COTTON IN THE ECONOMY OF EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

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COTTON IN THE ECONOMY OF EAST CENTRAL

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PREFACE

The research reported in this dissertation was conducted under Oklahoma Agricultural Experiment Station Project, Hatch 1040, "An Economic Appraisal of Farming Adjustment Opportunities in Selected Areas of Oklahoma to Meet Changing Conditions." This is a cooperative research project with the United States Department of Agriculture, Southern Regional Project S-42.

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CHAPTER I

INTRODUCTION

Adjustment decisions by cotton farmers have been influenced by government programs for many years. Beginning with the Agricultural Adjustment Act of 1933, price supports and/or acreage allotment programs have attempted to restrain production and provide income compensation for participating cotton farmers.[1] Many subsequent agricultural acts, designed primarily to maintain incomes at adequate levels, have added other measures such as marketing quotas, diversion payments, and land retirement payments. Although there have been strong demands for the elimination of these programs, fear of adverse economic consequences of free markets, particularly in the short run, virtually assures continuation of the basic price and allotment programs.[2] Nevertheless, changes will be made in the programs from time to time to keep the supply of cotton in reasonable balance with demand at favorable prices to the farmer. As changes take place, cotton farmers will need to adjust their farming operations in order to maintain adequate incomes.

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[1] Price supports for cotton have been available to producers since 1933, with the exception of 1936. Acreage allotments and marketing quotas have been in effect since 1954.

[2] J. Gwyn Sutherland, Effects of Cotton Price and Allotment Variations on Farm Organizations and Incomes, Eastern Piedmont and Upper Plain (Economic Areas Six and E) North Carolina, A. E. Information Series No. 126 (Raleigh, 1966), p. 6.

In general, past agricultural policy measures have been fashioned within the context of the following objectives or principles:[3] (1) productive use of farm resources, (2) "equitable" incomes for farmers, (3) consistency with national interests, and (4) freedom of individual thought and action. With a special emphasis on price and income programs, agricultural policy measures have been formulated to offer some income protection without sacrificing other important principles. However, the basic objectives often conflict, making the simultaneous attainment of all a virtual impossibility. The policy choice, as developed in a political climate, is often simply selecting the proposal that is "easier to live with." Recognizing the limitations of "perfect" policy-making, use of more adequate economic information or guides for evaluating alternatives can improve policy choice criteria.

Policy decisions on cotton price-allotment program changes must be made in the complex agricultural environment characterized by mal-allocation of resources. Symptoms of agricultural resource imbalance--overproduction, low returns, and high government costs--are developed and explained in current farm policy writings.[4] Despite this imbalance, continuous adjustments in resource use and output are occurring in the agricultural sector. Improved technology and substitution of capital for labor with little increase in total inputs have increased the production

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[3] G. E. Brandow, "In Search of Principles of Farm Policy," Journal of Farm Economics, Vol. XLIV (December, 1962), p. 1146.

[4] Earl O. Heady and Luther G. Tweeten, Resource Demand and Structure of the Agricultural Industry, (Ames, 1963). Dale E. Hathaway, Government and Agriculture, (New York, 1963).

potential of the agricultural industry.[5] Therefore, with the basic structure (production, supply, and demand parameters) of agriculture changing, prediction of area or regional farm adjustment effects is a formidable task at best. Further, aggregative consequences of program changes are not completely resolved within the farm sector. Program changes also have ramifications for the nonfarm economy of communities, areas, and regions. Thus, agricultural program changes need economic appraisal with respect to all sectors.

Some of the questions concerning the effects of agricultural program changes on individual farm adjustments are: What is the optimal combination of resources and enterprises in response to alternative government price-allotment combinations? Is the resulting maximized return adequate for family living and continued agricultural production? What farm size is necessary to meet family income goals? What are the analytical farm firm models to consider for evaluating the effects of government program changes?

Aggregative farm adjustment effects of policy also pose questions such as: What farm resource levels, geographic distribution, and uses are needed in the area? What are the implications of potential farm adjustments on nonfarm firms and institutions in the area? What research approaches are required to encompass the micro to macro levels of economic activity?

This study is an attempt to help answer these questions as they relate to the East Central and South Central Area of Oklahoma.

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[5]William Mackenzie, "Resources and Productivity," Journal of Farm Economics, Vol. XLVII (December, 1965), pp. 1130-1139.

Objectives of the Study

The major purpose of this study is to determine the potential farm adjustments for specified resource situations under selected cotton support price and allotment relationships and to analyze their effects at micro and macro levels for one area of Oklahoma. Specifically, the objectives are as follows:

1. To determine the effects of alternative cotton price-allotment combinations on optimum farm organizations of representative farms for selected soil resource situations within the area;
2. To determine the minimum resource requirements needed to obtain specified levels of income under alternative cotton price-allotment combinations for selected soil resource situations within the area;
3. To compare and contrast the aggregative results obtained from optimum farm organizations of representative farms and minimum resource organizations for the area, and;
4. To analyze the implications of potential farm adjustments on employment, population, and consumption expenditures of both farm and nonfarm sectors in the study area.

Description of the Area

The East Central and South Central Area of Oklahoma, designated as Economic Areas 6 and 8, by the 1959 census,[6] includes all or part of

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[6]U.S. Department of Commerce, U.S. Census of Agriculture, 1959, Bureau of the Census (Washington, 1959).

the 30 counties shown in Figure 1. This geographical area of interest is part of a more comprehensive regional adjustment study.[7]

In general, the agriculture of the area has, during recent years, undergone substantial changes, perhaps more than in other regions of Oklahoma. For example, cotton acreage has declined while other cash crops, such as peanuts and soybeans, have gained in agricultural importance. Although cotton and other cash crops continue to represent important farm income producing enterprises, the trend in type of farming has been toward more beef cattle enterprises on East Central and South Central Area farms.

Selected agricultural statistics for the East Central and South Central Area are shown in Table I. According to the 1959 Census of Agriculture, there were 34,450 farms in the designated area. Their average size was 295 acres, considerably less than the 1959 state average of 378 acres. The 34,450 farms represented approximately one-third of the total in Oklahoma.

Primary cash crops are peanuts, cotton, alfalfa, soybeans, wheat, and grain sorghum. The area accounts for more than one-half of the state's peanut acreage. The 104,276 acres of cotton produced in 1959 represented 17.3 percent of Oklahoma's cotton acreage. Wheat, an important cash crop in the state, is comparatively less important in the

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[7]The area of this study is a part of Regional Research Project S-42, "An Economic Appraisal of Farming Adjustment Opportunities in the Southern Region to Meet Changing Conditions." It is a cooperative effort of the Departments of Agricultural Economics of the following State Agricultural Experiment Stations: Arkansas, Alabama, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, and Virginia; and the Farm Production Economics Division, Economic Research Service; and Cooperative State Experiment Station Service of the United States Department of Agriculture.

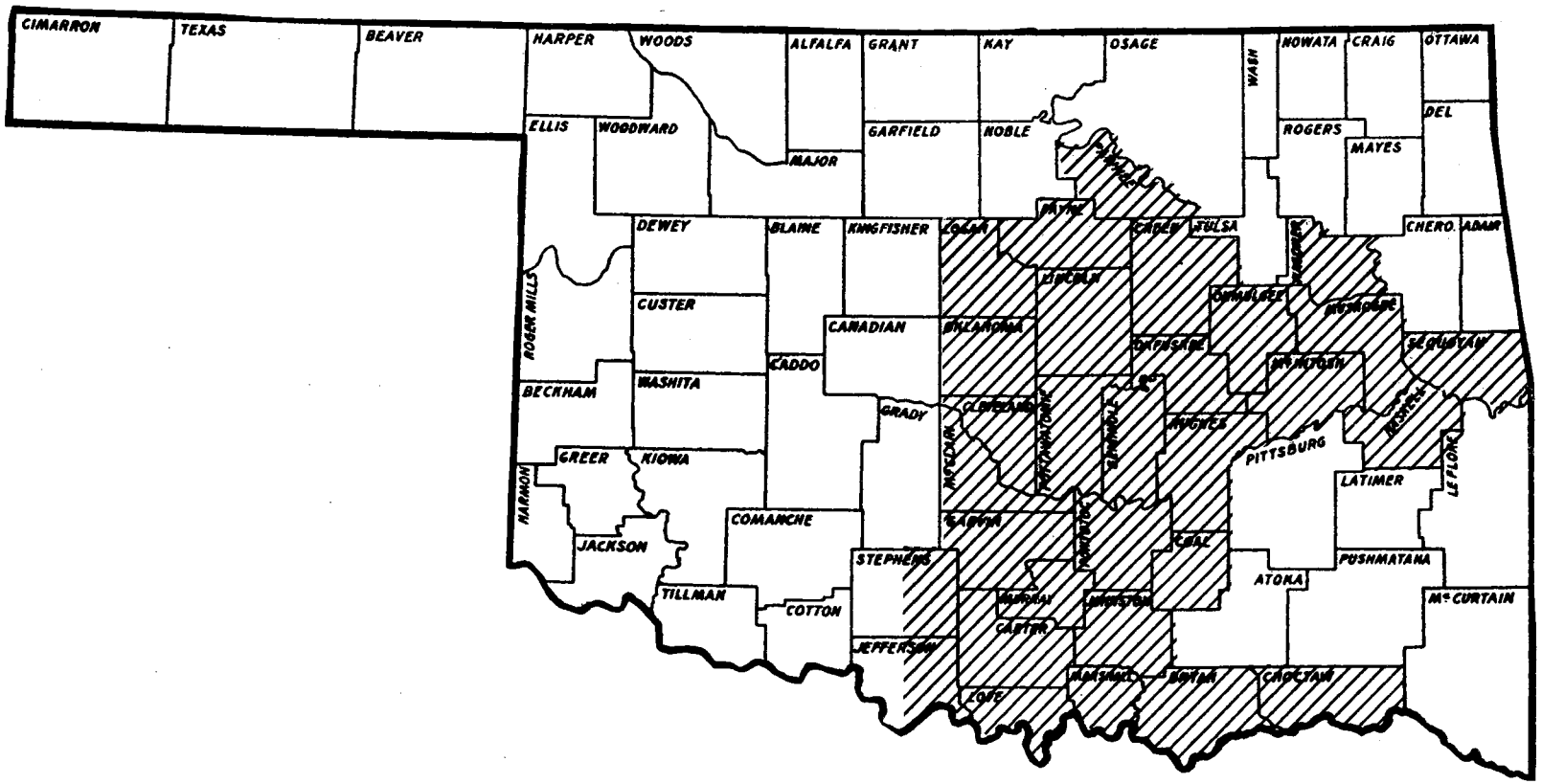

Figure 1. Map of Oklahoma Showing the Area of Study.

TABLE I

ESTIMATED NUMBER OF FARMS, ACRES IN FARMS, AVERAGE FARM SIZE, TYPES OF FARMS, SELECTED CROPS HARVESTED, LIVESTOCK NUMBERS, AND SALES (1959); EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Area Total
Number of farms	each	34,450
Acres in farms	each	10,164,137
Average size of farms	acre	295
Types of Farms:		
Cash-grain	each	1,635
Cotton	each	1,539
Other field crops	each	962
Livestock	each	16,325
Livestock ranches	each	7,893
Other	each	6,096
Selected Crops Harvested:		
Cotton	acre	104,276
Peanuts	acre	60,757
Wheat[a]	acre	239,724
Alfalfa	acre	112,329
Number of cattle	head	1,102,156
Value of all products sold	dol.	139,772,971
Value of crops sold	dol.	35,968,308
Value of livestock and livestock products sold	dol.	103,804,663

Source: U. S. Department of Commerce, Bureau of the Census, U. S. Census of Agriculture, 1959.

[a]Area wheat acreage compares with 4,321,253 total acres of wheat grown in Oklahoma in 1959.

area. According to census data, wheat acreage in the area was only 5.5 percent of the total wheat acres for the state in 1959.

Livestock, primarily beef cattle, is responsible for the bulk of the revenue from the farm products of the area. Of the total value of all products sold--$139.8 million--livestock and livestock products accounted for $103.8 million in 1959. This represented about one-third of the state's sales of livestock and livestock products in 1959.

Area soils can be classified into two major groups, sandy and clayey, for this study. In general, the sandy soils are composed of sandy and loamy soils of the Cherokee and Reddish Prairies and the Cross Timbers resource areas. The comparatively less fertile clayey soils are the silty and clayey soils of the Cherokee and Grand Prairie land resource area.[8] A more detailed analysis of the soil classifications is presented in Chapter III.

The climatological characteristics of East Central and South Central Oklahoma are conducive to agricultural production. The average annual precipitation is 39 inches; the area has an average of 225 frost-free days.[9]

Although the economy of the area is based predominately on agriculture, location of the largest urbanized centers of the state within the area provides nonfarm employment opportunities in manufacturing and service industries. Oklahoma City, Tulsa, and Muskogee are the large

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[8]Fenton Gray and H. M. Galloway, Soils of Oklahoma, Oklahoma Agricultural Experiment Station, MP-56 (Stillwater, 1959).

[9]U. S. Department of Commerce, Climatological Data, Oklahoma, Annual Summary, Vol. 71, No. 13 (Washington, 1964), p. 171.

cities in the area. McAlester and Ft. Smith, Arkansas, are on the fringe of the area. In addition, smaller urban centers--Durant, Ardmore, Shawnee, and Okmulgee--offer services not entirely oriented toward agriculture. The smaller towns are primarily service centers for the area's agricultural industry.

Review of Previous Research

Three major research approaches or models which have been applied to selected adjustment problems are: (1) linear programming maximization model to determine optimum farm organizations with specified resources bases, (2) linear programming minimum resource model to determine minimum resource requirements to meet specified income levels, and (3) time series and cross-sectional data analyses to determine farm-nonfarm interactions.

Research involving the maximization model is characterized by firm oriented aggregative supply response studies designed to determine production levels for major commodities under different economic and institutional environments. The minimum resource model is also firm oriented with estimates of resources needed and production levels for farm commodities in a "long-run" setting. Research emphasizing farm and nonfarm relationships has used time series and cross-sectional data analyses to obtain estimates of area and farm population trends and projections; business trends and projections; factor demand relationships; adjustment parameters, quantities, lags, and population multipliers.[10]

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[10]Odell L. Walker, Luther G. Tweeten, and Larry J. Connor, "Potential Economic and Social Adjustments in the Southwest." Proceedings of Agricultural Economics and Rural Sociology Section, Southwest Social Science Association Meeting (Dallas, Texas, March, 1964).

Research using the maximization and minimum resource approaches in adjustment studies is typified by such regional studies as S-42 and GP-5 which have been completed in Oklahoma.[11] The initial work in determining the minimum resource requirements needed for specified incomes was formulated and conducted by Brewster.[12]

Orazem, et al., and Douglas, et al., provide an illustration of research conducted in investigating the implications of agricultural adjustments in the nonfarm sector.[13] Their work, using time series analysis, provided indications of trends in farm population and business firms in southwestern Kansas. Jansma estimated production expenditure and consumption multipliers needed for evaluating adjustment impacts and remedial measures.[14] In another adjustment study, Olson used estimated farm adjustments to determine the effects on the

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[11] John W. Goodwin, James S. Plaxico, and William F. Lagrone, Aggregation of Normative Microsupply Relationships for Dryland Crop Farms in the Rolling Plains of Oklahoma and Texas, Oklahoma Agricultural Experiment Station, Bulletin T-103 (Stillwater, 1963). Larry Connor and Odell Walker, Potential Long-Run Adjustments for Oklahoma Panhandle Farmers, Oklahoma Agricultural Experiment Station, Bulletin T-114 (Stillwater, 1965). Percy L. Strickland, Jr., James S. Plaxico, and William F. Lagrone, Minimum Land Requirements and Adjustments for Specified Income Levels, Southwestern Oklahoma, Oklahoma Agricultural Experiment Station, Bulletin B-608 (Stillwater, 1963).

[12] John M. Brewster, Farm Resources Needed for Specified Income Levels, Agricultural Research Service, USDA, Agricultural Information Bulletin No. 180 (Washington, 1957).

[13] Frank Orazem, et al., Implications of Projected Changes in Farming Opportunities in Western Kansas, Kansas Agricultural Experimemt Station, Bulletin 452 (Manhattan, 1962). Louis H. Douglas, et al., "Southwest Kansas Survey Highlights," mimeographed at Kansas State University, (Manhattan, 1963).

[14] J. Dean Jansma, "Secondary Effects of Upstream Watershed Development: Roger Mills County, Oklahoma," (unpublished Ph.D thesis, Oklahoma State University, 1964).

total economic activity of the Southwestern Oklahoma Area.[15] Multiplier analysis was used to estimate area changes in population, employment, personal income, and volume of trade resulting from adjustments in the farm sector.

These three major research models have been applied to adjustment problems in areas which have agricultural, industrial, and demographic characteristics similar to those of the East Central and South Central Oklahoma Area. Results of these studies have encouraged application of these models, with modifications described later, to this study.

Organization of Remainder of Thesis

As a guide to the organization of the thesis, the chapters are briefly outlined as follows:

Chapter II: Conceptual Development. Analytical models of the farm firm--linear programming maximization and minimum resource--are developed and examined for consistency with the specified objectives of the study.

Chapter III: Research Procedures. Soil resource situations, representative farm, and representative acre are explained as applicable to the operational firm models selected in the study. In addition, general assumptions and restrictions relevant to the models are discussed.

Chapter IV: Optimum Representative Farm Organizations with Alternative Cotton Price-Allotment Programs. Using the linear programming

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[15] Carl E. Olson, "The Impact of Agricultural Resource Adjustments On The Economy of Southwestern Oklahoma," (unpublished Ph.D thesis, Oklahoma State University, 1966).

maximization model, optimum plans with alternative cotton price-allotment combinations are determined and examined for each representative farm. Choices of the current cotton program are also evaluated for further comparisons of government cotton programs.

Chapter V: Minimum Resource Farm Organizations with Alternative Cotton Price-Allotment Programs. Using the linear programming minimum resource model, optimum plans with alternative cotton price-allotment combinations (same as representative farm) are determined and examined. Minimum resource requirements with alternative land returns and annual capital costs are also evaluated.

Chapter VI: Aggregative Adjustment Implications. The aggregative results of the models are compared and evaluated. The implications of changes in the farm sector due to government cotton programs are extended to the nonfarm sector with a simplified interdependence model using multiplier analysis.

Chapter VII: Summary. A brief summary of the objectives, results, and implications of the study is presented. The chapter is concluded with a section concerning the need for further research.

CHAPTER II

CONCEPTUAL DEVELOPMENT

This study is concerned with determining and evaluating the effects of potential farm adjustments in response to specified policy measures. The resultant adjustment decisions are also influenced by the objectives or motives of the individual entrepreneur commanding the production processes of the farm firm. Thus, the farm firm is the basic unit of inquiry.

The objectives which are oriented to farm firm decisions are: (1) determination of the most profitable combination of enterprises on representative farms for specified cotton programs and (2) determination of minimum resources required by farms to attain specified levels of income for specified cotton programs. The associated motives of entrepreneurs are: (1) maximization of profit subject to the resources available and (2) minimization of resources subject to a "satisfactory" level of profit. Two farm firm analytical models--the maximization model and the minimum resource model--are examined for consistency with these objectives.

As a basis for relating the two models of the farm firm to the economic theory of the firm, the traditional marginal analysis model of the firm is compared with the linear programming maximization model. Then the evaluation of the models is extended to the linear programming minimum resource model with comparisons to the maximization model.

Marginal Analysis

Traditional economic theory generally contends that each person is a rational decision maker whose primary purpose in the production of economic goods is to maximize the attainment of goals from the use of the resources which he controls. Marginal analysis, relative to this purpose, is concerned with the process of making choices between alternatives, considering small changes in the value of the objective function resulting from small changes in decision variables. In the application of marginal analysis to the economic theory of the firm, the problem is reduced to finding the maximum values of the objective function subject to a set of constraints.

The neoclassical concept of the economic theory of the firm as developed by J. R. Hicks is typical of a firm model for marginal analysis:[1]

The production function for the multi-product, multi-factor model of the firm is given by:

$$(2.1) \quad F(X_1, \ldots\ldots X_n; A_1, \ldots\ldots A_m) = 0$$

for n products and m factors and is assumed to possess first- and second-order partial derivatives which are different from zero for all solutions. The firm is seeking to maximize profit (π) subject to the technical rules given by its production function:

$$(2.2) \quad \pi = \sum_i^n P_i X_i - \sum_j^m C_j A_j + \lambda F(X_1, \ldots X_n; A_1, \ldots A_m)$$

where P_i is the price of the i^{th} product and C_j is the price of the j^{th} factor. The solution may be derived by use of the Lagrangian

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[1] J. R. Hicks, Value and Capital, (New York, 1946), pp. 319-320.

differential gradient method where the first-order conditions for profit maximization require that the marginal rate of product transformation between each pair of products equals their price ratios;

$$(2.3)\quad \frac{\partial X_k}{\partial X_i} = \frac{P_i}{P_k} \quad \begin{matrix}(i,k = 1,....n)\\ (i \neq k)\end{matrix}$$

the value of the marginal productivity of each factor with respect to each product equals the factor price;

$$(2.4)\quad P_i \frac{\partial X_i}{\partial A_j} = C_j \quad \begin{matrix}(i = 1,....n)\\ (j = 1,....m)\end{matrix}$$

and the rate of technical substitution between each pair of factors equals their price ratios.

$$(2.5)\quad \frac{\partial A_k}{\partial A_j} = \frac{C_j}{C_k} \quad \begin{matrix}(j, k = 1,....m)\\ (j \neq k)\end{matrix}$$

Linear Programming Maximization Model

Linear programming is a mathematical technique for solving problems involving the maximization or minimization of a linear objective function subject to a set of linear constraints imposed on the variables of the objective function. A linear programming problem has three quantitative components: (1) an objective, (2) alternative methods or processes for attaining the objective, and (3) resource or other restrictions.[2] The theory of the firm discussed above also involves these three components and can be expressed as a linear programming problem.

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[2]Earl O. Heady and Wilfred Candler, Linear Programming Methods, (Ames, 1963), p. 2.

In the general case of the multi-product, multi-factor linear programming maximization model, the firm will seek to maximize profit:[3]

$$(2.6)\quad \pi = (P_1-VC_1)X_1 + (P_2-VC_2)X_2 + \ldots.+(P_n-VC_n)X_n$$

subject to

$$(2.7)\quad a_{11}X_1+a_{12}X_2+\ldots\ldots\ldots+a_{1n}X_n \leq B_1$$

$$a_{21}X_1+a_{22}X_2+\ldots\ldots\ldots+a_{2n}X_n \leq B_2$$

$$\cdot \quad \cdot \qquad\qquad \cdot \quad \cdot$$

$$\cdot \quad \cdot \qquad\qquad \cdot \quad \cdot$$

$$a_{m1}X_1+a_{m2}X_2 \ldots\ldots\ldots+a_{mn}X_n \leq B_m$$

and

$$(2.8)\quad X_1 \geq 0,\ X_2 \geq 0,\ \ldots.,\ X_n \geq 0$$

where there are n different products and m fixed factors. The output of each product is denoted by $X_1, X_2, \ldots\ldots\ldots X_n$; the quantity of the fixed factors by $B_1, B_2, \ldots\ldots\ldots B_m$; and the unit factor requirements of the product by $a_{1j}, a_{2j}, \ldots\ldots a_{mj}$, where $j = 1,2\ldots\ldots$ n. The firm has n activities.[4] The unit variable cost for each activity (VC_j) and the price of the j^{th} product (P_j), ($j = 1,2, \ldots\ldots\ldots n$), are given and constant.

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[3]Yuan-li Wu and Ching-wen Kwang, "An Analytical and Graphical Comparison of Marginal Analysis and Mathematical Programming in the Theory of the Firm," Linear Programming and the Theory of the Firm, (New York, 1960).

[4]An activity or process is defined as a method for converting factors or other restrictions into a product.

A solution to the linear programming model of the firm can be obtained by one or more variations of Dantzig's "simplex algorithm."[5] The criterion for the linear programming optimum solution is indicated by the amount by which profit will be changed by the introduction of one unit of an activity not in the solution:

$$(2.9)\quad \Delta\pi = \Sigma_i (P_i - VC_i) \frac{\Delta X_i}{\Delta X_k} - (P_k - VC_k)$$

where the i^{th} activity is in the solution and the k^{th} activity is not in the solution. If the opportunity cost--the amount of income sacrificed as some activities are reduced to increase another activity by one unit --is less than the amount of revenue added by a one-unit increase of the activity (X_k), profit will be increased by making the change.

Comparison of the Marginal Analysis and Linear Programming Maximization Models

The principle assumptions underlying the marginal analysis model are as follows: (1) the firm possesses an infinite number of production processes or activities; (2) the firm's production function is concave and continuous; (3) resources are perfectly adaptable; and (4) factor proportions are completely variable. Under the assumptions of the linear programming maximization model, the number of processes or activities of the firm is finite. The production function is linear and discontinuous. Furthermore, resources are not perfectly adaptable; factor proportions are completely fixed.

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[5] George B. Dantzig, Linear Programming and Extensions, (Princeton, 1963).

Recognizing differences in assumptions between the models when applied to the economic theory of the firm, how is the linear programming maximization model reconciled as an analytical approach? Naylor cites limitations of the marginal analysis model as an operation tool to be used in making decisions in the real world.[6] He views the formulation of the Hicksian-type production function, estimation of its parameters, and the solution of a huge set of nonlinear equations as a formidable task which functionally limits the model. In contrast, computer codes exist for solving linear programming problems with an excess of 2,000 equations and an almost unlimited number of variables.

Baumol gives two justifications for the use of the linear programming model of the firm.[7] First, the linear programming model examines what lies behind the production function in terms of the optimal choice of activity combinations for any set of factor or product levels. In the marginal analysis model, it is assumed that the optimal technical production processes have been predetermined. Secondly, the concepts of production processes or activities are much more closely associated with the language of the firm decision maker.

Linear Programming Minimum Resource Model

In the previous section, it was suggested that the linear programming model of the firm could be viewed as an alternative to marginal

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[6]Thomas H. Naylor, "The Economic Theory of the Firm: Three Tools of Analyses," The Quarterly Review of Economics and Business, Vol. 5 (1965), pp. 33-49.

[7]William J. Baumol, Economic Theory and Operations Analysis, (New Jersey, 1965), pp. 270-294.

analysis when firms seek to maximize profits. However, the profit maximization motive as assumed in these models has been challenged. For example, Rothschild has suggested that the primary motive of the entrepreneur is long-run survival.[8] Therefore, decisions are aimed toward the maximization of a security level for the organization. Baumol suggests the case in which the objective of the firm is to maximize sales volume subject to some minimum level of profit.[9]

Simon and Margolis have argued that profit maximization should be replaced with a goal of making satisfactory profits where satisfactory profits represent a level of aspiration which the firm uses to evaluate alternative policies.[10] Farmers, for example, may have the goal of obtaining some acceptable level of income for the operator and his family. Farm decisions are influenced by this desired income goal rather than profit maximization, per se.

Strickland, Plaxico, and Lagrone list two possible justifications for the income goal postulate. These are: (1) the income level maintains the "status quo," and meets the "satisfaction" criteria, and (2) the income level represents the "opportunity cost" of farming.[11]

Since the objective function is flexible, the linear programming technique can be further extended to determine minimum resource

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[8] K. W. Rothschild, "Price Theory and Oligopoly," Economic Journal, Vol. 42, (1947), pp. 297-320.

[9] William J. Baumol, Business Behavior, Value and Growth, (New York, 1959), pp. 45-53.

[10] J. Margolis, "The Analysis of the Firm: Relationalism, Conventionalism, and Behaviorism," Journal of Business, Vol. 31 (1958) pp. 187-199. H. A. Simon, "A Behavioral Model of Rational Choice," Quarterly Journal of Economics, Vol. 69 (1952), pp. 99-118.

[11] Strickland, et al., p. 8.

requirements needed for specified income levels, given the income target of the firm, the resource restrictions, and the admissible enterprises.

In the general case, the firm will seek to minimize:

$$(2.10) \quad B^* = a_1X_1 + a_2X_2 + \ldots\ldots + a_nX_n$$

subject to

$$(2.11) \quad \begin{aligned} a_{11}X_1 + a_{12}X_2 + \ldots\ldots + a_{1n}X_n &\leq B_1 \\ a_{21}X_1 + a_{22}X_2 + \ldots\ldots + a_{2n}X_n &\leq B_2 \\ \cdot \quad \cdot \qquad\qquad \cdot \quad \cdot & \\ \cdot \quad \cdot \qquad\qquad \cdot \quad \cdot & \\ a_{m1}X_1 + a_{m2}X_2 + \ldots\ldots + a_{mn}X_n &\leq B_m \end{aligned}$$

$$(2.12) \quad (P_1-VC_1)X_1 + (P_2-VC_2)X_2 + \ldots\ldots + (P_n-VC_n)X_n \geq \pi^*$$

and

$$(2.13) \quad X_1 \geq 0,\ X_2 \geq 0,\ \ldots,\ X_n \geq 0$$

where B^* is the resource to be minimized; a_i is the quantity of the resource required per unit of the i^{th} product; and X_i is the quantity of the i^{th} product produced. In the resource restrictions (2.11), a_{ij} is the quantity of the j^{th} resource required per unit of the i^{th} product; B_j is the amount of the j^{th} restricted resource; and m is the number of restricted resources. In the income restriction (2.12), π^* is the specified income level and (P_i-VC_i) is the net income from producing one unit of the i^{th} product. In the solution, activities may be included which allow the purchase of "restricted" resources in order to attain the income target. Clearly, the major decisions in the application of the linear programming minimum resource model concern the determination of the income level to be attained and the resource requirement to be minimized.

Income Levels

Hathaway[12] compared the median money incomes of full-time workers by industry in the United States. In 1960, the median income in the agricultural industry was $2,241 compared to an "average" median income of $5,455 for the 12 major industries. He asserted that money income tends to understate the total real income of farmers and concluded that the returns for comparable labor would be about equal if the median incomes of farm families were 86 percent of nonfarm families.

Average annual earnings for selected industries in the United States, Oklahoma and East Central and South Central Oklahoma Area in 1962 are compared in Table II. These national, state, and area statistics illustrate the comparatively low income position of the agricultural industry. With a high level of out-migration during the past two decades, it is apparent that returns to farm employment are less than to nonfarm employment.

To analyze potential adjustments under the assumptions of the minimum resource model, it is assumed that the farm operator and his family aspires to an income level of $5,000. This level is comparable to nonfarm income of approximately $5,800 (using Hathaway's criterion of 86 percent). Although the $5,000 target is considerably greater than the average annual earnings from agriculture in Table II, this level may be low relative to the managerial responsibilities required for a highly capitalized farm business unit.

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[12]Hathaway, p. 37-42.

TABLE II

AVERAGE ANNUAL EARNINGS PER FULL TIME EMPLOYEE FOR SELECTED INDUSTRIES: UNITED STATES, OKLAHOMA, AND EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA FOR 1962

Industry	United States[a]	Oklahoma[b]	Area[c]
	(dollars)	(dollars)	(dollars)
Agriculture	1,816	2,239[d]	1,585[d]
Mining	6,030	6,284	5,472
Contract construction	5,890	5,101	4,857
Manufacturing	5,715	5,198	4,970
Wholesale and retail trade	4,661	3,768	3,717
Finance, insurance, and real estate	5,163	4,634	4,642
Public utilities	6,130	5,542	5,398
Services	3,887	3,288	3,163

[a] Survey of Current Business, U. S. Department of the Census Office of Business Economics, July, 1963.

[b] Handbook of Oklahoma Employment Statistics 1939-1965, Oklahoma Employment Security Commission Research and Planning Division, March, 1966.

[c] County Employment and Wage Data, Oklahoma 1962-1963, Oklahoma Employment Security Commission Research and Planning Division, August, 1964.

[d] Per farm income (total farm proprietor income plus wages and salaries/total census farms) in 1959. County Building Block Data for Regional Analysis: Oklahoma, Research Foundation, Oklahoma State University, Stillwater, 1965.

Resource Minimized

Although any one of the three factors of production--land, labor, and capital--may be minimized subject to the specified income level, the land resource is selected for this study on the basis of the following factors:[13]

1. Labor is not a limited resource within the area;
2. The minimization of capital yields solutions similar to that of the minimization of land;
3. Land is limited and is a major production resource in the agricultural sector of the area; and
4. Land prices are extremely difficult to estimate.

Previous research supports selection of the land resource. For example, Parekh's comparison of the minimum land model with the minimum labor model indicated the land minimization model to be more "realistic and practicable." Compared with the minimum labor model, the resource requirements appeared to be nearer a minimum in the minimum land model.[14]

Comparison of the Linear Programming Maximization and Minimum Resource Models

The maximization model is selected as the analytical approach to be used in the determination of the most profitable[15] combination of

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[13]Connor and Walker, p. 10.

[14]Jayanti Lal Parekh, "Minimum Resource Requirements and Adjustments Needed for Specified Levels of Farm Income on the Blackland Soils of the Blackland Area of Texas," (unpublished M.S. thesis, Texas A & M University, 1965), p. 63.

[15]Profit, as defined in this section, is the residual return to land, unallocated overhead, operator labor, risk, and management.

resources where the farm firm size is specified. The minimum resource model, using land as the criterion, is chosen to determine the minimum resources required to provide a specified level of income. Selection of the two analytical models is consistent with the objectives of the study. With the size of farm specified, some resources are necessarily fixed in the maximization model of the firm. However, in the minimum resource model, all resources are essentially variable with the provision for purchasing additional resources as needed. Using the same basic set of prices and alternatives, how do the two models compare with respect to combination of resources?

Example solutions of the two models are compared graphically in Figure 2. Two resources--land and capital--are combined in the production of two activities or processes by the farm firm. According to linear programming assumptions, each point on the activity rays (OF and OE) represents a specific production or profit level (prices of products and factors are constant). By connecting equal profit levels, a family of "profit indifference" curves (AB, CD, and EF) are constructed.

If the farm firm--with land fixed at L_1 and capital use unlimited--seeks to maximize profit, the optimal solution occurs at point F ($7,500) on the highest profit indifference curve attainable with the land restriction. In this maximization model solution, K_2 of capital is used in the most profitable combination with land in the exclusive production of Activity II. A similar solution is obtained using the minimum resource model where the firm desires to minimize the quantity of land subject to a profit level of $7,500. In the minimum resource model--with both land and capital variable--the minimum land required is determined where the lowest point on the $7,500 profit indifference

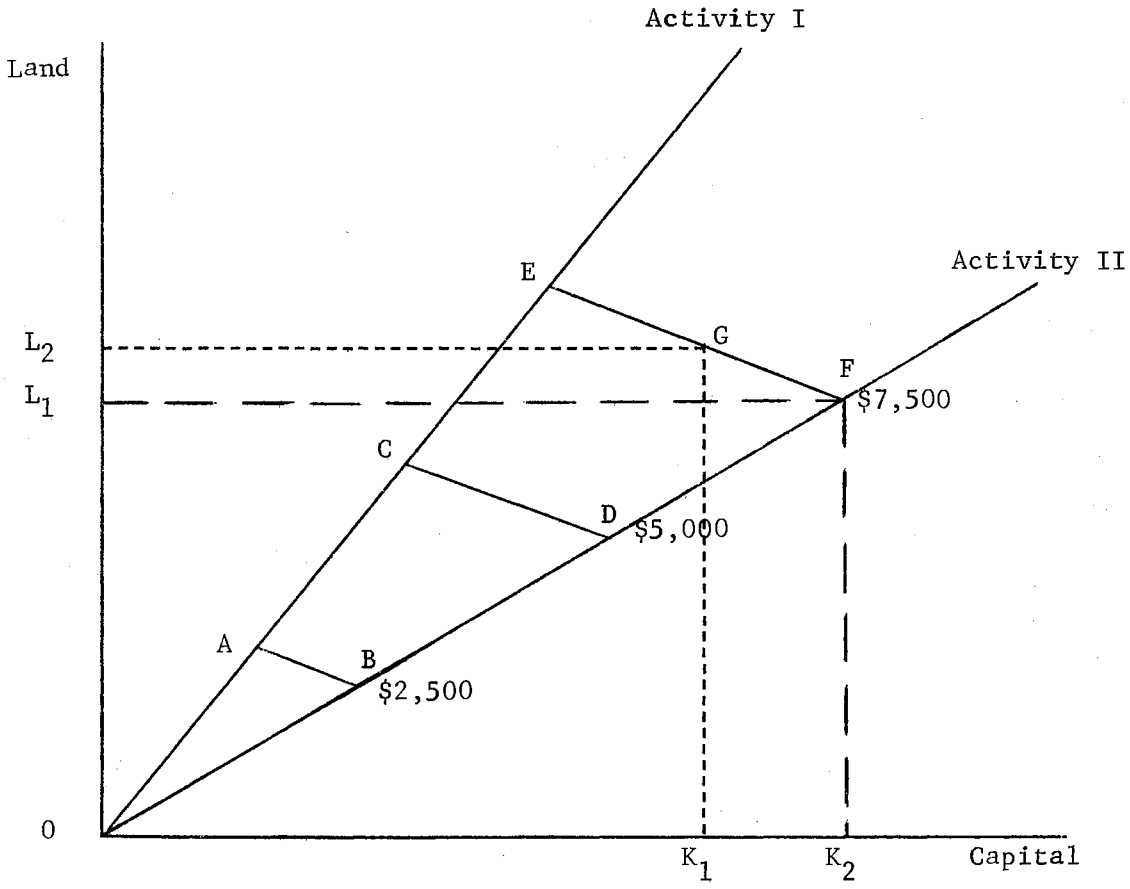

Figure 2. Theoretical Comparison of Linear Programming Maximization and Minimum Resource Models.

curve is reached (point F). This solution is the best combination of resources to use if land is actually fixed at L_1.

In another maximization model example, consider the possibility of both land and capital being limited for the farm firm. With land and capital fixed at L_2 and K_1 respectively, the solution occurs at point G profit indifference curve EF. The residual return to land, overhead, operator labor, risk, and management is $7,500. However, a combination of the two activities would be produced. In this case, the organization or combination of resources differs from the minimum resource model results due to the fixed resource assumptions of the maximization model. Other differences in organization may be anticipated if the ratio of land to capital price is altered by the purchase of these resources in the minimization model. That is, the slope of the profit indifference curves would change.

Thus, using the same prices, activities, and resources in each model, the resulting organizations may or may not be similar--depending on the assumptions regarding farm size specifications and other restrictions. The differences as related to the objectives of the study are anticipated to be due primarily to the assumption of fixed resources in the maximization model and the allowance for mobility of resources in the minimum resource model. Specific assumptions and resource restrictions as applicable to the analytical use of the two linear programming models are examined in Chapter III.

CHAPTER III

RESEARCH PROCEDURES

The four basic research steps used in this study are: (1) selection of typical or representative farm resource situations within the area; (2) construction of enterprise budgets for the area; (3) determination of optimum farm organizations, using the linear programming maximization model, under alternative adjustment hypotheses; and (4) determination of minimum resource requirements of farm organizations, using the linear programming minimum resource model, under alternative adjustment hypotheses.

These basic steps, which are farm firm oriented, are later extended for area adjustment implications by the use of aggregative procedures and multiplier analysis. The explanation and assumptions of these extensions are developed in Chapter VI.

Following the definition of the major soil resource situations, a representative farm and a representative acre are respectively designated as the basic units which are applicable to the maximization and the minimum resource models. The remainder of the chapter is devoted to general assumptions consistent with both models.

Soil Resource Situations

Within the broad geographical area in Figure 1, three soil resource situations are defined to represent relatively homogeneous groups of soil

productivity classifications. The major soil resource situations of the East Central and South Central Oklahoma Area are denoted as: (1) sandy (2) clayey, and (3) bottomland, according to distinguishing soil characteristics. Bottomland soils are deleted in this study as explained later. However, the major sandy and clayey soil groups are further delineated according to physical characteristics, productivity capabilities, and management requirements.

Sandy soils are the deep, sandy, and loamy upland soils of the Cherokee and Reddish Prairies and Cross Timbers resource areas. These soils are classified as S_1, S_2, S_3, and S_4. Class S_1 soils are deep, nearly level, loamy upland soils which are typically classified as the Teller, Vanoss, or equivalent soils series. Class S_2 soils are the gently sloping, moderately coarse, and loamy upland soils. Classes S_3 and S_4 soils vary from gently sloping to rolling upland soils and are characterized by the Dougherty-Stidham soil series. Definitions of the productivity classes and the estimated yields for various crops on sandy soils are shown in Appendix A, Table I.

The clayey soils are the silty and clayey upland soils of the Cherokee and Grand Prairie land resource areas. These soils are classified as C_1, C_2, C_3, and C_4 according to their physical and economic characteristics. Classes C_1 and C_2 are deep and loamy upland soils varying in slope from nearly level to gently sloping. The C_3 class is characterized by a deep, nearly level claypan soil. Shallow, eroded, and sloping soils not suitable for row crops are denoted as class C_4. The definitions of the productivity classes and estimated yields for various crops on clayey soils are shown in Appendix A, Table II.

Only the land with allotted crops is considered for adjustment possibilities in the study. Accordingly, commercial farms with cotton, peanut, and wheat allotments are included. Livestock ranches, livestock farms, dairy farms, and part-time farms are excluded. In addition, results of analyses of the major bottomland soils situation indicated a very limited profitability and use of allotment crops. Using selected cotton prices and allotments, cotton did not enter the programmed solutions until the price of cotton was 30.8 cents per pound. Reichardt's study also disclosed that cotton, even with high support prices, was only slightly more profitable than the competing nonallotment crops on bottomland soils.[1] Wheat was also determined to be less profitable than other competing crops. Wheat did not enter the programmed solutions. Although peanuts were determined to be profitable on bottomland soils, the current allotments are only 1.1 percent of the total cropland. Consequently, the major bottomland soils resource situation was excluded in this study.

The estimated included acreages of total land, total cropland, soil productivity classes, native pasture, and range and other land are shown in Table III. The clayey resource situation is divided into two subresource situations according to the allotment criterion--clayey, with cotton and peanut allotments; and clayey (c), with cotton allotments only.

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[1]Allan Wayne Reichardt, "Farm Adjustment Opportunities of Major Bottomland Soils of Southcentral and Eastcentral Oklahoma," (unpublished M.S. dissertation, Oklahoma State University, 1964), p. 61.

TABLE III

ESTIMATED INCLUDED ACREAGES, TOTAL FARM LAND, TOTAL CROPLAND SOIL PRODUCTIVITY CLASSES, NATIVE PASTURE, AND RANGE AND OTHER LAND BY RESOURCE SITUATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA[a]

Item	Sandy	Clayey[b]	Clayey (c)[c]
	(acres)	(acres)	(acres)
Total farm land	380,217	248,873	73,906
Total cropland	173,000	165,000	49,000
Soil productivity class:			
1	43,345	24,638	7,317
2	51,710	99,050	29,415
3	60,835	24,638	7,317
4	17,110	16,674	4,951
Native pasture	169,195	58,986	17,515
Range and other land	38,022	24,887	7,391

[a]These estimates as based on Soil Survey Reports, SCS N-2 Soil Inventory Forms, ASCS records, and the 1959 Census of Agriculture.

[b]Clayey resource situation with cotton and peanut allotments.

[c]Clayey resource situation with cotton allotments only.

The Representative Farm

A representative farm for each resource situation was selected as the basic unit of the maximization model to investigate the effects of alternative government cotton programs. Thompson defined a representative farm as one which embodies the characteristics of a group of farms[2]. A representative farm is not necessarily typical of a particular or average farm of a soil resource situation. Rather, it is considered in this study to be representative of the commercial farms with respect to adjustment opportunities. Plaxico and Tweeten viewed the representative farm approach as particularly helpful in public policy evaluation in guiding adjustments and cushioning income effects of such adjustments. However, the "judgement" criterion for selecting representative farms was viewed by these authors as a limitation of the approach.[3]

The resource restrictions assumed for each of the representative farms associated with the two resource situations are presented in Table IV. A representative farm for the sandy resource situation contains 660 acres of total land of which 300 acres are cropland, and 294 acres are native pasture. The clayey resource situation actually has two representative farms, differing only in allotment restrictions. However, the basic farm has a total of 520 acres of land--345 acres of

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[2]James F. Thompson, "Defining Typical Resource Situations," Farm Size and Output Research, (Southern Cooperative Series, Bulletin No. 56, 1958), pp. 32-46.

[3]James S. Plaxico and Luther G. Tweeten, "Representative Farms for Policy and Projection Research," Journal of Farm Economics, Vol. XLV, No. 5 (December, 1963), pp. 1458-65.

TABLE IV

RESOURCE AND ALLOTMENT RESTRICTIONS FOR REPRESENTATIVE FARMS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Soil Resource Situations		
		Sandy	Clayey	Clayey (c)
Total land	acre	660.0	520.0	520.0
Total cropland	acre	300.0	345.0	345.0
Class 1, total	acre	75.0	51.7	51.7
Class 1, row crop	acre	60.0	41.4	41.4
Class 2, total	acre	90.0	207.0	207.0
Class 2, row crop	acre	67.5	155.3	155.3
Class 3, total	acre	105.0	51.8	51.8
Class 3, row crop	acre	70.0	34.5	34.5
Class 4, total	acre	30.0	34.5	34.5
Native pasture	acre	294.0	123.0	123.0
Farmstead and waste	acre	66.0	52.0	52.0
Allotments:				
Cotton	acre	34.2	48.0	109.0
Peanuts	acre	79.5	65.5	0.0
Total operator labor[a]	hour	2,251	2,251	2,251
Jan.-April	hour	667	667	667
May-July	hour	605	605	605
Aug.-Sept.	hour	418	418	418
Oct.-Dec.	hour	561	561	561
Buildings, fences, etc.[b]				

[a]Twenty-two working days are assumed per month except February which has 20 working days. Working hours per day are assumed as follows: December through March--7 1/2 hours; April, May, and November--8 1/2 hours; and June through October--9 1/2 hours. Management time of 1/2 hour per day is not included in the working hours.

[b]A set of improvements, including the necessary buildings and fences, is assumed for each of the representative farms.

cropland, and 123 acres of native pasture. Row crops are restricted on classes 1, 2, and 3 land to 80, 75, and 66.6 percent of the total cropland, respectively.

The linear programming maximization model determines the most profitable combination of enterprises for each representative farm in the area. The entrepreneurial objective assumed is that of maximizing profit subject to specified resource restrictions.

The Representative Acre

In the minimum resource model, a representative acre is the counterpart of the representative farm approach. Because land is to be minimized, a representative acre for each soil resource situation is needed as the basic unit of the model. The representative acre contains the same proportions of each soil productivity class, cropland, native pasture, and allotments as the representative farm. Therefore, the minimum resource model essentially aggregates a set of representative acres into a farm unit which is proportionately comparable to the representative farm. The percentages of resources and allotments for the representative acre of each soil resource situation are shown in Table V.

The linear programming minimum resource model, using the representative acre concept, determines the minimum land required to meet the specified income target.

General Assumptions and Restrictions

The assumptions and restrictions concerning enterprises, prices, capital, machinery, labor, tenure, allotments, and overhead costs which

TABLE V

RESOURCE AND ALLOTMENT RESTRICTIONS AS PERCENTAGES OF EACH REPRESENTATIVE ACRE, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Soil Resource Situations		
	Sandy	Clayey	Clayey (c)
	(percent)	(percent)	(percent)
Total land	100.0	100.0	100.0
Total cropland	45.5	66.3	66.3
Class 1, total	11.4	9.9	9.9
Class 1, row crop	9.1	7.9	7.9
Class 2, total	13.6	39.8	39.8
Class 2, row crop	10.2	29.8	29.8
Class 3, total	16.0	9.9	9.9
Class 3, row crop	10.6	6.7	6.7
Class 4, total	4.5	6.7	6.7
Native pasture	44.5	23.7	23.7
Allotments:			
Cotton	5.2	9.2	21.0
Peanuts	12.0	12.6	0.0

are applicable to both models are explained in the remainder of this chapter.

Enterprises

Input-output enterprise budgets for the two soil resource situations were developed as one phase of this study.[4] Except for the exclusion of certain enterprises because of institutional, resource, or market restrictions, these enterprises are considered as admissible alternatives for the representative or minimum resource farms examined in the study.

Admissible crop enterprises are: cotton, peanuts, alfalfa, soybeans, grain sorghum, oats, rye and vetch, and Bermuda grass pasture. Wheat is excluded on the sandy and clayey soil situations because of limited allotments--2.6 and 3.3 percent of the cropland, respectively. Broomcorn, a specialty crop limited by market and high labor requirements, is also excluded in this study. A description of the included crop enterprises is presented in Appendix A, Tables I and II.

Livestock enterprise alternatives are confined to two basic beef cattle operations in the area--cow-calf and stocker buy-sell. The beef cow-calf enterprise includes both spring and fall calving activities with alternative rations and pastures. Stocker buy-sell activities

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[4] Herman E. Workman, et. al., Alternative Crop Enterprises on Major Upland Soils of East Central and South Central Oklahoma: Resource Requirements, Costs, and Returns, Oklahoma Agricultural Experiment Station, Processed Series P-523 (Stillwater, 1965). Kenneth C. Schneeberger, et. al., Resource Requirements, Costs and Expected Returns; Beef Cattle and Improved Pasture Alternatives; East Central and South Central Oklahoma, Oklahoma Agricultural Experiment Station, Processed Series P-544 (Stillwater, 1966).

include buying in the fall, using alternative rations and pastures, and selling in the spring or fall. Included livestock enterprise activities are described in Appendix A, Table III.

An advanced level of technology is assumed in the enterprise budgets used in this study. This level of technology reflects the operational capability of efficient farm managers rather than an average of past performances.

Prices

The assumed prices paid and received by farmers in the East Central and South Central Oklahoma Area are shown in Appendix A, Tables IV and V. Prices paid are current prices (1963 level) based on survey data and U. S. Department of Agriculture price information. Prices received, also approximating current levels, are five-year averages (1958-1962) which are adjusted for current trends.

The cotton prices used in this study are set at four levels--17.6, 22.0, 26.4, and 30.8 cents per pound of lint cotton. For a specific comparison to the study, the price of peanuts is also varied from the current price level.

Land prices used are based on current land transactions and estimates of farm appraisers. The land price used for each soil type is a weighted average price which reflects the typical acre included in the study. The price includes any necessary service buildings, but does not include the value of a dwelling, mineral rights, and other non-agricultural use values. Sandy and clayey soils are valued at $200 and $170 per acre, respectively.

Capital

It is assumed that capital is unlimited and can be borrowed as long as the returns to the firm exceed or equal the market rate. Interest rates of six percent per year for annual operating capital and five percent per year for land capital are assumed for this study, unless specified otherwise.

The operating capital charge for each enterprise is the annual capital times the interest rate. Annual capital is computed by adjusting cash inputs to an annual equivalent basis and adding machinery capital. Total capital indicates the capital used by an enterprise during a year. For example, power and machinery represent a year-round investment; total and annual capital are equal. However, for seed or fertilizer used only three months, the annual capital is only one-fourth of the total capital requirement. Therefore, total operating capital is always greater than (or equal to) annual operating capital. The annual operating capital computation is used in determining capital requirements in this study.

Machinery

Sets of machinery assumed are those most prevalent in the areas as determined from farmer surveys. The enterprise budgets used in this study are based upon the use of four-row power units and machinery complements. Costs of owning and operating machinery are considered variable for all planning periods and are expressed on a cost per hour basis. (See Appendix A, Table VI.)

Labor

The available hours of operator labor per year which are assumed for the representative farms of the area are shown in Table IV. The minimum resource farms are also assumed to have the same hours of annual operator labor available.

Operator labor is allocated to four periods of the year to reflect the heavy work periods for major crops. The distribution on each of the farms is as follows: January through April, 667 hours; May through July, 605 hours; August through September, 418 hours; and October through December, 561 hours. The labor hours exclude time necessary for carrying on the managerial duties. Additional labor, as required, may be purchased during the year at $1 per hour. Labor used in custom machinery operations is included as a component of the custom charge.

Tenure

The tenure situation is defined in order to make the return estimates consistent in the study. It is assumed that the manager is an owner-operator (100 percent equity) who seeks a five percent return on his land investment, unless specified otherwise. The interpretation of the return estimates for this tenure assumption with extensions to other situations is explained in Chapter IV.

Allotments

Data obtained from the Agricultural Stabilization and Conservation Service provide the basis for estimating current cotton and peanut allotments. The total cotton allotments on the sandy, clayey, and

clayey (c) soil resource situations (identified as commercial farms with cotton and peanut allotments) are 19,800, 23,000, and 15,000 acres, respectively. Peanut allotments are 45,800 and 31,300 acres for the sandy and clayey resource situations, respectively.

Cotton allotments for the sandy, clayey, and clayey (c) representative farms are estimated at 34.2, 48.0, and 109.0 acres respectively. Peanut allotments are estimated at 79.5 and 65.5 acres for the sandy and clayey representative farms (Table IV).

For the minimum resource farm, it is assumed that each additional representative acre purchased contains the same percentage of allotments as the representative farm for the soil resource situation. The cotton and peanut allotments as percentages of the representative acres are shown in Table V.

Unallocated Overhead Costs

Some expenses of a farm operation cannot be included in the enterprise budgets. These costs which are common to the overall farm business are grouped together in one category--unallocated overhead costs. Overhead costs include pickup truck expenses, telephone, bookkeeping, insurance, and other general expenses.

The assumed overhead costs for a representative farm in the East Central and South Central Oklahoma Area are shown in Appendix A, Table VII. Although the size of the farm varies in the minimization analysis, it is assumed that the unallocated overhead costs for the representative farm are applicable for each feasible organization.

CHAPTER IV

OPTIMUM REPRESENTATIVE FARM ORGANIZATIONS WITH ALTERNATIVE COTTON-PRICE ALLOTMENT PROGRAMS

The purpose of this chapter is to investigate the effects of different government cotton price support and allotment programs on optimal representative farm organizations. Using the linear programming maximization model of the farm firm, each optimal plan is the one which maximizes the residual return to the operator's land, labor, unallocated overhead, risk, and management.

Cotton price and allotment combinations used in this analysis essentially relate four price levels with four allotment levels. Cotton support prices selected are 17.6, 22.0, 26.4, and 30.8 cents per pound of lint cotton. These prices in Oklahoma are equivalent to U. S. average cotton prices of 20, 25, 30, and 35 cents, respectively. With the 1963 allotment as the base, acreage levels of 55, 85, 100, and 115 percent of base are determined (see Table VI). Peanuts, the other allotment crop on the sandy and clayey soils, are held constant at the 1963 allotment level.

Although this study is concerned primarily with selected government price support and allotment programs, a "free market" situation is also programmed with four cotton price levels and presented in the appendix tables with other allotment levels. Solutions are obtained with peanuts at the current price of $10.40 per hundred weight and at an estimated

TABLE VI

COTTON ALLOTMENT LEVELS USED WITH ALTERNATIVE PRICES ON REPRESENTATIVE FARMS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Cotton Allotment Level	Unit	Soil Resource Situation		
		Sandy	Clayey	Clayey (c)
Base (1963)	acre	34.2	48.0	109.0
55 percent	acre	18.8	26.4	60.0
85 percent	acre	29.1	40.8	92.6
115 percent	acre	39.3	55.2	125.4
No allotments[a]	acre	197.5	196.7	196.7

[a]Cotton acreage restricted only by cropland available for cotton production.

"long-run" price of $8.00 per hundred weight. Long-run price estimates are based on the premise that the relative profitableness of peanuts would decline with no restrictions on production. However, due to supply and demand implications of an equilibrium adjustment expected under free markets, the programmed organizations with no allotments are not specifically analyzed in the context of a selected government program. Instead, they are presented in tabular form.

Programmed plans for the range of cotton price and allotment combinations are analyzed for each representative farm with respect to: (1) enterprise combinations and land use, (2) labor requirements, (3) capital requirements, and (4) return estimates. In addition, selected choices of the 1966 cotton program are developed and examined for further comparison of government cotton programs.

Sandy Soil Representative Farm Organizations

The most profitable plans with different cotton price-allotment combinations programmed for the sandy representative farm are presented in Appendix B, Table I. Crop enterprises in the optimum plans are cotton, peanuts, alfalfa, and Bermuda pasture. Beef stocker buy-sell activities appear as the supplementing livestock enterprises. In each of the 16 optimum organizations involving allotment programs, peanuts are in the solutions at the full allotment acreage--79.5 acres--on classes S_2 and S_3 land.

With the low price level of 17.6 cents per pound, cotton is produced only on 9.8 acres of S_2 land regardless of allotment levels. However, at or above a price level of 22 cents, cotton is programmed at the full allotment level and supersedes alfalfa on S_2 land. Land use by cotton

is shifted to class S_1 land when prices are 26.4 and 30.8 cents per pound. Alfalfa, in the allotment organizations, declines from 145.7 acres to 116.2 acres on S_1 and S_2 land as cotton allotments and prices are increased and substitution occurs. Bermuda pasture activites on classes S_3 and S_4 land are insensitive to changing cotton prices and allotments remaining at the 65-acre level in each organization.

Beef cow-calf activities do not enter the optimum solutions--the more profitable use of resources being beef stocker buy-sell activities. The buy-sell activities are also stable to changing cotton programs remaining at approximately the same level (136 head).

Relatively small changes in labor and capital requirements result from different cotton program changes. No additional labor is necessary other than that included in custom machinery work. Annual operator labor varies only 54 hours in the optimum plans. Annual operating capital requirements change only from $21,809 to $22,559. These comparatively small changes in labor and capital indicate that individual sandy farm organizations have a high degree of stability with respect to cotton program changes. Although some adjustments are made in combination of enterprises, the changes do not require major resource adjustments.

Stability Ranges

Stability ranges of net return or cost coefficients for the programmed activities provide additional information for interpreting the resulting enterprise combinations. These ranges indicate the amount by which coefficients in the optimum plan could vary before a change in the organization occurs. Stability ranges of selected activites for a specified optimum organization for each representative farm are shown

in Appendix B, Table IV. The ranges in these plans are similar for other optimum plans as programmed in allotment situations.

Wide stability ranges of peanut activities indicate the strong position of the enterprise in sandy soil organizations. Annual capital, stocker buy-sell, and alfalfa activities have rather narrow ranges. For example, a decrease of $2.58 per head in the net return coefficient of the P-61 buy-sell activity would change the optimum organization in favor of a beef cow-calf activity.

Interpretation of Return Estimates

The interpretation of profit or return estimates may be qualified according to assumptions concerning the return on owned resources and the equity position of the operator. The linear programming model, as defined, maximizes a residual return of annual gross income or sales less annual operating costs--including annual capital charges at six percent. Other charges, such as return on land investment, land rent, land taxes, and unallocated overhead, are not considered in the residual return. However, a computed return to operator labor, risk, and management may be calculated by deducting specified charges for land, taxes, and unallocated overhead from the residual return.

In order to standardize the interpretation of the return estimates for comparisons, it is assumed that the owner-operator seeks a five percent return on his land investment. For example, the residual return for the optimum sandy farm plan, with cotton at 17.6 cents per pound and the allotment at 55 percent of base, is $12,305 (Appendix B, Table I). With land taxes assumed at one percent of the land value of $200 per

acre, the computed return to operator labor, risk, and management is $3,277:

Residual return	$12,305
Less:	
Return on owned land	6,600
Land taxes	1,320
Unallocated overhead	1,108
Computed return to operator labor, risk, and management	$ 3,277

Alternatively, return estimates may be considered for other equity or asset positions of the operator. In the example given, if the equity positions of the operator are: (1) full-owner with 100 percent equity in land, (2) owner-renter with 50 percent equity, or (3) renter with no equity in land, the computed returns to operator land capital, labor, risk, and management are as follows:

	Full-Owner	Owner-Renter	Renter
Residual return	$12,305	$12,305	$12,305
Less:			
Land taxes	1,302	660	0
Land rent	0	3,960	7,920
Unallocated overhead	1,108	1,108	1,108
Computed return to operator land, labor, risk, and management	$ 9,877	$ 6,577	$ 3,277

where land rent is assumed at six percent of the land value in the example. Although the computed returns for the renter and the owner who seeks a five percent return on his land investment are identical in the example, disposable incomes are clearly different.

The residual return and the computed return to operator labor, risk, and management are the return estimates cited most in this analysis. These estimates for the optimum sandy soil farm plans are summarized in Table VII. As cotton prices and allotments are increased, residual returns increase from $12,305 to $14,017. The computed returns are comparatively smaller after returns to land resources, taxes, and

TABLE VII

SANDY SOIL REPRESENTATIVE FARM: ESTIMATED RESIDUAL RETURNS[a] AND RETURNS TO OPERATOR LABOR, RISK, AND MANAGEMENT; EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Cotton Price (cents per pound)			
	17.6	22.0	26.4	30.8
	(dollars)			
Cotton Allotment at 55 Percent of Base Level:				
Residual return	12,305	12,492	12,828	13,179
Return to operator labor, risk, and management	3,277	3,464	3,800	4,151
Cotton Allotment at 85 Percent of Base Level:				
Residual return	12,305	12,532	13,056	13,600
Return to operator labor, risk, and management	3,277	3,504	4,028	4,572
Cotton Allotment at Base Level:				
Residual return	12,305	12,552	13,168	13,808
Return to operator labor, risk, and management	3,277	3,544	4,140	4,780
Cotton Allotment at 115 Percent of Base Level:				
Residual return	12,305	12,572	13,282	14,017
Return to operator labor, risk, and management	3,277	3,544	4,254	4,989

[a]Residual return is defined as the return to operator land, taxes, overhead, labor, risk, and management.

overhead costs are charged on the same allotment situations. After deducting these charges ($9,028), computed returns to operator labor, risk, and management range from $3,277 to $4,989 as cotton price-allotment combinations are increased.

Clayey Soil Representative Farm Organizations

The optimum clayey representative farm organizations with selected cotton price-allotment combinations are presented in detail in Appendix B, Table II.

The available cropland resources of this representative farm are used for cotton, peanuts, alfalfa, soybeans, and Bermuda pasture enterprises. Livestock enterprises, similar to those of the sandy farm organizations, are beef stocker buy-sell activities. Peanuts, alfalfa, Bermuda pasture, and stocker enterprises are unaffected by changing cotton price and allotment programs. Peanuts are programmed in the clayey optimum organizations at the maximum level permitted by allotment restrictions. Alfalfa and Bermuda pasture are stable in the plans at 10.3 acres on C_1 land and 138 acres on C_2, C_3, and C_4 land, respectively. Stocker buy-sell activities are likewise unchanging at 159 head in the plans.

Organizations are the same for each allotment level when cotton is priced at 17.6 cents per pound. In these plans, cotton is produced on 11.9 acres of C_2 land which is less than the allotment restriction in each case. As the price is increased to 22 cents per pound, cotton appears at the full allotment level and substitutes for soybeans on class C_2 land. Soybeans, on C_1 and C_2 land, decline from 119.3 acres to 76 acres in the organizations as cotton allotments are increased.

Thus, in contrast to the sandy representative farm, soybeans are competitors with cotton.

The stability of organizations is also demonstrated by the small variation in annual labor and capital requirements resulting from cotton program changes. Operator labor varies only 34 hours annually. Additional hired labor is unnecessary. Annual capital increases by only $418 as cotton price and allotment levels are raised.

Stability ranges for various activities of selected clayey representative farm optimal plans are shown in Appendix B, Table IV. Alfalfa has a rather wide stability range. Activities with narrow ranges include soybeans, annual capital, and stocker buy-sell. For example, if annual capital costs are increased to 7.8 percent, a change to soybeans is indicated on class C_3 land.

Estimated returns for each of the clayey optimal plans are compared in Table VIII. Residual returns range from $8,905 to $11,023 as cotton prices and allotments are increased. The return to operator labor, risk, and management is computed by deducting $6,412 from the respective residual return estimates. Comparing returns with the larger sandy representative farm, the residual returns are approximately $3,000 greater for the sandy farm. However, the returns to operator labor, risk, and management are only slightly greater--$378 to $784--in the sandy farm organizations.

Clayey (c) Soil Representative Farm Organizations

Results of the linear programming maximization model with specified cotton price-allotment programs on the clayey representative farm lacking a peanut allotment are shown in Appendix B, Table III.

TABLE VIII

CLAYEY SOIL REPRESENTATIVE FARM: ESTIMATED RESIDUAL RETURNS[a] AND RETURNS TO OPERATOR LABOR, RISK, AND MANAGEMENT; EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Cotton Price (cents per pound)			
	17.6	22.0	26.4	30.8
	(dollars)			
Cotton Allotment at 55 Percent of Base Level:				
Residual return	8,905	9,167	9,573	9,980
Return to operator labor, risk, and management	2,493	2,755	3,161	3,568
Cotton Allotment at 85 Percent of Base Level:				
Residual return	8,905	9,244	9,873	10,501
Return to operator labor, risk, and management	2,493	2,832	3,461	4,089
Cotton Allotment at Base Level:				
Residual return	8,905	9,284	10,023	10,762
Return to operator labor, risk, and management	2,493	2,872	3,611	4,350
Cotton Allotment at 115 Percent of Base Level:				
Residual return	8,905	9,323	10,173	11,023
Return to operator labor, risk, and management	2,493	2,911	3,761	4,611

[a]Residual return is defined as the return to operator land, taxes, overhead, labor, risk, and management.

Cotton, soybeans, alfalfa, and Bermuda pasture are the crop enterprises entering the optimal plans. Livestock enterprises are confined to stocker buy-sell activities. Bermuda and alfalfa are in each of the most profitable plans at constant levels, regardless of cotton prices or allotments. These levels are 10.3 acres of alfalfa on class C_1 land and 138 acres of Bermuda pasture on classes C_2, C_3, and C_4 land. Similarly, beef stocker buy-sell activites are not affected by changing cotton prices or allotments, being constant at a level of 138 head for each plan.

Organizations of the clayey (c) farm also are identical for each allotment level when cotton is 17.6 cents per pound. Cotton is profitable only on 12.6 acres of C_2 land, although allotments vary from 60 to 125.4 acres. However, with cotton at 22 cents or greater, cotton is produced at full allotment levels--substituting for soybeans on class C_2 land. Soybeans, which become relatively less profitable as cotton prices increase, decline from 184.1 to 71.3 acres.

Operator labor requirements for the clayey (c) optimum organizations are similar to the clayey organizations. However, additional labor is hired with allotments at 115 percent of base level. Operating capital requirements are less than those of the clayey farm ranging from $22,912 when cotton is 17.6 cents per pound, to $24,005 when cotton is 30.8 cents and at 115 percent allotment level.

Alfalfa has a wide stability range; other activities--soybeans, cotton, stocker buy-sell, and annual capital--have narrow ranges. With the cotton allotment at base level and cotton at 26.4 cents per pound, if the net return of soybeans on class C_2 land is decreased only 53 cents per acre, grain sorghum enters the plan (Appendix B, Table IV). Although

the cotton activities have narrow ranges, changes indicated by increased costs are from machine harvest to hand harvest cotton.

Residual returns for varying cotton price-allotment combinations range from $5,727 to $10,387 (Table IX). After deducting the cost of land, taxes, and overhead--$6,412--from the residual returns, the computed return to operator labor, risk, and management for some plans with combinations of low cotton prices and allotments is less than zero.

Rather significant differences are noted in comparing return estimates for the clayey (c) representative farm organizations with those of the clayey farm. Since the two farms are identical in basic resource structure, the greater returns are obviously due to allotment restrictions, particularly the exclusion of peanuts on the clayey farm. Thus, some indication of the "value" of peanut allotments may be expressed by the peanut allotment "shadow price." The "shadow price" is the marginal value of product (MVP) of an additional acre of peanut allotment in the solution.[1] Although differences in cotton allotments of the two farms also affect the shadow prices, the MVP of one acre of peanut allotment for the clayey (c) organization (base allotment and cotton at 26.4 cents) is $49.23. This compares with the value of an additional acre of cotton allotment of $5.43 when cotton is 26.4 cents per pound.

Free Market Organizations

Results of programming each representative farm with no allotment restrictions are also presented in Appendix B, Tables I, II, and III.

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[1]Shadow prices for allotment acres are determined by the linear programming computer routine.

TABLE IX

CLAYEY (C) SOIL REPRESENTATIVE FARM: ESTIMATED RESIDUAL RETURNS[a] AND RETURNS TO OPERATOR LABOR, RISK, AND MANAGEMENT; EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Cotton Price (cents per pound)			
	17.6	22.0	26.4	30.8
	(dollars)			
Cotton Allotment at 55 Percent of Base Level:				
Residual return	5,727	6,178	7,102	8,026
Return to operator labor, risk, and management	-685	-234	690	1,614
Cotton Allotment at 85 Percent of Base Level:				
Residual return	5,727	6,355	7,781	9,207
Return to operator labor, risk, and management	-685	-57	1,369	2,795
Cotton Allotment at Base Level:				
Residual return	5,727	6,444	8,122	9,801
Return to operator labor, risk, and management	-685	32	1,710	3,389
Cotton Allotment at 115 Percent of Base Level:				
Residual return	5,727	6,525	8,456	10,387
Return to operator labor, risk, and management	-685	113	2,044	3,975

[a]Residual return is defined as the return to operator land, taxes, overhead, labor, risk, and management.

With peanuts at current prices, the "equilibrium" plans of the sandy and clayey representative farms are clearly influenced by high peanut levels. However, at a "long-run" price for peanuts, peanut levels and return estimates are decidedly reduced. That is, cotton becomes more competitive with peanuts for available resources. For example, consider the clayey representative farm with no allotment restrictions and peanuts at $8 per hundred (Appendix B, Table II). With cotton priced at only 17.6 cents, peanuts command all of the available cropland--196.7 acres. However, as cotton prices increase, cotton replaces peanuts and completely substitutes for peanuts at 30.8 cents. Although the enterprise organizations are different, the return estimates, costs, and capital requirements of some of the no allotment-lower peanut price solutions are similar to the allotment solutions.

The implications of alternative peanut prices and allotment in the East Central and South Central Oklahoma Area are being investigated in a current study. Thus, the free market or no allotment restriction situation--shown to be significantly influenced by peanut prices--is not specifically considered for potential farm adjustments in this study.

The 1966 Upland Cotton Program

The current cotton program authorized under the Food and Agricultural Act of 1965 offers alternative price support payments, acreage diversion payments, and price support loans to participating cotton growers. The program alternatives are designed to reduce cotton

production and keep it competitively priced without decreasing farmers' incomes.[2]

In general, the 1966 upland cotton program provides for market support of cotton near world price levels with farmers participating in the acreage diversion program receiving price support payments.

The program, as applied to farms with 10 acres or more of effective cotton allotment, offers the grower essentially six alternatives: (1) nonparticipation in the program, (2) diversion of 12.5 percent of effective allotment, (3) diversion of 25 percent of effective allotment, (4) diversion of 35 percent of effective allotment, (5) diversion of 12.5 percent of farm allotment, but planting no cotton, and (6) sale or lease of cotton allotment to another farmer.

Participating farmers, who plant cotton and divert 12.5, 25, or 35 percent of their effective allotments, receive diversion payments based on 10.5 cents per pound payment rate. These participants are also eligible for price support payments at a rate of 9.42 cents per pound based on the farm's domestic allotment, regardless of the diversion level. The domestic cotton allotment is 65 percent of the effective base cotton allotment. In addition, all cotton production on participating farms is eligible for price support loans at a national average rate of 21 cents per pound, basis middling one-inch cotton at average location. A producer with a cotton allotment, who plants no cotton, may receive diversion payments on 12.5 percent of his farm allotment. The balance of his allotment may be released for reapportionment. He

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[2]Agricultural Stabilization and Conservation Service, USDA PA-685 (November, 1965)--publication prepared for Agricultural Stabilization and Conservation Committeemen.

may also privately sell or lease his upland cotton allotment to another farmer.

As a comparison to the alternative cotton price-allotment programs previously discussed, selected alternatives within the new upland cotton program are analyzed for each of the representative farms. The alternatives assumed are: (1) nonparticipation, (2) 12.5 percent diversion, (3) 25 percent diversion, and (4) 35 percent diversion. Given these choices, which plan is the most profitable for representative farms? How do these choices compare with the other alternative cotton price-allotment programs analyzed in this chapter?

One method to compare the choices is to enter the alternatives in the linear programming maximization model. Major factors affecting the program selected by the individual producer are: (1) cotton production costs per acre; (2) utilization of the diverted acres; and (3) diverted crop costs per acre.

The nonparticipation alternative for each representative farm is assumed to be the previously programmed combination of cotton at 22 cents per pound and base level allotments. It is also assumed that the diverted acres can be planted to rye and vetch which will yield winter grazing and is in compliance with the soil conserving use regulations of the program. Thus, new activities or alternatives--diverted acres, diversion payments, and price support payments--are included in the linear programming tableau. The resulting optimum organizations for each of the representative farms are shown in Appendix B, Table V. A summary of the estimates of residual returns and returns to operator labor, risk, and management is presented in Table X.

TABLE X

1966 UPLAND COTTON PROGRAM: ESTIMATED RESIDUAL RETURNS[a] AND RETURNS TO OPERATOR LABOR, RISK, AND MANAGEMENT FOR SPECIFIED CHOICES; EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Nonparticipation	Percent Diversion		
		12.5	25.0	35.0
	(dollars)			
Sandy Soil Representative Farm, Base Allotment--34.2 Acres:				
Residual return	12,552	13,395	13,434	13,464
Return to operator labor, risk, and management	3,524	4,367	4,406	4,436
Clayey Representative Farm, Base Allotment--48.0 Acres:				
Residual return	9,284	10,349	10,387	10,420
Return to operator labor, risk, and management	2,872	3,937	3,975	4,008
Clayey (c) Representative Farm, Base Allotment--109.0 Acres:				
Residual return	6,444	8,858	8,937	9,008
Return to operator labor, risk, and management	32	2,446	2,525	2,596

[a]Residual return is defined as the return to operator land, taxes, overhead, labor, risk, and management.

The participation choice is clearly favored according to the return estimates for each farm. Both residual returns and returns to operator labor, risk, and management are improved by diverting more land. Thus, the 35 percent diversion choice is indicated to be more profitable and at the same time reduces the cotton produced. Residual returns for 35 percent diversion are increased over the nonparticipation choice by 7, 12, and 40 percent respectively for sandy, clayey, and clayey (c) optimum farm plans.

The best choice of the current cotton program for each representative farm is similar with respect to estimated returns to the previously programmed cotton-price allotment combination--cotton priced at 30.8 cents with 85 percent of base cotton allotment. However, the total lint cotton produced on the three farms is reduced by 25 percent with the 35 percent diversion choice as compared to the total cotton produced on the three representative farms with the 30.8 cents and 85 percent allotment combination.

Other alternatives, such as skip-row planting and leasing or selling cotton allotments, are not considered in this analysis. For the individual producer, these alternatives may also influence choices. However, the programmed results appear to be consistent with the actions currently being taken by cotton producers who are reported to be diverting approximately 31 percent of their effective allotments nationwide.[3]

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[3]This estimate was reported by officials of the State Agricultural Stabilization and Conservation Service office at Stillwater, Oklahoma, 1966.

Summary of Chapter

The primary objective of this chapter was to determine the effects of specified alternative cotton price-allotment programs on the most profitable combination of resources for the three representative farms of the study area. Optimum organizations were derived by use of the linear programming maximization model for four cotton prices combined with four allotment situations and one no allotment situation. In addition, specific alternatives of the current upland cotton program were incorporated in the maximization models for further analysis of the cotton price-allotment choices.

Cotton was included in each of the optimum organizations at the full allotment limit, with the exception of cotton priced at 17.6 cents per pound. Peanuts, the other allotment crop, was clearly the dominant income producing enterprise on farms where peanut allotments were in effect.

As the price of cotton and allotments increased, cotton supplanted a portion of the soybean acreage on the clayey soil farm and alfalfa acreage on the sandy soil farm. With a constant peanut allotment level, the combination of other enterprises was not altered by changes in cotton prices and allotments. Residual returns--gross income minus annual operating costs--for the sandy, clayey, and clayey (c) farm organizations increased 14, 24, and 81 percent respectively, as cotton prices and allotments were raised from low combinations to high combinations. Returns to operator labor, risk, and management for the representative farms as defined were extremely small for some organizations, especially on the clayey (c) farm. Clearly, other factors--

such as farm size, the relatively high profitability of peanuts, and return on land investment--affect returns to operator labor, risk, and management.

Free market solutions were also presented for the reader's interest. A current study, with peanuts as the basic adjustment crop, is perhaps more relevant to the implications of changes in peanut prices and allotments.

Selected choices in the 1966 upland cotton program were analyzed with respect to the three representative farm situations. The basic choices selected were (1) nonparticipation, (2) 12.5 percent diversion, (3) 25 percent diversion, and (4) 35 percent diversion. These choices were evaluated on the basis of linear programming maximization model results.

The results were clearly economically favorable for participation in the program rather than nonparticipation. Among the diversion choices, a preference for the 35 percent diversion was indicated for each of the representative farms. These results were consistent with the actions presently being taken by farmers.

This analysis, using selected representative farm sizes, indicated that an optimum farm organization is not static with changing government programs. That is, individual farm organizations must be adjusted in order to maximize returns from available resources. However, the maximized returns were relatively small when charges for land, taxes, and overhead were deducted. Thus, the question of what is an adequate land base for the provision of a sufficient family living level is posed. This question receives attention as minimum resource model organizations are investigated in the following chapter.

CHAPTER V

MINIMUM RESOURCE FARM ORGANIZATIONS WITH ALTERNATIVE COTTON PRICE-ALLOTMENT PROGRAMS

The primary purpose of this chapter is to determine and evaluate effects of selected cotton programs on individual farm organizations under the assumptions of the minimum resource model. Cotton price supports and allotment combinations used for this analysis are the same as used in the representative farm situations in Chapter IV. The secondary purpose is to investigate the effects of alternative land returns and annual capital costs on the minimum resource requirements of individual farms. The essential assumption is that the farm family aspires to attain a $5,000 income and desires to minimize land requirements in order to obtain this level of income.

The first section of this chapter is devoted to the analysis of minimum resource organizations resulting from alternative cotton price-allotment programs. The effects are examined on (1) the land, labor, and capital requirements, and (2) the combination of enterprises. Effects of different land capital returns and annual operating capital charges for minimum resource organizations are analyzed in the last section.

Sandy Soil Minimum Resource Organizations

Complete minimum resource model results with different cotton-price allotment programs on the sandy soil resource situation are presented in

Appendix C, Table I. In addition, a summary of the land, labor, and capital requirements for each programmed organization is shown in Table XI.

Minimum land requirements to obtain a $5,000 return to operator labor, risk, and management under selected allotments ranges from 658 acres, with cotton at 30.8 cents and 15 per cent above the base allotment level, to 933 acres, with cotton at 17.6 cents.

No additional labor is hired other than that incorporated in machine custom harvesting with all sizes of sandy minimum resource farms. Operator labor in the organizations varies from 1,431 hours to 1,733 hours annually. The greater proportion of unused annual operator labor accumulates during the August-September period.

Total capital requirements, land and annual operating capital, vary almost proportionally with the land requirement. The impact of alternative cotton price allotments on total capital is pronounced. Requirements vary from $154,728 to $218,531 for allotment restriction situations. The major capital resource under the assumptions of the minimum resource model is land. Thus, in order to meet the specified income level and fixed return to land with declining cotton prices and allotments, more of the land resource is necessary, resulting in increasing total capital requirements.

The most profitable combinations of enterprises under the assumptions of the minimum resource model for the sandy soil resource situation include cotton, peanuts, alfalfa, Bermuda pasture, and beef stocker buy-sell activities. The crop activities appear at approximately the same proportion of available cropland as in the comparable maximization plans, indicating that the combination of enterprises is

TABLE XI

SANDY SOIL RESOURCE SITUATION: ESTIMATED MINIMUM REQUIREMENTS (LAND, LABOR, AND CAPITAL) FOR $5,000 RETURN TO OPERATOR LABOR, RISK, AND MANAGEMENT FOR SPECIFIED COTTON PRICE-ALLOTMENT COMBINATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
Cotton Allotment at 55 Percent of Base Level:					
Total land	acre	933	902	833	771
Operator labor	hour	1,673	1,685	1,597	1,521
Land capital	dol.	186,620	180,460	166,580	154,300
Annual capital	dol.	31,911	31,183	28,787	26,664
Cotton Allotment at 85 Percent of Base Level:					
Total land	acre	933	894	794	712
Operator labor	hour	1,673	1,708	1,579	1,474
Land capital	dol.	186,620	178,780	158,840	142,440
Annual capital	dol.	31,911	31,118	27,647	24,792
Cotton Allotment at Base Level:					
Total land	acre	933	890	775	684
Operator labor	hour	1,673	1,720	1,570	1,452
Land capital	dol.	186,620	177,900	155,000	136,820
Annual capital	dol.	31,911	31,084	27,082	23,907
Cotton Allotment at 115 Percent of Base Level:					
Total land	acre	933	885	757	658
Operator labor	hour	1,673	1,733	1,561	1,431
Land capital	dol.	186,620	177,020	151,340	131,640
Annual capital	dol.	31,911	31,050	26,543	23,088

essentially the same for both models. For example, the 658-acre sandy minimum resource farm organization is very similar to the comparable representative farm organization (Appendix B, Table I).

Clayey Soil Minimum Resource Organizations

Programmed results of the cotton-price allotment programs on the clayey soil resource situation are found in Appendix C, Table II. Land, labor, and capital requirements for a $5,000 return to operator labor, risk and management are summarized in Table XII.

Minimum land requirements to attain the specified income level are highest--1,266 acres--for cotton selling for only 17.6 cents per pound at each allotment level, and least--618 acres--with cotton at 30.8 cents and allotments at 15 percent above the base level. Thus, the low price-low allotment combination requires approximately 105 percent more land resources than that of the high price-high allotment combination in order to meet the model income requirements.

As the size of farm increases, annual operator labor increases from 1,792 hours for a 618-acre farm to 2,006 hours for a 1,266-acre farm. Additional labor is hired in each of the organizations and is increased from 25 to 520 hours as farm sizes enlarge. The greater levels of operator labor for the clayey minimum resource farm plans indicate more efficient use of the "fixed" operator labor as compared with the clayey maximization farm organizations.

Potential adjustments in farm sizes on clayey soils under alternative cotton price-allotment programs have significant implications with respect to capital requirements. The total capital requirements

TABLE XII

CLAYEY SOIL RESOURCE SITUATION: ESTIMATED MINIMUM REQUIREMENTS (LAND, LABOR, AND CAPITAL) FOR $5,000 RETURN TO OPERATOR LABOR, RISK, AND MANAGEMENT FOR SPECIFIED COTTON PRICE-ALLOTMENT COMBINATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
Cotton Allotment at 55 Percent of Base Level:					
Total land	acre	1,266	1,162	962	823
Operator labor	hour	2,006	1,988	1,953	1,901
Hired labor	hour	520	417	137	102
Land capital	dol.	215,220	197,506	163,574	139,978
Annual capital	dol.	41,109	38,187	31,522	28,355
Cotton Allotment at 85 Percent of Base Level:					
Total land	acre	1,266	1,125	861	704
Operator labor	hour	2,006	1,981	1,919	1,875
Hired labor	hour	520	389	102	87
Land capital	dol.	215,220	191,199	146,421	119,714
Annual capital	dol.	41,109	37,254	28,725	30,610
Cotton Allotment at Base Level:					
Total land	acre	1,266	1,106	818	658
Operator labor	hour	2,006	1,978	1,901	1,834
Hired labor	hour	520	375	117	56
Land capital	dol.	215,220	188,088	139,043	111,877
Annual capital	dol.	41,109	36,793	28,415	29,154
Cotton Allotment at 115 Percent of Base Level:					
Total land	acre	1,266	1,089	779	618
Operator labor	hour	2,006	1,975	1,892	1,792
Hired labor	hour	520	361	114	25
Land capital	dol.	215,220	185,079	132,498	105,111
Annual capital	dol.	41,109	36,437	29,139	27,457

increase by $123,761 when moving from the 618-acre farm to the 1,266-acre farm. Approximately 93 percent greater total investment is needed to provide the specified return to operator labor, risk, and management for the low price-low allotment cotton program compared with that of the high price-high allotment program.

Cotton, peanuts, alfalfa, soybeans, Bermuda pasture, and beef stockers are the programmed enterprises in the clayey minimum resource organizations. Except at 17.6 cents per pound, cotton is produced at the full allotment level. Peanuts are included in each plan at the full allotment level. Although the crop enterprises selected by the clayey minimum resource model are the same enterprises entering the clayey representative farm organizations, the combination of enterprises, as percentages of the available cropland, differ in the two models. Peanuts and cotton appear in both the minimum resource and the maximization organizations at approximately the same percentage level of cropland. However, the relatively less profitable crop enterprises--alfalfa, soybeans, and Bermuda pasture--are distributed on the cropland at different percentage levels. With 55 percent allotments and cotton at 22 cents per pound, alfalfa, soybeans, and Bermuda pasture are distributed in the minimum resource organization at 30, 18, and 25 percent of the available cropland, respectively. Comparable percentage distributions on the clayey representative farm are 3, 30, and 40 percent of the total cropland. The change in the linear relationship between the models is attributed to the additional hired labor requirements of the minimum resource farms. That is, alfalfa becomes relatively more profitable than soybeans and Bermuda pasture when hired labor is used. Also, as labor costs are increased, stocker buy-sell numbers are reduced.

Clayey (c) Soil Minimum Resource Organizations

The clayey (c) soil resource organizations resulting from selected cotton and price combinations for a $5,000 return to operator labor, risk, and management are presented in Appendix C, Table III. A summary of the land, labor, and capital requirements for these organizations is shown in Table XIII.

Feasible clayey (c) minimum resource organizations are only obtained at a cotton price of 30.8 cents for the 55 and 85 percent allotment levels. A cotton price of 26.4 cents or 30.8 cents is required to obtain a $5,000 return under the 100 percent and 115 percent allotment plans. The occurrence of nonfeasible solutions implies that a combination of resources meeting the minimum resource model requirements does not exist.

Annual operator labor requirements vary from 1,841 hours for a 734-acre farm up to 2,115 hours for a 2,774-acre farm. Hired labor, which is necessary in each of clayey (c) minimum resource organizations, varies with farm sizes from 189 to 2,760 hours annually.

Total capital investment necessary is extremely large for low allotment solutions. With cotton at 30.8 cents per pound, a 260 percent greater total capital investment is necessary to obtain a $5,000 return to operator labor, risk, and management with a 55 percent cotton allotment than with a 115 percent allotment level. Capital requirements for the clayey (c) minimum resource organizations are also much greater than the comparable clayey minimum organizations. With peanut allotments on the clayey (c) soil resource situation being the only difference in restrictions, the lack of peanut allotments is reflected in the larger capital resources need to obtain a specified income level.

TABLE XIII

CLAYEY (C) SOIL RESOURCE SITUATION: ESTIMATED MINIMUM REQUIREMENTS (LAND, LABOR, AND CAPITAL) FOR $5,000 RETURN TO OPERATOR LABOR, RISK, AND MANAGEMENT FOR SPECIFIED COTTON PRICE-ALLOTMENT COMBINATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
Cotton Allotment at 55 Percent of Base Level:					
Total land	acre	N.F.S.[a]	N.F.S.	N.F.S.	2,774
Operator labor	hour				2,115
Hired labor	hour				2,760
Land capital	dol.				471,665
Annual capital	dol.				81,487
Cotton Allotment at 85 Percent of Base Level:					
Total land	acre	N.F.S.	N.F.S.	N.F.S.	1,163
Operator labor	hour				1,925
Hired labor	hour				508
Land capital	dol.				197,778
Annual capital	dol.				34,535
Cotton Allotment at Base Level:					
Total land	acre	N.F.S.	N.F.S.	2,616	896
Operator labor	hour			2,095	1,880
Hired labor	hour			2,727	203
Land capital	dol.			444,805	152,286
Annual capital	dol.			79,279	27,002
Cotton Allotment at 115 Percent of Base Level:					
Total land	acre	N.F.S.	N.F.S.	1,895	734
Operator labor	hour			2,012	1,841
Hired labor	hour			1,686	189
Land capital	dol.			322,082	124,831
Annual capital	dol.			57,846	28,688

[a]No feasible solution obtained.

Enterprises in the clayey (c) minimum resource organizations are identical to comparable representative farm plans which include cotton, alfalfa, soybeans, Bermuda pasture, and stockers. However, with the exception of cotton, the combinations of crop enterprises as a percentages of the total cropland differ in the two models. These differences between the maximization and the minimum resource models are also attributed to the increased cost effect resulting from the allocation of hired labor to these crops. The beef stockers numbers are also proportionately less in the minimum resource model organizations.

Alternative Land Capital Returns

The significance of land capital requirements necessary in the minimum resource model adjustments was emphasized in the preceding section. In these organizations, it was assumed that the owner-operator desired a five percent return on his land capital investment in addition to the specified income target. To meet these rigid return requirements, increasing quantities of land and land capital were needed as cotton prices and allotments declined. If it is assumed that the government program selected for the area cotton producers is a combination of base allotments and a price of 26.4 cents per pound, what are the effects of alternative returns to the operator's land capital investment on the minimum resource requirements?

In order to determine these effects, each of the soil resource situations was programmed with annual operating capital fixed at six percent and land capital at alternative levels--0, 1, 2, 3, 4, and 5 percent.

Sandy Soil Resource Situation

Minimum land requirements for the sandy soil situation, as shown in Table XIV, vary from 328 acres to 775 acres in order to attain a $5,000 return to operator labor, risk, and management. Annual labor requirements are confined to operator labor only, ranging from 988 hours for a zero capital charge to 1,570 hours for a 5 percent land capital return. Both land and total capital requirements are increased by 137 percent for 5 percent land capital return over no return on land capital. Residual returns--returns to land, operator labor, unallocated overhead costs, risk, and management--reflect the increasing specified returns to land and vary extensively from $6,763 to $15,408. The share of the residual returns allocated to land increases accordingly to $7,750 as the land capital returns increase to five cents per dollar.

In Table XIV, levels of crop enterprises in the plans are expressed as percentages of the total cropland available. Therefore, changes in combination of enterprises are indicated by changes in the percentages of cropland devoted to each crop enterprise. Since no changes occur as the result of varying land capital costs, the effects are essentially linear. That is, the resources used and enterprises selected vary in fixed proportions. For example, the ratio of land capital to annual operating capital is constant at 5.7 in each plan.

Alternative land capital charges are interpreted as internal interest rates or "satisfactory" returns on land investment. Accordingly, the residual returns are returns to operator labor, land opportunity cost, taxes, overhead, risk, and management. Land capital returns also may be interpreted in terms of land prices or land equity positions.

TABLE XIV

SANDY SOIL RESOURCE SITUATION: ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR, RISK, AND MANAGEMENT WITH ALTERNATIVE LAND CAPITAL RETURNS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Land Capital Return (per dollar)					
		.00	.01	.02	.03	.04	.05
Total land	acre	327.6	370.4	426.0	501.2	608.8	775.0
Cropland[a]	pct.	100.0	100.0	100.0	100.0	100.0	100.0
Cotton	pct.	11.4	11.4	11.4	11.4	11.4	11.4
Peanuts	pct.	26.4	26.4	26.4	26.4	26.4	26.4
Alfalfa	pct.	40.5	40.5	40.5	40.5	40.5	40.5
Bermuda	pct.	21.7	21.7	21.7	21.7	21.7	21.7
Cotton lint	cwt.	72.4	81.8	94.1	110.8	134.5	171.3
Beef stockers	head	69.0	78.0	90.0	105.0	128.0	163.0
Operator labor	hour	988.0	1,044.0	1,116.0	1,214.0	1,354.0	1,570.0
Land capital	dol.	65,520	74,080	85,200	100,240	121,760	155,000
Annual capital	dol.	11,444	12,939	14,882	17,512	21,271	27,082
Gross income	dol.	22,985	25,985	29,886	35,164	42,707	54,370
Operating costs	dol.	16,222	18,395	21,222	25,046	30,512	38,962
Residual return	dol.	6,763	7,590	8,664	10,118	12,195	15,408
Return to operator labor, risk, and management	dol.	5,000	5,000	5,000	5,000	5,000	5,000
Return to land capital	dol.	0	741	1,704	3,007	4,870	7,750

[a]Total cropland acres are approximately 45.5 percent of the total land acres.

As a land price interpretation, consider the organization with no land return specified (see Table XIV). This plan, with land valued at $200 per acre, is analogous to an organization with land valued at $100 per acre and a 1 percent land return specified. Taxes are assumed at 1 percent of the land value.

The land capital returns--0, 1, 2, 3, 4, and 5 percent--correspond to land equity positions of 100, 80, 60, 40, 20, and 0 percent, respectively. For example, if the operator has a 20 percent land equity (Table XIV, 4 percent land capital), the residual return ($12,195) may be used to pay for land taxes, overhead, external interest on borrowed capital, and a $5,000 return to operator land equity, labor, risk, and management.

Clayey Soil Resource Situation

Programmed minimum resource organizations with selected land capital charges for the clayey soil resource situation are presented in Table XV. The minimum land requirements, which are very similar to those of the sandy soil situation, vary from 359 to 818 acres as land capital is varied from 0 to 5 percent. Annual operator labor for the resulting organizations is supplemented by hired labor at the larger farm sizes--635 and 818 acres. Total capital requirements increase 117 percent over the capital cost range. The residual returns for the clayey soil situation range from $6,718 (0 percent) to $14,450 (5 percent). The shares going to land capital increase to 48 percent of the residual returns over this range of capital charges.

Significant effects on enterprise combination resulting from the variation of land investment costs are indicated by the cropland percentage changes. A change in the linear relationship is noted as land

TABLE XV

CLAYEY SOIL RESOURCE SITUATION: ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR, RISK, AND MANAGEMENT WITH ALTERNATIVE LAND CAPITAL RETURNS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Land Capital Return (per dollar)					
		.00	.01	.02	.03	.04	.05
Total land	acre	358.7	402.0	457.3	530.3	634.9	817.9
Cropland[a]	pct.	100.0	100.0	100.0	100.0	100.0	100.0
Cotton	pct.	13.9	13.9	13.9	13.9	13.9	13.9
Peanuts	pct.	19.0	19.0	19.0	19.0	19.0	19.0
Alfalfa	pct.	3.0	3.0	3.0	3.0	3.0	16.6
Soybeans	pct.	24.0	24.0	24.0	24.0	24.0	24.0
Bermuda	pct.	40.1	40.1	40.1	40.1	40.1	26.5
Cotton lint	cwt.	115.5	129.5	147.3	170.7	204.4	263.4
Beef stockers	head	95.0	106.0	121.0	140.0	168.0	150.0
Operator labor	hour	1,290.0	1,377.0	1,488.0	1,634.0	1,808.0	1,901.0
Hired labor	hour	0.0	0.0	0.0	0.0	35.0	117.0
Land capital	dol.	60,979	68,340	77,741	90,151	107,933	139,043
Annual capital	dol.	15,868	17,788	20,236	23,465	28,114	28,415
Gross income	dol.	27,045	30,315	34,485	39,984	47,873	53,888
Operating costs	dol.	20,327	22,840	26,044	30,271	36,369	39,438
Residual return	dol.	6,718	7,475	8,441	9,713	11,504	14,450
Return to operator labor, risk, and management	dol.	5,000	5,000	5,000	5,000	5,000	5,000
Return to land capital	dol.	0	683	1,555	2,705	4,320	6,952

[a]Total cropland acres are approximately 66.3 percent of the total land acres.

capital costs are increased from 4 to 5 percent. Cropland percentages allocated to alfalfa and Bermuda pasture change with alfalfa substituting for 33.9 percent of cropland devoted to Bermuda pasture. The change in the most profitable combination of enterprises is associated with increased labor requirements.

Clayey (c) Soil Resource Situation

As presented in Table XVI, the range of minimum land required under varying rates of land capital returns is quite extensive for the clayey soil situation without peanut allotments. Land requirements vary from 446 acres with no land capital charges to 2,616 acres with a 5 percent land capital return. Other resource requirements are equally significant. Total annual labor--operator and hired--increases from 1,513 hours to 4,822 hours requiring substantial amounts of hired labor to meet the specified goals of the minimum resource model. Total capital increases 450 percent over the land capital cost range. The residual returns, which are necessary to pay a return to operator labor, risk, and management, vary from $6,900 to $32,796. Land shares increase to $22,240 as land capital costs are increased to 5 percent.

Organizational changes with respect to the most profitable combination of enterprises occur at 3 percent land capital return where the size of business requires 215 hours of hired labor. As a percentage of the total cropland available, alfalfa acreage is increased. There is a corresponding decline in soybean and Bermuda pasture acreages. Soybeans decline to 13.3 percent of the cropland at 4 percent land capital cost. The land-annual capital ratio increases from 4.1 to 5.6 as specified returns to land capital vary from 0 to 5 percent.

TABLE XVI

CLAYEY (C) SOIL RESOURCE SITUATION: ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR, RISK, AND MANAGEMENT WITH ALTERNATIVE LAND CAPITAL RETURNS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Land Capital Return (per dollar)					
		.00	.01	.02	.03	.04	.05
Total land	acre	446.4	542.5	662.6	867.0	1,301.2	2,616.5
Cropland[a]	pct.	100.0	100.0	100.0	100.0	100.0	100.0
Cotton	pct.	31.7	31.7	31.7	31.7	31.7	31.7
Alfalfa	pct.	3.0	3.0	3.0	19.6	30.0	30.0
Soybeans	pct.	25.2	25.2	25.2	23.7	13.3	13.3
Bermuda	pct.	40.1	40.1	40.1	25.0	25.0	25.0
Cotton lint	cwt.	342.8	398.7	487.0	637.3	956.4	1,923.1
Beef stockers	head	104.0	121.0	148.0	116.3	174.0	351.0
Operator labor	hour	1,513.0	1,666.0	1,789.0	1,866.0	1,941.0	2,095.0
Hired labor	hour	0.0	0.0	120.0	215.0	745.0	2,727.0
Land capital	dol.	75,888	92,225	112,642	147,390	221,204	444,805
Annual capital	dol.	19,095	22,212	27,190	26,334	39,116	79,280
Gross income	dol.	30,129	35,046	42,802	46,966	71,549	143,875
Operating costs	dol.	23,229	27,093	33,315	34,962	54,381	111,079
Residual return	dol.	6,900	7,953	9,487	12,004	17,168	32,796
Return to operator labor, risk, and management	dol.	5,000	5,000	5,000	5,000	5,000	5,000
Return to land capital	dol.	0	992	2,253	4,422	8,848	22,240

[a]Total cropland acres are approximately 66.3 percent of total land acres.

Interpretation of land capital costs as "satisfactory" returns to owned land resources is particularly significant in terms of potential adjustments on the clayey (c) soil resource situation. With alternative cotton price-allotments and a 5 percent return on land investment assumed, feasible solutions were programmed only with high cotton prices or allotments. However, if the land owner considers a less than 5 percent return on his land investment as satisfactory, the adjustments indicated by alternative government programs may not be as drastic as the previously programmed results indicate. For example, the $5,000 specified income level could be attained on 663 acres with a 2 percent land return compared to 2,616 acres with a 5 percent return to land investment.

Alternative Annual Operating Capital Costs

In the previous analysis of alternative cotton programs, a charge of six cents per dollar was assessed to annual operating capital and was included as a component of total operating costs. This charge may be viewed alternatively as an actual interest rate paid for borrowed operating capital or as an "opportunity cost" for owned capital.

If the rigid assumption of an internal or external rate of 6 percent on annual capital is relaxed, what are the effects on the minimum resource farm organizations? To investigate this question, a government cotton program of base allotments and cotton at 26.4 cents per pound is assumed. With land capital return constant at two percent, each of the soil resource situations is programmed with alternative levels of operating capital costs--0, 6, 12, and 18 percent.

Sandy Soil Resource Situation

Programmed minimum resource organizations resulting from the variation of annual operating capital on the sandy soil resource situation are shown in Table XVII. Minimum land requirements, with a two percent return on land capital, vary from 368 acres to 545 acres over the annual capital cost range. Total labor requirements are not significantly affected by the influence of operating capital costs. With no extra labor needed, annual operator labor at 18 percent operating capital increases only 117 hours over the requirements when no charges are affixed to operating capital. Although operating capital decreases as the cost of capital increases, the total capital requirements increase from $87,541 to $119,486 over the operating capital cost range. The residual returns increase from $8,315 to $9,376 as capital costs are increased.

Effects of alternative annual capital interest rates on the allocation of resources to the enterprises may be analyzed according to the cropland percentages commanded by each enterprise in the organizations (Table XVII). The more profitable crops--peanuts, cotton, and alfalfa --retain their respective percentages over the annual capital price range. However, as the rate on operating capital increases to 12 percent, capital becomes too expensive for Bermuda pasture activities. Consequently, 21.7 percent of the total cropland is left idle. The organizations also reflect the substitution of land capital for operating capital as operating capital costs increase. The land-annual capital ratio widens from 5.7 to 9.1 as annual capital increases from 6 to 12 percent. Although the crop enterprise percentages do not change at the

TABLE XVII

SANDY SOIL RESOURCE SITUATION: ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR, RISK, AND MANAGEMENT WITH ALTERNATIVE ANNUAL CAPITAL COSTS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Annual Capital Price (per dollar)			
		.00	.06	.12	.18
Total land	acre	367.8	426.0	490.0	544.7
Cropland[a]	pct.	100.0	100.0	100.0	100.0
Cotton	pct.	11.4	11.4	11.4	11.4
Peanuts	pct.	26.4	26.4	26.4	26.4
Alfalfa	pct.	40.5	40.5	40.5	40.5
Bermuda	pct.	21.7	21.7	0.0	0.0
Idle cropland	pct.	0.0	0.0	21.7	21.7
Cotton lint	cwt.	81.3	94.1	108.3	120.4
Beef cows	head	0.0	0.0	0.0	16.0
Beef stockers	head	78.0	90.0	64.0	18.0
Operator labor	hour	1,043.0	1,116.0	1,046.0	1,160.0
Land capital	dol.	73,560	85,200	98,000	108,940
Annual capital	dol.	12,981	14,882	10,795	10,546
Gross income	dol.	25,939	29,886	27,742	24,125
Operating costs	dol.	17,624	21,222	18,694	14,749
Residual return	dol.	8,315	8,664	9,048	9,376
Return to operator labor, risk, and management	dol.	5,000	5,000	5,000	5,000
Annual capital costs	dol.	0	893	1,295	1,898

[a]Total cropland acres are approximately 45.5 percent of the total land acres.

18 percent level, the land-annual capital ratio increases to 10.3 indicating the substitution of more profitable activities for less profitable activities within enterprises.

Effects of different annual operating capital costs may be interpreted as actual changes in the cost of net revenue coefficients of the enterprise activities. For example, increasing the interest rate from 6 to 12 percent is equivalent to increasing the per acre cost of the P-5 Bermuda (4) activity by $1.34 or decreasing the net return per head of P-61 buy-sell activity by $6.92.

Clayey Soil Resource Situation

The minimum land requirements with changing operating capital costs range from 373 to 631 acres for the clayey soil resource situation as shown in Table XVIII. Annual labor requirements, which are satisfied by the available operator labor, vary from 1,379 to 1,661 hours. Size of business, as indicated by the total capital requirements, increases from $86,345 to $120,903 with the land-operating capital ratio increasing from 2.8 to 7.9 as operating capital costs increase. The residual returns to operator land, taxes, overhead, labor, risk, and management increase from $8,012 to $9,328 over the range of operating capital costs assumed.

As annual capital interest rates increase from 0 to 6 percent, the comparative profitableness of soybean and Bermuda pasture enterprises change. Soybeans enter the plan at 24 percent of the available cropland and the Bermuda pasture acreage is reduced by this amount. At the 12 percent interest rate, both alfalfa and soybean enterprises are increased while Bermuda pasture is further reduced. Bermuda is

TABLE XVIII

CLAYEY SOIL RESOURCE SITUATION: ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR, RISK, AND MANAGEMENT WITH ALTERNATIVE ANNUAL CAPITAL COSTS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Annual Capital Price (per dollar) .00	.06	.12	.18
Total land	acre	373.4	457.3	549.5	631.4
Cropland[a]	pct.	100.0	100.0	100.0	100.0
Cotton	pct.	13.9	13.9	13.9	13.9
Peanuts	pct.	19.0	19.0	19.0	19.0
Alfalfa	pct.	3.0	3.0	18.1	18.1
Soybeans	pct.	0.0	24.0	34.1	34.1
Oats	pct.	0.0	0.0	0.0	4.8
Bermuda	pct.	64.1	40.1	14.9	0.0
Idle cropland	pct.	0.0	0.0	0.0	10.1
Cotton lint	cwt.	120.2	147.3	176.9	203.3
Beef cows	head	0.0	0.0	0.0	15.0
Beef stockers	head	152.0	121.0	75.0	12.0
Operator labor	hour	1,379.0	1,488.0	1,541.0	1,661.0
Land capital	dol.	63,478	77,741	93,415	107,338
Annual capital	dol.	22,867	20,236	16,047	13,565
Gross income	dol.	34,755	34,485	33,221	28,321
Operating costs	dol.	26,743	26,044	24,311	18,993
Residual return	dol.	8,012	8,441	8,910	9,328
Return to operator labor, risk, and management	dol.	5,000	5,000	5,000	5,000
Annual capital costs	dol.	0	1,214	1,926	2,442

[a]Total cropland acres are approximately 66.3 percent of total land acres.

finally eliminated as competitor for resources at 18 percent capital cost. Oats are profitable on 4.8 percent of the available cropland which was previously devoted to Bermuda pasture production. Substitution of land capital for operating capital is clearly evident as 10.1 percent of the cropland is left idle.

Clayey (c) Soil Resource Situation

Minimum resource model results are shown in Table XIX for the clayey (c) soil resource situation. Without peanut allotments, the minimum land requirements are necessarily greater and have a wider range than the clayey situation. Minimum farm sizes vary from 501 to 1,104 acres through the operating capital cost range assumed. Total annual labor required for the organizations ranges from 1,624 hours to 2,201 hours including additional hired labor needed as farm sizes increase. The total capital ranges from $110,125 to $208,960. Residual returns vary from $8,664 to $11,736 as operating capital costs are increased to 18 percent.

Organizational changes due to increased annual capital costs occur at the 6 percent level where soybeans supplant 25 percent of Bermuda pasture's share of cropland. Further changes result as annual capital rates are raised to 12 percent indicating an increase in the relative profitableness of alfalfa and soybeans. Oats, unprofitable in previous programs, are introduced at 4.8 percent of the cropland. However, Bermuda pasture is eliminated at 12 percent annual capital costs. At the same time, 10.1 percent of the cropland is left idle. At 18 percent, alfalfa enhances its position as an enterprise choice while soybeans

TABLE XIX

CLAYEY (C) SOIL RESOURCE SITUATION: ESTIMATED MINIMUM REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR, RISK, AND MANAGEMENT WITH ALTERNATIVE ANNUAL CAPITAL COSTS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Annual Capital Price (per dollar) .00	.06	.12	.18
Total land	acre	501.3	662.6	859.2	1,103.5
Cropland[a]	pct.	100.0	100.0	100.0	100.0
Cotton	pct.	31.7	31.7	31.7	31.7
Alfalfa	pct.	3.0	3.0	18.1	30.0
Oats	pct.	0.0	0.0	4.8	0.0
Soybeans	pct.	11.9	25.2	35.3	23.4
Bermuda	pct.	53.4	40.1	0.0	0.0
Idle cropland	pct.	0.0	0.0	10.1	14.9
Cotton lint	cwt.	368.4	487.0	631.5	811.0
Beef cows	head	0.0	0.0	6.0	0.0
Beef stockers	head	152.0	148.0	30.0	54.0
Operator labor	hour	1,624.0	1,789.0	1,856.0	1,893.0
Hired labor	hour	0.0	120.0	170.0	308.0
Land capital	dol.	85,221	112,642	146,064	187,595
Annual capital	dol.	24,904	27,190	17,583	21,365
Gross income	dol.	37,094	42,802	35,573	47,659
Operating costs	dol.	28,430	33,315	25,084	35,923
Residual return	dol.	8,664	9,487	10,489	11,736
Return to operator labor, risk, and management	dol.	5,000	5,000	5,000	5,000
Annual capital costs	dol.	0	1,631	2,110	3,846

[a]Total cropland acres are approximately 66.3 percent of total land acres.

are less desirable with higher interest costs. Land previously devoted to oats is idled under the higher interest change.

With hired labor entering the organizations at 6, 12, and 18 percent annual capital, the choice of activities in the organizations is influenced by both increasing labor and capital costs. As a result, the direction or trend of the relative profitableness of certain enterprises tends to change as annual capital costs increase. This behavior is indicated by the "in and out" response by oats, beef cows, and stockers in the clayey (c) soil situation.

Interpretation of Minimum Resource Results

The influence of changes in cotton support prices and allotments on the minimum resource organizations was vividly shown by the extensive range of capital requirements necessary to attain the specified income objective. As farm sizes increased with lower price-allotment combinations, the total capital--particularly land capital--became increasingly large. The capital requirement problem was even more intensified on the clayey (c) soil resource situation where no feasible solutions were available at low price-allotment levels to meet the objectives of the model.

Comparison of the results of the two linear programming models revealed that the choice of enterprises was the same for the representative farms and the minimum resource farms. However, with increased labor requirements of minimum resource farm organizations, certain enterprises were not combined in the same proportions as the comparable representative farms. In the minimum resource model, the "fixed"

operator labor was allocated by priority to the more profitable enterprises--cotton and peanuts. As land requirements were increased to obtain the $5,000 return to operator labor, risk, and management, additional labor was hired and was necessarily allocated to the comparatively less profitable enterprises after the available operator labor was exhausted. These less profitable enterprises generally had rather narrow cost stability ranges. Thus, the increased labor costs changed the relative profitableness of these enterprises.

By relaxing the specified 5 percent return to land resources and allowing lower levels, the effects of potential adjustments were somewhat cushioned. Hence, the implication was that other factors are perhaps relevant in adjustment studies. For example, factors such as the operator's age, capital availability, land appreciation, tenure, and family living goals may lend credence to the possibility of accepting lower returns on the land equity. Similarly, the acceptance of a lower income target would also reduce the magnitude of adjustment. For example, the minimum resource solutions on the clayey (c) soil resource situation would be stable with reduced land returns or income goals.

Changing annual capital interest rates also influenced the potential adjustments as shown by varying the rates from 0 to 18 percent for a specified cotton program. The selected interest rates were interpreted as either internal or external rates directly. As an internal rate or reservation price for capital, an 18 percent interest rate implied that the farmer combined his available resources with those enterprises which yielded at least a return of 18 cents for each dollar's worth of capital used. As annual capital costs increased with the minimum resource organizations, the land-annual capital ratio

tended to widen, indicating the substitution of land for operating capital. Further, the combined forces of hired labor and increased capital costs caused organizational changes in enterprise combinations. The impact of these forces was discernable in directional changes in the relative profitableness of the secondary enterprises. The more profitable enterprises were not affected by the interest rate changes.

Results of this chapter pose questions relating to capital control in agriculture and the importance of methods for attaining capital control: Can the owner-operator "family" farm handle the huge investments indicated by potential adjustments? What is the place of partnerships, corporations, integration, and credit institutions in potential farm adjustments? Are government programs designed to attract capital into agriculture? Will capital funds for investment come from within the agricultural sector? No attempt is made to answer all these questions. However, it is apparent that farm adjustments initiated by government programs are influenced by the acquisition costs and returns of capital used in agriculture.

Finally, the minimum resource and the representative farm model results have been contrasted for specified cotton programs in this chapter. How do the results of the two models compare as a means for anticipating individual farm adjustments? The basic differences between the two approaches were apparent in the individual representative and minimum resource organizations. Essentially, the land resource was fixed in the maximization model while all resources--including land--were variable in the minimum resource model. Thus, given a land-based type of agriculture and relevant income goals, the minimum resource model appears more acceptable for considering individual farm adjustments

over time. However, the models are examined in more detail with respect to explaining aggregative response to government cotton programs in Chapter VI.

CHAPTER VI

AGGREGATIVE ADJUSTMENT IMPLICATIONS

Individual farm organizations presented in the preceding chapters indicate changes that an individual farm operator could profitably make in response to different cotton price and allotment programs. If all farmers are motivated to adjust their farming operations accordingly, substantial changes in the area's agriculture and economy would be anticipated. This chapter is oriented to estimating and analyzing these changes.

An aggregation procedure for use in estimating total area farm adjustments is developed, and maximization and minimum resource model aggregates are evaluated. In the last part of the chapter, indicated changes in employment, population, and consumption expenditures are developed in a simplified interdependence model using multiplier analysis. The latter step is a long overdue first attempt in agricultural economics research to estimate effects of alternative agricultural programs on the whole economy of the area.

Aggregation Procedure

Farm aggregates for the study area are obtained by multiplying the relevant data from individual farm plans by the total number of farms represented by each and summing the results. The total number of farms or the aggregation weight for each resource situation is ascertained by

dividing the individual farm land requirements into the land resource base acreage. This simple procedure is subject to some criticism as a result of aggregation bias.[1] An "ultimate" but infeasible research approach in obtaining farm aggregates would be to program each farm.

The total land included for potential adjustments is shown in Table III, Chapter III. According to soil resource situations in the East Central and South Central Oklahoma Area, included acreages are as follows: (1) sandy--380,217 acres, (2) clayey--248,873 acres, and (3) clayey (c)--73,906 acres. In addition to cotton and peanuts, sandy and clayey soils have wheat allotments of 4,500 acres and 5,400 acres, respectively. Wheat is excluded as an admissable enterprise alternative on these soil situations due to the limited allotment acreages. Accordingly, the total land mix acreage required for wheat production is deducted from the total land resource base (sandy and clayey soil situations). The resulting adjusted total land resource base for the sandy soil resource is 370,327 acres. Similarly, the clayey resource situation is adjusted to 240,728 acres.

Results of both the maximization and the minimum resource models are aggregated to determine area effects of potential adjustments. The basic assumption is that all farm operators on the included soil resource situations adopt the optimum organizations as indicated by the representative farms and minimum resource farms. The period of time for adjustments assumed is long enough for intermediate capital items such as farm machinery, buildings, equipment, livestock, and pasture

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[1] George E. Frick and Richard A. Andrews, "Aggregation Bias and Four Methods of Summing Farm Supply Functions," Journal of Farm Economics, Vol. 47 (August, 1965).

improvements to be considered as variable inputs. Where adjustments in farm sizes occur as in the minimum resource model, land is also considered variable.

Maximization and Minimum Resource Aggregates

As stated previously, the analysis of each model is based upon specified price and production controls for cotton and peanuts. General assumptions concerning prices, enterprise alternatives, and restrictions apply equally to the maximization and minimum resource models. The total included soil resource base in aggregate is the same for the maximization and minimum resource results. Therefore, any differences in the resulting aggregates can be attributed to basic assumptions of the two models--maximization of profits subject to a specified representative farm resource situation, and the minimization of land requirements subject to a specific income target.

The maximization model aggregate results for each resource situation are presented in Appendix D, Tables I, II, and III. Aggregation data of the minimum resource model are shown in Appendix D, Tables IV, V, and VI.

Because of the lack of solutions on the clayey (c) minimum resource situation, no attempt is made to compare each area aggregate organization for alternative cotton programs. Instead, the area aggregates for the two models with selected cotton prices and allotments at 55 and 115 percent of base level are analyzed. Aggregates for maximization and minimum resource models are shown in Tables XX and XXI, respectively. Small differences in aggregate cropland levels are due to rounding error in the aggregation of representative acres.

TABLE XX

MAXIMIZATION MODEL AREA AGGREGATES FOR SANDY, CLAYEY, AND CLAYEY (C) SOIL RESOURCE SITUATIONS FOR SELECTED COTTON PRICE-ALLOTMENT COMBINATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price and Allotment Combinations[a]						
		17.6-LH	22.0-L	26.4-L	30.8-L	22.0-H	26.4-H	30.8-H
		(thousands)						
Cotton	acre	12.8	31.4	31.4	31.4	65.5	65.5	65.5
Peanuts	acre	74.9	74.9	74.9	74.9	74.9	74.9	74.9
Alfalfa	acre	87.9	82.8	82.8	82.8	71.3	71.3	71.3
Soybeans	acre	81.4	67.9	67.9	67.9	45.3	45.3	45.3
Bermuda	acre	120.0	120.0	120.0	120.0	120.0	120.0	120.0
Cotton lint	cwt.	46.7	113.2	117.4	117.4	236.7	245.5	245.5
Beef stockers	head	170.6	169.5	169.5	169.5	169.5	169.5	169.5
Operator labor	hour	1,757.2	1,769.5	1,767.9	1,767.9	1,814.5	1,813.4	1,813.4
Hired labor	hour	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Land capital	dol.	127,552.5	127,552.5	127,552.5	127,552.5	127,552.5	127,552.5	127,552.5
Annual capital	dol.	27,588.6	27,297.5	27.298.1	27,298.1	27,709.0	27,709.0	27,709.0
Gross income	dol.	48,469.0	48,956.8	49,458.4	49,975.0	50,070.5	51,119.0	52,199.2
Operating costs	dol.	36,628.3	36,825.7	36,819.6	36,819.6	37,773.2	37,755.3	37,755.3
Residual return	dol.	11,840.7	12,131.1	12,638.8	13,155.4	12,297.3	13,363.7	14,443.9
Return to operator labor, risk, and management	dol.	2,895.5	3,185.9	3,693.6	4,210.2	3,352.1	4,418.5	5,498.7

[a]Allotment levels are denoted: 55 percent of base level, L and 115 percent of base level, H.

TABLE XXI

MINIMUM RESOURCE MODEL AREA AGGREGATES FOR SANDY, CLAYEY, AND CLAYEY (C) SOIL RESOURCE SITUATIONS FOR SELECTED COTTON PRICE-ALLOTMENT COMBINATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

		Cotton Price and Allotment Combinations[a]						
		17.6-LH	22.0-L	26.4-L	30.8-L	22.0-H	26.4-H	30.8-H
		(thousands)						
Cotton	acre	4.4	23.0	23.0	31.6	47.7	65.6	65.6
Peanuts	acre	74.7	74.7	74.7	74.7	74.7	74.7	74.7
Alfalfa	acre	132.6	124.6	124.6	117.7	113.1	100.7	73.1
Soybeans	acre	39.7	29.1	29.1	61.6	15.9	39.1	45.0
Bermuda	acre	76.7	76.7	76.7	91.5	76.7	97.0	118.7
Cotton lint	cwt.	16.2	84.3	88.6	118.6	174.9	246.3	246.3
Beef stockers	head	119.8	119.8	119.8	132.1	119.8	136.8	156.2
Operator labor	hour	1,045.3	1,103.5	1,198.7	1,342.2	1,161.8	1,426.8	1,688.1
Hired labor	hour	98.9	86.4	34.3	103.3	79.8	101.0	28.7
Land capital	dol.	114,989.8	114,989.4	114,989.4	127,554.6	115,058.0	127,553.5	127,533.0
Annual capital	dol.	20,481.7	20,710.7	20,685.8	23,259.6	21,028.0	24,246.6	26,567.4
Gross income	dol.	39,924.0	40,577.0	40,971.8	45,189.7	41,341.8	46,953.0	50,243.6
Operating costs	dol.	29,439.2	29,905.1	29,810.9	32,685.3	30,536.5	34,160.1	36,161.4
Residual return	dol.	10,484.8	10,671.9	11,160.9	12,504.4	10,805.3	12,792.9	14,082.2
Return to operator labor, risk, and management	dol.	2,935.2	3,088.2	3,474.1	3,995.0	3,197.6	4,186.3	5,263.2

[a]Allotment levels are denoted: 55 percent of base level, L and 115 percent of base level, H.

Total cotton and peanut acreage levels are essentially the same for both models where total aggregates are comparable (feasible solutions in each situation). Likewise, the aggregate lint cotton production levels are similar for each model. However, aggregate differences are indicated in the levels of alfalfa, soybeans, and Bermuda pasture. Alfalfa is relatively more profitable in the minimum resource model than in the representative farm model. Soybeans and Bermuda pasture, however are programmed at higher levels in the maximization organization. Aggregate beef stocker numbers reflect the influence of Bermuda pasture's position--being at higher levels in the maximization model aggregations.

The aggregate annual labor requirements are also greater in the maximization model results. The maximization model uses approximately 60 to 70 percent of the total operator labor available on the 1,166 representative farms in the area. However, aggregate annual operator labor on the minimum resource farms is approximately 76 percent employed according to the total labor available. The larger minimum resource farms also require additional hired labor as contrasted to no extra labor requirements in the maximization model aggregations for the area. Aggregate operating capital, gross income, and operating costs are also at higher levels for the maximization model. The aggregate residual returns and returns to operator labor, risk, and management are similar in both models for comparable aggregates.

Reconciling the Models--Aggregate Farm Response

As a research technique designed to explain the response of large numbers of farmers to a change in government cotton programs, are the

two models equally "adequate"? Alternatively, which model gives the best indications of future adjustments? It has been pointed out that there are no significant differences in aggregate peanut and cotton production resulting from the choice of models where feasible minimum resource solutions are obtained. It is reasonable to assume that feasible solutions also would be obtained if the income target was lower on the clayey (c) soil resource situation. This is similar to the reduced return to land solution in Chapter V. If the objective of the response study is to estimate cotton or peanut production, then the choice of models would not be critical. Thus, if the result holds in other areas, credence is given to supply estimates such as have been obtained to S-42, GP-5, and other studies. However, if the objectives are more extensive, including other enterprise combinations and aggregate production levels, different results are obtained according to the choice of model. These differences are largely attributed to larger farm sizes and the additional labor requirements of the minimum resource model.

One of the critical assumptions of the representative farm technique appears to be the choice of farm size. By selecting smaller units as representative farms, the conditional predictive supply response[2] for cotton and peanuts is expected to be similar to that obtained by the aggregation of larger representative farm units. However, the returns to operator labor, risk, and management for the small farms may be "unsatisfactory" for meeting the financial needs of the farm

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[2]A conditionally predictive supply response reflects expectations under a specific set of assumptions.

family. Results presented in Appendix B, Tables I, II, and III show that none of the individual representative farms with alternative government cotton programs achieves a return to operator labor, risk, and management equal to or greater than $5,000. Even though the maximization model solutions are obtained under alternative cotton programs, they may not be "stable," i.e. the level of returns is too low for continuing agricultural production. Clearly, the choice of the size of the representative farm in the maximization model does affect enterprise organization and return estimates. Further, the implication is that the land resource is not mobile in "equilibrium." While mobile resources are paid an amount equal to what they can earn in alternative uses, the fixed resource is paid a residual or "economic rent."[3]

An alternative procedure using both models jointly may avoid the problems developed by the choice of farm size. For example, an iterative procedure for estimating a regional cotton supply curve is considered. After the representative farm size is "selected," a conditionally predictive cotton supply curve is obtained using the maximization model and selected cotton prices. Confronting the regional supply curve with a regional demand curve, an "equilibrium" cotton price is determined. Using this estimate of the equilibrium price in the minimum resource model, a new estimate of the representative farm size is obtained. By re-programming the maximization model with a new estimate of farm size, a new supply curve and equilibrium price are determined. Thus, using the new equilibrium cotton price in the minimum

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[3]Richard H. Leftwich, The Price System and Resource Allocation, (New York, 1961), pp. 294-295.

resource model, another estimate of farm size is obtained. If this procedure is continued, an "equilibrium" farm size and cotton supply curve is obtained when farm sizes become stable in size and the price programmed is the equilibrium price. Clearly, a major problem of this procedure is the estimation of a regional demand function.

One of the merits of the minimum resource model, in contrast to the maximization model, is that it allows for mobility of resources, including land. This is a key tenet of long-run economic equilibrium theory. In this respect, selecting an income goal in the minimum resource model and allowing all of the resources to seek their best uses appears to be more plausible for response prediction than selecting a representative farm. For example, if the objectives are to estimate the demand for inputs and consumer goods, changes in the product mix, need for marketing services, or the "total" impact of farm program changes, the use of the maximization model is indicated to be limited. The estimates of total output, farm numbers, enterprise combinations, and resource requirements are critical factors in satisfying these objectives.

The results of the minimum resource model in Chapter V suggest that there may be other relevant factors influencing the motives and desires of individual entrepreneurs. Changes in returns to land investment and annual capital costs are found to affect the size and organization of the individual farm business and consequently, the area aggregates. Other factors such as family living goals, retirement plans, age of farmers, tenure status, growth and expansion plans, off-farm work, and capital control methods would also tend to affect the

minimum resource model results.[4] Perhaps more study should be given to basic economic, social, and institutional factors which influence the level of returns sought by individual farm operators. Incorporated in the minimum resource model, these factors would give a more reliable measure of the effects of price and institutional forces on the area's agriculture.

Other Implications in the Farm Sector

Fewer farms and larger farm sizes are consistent with the minimum resource model results. The estimated commercial farm size for the area averages approximately 350 acres, according to 1959 Agricultural Census. This compares with the average minimum resource farm size of 818 acres, with cotton at 115 percent of base level and 30.8 cents per pound. The estimated aggregate number of farms under this specified assumption is 837 for the area. This number is less than one-half of the 1,957 farms currently estimated to be in the adjustment area.

Relative positions of the basic allotment crops, cotton and peanuts, in the area agricultural economy are important in assessing area adjustment implications. Results of each model emphasize the superiority of peanuts as contrasted to the borderline position of cotton at low prices. Peanuts, at a constant price and allotment level in the organizations, give stability to the sandy and clayey soil resource organizations. Cotton is clearly shown to be less profitable

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[4] Waymon A. Halbrook, "Minimum Resource Requirements and Adjustment Alternatives for Livestock Producers on the Eastern Prairies of Oklahoma," (unpublished Ph. D. thesis, Oklahoma State University, 1967), p. 112-116. Connor and Walker, pp. 19-23.

than peanuts; however, it is programmed as the next most profitable alternative to peanuts. Positions of the two cash crop enterprises are compared in Table XXII showing allotment and planted acreage from 1956 to 1965.

Cotton allotments have declined from 175,100 acres in 1956 to 131,400 acres in 1965 with only 60 percent of the cotton allotments planted in 1965. During this period, the number of operating cotton gins in the East Central and South Central Area also decreased from 73 to only 36.[5] At the same time, peanuts have remained comparatively unchanged in terms of total allotments and the use of these allotments in the area. Thus, it is apparent that the trend for cotton production in the area, under recent government programs, has been declining. Approximately 61,000 acres of current cotton allotments are on the excluded bottomland soil resource situation where cotton is shown to be a poor competitor with other crop enterprises. In addition, approximately 13,800 acres of cotton allotments are on part-time and semi-retired farms in the area. These allotments may be expected to be diverted to areas of the state where cotton has a comparative advantage.

The declining position of cotton in the area is consistent with the solutions of each model, indicating that cotton "stabilizes" at approximately 56,900 acres with base allotments and prices at or above 22 cents per pound. Similarly, the favorable position of peanuts under present prices and allotments is illustrated by the results of the models. In view of the current profitableness of peanuts, the selection

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[5]Reported by the Oklahoma Cotton Ginner's Association, Inc., Oklahoma City, Oklahoma.

TABLE XXII

COMPARISON OF ALLOTMENT AND PLANTED ACRES FOR COTTON AND PEANUTS (1956-1965), EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA[a]

	Cotton		Peanuts	
Year	Allotment	Planted	Allotment	Planted
	(thousand acres)			
1956	175.1	153.8	83.7	65.8
1957	172.4	135.2	83.4	64.0
1958	167.7	119.7	83.3	64.2
1959	161.2	107.8	83.5	62.7
1960	158.7	99.3	83.5	57.7
1961	171.3	99.6	83.1	59.2
1962	165.3	88.1	82.5	69.6
1963	141.6	77.4	81.9	59.9
1964	141.6	81.3	82.0	64.7
1965	131.4	78.9	82.0	68.2

[a]Data obtained from the Agricultural Stabilization and Conservation Service State Office in Stillwater, Oklahoma.

of peanuts as the basic allotment crop with alternative price and allotment combinations should be considered in further research on adjustment possibilities for this area.

Implications of Farm Adjustments on the Area Economy

Farm adjustments to attain economic units, as hypothesized in the minimum resource model area aggregates, also have important implications for the total area economy. Similarly, changes in government programs with subsequent adjustments in the farm sector have indirect ramifications for the nonfarm community.

This section attempts to extend the farm adjustment inferences of selected cotton price-allotment programs to economic implications for the broader area, including both farm and nonfarm segments of the economy. The analysis presented is basically a methodological approach of broadening the scope of area adjustment studies. The interdependence model is developed from Olson's study concerning the total impact of agricultural adjustments on the economic activity in Southwestern Oklahoma.[6]

Using the minimum resource aggregative results of selected cotton price support and allotment programs, the objective of this section is to analyze the possible effects of changes in government cotton programs on the area in terms of changes in employment, population, and expenditures. First, the change in demand for productive inputs by agriculture is determined for a cotton program change. An interdependence model with four basic equations is formulated to relate

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[6]Olson, p. 16-23.

changes in the farm sector to the nonfarm sector. Finally, specific results are generalized to include total economic and policy implications.

Demand for Agricultural Production Inputs

The demand for productive inputs by the agricultural sector is based on the aggregative results of the minimum resource model for specified changes in cotton allotment programs. The first program combinations selected for comparison in this analysis are: (1) cotton allotments at 55 percent of base with cotton at 30.8 cents per pound and (2) cotton allotments at 115 percent of base with cotton price at 30.8 cents per pound (see Table XXI). Essentially, the analysis is made in terms of moving from a high allotment program (30.8-H) to a low allotment program (30.8-L). That is, what are the changes in demand for agricultural inputs under lower cotton allotments? The lower allotment program selected approximates the current cotton program with a 35 percent diversion of allotments.

Demand for agricultural inputs is determined similarly to the aggregation procedure used previously for operating costs and labor. However, the aggregation for specified requirements originates with individual enterprise budgets and is extended to area aggregates. Results of this computation for the two combinations are shown in Table XXIII. The difference between the total inputs purchased at retail and the aggregate total operating costs is due to exclusion of hired labor, livestock purchases, and interest.

The change from a high allotment cotton program to a low allotment combination indicates a decrease of $744,669 in retail purchased

TABLE XXIII

SUMMARY OF AGGREGATE AGRICULTURAL INPUT DEMAND AND CHANGES IN DEMAND ACCORDING TO CHANGE IN COTTON PRICE-ALLOTMENT PROGRAMS (HIGH ALLOTMENT TO LOWER ALLOTMENT), EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Agricultural Inputs	Cotton Price-Allotment Combination 115-30.8	55-30.8	Change
Sold at Retail			
Seed	$ 1,979,716	$ 2,055,346	$+ 75,630
Fertilizer	2,859,691	2,957,738	+ 98,047
Lime	438,786	531,314	+ 92,528
Agricultural chemicals	2,538,254	2,355,141	-183,113
Purchased feed, minerals, etc.[a]	2,567,139	2,113,077	-454,062
Machinery operating costs[b]	2,162,210	1,997,240	-164,970
Machinery ownership costs	1,923,336	1,784,613	-138,723
Miscellaneous expenses	423,139	353,133	- 70,006
Total	$14,892,271	$14,147,602	$-744,669
Not Sold at Retail			
Hired labor	$ 98,757	$ 102,685	$+ 3,928
Custom work labor	1,744,446	1,611,680	-132,766
Total	$ 1,843,203	$ 1,714,365	$-128,838

[a] Includes total estimated custom machinery operating costs.

[b] Includes estimated custom machinery ownership costs.

agricultural inputs in the area. Seed, fertilizer, and lime expenditures increase while other input class expenditures decrease. In moving to lower allotments, more alfalfa and soybeans are produced and less cotton, Bermuda, and beef stockers are grown. Business firms supplying farm inputs such as tractors and farm machinery, agricultural chemicals, fuel and oil supplies, and feed supplies would be adversely affected by the program change. In addition, the decrease in residual returns or "total disposable income" of over $1,500,000 in the farm sector would be of concern to other nonfarm firms in the area.

Human resources are also affected by the change in government programs. Although the hired labor expenditure increases by $3,928, total labor cost--including labor incorporated in custom work--decreases $128,838. Change in total demand for hired labor is equivalent to 47 full-time agricultural workers.[7] A direct effect of the assumed change in government cotton programs is a decrease in total farms--from 1,053 to 799. With lower allotments, the farm size is necessarily increased to maintain a satisfactory level of family living. Consequently, total operator labor is decreased by 254 full-time operators with the aggregative farm adjustment. In total, agricultural employment is decreased by 301 workers in the area.

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[7] Total demand in full-time agricultural workers is computed by dividing the dollar demand for hired labor and custom work labor by the assumed wage rates per hour--$1.00 and $1.15, respectively. Each full-time worker is assumed to provide 2,500 hours of labor per year.

The Interdependence Model

The interdependence model for this analysis consists of four equations adapted from Olson's model for Southwestern Oklahoma Area:[8]

$$(6.1)\quad \Delta E_2 = b_1 \Delta E_1$$

$$(6.2)\quad \Delta P_2 = b_2 \Delta E_2$$

$$(6.3)\quad \Delta P_1 = b_3 \Delta E_1$$

$$(6.4)\quad \Delta C = \Delta C_1 + \Delta C_2 + \Delta C_3$$

$$(6.41)\quad \Delta C = \Delta C_1 + b_4 \Delta P_1 + b_5 \Delta P_2$$

ΔE_1 and ΔE_2 are the changes in agricultural and nonagricultural employment, respectively. ΔP_1 and ΔP_2 are changes in agricultural and nonagricultural populations, respectively. In equation 6.4, ΔC, ΔC_1, ΔC_2, and ΔC_3 are the changes in total, agricultural, farm family consumption, and nonfarm family consumption expenditures, respectively.

Coefficients b_1 and b_2 are the basic-derivative employment and the nonfarm employment-population multipliers, respectively. The basic-derivative employment multiplier (b_1) is used to project changes in nonagricultural employment (ΔE_2) caused by changes in agricultural employment (ΔE_1). The change in nonfarm population is estimated using the employment-population multiplier in equation 6.2. The basic-derivative multiplier is the ratio of derivative employment to basic employment where derivative industries are those which produce goods and services locally for sale within the study area. Basic industries are those which produce goods and services locally for sale outside the study

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[8] Ibid., p. 16-18.

area. Employment in agriculture, manufacturing, and mining are considered basic; all others are derivative.[9] The nonfarm employment-population multiplier (b_2) was estimated by least squares regression using time series and cross-sectional data.[10]

Coefficients b_1 and b_2 determined in Olson's study of a similar area are used in this analysis where b_1 equals 1.82 and b_2 equals 3.19 in equations 6.1 and 6.2, respectively. The coefficient b_3 in equation 6.3 is 3.26, which is the estimated average farm family size in Central and Southeastern Oklahoma. Other coefficients b_4 and b_5 are agricultural and nonagricultural per capita consumption expenditures, where b_4 equals 1,164 and b_5 equals 1,381.[11]

Thus, the four estimating equations of the interdependence model, with numerical coefficients, are as follows:

$$(6.1) \quad \Delta E_2 = 1.82\Delta E_1$$

$$(6.2) \quad \Delta P_2 = 3.19\Delta E_2$$

$$(6.3) \quad \Delta P_1 = 3.26\Delta E_1$$

$$(6.41) \quad \Delta C = \Delta C_1 + 1164\Delta P_1 + 1381\Delta P_2$$

where the predetermined variables--change in agricultural expenditures (ΔC_1) and change in agricultural population (ΔP_1)--are necessary to complete the analysis of the effects on employment, population, and expenditures.

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[9] Ibid., p. 30-36.

[10] Ibid., p. 61.

[11] Using the procedure as outlined in Appendix E of Olson's thesis, the estimated per capita family expenditures for farm and nonfarm families are $3,794 and $4,144, respectively. The estimated average sizes of farm and nonfarm families are 3.26 and 3.08, respectively.

Analysis and Implications

In evaluating the impact caused by changes in the specified farm programs, the change in agricultural employment (ΔE_1) is estimated to be 301, a decrease of 254 farm operators and 47 full-time agricultural workers. According to equation 6.1, the estimated decrease in agriculture employees results in a decrease of 548 nonfarm employees. Nonagricultural population, using equation 6.2, is estimated to decrease by 1,748 persons. Change in farm population is estimated to be 981 persons in equation 6.3.

The last equation, 6.4, is used to project changes in consumption expenditures by the farm population (ΔP_1) and by the nonfarm population (ΔP_2). With the decrease in agricultural expenditures (ΔC_1) of $744,669, a decrease of $4,300,541 in total area consumption expenditures (ΔC) is estimated. The change in farm family expenditures (ΔC_2) is $1,141,884; nonfarm family consumption expenditures (ΔC_3) are reduced by $2,413,988.

Another policy change considered is the movement from a low allotment-high price to a higher allotment-lower price cotton program. The estimated changes in demand for agricultural inputs are summarized in Table XXIV. The impact of this change in the agricultural sector indicates increases in retailed purchased inputs ($767,823), farms and farm operators (38), and other full-time agricultural workers (61). Using the interdependence model, total agricultural population in the area is estimated to grow by 333 persons. An increase of 574 persons is indicated for the nonagricultural population. The changes in farm family and nonfarm family consumption expenditures are $387,612 and $792,694,

TABLE XXIV

SUMMARY OF AGGREGATE AGRICULTURAL INPUT DEMAND AND CHANGES IN DEMAND ACCORDING TO CHANGE IN COTTON PRICE-ALLOTMENT PROGRAMS (LOW ALLOTMENT-HIGH PRICE TO HIGHER ALLOTMENT-LOWER PRICE), EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Agricultural Inputs	Cotton Price Allotment Combination		
	55-30.8	115-26.4	Change
Sold at Retail			
Seed	$ 2,055,346	$ 2,016,665	$- 38,681
Fertilizer	2,957,738	3,037,044	+ 79,306
Lime	531,314	491,969	- 39,345
Agricultural chemicals	2,355,141	2,619,313	+264,172
Purchased feed, minerals, etc.	2,113,077	2,204,396	+ 91,319
Machinery operating costs[a]	1,997,240	2,202,962	+205,722
Machinery ownership costs[b]	1,784,613	1,976,053	+191,440
Miscellaneous expenses	353,133	367,023	+ 13,890
Total	$14,147,602	$14,915,425	$+767,823
Not Sold at Retail			
Hired labor	$ 102,685	$ 100,981	$- 1,704
Custom work labor	1,611,680	1,804,799	+193,119
Total	$ 1,714,365	$ 1,905,780	$+191,415

[a] Includes total estimated custom machinery operating costs.

[b] Includes estimated custom machinery ownership costs.

respectively. Thus, total area consumption expenditures are estimated to increase $1,948,129 as a result of the cotton program change.

Agricultural resource adjustments to different government programs are indicated to have an appreciable impact on the total economy of the area. The severity of the impact depends in large part on the nature of government program changes, the size of interdependence coefficients, the period of agricultural adjustments, and the actions of the nonagricultural sector to absorb the impact. Clearly, farm adjustments which reduce farm numbers and population require measures to offset reduction in unemployment and to maintain a balanced economy in the area.

Although the analysis is primarily methodological in the context presented, the results have farm policy implications. In the first example, which directly affects a relatively small proportion of the total agriculture of the area, the change in the agricultural program initiated a change in total consumption expenditures of over $4,000,000. The analysis of the impact of changes in consumption could very well be extended to changes in investment spending--the accelerator effect. Further, implications of effects on churches, schools, and other community institutions may also be significant. However, the specified multipliers used in this analysis illustrate the comprehensiveness of policy-induced agricultural adjustments. Particularly, the results imply that responsibilities of agricultural policy makers are not necessarily confined to direct effects of agricultural adjustments, per se. Rather, the realm of policy decisions encompasses the total community of both farm and nonfarm sectors.

Present and future agricultural policy measures need adequate economic guides which are tendered toward the effectual prediction of the more extensive effects of proposed policy. These guides, the products of research, offer a challenge to the researcher to re-evaluate and refine current adjustment study methods as well as to develop new and more reliable predictive approaches.

CHAPTER VII

SUMMARY

The basic problem underlying this study was the apparent lack of adequate information relative to the possible effects of policy-induced farm adjustments at both the micro and macro levels of the total economy in East Central and South Central Oklahoma Area. The broad audience of concern included agricultural policy makers and administrators, agri-businessmen, individual farmers, and the nonfarm citizenry. The major purpose was to determine potential farm adjustments under different cotton support price and allotment combinations and to analyze the effects at micro and macro levels. Specifically, the objectives were: (1) to determine optimum representative farm organizations with selected cotton programs; (2) to determine minimum resource requirements needed to obtain a "satisfactory" level of income with selected cotton programs; (3) to develop and contrast the aggregative results of the two models; and (4) to examine the implications of potential farm adjustments on area population, employment, and consumption expenditures.

Two farm firm analytical approaches--a linear programming maximization model and a linear programming minimum resource model--were used to investigate the individual farm adjustments. Using a simple aggregative procedure, the individual farm adjustments were extended to area farm aggregations.

Basic research procedures of the micro level investigation were: (1) defining soil resource situations of the area; (2) developing the basic units of the maximization and minimum resource models; and (3) specifying the general assumptions and restrictions relative to the farm firm models.

Two soil resource situations, sandy and clayey, were defined to represent relatively homogeneous groups of soil productivity classifications. In this study, only land with allotment crops was considered for adjustment possibilities. Further, the clayey resource situation was sub-divided into two situations, clayey and clayey (c). The situations differed only in allotment restrictions. Clayey soils were those having both peanut and cotton allotments; clayey (c) soils were limited to cotton allotments only.

A representative farm was determined as the basic unit for the maximization model on each soil resource situation. In this study, the representative farm was considered as a farm which embodied the characteristics of the group of area farms with respect to adjustment opportunities. The counterpart unit for the minimum resource model, the representative acre, was also developed where land was determined as the appropriate resource to be minimized. The representative acre was defined as an acre of land containing the same proportions of each soil productivity class, cropland, native pasture, and allotments as the representative farm.

Admissible crop enterprises for the two firm models included cotton, peanuts, alfalfa, soybeans, rye and vetch, and Bermuda pasture. Livestock enterprises were confined to beef cow-calf and stocker buy-

sell activities. Prices paid and received approximated current levels with the exception of selected prices received for cotton and peanuts.

Individual Farm Adjustment Results

Farm firm investigations were developed on the basis of selected cotton price support and allotment combinations. Four cotton support price levels were related to four cotton allotment levels. Selected cotton prices were: 17.6, 22.0, 26.4, and 30.8 cents per pound. Cotton allotment levels were: 55, 85, 100, and 115 percent of the 1963 base allotment acreage. In the basic analysis of this study, peanut allotments were assumed at current prices and allotments. However, a "free market" situation was also programmed with both current and long-run prices for peanuts.

Optimum farm organizations were determined using the two linear programming models, maximization and minimum resource, on each of the soil resource situations. The maximization model selected the most profitable organization of resources and enterprises subject to the specified resource restrictions of the representative farm. The minimum resource model, with land as the relevant resource to be minimized, selected the optimum combination of enterprises and resources which are consistent with the minimum land necessary to attain a $5,000 return to operator labor, risk, and management. Residual returns to operator land, taxes, overhead, labor, risk, and management were also defined. Return estimates of both models were standardized for comparison.

Maximization Model

Results of the maximization model with changing cotton prices and allotments indicated that an optimum farm organization is not static. However, the magnitude of potential farm organizational adjustments varied considerably with the specific resource situations. The maximized returns were relatively small when charges for land, taxes, and overhead were deducted. In fact, none of the programmed optimum organizations achieved the equivalent of a $5,000 return to operator labor, risk, and management. The return estimates were obviously affected by the land resource restrictions of the representative farms. Thus, the maximization model results posed the question of what is an adequate farm size to provide a sufficient income for the farm family.

Cotton was included in each of the optimum plans at the full allotment level at or above 22 cents per pound. Peanuts, however, were clearly the dominant income producing enterprise--being at the full allotment level in all organizations. While other enterprises remained comparatively stable in response to alternative government cotton programs, soybeans and alfalfa competed with cotton for resources as cotton prices decreased. Residual returns, computed as the difference between gross income and operating costs, for representative farms varied considerably. As cotton prices and allotments were raised, the residual returns increased by 14, 24, and 81 percent for the sandy, clayey, and clayey (c) farms, respectively. The highly profitable peanut enterprise clearly gave stability to the sandy and clayey representative farms. Without peanut allotments, the clayey (c) representative farm

returns to operator labor, risk, and management were negative for combinations of low cotton prices and allotments.

Selected alternatives of the 1966 upland cotton program were also analyzed in the maximization model framework. Of the choices programmed--nonparticipation, 12.5 percent diversion, 25 percent diversion, and 35 percent diversion--the 35 percent diversion was indicated to be the more profitable choice for each of the representative farms. Residual returns for the sandy, clayey, and clayey (c) farms were increased by 7, 12, and 40 percent, respectively, by the choice of 35 percent allotment diversion over nonparticipation.

The "free market" solutions were significantly influenced by the relative profitableness of peanuts at current prices. However, at a long-run or reduced price for peanuts, cotton became more competitive with peanuts for available resources. As a result, the free market solutions with long-run prices for peanuts and cotton were similar to those obtained with the allotment restrictions.

Minimum Resource Model

Using the same cotton prices and allotment levels as in the maximization model approach, minimum land requirements necessary to obtain a $5,000 return to land, operator labor, risk, and management were determined on each of the soil resource situations. In contrast to the maximization model assumptions, all resources, including land, were considered as variable inputs.

In response to the $5,000 income goal, minimum land requirements (farm size) in the minimum resource model solutions were influenced considerably by changing government cotton programs. That is, farm sizes

tended to increase with lower cotton price-allotment combinations. The variations in farm sizes over the price-allotment range were as follows: sandy soils, 658 to 933 acres; clayey soils, 618 to 1,266 acres; and clayey (c) soils, 734 to 2,774 acres. However, at lower cotton prices, no feasible solutions were found on the clayey (c) soil resource situation. Again, the wide divergence in land requirements--similar to the divergence in returns in the maximization model results--was significantly influenced by the profitability of peanuts in the organizations. The increase in land requirements under the minimum resource model emphasized the problem of large capital acquisition. The land capital requirements became very large for reduced cotton prices and allotments. Although the choice of enterprises was identical for each model, changes in the organization of enterprises were noted in the minimum resource model as compared with the maximization model. Additional hired labor resources tended to change the relative profitableness of enterprises in the minimum resource model.

The implications of land capital requirements were further examined by relaxing the fixed 5 percent return to land capital and allowing lower returns--0, 1, 2, 3, and 4 percent. The results indicated that farm adjustments may be cushioned somewhat by farmers accepting lower returns on their land investment, i.e. the minimum land requirements were reduced considerably. Factors such as operator's age, capital availability, land appreciation, tenure, and family living goals may be relevant to the acceptance of lower land returns.

With a specified land capital return and a specified cotton program assumed, annual capital interest rates were also varied--0, 6, 12, and

18 percent. As annual capital costs increased, the land-annual capital ratio increased indicating a substitution of land capital for operating capital. Organizational changes in enterprises resulted from the combined forces of additional labor costs and higher annual capital costs.

Aggregative Farm Adjustment Results

Aggregation of individual farm organizations was based on the premise that all farmers are motivated to adjust their farming operations in response to changes in government cotton programs. Summation of representative and minimum resource farm optimum solutions provided estimates of the area agricultural response to alternative government programs. Using the area farm adjustment estimates, effects on specified areas of the economy--changes in population, employment, and expenditures--were estimated via an interdependence model using multiplier analysis.

Implications of Model Selection

Differences in the aggregative farm response of the two models to specified cotton programs posed questions relative to the usefulness of each model for anticipating potential aggregative adjustments. Thus, an attempt was made to reconcile each model as an analytical approach for explaining future adjustments. In comparing the aggregate estimates, differences in both enterprise and "dollar" levels were noted between the two models. However, cotton and peanut production levels were essentially the same for each model. Differences in other enterprise levels and organizations stemmed from larger farm sizes of the minimum resource model necessary for an "adequate" level of income.

Since none of the individual representative farms achieved this income goal of a $5,000 return to operator labor, risk, and management, the aggregative results of the model may not be "stable." That is, selected representative farm sizes may not be sufficient for continued agricultural production. An alternative procedure was offered as a possibility of overcoming the problem of farm size specification.

The minimum resource model, in contrast, allows for mobility of all resources. However, a point of concern with this model is the validity of level of returns sought by entrepreneurs. There may be other relevant factors influencing the motives of entrepreneurs such as age, tenure, off-farm work, growth plans, and capital control methods.

Thus, the results indicated that if the objective of the adjustment study is to estimate cotton and peanut supply response, the choice of models is not critical. However, for more extensive estimates such as the demand for inputs, changes in the product mix, or "total" farm impact of farm program changes, the minimum resource model appeared the better choice. More study was suggested in determining the basic economic, social, and institutional forces which influence the level of returns desired by individual farm operators. In addition, peanuts, as the basic adjustment crop in the area, should be considered in further farm adjustment research of this area.

Implications of Farm Adjustments on the Area Economy

The impact of changes in government cotton programs on changes in employment, population, and expenditures was estimated using an interdependence model.

Two changes in government cotton programs were considered: (1) a high allotment-high price to a low allotment-high price program and (2) a low allotment-high price to a higher allotment-lower price program. Four equations of the interdependence model related changes in area population, employment, and consumption expenditures to changes in agricultural input demand and farm population.

Although the approach was basically methodological and clearly limited by choice of coefficients, the general implications of the results are significant for future adjustment studies. For example, the change from a high allotment to a low allotment program resulted in an estimated change in demand for purchased agricultural inputs of $744,669. Demand for certain inputs increased while others decreased according to farm organizational changes. Thus, business firms supplying inputs are directly affected by cotton program changes. Changes in human resources were particularly noteworthy in the analysis. A decrease in farms--1,053 to 799--contributed to a decrease in agricultural employment of 301 workers. The repercussions, linked by the interdependence of the farm and nonfarm sectors, involved an estimated decline in nonfarm population of 1,748 persons. Nonfarm employment decreased by 548 workers and total consumption expenditures decreased by over $4,000,000.

The implications of the results clearly involve the interest of the total community in agricultural policy formulation. That is, any proposed policy change directed toward the agricultural sector must necessarily be evaluated in terms of total effects on individual farmers, businesses, and social institutions of the area of concern.

The severity of the impact on the total economy depends on the nature of the program change, the coefficients, period of adjustment, and actions of the area leaders to absorb the impact. The need for adequate economic guides thus extends from the level of conception of program changes to area farm and nonfarm leaders who have a vested interest in continuing economic growth of the area.

Need for Further Research

An apparent problem of adjustment studies involves the selection of the appropriate model or technique. Of primary concern to the researcher in the choice and use of models are critical value judgments such as: what constitutes an economic farm unit or what is a satisfactory farm income goal. Thus, some informational research is needed to develop the basic assumptions of the models. The informational research needed might be classified as "socio-economic" with emphasis on the human resources.

The micro level research should perhaps be oriented toward determining the attitudes and status of farm families. The variables would include family goals, farm succession and tenure, operator age, credit use, mobility of family, and youth migration. Much attention was given to soil resources in this study. The analysis might be improved by the identification of homogeneous classes of human resources based on the variables suggested above.

The whole area of the macro level research needs further attention. In particular, more reliable data or coefficients are needed for the interdependence model as was used in this study.

SELECTED BIBLIOGRAPHY

Baumol, William J. Business Behavior, Value and Growth. New York: The Macmillan Company, 1959.

_____. Economic Theory and Operations Analysis. 2nd ed. Englewood Cliffs: Prentice Hall Inc., 1965.

Brandow, George E. "In Search of Principles of Farm Policy." Journal of Farm Economics. Vol. XLIV (December, 1962), 1145-1155.

Brewster, John M. Farm Resources Needed for Specified Income Levels. Washington: United States Department of Agriculture, Agricultural Research Service, Agricultural Information Bulletin No. 180, December, 1957.

Connor, Larry Jean, and Odell L. Walker. Potential Long-Run Adjustments for Oklahoma Panhandle Farmers. Stillwater: Oklahoma Agricultural Experiment Station in cooperation with the United States Department of Agriculture Technical Bulletin T-114, January, 1965.

Dantzig, George B. Linear Programming and Extensions. Princeton: Princeton University Press, 1963.

Dorfman, Robert. Application of Linear Programming to the Theory of the Firm. Berkeley: University of California Press, 1951.

Douglas, Louis H. et al. "Southwest Kansas Survey Highlights." Manhattan: (mimeographed at Kansas State University), 1963.

Frick, George E., and Richard A. Andrews. "Aggregation Bias and Four Methods of Summing Farm Supply Functions." Journal of Farm Economics. Vol. 47, No. 3 (August, 1965), 696-700.

Goodwin, John W., James S. Plaxico, and William F. Lagrone. Aggregation of Normative Microsupply Relationships for Dryland Crop Farms in the Rolling Plains of Oklahoma and Texas. Stillwater: Oklahoma Agricultural Experiment Station Technical Bulletin T-103, 1963.

Gray Fenton, and H. M. Galloway. Soils of Oklahoma. Stillwater: Oklahoma Agricultural Experiment Station, Miscellaneous Publication MP-56, 1959.

Halbrook, Waymon A. "Minimum Resource Requirements and Adjustment Alternatives for Livestock Producers on the Eastern Prairies of Oklahoma." (unpublished Ph.D. dissertation, Oklahoma State University, 1967).

Hathaway, Dale E. Government and Agriculture. New York: The Macmillan Company, 1963.

Heady, Earl O., and Wilfred Candler. Linear Programming Methods. Ames: Iowa State University Press, 1963.

_____, and Luther G. Tweeten. Resource Demand and Structure of the Agricultural Industry. Ames: Iowa State University Press, 1963.

Hicks, J. R. Value and Capital. New York: Oxford University Press, 1946.

Jansma, J. Dean. "Secondary Effects of Upstream Watershed Development: Roger Mills County, Oklahoma." (unpublished Ph.D. dissertation, Oklahoma State University, 1964).

Leftwich, Richard H. The Price System and Resource Allocation. Rev. ed. New York: Holt, Rinehart, and Winston, 1961.

MacKenzie, William. "Resources and Productivity." Journal of Farm Economics. Vol. XLVII (December, 1965), 1130-1139.

Margolis, J. "The Analysis of the Firm: Rationalism, Conventionalism, and Behaviorism." Journal of Business. Vol. 31 (1958), 187-199.

Naylor, Thomas H. "The Economic Theory of the Firm: Three Tools of Analyses." The Quarterly Review of Economics and Business. Vol. 5 (1965), 33-49.

Olson, Carl E. "The Impact of Agricultural Resource Adjustments on the Economy of Southwestern Oklahoma." (unpublished Ph.D. dissertation, Oklahoma State University, 1967).

Orazem, Frank et al. Implications of Projected Changes in Farm Opportunities in Western Kansas. Manhattan: Kansas Agricultural Experiment Station Bulletin 452, 1962.

Parekh, Jayanti Lal. "Minimum Resource Requirements and Adjustments Needed for Specified Levels of Farm Income on the Blackland Soils of the Blackland Area of Texas." (unpublished M.S. thesis, Texas A & M University, 1965).

Peach, W. Nelson, Richard W. Poole, and James D. Tarver. County Building Block Data for Regional Analysis: Oklahoma. Stillwater: Oklahoma State University, March, 1965.

Plaxico, James S., and Luther G. Tweeten. "Representative Farms for Policy and Projection Research." Journal of Farm Economics. Vol. XLV, No. 5 (December, 1963), 1458-1465.

Reichardt, Allen W. "Farm Adjustment Opportunities of Major Bottomland Soils of Southcentral and Eastcentral Oklahoma." (unpublished M.S. thesis, Oklahoma State University, 1964).

Rothschild, K. W. "Price Theory and Oligopoly." Economic Journal. Vol. 42 (1947), 297-320.

Schneeberger, Kenneth C. et al. Resource Requirements, Costs, and Expected Returns; Beef Cattle and Improved Pasture Alternatives; East Central and South Central Oklahoma. Stillwater: Oklahoma Agricultural Experiment Station in cooperation with the United States Department of Agriculture, Processed Series P-544, 1966.

Simon, Herbert A. "A Behaviorial Model of Rational Choice." Quarterly Journal of Economics. Vol. 69 (1952), 99-118.

Strickland, Percy L. Jr., James S. Plaxico, and William Lagrone. Minimum Land Requirements and Adjustments for Specified Income Levels, Southwestern Oklahoma. Stillwater: Oklahoma Agricultural Experiment Station Bulletin B-608, 1963.

Sutherland, J. Gwyn. Effects of Cotton Price and Allotment Variations on Farm Organizations and Incomes, Eastern Piedmont and Upper Plain (Economic Areas Six and E), North Carolina. Raleigh: A. E. Information Series No. 126, 1966.

Thompson, James F. "Defining Typical Resource Situations." Farm Size and Output Research. Southern Cooperative Series Bulletin No. 56, 1958, 32-46.

Tweeten, Luther G., Alan W. Reichardt, and William F. Lagrone. Profitable Plans for Farms in the Major Bottomlands of South Central and East Central Oklahoma. Stillwater: Oklahoma Agricultural Experiment Station in cooperation with the United States Department of Agriculture, Bulletin B-641, December, 1965.

United States Department of Commerce. Climatological Data, Oklahoma. Washington: Annual Summary 1964, Vol. 71, No. 13, 1964.

_____. U.S. Census of Agriculture 1959. Washington: Bureau of Census, 1959.

Walker, Odell L., Luther G. Tweeten, and Larry J. Connor. "Potential Economic and Social Adjustments in the Southwest." Proceedings of Agricultural Economics and Rural Sociology Section. Dallas: Southwest Social Science Association Meeting (March, 1964), 1-24.

White, James H., James S. Plaxico, and William F. Lagrone. Influence of Selected Restraints on Normative Supply Relationships for Dryland Crop Farms on Loam Soils, Southwestern Oklahoma. Stillwater: Oklahoma Agricultural Experiment Station in cooperation with the United States Department of Agriculture, Technical Bulletin T-101, May, 1963.

Workman, Herman E. et al. Alternative Crop Enterprises on Major Upland Soils of East Central and South Central Oklahoma: Resource Requirements, Costs, and Returns. Stillwater: Oklahoma Agricultural Experiment Station in cooperation with the United States Department of Agriculture, Processed Series P-523, 1965.

Wu, Yuan-li and Ching-wen Kwang. "An Analytical and Graphical Comparison of Marginal Analysis and Mathematical Programming in the Theory of the Firm." Linear Programming and the Theory of the Firm. (Kenneth E. Boulding and Allen W. Spivey, eds.). New York: The Macmillan Company, 1960.

APPENDIXES

APPENDIX A, TABLE I

DEFINITIONS OF LAND RESOURCE SITUATIONS AND YIELD LEVELS BY PRODUCTIVITY CLASS: NONIRRIGATED SANDY SOILS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Class S_1 - Deep, nearly level, loamy upland soils. Key series are Teller, Vanoss, and Chickasaw.

Class S_2 - Deep, gently sloping, moderately coarse and loamy upland soils. Key series are Teller, Bates, Zaneis, Stephensville and Norge.

Class S_3 - Deep, gently sloping, moderately coarse, light-colored upland soils. Key series is Dougherty-Stidham.

Class S_4 - Deep, coarse-textured, rolling upland soils. Key series is Dougherty-Stidham (not adapted to row crops).

Enterprise	Unit	Productivity Class S_1	S_2	S_3	S_4
		(yield per acre)			
Crop:					
Cotton (lint)	lb.	425.0	385.0	270.0	NR[a]
Peanuts	lb.	1,350.0	1,300.0	1,400.0	NR
Grain sorghum	lb.	2,900.0	2,500.0	1,800.0	NR
Soybeans	bu.	25.0	20.0	NR	NR
Oats	bu.	50.0	45.0	NR	NR
Alfalfa	ton	3.5	3.0	NR	NR
Grazing:[b]					
Oats, harvested	AUM	.6	.6	NR	NR
Peanuts, residue	AUM	.9	.9	.9	NR
Grain sorghum, stubble	AUM	.2	.2	.2	NR
Bermuda, 0-50-50[c]	AUM	6.0	5.7	4.7	4.1
Bermuda, 50-50-50	AUM	7.6	7.2	6.0	5.2
Bermuda, 100-50-50	AUM	9.5	9.0	7.5	6.5
Bermuda, overseeded with vetch	AUM	8.0	7.6	6.3	5.4
Rye-vetch, 40-40-20	AUM	4.0	4.0	2.5	NR

[a]Not recommended for these soils.

[b]Native range grazing yield is 1.2 AUM's per acre.

[c]Alternative fertilization nutrient levels. Fertilization requirements for crop enterprises are in the individual enterprise budgets of source material--Herman E. Workman, et al., and Kenneth C. Schneeberger, et al.

APPENDIX A, TABLE II

DEFINITIONS OF LAND RESOURCE SITUATIONS AND YIELD LEVELS BY PRODUCTIVITY CLASS: NONIRRIGATED CLAYEY SOILS EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Class C_1 - Deep, nearly level, loamy upland soils. Key series are Choteau, Okemah, Taloka, and Summit.

Class C_2 - Deep, gently sloping, loamy upland soils. Key series are Choteau, Dennis, Durant, Newtonia, and Labette.

Class C_3 - Deep, nearly level claypan soils. Key series are Parsons and Woodson.

Class C_4 - Shallow, eroded and sloping soils not suitable for row crops.

Enterprise	Unit	Productivity Class C_1	C_2	C_3	C_4
			(yield per acre)		
Crop:					
Cotton (lint)	lb.	375.0	350.0	NR[a]	NR
Peanuts	lb.	1,250.0	1,150.0	NR	NR
Grain sorghum	lb.	2,500.0	2,350.0	1,900.0	NR
Soybeans	lb.	1,500.0	1,200.0	960.0	NR
Oats	bu.	45.0	40.0	38.0	NR
Alfalfa	ton	3.0	2.0	NR	NR
Grazing:[b]					
Oats, harvested	AUM	.6	.6	.6	NR
Peanuts, residue	AUM	.9	.9	NR	NR
Grain sorghum, stubble	AUM	.2	.2	.2	NR
Bermuda, 0-15-0[c]	AUM	3.3	3.3	2.6	2.5
Bermuda, 10-20-10	AUM	4.5	4.5	3.4	3.3
Bermuda, 15-30-15	AUM	5.2	5.2	3.8	3.7
Bermuda, 50-50-50	AUM	6.8	6.8	4.8	4.6
Bermuda, 100-50-50	AUM	8.5	8.5	6.4	6.2
Bermuda, overseeded with vetch	AUM	7.1	7.1	5.0	4.8
Rye-vetch, 20-40-20	AUM	4.0	4.0	NR	NR
Small grain, 40-40-20	AUM	NR	NR	2.0	2.0

[a]Not recommended for these soils.

[b]Native range grazing yield is 1.2 AUM's per acre.

[c]Alternative fertilizer nutrient levels. Fertilizer requirements for crop enterprises are in the individual enterprise budgets of source material--Herman E. Workman, et al., and Kenneth C. Schneeberger, et al.

APPENDIX A, TABLE III

DESCRIPTION OF LIVESTOCK ENTERPRISES FOR EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Calving Date	Purchase Date	Marketing Date	Production Practices
Beef cow-calf	Mar. 1		Oct. 10	Winter ration of cottonseed cake, hay, and pasture.
Beef cow-calf	Mar. 1		Oct. 10	Winter ration of cottonseed cake, and hay.
Beef cow-calf	Mar. 1		Oct. 10	Winter ration of cottonseed cake, hay, and pasture; some small grain grazing.
Beef cow-calf	Nov. 1		Aug. 1	Winter ration of cottonseed cake, hay, and pasture.
Beef cow-calf	Nov. 1		May 20	Winter ration of small grain grazing with cottonseed cake, hay; pasture in bad weather.
Stocker buy-sell		Oct. 10	Mar. 1	Winter grazing with hay, cottonseed cake; pasture in bad weather.
Stocker buy-sell		Oct. 10	May 20	Supplemental winter grazing.
Stocker buy-sell		Oct. 10	Aug. 10	Rough winter on cottonseed cake, hay, and pasture; summer graze on pasture.
Stocker buy-sell		Oct. 10	Aug. 10	Rough winter on cottonseed cake, hay, and pasture; summer graze on pasture plus grain.

APPENDIX A, TABLE IV

ASSUMED PRICES PAID AND RECEIVED BY FARMERS
EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Price (dollars)
Prices Paid		
Seed:		
Cotton	lb.	0.12
Peanuts	lb.	0.30
Grain sorghum	lb.	0.20
Soybeans	lb.	0.06
Oats	bu.	1.10
Alfalfa	lb.	0.50
Rye	bu.	1.20
Clover	lb.	2.00
Vetch	lb.	0.13
Custom Rates:		
Mechanical strip cotton	cwt.	1.00
Defoliate cotton	acre	4.00
Haul, gin, wrap cotton	cwt.	1.10
Combine peanuts	cwt.	1.20
Dig-shake peanuts	acre	4.50
Haul and dry peanuts	cwt.	0.80
Combining:		
Oats and grain sorghum	acre	4.00
Soybeans	acre	5.00
Hauling:		
Oats	bu.	0.07
Grain sorghum	bu.	0.05
Soybeans	bu.	0.08
Mow, rake, bale hay	bale	0.20
Hoeing (custom)	acre	3.00
Labor	hour	1.00

APPENDIX A, TABLE IV (Continued)

Item	Unit	Price
		(dollars)
Fertilizer and Chemicals:		
Nitrogen	lb.	0.12
Phosphorus	lb.	0.10
Potassium	lb.	0.05
Lime (custom applied)	ton	5.00
Sulphur dust (custom applied)	application/acre	5.25
Cotton herbicide	application/acre	2.30
Cotton insecticide	application/acre	1.50
Peanut herbicide	application/acre	2.70
Grain sorghum herbicide	application/acre	2.10
Soybeans herbicide	application/acre	2.70
Alfalfa insecticide	application/acre	1.75
Land:		
Sandy soil	acre	200.00
Clayey and clayey (c) soils	acre	170.00
Prices Received[a]		
Cotton lint	cwt.	Variable[b]
Cotton seed	cwt.	2.50
Grain sorghum	cwt.	1.63
Peanuts[c]	cwt.	10.40
Peanut hay	ton	17.60
Oats	bu.	0.63
Alfalfa hay (in field)	ton	20.48
Soybeans	lb.	0.033
Bermuda hay	ton	18.00
One month of grazing	AUM	3.00

[a]These are approximate prices prevailing in the area in 1963.

[b]Four selected price levels used in this study.

[c]Peanuts are also priced at $0.08 per pound for specific comparisons.

APPENDIX A, TABLE V

ASSUMED PRICES[a] FOR CALVES, STEERS, AND CULL COWS BY MONTHS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Class and Grade	Monthly Average												Yearly Average
	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	
	(dollars per cwt.)												
Calves:													
Good and choice steers, 500 lbs. and less	23.64	24.37	25.02	25.26	24.97	24.73	24.20	24.12	24.03	23.42	23.23	23.08	24.17
Heifers, 500 lbs. and less	21.64	22.37	23.02	23.26	22.97	22.73	22.20	22.12	22.03	21.42	21.33	21.08	22.17
Steers:													
Good 500-800 lbs.	21.13	21.75	22.12	22.42	22.29	21.86	21.35	21.24	21.05	20.23	20.47	20.58	21.37
Cows:													
Utility, all weights	13.83	14.09	14.53	14.87	19.94	14.55	13.95	13.49	13.35	13.13	13.06	13.43	13.94

[a]Approximate current price levels adjusted for commodity cycle. Source: Blakley, Leo V., and Walker, Odell, L., Unpublished Data, Department of Agricultural Economics, Oklahoma State University, 1962.

APPENDIX A, TABLE VI

ESTIMATED COST PER HOUR OF USE FOR SPECIFIED FOUR-ROW EQUIPMENT, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Equipment	Specifications	New cost	New cost less salvage[a]	Years to obsolescense	Hours of use to wear out	Fuel, oil and repair cost per hour	Depreciation per hour of use[b]	Capital per hour[c]
		(dol.)	(dol.)	(yrs.)	(hrs.)	(dol.)	(dol.)	(dol.)
Tractor	4 or 3-16 tricycle, L.P.,P.S., hydraulic system, PTO, 51 HP	4,400	3,872	15	12,000	.95	.32	2.75
Moldboard plow	3-16 integral	415	365	15	2,000	.18	.18	1.56
Disc plow	26" disc, 4-D	425	374	15	2,000	.07	.19	1.60
Tandem disc	12' wheel type	660	580	15	2,000	.12	.29	2.48
Oneway	8'	515	455	15	2,000	.10	.23	1.94
Spiketooth	24'	135	119	20	2,500	.02	.05	.54
Planter	4-row	720	634	20	1,200	.24	.53	6.00
Rotary hoe	14' pull	380	334	15	1,500	.07	.22	1.90
Cultivator	4-row	610	537	12	2,500	.11	.21	1.47
Grain drill	16-7" press wheel	730	642	20	1,200	.24	.54	6.08
Rotary mower	heavy housing	450	396	15	2,000	.10	.20	1.35
Stalk cutter	14'	350	308	15	1,200	.14	.26	.38
Spray rig	8-row	270	238	15	2,000	.05	.12	1.01
Lister planter	4-row	675	595	20	1,200	.22	.50	5.63

[a]Salvage value of implements assumed to be 12 percent of new value.

[b]New cost less salvage divided by estimated hours of use to wear out.

[c]One-half new cost divided by annual hours of operation.

APPENDIX A, TABLE VII

ASSUMED ANNUAL OVERHEAD COSTS FOR A REPRESENTATIVE FARM IN EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA[a]

Item[b]	Annual Cost
	(dollars)
Pickup truck:	
Interest on investment	75.00
Depreciation	305.00
Gas, oil, lubrication	223.00
Repairs	105.00
Insurance	85.00
Telephone	75.00
Bookkeeping and tax service	40.00
Insurance on buildings and workers	100.00
Miscellaneous[c]	100.00
Total	1,108.00

[a]Adapted for use in East Central and South Central Oklahoma from: Hall, Harry H., Larry J. Connor, Odell L. Walker, and William F. Lagrone, Resource Requirements, Costs, and Expected Returns; Alternative Crop and Livestock Enterprises; Oklahoma Panhandle. Oklahoma State University Processed Series P-459, July 1963, p. 49, and Strickland, Percy L., James S. Plaxico, and William F. Lagrone, Minimum Land Requirements and Adjustments for Specified Income Levels, Southwestern Oklahoma, Oklahoma Agricultural Experiment Station and FPED, ERS, USDA, May, 1963, Bulletin B-608.

[b]Costs of buildings, fencing and other equipment for livestock, machinery and land taxes were considered to vary with farm size and livestock enterprises.

[c]Includes such items as farm shop and shop tools, fuel storage tanks, etc.

APPENDIX B, TABLE I

SANDY SOIL REPRESENTATIVE FARM: ESTIMATED OPTIMUM FARM ORGANIZATIONS FOR SPECIFIED COTTON PRICE-ALLOTMENT COMBINATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price (cents per pound)			
		17.6	22.0	26.4	30.8
Cotton Allotment at 55 Percent of Base Level:					
Total land	acre	660.0	660.0	660.0	Organization same as 26.4
Cropland	acre	300.0	300.0	300.0	
Cotton	acre	9.8	18.8	18.8	
Peanuts	acre	79.5	79.5	79.5	
Alfalfa	acre	145.7	136.7	136.7	
Bermuda	acre	65.0	65.0	65.0	
Cotton lint	cwt.	37.6	72.4	79.9	
Beef stockers	head	138.0	136.0	136.0	
Operator labor	hour	1,360.0	1,364.0	1,361.0	
Land capital	dol.	132,000	132,000	132,000	132,000
Annual capital	dol.	22,559	21,809	21,810	21,810
Gross income	dol.	44,868	44,640	44,965	45,316
Operating costs	dol.	32,563	32,148	32,137	32,137
Residual return	dol.	12,305	12,492	12,828	13,179
Return to operator labor, risk and management	dol.	3,277	3,464	3,800	4,151
Cotton Allotment at 85 Percent of Base Level:					
Total land	acre	Organization same as 17.6 (above)	660.0	660.0	Organization same as 26.4
Cropland	acre		300.0	300.0	
Cotton	acre		29.1	29.1	
Peanuts	acre		79.5	79.5	
Alfalfa	acre		126.4	126.4	
Bermuda	acre		65.0	65.0	
Cotton lint	cwt.		112.0	123.7	
Beef stockers	head		136.0	136.0	
Operator labor	hour		1,389.0	1,386.0	
Land capital	dol.		132,000	132,000	132,000
Annual capital	dol.		21,892	21,982	21,982
Gross income	dol.		44,880	45,382	45,926
Operating costs	dol.		32,348	32,326	32,326
Residual return	dol.		12,532	13,056	13,600
Return to operator labor, risk and management	dol.		3,504	4,028	4,572

APPENDIX B, TABLE I (Continued)

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
Cotton Allotment at 100 Percent of Base Level:					
Total land	acre	660.0	660.0	660.0	Organization same as 26.4
Cropland	acre	300.0	300.0	300.0	
Cotton	acre	9.8	34.2	34.2	
Peanuts	acre	79.5	79.5	79.5	
Alfalfa	acre	145.7	121.3	121.3	
Bermuda	acre	65.0	65.0	65.0	
Cotton lint	cwt.	37.6	131.7	145.4	
Beef stockers	head	138.0	136.0	136.0	
Operator labor	hour	1,360.0	1,402.0	1,399.0	
Land capital	dol.	132,000	132,000	132,000	132,000
Annual capital	dol.	22,559	22,067	22,067	22,067
Gross income	dol.	44,868	44,998	45,588	46,228
Operating costs	dol.	32,563	32,446	32,420	32,420
Residual return	dol.	12,305	12,552	13,168	13,808
Return to operator labor, risk, and management	dol.	3,277	3,524	4,140	4,780
Cotton Allotment at 115 Percent of Base Level:					
Total land	acre	Organization same as 17.6 (above)	660.0	660.0	Organization same as 26.4
Cropland	acre		300.0	300.0	
Cotton	acre		39.3	39.3	
Peanuts	acre		79.5	79.5	
Alfalfa	acre		116.2	116.2	
Bermuda	acre		65.0	65.0	
Cotton lint	cwt.		151.3	167.0	
Beef stockers	head		136.0	136.0	
Operator labor	hour		1,414.0	1,412.0	
Land capital	dol.		132,000	132,000	132,000
Annual capital	dol.		22,152	22,152	22,152
Gross income	dol.		45,117	45,795	46,530
Operating costs	dol.		32,545	32,513	32,513
Residual return	dol.		12,572	13,282	14,017
Return to operator labor, risk, and management	dol.		3,544	4,254	4,989

APPENDIX B, TABLE I (Continued)

Item	Unit	Cotton Prices (cents per pound) 17.6	22.0	26.4	30.8
No Allotment Restrictions:					
Total land	acre	660.0	Organization same as 17.60	Organization same as 17.60	660.0
Cropland	acre	300.0			300.0
Cotton	acre	0.0			6.3
Peanuts	acre	197.5			191.2
Alfalfa	acre	37.5			37.5
Bermuda	acre	65.0			65.0
Cotton lint	cwt.	0.0			26.6
Beef stockers	head	177.0			175.0
Operator labor	hour	1,372.0			1,597.0
Land capital	dol.	132,000			132,000
Annual capital	dol.	28,293			28,113
Gross income	dol.	60,117			59,712
Operating costs	dol.	41,663			41,149
Residual return	dol.	18,454			18,563
Return to operator labor, risk and management	dol.	9,426			9,535
No Allotment Restrictions:[a]					
Total land	acre	Organization same as 17.6 (above)	660.0	660.0	660.0
Cropland	acre		300.0	300.0	300.0
Cotton	acre		6.3	60.0	127.5
Peanuts	acre		191.2	137.5	70.0
Alfalfa	acre		37.5	37.5	37.5
Bermuda	acre		65.0	65.0	65.0
Cotton lint	cwt.		26.6	255.0	514.9
Beef stockers	head		175.0	155.0	133.0
Operator labor	hour		1,597.0	1,586.0	1,614.0
Land capital	dol.	132,000	132,000	132,000	132,000
Annual capital	dol.	28,293	28,113	25,106	23,195
Gross income	dol.	53,743	53,307	49,685	48,064
Operating costs	dol.	41,663	41,149	37,243	33,481
Residual return	dol.	12,080	12,158	12,442	14,583
Return to operator labor, risk and management	dol.	3,052	3,130	3,414	5,555

[a]Peanuts priced at $8.00 per hundred weight.

APPENDIX B, TABLE II

CLAYEY SOIL REPRESENTATIVE FARM: ESTIMATED OPTIMUM FARM ORGANIZATIONS FOR SPECIFIED COTTON PRICE-ALLOTMENT COMBINATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
Cotton Allotment at 55 Percent of Base Level:					
Total land	acre	520.0	520.0	Organization same as 22.0	Organization same as 22.0
Cropland	acre	345.0	345.0		
Cotton	acre	11.9	26.4		
Peanuts	acre	65.5	65.5		
Alfalfa	acre	10.3	10.3		
Soybeans	acre	119.3	104.8		
Bermuda	acre	138.0	138.0		
Cotton lint	cwt.	41.6	92.4		
Beef stockers	head	159.0	159.0		
Operator labor	hour	1,652.0	1,663.0		
Land capital	dol.	88,400	88,400	88,400	88,400
Annual capital	dol.	25,218	25,358	25,358	25,358
Gross income	dol.	40,575	41,301	41,707	42,114
Operating costs	dol.	31,670	32,134	32,134	32,134
Residual return	dol.	8,905	9,167	9,573	9,980
Return to operator labor, risk, and management	dol.	2,493	2,755	3,161	3,568
Cotton Allotment 85 Percent of Base Level:					
Total land	acre	Organization same as 17.6 (above)	520.0	Organization same as 22.0	Organization same as 22.0
Cropland	acre		345.0		
Cotton	acre		40.8		
Peanuts	acre		65.5		
Alfalfa	acre		10.3		
Soybeans	acre		90.4		
Bermuda	acre		138.0		
Cotton lint	cwt.		142.8		
Beef stockers	head		159.0		
Operator labor	hour		1,675.0		
Land capital	dol.		88,400	88,400	88,400
Annual capital	dol.		25,497	25,497	25,497
Gross income	dol.		41,839	42,468	43,096
Operating costs	dol.		32,595	32,595	32,595
Residual return	dol.		9,244	9,873	10,501
Return to operator labor, risk, and management	dol.		2,832	3,461	4,089

APPENDIX B, TABLE II (Continued)

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
Cotton Allotment 100 Percent of Base Level:					
Total land	acre	520.0	520.0	Organization same as 22.0	Organization same as 22.0
Cropland	acre	345.0	345.0		
Cotton	acre	11.9	48.0		
Peanuts	acre	65.5	65.5		
Alfalfa	acre	10.3	10.3		
Soybeans	acre	119.3	83.2		
Bermuda	acre	138.0	138.0		
Cotton lint	cwt.	41.6	168.0		
Beef stockers	head	159.0	159.0		
Operator labor	hour	1,652.0	1,680.0		
Land capital	dol.	88,400	88,400	88,400	88,400
Annual capital	dol.	25,218	25,567	25,567	25,567
Gross income	dol.	40,575	42,109	42,848	43,587
Operating costs	dol.	31,670	32,825	32,825	32,825
Residual return	dol.	8,905	9,284	10,023	10,762
Return to operator labor, risk, and management	dol.	2,493	2,872	3,611	4,350
Cotton Allotment 115 Percent of Base Level:					
Total land	acre	Organization same as 17.6 (above)	520.0	Organization same as 22.0	Organization same as 22.0
Cropland	acre		345.0		
Cotton	acre		55.2		
Peanuts	acre		65.5		
Alfalfa	acre		10.3		
Soybeans	acre		76.0		
Bermuda	acre		138.0		
Cotton lint	cwt.		193.2		
Beef stockers	head		159.0		
Operator labor	hour		1,686.0		
Land capital	dol.		88,400	88,400	88,400
Annual capital	dol.		25,636	25,636	25,636
Gross income	dol.		42,378	43,228	44,078
Operating costs	dol.		33,055	33,055	33,055
Residual return	dol.		8,323	10,173	11,023
Return to operator labor, risk, and management	dol.		2,911	3,761	4,611

APPENDIX B, TABLE II (Continued)

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
No Allotment Restrictions:					
Total land	acre	520.0	Organization same as 17.60	Organization same as 17.60	520.0
Cropland	acre	345.0			345.0
Cotton	acre	0.0			10.6
Peanuts	acre	196.7			186.1
Alfalfa	acre	10.3			10.3
Bermuda	acre	138.0			138.0
Cotton lint	cwt.	0.0			37.0
Beef stockers	head	201.0			198.0
Operator labor	hour	1,403.0			1,725.0
Land capital	dol.	88,400			88,400
Annual capital	dol.	29,739			29,463
Gross income	dol.	58,068			57,360
Operating costs	dol.	42,997			42,163
Residual return	dol.	15,071			15,197
Return to operator labor, risk, and management	dol.	8,659			8,785
No Allotment Restrictions:[a]					
Total land	acre	Organization same as 17.6 (above)	520.0	520.0	520.0
Cropland	acre		345.0	345.0	345.0
Cotton	acre		10.6	129.3	196.7
Peanuts	acre		186.1	67.4	0.0
Alfalfa	acre		10.3	10.3	10.3
Bermuda	acre		138.0	138.0	138.0
Cotton lint	cwt.		37.0	452.3	698.6
Beef stockers	head		198.0	160.0	138.0
Operator labor	hour		1,725.0	1,745.0	1,757.0
Land capital	dol.	88,400	88,400	88,400	88,400
Annual capital	dol.	29,739	29,463	26,418	24,714
Gross income	dol.	52,542	51,799	45,457	44,777
Operating costs	dol.	42,997	42,163	35,655	31,979
Residual return	dol.	9,545	9,636	9,802	12,798
Return to operator labor, risk, and management	dol.	3,133	3,224	3,390	6,386

[a]Peanuts priced at $8.00 per hundred weight.

APPENDIX B, TABLE III

CLAYEY (C) SOIL REPRESENTATIVE FARM: ESTIMATED OPTIMUM FARM ORGANIZATIONS FOR SPECIFIED COTTON PRICE-ALLOTMENT COMBINATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
Cotton Allotments at 55 Percent of Base Level:					
Total land	acre	520.0	520.0	Organization same as 22.0	Organization same as 22.0
Cropland	acre	345.0	345.0		
Cotton	acre	12.6	60.0		
Soybeans	acre	184.1	136.7		
Alfalfa	acre	10.3	10.3		
Bermuda	acre	138.0	138.0		
Cotton lint	cwt.	44.1	210.0		
Beef stockers	head	138.0	138.0		
Operator labor	hour	1,613.0	1,649.0		
Hired labor	hour	0.0	0.0		
Land capital	dol.	88,400	88,400	88,400	88,400
Annual capital	dol.	22,912	23,370	23,370	23,370
Gross income	dol.	31,733	33,700	34,624	35,548
Operating costs	dol.	26,006	27,522	27,522	27,522
Residual return	dol.	5,727	6,178	7,102	8,026
Return to operator labor, risk, and management	dol.	-685	-234	690	1,614
Cotton Allotment 85 Percent of Base Level:					
Total land	acre	Organization same as 17.6 (above)	520.0	Organization same as 22.0	Organization same as 22.0
Cropland	acre		345.0		
Cotton	acre		92.6		
Soybeans	acre		104.1		
Alfalfa	acre		10.3		
Bermuda	acre		138.0		
Cotton lint	cwt.		324.1		
Beef stockers	head		138.0		
Operator labor	hour		1,675.0		
Hired labor	hour		0.0		
Land capital	dol.		88,400	88,400	88,400
Annual capital	dol.		23,684	23,684	23,684
Gross income	dol.		34,919	36,345	37,771
Operating costs	dol.		28,564	28,564	28,564
Residual return	dol.		6,355	7,781	9,207
Return to operator labor, risk, and management	dol.		-57	1,369	2,795

APPENDIX B, TABLE III (Continued)

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
Cotton Allotment 100 Percent of Base Level:					
Total land	acre	520.0	520.0	Organization same as 22.0	Organization same as 22.0
Cropland	acre	345.0	345.0		
Cotton	acre	12.6	109.0		
Soybeans	acre	184.1	87.7		
Alfalfa	acre	10.3	10.3		
Bermuda	acre	138.0	138.0		
Cotton lint	cwt.	44.1	381.5		
Beef stockers	head	138.0	138.0		
Operator labor	hour	1,613.0	1,688.0		
Hired labor	hour	0.0	0.0		
Land capital	dol.	88,400	88,400	88,400	88,400
Annual capital	dol.	22,912	23,842	23,842	23,842
Gross income	dol.	31,733	35,533	37,211	38,890
Operating costs	dol.	26,006	29,089	29,089	29,089
Residual return	dol.	5,727	6,444	8,122	9,801
Return to operator labor, risk, and management	dol.	-685	32	1,710	3,389
Cotton Allotments 115 Percent of Base Level:					
Total land	acre	Organization same as 17.6 (above)	520.0	Organization same as 22.0	Organization same as 22.0
Cropland	acre		345.0		
Cotton	acre		125.4		
Soybeans	acre		71.3		
Alfalfa	acre		10.3		
Bermuda	acre		138.0		
Cotton lint	cwt.		438.9		
Beef stockers	head		138.0		
Operator labor	hour		1,693.0		
Hired labor	hour		8.0		
Land capital	dol.		88,400	88,400	88,400
Annual capital	dol.		24,005	24,005	24,005
Gross income	dol.		36,146	38,077	40,008
Operating costs	dol.		29,621	29,621	29,621
Residual return	dol.		6,525	8,456	10,387
Return to operator labor, risk, and management	dol.		113	2,044	3,975

APPENDIX B, TABLE III (Continued)

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
No Allotment Restrictions:					
Total land	acre	520.0	520.0	520.0	Organization same as 26.4
Cropland	acre	345.0	345.0	345.0	
Cotton	acre	12.6	155.3	196.7	
Soybeans	acre	184.1	41.4	0.0	
Alfalfa	acre	10.3	10.3	10.3	
Bermuda	acre	138.0	138.0	138.0	
Cotton lint	cwt.	44.1	543.4	698.6	
Beef stockers	head	138.0	138.0	138.0	
Operator labor	hour	1,613.0	1,698.0	1,704.0	
Hired labor	hour	0.0	26.0	51.0	
Land capital	dol.	88,400	88,400	88,400	88,400
Annual capital	dol.	22,912	24,304	24,714	24,714
Gross income	dol.	31,733	37,262	41,702	44,776
Operating costs	dol.	26,006	30,594	31,979	31,979
Residual returns	dol.	5,727	6,668	9,723	12,797
Return to operator labor, risk, and management	dol.	-685	256	3,311	6,385

APPENDIX B, TABLE IV

COMPARISON OF STABILITY RANGES OF SELECTED ACTIVITIES WITH COTTON AT 26.4 CENTS PER POUND AND BASE LEVEL ALLOTMENT, REPRESENTATIVE FARMS OF EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Activity[a]	Unit	Cost (-) or Return (+) (dollars)	Stability Range (dollars)
Sandy Soil Representative Farm:			
P-3 Bermuda (3)	acre	-10.96	-13.75 to 10.97
P-5 Bermuda (4)	acre	-10.96	inf. to 13.47
P-15 Cotton (1), h.h.[b]	acre	-31.42	24.99 to 32.36
P-16 Cotton (1), m.h.[c]	acre	-59.37	58.42 to 62.42
P-25 Alfalfa (1)	acre	+29.63	26.59 to 32.01
P-26 Alfalfa (2)	acre	+22.39	20.00 to 25.43
P-47 Peanuts (2)	acre	+72.48	69.44 to 97.19
P-48 Peanuts (3)	acre	+80.48	55.77 to inf.
P-58 Buy-sell	head	+25.06	23.48 to 25.07
P-59 Buy-sell	head	+21.05	21.03 to 22.63
P-61 Buy-sell	head	+29.32	26.74 to 29.44
P-39 Annual capital	dol.	- .06	.059 to .08
P-45 Cotton sell	cwt.	+26.40	24.83 to inf.
Clayey Soil Representative Farm:			
P-3 Bermuda (2)	acre	- 8.88	4.07 to 10.97
P-5 Bermuda (3)	acre	- 3.81	inf. to 4.86
P-6 Bermuda (4)	acre	- 3.91	inf. to 8.27
P-20 Cotton (2), h.h.[b]	acre	-31.32	27.27 to 35.67
P-21 Cotton (2), m.h.[c]	acre	-55.57	31.29 to 59.62
P-22 Soybeans (1)	acre	+24.86	23.76 to inf.
P-23 Soybeans (2)	acre	+15.36	14.67 to 16.46
P-28 Alfalfa (1)	acre	+22.39	10.14 to 24.44
P-61 Peanuts (2)	acre	+58.93	57.83 to inf.
P-70 Buy-sell	head	+25.06	23.48 to 27.01
P-71 Buy-sell	head	+21.05	19.10 to 22.63
P-73 Buy-sell	head	+29.32	27.47 to 34.68
P-53 Annual capital	dol.	- .06	.02 to .08
P-58 Cotton sell	cwt.	+26.40	20.45 to 43.04

APPENDIX B, TABLE IV (Continued)

Activity[a]	Unit	Cost (-) or Return (+) (dollars)	Stability Range (dollars)
Clayey (c) Soil Representative Farm:			
P-3 Bermuda (2)	acre	- 8.88	4.07 to 11.10
P-5 Bermuda (3)	acre	- 3.81	inf. to 4.73
P-6 Bermuda (4)	acre	- 3.91	inf. to 7.35
P-20 Cotton (2), h.h.[b]	acre	-31.32	27.27 to 35.67
P-21 Cotton (2), m.h.[c]	acre	-55.57	32.29 to 59.61
P-22 Soybeans (1)	acre	+24.86	23.76 to inf.
P-23 Soybeans (2)	acre	+15.36	14.82 to 16.46
P-28 Alfalfa (1)	acre	+22.39	10.14 to 24.44
P-73 Buy-sell	head	+29.32	27.56 to 34.68
P-53 Annual capital	dol.	- .06	.012 to .078
P-58 Cotton sell	cwt.	+26.40	20.45 to 43.04

[a]Programmed activity with land class in parenthesis.

[b]Cotton, hand harvest.

[c]Cotton, machine harvest.

APPENDIX B, TABLE V

ESTIMATED OPTIMUM FARM ORGANIZATIONS FOR SPECIFIED CHOICES OF THE 1966 UPLAND COTTON PROGRAM, REPRESENTATIVE FARMS OF EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Nonpartici-pation	Percent Diversion 12.5	25.0	35.0
Sandy Soil Representative Farm, Base Allotment-34.2 Acres:					
Total land	acre	660.0	660.0	660.0	660.0
Cropland	acre	300.0	300.0	300.0	300.0
Cotton	acre	34.2	29.9	25.6	22.2
Peanuts	acre	79.5	79.5	79.5	79.5
Alfalfa	acre	121.3	121.3	121.3	121.3
Bermuda	acre	65.0	65.0	65.0	65.0
Diverted	acre	0.0	4.3	8.6	12.0
Cotton lint	cwt.	131.7	115.2	98.8	85.6
Beef stockers	head	136.0	138.0	141.0	143.0
Operator labor	hour	1,402.0	1,399.0	1,397.0	1,395.0
Land capital	dol.	132,000	132,000	132,000	132,000
Annual capital	dol.	22,067	22,312	22,572	22,781
Gross income	dol.	44,998	46,017	46,249	46,435
Operating costs	dol.	32,446	32,622	32,815	32,971
Residual return	dol.	12,552	13,395	13,434	13,464
Return to operator labor, risk, and management	dol.	3,524	4,367	4,406	4,436
Clayey Representative Farm, Base Allotment-48.0 Acres:					
Total land	acre	520.0	520.0	520.0	520.0
Cropland	acre	345.0	345.0	345.0	345.0
Cotton	acre	48.0	42.0	36.0	31.2
Peanuts	acre	65.5	65.5	65.5	65.5
Alfalfa	acre	10.3	10.3	10.3	10.3
Soybeans	acre	83.2	83.2	83.2	83.2
Bermuda	acre	138.0	138.0	138.0	138.0
Diverted	acre	0.0	6.0	12.0	16.8
Cotton lint	cwt.	168.0	147.0	126.0	109.2
Beef stockers	head	159.0	161.0	163.0	164.0
Operator labor	hour	1,680.0	1,673.0	1,667.0	1,661.0
Land capital	dol.	88,400	88,400	88,400	88,400
Annual capital	dol.	25,567	25,727	25,914	26,045
Gross income	dol.	42,109	43,161	43,220	43,245
Operating costs	dol.	32,825	32,812	32,833	32,825
Residual return	dol.	9,284	10,349	10,387	10,420
Return to operator labor, risk, and management	dol.	2,872	3,937	3,975	4,008

APPENDIX B, TABLE V (Continued)

Item	Unit	Nonpartici-pation	Percent Diversion 12.5	25.0	35.0
Clayey (c) Representative Farm, Base Allotment-109.0 Acres:					
Total land	acre	520.0	520.0	520.0	520.0
Cropland	acre	345.0	345.0	345.0	345.0
Cotton	acre	109.0	95.4	81.7	70.8
Soybeans	acre	87.7	87.7	87.7	87.7
Alfalfa	acre	10.3	10.3	10.3	10.3
Bermuda	acre	138.0	138.0	138.0	138.0
Diverted	acre	0.0	13.6	27.3	38.2
Cotton lint	cwt.	381.5	333.8	286.1	248.0
Beef stockers	head	138.0	142.0	146.0	149.0
Operator labor	hour	1,688.0	1,668.0	1,650.0	1,635.0
Land capital	dol.	88,400	88,400	88,400	88,400
Annual capital	dol.	23,842	24,067	24,340	24,531
Gross income	dol.	35,533	37,860	37,928	37,936
Operating costs	dol.	29,089	29,002	28,991	28,928
Residual return	dol.	6,444	8,858	8,937	9,008
Return to operator labor, risk, and management	dol.	32	2,446	2,525	2,596

APPENDIX C, TABLE I

SANDY SOIL RESOURCE SITUATION: ESTIMATED MINIMUM RESOURCE REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR, RISK, AND MANAGEMENT WITH SPECIFIED COTTON PRICE-ALLOTMENT COMBINATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
Cotton Allotment at 55 Percent of Base Level:					
Total land	acre	933.1	902.3	832.9	771.5
Cropland	acre	424.6	410.5	379.0	351.0
Cotton	acre	6.7	26.2	24.1	22.4
Peanuts	acre	112.0	108.2	100.0	92.6
Alfalfa	acre	213.5	186.8	172.4	159.7
Bermuda	acre	92.4	89.3	82.5	76.3
Cotton lint	cwt.	26.0	100.7	102.6	95.1
Beef stocker	head	196.0	190.0	175.0	162.0
Operator labor	hour	1,673.0	1,685.0	1,597.0	1,521.0
Land capital	dol.	186,620	180,460	166,580	154,300
Annual capital	dol.	31,911	31,183	28,787	26,664
Gross income	dol.	63,538	62,005	57,657	53,825
Operating costs	dol.	46,233	45,069	41,554	38,459
Residual return	dol.	17,305	16,936	16,103	15,366
Return to operator labor, risk, and management	dol.	5,000	5,000	5,000	5,000
Cotton Allotment at 85 Percent of Base Level:					
Total land	acre		893.9	794.2	712.2
Cropland	acre		406.7	361.3	324.0
Cotton	acre		39.3	34.9	31.3
Peanuts	acre		107.3	95.3	85.5
Alfalfa	acre		171.6	152.5	136.7
Bermuda	acre		88.5	78.6	70.5
Cotton lint	cwt.		151.4	148.5	133.1
Beef stockers	head		188.0	167.0	150.0
Operator labor	hour		1,708.0	1,579.0	1,474.0
Land capital	dol.		178,780	158,840	142,440
Annual capital	dol.		31,118	27,647	24,792
Gross income	dol.		61,742	55,460	50,320
Operating costs	dol.		44,907	39,822	35,666
Residual return	dol.		16,835	15,638	14,654
Return to operator labor, risk, and management	dol.		5,000	5,000	5,000

Organization same as 17.6 (above)

APPENDIX C, TABLE I (Continued)

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
Cotton Allotment at 100 Percent of Base Level:					
Total land	acre	933.1	889.5	775.0	684.1
Cropland	acre	424.6	404.7	353.6	311.3
Cotton	acre	6.7	46.3	40.3	35.6
Peanuts	acre	112.0	106.7	93.0	82.1
Alfalfa	acre	213.5	163.7	142.6	125.9
Bermuda	acre	92.4	88.0	76.7	67.7
Cotton lint	cwt.	26.0	178.1	171.3	151.2
Beef stockers	head	196.0	187.0	163.0	144.0
Operator labor	hour	1,673.0	1,720.0	1,570.0	1,452.0
Land capital	dol.	186,620	177,900	155,000	136,820
Annual capital	dol.	31,911	31,084	27,082	23,907
Gross income	dol.	63,538	61,605	54,370	48,662
Operating costs	dol.	46,233	44,823	38,962	34,345
Residual return	dol.	17,305	16,782	15,408	14,317
Return to operator labor, risk, and management	dol.	5,000	5,000	5,000	5,000
Cotton Allotment at 115 Percent of Base Level:					
Total land	acre		885.1	756.7	658.2
Cropland	acre		402.7	344.3	299.5
Cotton	acre		53.1	45.4	39.5
Peanuts	acre		106.2	90.8	79.0
Alfalfa	acre		155.8	133.2	115.8
Bermuda	acre		87.6	74.9	65.2
Cotton lint	cwt.		204.5	193.0	167.8
Beef stockers	head		186.0	159.0	138.0
Operator labor	hour		1,733.0	1,561.0	1,431.0
Land capital	dol.		177,020	151,340	131,640
Annual capital	dol.		31,050	26,543	23,088
Gross income	dol.		61,468	53,331	47,130
Operating costs	dol.		44,739	38,143	33,124
Residual return	dol.		17,089	15,188	14,006
Return to operator labor, risk, and management	dol.		5,000	5,000	5,000

Organization same as 17.6 (above)

APPENDIX C, TABLE I (Continued)

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
No Allotment Restrictions:					
Total land	acre	382.4	Organization same as 17.6	Organization same as 17.6	371.1
Cropland	acre	174.0			168.9
Cotton	acre	0.0			10.4
Peanuts	acre	114.3			100.6
Alfalfa	acre	21.8			21.2
Bermuda	acre	37.9			36.7
Cotton lint	cwt.	0.0			44.2
Beef stockers	head	103.0			96.0
Operator labor	hour	797.0			1,148.0
Land capital	dol.	76,480			74,220
Annual capital	dol.	16,468			15,683
Gross income	dol.	34,914			33,212
Operating costs	dol.	24,217			22,651
Residual return	dol.	10,697			10,561
Return to operator labor, risk, and management	dol.	5,000			5,000
No Allotment Restrictions:[a]					
Total land	acre	1,015.3	1,013.2	944.3	598.9
Cropland	acre	462.0	461.0	429.6	272.5
Cotton	acre	0.0	1.1	85.9	115.6
Peanuts	acre	303.6	301.8	196.4	63.5
Alfalfa	acre	57.9	57.8	53.8	34.1
Bermuda	acre	100.5	100.3	93.5	59.3
Cotton lint	cwt.	0.0	4.7	365.2	466.8
Beef stockers	head	275.0	273.0	222.0	123.0
Operator labor	hour	1,814.0	1,850.0	1,845.0	1,535.0
Hired labor	hour	303.0	303.0	186.0	0.0
Land capital	dol.	203,060	202,640	188,860	119,780
Annual capital	dol.	43,876	43,754	36,162	21,861
Gross income	dol.	82,904	82,655	71,267	44,219
Operating costs	dol.	64,612	64,388	53,828	30,924
Residual return	dol.	18,292	18,267	17,439	13,295
Return to operator labor, risk, and management	dol.	5,000	5,000	5,000	5,000

[a]Peanuts priced at $8.00 per hundred weight.

APPENDIX C, TABLE II

CLAYEY SOIL RESOURCE SITUATION: ESTIMATED MINIMUM RESOURCE REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR, RISK, AND MANAGEMENT WITH SPECIFIED COTTON PRICE-ALLOTMENT COMBINATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
Cotton Allotment at 55 Percent of Base Level:					
Total land	acre	1,266.0	1,161.8	962.2	823.4
Cropland	acre	839.3	770.3	637.9	545.9
Cotton	acre	8.9	59.3	49.1	42.0
Peanuts	acre	159.5	146.4	121.2	103.7
Alfalfa	acre	251.9	231.2	191.5	90.0
Soybeans	acre	208.8	140.5	116.4	164.7
Bermuda	acre	210.2	192.9	159.7	145.5
Cotton lint	cwt.	31.2	207.4	171.8	147.0
Beef stockers	head	221.0	203.0	168.0	152.0
Operator labor	hour	2,006.0	1,988.0	1,953.0	1,901.0
Hired labor	hour	520.0	417.0	137.0	102.0
Land capital	dol.	215,220	197,506	163,574	139,978
Annual capital	dol.	41,109	38,187	31,522	28,355
Gross income	dol.	77,345	73,013	61,229	53,198
Operating costs	dol.	58,324	55,055	45,306	38,691
Residual return	dol.	19,021	17,958	15,923	14,507
Return to operator labor, risk, and management	dol.	5,000	5,000	5,000	5,000
Cotton Allotment at 85 Percent of Base Level:					
Total land	acre	Organization same as 17.6 (above)	1,124.7	861.3	704.2
Cropland	acre		745.6	571.1	466.8
Cotton	acre		87.7	67.2	54.9
Peanuts	acre		141.7	108.5	88.7
Alfalfa	acre		223.8	128.8	18.8
Soybeans	acre		105.7	123.6	121.8
Bermuda	acre		186.7	143.0	182.6
Cotton lint	cwt.		307.0	235.1	192.2
Beef stockers	head		196.0	150.0	182.0
Operator labor	hour		1,981.0	1,919.0	1,875.0
Hired labor	hour		389.0	102.0	87.0
Land capital	dol.		191,199	146,421	119,714
Annual capital	dol.		37,254	28,725	30,610
Gross income	dol.		71,819	55,526	52,926
Operating costs	dol.		54,239	40,633	39,635
Residual return	dol.		17,580	14,893	13,291
Return to operator labor, risk, and management	dol.		5,000	5,000	5,000

APPENDIX C, TABLE II (Continued)

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
Cotton Allotment at 100 Percent of Base Level:					
Total land	acre	1,266.0	1,106.4	817.9	658.1
Cropland	acre	839.3	733.6	542.2	436.2
Cotton	acre	8.9	101.8	75.2	60.5
Peanuts	acre	159.5	139.4	103.1	82.9
Alfalfa	acre	251.9	220.2	90.1	13.1
Soybeans	acre	208.8	88.5	130.0	104.6
Bermuda	acre	210.2	183.7	143.8	175.1
Cotton lint	cwt.	31.2	356.3	263.4	211.9
Beef stockers	head	221.0	193.0	150.0	174.0
Operator labor	hour	2,006.0	1,978.0	1,901.0	1,834.0
Hired labor	hour	520.0	375.0	117.0	56.0
Land capital	dol.	215,220	188,088	139,043	111,877
Annual capital	dol.	41,109	36,793	28,415	29,154
Gross income	dol.	77,345	71,230	53,888	50,560
Operating costs	dol.	58,324	53,837	39,438	37,739
Residual return	dol.	19,021	17,393	14,450	12,821
Return to operator labor, risk, and management	dol.	5,000	5,000	5,000	5,000
Cotton Allotment at 115 Percent of Base Level:					
Total land	acre		1,088.7	779.4	618.3
Cropland	acre		721.8	516.7	409.9
Cotton	acre		115.4	82.6	65.5
Peanuts	acre		137.2	98.2	77.9
Alfalfa	acre		216.6	67.5	12.4
Soybeans	acre		71.9	113.0	89.6
Bermuda	acre		180.7	155.4	164.5
Cotton lint	cwt.		403.9	289.2	229.4
Beef stockers	head		190.0	159.0	163.0
Operator labor	hour		1,975.0	1,892.0	1,792.0
Hired labor	hour		361.0	114.0	25.0
Land capital	dol.		185,079	132,498	105,111
Annual capital	dol.		36,437	29,139	27,457
Gross income	dol.		70,660	53,869	48,088
Operating costs	dol.		53,447	39,811	35,673
Residual return	dol.		17,213	14,058	12,415
Return to operator labor, risk, and management	dol.		5,000	5,000	5,000

Organization same as 17.6 (above)

APPENDIX C, TABLE II (Continued)

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
No Allotment Restrictions:					
Total land	acre	344.1			334.6
Cropland	acre	228.1			221.8
Cotton	acre	0.0			14.1
Peanuts	acre	129.7			112.0
Alfalfa	acre	6.9			6.7
Bermuda	acre	91.5			89.0
Cotton lint	cwt.	0.0			49.5
Beef stockers	head	119.0			111.0
Operator labor	hour	866.0			1,272.0
Hired labor	hour	0.0			0.0
Land capital	dol.	58,497	Organization same as 17.6	Organization same as 17.6	56,882
Annual capital	dol.	17,975			17,110
Gross income	dol.	35,970			34,030
Operating costs	dol.	26,352			24,509
Residual return	dol.	9,618			9,521
Return to operator labor, risk, and management	dol.	5,000			5,000
No Allotment Restrictions:[a]					
Total land	acre	922.4	916.2	887.6	446.4
Cropland	acre	611.5	607.5	588.4	296.0
Cotton	acre	0.0	9.2	9.5	168.3
Peanuts	acre	347.7	336.2	325.1	0.0
Alfalfa	acre	18.4	110.0	106.5	8.9
Bermuda	acre	245.4	152.1	147.3	118.8
Cotton lint	cwt.	0.0	32.3	33.4	597.9
Beef stockers	head	318.0	231.0	223.0	100.0
Operator labor	hour	1,842.0	2,010.0	2,003.0	1,531.0
Hired labor	hour	478.0	235.0	190.0	0.0
Land capital	dol.	156,808	155,754	150,892	75,888
Annual capital	dol.	48,421	38,001	36,780	18,996
Gross income	dol.	86,643	75,749	73,488	35,290
Operating costs	dol.	71,127	60,295	58,326	24,628
Residual return	dol.	15,516	15,454	15,162	10,662
Return to operator labor, risk, and management	dol.	5,000	5,000	5,000	5,000

[a]Peanuts prices at $8.00 per hundred weight.

APPENDIX C, TABLE III

CLAYEY (C) SOIL RESOURCE SITUATION: ESTIMATED MINIMUM RESOURCE REQUIREMENTS FOR $5,000 RETURN TO OPERATOR LABOR, RISK, AND MANAGEMENT WITH SPECIFIED COTTON PRICE-ALLOTMENT COMBINATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
Cotton Allotment at 55 Percent of Base Level:					
Total land	acre	No feasible solution	No feasible solution	No feasible solution	2,774.5
Cropland	acre				1,839.4
Cotton	acre				321.8
Alfalfa	acre				552.1
Soybeans	acre				504.9
Bermuda	acre				460.6
Cotton lint	cwt.				1,126.5
Beef stockers	head				372.0
Operator labor	hour				2,115.0
Hired labor	hour				2,760.0
Land capital	dol.				471,665
Annual capital	dol.				81,487
Gross income	dol.				143,750
Operating costs	dol.				109,343
Residual return	dol.				34,407
Return to operator labor, risk, and management	dol.				5,000
Cotton Allotment at 85 Percent of Base Level:					
Total land	acre				1,163.4
Cropland	acre				771.3
Cotton	acre	No feasible solution	No feasible solution	No feasible solution	207.1
Alfalfa	acre				231.5
Soybeans	acre				139.6
Bermuda	acre				193.1
Cotton lint	cwt.				724.8
Beef stockers	head				156.0
Operator labor	hour				1,925.0
Hired labor	hour				508.0
Land capital	dol.				197,778
Annual capital	dol.				34,535
Gross income	dol.				65,198
Operating costs	dol.				47,223
Residual return	dol.				17,975
Return to operator labor, risk, and management	dol.				5,000

APPENDIX C, TABLE III (Continued)

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
Cotton Allotment at 100 Percent of Base Level:					
Total land	acre			2,616.5	895.8
Cropland	acre			1,734.7	593.9
Cotton	acre			549.5	188.1
Alfalfa	acre	No feasible solution	No feasible solution	520.7	145.1
Soybeans	acre			230.2	112.0
Bermuda	acre			434.3	148.7
Cotton lint	cwt.			1,923.1	658.4
Beef stockers	head			351.0	120.0
Operator labor	hour			2,095.0	1,880.0
Hired labor	hour			2,727.0	203.0
Land capital	dol.			444,805	152,286
Annual capital	dol.			79,279	27,002
Gross income	dol.			143,875	51,759
Operating costs	dol.			111,079	36,514
Residual return	dol.			32,796	15,245
Return to operator labor, risk, and management	dol.			5,000	5,000
Cotton Allotment at 115 Percent of Base Level:					
Total land	acre			1,894.6	734.3
Cropland	acre			1,256.1	486.8
Cotton	acre			458.5	177.7
Alfalfa	acre	No feasible solution	No feasible solution	377.0	30.7
Soybeans	acre			106.1	99.1
Bermuda	acre			314.5	179.3
Cotton lint	cwt.			1,604.7	621.9
Beef stockers	head			254.0	150.0
Operator labor	hour			2,012.0	1,841.0
Hired labor	hour			1,686.0	189.0
Land capital	dol.			322,082	124,831
Annual capital	dol.			57,846	28,688
Gross income	dol.			107,383	49,720
Operating costs	dol.			81,950	36,124
Residual return	dol.			25,433	13,596
Return to operator labor, risk, and management	dol.			5,000	5,000

APPENDIX C, TABLE III (Continued)

Item	Unit	Cotton Price (cents per pound) 17.6	22.0	26.4	30.8
No Allotment Restrictions:					
Total land	acre			938.4	446.4
Cropland	acre			622.1	295.9
Cotton	acre	No feasible solution	No feasible solution	353.8	168.3
Alfalfa	acre			112.6	8.9
Bermuda	acre			155.7	118.7
Cotton lint	cwt.			1,256.7	597.9
Beef stockers	head			126.0	100.0
Operator labor	hour			1,743.0	1,531.0
Hired labor	hour			601.0	0.0
Land capital	dol.			159,528	75,888
Annual capital	dol.			30,202	18,996
Gross income	dol.			58,743	35,289
Operating costs	dol.			43,064	24,628
Residual return	dol.			15,679	10,661
Return to operator labor, risk, and management	dol.			5,000	5,000

APPENDIX D, TABLE I

SANDY REPRESENTATIVE FARM: AREA AGGREGATIONS OF CROPS, COTTON LINT, LIVESTOCK, LABOR, CAPITAL, GROSS INCOME, OPERATING COSTS, RESIDUAL RETURNS, AND RETURNS TO OPERATOR LABOR, RISK, AND MANAGEMENT FOR SPECIFIED COTTON PRICE-ALLOTMENT COMBINATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price and Allotment Combinations[a]						
		17.6-LMBH	22.0-L	26.4-L	30.8-L	22.0-M	26.4-M	30.8-M
		(thousands)						
Cotton	acre	5.5	10.6	10.6	Organization same as 26.4-L	16.3	16.3	Organization same as 26.4-M
Peanuts	acre	44.6	44.6	44.6		44.6	44.6	
Alfalfa	acre	81.7	76.6	76.6		70.9	70.9	
Bermuda	acre	36.5	36.5	36.5		36.5	36.5	
Cotton lint	cwt.	21.1	40.6	44.8		62.8	69.4	
Beef stockers	head	77.4	76.3	76.3		76.3	76.3	
Operator labor	hour	763.1	765.3	763.7		779.4	777.7	
Hired labor	hour	0.0	0.0	0.0		0.0	0.0	
Land capital	dol.	74,065.2	74,065.2	74,065.2		74,065.2	74,065.2	
Annual capital	dol.	12,657.9	12,237.0	12,237.6		12,283.6	12,334.1	
Gross income	dol.	25,175.4	25,047.5	25,229.9	25,426.8	25,182.2	25,463.8	25,769.1
Operating costs	dol.	18,271.1	18,038.2	18,032.1	18,032.1	18,150.5	18,138.1	18,138.1
Residual return	dol.	6,904.3	7,009.3	7,197.8	7,394.7	7,031.7	7,325.7	7,631.0
Return to operator labor, risk, and management	dol.	1,838.7	1,943.7	2,132.2	2,329.1	1,966.1	2,260.1	2,565.4

APPENDIX D, TABLE I (Continued)

Item	Unit	Cotton Price and Allotment Combinations[a]					
		22.0-B	26.4-B	30.8-B	22.0-H	26.4-H	30.8-H
		(thousands)					
Cotton	acre	19.2	19.2	Organization same as 26.4-B	22.1	22.1	Organization same as 26.4-H
Peanuts	acre	44.6	44.6		44.6	44.6	
Alfalfa	acre	68.0	68.0		65.1	65.1	
Bermuda	acre	36.5	36.5		36.5	36.5	
Cotton lint	cwt.	73.9	81.6		84.9	93.7	
Beef stockers	head	76.3	76.3		76.3	76.3	
Operator labor	hour	786.7	785.0		793.4	792.3	
Hired labor	hour	0.0	0.0		0.0	0.0	
Land capital	dol.	74,065.2	74,065.2		74,065.2	74,065.2	
Annual capital	dol.	12,381.8	12,381.8		12,429.5	12,429.5	
Gross income	dol.	25,248.4	25,579.4	25,938.5	25,315.1	25,695.6	26,107.9
Operating costs	dol.	18,205.5	18,190.9	18,190.9	18,261.0	18,243.1	18,243.1
Residual return	dol.	7,042.9	7,388.5	7,747.6	7,054.1	7,452.5	7,864.8
Return to operator labor, risk, and management	dol.	1,977.3	2,322.9	2,682.0	1,988.5	2,386.9	2,799.2

[a]Allotment levels are denoted: 55 percent of base level, L; 85 percent of base level, M; 100 percent of base level, B; and 115 percent of base level, H.

APPENDIX D, TABLE II

CLAYEY REPRESENTATIVE FARM: AREA AGGREGATIONS OF CROPS, COTTON LINT, LIVESTOCK, LABOR, CAPITAL, GROSS INCOME, OPERATING COSTS, RESIDUAL RETURNS, AND RETURNS TO OPERATOR LABOR, RISK, AND MANAGEMENT FOR SPECIFIED COTTON PRICE-ALLOTMENT COMBINATIONS EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price and Allotment Combinations[a]						
		17.6-LMBH	22.0-L	26.4-L	30.8-L	22.0-M	26.4-M	30.8-M
		(thousands)						
Cotton	acre	5.5	12.2	Organization same as 22.0-L	Organization same as 22.0-L	18.9	Organization same as 22.0-M	Organization same as 22.0-M
Peanuts	acre	30.3	30.3			30.3		
Alfalfa	acre	4.8	4.8			4.8		
Soybeans	acre	55.2	48.5			41.8		
Bermuda	acre	63.9	63.9			63.9		
Cotton lint	cwt.	19.3	42.8			66.1		
Beef stockers	head	73.6	73.6			73.6		
Operator labor	hour	764.8	769.8			775.4		
Hired labor	hour	0.0	0.0			0.0		
Land capital	dol.	40,923.0	40,923.0			40,923.0		
Annual capital	dol.	11,674.2	11,738.9			11,803.3		
Gross income	dol.	18,783.4	19,119.5	19,307.4	19,495.8	19,368.5	19,659.7	19,950.4
Operating costs	dol.	14,661.0	14,875.8	14,875.8	14,875.8	15,089.2	15,089.2	15,089.2
Residual return	dol.	4,122.4	4,243.7	4,431.6	4,620.0	4,279.3	4,570.5	4,861.2
Return to operator labor, risk, and management	dol.	1,154.1	1,275.4	1,463.3	1,651.7	1,311.0	1,602.2	1,892.9

APPENDIX D, TABLE II (Continued)

Item	Unit	Cotton Price and Allotment Combinations[a]					
		22.0-B	26.4-B	30.8-B	22.0-H	26.4-H	20.8-H
		(thousands)					
Cotton	acre	22.2	Organization same as 22.0-B	Organization same as 22.0-B	25.5	Organization same as 22.0-H	Organization same as 22.0-H
Peanuts	acre	30.3			30.3		
Alfalfa	acre	4.8			4.8		
Soybeans	acre	38.5			35.2		
Bermuda	acre	63.9			63.9		
Cotton lint	cwt.	77.8			89.4		
Beef stockers	head	73.6			73.6		
Operator labor	hour	777.7			780.5		
Hired labor	hour	0.0			0.0		
Land capital	dol.	40,923.0			40,923.0		
Annual capital	dol.	11,835.7			11,867.7		
Gross income	dol.	19,493.5	19,835.6	20,177.7	19,618.0	20,011.5	20,405.0
Operating costs	dol.	15,195.7	15,195.7	15,195.7	15,302.2	15,302.2	15,302.2
Residual returns	dol.	4,297.8	4,639.9	4,982.0	4,315.8	4,709.3	5,102.8
Return to operator labor, risk, and management	dol.	1,329.5	1,671.6	2,013.7	1,347.5	1,741.1	2,134.5

[a]Allotment levels are denoted: 55 percent of base level, L; 85 percent of base level, M; 100 percent of base level, B; and 115 percent of base level, H.

APPENDIX D, TABLE III

CLAYEY (C) REPRESENTATIVE FARM: AREA AGGREGATIONS OF CROPS, COTTON LINT, LIVESTOCK, LABOR, CAPITAL, GROSS INCOME, OPERATING COSTS, RESIDUAL RETURNS, AND RETURNS TO OPERATOR LABOR, RISK, AND MANAGEMENT FOR SPECIFIED COTTON-ALLOTMENT COMBINATIONS EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price and Allotment Combinations[a]						
		17.6-LMBH	22.0-L	26.4-L	30.8-L	22.0-M	26.4-M	30.8-M
		(thousands)						
Cotton	acre	1.8	8.6	Organization same as 22.0-L	Organization same as 22.0-L	13.2	Organization same as 22.0-M	Organization same as 22.0-M
Soybeans	acre	26.2	19.4			14.8		
Alfalfa	acre	1.4	1.4			1.4		
Bermuda	acre	19.6	19.6			19.6		
Cotton lint	cwt.	6.3	29.8			46.0		
Beef stockers	head	19.6	19.6			19.6		
Operator labor	hour	229.3	234.4			238.1		
Hired labor	hour	0.0	0.0			0.0		
Land capital	dol.	12,564.3	12,564.3			12,564.3		
Annual capital	dol.	3,256.5	3,321.6			3,366.2		
Gross income	dol.	4,510.2	4,789.8	4,921.1	5,052.4	4,963.0	5,165.7	5,368.4
Operating costs	dol.	3,696.2	3,911.7	3,911.7	3,911.7	4,059.8	4,059.8	4,059.8
Residual return	dol.	814.0	878.1	1,009.4	1,140.7	903.2	1,105.9	1,308.6
Return to operator labor, risk, and management	dol.	-97.3	-33.2	98.1	229.4	-8.1	194.6	397.3

APPENDIX D, TABLE III (Continued)

Item	Unit	Cotton Price and Allotment Combinations[a]					
		22.0-B	26.4-B	30.8-B	22.0-H	26.4-H	30.8-H
		(thousands)					
Cotton	acre	15.5	Organization same as 22.0-B	Organization same as 22.0-B	17.9	Organization same as 22.0-H	Organization same as 22.0-H
Soybeans	acre	12.5			10.1		
Alfalfa	acre	1.4			1.4		
Bermuda	acre	19.6			19.6		
Cotton lint	cwt.	54.2			62.4		
Beef stockers	head	19.6			19.6		
Operator labor	hour	239.9			240.6		
Hired labor	hour	0.0			0.0		
Land capital	dol.	12,564.3			12,564.3		
Annual capital	dol.	3,388.7			3,411.8		
Gross income	dol.	5,050.3	5,288.8	5,527.4	5,137.4	5,411.9	5,686.3
Operating costs	dol.	4,134.4	4,134.4	4,134.4	4,210.0	4,210.0	4,210.0
Residual return	dol.	915.9	1,154.4	1,393.0	927.4	1,201.9	1,476.3
Return to operator labor, risk, and management	dol.	4.6	243.0	481.7	16.1	290.5	564.9

[a]Allotment levels are denoted: 55 percent of base level, L; 85 percent of base level, M; 100 percent of base level, B; and 115 percent of base level, H.

APPENDIX D, TABLE IV

SANDY MINIMUM RESOURCE FARM: AREA AGGREGATIONS OF CROPS, COTTON LINT, LIVESTOCK, LABOR, CAPITAL, GROSS INCOME, OPERATING COSTS, RESIDUAL RETURNS, AND RETURNS TO OPERATOR LABOR, RISK, AND MANAGEMENT FOR SPECIFIED COTTON PRICE-ALLOTMENT COMBINATIONS EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price and Allotment Combinations[a]						
		17.6-LMBH	22.0-L	26.4-L	30.8-L	22.0-M	26.4-M	30.8-M
		(thousands)						
Cotton	acre	2.7	10.7	10.7	10.7	16.3	16.3	16.3
Peanuts	acre	44.4	44.4	44.4	44.4	44.4	44.4	44.4
Alfalfa	acre	84.7	76.7	76.7	76.7	71.1	71.1	71.1
Bermuda	acre	36.7	36.7	36.7	36.7	36.7	36.7	36.7
Cotton lint	cwt.	10.3	41.3	45.6	45.6	62.7	69.2	69.2
Beef stockers	head	77.8	77.9	77.8	77.8	77.9	77.9	77.9
Operator labor	hour	663.9	691.6	710.1	730.1	707.6	736.3	766.4
Hired labor	hour	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Land capital	dol.	74,065.7	74,066.2	74,066.5	74,065.5	74,065.0	74,065.5	74,064.5
Annual capital	dol.	12,664.8	12,798.4	12,799.6	12,798.9	12,891.6	12,891.5	12,891.1
Gross income	dol.	25,216.9	25,448.7	25,636.0	25,836.0	25,578.5	25,860.4	26,164.9
Operating costs	dol.	18,348.9	18,497.7	18,476.2	18,460.7	18,604.1	18,568.6	18,545.3
Residual return	dol.	6,868.0	6,951.0	7,159.8	7,375.8	6,974.4	7,291.8	7,619.6
Return to operator labor, risk, and management	dol.	1,984.4	2,052.2	2,223.2	2,400.0	2,071.4	2,331.5	2,599.8

APPENDIX D, TABLE IV (Continued)

Item	Unit	Cotton Price and Allotment Combinations[a]					
		22.0-B	26.4-B	30.8-B	22.0-H	26.4-H	30.8-H
		(thousands)					
Cotton	acre	19.2	19.2	19.2	22.2	22.2	22.2
Peanuts	acre	44.4	44.4	44.4	44.4	44.4	44.4
Alfalfa	acre	68.2	68.2	68.2	65.2	65.2	65.2
Bermuda	acre	36.7	36.7	36.7	36.7	36.7	36.7
Cotton lint	cwt.	74.1	81.9	81.9	85.6	94.4	94.4
Beef stockers	head	77.9	77.9	77.9	77.8	77.8	77.6
Operator labor	hour	716.1	750.2	786.0	725.1	763.9	805.1
Hired labor	hour	0.0	0.0	0.0	0.0	0.0	0.0
Land capital	dol.	74,065.1	74,065.2	74,064.8	74,065.2	74,065.8	74,065.9
Annual capital	dol.	12,941.2	12,940.9	12,941.6	12,991.3	12,990.1	12,990.2
Gross income	dol.	25,648.0	25,980.2	26,342.2	25,718.2	26,100.2	26,517.2
Operating costs	dol.	18,661.2	18,617.6	18,591.9	18,718.8	18,667.2	18,636.9
Residual return	dol.	6,986.8	7,362.6	7,750.3	6,999.4	7,433.0	7,880.3
Return to operator labor, risk, and management	dol.	2,081.6	2,389.2	2,706.6	2,092.0	2,447.0	2,813.2

[a]Allotment levels are denoted: 55 percent of base level, L; 85 percent of base level, M; 100 percent of base level, B; and 115 percent of base level, H.

APPENDIX D, TABLE V

CLAYEY MINIMUM RESOURCE FARM: AREA AGGREGATIONS OF CROPS, COTTON LINT, LIVESTOCK, LABOR, CAPITAL, GROSS INCOME, OPERATING COSTS, RESIDUAL RETURNS, AND RETURNS TO OPERATOR LABOR, RISK, AND MANAGEMENT FOR SPECIFIED COTTON PRICE-ALLOTMENT COMBINATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price and Allotment Combinations[a]						
		17.6-LMBH	22.0-L	26.4-L	30.8-L	22.0-M	26.4-M	30.8-M
					(thousands)			
Cotton	acre	1.7	12.3	12.3	12.3	18.8	18.8	18.8
Peanuts	acre	30.3	30.3	30.3	30.3	30.3	30.3	30.3
Alfalfa	acre	47.9	47.9	47.9	26.3	47.9	36.0	6.4
Soybeans	acre	39.7	29.1	29.1	48.2	22.6	34.5	41.7
Bermuda	acre	40.0	40.0	40.0	42.5	40.0	40.0	62.4
Cotton lint	cwt.	5.9	43.0	43.0	43.0	65.7	65.7	65.7
Beef stockers	head	42.0	42.0	42.0	44.4	41.9	41.9	62.2
Operator labor	hour	381.4	411.9	488.6	555.8	424.0	536.3	640.9
Hired labor	hour	98.9	86.4	34.3	29.8	83.3	28.5	29.7
Land capital	dol.	40,924.1	40,923.2	40,922.9	40,923.9	40,922.3	40,923.2	40,923.0
Annual capital	dol.	7,816.9	7,912.3	7,886.2	8,289.9	7,973.5	8,028.4	10,463.7
Gross income	dol.	14,707.1	15,128.3	15,335.8	15,523.7	15,371.4	15,519.0	18,092.2
Operating costs	dol.	11,090.3	11,407.4	11,334.7	11,311.7	11,608.8	11,356.5	13,548.8
Residual return	dol.	3,616.8	3,720.9	4,001.1	4,212.0	3,762.6	4,162.5	4,543.4
Return to operator labor, risk, and management	dol.	950.8	1,036.0	1,250.9	1,461.8	1,070.2	1,397.5	1,709.2

APPENDIX D, TABLE V (Continued)

Item	Unit	Cotton Price and Allotment Combinations[a]					
		22.0-B	26.4-B	30.8-B	22.0-H	26.4-H	30.8-H
		(thousands)					
Cotton	acre	22.1	22.1	22.1	25.5	25.5	25.5
Peanuts	acre	30.3	30.3	30.3	30.3	30.3	30.3
Alfalfa	acre	47.9	26.5	4.8	47.9	20.8	4.8
Soybeans	acre	19.3	38.4	38.4	15.9	35.0	35.0
Bermuda	acre	40.0	42.3	64.0	40.0	48.0	64.0
Cotton lint	cwt.	77.5	77.5	77.5	89.3	89.3	89.3
Beef stockers	head	42.0	44.1	63.6	42.0	49.1	63.5
Operator labor	hour	430.4	559.5	670.9	436.7	584.4	697.7
Hired labor	hour	81.6	34.4	20.5	79.8	35.2	9.7
Land capital	dol.	40,922.3	40,923.1	40,923.5	40,922.8	40,923.3	40,922.9
Annual capital	dol.	8,005.1	8,363.1	10,664.2	8,036.7	8,999.9	10,689.8
Gross income	dol.	15,497.5	15,860.3	18,494.3	15,623.6	16,663.8	18,722.1
Operating costs	dol.	11,713.3	11,607.4	13,672.9	11,817.7	12,296.0	13,888.6
Residual return	dol.	3,784.2	4,252.9	4,821.4	3,805.9	4,367.8	4,833.5
Return to operator labor, risk, and management	dol.	1,087.9	1,471.6	1,829.0	1,105.6	1,544.3	1,946.7

[a]Allotment levels are denoted: 55 percent of base level, L; 85 percent of base level, M; 100 percent of base level, B; and 115 percent of base level, H.

APPENDIX D, TABLE VI

CLAYEY (C) MINIMUM RESOURCE FARM: AREA AGGREGATIONS OF CROPS, COTTON LINT, LIVESTOCK, LABOR, CAPITAL, GROSS INCOME, OPERATING COSTS, RESIDUAL RETURNS, AND RETURNS TO OPERATOR LABOR, RISK, AND MANAGEMENT FOR SPECIFIED COTTON PRICE-ALLOTMENT COMBINATIONS, EAST CENTRAL AND SOUTH CENTRAL OKLAHOMA

Item	Unit	Cotton Price and Allotment Combinations[a]				
		17.6,22.0,26.4-L	30.8-L	17.6,22.0,26.4-M	30.8-M	17.6,22.0-B
			(thousands)			
Cotton	acre	No feasible solution	8.6	No feasible solution	13.2	No feasible solution
Soybeans	acre		13.4		8.8	
Alfalfa	acre		14.7		14.7	
Bermuda	acre		12.3		12.3	
Cotton lint	cwt.		30.0		46.0	
Beef stockers	head		9.9		9.9	
Operator labor	hour		56.3		122.3	
Hired labor	hour		73.5		32.3	
Land capital	dol.		12,565.2		12,564.8	
Annual capital	dol.		2,170.8		2,194.0	
Gross income	dol.		3,829.5		4,142.0	
Operating costs	dol.		2,912.9		3,000.1	
Residual return	dol.		916.6		1,141.9	
Return to operator labor, risk, and management	dol.		133.2		317.7	

APPENDIX D, TABLE VI (Continued)

Item	Unit	Cotton Price and Allotment Combinations[a]				
		26.4-B	30.8-B	17.6,22.0-H	26.4-H	30.8-H
				(thousands)		
Cotton	acre	15.5	15.5		17.9	17.9
Soybeans	acre	6.5	9.2		4.1	10.0
Alfalfa	acre	14.7	12.0		14.7	3.1
Bermuda	acre	12.3	12.3		12.3	18.0
Cotton lint	cwt.	54.3	54.3		62.6	62.6
Beef stockers	head	9.9	9.9		9.9	15.1
Operator labor	hour	59.2	155.1		78.5	185.3
Hired labor	hour	77.1	16.7		65.8	19.0
Land capital	dol.	12,565.7	12,563.6		12,564.4	12,564.2
Annual capital	dol.	2,239.6	2,227.7		2,256.6	2,887.4
Gross income	dol.	4,064.5	4,270.1		4,189.0	5,004.3
Operating costs	dol.	3,137.9	3,012.4		3,196.9	3,635.9
Residual return	dol.	926.6	1,257.7		992.1	1,368.4
Return to operator labor, risk, and management	dol.	141.3	412.5		195.0	503.3

No feasible solution

[a]Allotment levels are denoted: 55 percent of base level, L; 85 percent of base level, M; 100 percent of base level, B; and 115 percent of base level, H.

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Education: Graduated from Mansfield High School, Mansfield, Arkansas, in 1943; attended Arkansas Polytechnic College, Russellville, Arkansas, 1946-48; received the Bachelor of Science Degree in Agriculture from the University of Arkansas in 1953; received the Master of Science in Agricultural Economics from Oklahoma State University in 1966; completed requirements for the Doctor of Philosophy at Oklahoma State University in May, 1967.

Professional Experience: Served with the United States Army, January, 1945, until May, 1946; Instructor, Veterans Farm Training Program, Arkansas, June, 1948, until June, 1952; Assistant, Associate, and County Agent with Arkansas Agricultural Extension Service, Benton, Crawford, and South Logan counties, June, 1953, until February, 1958; Agricultural Director for Arkansas Tuberculosis Sanatorium, February, 1958, until November, 1960; Associate County Agent, Washington County, November, 1960, until September, 1963; Research Assistant and N.D.E.A. Fellow at Oklahoma State University, November, 1963, until September, 1966; Associate Professor of Agricultural Economics and Extension Economist, University of Missouri, September, 1966 to present.

Organizations: Phi Kappa Phi; Missouri Society of Farm Managers and Rural Appraisers; American Farm Economics Association.