SOME EFFECTS OF THE SOIL BANK ON CORN AND WHEAT CROPPING PRACTICES IN FOUR MICHIGAN FARMING AREAS

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SOME EFFECTS OF THE SOIL BANK ON CORN AND WHEAT CROPPING PRACTICES IN FOUR MICHIGAN FARMING AREAS

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ABSTRACT

The purpose of this study was to analyze some of the actions and adjustments which farmers have made with respect to the Soil Bank Act.

With this purpose in mind, 364 farms in four important economic areas of Michigan were visited during the summer of 1957. Farmers were asked questions in an effort to provide an answer to the following problems: (1) What types of farms and farmers were using the Soil Bank? (2) How was the Soil Bank affecting farmers' cropping practices? and (3) Was the Soil Bank creating a different pattern of land use than was created by previous control programs?

The 109 Soil Bank participants were compared to 255 non-participants with respect to various different characteristics of the farm and farmer. No significant differences were found with respect to size of farm, the ownership status, and age of the operator. However, significant differences were found with respect to the type of farm and the proportion of his total income the operator earned from farming. However, intensive livestock operators and full-time farmers appeared relatively more reluctant to participate in the Soil Bank.

Within the sample, 55 farmers or 15 percent of the sample participated in the wheat acreage reserve. A total of 83 farmers or 23 percent of the sample participated in

the corn acreage reserve. The decrease in corn and wheat acreage from 1956 to 1957 for the sample was affected by the acreage which the Soil Bank participants placed in the acreage reserve. Non-participants did not decrease their acreages of corn, and wheat producers who were non-participants decreased wheat acreage by only eight-tenths of a percent.

Corn and wheat producers who participated in the Soil Bank did not significantly substitute plant nutrients on their remaining corn or wheat for the land removed from production. More important was the fact that both participants and non-participants increased their use of plant nutrients from 1956 to 1957, serving to partly offset Soil Bank induced acreage reductions by increased yields.

It was tentatively concluded that one of the reasons why the Soil Bank did not reduce the acreage of wheat and corn in the nation enough to raise prices and significantly reduce surpluses was the fact that payment rates were not high enough to attract intensive livestock and full time farmers. It was also tentatively suggested that, although Soil Bank participants did not significantly appear to substitute capital inputs to production for land inputs removed through the Soil Bank, all groups of farmers are increasing their use of capital inputs in the form of more plant nutrients. This increased productivity will continue to offset any acreage reduction or control program.

Approved Lawrence Witt

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The author assumes full responsibility for any errors that may be present in this manuscript.

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Since 1920, land resources devoted to agricultural production have increased only slightly. Yet, through the use of new technology, more use of capital, and better management, the productivity of American agriculture has increased faster than has the demand for most of agriculture's products. Various estimates suggest that for the aggregate of agricultural products, there exists a price elasticity of demand of about -.25, that is, a one percent change in supply changes the aggregate price paid to farmers by four percent in the opposite direction. This inelastic demand is coupled with an elastic supply response, and has resulted in free market prices for farm products which have generally been too low for most people to accept.

The Surplus Problem

Farm interests and Congress have long been aware of American agriculture's capacity to overproduce and of the resulting tendency of this capacity to lower prices and farm income--even, as now, in the face of relative non-agricultural prosperity. Proposed solutions have included no action (free market), tax exemptions for farmers, production controls, marketing quotas, price supports at

varying percentages of different parity formulas, various labor displacement schemes and combinations of these. Perhaps for political reasons, production controls and price supports have been applied the most often.

Production control policies operate under the assumption that by limiting the land input to production, a decrease in output will be effected. With an inelastic price elasticity of demand, a small decrease in output should provide impetus for a favorable rise in the price of farm products. Price supports have been made available to those farmers who limited their use of land in growing various supported commodities.

The history of these price support programs shows that substitution ratios among inputs are not fully understood. With prices fixed at high levels, farmers offset acreage limitations by increasing their intensity of production on remaining acres or by substituting plantings of non-supported commodities on the restricted acreage. The results of 25 years of attempts to raise prices are almost eight billion dollars worth of surplus commodities held by the Commodity Credit Corporation, farm prices which are still too low to be generally acceptable, and expenditure of some $4 billion per year on agricultural programs.

The Soil Bank program grew out of a recognition that society is unwilling to accept the consequences of abundance and will not allow prices to fall to levels that will allow

agricultural products to clear the free market. It is a further expansion of the theory that control of land inputs will control production. The Soil Bank is an action program designed partly as a short run attempt to alter the supply function of certain basic commodities considered to be in surplus and partly as an attempt to provide a long run alternative use for productive resources which will help alleviate the overall surplus problem.

Such an action type government farm program as the Soil Bank will tend to affect different segments of the agricultural community in different ways. It will also find acceptance in varying degree by different types and classes of producers. During the summer of 1957, after the Soil Bank had been in effect for one year, 364 Michigan farms were visited. Questions were asked in an effort to provide an answer for each of the following problems:

(1) What types of farms and farmers were using the Soil Bank?

(2) How was the Soil Bank affecting farmers' cropping practices?

(3) Was the Soil Bank creating a different pattern of land use than was created by previous control programs?

Background of the Soil Bank

The original Agricultural Adjustment Act of 1933 was similar in several ways to the Soil Bank Act. The A.A.A. provided supplementary payments for farmer's products if

they would limit their use of land in the production of 15 basic commodities[1] to previously established allotments. The Act further provided, in part, as follows:

> Such agreement to curtail...production shall contain a further provision that such...producer shall not use the land taken out of...production, for the production for sale directly or indirectly of any other nationally produced agricultural commodity or product.[2]

Payments to farmers were derived from taxes on food processors and were based on what were then thought to be "reasonable" prices defined as parity. The formulation of parity ratios has a history unto itself, but at that time it was designated as agriculture's position relative to 1910-1914.

The objective of the original act was to eventually establish and maintain a level of production at which products would move in the free market at "reasonable" prices.

By 1934, the Commodity Credit Corporation was established in conjunction with the A.A.A. of 1933, and a loan program for corn growers was in effect. Loans were made to farmers at 55 percent of parity prices if they would rather store than sell. Later, most commodities were made eligible for loans. The original intent of the A.A.A. was not to

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[1]These commodities included: wheat, cotton, field corn, hogs, rice, tobacco, milk and its products, rye, flax, barley, grain sorghums, cattle, sugar beets, sugar cane, and peanuts.

[2]Agricultural Adjustment Act, Public Law 10, 73rd Congress, 1st Session, Title I.

guarantee farmers a satisfactory price directly through the support program. Rather, it was designed to help farmers carry surplus stocks until changed conditions brought about by production controls or other causes would enable them to move accumulated C.C.C. stocks to market in an orderly fashion.

In 1936, the Supreme Court ruled that federal production controls were unconstitutional along with the processor's tax. The Soil Conservation and Domestic Allotment Act of 1936 served as an emergency substitute by providing an annual appropriation of 500 million dollars to be spent to encourage farmers to practice soil conservation. However, large surpluses of wheat and cotton were produced in 1936 and by 1938, pressure was on Congress to reestablish some form of production control.

The Agricultural Adjustment Act of 1938 established essentially the same type of program which still exists. For farmers desiring paid supports, restrictions of crop plantings were reduced to include only the crop or crops for which the farmer would receive a support payment. The U.S.D.A. was required to provide support loans only on corn, wheat, and cotton, although the C.C.C. was authorized to make loans on other commodities. Three other provisions of the act included: (1) continuance of acreage allotments with payments based on acreage in the allotment, (2) marketing quotas with penalties for non-compliance if accepted by

a two-thirds majority of producers determined by special referendum, and (3) continuation of marketing agreements whereby farmers and producers can exercise control over the marketing of certain products.

Since 1938, the number and kinds of commodities under support loans and support prices and the parity formulas used to determine the support prices have varied, but the same general framework has been in use down to the present day. Farmers have responded by increasing production in 1955, 56 percent over 1930, and this in the face of an increase of only 35% in population.[3] It has been pointed out that in the period 1949 through 1956, except for the period influenced by the Korean War, agriculture was geared to produce an average of eight percent more total product than was demanded through normal consumption channels, including exports, at generally acceptable prices.[4] By intensifying the use of non-land inputs in production and by substituting non-"basic" crops for those "basic" crops removed from production, the farmer has kept well filled the larder of the

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[3]Theodore W. Schultz, Agriculture and the Application of Knowledge, from the program for a conference sponsored by the W. K. Kellogg Foundation, Battle Creek, Michigan, June 1956, p. 56.

[4]John F. Stollsteimer, "Effects of Government Loan and Purchase Programs Upon Domestic Market Supplies of Farm Products in the Post War Period." (Unpublished M.S. Thesis) Michigan State University, East Lansing, Michigan, 1957, p. 108, Table 26.

Commodity Credit Corporation. Even war periods, with their resultant increases in demand, have provided only temporary periods of balance. In some respects, the war years served to intensify the problem by allowing an accumulation of more productive resources than were needed in post war years.

In 1955, Congress was ready to attempt a new approach to the surplus and price problem. J. Carroll Bottum has concisely summarized the alternatives that lay before Congress at that time:

> (1) let lower prices shrink production, (2) use some form of production or marketing controls across the board, or (3) draw land out of crops by making payments either for non-use or a lower economic use--commonly referred to as soil bank approach.
>
> Some might wish to add transfer payments to agriculture or price supports as a panacea. While these may ease the income situation for agriculture, they are like aspirin: they ease the pain but are not the cure.
>
> Low prices will adjust agricultural production in the long run, but the process is slow. We know that when a supply of one commodity is large and the price is low relative to others, the farmer will adjust more quickly than when he has to adjust total production. This is the problem of shifting resources within agriculture.
>
> However, if all commodities are in over supply and there is no commodity to shift to, there is a problem of shifting resources out of agriculture. This is a much more difficult shift and takes longer. Some marginal land and some farms must shift out of crops as a result of unprofitable returns. This shift requires several years. The question is, 'Does agriculture and society want to go through the price and income hardships of this course of action unaided as compared to the other alternatives?'
>
> If the control is taken and it proves effective, then controls must limit production or marketing of all

major commodities or at least of all major harvested crops. We have had enough experience with controls to know the problem of setting up individual crop limitations. Too much substitution is possible in agriculture to solve the overall supply problem by reducing only certain crops. The total problem must be treated.

The third alternative involves drawing certain acres of harvested crops out of production and shifting them into grass, fallow, or trees through rental or acreage reserve payments. In most cases, the land will go to grass. The grass may or may not be used, depending upon the plan. A fixed percentage of land taken out on each farm would not correct the long-time production problem unless the acreage were held out of production indefinitely.[5]

The Soil Bank Program

From the observation of a fall in farm prices and a concurrent rise in farm costs, farm groups and Congressional and state legislators in 1954 began pressuring the administration for a new remedy to curb the worsening situation. Senator Hubert Humphrey (Dem., Minnesota) presented an Acreage Reserve Bill to the Senate in 1955. This bill was rejected by True Morse, the Under Secretary of Agriculture, because he felt it would pay farmers for not producing and would be too difficult to administer. In October of 1955, the governors of the midwestern states met to formulate an action program for consideration by the administration.

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[5]J. Carroll Bottum, The Soil Bank as a Solution to the Farm Price and Income Problem, 85th Congress, 1st Session, Joint Economic Committee Print, Washington, D. C., November 22, 1957, pp. 701, 702.

Proposals of other interested groups, particularly The American Farm Bureau Federation, were also aired and presented to Congress and the administration. On January 9, 1956, President Eisenhower presented the soil bank proposal in a special message to Congress.

Before the Agricultural Act of 1956, known as the Soil Bank Act, was finally passed, a wide divergency of political forces were brought into play to help shape the final legislation. The Farm Bureau emphasized the Acreage Reserve proposal. Farm Bureau President, Shuman, stated:

> The basic purpose of the surplus reduction and Soil Bank Plan, as we conceive it, is to bring about at the earliest feasible date a balance between annual supply and effective demand and to make more rapid progress toward the liquidation of current surplus stocks.[6]

In contrast to the Farm Bureau's position, the Farmers Union feared that four year's use of the acreage reserve provisions would place agriculture in a position of being unable to re-expand production to meet domestic and export requirements in 1960. They further stated:

> We are convinced that it (the Soil Bank) is grounded on the false premise that the mere physical existence of stocks in the inventories of the Commodity Credit Corporation is a farm income depressing factor.[7]

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[6]American Farm Bureau Official Newsletter, January 16, 1956, p. 11.

[7]U.S. Congress, House, General Farm Legislation, Part I., Hearings Before the Committee on Agriculture, 84th Congress, 2nd Session, Washington: Government Printing Office, 1956, p. 7.

The Grange felt that too much blanket authority would have to be given to the U.S.D.A. for administration of the acreage reserve. They further insisted that the acreage reserve provisions should provide "adequate incentive to ...(1) 'buy' a substantial adjustment between currently available markets and current agricultural supply; and (2) put dollars of purchasing power in the hands of the rural families of America (which we believe is highly desirable in the face of the situation that now confronts us)."[8]

There was some disagreement among the major farm organizations concerning the best method of buying acreage reductions in the Soil Bank. The Farm Bureau urged that "...producers who voluntarily decide to underplant any allotment...receive a payment in the form of negotiable certificates valid for the purchase of C.C.C. stocks.[9] The Farm Bureau felt that it was equally important for the country to work toward the elimination of the surplus stocks of commodities held by the C.C.C. and that this goal should be pursued in connection with crop acreage reductions. The Grange felt that payments should be "sufficiently attractive to try to reduce government stocks...and also add some money to the pockets of farmers."[10]

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[8] Ibid., Part 2, statement by Herschel D. Newsom, p. 615.

[9] Ibid., statement by Charles B. Schuman, p. 415.

[10] Ibid., statement by Herschel Newsome, p. 617.

Melvin P. Gahlbach, chairman of the Soil-Bank Association of Lincoln, Illinois, was, in 1954, one of the first persons to present a soil bank plan to a congressional committee. In his testimony in 1956 he stated:

> Our proposal was never intended to unload government-held surpluses onto the farmer or onto the market, but instead, to effectively adjust production below current needs to make use of present held surpluses at their full value.[11]

The first attempt to put a Soil Bank program into effect was a House bill, H. R. 12. President Eisenhower vetoed the program replying that parity supports of 90%, parity for wheat, cotton, corn, and peanuts, mandatory price supports for feed grains, and a multiple price plan for wheat and rice would increase the amount of government control and the amount of government-held surpluses. The President signed the second bill which became known as the Soil Bank Act, on May 28, 1956.[12]

Provisions of the Soil Bank Act

The Soil Bank is divided into two parts, the Acreage Reserve and the Conservation Reserve. The Conservation Reserve contracts run for three, five, or ten years depending on the type of conservation practice to be used and the

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[11] Ibid., p. 324.

[12] Public Law 540, 84th Congress, Chapter 327, 2nd Session, HR 10875.

condition of the land at the commencement of the contract. The Conservation Reserve is specifically designed to encourage farmers to shift their acres from production of non-allotment crops to soil conserving practices such as grass, trees, wildlife cover or water storage. Any farmer may participate on land that has been tilled, or has been in a regular rotation in the year immediately before the contract is signed. The farmer may also contract land that has tame hay or silage harvested from it within the two years immediately before the contract is signed. Up to 80 percent of the cost of establishing permanent conservation uses plus an annual payment for contracted acreage averaging eleven dollars an acre in Michigan is returned to participating farmers. A farmer must contract a minimum of two acres if trees are to be planted, or five acres for other types of cover. The maximum payment for any one farm is $5,000.

This study is more concerned with the Acreage Reserve part of the Soil Bank Act. Within the sample of 364 farms which were used to evaluate the Soil Bank, only three farms participated in the Conservation Reserve. The ratio (.82%) corresponds with a ratio of 1.73% participation for all Michigan farms.

The Acreage Reserve is a short-run program providing payments to farmers for underplanting their allotments of "basic" crops, corn, wheat, short staple cotton, rice, and

tobacco. The payments are of such a size as to compensate farmers for the average net income they would have received had they planted the "basic" crops on the reserved acres. Payments are made in the form of negotiable certificates which may either be cashed at a bank or redeemed in a surplus commodity, if any are available, from the Commodity Credit Corporation at 5 percent more than the face value of the certificate. Payments on each individual farm are determined by multiplying the base unit rate of the crop ($1.20 a bushel for wheat, $.90 a bushel for corn) times the normal yield per acre and then by the number of acres a farmer will put into the program.

A farmer may place in the acreage reserve 20 acres of corn or 30 percent of his allotment, and 50 acres of wheat or 50 percent of his allotment, whichever is higher. In addition, a farmer participating in the Acreage Reserve can plant his allotment of a "basic" crop minus the acreage put in reserve, but must comply with all acreage allotments applying to his farm. One exception to this rule is wheat. Any farmer may produce as much as 15 acres of wheat and still be eligible for Soil Bank payments on other "basic" crops. However, a provision similar to one found in the Agricultural Act of 1938 allows a farmer to increase his acreage of non-basic crops as long as he keeps idle the designated acres for the Acreage Reserve.

Administrative Interpretations

The administration by a federal agency of such a large government undertaking as the Soil Bank program may prove to be a strategic factor in affecting the impact of the program on the public. Congress allowed a wide variance in specific procedures in administering the Soil Bank in several instances.

In 1957, a limit of $750 million was set on payments to producers who participated in the Acreage Reserve. These funds were alloted to counties over the United States. Within these funds, county A.S.C. committees accepted agreements from farmers on a "first come, first served" basis. If county funds were all obligated before the end of the sign-up period, a list was prepared of those farmers who desired to take part in the program, but whose applications were received too late for inclusion under the initial allotment. Unused funds from other counties and states could then be channeled into areas which had a higher demand for participation in the Acreage Reserve.

This particular administrative interpretation of the Soil Bank Act allowed for the possibility of a concentration of funds available for use by a certain type of farmer or farmers in a certain area. Conceivably, a redistribution of income from non-farm sources and between areas of agriculture could take place using tax monies as a vehicle of transfer. Certain farmers or areas could benefit from this

program more than others. For instance, it might be hypothesized that the Soil Bank program instead of merely working to cut back price depressing surpluses and bring supplies in line with demand, may also serve to keep people on farms who have better alternative opportunities off the farm. One hypothesis of this study is that farmers who earn a considerable proportion of their income off the farm avail themselves more readily of Soil Bank payments than those who earn most or all of their income from farming. It should be noted that Michigan, which offers considerable off-farm job opportunities in rural areas, used an additional $2 million allocation of funds in 1957 to meet the demand for corn acreage reserve contracts. These funds came primarily from intensively farmed corn belt states such as Iowa and Illinois which did not fully use their initially allocated funds.

During the development of the Soil Bank legislation, considerable attention was given to provision of adequate safeguards for the interests of tenants and sharecroppers. The Secretary of Agriculture was given wide discretion in protecting these interests through his local A.S.C. committees. Soil Bank payments are to be shared in the same manner as the income from crop production would have been shared had the crops been grown. It should be noted, however, that a landlord could terminate the services of a tenant and then put his land in the Soil Bank. The burden

of proof of the landlord's intent to force a tenant off the farm in order to participate in the Soil Bank lies on the local A.S.C. committee and would be difficult to sustain. This provision has not proved troublesome in Michigan where most farmers state that there is plenty of land available for rent.

The architects of the Soil Bank Act were hopeful that farmers would redeem their Soil Bank payment certificates in surplus commodities. A five percent bonus on the face value of the certificates was offered as an inducement for commodity redemptions. In 1957, however, free market grain prices were below the support prices. This enabled farmers to redeem their certificates in cash and buy on the open market more advantageously than by redeeming certificates directly for commodities. The C.C.C. reported that few farmers redeemed certificates in 1957. Had the free market price for grain been equal to or above the support price, it is possible that many farmers would have taken their Soil Bank payments in commodities, greatly reducing the quantity of surplus commodities held by the C.C.C. Such an action would, however, have tended to reduce free market demand and prices.

CHAPTER II

REVIEW OF LITERATURE

The Soil Bank was introduced as an additional procedure designed to reduce surpluses and raise farm incomes. The method employed by the Soil Bank consists of limiting the land input in production. This idea finds its origins in the original Agricultural Adjustment Act of 1933. To better understand why this type of program was undertaken again and what impact it may have on agriculture, three questions should be asked: First, why is there a surplus problem? Second, why was the Soil Bank Act offered as a solution to the problem? And third, what is the theoretical economic framework from which was derived a belief that a "soil bank" type program would work? The first question is much too complex, beyond a few comments, for an answer here. However, account will be taken of the second and third questions.

Sherman Johnson has said that technological innovations made available through research, evolving in a favorable environment, and financed by high wartime and postwar prices for products, have provided a source of overproduction.[13] Johnson cites the two most important environmental

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[13]Sherman E. Johnson, "The Meaning of Technical Change in the Farm Economy of North America" (paper prepared for discussion at the Ninth International Conference of Agricultural Economists, Otanierni, Finland, August 20, 1955.)

factors as (1) education and (2) sufficient income to take advantage of new opportunities. He then notes that the adoption of new technologies has meant higher investment costs and higher cash operating expenses, resulting in higher "break-even points" in farming. This in turn means that farm income is more vulnerable to lower prices and crop failures.[14]

Johnson introduced the idea that advances in technology frequently accelerate imbalances in agricultural production although he does not fully explain this concept. Earl Heady begins to explain this imbalance by demonstrating the supply function for agricultural production.[15] He first states that the supply function for individual farm products is highly elastic because: (1) the production function approaches an elasticity of 1.0 on individual farms; (2) large changes can be made in the quantity of resources used on any one crop without significantly changing the total quantities used in agriculture; (3) skills of labor and the services of capital resources have great adaptibility between products; (4) the production possibility curve is one with great flexibility for transfer of resources between products; and (5) shifts of resources between

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[14] Ibid., p. 14.

[15] Earl O. Heady, "The Supply of U.S. Farm Products Under Conditions of Full Employment," American Economic Review, May 1955, pp. 228-38.

products does not always bring on any change in uncertainty. Thus, on a particular farm there are wide opportunities for input and product substitution.

Heady then notes that the short run aggregate supply function is relatively inelastic. Although output does respond, in a small way, to price changes under conditions of full employment, planned changes in the use of inputs between years have never been over 2.5 percent. This leads Heady to conclude that factor/product price ratios do not readily influence aggregate agricultural output in the short run. He does say that output becomes responsive to prices in the long run as more resources are brought into agriculture.

Glenn Johnson has gone further to explain the nature of the surplus and income distribution problem. He states that the nature of the market for factors of production in agriculture has created a partially irreversable supply function.[16] Dr. Johnson notes that for most agricultural resources, market prices are different between acquisition costs and salvage value. Therefore when production increases, over the long run, resources are best used in least cost combination, purchased of course at their acquisition

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[16]Glenn L. Johnson, "Some Contributions of Micro-Analysis to Agricultural Policy," (paper given before a seminar for Cooperators in the Tennessee Valley Authority Agricultural Economic Research activities, Knoxville, Tennessee, March 9, 1956, mimeograph.)

cost. With a contraction in product prices, these imperfectly priced resources remain worth more in production than on the "resale" market, at least for a time.

He then cites war and the accompanying price supports used to call forth enough production to meet demand as a major incentive for the purchase of production resources. At war's end, demand, and hence product prices, fall. But the marginal value productivity of productive resources remain above their salvage values giving rise to production of more commodities than will clear the market at acceptable prices.

Many other agricultural economists have commented on the origin of the surplus problem. Schultz has emphasized the higher quality of the inputs used in production, particularly where the human factor is concerned.[17] Cochrane has given importance to increasing technology and to supply inelasticity as being sources of the surplus problem.[18] The references discussed in the paragraphs above, however, seem most pertinent to the problems covered in this thesis.

The second question at the beginning of this chapter asks why a soil bank type program was offered as a solution

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[17]Theodore W. Schultz, "Reflections on Agricultural Production, Output, and Supply," Journal of Farm Economics, August 1956, pp. 758-62, especially p. 762.

[18]Willard W. Cochrane, "Conceptualizing the Supply Relation in Agriculture," Journal of Farm Economics, December 1955, pp. 1161-76.

to the farm problem. Glenn Johnson divides proposed solutions to the problem into two parts: competitive production adjustments and non-competitive productive adjustments. Competitive adjustments include: attempts to reach static equilibrium by cutting out government controls or at least modifying them to provide flexible price supports (thus presumably squeezing out resources), improving farm income by expanding demand, increasing the net income of farmers by lowering their costs through better farm management, and by preventing further expansions of production by curtailing aid to farmers in the form of new technology and farm management practices through research. Johnson indicates that market expansion and cost lowering policies have been unsuccessful. If society were to use static equilibrium adjustment methods and/or curtail the availability of technological advances and good farm management practices to farmers, careful examination of societal values would be needed. Some of these values might include: should adjustment include a painful squeezing out of inefficient farmers; and should political hindrances be disregarded in order to further economic efficiency. Johnson says that the values held by society will not permit these adjustment methods.

Non-competitive adjustments include public education, incentives to leave farming, public credit, and publicly supported research on one hand and monopolistic

restrictions on output and marketing on the other. Monopolistic restrictions include marketing quotas, acreage allotments, soil bank, and loan programs. Rural leaders and politicians, after having made value judgments which go beyond or bypass the attainment of economic efficiency, have offered the Soil Bank as a solution, conferring certain monopoly powers on agriculture. This solution appears to be based on a particular conception of the relation of agricultural production to land as an input factor. The monopoly implicit in the Soil Bank is the concept of distributing public tax monies to agriculture, allowing agriculture to decrease land inputs--and presumably production. This gives agriculture as a group the power to restrain trade and raise prices.

The third question under consideration asks for a theoretical framework illustrating the operation of the Soil Bank. Dr. Earl Heady discusses the explicit conditions under which output can be decreased or revenue increased under various aspects of controls in an article in The Review of Economics and Statistics.[19] At the time this article was written, acreage control programs allowed land withdrawn from the production of controlled crops to be

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[19]Earl O. Heady, "Resource and Revenue Relationships in Agricultural Production Control Programs," The Review of Economics and Statistics, Vol. XXXIII, No. 3, August 1951, pp. 228-40.

planted in non-controlled crops. Therefore, most of Dr. Heady's analysis allows for this substitution to occur. However, he does illustrate the condition prevailing on farm firms where one product specialization occurs to the extent that no substitution is possible. This case parallels the Soil Bank, because land removed from the production of a control crop may not be used for production or sale of any grain or forage crop. He outlines the alternatives open to a participating farmer as follows:

> If production is continued under a one-crop system after control programs are applied, output will be lessened on individual farms if the farmer is not able to (1) reallocate given labor and capital resources on fewer acres or (2) substitute more labor, capital and other non-land resources for land resources, to an extent which offsets the reduction in land output (e.g. the acreage left out of production under the control program).[20]

Figure I illustrates the logic implicit in an acreage control program of the soil bank type. Heady uses this chart to illustrate the control of one factor on a single product farm. The curves IP, I'P', and I"P" are isoproduct lines suggesting how various combinations of land and other factors (labor and capital) could be used in producing a given output of crops. It may be supposed that, given the initial factor inputs of OL_2 land, and OC_2 capital and labor, withdrawal of L_1L_2 units of land from

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[20] Ibid., p. 229.

production would also result in withdrawal of C_1C_2 units of non-land resources from production. Heady then points out that

> ...output would then decrease (a) in the same proportions (as the decrease in factor inputs) if the production function is linear, (b) by greater proportions if the elasticity of the production function is greater than 1.0, and (c) by smaller proportions if the elasticity is less than 1.0. [21]

Heady explains that the most probable adjustment in this case will be such that while the input of land is reduced, the total input of labor and capital may remain near previous levels resulting in a more intensive cultivation of land remaining in cultivation. The difference in outcome is illustrated in Figure I. If the reduction in land inputs L_1L_2 were to be accompanied by a proportional decrease in capital and labor C_1C_2, output would drop from IP to I"P". If capital and labor inputs remain at C_2, output will only drop to I'P'. Heady suggests that decreasing returns to scale and to single factors operate in agriculture and that this would further reduce the shift of the iso-product curves when land inputs are decreased.

This analysis has several implications for the Soil Bank. Farmers are given cash payments for the land removed from farm production. They might conceivably use these payments as additional productive capital and increase capital-

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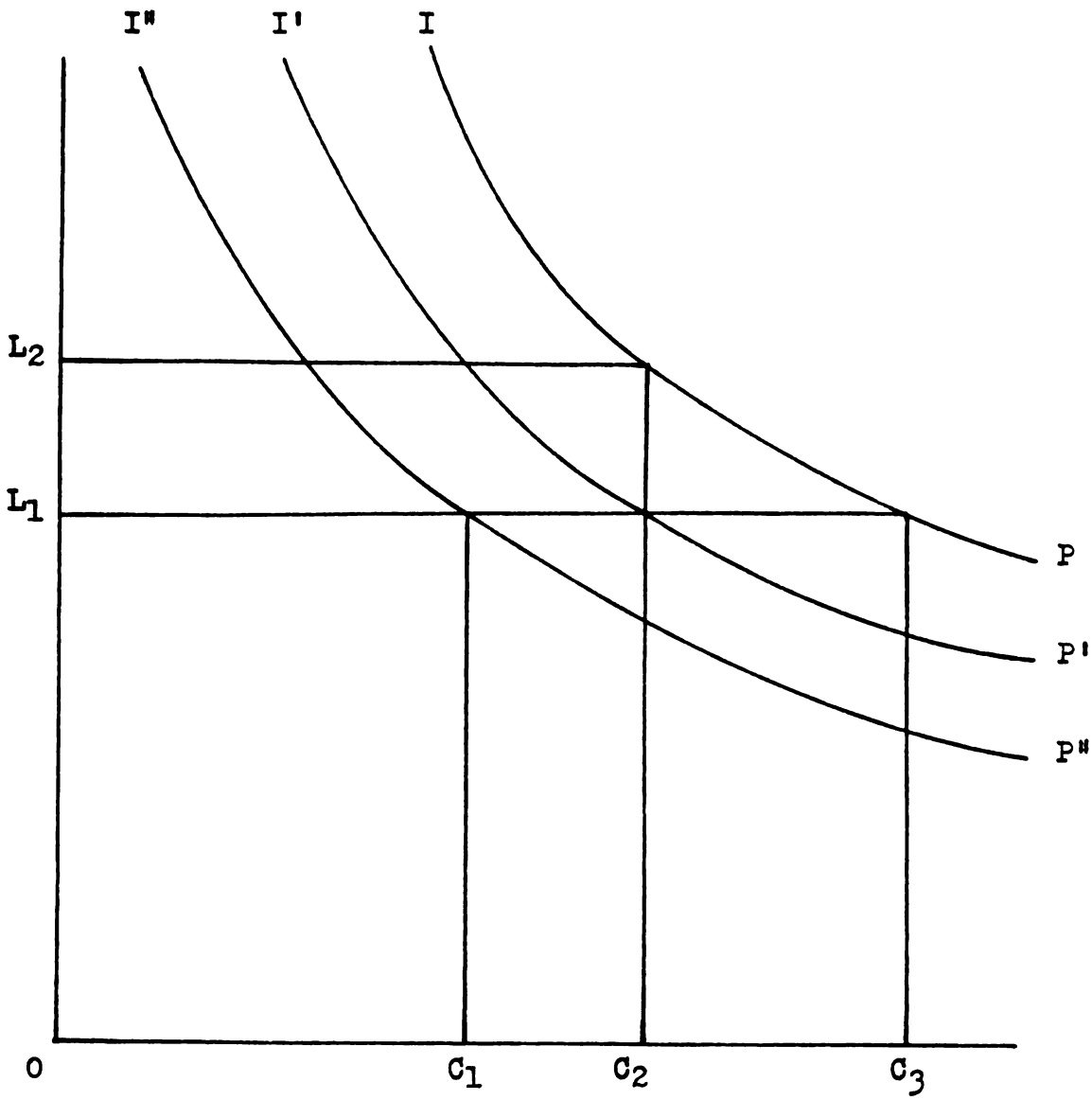
[21] Ibid., p. 236.

Figure I.

PRODUCTION SURFACE OBTAINED FROM A
TWO-VARIABLE INPUT FUNCTION



labor inputs to C_3 leaving them on the same iso-product line as they were before the introduction of the Soil Bank program. They might also accept Soil Bank payments and, with less land to cultivate, find off-farm employment. This might reduce the capital-labor inputs to C_1 reducing output to I"P". The empirical analysis in this thesis gives some indication as to how Michigan farmers are using these payments.

The Soil Bank has been in effect now for over a year and a half. Although there has not been enough time yet for much empirically based critical evaluation of the act, a number of groups and persons have rendered comments and judgments.

Many organizations and groups within the fields of agriculture are affected by the provisions of the Soil Bank Act. The American Bee Journal carried an article pointing out the implications of the Soil Bank on beekeepers.[22] Forestry finds itself particularly affected by the provisions of the Conservation Reserve part of the Soil Bank. W. S. Swingler discusses the increased need for seed stock and trained foresters in an article in the Journal of Forestry.[23] An article in Farm Management is typical of

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[22]"What the Soil Bank Means to Beekeepers," American Bee Journal, October, 1956.

[23]W. S. Swingler, "Forestry in the Soil Bank," Journal of Forestry, November, 1956, pp. 747-49.

the material found in popular farm magazines. It points out the responsibilities that go with participation in the Soil Bank including weed and insect control. The article urges farmers to take a close look at the costs of maintaining reserved acres in order to determine if the Soil Bank offers good income possibilities.[24]

Much of the material published on the Soil Bank consists of guides for the farmer, describing their best use of the Soil Bank as an income alternative. Michigan State University and many other land grant colleges have published pamphlets, handbooks, etc., for use by county agents and extension personnel to explain the Soil Bank to farmers. Some of these publications make use of the partial budget method which estimates the effect on net income of making management decisions involving the Soil Bank.

Several leading agricultural economists have viewed the Soil Bank Act in retrospect and passed judgments, favorable and unfavorable. Dr. O. B. Jesness stated:

> My reaction to the soil bank approach is that it has much merit in principle but its application has been such that it has fallen far short of achieving its objective, namely adjustment of production. The acreage reserve was intended to hold out of use temporarily some highly productive land to enable CCC to move its excess stocks into use. The conservation reserve, ..., was intended to achieve a longer-run balance in capacity to produce.

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[24]"A Manager's Responsibility: Soil Bank Deposits," Farm Management, December, 1956.

> Among the difficulties of the soil bank is the fact that it has been accepted as an income booster, a form of crop insurance, and a conservation measure to such an extent that its adjustment goal has been lost sight of by many. Sufficient emphasis has not been placed on getting a dollar's worth of adjustment for each dollar of the public's money expended. The application has been general rather than specific. Our surplus problems are in specific lines, especially wheat and cotton, and in specific classes of wheat and in particular areas and regions. A program to achieve its end must be highly selective with respect to crops, areas, farms and farmers rather than to be available to Tom, Dick and Harry without regard to the adjustment results.[25]

Another viewpoint was given by Don Paarlberg, Under Secretary for Agriculture, in a discussion found in The Journal of Farm Economics.[26] Paarlberg pointed out that advancing technology and high level price supports have called forth the surpluses. He further says that the Soil Bank, coupled with realistic levels of price support, research in developing new products and markets, upgrading of diets, and programs to lighten the impact of technology on disadvantaged individuals are all being coupled together in order to bring agriculture into balance.

J. Carroll Bottum in the Farm Policy Forum[27] estimated

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[25]Letter from Dr. O. B. Jesness, Department of Agricultural Economics, University of Minnesota, St. Paul, Minnesota, January 16, 1958.

[26]Don Paarlberg, "Shortcomings in Current Explanations of National Farm Surpluses," Journal of Farm Economics, December, 1956, pp. 1708-16.

[27]J. Carroll Bottum, "The Soil Bank Approach," Farm Policy Forum, Summer, 1956, p. 20.

that no noticeable effect on aggregate production will appear until 25 to 30 million acres of non-roughage crops are taken from production. He maintained that the first 25 million acre shift out of non-roughage crops would be counterbalanced by:

(1) the fact that grass, legumes, and fallow crops are complementary in the long run to the production of grain and fiber,

(2) new technology which could offset the reduction of crop acreages at the rate of 5 million acres a year,

(3) lower than average producing acres of land being shifted into the Soil Bank.

Bottum further pointed out that a program which brought about adjustments just short of a useful goal (30 million acres) would be pointed to as a failure.

Willard Cochrane stated that the Soil Bank is no policy for the faint-hearted--60 to 80 million acres would be needed to cut aggregate output four to five percent.[28] This is the current rate of overproduction at present support levels. Cochrane further states that the Soil Bank rental bill to the U.S. Treasury might then run from $1 billion to $1½ billion per year--year after year.

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[28]Willard W. Cochrane, "An Appraisal of Recent Changes in Agricultural Programs in the United States," Journal of Farm Economics, May, 1957, p. 295.

Currently, considerable interest is being shown by Congress in the enlargement of the Conservation Reserve. Cochrane states:

> ...if proponents and administrators of the soil bank idea get to mixing soil conservation goals and increased productivity for the future in with their immediate plans for reducing production, as a sop to the supposed tender public conscience, the soil bank idea may well end in a fiasco. It is impossible to reduce production and expand it simultaneously.[29]

In 1954, a survey taken from the same sample used in this thesis gave some indication of the results of production control programs.[30] The controls used in 1954 included wheat marketing quotas and corn allotments. The results from this study indicated that cash grain farms were more successful in offsetting production controls than were livestock producers. It was also suggested that the impact of production controls on farms may be quite different, depending upon the enterprises around which the farm is organized.

Preliminary results from studies being made by the U.S.D.A. of Soil Bank farmers have produced some findings which should be compared with those reported in Chapter IV of this thesis. It was suggested that (1) Soil Bank

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[29]Ibid.

[30]Dale E. Hathaway, "The Effects of Agricultural Production Controls in 1954 on Four Michigan Farming Areas," Quarterly Bulletin, Michigan Agricultural Experiment Station, East Lansing, Michigan, Vol. 37, No. 4, May, 1955.

participants average older in age than non-participants, (2) a larger proportion of participants have non-farm jobs than non-participants, (3) many farmers are using the Conservation Reserve to get crop land not well adapted for crops shifted to permanent cover crops, (4) some farmers faced with difficulty in hiring farm labor are putting part of their farms into the Conservation Reserve, (5) most non-participants say that much higher payment rates would be necessary to make participation profitable, and (6) land put into the Soil Bank appears to be as valuable and productive as land not being reserved.

An empirical study of the Soil Bank was completed recently in Wisconsin.[31] The findings from this study pointed out that many farmers participating in the Soil Bank are using the Soil Bank payments to overcome the transitional problems of insecurity in the shift to industrial employment. Another conclusion from this study indicated that about 68 percent of those Soil Bank participants who had rented land to others in 1956 decreased the amount rented to others in 1957.

Some of the characteristics of the 189 Soil Bank participants who responded in the Wisconsin survey follow:

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[31]A. Allan Schmid, "The Soil Bank: An Appraisal of the Experience in Rock County, Wisconsin," Agricultural Economics Pamphlet 23, University of Wisconsin, Madison, Wisconsin, 1957.

Several characteristics of the Soil Bank participants are tied up with the fact that one-half of the survey respondents were working off the farm in addition to their farming activities.

First, the Soil Bank participants on the whole did not shift their operations from cash grain to dairy or livestock farming. They seemed to be using the Soil Bank to replace a large part of their farm income and did not try to make up the loss in total income, if any, by shifts within the farm operation itself.

Second, a majority of the farmers who placed land in the Acreage Reserve put all of their eligible land in the program. This indicates that farmers used the program on an all or nothing basis rather than as a supplement for part of the grain production operation.

Third, most of the Acreage Reserve participants were cash grain farmers. Farmers who fed most of the grain that they raised did not participate to a great extent.

Another important aspect of the participants was that about one-fourth of participants were over 65 years of age. Elderly farmers, those in poor health, and others who wanted to farm less intensively seemed to find the program an attractive alternative.[32]

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[32] Ibid., pp. 36, 37.

CHAPTER III

PROCEDURE AND METHOD

The Sample

The sample which provided data for this study was originally selected in 1954.[33] By resurveying the same sample as used previously, it was hoped to reduce any memory bias concerning past farm and crop acreage figures. In 1954, the sample selection was based on the following criteria: first, to sample farms with the largest number of production

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[33]The following studies have been completed using data obtained from this sample: Hsiang Hsing Yeh, "Estimating Input-Output Relationships for Wheat in Michigan Using Sampling Data, 1952-54" (Master's Thesis, Michigan State University, East Lansing, Michigan, 1955.) William Delmar Murphy, "Attitudes of Michigan Farmers Toward Government Production Control Programs as Shown in a 1954 Survey" (Master's Thesis, Michigan State University, East Lansing, Michigan, 1955.) Myron Eugene Wirth, "Production Responses to Agricultural Controls in Four Michigan Farming Areas in 1954" (Master's Thesis, Michigan State University, East Lansing, Michigan, 1956.) Dale E. Hathaway, "The Effects of Agricultural Production Controls in 1954 on Four Michigan Farming Areas," Quarterly Bulletin, Michigan Agricultural Experiment Station, May, 1955, pp. 565-573. Lawrence Witt and Dale E. Hathaway, "Farmers' Plans to Change Livestock Numbers as Related to Agricultural Production Controls," Quarterly Bulletin, Michigan Agricultural Experiment Station, May, 1956, pp. 511-519. Charles Beer, "Effect of Acreage Control Programs on Crop and Livestock Operations on Selected Michigan Farms" (Ph.D. Thesis, Michigan State University, East Lansing, Michigan, 1957.) Eber W. Eldridge, "Wheat Acreage Shifts in Michigan and the Implications" (Master's Thesis, Michigan State University, East Lansing, Michigan, 1957.)

decisions and alternatives which are typical of decisions being made in commercial farming areas in Michigan; second, to obtain a random sample within counties in these types of farming areas; third, to select townships within these counties in an attempt to maintain an approximately uniform soil type within each of the economic areas;[34] fourth, to sample those farms with a minimum 15 acre wheat allotment.[35]

The selection of townships within each county was limited to include only those townships which had not participated in a similar survey in 1952 and where there were no township agent programs in progress. This restriction avoided dual enumeration by Michigan State University.

The sample farms were located in four different economic areas as shown in Figure II. The types of farms, by percentages, in the four economic areas are shown in Table I.

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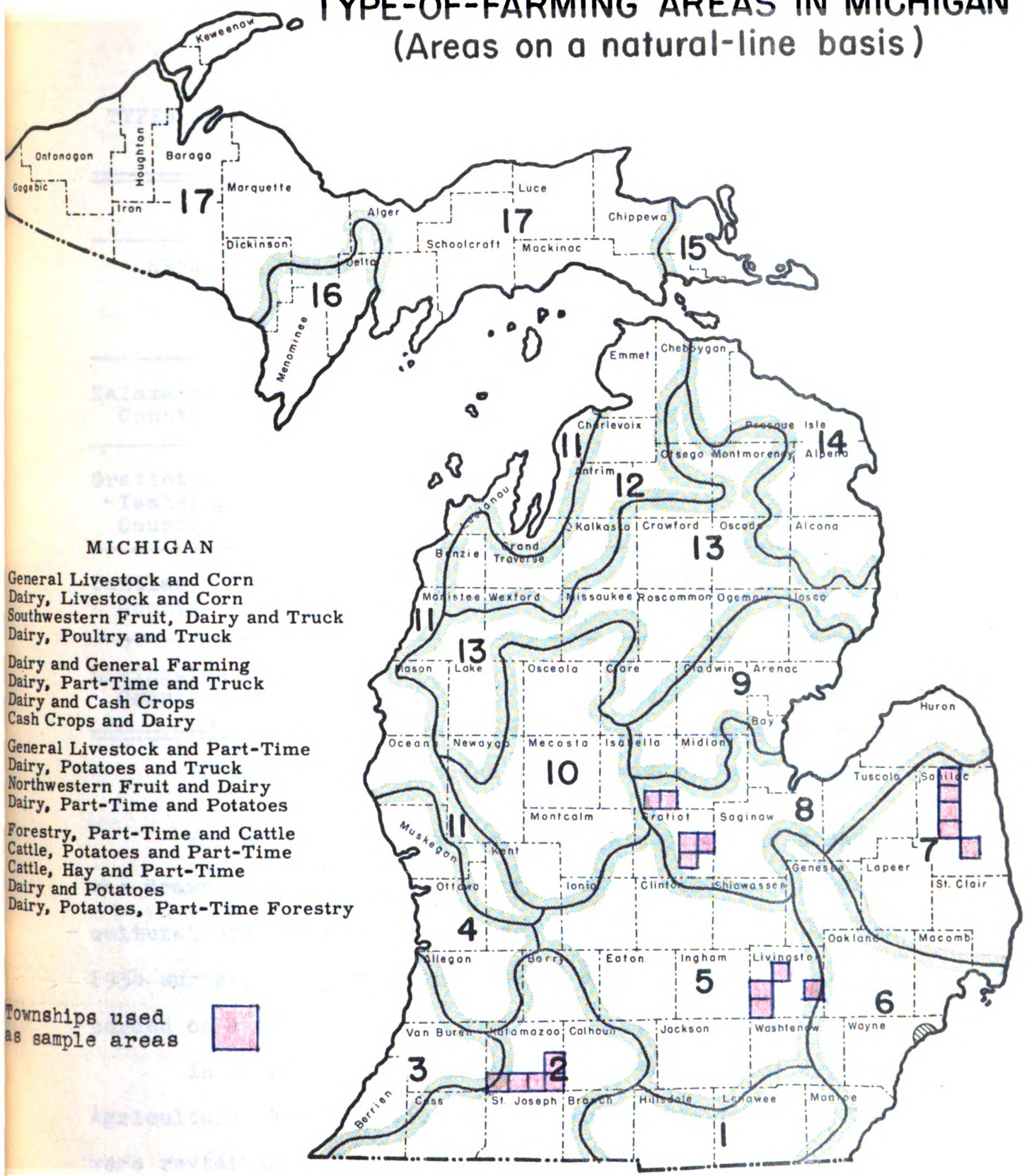
[34]For one area, Gratiot-Isabella, it was necessary to select townships from both counties in order to maintain a uniform soil type.

[35]In 1954, this sample was chosen primarily to provide data for studies of the effect on then existing production controls on Michigan farms. The wheat marketing quotas of the Agricultural Act of 1954 provides that farmers who have wheat acreage allotments of more than 15 acres are required to comply with these allotments or pay a cash penalty for all wheat grown on acreage in excess of the allotment. Therefore all farmers with wheat allotments of less than 15 acres were eliminated, since they were required to make an adjustment in acreage only if they wanted to be eligible for price supports. Although the farms interviewed were larger than the average farm shown by the census, they were quite typical of commercial farms in Michigan.

TYPE-OF-FARMING AREAS IN MICHIGAN
(Areas on a natural-line basis)



The 83 counties in Michigan are here grouped into 17 type-of-farming areas as indicated in this map. The "natural" boundaries of these areas do not, however, follow county boundaries, but lines representing the influences of soil, climate and markets.

Figure II. Location of sample townships

TABLE I.

TYPES OF FARMS, BY PERCENT, IN THE FOUR FARMING AREAS*

	TYPES OF FARMS (PERCENT OF TOTAL)			
AREA	Dairy	Livestock other than dairy or poultry	Cash grain	General Farms
Kalamazoo County	29	14	15	24
Gratiot and Isabella Counties	30	5	20	22
Sanilac County	28	2	42	22
Livingston County	38	11	15	18

*Data for 1949 from the 1950 Census of Agriculture.

For each township selected for study, a random sample was drawn from the wheat listing sheets on the County Agricultural Stabilization and Conservation Committees. In the 1954 survey, 414 farms were visited and information was recorded on a seventeen-page questionnaire.

In order to bring information up to date the County Agricultural Stabilization and Conservation Committee offices were revisited in 1957. The current wheat listing sheets were examined to determine which farms would be resurveyed.

Farms were eliminated from the 1957 survey if the ownership of over fifty percent of the total farm acreage had been split in such a manner as to create a new management unit. It must be considered that the farms dropped from the study could introduce a bias into the final results. In examining the 1957 sample, there appears to be no significant difference in the number of farms dropped for each economic area. Including those farms where the farm operator could not be contacted, the percentage decrease from 1954 in each area was as follows: Kalamazoo County, 14 percent; Gratiot-Isabella Counties, 11 percent; Sanilac County, 11 percent; Livingston County, 11 percent.

The average crop acreage of the farms used in this study was 174.8 acres while the average crop acreage of the farms dropped from this study was only 132.2 acres. Most of these latter farms were dropped because of absorption into larger management units or because they are no longer being farmed. The increase in size of the farms used in the study is consistent with the nation wide trend toward larger and fewer farms.

This analysis has assumed that the farms dropped from the 1954 survey are random in effect and will not bias the results of the 1957 survey.

Analysis

The questionnaire used for the survey contains questions which provided information on the following subjects: characteristics of the Soil Bank and non-Soil Bank participating farms and farmers; livestock and cropping practices and crop acreages for Soil Bank and non-Soil Bank participants; farmers attitudes toward and opinions of the Soil Bank Act and other government programs. This study is concerned with the first two subjects.

The questions used in this study mainly concern factual material which was either pre-coded or provided blanks to be filled in by the enumerator. Farmers who increased or decreased their acreage of wheat and/or corn were asked for their reasons for the change. These questions were left open ended and later coded to fit the IBM card.

All of the data were coded and punched on IBM cards for machine sorting and tabulations. When comparisons are made between the 1957 and 1954 surveys, identical farms are compared except when findings from other studies are referred to. Information concerning payment rates per acre for sample farms was obtained from the wheat and corn listing sheets of the County A.S.C. committees.

CHAPTER IV

CHARACTERISTICS AND COMPOSITION OF SOIL BANK AND NON-SOIL BANK PARTICIPATING FARMS AND FARMERS

One of the major factors governing the success of agricultural production control programs is the desire of farmers to participate. If the program is designed in such a manner as to offer a satisfactory management alternative to enough farmers, so that aggregate production of surplus commodities is brought into balance with demand, the program can be deemed a success.

If, as has been estimated, from 30 to 80 million acres would have to be withdrawn from the production of "basic" crops for the Soil Bank to be effective, then the present Soil Bank has not been successful. In 1957, only about 21 million acres of "basic" crop land was placed in the acreage reserve while another seven million acres of non-allotment crop land was placed in the conservation reserve. Grain prices dropped by 8.3 percent from December 1956 to December 1957.[36] The Agricultural Marketing Service published the following information concerning crop output in 1957:

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[36]U.S. Department of Commerce, Business Statistics, (supplement to The Survey of Current Business), Washington, D. C., Government Printing Office, February 21, 1958.

> Reduced output of food grains, cotton, oilseeds, tobacco and vegetables will probably be about offset by increases for sugar crops, feed grains, and hay and forage...Smaller acreage allotments and Soil Bank participation reduced total land planted to crops this year by about 3 percent from 1956 but yields on the average are up from last year by nearly 5 percent. [37]

Commodity Credit Corporation holdings of surplus commodities decreased in 1957 although this decrease was mainly effected by PL 480 disposal programs such as foreign currency sales and domestic donations.

In this chapter, the characteristics and composition of Soil Bank and non-Soil Bank participants will be examined. From the analysis, implications will be drawn with respect to (1) some reasons why the Soil Bank has apparently failed to achieve its goal of reducing the accumulation of farm surpluses and (2) what types of farms and farmers have found it advantageous to participate in the Soil Bank program.

Size Characteristics

During the course of the survey, many farmers remarked, "The Soil Bank is only good for the little fellow. He puts his farm in the Soil Bank and goes to town to work." However, this statement is not verified by data from the sample. The median acreage of farms of Soil Bank participants was 150.2 acres, while the median acreage of farms of

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[37] Agricultural Marketing Service, U.S.D.A., The Demand and Price Situation, Washington, D. C., Government Printing Office, November, 1957.

non-participants was 158.6 acres, a difference of only 8.4 acres. Table II illustrates the distribution, by size of farm, for the 117 Soil Bank participants and 247 non-participants. While the percentage of participation was slightly

TABLE II

FARM SIZE RELATED TO SOIL BANK PARTICIPATION

	SOIL BANK	NON-SOIL BANK
Farm Acreage	Percentage of Farms	
0-139 acres	44	41
140-259 acres	42	41
260-500 acres and over	14	18
Number of farms	117	247

higher for small farmers (139 acres and under), no significant difference appears to exist between the size of farms of Soil Bank participants and non-participants, even at the ten percent level of Chi square.[38]

The eight acre difference in the median acreage of

[38]For an explanation of the Chi square test of significance see Appendix B.

the two sample groups of farms may be indicative of a tendency for small farmers to accept the Soil Bank more readily than larger farmers. However, a larger proportion of farms of less than 140 acres were cash grain farmers than for the sample as a whole. Larger farms were very predominantly livestock producers. The relationship of types of farms to Soil Bank participation is shown below.

Type of Farm Characteristics

The planners of a policy program such as the Soil Bank need to consider the program's impact on producers who market surplus grains in the form of livestock. Livestock producers make up 30 percent of all U.S. farms and 40 percent of Michigan farms. In Iowa, for example, where 63 percent of all farms are classified as livestock producers,[39] the acreage reduction goal established by the U.S.D.A. was not met. A possible explanation for this may be the fact farmers feel that the value of land used in the production of livestock feed (corn) is much greater than the value of that land in the Soil Bank. This hypothesis is supported by the results of analysis of the sample data in this study, as Illustrated in Table III. Intensive livestock producers appeared relatively unwilling to participate in the Soil

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[39] Census of Agriculture, U.S. Department of Commerce, 1954.

TABLE III

INTENSITY OF LIVESTOCK OPERATIONS AS RELATED TO SOIL BANK PARTICIPATION

	SOIL BANK PARTICIPANT	NON-SOIL BANK PARTICIPANT
	Percent of Farms	
Intensive (Less than 5 acres per animal unit)*	17	48
Extensive (More than 5 acres per animal unit)	30	27
Less than 5 animal units of livestock	9	7
No livestock	44	18
Total farms	117	247

*For an explanation of the derivation of the animal unit see Appendix C.

Bank, while the majority of the Soil Bank participants were farmers with few or no livestock. Intensive livestock production requires a proportionately larger fixed investment in the livestock enterprise than is the case with extensive livestock production. It would be expected that the intensive livestock producers would be more unwilling to accept

a decrease in their primary feed source--corn.

Table IV illustrates the relationship of each type of farm in the sample to Soil Bank participation. Dairy and hog farmers appeared particularly unwilling to participate in the Soil Bank. Of the 152 dairy farmers in the sample, only 22 percent participated in the Soil Bank while only 18 percent of the 28 hog farmers participated. This compares with a total participation of 32 percent of all the sample farms. One possible reason why beef producers participated more readily in the Soil Bank than other types of livestock producers may be the fact that the beef enterprise requires less investment in fixed factors such as milking equipment and livestock housing.

Location Characteristics

The distribution of Soil Bank participants among the four economic areas surveyed in this study appears to be related to the number of livestock farmers in each area. Sanilac County had the highest proportion of livestock farmers of any sample area. Only 14 percent of all Soil Bank participants were located in this county. The distribution of Soil Bank participants related to the number of livestock farms and county livestock numbers is illustrated in Table V. The Gratiot-Isabella area, with the smallest percent of livestock farms, had the highest percent participation. Sanilac County had the least participation in the

TABLE IV

TYPES OF FARMS IN THE SAMPLE RELATED TO SOIL BANK PARTICIPATION

TYPE	SOIL BANK PARTICI-PANTS	% OF SOIL BANK PAR-TICIPANTS	% OF FARMS OF EACH TYPE	NON SOIL-BANK PAR-TICIPANTS	% OF NON-SOIL BANK PAR-TICI-PANTS	% OF FARMS OF EACH TYPE
Dairy	33	28	22	119	48	78
Beef	11	9	29	27	11	71
Hogs	5	4	18	23	9	82
Sheep	1	1	11	8	3	89
Other	1	1	20	4	2	80
General	6	5	46	7	3	54
Less than 5 animal units	8	7	35	15	6	65
No Live-stock	52	45	54	44	18	46
Total Farms	117	100	32	247	100	68

TABLE V

SOIL BANK PARTICIPATION RELATED TO NUMBERS OF LIVESTOCK FARMS IN THE FOUR ECONOMIC AREAS

	SOIL BANK PARTICIPANTS	LIVESTOCK FARMERS	COUNTY LIVESTOCK NUMBERS*
AREA	Percent of all Participants	Percent of sample farms in each area	
Kalamazoo County	24	56	37,891
Gratiot-Isabella Counties	36	55	59,134**
Sanilac County	14	81	141,437
Livingston County	26	63	50,505
Total Farms	117	247	

*Michigan Agricultural Statistics, Michigan Department of Agriculture, June, 1957. (Converted to animal units.)

**Average of the two counties.

Soil Bank and had the highest percentage of livestock farmers of the four areas of the study.

Characteristics With Respect to Respondents' Source of Income

Results from the Wisconsin Soil Bank study[40] indicated that Soil Bank payments may be helping to shift labor resources out of agriculture by making off-farm work appear more attractive. Soil Bank payments often enable a farmer to maintain his net farm income while he decreases his labor inputs in agriculture and increases his off-farm work load. The farmer is also able to maintain his equity in his farm for future use in case he is laid off from his off-farm employment.

This observation is substantiated by data from this study. Farmers in the sample were asked what proportion of their incomes were earned from farming. Among the Soil Bank participants, 33 percent had farm incomes of less than 40 percent of their total incomes. This contrasts with 18 percent of the non-participants who had farm incomes of less than 40 percent of their total incomes. Farmers with farm incomes of 90 to 100 percent of their total incomes were more frequently non-participants. The observed distribution is illustrated in Table VI. The Chi square test showed that there was a significant difference in the percent of income carned from farming between Soil Bank

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[40]Schmid, Op. Cit., p. 37.

participants and non-participants, even at the one percent level of significance.

TABLE VI

PROPORTION OF TOTAL INCOME FROM FARMING RELATED TO SOIL BANK PARTICIPATION

	SOIL BANK PARTICIPANT	NON-SOIL BANK PARTICIPANT
Income From Farming	Percent of Farms	
0-39%	33	18
40-89%	15	13
90-100%	52	69
Total Farms	117	247

The percentage of the respondent's income earned from farming was closely associated with the intensity of livestock production on the sample farms. This relationship is illustrated in Table VII. Farmers who spend time working away from the farm find it difficult to adequately maintain large numbers of livestock. Therefore, the distribution of the farmer's participation in the Soil Bank with respect to income earned from farming may be related to livestock numbers on the farm.

TABLE VII

THE RELATIONSHIP OF INCOME EARNED FROM FARMING AND INTENSITY OF LIVESTOCK PRODUCTION

PERCENT OF INCOME EARNED FROM FARMING	INTENSIVE LESS THAN 5 ACRES PER ANIMAL UNIT	EXTENSIVE MORE THAN 5 ACRES PER ANIMAL UNIT	LESS THAN 5 ANIMAL UNITS ON THE FARM	NO LIVESTOCK
	Percent of Farms			
0-39%	12	14	46	42
40-89%	8	15	25	18
90-100%	80	71	29	40
Total Farms	138	102	28	96

In Table VIII, the income and livestock production factors described above are compared simultaneously between Soil Bank participants and non-participants. If the hypothesis expressed in this thesis is correct, a large percentage of the Soil Bank participants will be extensive livestock producers or cash grain farmers earning none to 39 percent of their total incomes from farming. The largest percentage of the non-participants should be intensive livestock producers earning 90 to 100 percent of their income

TABLE VIII

PERCENT OF TOTAL INCOME EARNED FROM FARMING, AND TYPE OF FARM ENTERPRISE, RELATED TO SOIL BANK PARTICIPATION

PERCENT INCOME FROM FARMING	FARM ENTERPRISE	SOIL BANK PARTICIPANTS		NON-SOIL BANK PARTICIPANTS	
		Farms	Percent	Farms	Percent
0-39% (84 farms)	Intensive Livestock	5	4	11	4
	Extensive Livestock and/or Cash grain	34	29	34	14
40-89% (51 farms)	Intensive Livestock	3	3	9	4
	Extensive Livestock and/or Cash grain	15	13	24	9
90-100% (229 farms)	Intensive Livestock	12	10	98	40
	Extensive Livestock and/or Cash grain	48	41	71	29
Total farms		117	100	247	100

from farming. In Table VIII it is seen that 40 percent of the non-Soil Bank participants were intensive livestock producers. This is the largest group of non-participants. Among the Soil Bank participants, 29 percent were extensive livestock producers and/or cash grain farmers with farm incomes of less than 40 percent of their total incomes. It should be noted that only 23 percent of all the sample farmers fell in the 0 to 39% farm income category.

Extensive livestock producers and/or cash grain farmers were predominantly Soil Bank participants in all three income categories. This fact suggests that the farm enterprise factor was more important in determining the respondent's choice of the Soil Bank as a management alternative. This is understandable when it is seen that 83 farmers participated in the corn acreage reserve in 1957 while only 55 were in the wheat acreage reserve. Since corn is primarily grown for livestock feed and wheat is a cash crop, the corn acreage reserve participants strongly influenced the sample data with respect to livestock production and the Soil Bank. Each of these two groups will be more completely analyzed with respect to Soil Bank participation in Chapter V.

Farm Ownership Characteristics

The ownership status of the sample farm did not affect the farmer's desire to participate in the Soil Bank. Of

the 117 farms with acreage in the Soil Bank, 55 percent were owned by the farmer and 45 percent were rented from someone else. This compares closely with an ownership pattern of 52 percent owned and 48 percent rented for non-participants. No significant difference was found in the proportion of owned and rented farms for the two groups, even at the ten percent level of Chi square.

Age Characteristics

Many rural leaders have looked on the Soil Bank as an income alternative for retired farmers. Conceivably, a farmer who is approaching retirement age and who has difficulty finding a renter or hired labor, might find it advantageous to place his land in the acreage reserve and the conservation reserve. Most farmers in the sample stated that there was more land offered for rent than there were renters.

Under this condition it might be expected that Soil Bank participants would average older in age than non-participants. The median age of the 117 Soil Bank participants was 45.1 years while the median age of non-participants was 38.0 years--a difference of 7.1 years. However, when the distribution of ages of participants was compared with that of non-participants, as shown in Table IX, no significant difference could be found, even at the ten percent level of Chi square. When questioned about their attitudes toward

TABLE IX

AGE OF RESPONDENT RELATED TO SOIL BANK PARTICIPATION

	SOIL BANK PARTICIPANT	NON-SOIL BANK PARTICIPANT
AGE	Percent of Total	
Under 25	3	4
25-35	15	14
36-45	34	25
46-55	21	27
56-65	19	13
Over 65	8	12
Total respondents	117	247

the Soil Bank program, many non-participating elderly farmers expressed an interest in learning more about the income alternative which Soil Bank participation would provide. Perhaps when the Soil Bank, particularly the conservation reserve, has been in effect for a longer period of

time, more elderly farmers will use the Soil Bank as an alternative means of retiring.

Summary

The analysis of the sample suggests that the two important factors influencing the sample farmers' decision to participate in the Soil Bank were (1) the predominant enterprise on the farm, and (2) the extent of the farmers' off-farm work load. These two factors were, in turn, interrelated. Intensive livestock farmers tended to be full time farmers to a greater extent than extensive livestock or cash grain operators. The data obtained in the survey indicated that full time intensive livestock farmers were very reluctant to accept decreases in the acreage of land used to produce feed for their livestock enterprises. The part-time cash grain farmer apparently found Soil Bank payments an attractive income alternative, particularly since it allowed him to decrease his labor inputs to agriculture while maintaining his net farm income and perhaps to increase his total income.

The age and tenure status of the respondent did not appear to be significantly related to the farmer's decision to participate in the Soil Bank.

Intensive livestock producers tended to find it unprofitable to participate in the Soil Bank. If payment

rates were raised to the point where the livestock producer could profit by placing acreage in the Soil Bank and then buy feed, the program might have served to alleviate the feed grain surplus problem more effectively.

CHAPTER V

MICHIGAN WHEAT AND CORN CROPPING PRACTICES UNDER THE SOIL BANK

The purpose of this chapter is to examine the extent to which farmers in the sample are substituting non-labor factors of production for the reduced land factor. If it is assumed that most Soil Bank participating farms are not yet operating at a point where their marginal factor costs equal the marginal value products of these factors, then these farmers could profitably increase their inputs of non-land and non-labor factors, dampening or nullifying the effects of an acreage reduction. An analysis of (1) the extent of this substitution by farmers who reduced their land inputs and (2) the changes in the amounts of non-labor factors of production used by all producers provides a measure of the success of current production control programs.

Wheat and corn are the two crops analyzed in this study. They are the two most important field crops grown in the state. In 1956, corn accounted for 28.5 percent of the total value of Michigan agricultural production and wheat accounted for 15.2 percent.[41] These are the only

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[41] Michigan Agricultural Statistics, Michigan Department of Agriculture, June, 1957.

two "basic" commodities grown in Michigan which are eligible for the Soil Bank.

Wheat Acreage Trends

The wheat acreage of the sample farms has been reduced sharply since 1952. Most of this decrease took place in 1954 when mandatory wheat marketing quotas took effect. Wheat acreage was reduced from 15,069 acres in 1953 to 9,730 acres in 1954, a decrease of 35.4 percent. From 1954 to 1957 wheat acreage has declined further, by 15.1 percent, to 8,261 acres.

Table X illustrates the fact that harvested wheat acreage in the United States and Michigan was also drastically reduced from 1953 to 1954. The acreage of wheat in the sample, Michigan, and the United States decreased less from 1954 to 1955 and then increased from 1955 to 1956. From 1956 to 1957 a sharp decrease took place despite favorable weather conditions in Michigan and over much of the United States, and also despite continued high price supports.

Examination of figures from the sample and from the Michigan Agricultural Stabilization and Conservation Office indicate that the wheat acreage reserve of the Soil Bank is primarily responsible for the 1957 acreage decrease.

In 1957, the 989 acres placed in the wheat acreage reserve on the sample farms was 101.3 percent of the wheat

TABLE X

WHEAT ACREAGE TRENDS AND PERCENTAGE CHANGES FOR SOIL BANK PARTICIPANTS AND NON-PARTICIPANTS IN THE SAMPLE, IN MICHIGAN, AND IN THE UNITED STATES

AREA	1952 Acres	% change*	1953 Acres	% change*	1954 Acres	% change*	1955 Acres	% change*	1956 Acres	% change*	1957 Acres
Soil Bank					1,494	-3.2	1,446	1.7	1,470	-62.0	558
Non-Soil Bank					8,236	-9.4	7,462	4.1	7,767	- 0.8	7,703
Total Sample	12,024	25.3	15,069	-35.4	9,730	-8.4	8,908	3.7	9,237	-10.5	8,261
Michigan** (000)	1,438	6.0	1,524	-33.7	1,010	-5.6	953	9.4	1,043	-5.0	991
U.S.A.** (000)	71,130	-4.6	67,840	-19.8	54,356	-13.6	47,285	5.3	49,784	-12.3	43,664

*Difference as the percent of the previous year. Minus signs represent a decrease from the previous year.

**Agricultural Marketing Service, 1957 Annual Summary, Crop Production, U.S.D.A., Washington, D.C., December 17, 1957.

acreage reduction. The wheat acreage reserve in Michigan in 1957 was 248.0 percent of the acreage reduction and figures for the United States show that the 1957 wheat acreage reserve was 208.9 percent of the wheat acreage reduction. These figures indicate that within the sample the Soil Bank accounted for the wheat acreage reduction while for the state and nation, wheat acreage increases offset something over half of the Soil Bank reduction.

A study made of the parent sample from which the farms in the Soil Bank study were chosen[42] pointed out one method farmers have to increase wheat acreage under the mandatory wheat acreage control program. Under the Agricultural Act of 1954, no overplanting penalty is assessed if the wheat allotment on the farm is fifteen acres or less and if these farms plant no more than 15 acres of wheat. For example, a farm with a wheat allotment of seven acres could plant and market 15 acres of wheat. It appears that over one half of the wheat acreage reduction in Michigan induced by the Soil Bank was offset by non-Soil Bank participating farmers who overplanted wheat acreage allotments of less than 15 acres. Eldridge pointed out that in areas of specialized wheat production there are fewer farms with

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[42]Eber W. Eldridge, Op. Cit., for a description of the parent sample, see pp. 28-29. It should be noted that while the sample used for the Soil Bank study is stratified to exclude farms of less than 70 acres, Eldridge includes all farms.

allotments of less than 15 acres. This explains why, for the nation, the Soil Bank induced wheat acreage reduction was not offset as much as in Michigan, even though this offsetting factor was still considerable.

The four areas of the sample were analyzed with respect to wheat acreage trends and wheat acreage placed in the Soil Bank. The pattern of acreage change appears to be related to the two factors described in Chapter IV: (1) the predominant enterprise around which the farms in each area are organized and (2) the importance of off-farm income in each area. Table XI illustrates the wheat acreage and percentage change for each area and the percent of farms with incomes from farming of less than 50 percent. The farms in the Gratiot-Isabella area, which are more predominantly cash grain and general farms, decreased their wheat acreage by only 5.1 percent from 1954. In this area, only 20 percent of the farmers have farm incomes of less than 50 percent of their total incomes. In Livingston County, where wheat acreage declined by 20.2 percent from 1954, the predominant farm enterprise is dairying, and 40 percent of the farmers earn less than 50 percent of their incomes from farming. Kalamazoo and Sanilac Counties are also predominantly livestock and dairy areas and wheat acreage declined by 20.1 and 15.4 percent respectively. In Kalamazoo County 38 percent of the farmers earn less than 50 percent of their income from farming and 22 percent of the farmers in Sanilac

TABLE XI

WHEAT ACREAGE RESERVE, WHEAT ACREAGE TRENDS, AND PERCENTAGE CHANGES* IN THE FOUR SAMPLE AREAS 1954-1957

AREA	1954 Acres	% change	1955 Acres	% change	1956 Acres	% change	1957 Acres	1954-1957 % Change	1957 Wheat Acreage Reserve	% of farms in each area with less than 50% income from farming
Kalamazoo County	2,897	- 9.2	2,629	6.6	2,803	-17.4	2,315	-20.1	516	38
Gratiot-Isabella Counties	2,424	- 6.5	2,265	6.3	2,408	- 4.5	2,299	- 5.1	158	20
Sanilac County	2,280	-13.3	1,965	4.5	2,053	- 6.1	1,928	-15.4	103	22
Livingston County	2,154	- 4.9	2,049	-3.7	1,973	-12.8	1,719	- 20.2	212	40

*Difference as the percent of the previous year. Minus signs represent a decrease from the previous year.

earn less than 50 percent from farming.

The sample farms were divided into two income groups; those farms where less than 50 percent of the total income was earned from farming, and farms with farm incomes of 50 percent or over. These two categories were compared with respect to wheat acreage changes from 1956 to 1957. The results are shown in Table XII. Of the farmers in the less than 50 percent farm income category, 61 percent decreased wheat acreage. On farms where 50 percent or more of the total income was earned from farming a slightly smaller percentage, or 59 percent, decreased wheat acreage. A higher percentage of farms in the 50 percent or more farm income

TABLE XII

WHEAT ACREAGE CHANGE 1956 TO 1957 COMPARED TO PERCENT OF INCOME EARNED FROM FARMING

	CHANGE IN WHEAT ACREAGE, 1956 TO 1957			
	Increase	Decrease	No Change	Total Farms
PERCENT OF INCOME EARNED FROM FARMING	Percent of Farms			
0-49 percent	24	61	15	109
50-100 percent	34	59	7	255

group increased wheat acreage than in the 50 percent or less group. For the sample as a whole, the respondent's source of income appeared to affect his decision to increase wheat acreages. However, this factor appeared to be more important within each area than over the whole sample.

The study by Eldridge indicated that 80 percent of the farms in Sanilac County and 83 percent of the farms in Gratiot-Isabella Counties had wheat allotments of 15 acres or less. Only 53 percent of the farms in Kalamazoo County and 73 percent of the farms in Livingston County had allotments of less than 15 acres.[43] Thus farmers in the Sanilac and Gratiot-Isabella Counties were more able to counter the trend toward decreased wheat acreage by overplanting their wheat allotments. Eldridge found that wheat allotments were overplanted by 23 percent in Gratiot-Isabella Counties and 10 percent in Sanilac County.

The stratification used in selecting the sample for the Soil Bank study tended to decrease the number of farms with wheat allotments of less than 16 acres in each area. However, the farms in the sample were sorted into two categories; 147 farms with a wheat allotment of 15 acres or less and 217 farms with a wheat allotment of 16 acres or more. Although the distribution of these two groups by areas bore

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[43] Ibid., p. 45.

little resemblance to the distribution observed in Eldridge's study, farms with wheat allotments of less than 16 acres were compared for each area. In Gratiot-Isabella Counties where acreage decreased by only 5.1 percent in 1957 from 1954, 46.3 percent of the low allotment farmers increased wheat acreage in 1957 over 1956. In Sanilac County where wheat acreage decreased by 15.4 percent, 42.2 percent of these farmers increased wheat acreage. In Kalamazoo and Livingston Counties where acreage decreased by over 20 percent, only 29.3 and 36.2 percent, respectively, of the under 16 acre allotment group increased wheat acreage. Farmers with wheat allotments of less than 16 acres who are located in areas where cash grain farming is important are tending to overplant their allotments in order to keep incomes up.

A study made of this sample in 1954 suggested that (1) areas in which most of the farms were oriented around dairy herds had the most difficulty in maintaining production under controls and (2) areas with a relatively higher proportion of cash grain farms were more successful in offsetting controls.[44]

The distribution of participation in the wheat acreage reserve parallels, as would be expected, the reduction in wheat acreage in the four areas. Farmers with a wheat wheat allotment who are turning to alternative enterprises

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[44]Dale E. Hathaway, Op. Cit., p. 573.

in the face of government wheat marketing quotas, appear more willing to retire wheat land in the Soil Bank. Also, in areas where a greater proportion of farmers work off the farm, a larger number of farmers participated in the wheat acreage reserve, presumably reducing their labor inputs. It was pointed out in Chapter IV that the Soil Bank offers an alternative income for farmers making the transition to off farm employment. This is particularly true of the wheat acreage reserve, since a reduction of wheat acreage and the required labor inputs does not require a reduction in any other farm enterprise such as beef, poultry, or dairy.

The respondents were asked why they changed their wheat acreage from 1956 to 1957. Table XIII shows the answers that were given by farmers who changed acreage. The two most important reasons given for an increase in wheat acreage were (1) "to fit my rotation" and (2) farm operations other than rotation. The most important reason given by farmers decreasing wheat acreage was Soil Bank participation. Many farmers also cited a cut in allotment and rotation as reasons for decreasing wheat acreage.

Within each area, one factor which could have affected the individual farmer's decision to participate in the wheat acreage reserve was the payment rate offered him by the county A.S.C. office. Payment rates are based each year on the average county yields per acre for the two previous years. Personnel from the county A.S.C. offices rate

TABLE XIII

REASONS WHY FARMERS CHANGED THEIR WHEAT ACREAGE,

1956 TO 1957

REASON	NUMBER OF FARMS	PERCENT OF FARMS
Increased Acreage		
1. Allotment was increased (larger farm in 1957, etc.)	18	21
2. Rotation induced increase	28	33
3. Farm operations other than rotation induced increase	22	26
4. Approached 15 acres legal maximum wheat acreage (Farmers with less than 15 acre allotment)	10	12
5. Don't know	7	8
Sub Total	85	100
Decreased Acreage		
1. Allotment was cut	24	20
2. Allotment was cut because farm size decreased	5	4
3. Rotation induced reduction	25	21
4. Farm operation other than rotation induced reduction	20	17
5. Participated in wheat acreage reserve	42	35
6. Don't know	3	3
Sub Total	119	100
No answer, no change in acreage or no wheat produced	160	
Total	364	

each farm for productivity on an index basis. Given the county yields and the index of productivity for each farm, payment rates are assigned to all farms in the county prior to the time set for making contracts. Considerable variation within each county is possible as long as the county average yield is met.

There appeared to be no significant difference between the payment rate offered to wheat acreage reserve participants and non-participants, both for the whole sample and for each county.

Wheat Cropping Practices

In order to determine the extent of input substitution by farmers who participated in the wheat acreage reserve, two sorting operations were necessary. First, wheat acreage reserve participants were separated from all other wheat growers. Second, wheat acreage reserve participants who did not remove all their wheat acreage from production were separated from those participants who placed their entire wheat allotment in the Soil Bank. Comparisons were then made between inputs applied on wheat on Soil Bank participating farms and non-participating farms. A total of 55 farms participated in the wheat acreage reserve in 1957. Of these, 29 farms placed only a part of their wheat allotment in the acreage reserve. A total of 301 farms grew wheat but did not participate in the wheat acreage reserve.

Farmers were asked if they used certified seed for all or part of their 1957 wheat crop. Of the Soil Bank participants who grew wheat, 14 percent used certified seed while 15 percent of the non-participants used certified seed. Therefore, no significant difference appeared to exist between participants and non-participants regarding their use of certified seed.

The rate of application of fertilizer, excluding nitrogen top dressing, differs slightly between participants and non-participants. The average pounds of plant nutrients applied as fertilizer, per acre, on wheat grown on Soil Bank farms was 3.80 pounds while the application on non-Soil Bank farms was 3.34 pounds. Farmers participating in the Soil Bank applied 0.64 pounds of nitrogen in top dressing compared to a rate of 0.37 pounds for non-participants. These figures may be indicative of a tendency for Soil Bank farmers to apply more plant nutrients on wheat than non-participants apply. However, when the application rates in 1957 were compared with rates for 1956, non-participants appeared to be increasing their rates of application more often than are Soil Bank participants. Of the Soil Bank farmers who grew wheat, 10 percent were increasing their rate of application, compared with 17 percent of non-participants. While 21 percent of the participants were decreasing their rates of application, only 13 percent of non-participants were decreasing their rates of

application. In any case, the number of Soil Bank participants, within the sample, who grew wheat is too small to provide enough data from which conclusions can be drawn with a high level of confidence of accuracy.

Summary of Wheat Acreages and Practices

The wheat acreage reserve appears to have been successful in cutting back wheat acreage in the sample, Michigan, and the United States in 1957. Some reluctance to decrease wheat acreage was exhibited by sample farmers who derive most of their income from cash grain farming. These farmers tended to overplant their allotments if the allotments were less than 16 acres.

Livestock farmers and part time farmers were most willing to place land in the wheat acreage reserve, probably to expand other farm enterprises or as a way to reduce farm labor inputs and transfer them to off-farm work.

These findings may appear to be inconsistent with the results reported in Chapter IV. However, since wheat is grown mostly as a cash crop and corn as a livestock feed, the motives influencing a reduction in acreage for these two crops should differ. A farmer who derives a large portion of his total income from growing and selling wheat would be expected to resist an acreage reduction in his primary enterprise. The Soil Bank does offer payment for the acreage reduction, but leaves the full time farmer with a surplus

of his fixed labor resources. Corn producers, as will be shown later, are more strongly affected by their livestock enterprise since corn production is an integral part of the enterprise.

The wheat acreage reserve participants in this sample did not significantly substitute more inputs (in the form of better seed and more plant nutrients) for their loss of wheat land. The slightly higher use of plant nutrients by Soil Bank participants, as indicated by farms in this sample, if multiplied by much of the wheat land on Soil Bank farms in the United States, would partially offset the production reduction brought about by the Soil Bank. The increase in the rate of application by non-Soil Bank participants as shown by this sample would tend to further offset the effects of wheat acreage reductions. Such increases in the use of plant nutrients, however, might have occurred anyway as part of the changing production pattern. These increases then, may not necessarily be attributable to the existence of a Soil Bank program. In areas where wheat is farmed extensively and where water is more likely to be a limiting factor, it would be more difficult, if not impossible, to profitably substitute chemical fertilizers for a loss of land to the Soil Bank. However, an important part of the American wheat crop is grown where substitution is possible.

Corn Acreage Trends

The harvested acreage of corn in the sample in 1957 increased 20.9 percent from 1952. Michigan's harvested corn acreage in 1957 likewise increased 10.2 percent over 1952. However, most of this increase took place prior to 1954. In 1954, larger carryover stocks of corn caused the Secretary of Agriculture to announce acreage allotments for corn. Sanilac County was the only sample county where no corn reduction occurred until 1957. It was not designated as a commercial corn county eligible for price supports under acreage allotments until 1956.[45] However, the sample as a whole has decreased corn acreage by 9.4 percent since 1954, at least partly because of the acreage allotment - price support program.

Michigan corn acreage has followed a similar trend. Corn acreage in 1957 had increased by 10.2 percent over 1952, but decreased by 2.7 percent since 1954. Again, the trend toward higher acreages of corn appears to have been reversed in 1954, partly because of government controls.

Corn acreage in the United States has decreased steadily since 1952. The acreage harvested in 1957 was 10.2 percent less than in 1952. The trend toward less corn acreage appears to have been accelerated since 1954. Corn

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[45]For a complete description of the designation of commercial corn producing areas see Myron E. Wirth, Op. Cit., p. 59.

acreage in the United States had decreased by 9.3 percent in 1957 from 1954.

In the sample, Michigan, and the United States, corn acreage appears to have been sharply reduced because of the corn acreage reserve part of the Soil Bank Act. This is shown in Table XIV. The weather in Michigan and the United States in 1957 was generally held to be favorable for corn production,[46] yet harvested acreage fell off from 1956, 12.8 percent for the sample farms, 7.9 percent for Michigan and 3.9 percent for the United States. Table XV illustrates the relationship of corn acreage reserve participation to acreage reduction in 1957 from 1956. It should be noted that all of the 9.4 percent corn acreage reduction from 1954 to 1957 in the sample was accounted for by the Soil Bank participants. Non-participants partly offset this reduction by increasing corn acreage by 12 percent.

Farmers in the sample were asked how many acres of corn they would have planted had there been no Soil Bank or government control programs. Farmers reported that they would have planted a total of 14,927 acres or 24.3 percent more acres of corn than were actually planted.

When acreage changes were compared for the four areas within the sample, only the sample farms in Sanilac County

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[46]Conversation with A. J. Hintzman, Statistician, Michigan Department of Agriculture, February 19, 1958.

TABLE XIV

CORN ACREAGE TRENDS AND PERCENTAGE CHANGES FOR SOIL BANK PARTICIPANTS AND NON-PARTICIPANTS IN THE SAMPLE, MICHIGAN, AND THE UNITED STATES, 1952 - 1957

AREA	1952 Acres	% change	1953 Acres	% change	1954 Acres	% change	1955 Acres	% change	1956 Acres	% change	1957 Acres	1954-1957 % change
Soil Bank					3,251	-13.1	2,826	-5.4	2,672	-70.3	794	-75.6
Non-Soil Bank					10,002	-7.9	9,207	20.6	11,106	0.9	11,208	12.0
Total Sample	9,928	24.2	12,330	7.4	13,253	-9.1	12,034	14.4	13,778	-12.8	12,002	-9.4
Michigan* (000)	1,672	9.6	1,768	7.2	1,896	6.1	2,012	-0.3	2,004	-7.9	1,844	-2.7
U.S.A.* (000)	80,940	-0.5	80,459	-0.3	80,186	-0.8	79,530	-4.8	75,634	-3.9	72,656	-9.3

*Agricultural Marketing Service, 1957 Annual Summary, Crop Production, U.S.D.A., Washington, D.C., December 17, 1957.

TABLE XV

RELATIONSHIP OF SOIL BANK CORN ACREAGE RESERVE PARTICIPATION TO CORN ACREAGE REDUCTION 1956 TO 1957

	AREA		
	U.S.A. (000)	Michigan	Sample
Corn acreage reduction 1956-1957	2,978*	160,000*	1,776
Corn acreage reserve 1957	5,235**	178,810**	1,465
Soil Bank acreage as % of corn acreage reduction 1956 to 1957	175.7%	111.2%	82.4%

*Agricultural Marketing Service, 1957 Annual Summary, Crop Production, U.S.D.A., Washington, D.C., December 17, 1957.

**Data from Michigan Agricultural Stabilization and Conservation Office, Lansing, Michigan.

increased corn acreage from 1954 to 1957. This is probably because of two factors. First and most important, Sanilac County is predominantly a livestock producing area. Since no penalties are provided for overplanting, livestock

producers, who feed all or most of their corn, would find no advantage in complying with their corn allotments. Second, Sanilac County was not eligible for corn price supports and acreage allotments until 1956 and the impact of the program in 1957 may not have been fully felt by the farmers.

Farmers in each of the four areas appeared to place corn acreage in the Soil Bank in proportion to the importance of the cash grain enterprise in each area. This relationship was similar to farmers' responses to the acreage allotment - price support program shown by a previous study of this sample.[47] Table XVII illustrates the distribution of corn acreage reserve participation in relation to the types of farms in each area.

The interrelation between types of farms and percent of income from farming as related to Soil Bank participation as described in Chapter IV was also important with corn producers. As illustrated in Table XVII, corn producers were divided into two income groups; those with farm incomes of 49 percent or less of their total incomes, and farmers with farm incomes of 50 percent or more of their total incomes. Of the farmers in the 49 percent or less farm income category, 65 percent decreased their corn acreage and only 25 percent increased their corn acreage from 1956 to 1957. In

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[47]Myron E. Wirth, Op. Cit., see Table XVI, p. 76.

TABLE XVI

CORN ACREAGE RESERVE PARTICIPATION IN RELATION TO TYPE OF FARMING IN EACH AREA

AREA	LIVESTOCK FARMERS % OF TOTAL IN EACH AREA	CASH-GRAIN FARMERS % OF TOTAL IN EACH AREA	CORN ACREAGE RESERVE ACRES	ACREAGE RESERVE PARTICIPATION PER FARM
Kalamazoo County	65	35	491	5.51
Gratiot-Isabella Counties	55	45	665	6.85
Sanilac County	81	19	91	1.02
Livingston County	63	37	218	2.44

the 50 percent or over farm income category, 52 percent decreased corn acreage and 42 percent increased. Farmers who earn most of their income from farming appear more unwilling to decrease corn acreage than do part time farmers. It should be noted that these figures compare closely with those for wheat producers.

Cash grain farmers rely more on a higher grain price than do livestock farmers. It would be expected that they

TABLE XVII

CORN ACREAGE CHANGE 1956 TO 1957 COMPARED TO PERCENT OF INCOME EARNED FROM FARMING

	CHANGE IN CORN ACREAGE 1956 TO 1957			
PERCENT OF INCOME EARNED FROM FARMING	Increase	Decrease	No Change	Total Farms
	Percent of Farms			
0-49 percent	25	65	10	88
50-100 percent	42	52	6	276

would comply with corn allotments more readily than livestock producers. Cutting back on cropping operations by complying with corn allotments or by participating in the Soil Bank would not only increase their profits from corn they are marketing (through higher C.C.C. prices), but also decrease their farm work load.

Most livestock producers, with a fixed investment in livestock, appear to find it difficult to justify participation in the corn acreage reserve. Corn grown by livestock producers is primarily fed on the farm. A decrease in corn production tends to cause a decrease in livestock numbers. It was illustrated in Table VII, Chapter IV, that livestock producers are largely full time farmers. A decrease in the

size of their livestock enterprise would, then, tend to decrease their total incomes. This relationship is considerably more pronounced than with wheat since wheat is primarily sold for cash in the market.

Farmers in the sample were asked why they changed their corn acreage from 1956 to 1957. Table XVIII shows the answers that were given. The two most important reasons given for an increase in corn acreage in 1957 were (1) "to fit my rotation" and (2) "to produce more feed for my cattle." The two important reasons given by the respondents for decreasing corn acreage were (1) "to fit my crop rotation" and (2) "Soil Bank participant in the corn acreage reserve."

Corn Acreage Reserve Payments

In addition to the factors described above, the corn acreage reserve Soil Bank payment rate set for each farm appeared to influence a farmer's decision to participate. The payment rate for each farm was recorded from county A.S.C. corn listing sheets and entered on the IBM card. When the corn acreage reserve participants were separated from non-participants, the average payment rate per acre for participants was $42.73 an acre. Non-participants were offered $35.79 an acre, a difference of $6.94 an acre. It is quite possible that Soil Bank participants were partly guided in their decision to participate by the cash income alternative given by the per acre rates he was offered.

TABLE XVIII

REASONS WHY FARMERS CHANGED THEIR CORN ACREAGE, 1956 TO 1957

REASON	NUMBER OF FARMS	PERCENT OF FARMS
Increased Acreage		
1. Needed more feed for my cattle	32	31
2. Needed more money	16	15
3. To fit the crop rotation	45	43
4. Size of the farm increased	12	11
Sub Total	105	100
Decreased Acreage		
1. To comply with allotments	30	16
2. To fit the crop rotation	74	39
3. Size of farm decreased	3	2
4. Decreased cattle numbers	1	0.5
5. Decreased farm labor inputs	13	7
6. Soil Bank participant in corn	70	36
Sub Total	191	100
No answer, no change in acreage or no corn produced	68	
Total	364	

Input Substitution by Corn Acreage Reserve Participants

Soil Bank participants in the acreage reserve were sorted from non-participants for both 1956 and 1957. However, the Soil Bank program was announced too late in 1956 to attract a large number of participants. Only 32 farmers participated in 1956 compared to 83 in 1957. Therefore, only farms who participated in 1957 will be analyzed because of the higher significance to be gained by using the larger number of Soil Bank participants.

In order to make comparisons for the use of inputs, only those farms which did not place the entire corn allotment in the Soil Bank will be compared to non-participating corn growers. Obviously, no comparisons are possible when no corn is grown. A large number of farmers placed their entire allotment in the acreage reserve. Of the 83 farmers who participated, only 34 grew cown in 1957. These farms were compared to 251 non-participating corn growers.

Farmers were asked what their planting rates of seed corn were. The mean planting rate for Soil Bank participants was 5.88 acres per bushel while the mean rate for non-participants was 6.20 acres per bushel, a difference of 0.32 acres per bushel.

The application rate of plant nutrients for Soil Bank participants was also higher than for non-participants. The mean rate of application for Soil Bank participants was 3.30 pounds per acre while the rate for non-participants was 1.43

pounds per acre.

Another method of increasing corn production is through the application of side dressing after the crop has been planted. Soil Bank participants appeared to apply more plant nutrients through side dressing than non-participants. Soil Bank participants applied an average of 0.47 pounds per acre of plant nutrients on 794 acres of corn, while non-participants applied nutrients at an average rate of 0.12 pounds per acre on 11,208 acres of corn.

Non-Soil Bank participants plowed under "green manure" more frequently than did participants. While only 26 percent of the non-participants used no "green manure," 41 percent of the Soil Bank participants used no "green manure." A larger percentage of the Soil Bank participants plowed down "green manure" on their entire corn acreage than did non-participants. However, non-participants more often plowed down "green manure" on a part of their corn acreage. There is conflicting evidence that there was any difference in the use of "green manure" between Soil Bank participants and non-participants.

Farmers in the Soil Bank do not appear to be significantly increasing their use of all plant nutrients more often than are non-participants, although farmers in both categories increased their application rates in 1957 over 1956. Table XIX illustrates the distribution of change for both categories.

TABLE XIX

CHANGES IN APPLICATION RATES OF PLANT NUTRIENTS ON CORN, 1957 OVER 1956 RELATED TO SOIL BANK PARTICIPATION

	SOIL BANK PARTICIPANTS GROWING CORN	NON-PARTICIPATING CORN GROWERS
	Percent of Farms	
Increase	38	31
Decrease	31	16
No Change	31	52

Summary of Corn Acreages and Practices

The acreage allotment-price support program and the Soil Bank appear to have been partially effective in reducing corn acreage in the sample since 1954. The Soil Bank in particular served to decrease corn acreage even in the face of a favorable year for corn production. For the United States, government control programs appear to have served to decrease corn acreage significantly, particularly since 1954.

Farmers in the sample reacted differently to the Soil

Bank, depending on the major enterprise around which the farm was organized. Livestock producers placed considerably less land in the corn acreage reserve than did cash grain operators. This result compares to a previous study of the sample where it was determined that livestock producers complied with corn acreage allotments significantly less often than did cash grain farmers.[48] Farmers within each category of enterprise were partly guided by the payment rate offered by the local A.S.C. office. Higher payment rates attracted more Soil Bank participants.

Corn producers who placed some land in the acreage reserve tended to offset part of the acreage reduction by farming their remaining corn land more intensively. All corn producers tended to increase their intensity of corn production from 1956. It may be expected then, that the effects of the corn acreage reduction were partly nullified by the increased intensity of corn production through the use of more capital inputs. Acreage controls which do not keep the land out of agricultural use, of course, are further circumvented by growing non-"basic" crops which provide livestock feed which can in part substitute for the corn not raised.

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[48] Ibid., p. 67.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Summary

For over three decades, the productivity of American agriculture has increased faster than has aggregate demand. During this time, with the exception of the time from Pearl Harbor through the Korean War, farm prices of the commodities produced in excess of quantities demanded at politically acceptable prices have been too low for most people to accept.

From a belief that farm incomes are too low, and while holding the value that agricultural incomes should equal incomes of the urban population, Congress has instituted programs to raise agricultural income levels. These programs have generally been designed to raise the prices farmers receive for the commodities they sell. The most oft-used method has been to decrease or at least freeze the land input to production in hopes of decreasing or freezing aggregate output. The architects of these programs, assuming a relatively inelastic price elasticity of demand, hoped that when demand caught up with supply, commodity prices would rise.

There is evidence that American agriculture is bestowed with an irreversable supply function. When land inputs to production were limited, farmers substituted more

capital inputs, maintaining and even increasing aggregate output. Under most of the agricultural control programs, farmers also found it possible to produce non-controlled crops, further serving to reduce the effectiveness of the programs.

Recognizing these facts, Congress, in 1956, instituted a control program called the Soil Bank Act which offered farmers a rental for land they would remove from the production of politically designated "basic" crops. Since the production of any commodity for sale was prohibited on this land, it was hoped that the production of these "basic" surplus commodities would be decreased.

By the end of 1957, it was apparent that the Soil Bank had not succeeded in decreasing the production of surplus commodities sufficiently enough to raise prices. An acreage reduction of the land used in the production of "basic" commodities did take place, but it was not of sufficient magnitude. Apparently a large group of farmers found the acreage reduction provisions of the act unacceptable even at the rental rates offered by the government. One of the purposes of this study was to determine which types of farmers found the Soil Bank an attractive management alternative and which types of farmers found it unacceptable.

The provisions of the Soil Bank have implications which go beyond the attainment of income goals. Among

these implications might be found the following: Did farmers who participated in the program substitute capital inputs for their reduced land inputs, therefore offsetting a part of the acreage reduction; and is the Soil Bank serving to shift surplus labor resources out of agriculture by offering a form of security to farmers seeking non-farm employment?

In the summer of 1957, 364 Michigan commercial farmers were visited in an attempt to answer the questions raised above.

The characteristics and composition of the respondents who participated in the Soil Bank were compared to non-participants. No significant differences were found between participants and non-participants with respect to size of farm, the ownership status of the farm operator, or the age of the operator.

Participation in the Soil Bank appeared to be related to the type of farm and the proportion of income the respondent earned from farming. Farms on which the predominant enterprise was livestock production, particularly dairy and hog production, least often had acreage in the Soil Bank acreage reserve. Only 17 percent of the Soil Bank participants were intensive livestock farmers with less than five acres per animal unit on their farms, while over 44 percent of the participants had no livestock at all.

It was then determined that there was a strong

relationship between the types of farm and the proportion of income the respondent earned from farming. Only 20 percent of the intensive livestock farmers earned less than 90 percent of their incomes from farming while over 60 percent of the cash grain operators with few or no livestock earned less than 90 percent of their incomes from farming.

Soil Bank participants were then compared with non-participants with respect to the intensity of livestock production in three income groups: 0-39 percent, 40-89 percent, and 90-100 percent of total incomes from farming. Although only 23 percent of the sample farmers earned less than 40 percent of their incomes from farming, 29 percent of the Soil Bank participants were extensive livestock or cash grain farmers in this income category. While 63 percent of the sample were full time farmers only 10 percent of the Soil Bank participants were intensive livestock farmers in this income group.

The next part of the analysis was concerned with the two "basic" crops eligible for the Soil Bank, corn and wheat.

For both commodities, the Soil Bank appears to have successfully increased a decrease in acreage in 1957 in the sample, Michigan, and the nation. In Michigan and the United States the acreage of wheat and corn land placed in the Soil Bank was about twice the total acreage reduction of these crops. This indicates that non-participating

farmers increased their acreages of corn and wheat offsetting about one half of the Soil Bank acres.

Cash grain farmers who derived most of their incomes from farming appeared relatively unwilling to decrease their acreage of wheat or to place wheat land in the wheat acreage reserve. Livestock farmers or part-time farmers were more willing to participate in the wheat acreage reserve. These were farmers who could apply capital and labor inputs, transferred from wheat production, to alternative enterprises.

Participation in the corn acreage reserve was also related to farm type and the proportion of total income the respondent received from farming. A significantly higher proportion of farms participated in the corn acreage reserve in areas where cash grain farming was more important. Sanilac County, where 81 percent of the respondents were livestock operators, had a corn acreage reserve participation of only 91 acres or 1.02 acres per sample farm. Livestock farms were only 55 percent of all the farms in the Gratiot-Isabella area, yet 665 acres of land were placed in the corn acreage reserve or an average of 6.85 acres per sample farm. Livestock producers appeared to be generally unwilling to reduce acreages of their primary feed source. Respondents who earned less than 60 percent of their incomes from farming decreased their corn acreage in 1957 from 1956 significantly more often than did farmers who earned most of

their total incomes from the farm. Where a farmer relied on his livestock operation for a major source of his income, he apparently found corn acreage reserve an unprofitable management alternative.

The cash income offered by acreage reserve payments guided corn producers in their decision to participate. The payment rate offered by the county A.S.C. offices to corn producers was higher for Soil Bank participants than for non-participants.

Tests of significance were applied to comparisons between Soil Bank participants and non-participants concerning their use of plant nutrients on corn and wheat. Although no significant difference was found between participants and non-participants, there was a slight indication that wheat and corn acreage reserve participants used more plant nutrients on their remaining wheat and corn land than did non-participants. More important was the fact that both groups increased their use of plant nutrients from 1956, serving to partly offset Soil Bank acreage reduction by increased yields.

Conclusions

Two important groups of farmers appeared relatively unwilling to reduce their land inputs to production under the provisions of the Soil Bank Act. Intensive livestock farmers were unwilling to place land in the corn acreage reserve and full time cash grain farmers were unwilling to

place land in the wheat acreage reserve. Since both of these groups of farmers make up an important segment of American agriculture, this unwillingness could be an important factor in the failure of the Soil Bank to bring about an effective acreage reduction of wheat and corn.

Livestock farmers who had wheat allotments on their farms tended to find the wheat acreage reserve an attractive management alternative. It is possible that they found the wheat acreage reserve payments a good income possibility, particularly since participation allowed a transfer of labor inputs to the livestock enterprise.

The substitution by the sample farmers of capital inputs, in the form of plant nutrients, for land inputs lost through the Soil Bank program was insignificant. Analysis of the change in the use of plant nutrients from 1956 to 1957 showed an increase by both Soil Bank participants and non-participants. Assuming that corn and wheat producers in many parts of the country have not yet reached the point where the marginal factor costs of plant nutrients equals the marginal value productivity of these nutrients, it can be expected that these farmers will continue to farm more intensively. This factor will tend to offset any form of production controls based on acreage limitations.

Part-time farmers found the Soil Bank program relatively more attractive than did full-time farmers. Although this study did not fully analyze farmers' reasons for

participation it may be expected that part-time farmers found that the Soil Bank was a method of maintaining net farm incomes while they transferred their labor resources to other jobs.

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APPENDICES

APPENDIX A

EXCERPTS FROM THE QUESTIONNAIRE USED FOR THIS STUDY

MICHIGAN STATE UNIVERSITY
FARM MANAGEMENT SURVEY

The information obtained in this questionnaire is intended to be used only for the purpose of research. All information pertaining to individuals will remain confidential and the names of persons cooperating in this survey will not be made public.

County_____Township_____Farm No._____

Interviewer Date Time begun Time ended Completed

1a. How many total acres are in the farm or farms you are operating in 1957?_____Reported 1954 acreage_____.

b. (If there is an increase in acreage) It appears that you are farming some land which was not in this farm in 1954. Did you buy or rent this additional acreage?
_____Type of owner in 1954_____

c. (If there is a decrease in acreage) It appears that you are farming less land than was in this farm in 1954. Did you own_____or rent_____this additional land in 1954?
(If owned) Have you sold this land?__or rented it out?__
(If rented) Why are you not renting this land now?_____

		1957
2.	How many acres of cropland (tillable acres)?	____
3.	How many acres of permanent pasture (not woods)?	____
4.	How many acres of woodlot?	____
5.	How many acres of buildings, etc?	____
	Total	____

6. You mentioned that you are farming_____acres of

tillable land. How many of it are idle including summer fallow and not being used for field crops and pasture in 1957?_____. Include any land which is in the acreage or conservation reserve of the Soil Bank.

7. What proportion of your total income is from farming? _____percent.

a. (If less than 100%) What is your major source of non-farm income?

_____

b. Are other members of your family living at home and working off the farm? Yes_____No_____. (If yes) What is their relationship to you?_____

What is their occupation?_____

Did you include their income in answering 7a? Yes__No___

8a. What is your ownership or tenure status on the land you farm?

1. Own all the land you farm_____
2. Own some land and rent additional land_____
3. Rent all of the land you farm_____
4. Manage farm for someone else as hired manager_____
5. Operate land in partnership with someone else_____
6. Is this a father-son partnership? Yes_____No_____
7. Other_____

b. (If part of land is rented) How many acres of land are rented?_____

Now I have some questions concerning wheat.

9a. Was there a change in your wheat acreage from the 1955 to the 1956 harvest? Decrease_____Increase_____No change _____DK_____. (If there was a change 1955-56) Why did you (decrease) (increase) your acreage?_____

_____

b. Were there any other reasons?_____

c. (For those who participated in 1956 Soil Bank) Did you put any of the wheat planted for 1956 in the Soil Bank program? Yes_____No_____
(If yes) What were the reasons why you did so?_____

_____

d. Did you put any wheat acreage temporarily into the Soil Bank program and later withdraw it? Yes_____No_____

Would you explain why you took these actions?_____

_____

e. Did you plant certified seed for the 1956 harvest? Yes_____No_____. How many pounds of fertilizer did you apply?_____Analysis_____Did you apply nitrogen top dressing? Yes_____No_____. How much?_____ Analysis_____

10a. Was there a change in wheat acreage 1956 to 1957? Decrease_____Increase_____No change_____DK_____ (If there was a change 1956 to 1957) Why did you (decrease) (increase) your wheat acreage in 1957?_____

_____

b. Were there any other reasons?_____

c. (If participated in Soil Bank program in 1957) Did you put any of wheat planted for the 1957 harvest into the Soil Bank program? Yes_____No_____ (If yes) Why did you do so?_____

d. Did you plant certified seed for the 1957 harvest? Yes_____No_____How many pounds of fertilizer did you apply?_____Analysis_____Did you apply nitrogen top dressing? Yes_____No_____How much_____Analysis_____

Now I have some questions concerning corn.

11a. Was there a change in your corn acreage from 1955 to 1956? Decrease_____Increase_____No change_____DK____ (If there is a change 1955-56) Why did you (decrease) (increase) your acreage?_____

b. Were there any other reasons?_____

_____

c. Did you comply with your corn allotment in 1956? Yes___ No___Other_____Why (did) (didn't) you comply with your allotment?_____

d. What rate of planting did you use in 1956?_____ acres per bushel. How many pounds of fertilizer did you apply. _____Analysis_____Did you use side dressing?_____ lbs. per acre. Analysis_____Did you plow down alfalfa or clover sod? Yes_____No_____How many acres?_____

12a. Was there a change in your corn acreage from 1956 to 1957? Decrease_____Increase_____No change_____DK____ (If there is a change 1956-57) Why did you (decrease) (increase) your acreage?_____

b. Were there any other reasons?_____

c. Did you comply with your corn allotment in 1957? Yes____ No____Other____Why (did) (didn't) you comply with your allotment?_____

d. What rate of planting did you use in 1957?_____ acres per bu. How many pounds of fertilizer did you apply? _____Analysis_____Did you use side dressing?_____ lbs. per acre. Analysis_____Did you plow down alfalfa or clover sod? Yes____No____. How many acres?_____

13. How many acres of corn (will/did) you plant for 1957 harvest? _____acres. How much do you expect to harvest per grain? _____acres. For silage? _____acres.

14. How many acres of corn would you have planted this year if there were no acreage allotments and Soil Bank program? _____acres. For grain? _____acres. For silage? _____acres.

16a. Have you participated in any part of the Soil Bank program? Yes_____No_____(Why did you) (Why did you not) participate in the program?_____

b. (If yes) How many total acres did you put in the acreage reserves in 1957? _____acres.

How many total acres did you put in the conservation reserve in 1957? _____acres.

18a. Have you made any changes in your livestock numbers in the last three years? Yes_____No_____.

b. (If the answer is yes, ask what kind of livestock has been adjusted, check this category and get data for them. Then complete the other items in the inventory and list reasons for all changes in the appropriate space below.)

Kind of livestock	No. on hand 6/1/57	No. on hand 6/1/56	Direction of change	No. of change
1. Dairy cows				
2. Heifers (dairy)				
3. Beef cows (breeding)				

Kind of livestock	No. on hand 6/1/57	No. on hand 6/1/56	Direction of change	No. of change
4. Feeder cattle				
5. Bred sows				
6. Hogs on feed				
7. Laying hens				
8. Pullets				
9. Broilers				
10. Turkeys, geese, etc.				
11. Sheep, ewes				
12. Feeder lambs				
13. Other				
14. Other				

20a. What is the payment per acre on this farm for wheat?____ _____For corn?_____.

21f. (For older farmers) If the Soil Bank program is continued is it likely to affect your retirement plans? Yes_____No_____. In what way_____

25. (Ask only if the operator is a part-owner or tenant)

a. Has it been more difficult to find land to rent during the last year? Yes_____No_____. If yes, why has this been so?_____

b. Has it been more difficult to conclude the rental agreement this year? Yes_____No_____. Explain_____

26. Approximately how long have you been farming as a farm operator?

_____1. Less than five years
_____2. Five to ten years
_____3. Eleven to fifteen years
_____4. Sixteen to twenty years
_____5. Over twenty years
_____6. No answer

27. Would you mind telling me your age?

_____1. Under 25
_____2. 25-35
_____3. 36-45
_____4. 46-55
_____5. 56-65
_____6. Over 65

APPENDIX B

EXPLANATION OF THE CHI-SQUARE TESTS OF SIGNIFICANCE USED IN THIS STUDY

Chi-square tests of significance were used in this study to determine whether or not various sets of attributes were related or independent.* In most cases Soil Bank participants were compared to non-participants with respect to different characteristics of the two groups. A 2 x 2 table is used as an example of how the calculation was carried out.

Calculation of Chi-square in a 2 x 2 Table
Under the Hypothesis of Independence

Sample Size - 364 Farms

Percent of Income From Farming		Soil Bank Participants	Non-Soil Bank Participants	Total
0-49	Observed	39	49	88
	Expected	28.08	59.28	
	Deviation	10.92	-10.28	
50-100	Observed	78	198	276
	Expected	88.92	187.72	
	Deviation	-10.92	10.28	
Total		117	247	

*This statistic is described in detail in Wilfred J. Dixon and Frank J. Massey, Jr., Introduction to Statistical Analysis, McGraw-Hill Co., New York, N.Y., 1951, Chapter 13.

Expected numbers:

$$(117)(88)/364 = 28.08$$
$$(117)(276)/364 = 88.92$$
$$(247)(88)/364 = 59.28$$
$$(247)(276)/364 = 187.72$$
$$\text{Total} \quad 364.00$$

$$\text{Chi-square} = \frac{(\text{Observed frequency} - \text{expected frequency})^2}{\text{expected frequency}}$$

$$\frac{(10.92)^2}{28.08} + \frac{(-10.92)^2}{88.92} + \frac{(-10.28)^2}{59.28} + \frac{(10.28)^2}{187.72} = 7.93$$

Degrees of freedom are calculated by the formula (number of rows x number of columns) in the table. In this table $(2 - 1)(2 - 1) = 1$.

The Chi-square value calculated in the table was 7.93 with one degree of freedom. The comparison of this value with Chi-square tables found in most statistical books shows that less than one percent of the random samples from the hypothetical population of four observations have values larger than 6.63. The hypothesis that Soil Bank participants and non-participants are distributed independently with respect to the proportion of incomes they derive from farming can be rejected. It may be concluded that non-participants make over half of their income from farming proportionately more than non-participants.

APPENDIX C

CONVERSION RATES FOR LIVESTOCK TO STANDARD ANIMAL UNITS

The animal units were converted using a cow as a standard unit. It is based primarily on manure produced in one year per 1,000 pounds of live weight as follows:*

	HEAD OF ANIMALS EQUAL TO ONE ANIMAL UNIT	TONS OF MANURE PRODUCED IN ONE YEAR PER 1,000 POUNDS OF LIVE WEIGHT
Cow	1	12.0
Steer	1	8.5
Horse	1	8.0
Sheep	8	6.0
Hogs	6	16.0
Chickens	250	4.5

*Illinois Agricultural Handbook, 1949, p. 206.

When reference is made to livestock intensity, the following criteria are applicable:

Livestock intensive -- less than 10 acres per animal unit.

Livestock extensive -- 10 or more acres per animal unit.