	1.0000	0.0	0.0	0.0	0.0
Wheat Yield	0.0	0.0	0.0	0.0	1.0000	0.38926	0.24459	0.21896
Grain Sorghum Yield	0.0	0.0	0.0	0.0	0.38926	1.00000	-0.33092	0.05553
Cotton Yield	0.0	0.0	0.0	0.0	0.24459	-0.33092	1.0000	0.22619
Forage Yield	0.0	0.0	0.0	0.0	0.21896	0.05553	0.22619	1.0000

TABLE 11. The Upper Right Trangular Correlation Matrices for Prices and Yields, Southwest Oklahoma

	Wheat Price	Sorghum Price	Cotton Price	Forage Price	Wheat Yield	Sorghum Yield	Cotton Yield	Forage Yield
Wheat Price	0.30872	0.87948	0.07687	0.35398	0.0	0.0	0.0	0.0
Grain Sorghum Price	0.0	0.88685	-0.13799	-0.44098	0.0	0.0	0.0	0.0
Cotton Price	0.0	0.0	0.99794	-0.06420	0.0	0.0	0.0	0.0
Forage Price	0.0	0.0	0.0	1.0000	0.0	0.0	0.0	0.0
Wheat Yield	0.0	0.0	0.0	0.0	0.82598	0.47929	0.20025	0.21896
Grain Sorghum Yield	0.0	0.0	0.0	0.0	0.0	0.93412	-0.35262	0.05553
Cotton Yield	0.0	0.0	0.0	0.0	0.0	0.0	0.97408	0.22619
Forage Yield	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.0000

the triangular distribution are presented in Table 12.

Data for the forage series are from Oklahoma State University Experiment Station results for the Mangum test station in Southwest Oklahoma (Denman and Arnold; Rommann, McMurphy, and LeGrand, 1976; Rommann, McMurphy, and LeGrand, 1977; Rommann, McMurphy, and LeGrand, 1978; McMurphy). The data are in pounds of dry forage harvested per acre of wheat pasture for the entire growing season, with some clippings taken as late as June. Because this analysis assumes that wheat is harvested for grain, the clipping data are used only until March 1. The resulting forage yield minimum, maximum and modal values in Table 12 are lower than would normally be expected from the forage yield series presented in Table 7.

The minimum prices used for wheat, grain sorghum, and cotton are the loan rates established for those crops for the 1980 season. This loan rate has historically been a reliable indicator of the lowest cash price that producers expect to receive. The modal value used for the price specificiations are the average cash prices received by producers for the current year. The maximum prices for wheat and grain sorghum are based on the release price of the Farmer Owned Grain Reserve. The maximum cotton price is based on the cash price in 1980. The minimum, maximum and modal prices for the forage enterprise are based on current expectations of the alfalfa hay price in Southwest Oklahoma.

The following chapter outlines the risk management alternatives analyzed in this study. These alternatives are examined by specifying the mathematical formulas used to derive the payment benefits from particular program participation.

TABLE 12. Price and Yield Distribution Parameters, Southwest Oklahoma

Enterprise	Unit	Minimum[A]	Mode[B]	Maximum[C]
Wheat Yield	BU/ACRE	0.00	23.45	32.00
Grain Sorghum Yield	BU/ACRE	0.00	43.45	54.00
Cotton Yield	LBS/ACRE	0.00	338.00	510.00
Forage Yield	LBS/ACRE	500.00	1000.00	1800.00
Wheat Price	$/BU	3.08	3.80	4.75
Grain Sorghum Price	$/BU	2.45	2.52	3.10
Cotton Price	$/LBS	0.484	0.584	0.870
Forage Price	$/LBS	0.020	0.0325	0.050

[A]Yield minimum values represent the lowest yield figures expected for Southwest Oklahoma. Price minimum for wheat, grain sorghum and cotton are the loan rates for each crop. The price minimum for the forage activity is the lowest expected cash price of alfalfa hay, Southwest Oklahoma.

[B]The yield modal values are derived from frequency counts of historical data and the price modal values are the average cash prices received by producers in Southwest Oklahoma.

[C]The maximum yield values are from estimates based on historical data. The maximum price for wheat, grain sorghum and cotton are the release prices from the Farmer Owned Grain Reserve. The maximum price for the forage activity is the maximum alfalfa hay price expected for Southwest Oklahoma.

CHAPTER III

ANALYSIS OF RISK MANAGEMENT ALTERNATIVES

The following is a detailed review of each commodity program and combination of programs analyzed in this study. To determine the direct payment made to the producer under varying alternatives, unique mathematical equations are specified for each program. These equations are the formulas utilized in the design framework of the model. An outline is also made of the assumptions, conditions, and requirements necessary to initiate a producer payment. Finally, a review is made of the assumptions concerning the proposed federal crop insurance program. This proposed FCI alternative is an attempt to determine the affects of recent legislation modifying the FCI program.

To provide a base against which the various risk management alternatives may be compared, the farm firm is first simulated over the 10-year planning horizon assuming no commodity or insurance programs are available to the producer. Then, participation in the deficiency payments program, disaster payments program, crop hail insurance on wheat and all-risk crop insurance program on wheat are evaluated. Table 13 provides a summary of the main characteristics of these current programs.

Various combinations of risk management alternatives are analyzed together. For example, deficiency and disaster programs are analyzed,

TABLE 13. Summary of Current Program Characteristics for Jackson County, Oklahoma

Program	Agency	Criteria	Required Declaration	Benefits	Crops under Protection[A]
Deficiency program	ASCS	Commodity program participants who receive prices below the target level.	Planted Acerage	Direct payments for deficiency in price received below the target price.	Wheat Grain Sorghum Cotton
Disaster program	ASCS	Commodity program participants who suffer crop losses.	Planted Acerage	Direct payments for deficiency in production below 60% of normal farm yield	Wheat Grain Sorghum Cotton
Crop-hail insurance	Private Industry	Losses or damages to growing crops caused by hail.	None	Insurance to compensate for crop losses resulting from hail.	Wheat
Federal Crop Insurance	FCIC	Losses to eligible covered crop.	Application Prior To Planting	Insurance to compensate for crop losses caused by natural hazards	Wheat

Source: Miller and Trock

[A]These are crops covered by the respective program for the purpose of this study. Other crops may be eligible for protection.

then these two programs are combined with crop hail insurance and then with the all-risk insurance program. In addition, deficiency payments are analyzed in combination with the all-risk insurance program. Proposed changes in the current FCI program will have an impact on the economic outcome of the FCI program. The proposed FCI program is analyzed alone and then compared to the existing program results. Finally, the proposed FCI program is analyzed in combination with the current deficiency program.

Deficiency Payment Program

The deficiency payment program is designed to reduce the long-run risks inherent to farming by reducing price risks, a major cause of income variability. Another reason for the deficiency program is the compensation for losses due to publicly financed technological change. Since demand for agricultural products in inelastic, each advance in technology has decreased producers' income. By providing a direct payment program the magnitude and impact of this income loss is reduced (Miller and Sharples).

In this analysis, wheat, grain sorghum and cotton are covered under the deficiency program. Stochastic prices are generated from the triangular price distributions for year t and compared to the trended target price. If the trended stochastic price is less than the target price, the deficiency payment is calculated and added to gross farm receipts. The deficiency payment is computed using the following formula:

$$DP_{ct} = (TP_{ct} - P_{ct})\ (NFY_c)\ (A_{ct})\ (AF_t) \qquad (1)$$

where:

DP_{ct} = the disaster payment for the specified commodity in period t.

TP_{ct} = the trended target price for the specified commodity in period t.

P_{ct} = the actual stochastic price per acre for the specified commodity in period t.

NFY_c = the normal farm yield of the specified commodity.

A_{ct} = the number of acres for harvest in period t.

AF_t = the allocation factor for period t. The allocation factor, specified for the simulation as one, is a ratio of the Normal Program Acreage to the National Acreage Harvested.

The target prices are trended at six percent during the planning horizon. The initial target prices are \$3.63 per bushel for wheat, \$2.50 per bushel for grain sorghum and \$.584 per pound for cotton. The trended target prices for each commodity are presented in Table 14. The ASCS established yield in Jackson County for wheat, grain sorghum, and cotton is 22.8 bushels per acre, 46.4 bushels per acre and 472 pounds per acre, respectively.

Disaster Payment Program

The disaster payments program also reduces income variability by reducing the adverse effects of yield fluctuations. Payments are made to support income levels of agricultural producers who experience crop losses or are unable to plant crops because of a natural hazard. To represent this natural occurrence, stochastic yields generated from triangular distributions are tested against 60 percent of normal farm yield for wheat and grain sorghum. To determine disaster payments for cotton producers, stochastic yields are tested against 75 percent of farm yield and multiplied by one-third the target price. If the stochastic

Table 14. Trended Target Prices for Wheat, Grain Sorghum, and Cotton

	ENTERPRISE		
SIMULATION YEAR	WHEAT ($/bu)	GRAIN SORGHUM ($/bu)	COTTON (¢/lb)
1[A]	3.63	2.50	.584
2	3.85	2.65	.619
3	4.08	2.81	.656
4	4.32	2.98	.696
5	4.58	3.16	.737
6	4.86	3.35	.782
7	5.15	3.55	.828
8	5.46	3.76	.878
9	5.79	3.98	.931
10	6.13	4.22	.987

[A]The initial target prices are 1980 target levels as specified by the USDA-ASCS. The preceding target prices have been trended at six percent annually.

yields are less than the normal farm yield figure, a program payment is calculated and added to gross farm receipts. The disaster payment is computed using the following formula:

$$DPP_{ct} = A_{ct}\,(.60NFY_c - Y_{ct}).50TP_{ct} \qquad (2)$$

where:

DPP_{ct} = the disaster payment made for the specified commodity in period t.

A_{ct} = the number of acres for harvest in period t.

NFY_c = the normal farm yield of the specified commodity.

Y_{ct} = the actual stochastic per acre yield for the specified commodity in period t.

TP_{ct} = the trended target price for the specified commodity in period t.

No production expenses are associated with participation in deficiency or disaster payment programs. Originally there was an indirect cost of participation due to the set aside requirement. For 1981, no set aside program has been announced. This study analyzed the effect such a requirement might have on the producer and returns to this farming operation. The impact of set aside acres is evaluated as part of scenarios containing deficiency and disaster programs.

The disaster program required wheat producers to set aside 20 percent and grain sorghum producers to set aside 10 percent of their normal harvested acres during the 1978 and 1979 crop years. For the organization of production used in this study, this represents 120 acres of wheat and 40 acres of grain sorghum. The cotton enterprise is not affected by a set aside program. The 160 acres that are set aside must be protected from erosion. The typical pattern for this area is to plant wheat, use it as a cover crop and graze it out. The costs of production (excluding harvesting costs) would not change, but the revised acreages would include 480 acres of wheat, 360 acres of grain sorghum, 400 acres of cotton and 480 acres of the forage activity.

Expenses for the grazeout activity are based on a small grain grazeout budget for Southwest Oklahoma (Oklahoma Crop and Livestock Budgets, 1980) and include all of the costs associated with planting an acre of wheat. The production cost per acre for the forage activity is $51.27. This figure is multiplied by 160 acres and is inflated at six percent annually. The added income is based on the weight gain in stocker animals from November until May. Assuming the animals weighed 400 pounds in November and 700 pounds in May, the average weight is 550 pounds. This figure is multiplied by $2.00 per hundredweight times six, the months grazed. This yields a $66.00 per acre charge for winter grazing. Assuming that each acre can support 1.2 head of cattle, the total income derived for winter grazing is $79.70 per acre. This per acre figure is multiplied by 160 acres and added to farm income. Over the years it is inflated at four percent per year.

Crop Hail Insurance

The erratic and uncertain nature of hail damage has enabled the private insurance industry to establish a well developed plan to provide insurance against crop hail losses. These losses are well suited for an insurance program because of the random nature of hail damage. Currently the private industry has a total liability coverage of $9 billion. Producers are paying $325 million annually with hail loss indemnities of about $200 million per year (Miller and Trock). In 1974 the private industry covered 84.2 percent of the total losses paid that were caused by hail damage (Miller and Walter). Thus, the private industry provides a substantial portion of total crop hail insurance.

In Jackson County wheat, grain sorghum and cotton producers are all eligible for crop hail insurance. Because of the growing season, wheat is the only major enterprise insured frequently against hail losses. Thus, the crop hail insurance analysis is limited to the wheat enterprise. In determining the possibility of a crop loss, normal farm yield is first compared to the stochastic yield. Because the reasons for crop losses are numerous, it is assumed that three of every ten years of low yields is due to hail damage. If a crop loss is present, the model will calculate a hail insurance payment based on an approximate 30 percent probability level. When these conditions are present, a loss percentage is calculated using the following formula:

$$LP_{wt} = 1 - \left[\frac{Y_{wt}}{NFY_w} \right] \qquad (3)$$

where:

LP_{wt} = the wheat loss percentage in period t

Y_{wt} = the actual stochastic per acre yield for wheat in period t.

NFY_w = the normal farm yield for wheat

The loss percentage is used in the following formula to derive the total insurance payment received by the producer for damages incurred by hail.

$$IP_{wt} = LP_{wt} \cdot A_{ct} \cdot PC_{wt} \qquad (4)$$

where:

IP_{wt} = the total insurance payment for hail damages to the wheat crop in period t.

LP_{wt} = the wheat loss percentage in period t

A_{wt} = the number of wheat acres insured against hail damage in period t.

PC_{wt} = the expenses incurred in planting and fertilizing an acre of wheat in period t. Normally this is the per acre value of insurance liability selected by the producer.

In this study, the cost of production represents the insurance coverage, as producers insure the expenses incurred in planting the wheat crop. Based on conversations with private insurance representatives in Jackson County, a premium rate of $8 per $100 of crop coverage is specified.

Federal Crop Insurance

The all-risk crop insurance alternative was based on specifications implemented by the Federal Crop Insurance Corporation (FCIC). Federal crop insurance has been the major source of all risk insurance coverage available since 1948 (Miller and Trock). The program was developed by experimentation and was to be gradually expanded across the country. Because of this plan, one-half of the country and numerous crops are without FCI coverage. Presently, Jackson County is limited to FCI covering only wheat enterprises. The initial portion of this analysis concerning the FCI program is limited to examining the current program.

The model is designed to calculate payments for yields below the FCI guarantee level. If the actual stochastic wheat yield is below the FCI guarantee, a payment is calculated and added to gross receipts. The following formula is used to derive the program payments:

$$CIP_t = (GL_t - Y_{ct})(A_{ct})(PE_{ct}) \qquad (5)$$

where:

CIP_t = the crop insurance payment for period t.

GL_t = the per acre guarantee level as specified by the FCIC in period t.

Y_{ct} = the actual stochastic yield in period t.

A_{ct} = the number of acres covered by FCI in period t.

PE_{ct} = the price elective chosen by the producer in period t.

The current FCI program was evaluated with a per bushel FCI guarantee of 50 percent. With the FCI average for wheat of 22.8 bushels per acre, the per bushel guarantee level is 11.4 bushels per acre. The price elective specified for this analysis is $3.00 per bushel.[1]

The premium rates are based on the price elective selected and the per bushel guarantee the producer selects. For the 1980 crop year no premium subsidy is available to producers. The provisions for 1981 will permit subsidies of 30 percent. Both the 30 percent subsidy level and an alternative with no subsidy are computed at the 50 percent guarantee level.

Alternative Combinations

The deficiency and disaster payments program are evaluated in combination with the All-Risk Insurance or the Crop Hail Insurance. Deficiency and disaster payment programs are evaluated assuming compliance with the set aside requirement. The scenario, including deficiency and disaster payments and All-Risk Insurance, involves no

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[1]The ASCS established yield and the FCIC average yield are assumed to be equal based on conversations with Deloise Brown, Jackson County FCIC Representative. Specifying lower FCIC average yields could vary the results presented in this study. The yield series used in this study is based on harvested acre yields while the FCIC estimates crop coverage and premium payments on planted acreage. Historically planted acre yields are approximately 15 percent lower than harvested acre yields.

government subsidy and a 50 percent guarantee level. A scenario, including deficiency and disaster payments and hail insurance, is also evaluated. Various combinations of deficiency and All-Risk Insurance are examined to evaluate different levels of subsidy and guarantee levels.

Proposed Federal Crop Insurance

The final analysis is based on proposed changes in the FCI program for Jackson County. As mentioned, the 1980 FCI program analyzed is limited to wheat production. The program for the 1981 crop year is expected to extend coverage to include wheat, grain sorghum and cotton. The guarantee options will cover 50, 65 and 75 percent of the average farm yield established by the FCIC. The price electives used in this analysis for wheat, grain sorghum and cotton are $3.00 per bushel, $2.00 per bushel, and $0.45 per pound, respectively. The current FCI program has no provision for premium subsidies. The 1981 FCI program will have a full 30 percent government subsidy for the 50 and 65 percent guarantee levels. If the producer chooses the 75 percent guarantee level, the subsidy level is equal to the 30 percent premium associated with the 65 percent guarantee level. The enterprise production cost and premium cost per acre for participation in the FCI program are presented in Table 15. The premium expenses given for grain sorghum and cotton are preliminary estimates of the anticipated FCI program costs for Jackson County (Walter). The FCI premium expense for the wheat enterprise is the actual 1980 cost figures, based on an FCIC average farm yield of 22.8 bushels per acre.

The actual average yields used by the FCIC to derive guarantee levels is presently unknown for grain sorghum and cotton. The wheat

Table 15. Enterprise Production Cost and Premium Expense Per Acre for Participation in the 1981 FCI Program, Jackson County, Oklahoma

Cost	Enterprise		
	Wheat	Grain Sorghum	Cotton
Production Cost[A] (dollars/acre)	$72.07	$28.46	$144.16
Premium Cost[B] (dollars/acre):			
50 Percent Guarantee	5.30	2.70	4.10
65 Percent Guarantee	7.40	4.30	6.50
75 Percent Guarantee	8.73	5.90	9.00
Premium Cost with a 30 Percent Subsidy (dollars/acre):			
50 Percent Guarantee	3.71	1.89	2.87
65 Percent Guarantee	5.18	3.01	4.55
75 Percent Guarantee	6.51	4.61	7.05

[A]Production costs are derived from enterprise budgets for Southwest Oklahoma, Oklahoma Crop and Livestock Budgets. (Production cost components include operating inputs, annual operating capital, taxes, insurance and labor.)

[B]The grain sorghum and cotton premium expenses are preliminary estimates obtained from Alan S. Walter, Staff Economist, FCIC, Kansas City, Missouri. The wheat premium expenses are actual figures based on an average FCIC county yield. These were obtained from Deloise Brown, Jackson County, FCIC, Altus, Oklahoma.

guarantee levels are actual figures obtained from the Jackson County FCIC office (Brown). Two sets of estimated yields for grain sorghum and cotton are utilized to analyze the possibility of high or low established average yield levels. These guarantee estimates are combined with the actual wheat levels to simulate the impacts of implementing the proposed 1981 FCI program. The guarantee levels are presented in Table 16.

The following chapter outlines the results of current and proposed commodity programs. The programs are compared using the mean, minimum, maximum, coefficient of variation in net worth and the number of bankrupt iterations. The expenses incurred by the producer and the government are presented for various yield levels.

Table 16. FCI Guarantee Levels for Wheat, Grain Sorghum, and Cotton

	GUARANTEE LEVEL[A]		
	Wheat (BU/Acre)	Grain Sorghum (BU/Acre)	Cotton (Lbs./Acre)
LOW ESTIMATED FCI AVERAGE YIELDS:			
50 Percent Guarantee	11.4	16.8	190.0
65 Percent Guarantee	14.8	21.8	247.0
75 Percent Guarantee	17.1	25.1	285.0
HIGH ESTIMATED FCI AVERAGE YIELDS:			
50 Percent Guarantee	11.4	20.0	204.0
65 Percent Guarantee	14.8	26.0	265.0
75 Percent Guarantee	17.1	30.0	305.0

[A]Wheat guarantee levels are actual figures obtained from Deloise Brown, Jackson County FCIC Office. The grain sorghum and cotton estimates were obtained from Alan S. Walter, Staff Economist, FCIC, Kansas City, Missouri.

CHAPTER IV

RESULTS OF COMMODITY PROGRAM EVALUATION

Each of the alternatives evaluated involved a 10-year simulation run replicated 100 times. Portions of the results for the current programs are summarized in Table 17 and Table 18. These results include the mean, minimum and maximum ending net worth, and coefficient of variation (standard deviation divided by the mean) of ending net worth. The number of bankruptcies occurring during the 100 iterations is also presented.

Current Program Results

Base Run

The base run simulates the growth of the farm firm without any type of public or private risk management program. At the end of the 10-year period, the farm firm has a mean ending net worth of $451,500, and there are 23 bankruptcies. The bankruptcy figure indicates that in 23 of the 100 iterations, or 23 percent of the time, percent equity dropped below 30 percent, the firm was unable to meet cash needs and a bankruptcy occurred. The base situation is sensitive to added debt. That is, as the initial equity is reduced further, the number of bankruptcies increases dramatically.

TABLE 17. Ending Net Worth for the Current Program Alternatives

Type of Alternative	ENDING NET WORTH ($000) MEAN	MIN	MAX	RANGE	C.V. (%)	BANK-RUPTCIES
No Commodity Program	451.5	152.9	697.0	544.1	26.1	23
Deficiency Payments Program:						
No set aside	536.8	305.7	739.4	433.7	20.2	12
Set aside requirement	506.0	302.1	711.0	408.9	20.5	15
Disaster Payments Program:						
No set aside	673.3	440.4	848.4	408.0	12.6	0
Set aside requirement	652.7	418.2	826.1	407.9	13.0	0
All Risk Insurance Program:						
No government subsidy at the 50% FCI guarantee	432.9	128.4	686.0	557.6	27.6	23
30% government subsidy at the 50% FCI guarantee	441.5	137.1	691.1	554.0	26.5	23
Crop-Hail Insurance Program:	449.4	159.4	676.1	516.7	25.2	21
Deficiency and Disaster Programs:						
No set aside	734.6	534.7	877.2	342.5	9.3	0
Set aside requirement	713.0	512.1	852.7	340.7	9.6	0

TABLE 17. (Continued)

Type of Alternative	ENDING NET WORTH ($000) MEAN	MIN	MAX	RANGE	C.V. (%)	BANK-RUPTCIES
Deficiency, Disaster and All Risk Insurance:						
No government subsidy	724.3	518.4	871.0	352.7	9.5	0
Deficiency, Disaster and Crop Hail Insurance:	732.6	551.5	862.5	311.0	9.0	0

TABLE 18. Ending Net Worth for the Current Deficiency and FCI Program

Type of Alternative	ENDING NET WORTH ($000) MEAN	MIN	MAX	RANGE	C.V. (%)	BANK-RUPTCIES
Deficiency and All Risk Insurance (wheat only)						
50% FCI guarantee with no subsidy	520.7	310.1	730.3	420.2	20.6	16
Set aside requirement	493.1	309.8	703.0	393.2	20.7	17
50% FCI guarantee with 30% subsidy	527.6	304.1	734.9	430.7	20.4	13
Set aside requirement	498.5	307.4	706.8	399.4	20.6	15
50% FCI guarantee with 100% subsidy	543.7	302.2	745.4	443.2	19.8	9
65% FCI guarantee with 30% subsidy	529.8	304.2	734.4	430.2	20.1	13
75% FCI guarantee with eligible subsidy	534.1	301.4	737.3	436.0	19.8	10

Deficiency Payment Program

The addition of the deficiency payment program, which is designed to reduce the adverse effects of price variability, increases mean ending net worth from $451,500 to $536,800, a substantial increase. In addition, the number of bankruptcies was reduced by about 50 percent to 12. The coefficient of variation decreases from 26.1 to 20.2 percent. Thus, for this individual farming operation the goals of the deficiency program parallel the results. The program increased the expected ending net worth and reduced the probability of financial disaster for the low equity producer.

The addition of the set aside program as a requirement for participation in the deficiency payment program reduces the mean ending net worth to $506,000 and increases the number of bankruptcies to 15. Even with the indirect costs associated with participation in the set aside program, the producer would generally favor the deficiency program with set aside over the base run with no commodity programs at all.

Disaster Payment Program

The disaster payments program, when analyzed alone, is the single most favorable program to the producer. There are significant increases in the ending net worth position over both the base run and the deficiency payments program. Expected ending net worth totals $673,300 and no bankruptcies occur. This represents a 49 percent increase in the mean net worth over the base run. The range in ending net worth is decreased by $136,100. Adding a set aside requirement to the disaster program again reduces the magnitude of the improvement over the base run.

Even with the reduction caused by the set aside program, disaster payments represent a substantial improvement over the base run. The number of bankruptcies remains zero with the addition of the set aside requirement. Disaster payments reduce substantially the effects of yield variability for the producer and significantly increase the chance of survival. The coefficient of variation associated with net worth is 12.6 percent under disaster programs, compared to 26.1 percent in the base run. It would clearly be beneficial for the producer to participate in the disaster payments program even if compliance with aset aside requirement is necessary.

All Risk Crop Insurance

The All Risk Insurance program does not yield results that are as favorable to the producer as those of the deficiency and disaster payments program. For the alternatives containing only all risk insurance, two levels of government subsidy are evaluated at the 50 percent guarantee level. These subsidy levels, 30 percent and no subsidy, both result in a less favorable net worth position than the base run at the end of 10-year simulation. The mean, maximum and minimum are all reduced and the range in ending net worth increases. The coefficient of variation for the alternative with no subsidy increases to 27.6 percent compared to 26.1 percent in the base run. The number of bankruptcies remains constant at 23.

A 30 percent subsidy with a 50 percent guarantee shows a favorable mean net worth level ($441,500) compared to the FCI program with no subsidy ($432,900). This subsidy level also reduces the coefficient of variation to 26.5 percent. The increase in net worth level for the subsidy program is small in comparison to the disaster payments program and the deficiency payments program. Even if a set aside requirement is imposed on the deficiency and disaster programs, they still yield more favorable results than all the risk insurance program. If the producer were faced with a choice of no program or all risk insurance with a subsidy, he would be better off in the long run to assume the yield risks himself because ending net worth is higher with no commodity programs or insurance.

Crop Hail Insurance

The crop hail insurance program which includes only wheat hail insurance coverage, yields ending net worth levels that are not as favorable as the base run which has no commodity or insurance programs. While the net worth is lower for the insurance program, the number of bankruptcies decreased from 23 to 21, compared to the base run.

Results for the wheat hail insurance alternative are low partly because the premium costs are incurred every year. This assumption may not represent the actions of a typical producer because most do not purchase wheat hail insurance every year. The model forces this constraint on the analysis because it is limited to either purchasing insurance every year or not at all. While expenses are incurred every year, the chance of income from insurance proceeds is limited to about three out of ten years. Thus, if the producer does participate in the wheat hail insurance program every year, these results suggest the producer would be worse off than if he never participated.

Deficiency and Disaster Payments

The three alternatives which include disaster and deficiency payments all show a greatly enhanced position compared to the base run. These combinations reduce risk and show more firm growth than any of the programs analyzed singularly. When deficiency and disaster programs are combined, mean ending net worth is $734,600 and bankruptcies are reduced to zero. Because disaster payments alone reduce the likelihood of firm failure to zero, any combination of other programs with disaster payments is likely to generate the same result.

The alternative of deficiency, disaster, and crop hail insurance has a mean net worth of $732,600 and a 9.0 percent coefficient of variation. The range in net worth ($311,000) is lower than any other alternative. A lower net worth occurs when deficiency and disaster payments are combined with the all risk insurance program. Any of these combinations greatly increases the chance of firm survival.

Deficiency Payments and Federal Crop Insurance

This portion of the analysis deals with combinations of deficiency payments and all risk insurance on wheat. The 50 percent of normal farm yield level is run with all subsidy levels. The set aside requirements are evaluated on alternatives with no subsidy and with the 30 percent subsidy.

Results on Table 18 indicate that the 50 percent yield guarantee with the premium subsidized 100 percent is more favorable for the producer. Mean net worth totals $543,700 and nine bankruptcies occur. At the same yield guarantee level but without the premium subsidy, the mean net worth is only $520,700 and 16 bankruptcies occur. At the 30 percent subsidy level, increasing the yield guarantee from 50 perent to 65 percent to 75 percent increase ending mean net worth from $527,600 to $534,100 and bankruptcies decline from 13 to 10. Thus, the percent yield guarantee appears to have relatively little impact on the mean ending net worth and the probability of firm survival.

Proposed Program Results

All Risk Insurance Program

The results for the proposed 1981 FCI program are presented in Table 19. The results indicate that the new program will be more beneficial to producers than the existing FCI program which is limited to wheat production. The mean net worth for this farm situation participating in the current FCI program at the 50 percent guarantee level is $432,900 (Table 17). This is a smaller mean net worth than results for the low range 50 percent guarantee level under the proposed FCI program which had a mean net worth of $445,700. Bankruptcies occurred 23 times under the current program and 21 times under the proposed program. By choosing to participate at the 75 percent guarantee level the producer would further reduce the possibility of bankruptcy. In this scenario, bankruptcies are reduced to six and mean net worth increases to $474,000.

The possibility of higher guarantee levels is favorable to the producer who participates in the proposed FCI program. The high 75 percent guarantee level has a mean net worth of $492,700. This represents an $18,700 increase in mean net worth over the low 75 percent

TABLE 19. Ending Net Worth of the Proposed 1981 FCI Program for Wheat, Grain Sorghum, and Cotton

Alternative	ENDING NET WORTH ($000) MEAN	MIN	MAX	RANGE	C.V. (%)	BANK-RUPTCIES
Proposed All Risk Crop Insurance						
(All Crops with a Low FCI Average Farm Yield)						
50% FCI guarantee with a 30% subsidy	445.7	167.6	685.4	517.8	24.7	21
65% FCI guarantee with a 30% subsidy	462.9	197.1	691.1	494.0	22.1	13
75% FCI guarantee with the eligible subsidy	474.0	301.3	700.9	400.0	20.8	6
Proposed All Risk Crop Insurance						
(All Crops with a High FCI Average Farm Yield)						
50% FCI guarantee with a 30% subsidy	452.3	175.3	689.3	514.0	23.9	19
65% FCI guarantee with a 30% subsidy	475.4	306.0	701.4	395.4	21.2	8
75% FCI guarantee with the eligible subsidy	492.7	310.8	715.9	405.1	19.7	3

guarantee level. When the high 75 percent guarantee level is implemented, bankruptcies are decreased to three. This high and low guarantee classification pertains to the FCIC yield estimates for grain sorghum and cotton. The results indicate an overclassification or underclassification of the FCIC yield estimates has a significant impact on firm growth and survival rate. In this instance, the farm manager who has a higher yield classifiction, compared to a lower estimate, will derive greater benefits from the proposed FCI program. As the guarantee levels increase, the ending net worth position improves and bankruptcies decrease.

A comparison of the high 65 percent level to the base run reveals that mean net worth increased from $451,500 (Table 17) to $475,400 (Table 19). The number of bankruptcies for the 65 percent guarantee is eight while the base run has 23. The variance in net worth decreases from 26.1 percent to 21.2 percent for the base run and the high 65 percent level, respectively.

Deficiency and Proposed Federal Crop Insurance

The 1981 FCI program is analyzed in combination with the current deficiency payments program to determine the potential impacts of eliminating the disaster payments program. The results reveal the deficiency and proposed FCI program do not provide the income support that is evident with the disaster program.

Results for the deficiency and proposed FCI program are presented in Table 20. These results show that the added grain sorghum and cotton coverage do not substantially increase net worth compared to the existing deficiency and FCI program. The mean net worth for the 50

TABLE 20. Ending Net Worth of the Deficiency and Proposed FCI Program for Wheat, Grain Sorghum, and Cotton

ALTERNATIVE	ENDING NET WORTH ($000) MEAN	MIN	MAX	RANGE	C.V. (%)	BANK-RUPTCIES
Deficiency and Proposed All Risk Insurance:						
(All Crops With a Low FCI Average Farm Yield)						
50% FCI guarantee with no subsidy:	517.9	306.6	720.3	413.7	20.1	8
Set aside requirement	490.3	303.1	693.5	390.4	20.1	11
50% FCI guarantee with 30% subsidy:	531.3	309.9	729.0	419.1	19.4	7
Set aside Requirement	501.7	303.7	701.5	397.8	19.9	8
50% FCI guarantee with 100% subsidy	561.9	310.9	748.5	437.6	18.0	3
65% FCI guarantee with 30% subsidy	548.1	310.9	733.3	422.4	17.6	2
75% FCI guarantee with the eligible subsidy	560.8	322.5	741.5	419.0	16.0	0
Deficiency and Proposed All Risk Insurance:						
(All Crops With a High FCI Average Farm Yield)						
50% FCI guarantee with no subsidy	524.2	304.4	724.0	419.0	19.6	7
Set aside requirement	496.0	303.2	697.1	393.9	19.9	9
50% FCI guarantee with 30% subsidy	537.6	306.9	732.6	425.8	18.9	6
Set aside requirement	507.6	302.8	705.1	402.2	19.5	7

TABLE 20. (Continued)

ALTERNATIVE	ENDING NET WORTH ($000) MEAN	MIN	MAX	RANGE	C.V. (%)	BANK-RUPTCIES
50% FCI guarantee with 100% subsidy	568.2	315.4	752.1	436.7	17.5	3
65% FCI guarantee with 30% subsidy	561.1	315.5	742.2	426.6	16.6	2
75% FCI guarantee with the eligible subsidy	580.2	347.8	754.9	407.1	14.6	0

percent guarantee with a 30 percent subsidy is $531,300 (Table 20), compared to $527,600 (Table 18) for the program containing wheat only. As the FCI guarantees increase, an increase in firm growth can be seen. The lower range 75 percent guarantee has a mean net worth of $560,800 (Table 20) compared to $534,100 (Table 18) with the current program. The added coverage provided by the proposed FCI program does increase the chance of firm survival. Comparing the proposed FCI program and the current program at the 75 percent level reveals that bankruptcies decrease from 10 (Table 18) to zero (Table 20).

The deficiency and proposed FCI program analyzed with the higher FCI guarantee levels show relatively small impacts on the levels of firm growth or chance of firm survival compared to the lower guarantee. The high range 50 percent guarantee level had a $524,200 (Table 20) mean net worth compared to $517,900 (Table 20) for the same alternative at the low guarantee level. Bankruptcies declined from 8 to 7 for the low and high yield levels, respectively. The bankruptcies at the 65 percent guarantee level with 30 percent subsidy remained constant at two for both sets of guarantee levels. These results indicate that the level of yield guarantees has little impact on the economic viability of this producer choosing to participate in the deficiency and the proposed FCI program.

Comparing the deficiency and proposed FCI program to the base run reveals significant increases in net worth and chance of firm survival. The lowest mean net worth with high FCI guarantee is the 50% guarantee with no subsidy and set aside acreage. This scenario has a mean net worth of $496,000 (Table 20) compared to the base run with $451,500 (Table 17). Bankruptcies occurred 23 times in the base run and decreased to nine with the deficiency and FCI program. These significant improvements indicate that producers might favor the deficiency and proposed 1981 FCI program over no program involvement.

Comparing the deficiency and proposed FCI program to the base run reveals significant increases in net worth and chance of firm survival. The lowest mean net worth with high FCI guarantee is the 50% guarantee with no subsidy and set aside acreage. This scenario has a mean net worth of $496,000 (Table 20) compared to the base run with $451,500 (Table 17). Bankruptcies occurred 23 times in the base run and decreased to nine with the deficiency and FCI program. These significant improvements indicate that producers might favor the deficiency and proposed 1981 FCI program over no program involvement.

The disaster and the combination of disaster and deficiency program both show improved financial position over the deficiency and 1981 FCI program. The best results for the later alternative is the 75 percent guarantee level with a mean net worth of $580,200 (Table 20). This is a decline in mean net worth of $93,100 and $154,400 for the disaster and combined disaster and deficiency program, respectively. There are no bankruptcies for any of the alternatives. The added premium cost associated with the FCI program decreases economic growth when comparing the disaster program or the disaster and deficiency program.

Government Costs

Current Programs

The benefits and costs of providing assistance to agricultural producers is a recent topic of debate. The social costs and benefits provided by commodity programs are largely unmeasured because of the difficulty in establishing an appropriate scale of assessment. The actual costs and benefits for providing these programs can be determined by estimating the payments made to producers and the government costs associated with those payments.

In an attempt to estimate the costs and payments made by the government a series of various yield levels is examined. This concept of various yield levels is used because the payments made by the government will vary with selected yields. Each of these yield levels is assigned a probability level based on the stochastic yields generated by the model. A summation of the government cost per acre multiplied by the probability level for each yield will determine the expected annual government cost over time. This expected net cost represents the total government expenditure per acre, based on the yield probability distribution. The current government cost and the estimated net government cost for providing this producer with crop coverage under the DPP and the FCI program is presented in Table 21 and Table 22, respectively. Various wheat, grain sorghum, and cotton yields are presented in Table 21 with the corresponding government outlay per acre. These are direct payments per acre that the producer would receive for the specified yield. The direct payments specified for wheat and grain sorghum are based on equation (2) of Chapter III. The disaster payments made to cotton producers is derived by the same equation but actual yields are tested against 75 percent of normal farm yield times one-third the cotton target price.

The producer who has a wheat yield of zero would receive $24.83 per acre in a direct payment (Table 21). If he has a wheat yield of 15 bushels per acre he is not eligible for a payment due to the higher

TABLE 21. Government Cost Per Acre of Selected Yields Under the Current Disaster Payments Program, Jackson County, Oklahoma

PROGRAM	SPECIFIED YIELD LEVELS					NET GOVERNMENT COST
	WHEAT YIELD LEVEL (BU./ACRE)					
	0	5	10	15	20	
Probability Level	(.027)	(.082)	(.091)	(.218)	(.582)	
Disaster Payment - Wheat	$ 24.83	$15.75	$ 6.68	0	0	
Producer Cost	0	0	0	0	0	
Government Cost Per Acre	24.83	15.75	6.68	0	0	$ 2.57
	GRAIN SORGHUM YIELD LEVEL (BU./ACRE)					
	0	10	20	30	40	
Probability Level	(.009)	(.100)	(.164)	(.191)	(.536)	
Disaster Payment - Grain Sorghum	$ 34.80	$22.30	$ 9.80	0	0	
Producer Cost	0	0	0	0	0	
Government Cost Per Acre	34.80	22.30	9.80	0	0	$ 4.15
	COTTON YIELD LEVEL (lbs./ACRE)					
	0	100	200	300	400	
Probability Level	(.036)	(.145)	(.246)	(.327)	(.246)	
Disaster Payment - Cotton	$103.37	$74.17	$44.97	$15.77	0	
Producer Cost	0	0	0	0	0	
Government Cost Per Acre	103.37	74.17	44.97	15.77	0	$30.70

TABLE 22. Government Cost or Surplus Per Acre Under the Current Federal Crop Insurance Program, Jackson County, Oklahoma

ALL RISK CROP INSURANCE	WHEAT YIELD LEVEL (BU./ACRE) 0	5	10	15	20	NET GOVERNMENT (COST) SURPLUS
Probability Level	(.027)	(.082)	(.091)	(.218)	(.582)	
50% Guarantee (11.4 bu./acre)	$34.20	$19.20	$ 4.20	$ 0	$ 0	
Premium Rate - no subsidy	5.30	5.30	5.30	5.30	5.30	
Government (Cost)/Surplus Per Acre	(28.90)	(13.90)	1.10	5.30	5.30	$2.42
65% Guarantee (14.8 bu./acre)	$44.40	$29.40	$14.40	$ 0	$ 0	
Premium Rate - no subsidy	7.40	7.40	7.40	7.40	7.40	
Government (Cost)/Surplus Per Acre	(37.00)	(22.00)	(7.00)	7.40	7.40	$2.48
75% Guarantee (17.1 bu./acre)	$51.30	$36.30	$21.30	$6.30	$ 0	
Premium Rate - no subsidy	8.73	8.73	8.73	8.73	8.73	
Government (Cost)/Surplus Per Acre	(42.57)	(27.57)	(12.57)	2.43	8.73	$1.06

yield. The estimated net government cost for providing this coverage is $2.57 per acre. The farmer who has a grain sorghum yield of 10 bushels per acre would receive $22.30 per acre. At the 30 bushel per acre level he would no longer receive payments. The government cost for providing grain sorghum coverage is $4.15 per acre. The cotton producer who has a zero yield is eligible for a direct payment of $103.37. If cotton yield is 300 pounds per acre the payment is $15.77 per acre. The cotton coverage provided by the DPP has the highest estimated government expenditure of $30.70 per acre.

Table 22 presents the government cost or surplus from participating in the current FCI program limited to wheat producers in Jackson County. Payments made to producers are based on equation (5) of Chapter III. If the farmer is enrolled at the 50 percent guarantee level and has a zero yield the direct payment minus premium expenses is $28.90 per acre. If the producer has a wheat yield of 20 bushels per acre the cost is the premium expenses incurred because he is not eligible for a payment due to the high yield. The payments for low yields increase as the guarantee level increases. At the five bushel per acre yield the payments are $13.90, $22.00, and $27.57 per acre for guarantee levels of 50, 65, and 75 percent, respectively.

The producer who has a yield of 20 bushels per acre of wheat will not be eligible for a payment under either 50 or 75 percent guarantee. Coverage under the 50 percent level will cost the producer $5.30 per acre and the 75 percent level will cost $8.73 per acre.

The estimated net government surplus under the current FCI program is $2.42, $2.48, and $1.06 per acre for the 50, 65, and 75 percent guarantee level, respectively. Based on the probabilities as determined by the stochastic yield series, the government has a per acre surplus for every FCI yield guarantee. This indicates the current FCI program, compared to the disaster payments program, provides the government with a more cost effective risk management program.

Premium costs under FCI is a major reason that the DPP provides greater financial stability than the FCI program. The producer incurs no cost when participating in the DPP. The only costs the government incur are fixed costs and administrative costs under the DPP when yields are high. The government would receive payments from producers when yields are above the guarantee levels under the FCI program.

Proposed Program

This analysis evaluates the government cost per acre for the proposed FCI program with extended crop coverage to include wheat, grain sorghum, and cotton. The government cost for each enterprise with the expected program requirements are presented in Tables 23, 24, and 25.

The effects of changes in the FCI program can be seen by comparing the proposed program for wheat (Table 23) and the existing FCI program (Table 22). The only difference in the government cost is the amount represented by the 30 percent subsidy. The government costs will be more under the proposed plan for low yields because producers will be paying less for coverage. For a 50 percent guarantee under the proposed program the government cost per acre will be $15.49 for a five bushel yield. The cost under the current plan for the same coverage would be $13.90 (Table 22) per acre. The effects of the premium subsidy under the proposed FCI program is also shown on the net government surplus. Comparing Table 22 and 23 reveals the surplus is reduced for the 50 and

TABLE 23. Government Cost or Surplus Per Acre Under the Proposed Federal Crop Insurance Program for Wheat, Jackson County, Oklahoma

PROPOSED ALL RISK INSURANCE PROGRAM	WHEAT YIELD LEVEL (BU./ACRE) 0	5	10	15	20	NET GOVERNMENT (COST)/SURPLUS
Probability Level	(.027)	(.082)	(.091)	(.218)	(.582)	
50% Guarantee (11.4 bu./acre)	$34.20	$19.20	$ 4.20	$ 0	$ 0	
Premium Rate 30% subsidy	3.71	3.71	3.71	3.71	3.71	
Government (Cost)/Surplus Per Acre	(30.49)	(15.49)	(.49)	3.71	3.71	$ .83
65% Guarantee (14.8 bu./acre)	$44.40	$29.40	$14.40	$ 0	$ 0	
Premium Rate 30% subsidy	5.18	5.18	5.18	5.18	5.18	
Government (Cost)/Surplus Per Acre	(39.22)	(24.22)	(9.22)	5.18	5.18	$ .26
75% Guarantee ((17.1 bu./acre)	$51.30	$36.30	$21.30	$6.30	$ 0	
Producer Cost - Eligible subsidy	6.51	6.51	6.51	6.51	6.51	
Government (Cost)/Surplus Per Acre	(44.79)	(29.79)	(14.79)	.21	6.51	$1.16

TABLE 24. Government Cost or Surplus Per Acre Under the Proposed Federal Crop Insurance Program for Grain Sorghum, Jackson County, Oklahoma

PROPOSED ALL RISK INSURANCE PROGRAM	GRAIN SORGHUM YIELD LEVEL (BU./ACRE) 0	10	20	30	40	NET GOVERNMENT (COST)/SURPLUS
Probability Level	(.009)	(.100)	(.164)	(.191)	(.536)	
50% Guarantee (20 bu/acre)	$50.00	$25.00	$ 0	$ 0	$ 0	
Producer Cost - 30% subsidy	1.89	1.89	1.89	1.89	1.89	
Government (Cost)/Surplus Per Acre	(48.11)	(23.11)	1.89	1.89	1.89	$(1.06)
65% Guarantee (26 bu./acre)	$65.00	$40.00	$15.00	$ 0	$ 0	
Producer Cost - 30% subsidy	3.01	3.01	3.01	3.01	3.01	
Government (Cost)/Surplus Per Acre	(61.99)	(36.99)	(11.99)	3.01	3.01	$(4.04)
75% Guarantee (30 bu./acre)	$75.00	$50.00	$25.00	$ 0	$ 0	
Producer Cost - Eligible subsidy	4.61	4.61	4.61	4.61	4.61	
Government (Cost)/Surplus Per Acre	(70.39)	(45.39)	(20.39)	4.61	4.61	$(5.17)

TABLE 25. Government Cost or Surplus Per Acre Under the Proposed Federal Crop Insurance Program for Cotton, Jackson County, Oklahoma

PROPOSED ALL RISK INSURANCE PROGRAM	COTTON YIELD LEVEL (BU./ACRE) 0	100	200	300	400	NET GOVERNMENT (COST)/SURPLUS
Probability Level	(.036)	(.145)	(.246)	(.327)	(.246)	
50% Guarantee (204 pounds/acre)	$91.80	$46.80	$ 1.80	$ 0	$ 0	
Producer Cost - 30% subsidy	2.87	2.87	2.87	2.87	2.87	
Government (Cost)/Surplus Per Acre	(88.93)	(43.93)	1.07	2.87	2.87	$ (7.66)
65% Guarantee (265 pounds/acre)	$119.25	$74.25	$29.25	$ 0	$ 0	
Producer Cost - 30% subsidy	4.55	4.55	4.55	4.55	4.55	
Government (Cost)/Surplus Per Acre	(114.70)	(69.70)	(24.70)	4.55	4.55	$(17.70)
75% Guarantee (305 pounds/acre)	$137.25	$92.25	$47.25	$2.25	$ 0	
Producer Cost - Eligible subsidy	7.05	7.05	7.05	7.05	7.05	
Government (Cost)/Surplus Per Acre	(130.20)	(85.20)	(40.20)	4.80	7.05	$(23.63)

65 percent guarantee level, while the 75 percent level results in a government cost.

The government costs for extending the program to grain sorghum and cotton are presented in Table 24 and 25, respectively. When compared to the DPP (Table 21), these results reveal government costs to be greater under the proposed FCI plan for low yields at high guarantee levels. The cost to the government for providing the DPP with a grain sorghum yield of 10 is $22.30 (Table 21). The same yield level with the proposed FCI program at the 75 percent guarantee level would cost the government $45.39. This is a large difference and indicates that very low yields within an area of heavy FCI coverage would be a very costly program for the government. For the same area with high yields there would be a large government surplus because no payments would be made. Considering these low and high yields as extremes, a comparison of probability levels in relation to net government cost reveals the proposed FCI program is relatively equal to the DPP. The net government cost for grain sorghum coverage under the DPP is $4.15 (Table 21) and the cost under the proposed FCI program at the 65 percent guarantee level is $4.04 (Table 24).

The proposed FCI program will be more costly for the government because of the premium subsidy. When yields are low the net payments will be larger because the producer is paying less for coverage. As the yields increase and producers become ineligible for payments the cash premium the government receives are also reduced by the lower cost producers are paying for coverage.

The government cost under the current FCI program for a producer who has a zero wheat yield at the 50 percent guarantee level is $28.90

(Table 22). The same coverage and yield under the proposed program is $30.49 (Table 23). This represents an increased cost of 5.5 percent. Examining the same 50 percent guarantee level for the current and proposed FCI program with a 20 bushel per acre yield reveals different results. The government would receive $5.30 (Table 22) per acre in premium payments from the producer under the current program. These receipts would be reduced to $3.71 (Table 23) per acre under the proposed program. This is a reduction in receipts of 30 percent. The government will receive less surplus per acre as yields increase under the proposed program.

As would be expected with the premium subsidy, the costs are greater for the government with the proposed FCI program. The producer will receive greater net payments as the premium costs are reduced. Producers will be in a less favorable position by participating the FCI program at higher yields. In cases of severe and wide spread natural disasters the government will make large expenditures under the FCI program especially with a premium subsidy to producers. If yields are high enough to prohibit producer payments the FCI program will be cost beneficial to the government.

CHAPTER V

SUMMARY AND CONCLUSIONS

The agricultural sector of the U.S. economy has a long history of unstable and variable prices and yields. Numerous acts of nature, such as drought, pestilence, and disease affect yield levels and are a major cause of variable yields. Foreign demand, domestic demand, and total world crop production have significant roles in widely fluctuating crop prices. These unstable prices and yields create a unique and challenging environment when trying to stabilize the income of agricultural producers. This attempt at income stabilization is the primary reason for the existence of public and private commodity programs.

These commodity programs are the subject of recent debate concerning the effects of commodity programs on the U.S. Treasury, the structural framework of American agriculture, and the fair and equitable distribution of program benefits among agricultural producers. The major purpose of this study is to evaluate the various impacts of alternative commodity programs. A detailed examination is made of alternative risk management programs and their impact on the firm growth and survival rate of a simulated farming scenario.

To analyze these program impacts, a simulation model in a stochastic price and yield environment is combined with alternative commodity programs. The simulation model calculates balance sheet information, net cash flow, and the probability of farm survival for each year on the planning horizon. Combined with alternative risk managment programs, comparisons of the adequacy and effectiveness of current and proposed government and private crop programs can be made at the farm level.

The farm scenario selected is typical for Southwestern Oklahoma and represents a full time farming operation. The net worth for this farm operator is approximately $311,000, with a 30 percent equity ratio. This low beginning equity percentage indicates a limited risk bearing ability and exposes the producer to a high chance of farm failure without income stabilization.

The initial data specified for the model includes the beginning farm financial situation, the organization of production, the proposed investment information and the risk management alternative to be analyzed. To simulate the variable nature of the agriculture sector in regards to prices and yields, a set of random and triangularly distributed prices and yields is calculated. The requirements, such as target prices, normal farm yield, and cost of participation, where appropriate, is specified for each commodity program analyzed. This initial scenario, once established, is simulated over a 10 year planning horizon with 100 iterations.

The commodity programs analyzed in this study represent the major public and private attempts to provide income stability to agricultural producers. To provide a base for comparisons of alternative risk managment decisions, the farming scenario is simulated assuming no commodity programs are available to the producer. This initial position simulates the farm firm growth and chance of firm survival without any type of subsidy or government payment.

The four major commodity programs now in existence, deficiency payments, disaster payments, federal crop insurance, and crop hail insurance are initially analyzed separately. To simulate the choices available to producers, various combinations of risk management alternatives are analyzed together. Proposed changes in the FCI program will have an impact on the economic welfare of agricultural producers who participate in the program. To analyze these effects, the proposed FCI program is initially analyzed alone, then compared to existing program results and finally analyzed in combination with the current deficiency program.

Risk Management Strategies

The following summarizes the current commodity program alternatives available to risk managers. Participation in a risk avoidance program is based on the growth in net worth, firm survival, and the producers perception of price and yield uncertainty. The risk management strategies analyzed in this study relate to a producer with a relatively low beginning equity position. Producers with higher equity levels may choose a different program, set of programs, or provide insurance internal to the farming operation. This is dependent upon the firm's ability to contend with price and yield variability.

The base run for the farming scenario reveals that there is approximately a one in four chance of firm failure. The low equity position, combined with an absence of income stabilization makes the producer sensitive to variable prices and yields. Further reductions in the equity position significantly increase the chance of bankruptcy. For this low equity farming scenario, producers with a lower equity position should analyze and determine the feasibility of participation in a commodity program.

The results of each current commodity program indicate that the impact on net worth and firm survival is dramatic. The variance among program results ranges from economic stability, zero bankruptcies with a significant growth in net worth to financial collapse, increased bankruptcies and the lack of growth in net worth, equal to the base run. The financial structure and growth performance of the farming scenario depends highly on the commodity program chosen.

The deficiency payments programs shows increases in the net worth position and decreases in the number of bankruptcies for this farming scenario. The results of the deficiency program do not equal the improvements in net worth and bankruptcy level caused by the disaster payments program. The income subsidization present in the DPP creates an economic boon for the producer. The disaster payments program yields the lowest bankruptcies and largest growth in net worth of all the current commodity programs analyzed singularly.

The lowest ending net worth position is shown when the FCI program with no government subsidy at the 50 percent guarantee level is analyzed. This type of FCI is typical for the area specified in this study and explains why producer participation in the federal crop insurance program has historically been very low. Several variables, such as premium costs paid by the producer, the per acre guarantee level, and the price elective chosen by the producer have significant impacts on the economic position of the farming scenario. An example is the net returns per acre for the producer who participates in the FCI program but does not suffer a crop loss. The premium cost for coverage is subtracted from the net returns to the operator. This reduction in net returns does not occur when participating in the disaster program because the producer does not pay any direct cost for coverage.

The combination of current programs reveals the same general conclusions as the singular analysis. When the DPP is combined with other programs the financial growth and structure of the farm firm strengthen. When the FCI program is combined with other programs the financial strength weakens. This is evident when comparing the DPP and deficiency program to the DPP, deficiency, and federal crop insurance. When the FCI program is added to the analysis the mean ending net worth decreases.

To simulate the possibility of the disaster payments program being eliminated, the deficiency and all risk crop insurance is analyzed in great detail. The possible elimination of the disaster payments program exists because of the large treasury cost involved in providing the DPP. The results indicate that this type of alternative, deficiency payments and FCI, with current program specifications will increase the chance of firm survival and improve ending net worth compared to no program alternatives at all. While this alternative does provide a better chance of firm survival, it will not provide the same income stabilization for the agricultural producer in comparison to the DPP.

Proposed Program Alternatives

The current Federal Crop Insurance program has already been amended by Congress with the passing of the Federal Crop Insurance Act of 1980.

The changes in the program for the 1981 crop year will expand coverage to include wheat, grain sorghum, and cotton. The 1981 crop year program also has provisions for a 30 percent government premium subsidy for producers who participate in the insurance program.

An analysis of the proposed program is done with estimates for grain sorghum and cotton FCI average yields and premium rates. The results suggest the new program provides more income stability to the producer, compared to the existing FCI program. The added crop coverage of the proposed FCI program substantially reduces the bankruptcies shown by the current FCI program, especially with the high average farm yields. If the producer is to choose between the proposed FCI program or no program alternative, these results suggest increased firm survival and growth in ending worth is achieved by participation in the FCI program. If the producer is to choose between the existing DPP and the proposed FCI program, the same historic low level of participation in the FCI program will be prevalent.

A combination of the proposed FCI program and the deficiency program is analyzed. This alternative yields greater financial strength than the alternative of existing FCI coverage and deficiency payments. This is due to the proposed FCI program which includes premium subsidies to producers and the addition of grain sorghum and cotton to the crops eligible for coverage. The results also suggest that the chance of firm survival increases as the guarantee level increases, even with the higher premium costs associated with greater coverage.

Government Costs

The cost of providing income stabilization to agricultural producers has grown significantly during recent years. The disaster and deficiency payment programs have been financed entirely by the U.S. Government. A means to reduce these costs is a major political concern. This study presents an analysis of the per acre cost incurred by the producer and the government for the existence of disaster payments program and federal crop insurance. An analysis is also presented of the expected annual government cost over time, based on the probability levels derived from the stochastic yield series.

The per acre cost assumed by the government for providing federal crop insurance and the DPP varies significantly, depending on yields. The DPP is a costly program for the government even if no direct payments are made to producers. While producers may not receive any direct payment, the government must finance the administration costs. Under the DPP the government has no means to cover the direct payments made to producers nor the fixed cost associated with providing the disaster payments program. The payments made to producers is inversely related to the yield level. As yields decrease the amount of payments made to producers increases. The cost of this program is extremely high for areas experiencing widespread drought or natural disaster. A comparison of the annual government cost reveals the current FCI program is less costly than the disaster program. This relationship coincides with past levels of government expenditures but it should be noted that the current FCI program only provides coverage for the wheat enterprise.

The framework of the federal crop insurance program provides a means for the government to recover a portion of the cost in providing crop coverage. The premium costs paid by producers helps offset the direct payment and administration costs of the FCI program. When comparing the government cost per acre for the DPP and the FCI program at a zero yield level for wheat, the FCI program is more costly. With a zero yield level, even at the lowest level of guarantee available under the FCI program, the government payment per acre to the producer is larger than the DPP. The government cost per acre under the highest FCI guarantee level is nearly double the cost compared to the DPP, when yield levels are zero. As the actual yield levels increase, this relationship is reversed. The ratio of premium costs to direct producer payments becomes smaller as yield levels increase with the FCI. This ratio eventually become positive as yields increase to a level where direct payments made to producers is offset by producer premium payments. In years when this relationship is present, the government has a means to finance a portion of the administration costs of the FCI program.

The proposed FCI program which offers producers a premium subsidy is more expensive for the government compared to the existing program. The net payments made to producers are higher at low yield levels and net government receipts will be lower at high yield levels. This proposed FCI program may require more government budget outlays than the existing FCI program but the subsidy offered under the new FCI program may increase program enrollment. If this increase in FCI participation is large enough, a gradual phasing out of the DPP could take place and still provide producers with a means of reducing income variability. This would be entirely dependent on the actual yield levels producers receive. Assuming normal crop yields this overall decrease in government cost could be realized with increased FCI participation and a decrease in disaster payments program.

Policy Implications

Each of the alternatives in this study is designed to reduce the natural risks associated with the agricultural sector and each alternative has a unique impact on the net returns to the agricultural producers. Recent plans to eliminate the current disaster and deficiency program should be given careful consideration, as these programs provide a major source of income stabiliization. Without this stability a large number of low equity producers will become insolvent. This is evident when examining this farming scenario without any type of commodity program alternative. The increased firm failure of low equity producers will have a dramatic impact on the structure of agriculture.

Proposed amendments to the FCI program include producer premium subsidies. An analysis of these subsidy levels indicates larger subsidies have larger stabilization effects on farm income. While these subsidy levels increase the chance of firm survival, they also increase Government expenditures. The Government premium receipts for providing insurance is decreased as the subsidy level increases. Combining smaller government receipts with expanded crop coverage, larger areas eligible for insurance, and greater producer participation due to premium subsidies, might increase the cost of the FCI program.

As the FCI program is expanded to crops currently ineligible for coverage, the estimated FCI yield will have an impact on the level of firm growth and survival. The results of the proposed FCI analysis indicate the firm equity level is increased for larger FCI yields. Based on the stochastic yield series used in this study, an overclassification or underclassification of FCI yield guarantees will affect producer program benefits and the cost incurred by the government.

Research Limitations

This scope of this study is limited to determining the best possible program or combination of programs which reduced the risk associated with a particular size and type operation in a specific geographical location in Southwest Oklahoma. Because the model relies heavily on the historic price and yield series it would be inappropriate to make generalizations of these results to other geographical areas of the country. The trended stochastic and triangularly distributed prices and yields for Southwest Oklahoma are not necessarily correlated to other parts of the country.

As in all simulation models, numerous assumptions must be made on economic variables which are random by nature. Variables such as inflation rates, price, and yield trend values, which are specified at a constant rate within the model, create a need to establish a range of outcomes for different alternatives. Other variables such as land ownership, cropping patterns and size of farm may provide a completely unique set of results. Of particular interest is the establishment of farming scenarios which represent the part-time, full-time, and corporate or investor-type farming operation. It is contingent that the largest portion of program benefits go to a small majority of large operators. The scope of this study is limited to the farming scenario analyzed.

The administration costs associated with government commodity programs is not analyzed in detail for this study. The cost structures in providing the proposed FCI program are difficult to determine because of the expanding number of crops being covered. It is not within the scope of this study to determine whether the additional cost in providing the proposed FCI is offset by the benefits received by producers and budget savings realized by the government.

Despite these limitations, this study provides an economic base in evaluating the existing commodity programs available to producers. Based on this farming scenario, assumptions are made concerning the financial stability provided by specific risk management alternatives.

Need For Additional Research

Several questions of importance concerning risk management programs create a need for further research in an attempt to derive an appropriate solution to commodity program inadequacies. An important and unanswered question involves the structural impacts commodity programs have on American agriculture. Additional research is needed to determine if commodity programs promote large scale farming operations. These structural issues have a large impact on the existence of the small part-time or family-farm operation. If program benefits do encourage large scale farming operations then federal policy can be directed at protecting the small agricultural entrepreneur.

Additional research is needed to determine the best social and economic role of private insurance coverage. The governmental subsidization of private insurance premiums for multi-peril coverage is a possibility that exists. This type alternative would require extensive research aimed at specifying realistic rates based on indemnities paid over time for natural disasters. The rates charged by the private insurance sector and the subsidies provided by the government would be related to losses common in a specific area.

The impact commodity programs have on land use is an important area of consideration. The existence of a liberal commodity program can induce inefficient and undesirable land use. The possibility of land cultivation in high-risk areas, when it should be used for grazing purposes, exists when a commodity program provides excess coverage. Not only do unwise commodity programs encourage crop cultivation in high-risk areas, they can also provide a means for producers to avoid losses due to their own poor management practices. Research to determine the efficient commodity program and level of coverage is needed for high-risk agricultural areas.

These broad questions provide a solid base for additional commodity program analysis and research. Answers to these questions would provide government administration, policymakers, and legislators with a criteria for establishing an economically sound disaster relief plan for both producers and the government.

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