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Selected elements in the growth of the farm firm

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SELECTED ELEMENTS IN THE GROWTH OF THE FARM FIRM

by

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TABLE OF CONTENTS

I. INTRODUCTION

Change, whether euphemistically called alteration, modification, innovation, transformation, metastasis, or revolution permeates one's entire life. Although change has occurred throughout history, the rate of change in recent times has reached nearly overwhelming proportions. Fortunate, indeed, is the man who can adapt, reorganize and reorient his life to grasp the challenges and opportunities which are forthcoming from the change of any situation. The research scientist in the social and physical sciences is, and should be, on the frontier of new knowledge which is ultimately and inevitably destined to disturb the existing status quo. Investigations into that which one comprehends to be tomorrow's problems, needs or desires could justifiably be called research.

The agricultural industry has not eluded the ever-present, and sometimes disquieting, course of change. Structural changes have occurred and will most likely continue to do so as Table 1 reveals.

Table 1. Number of farms, acres/farm and labor in agriculture since 1920 in the U.S. (19)

Year	Number of Farms (000)	Acres/Farm	Total Agricultural Labor (000)
1920	6,448	137	13,432
1930	6,289	157	12,497
1940	6,096	174	10,979
1950	5,382	215	9,922
1960	3,704	371	7,342

About 900,000 farms out of 3.5 million total produce three-fourths of the U. S. farm sales, but Heady states that by 1980 about 750,000 farms could well do the job (8). Also, by 1980 the agricultural labor force is expected to drop to 3 million people; hence, less than 4 percent of the nation's labor force will be engaged in food production. Real estate capital for the farm industry will increase 5 to 10 percent by 1980, but due to smaller numbers, real estate per farm will double. Capital use in the form of fertilizer chemicals, machinery and petroleum will advance 75 percent for the industry by 1980, but per farm use will triple. Heady views these projects as pointing to an obvious conclusion: great capital problems are ahead for the individual farm. The industry will halve its labor force, but single farms will hold their labor force constant. The declining number of farms will mean that the size of commercial farms will more than double. Consequently, the analysis of these changes, or revolutions if one prefers, and their modus operandi and related ramifications, can perhaps give insights into the solutions of problems which the changes cause. Capital used and its role in change and firm growth will be investigated in this study.

II. REVIEW OF LITERATURE

A. Static Models

Traditionally, farm size has been explained within the realm of returns to scale and the internal and external economies and diseconomies associated therewith. Most farm studies of size have had one or more of the following objectives: (1) to explain existing patterns of farm size, (2) to determine historical trends in farm size, (3) to describe differences in farm size among regions and among farms within regions, (4) to determine the size of farm necessary to provide minimum levels of living, (5) to learn the effects of farm size on financial stability, (6) to measure the effects of size on labor productivity, (7) to find the effects of various technological developments on farm size, (8) to describe the characteristics of particular farm size groups, (9) to determine the optimum size of farm under various conditions. The past forty years has been filled with research concerning these various objectives.

However, criticisms of returns-to-scale studies as well as related studies have appeared from time to time. Upchurch was critical of the returns-to-scale concept for several reasons (21). Firstly, the techniques of defining and quantifying have not been perfected. Problems arise because resources are "lumpy" and management is still a nebulous term. Also, bookkeeping techniques are far from standardized in the method used to determine the rate of return to labor and management, and the method employed is arbitrary in most studies. Secondly, without the generalization that unit costs are higher on small farms and lower on large farms, the returns-to-scale concept collapses. Upchurch states

that farm-size studies fail to show conclusively that small farms have higher per unit costs. Thirdly, he concludes that national agricultural adjustments can be explained by cause-effect relationships other than economies of scale.

Upchurch suggests that larger farms are the result of several factors other than scale economies: (1) for farmers with sufficient managerial ability, larger farms mean a larger income, (2) smaller farm operators are attracted off the farm by higher incomes offered by the non-farm sector and in many cases are not being replaced, (3) increases in mechanization has allowed greater output per farm, and (4) government programs encourage farm expansion; when a farm is tooled up for a certain acreage, which must be partially idled, the manager searches for more land to use his residual equipment. However, Upchurch's reasoning does not deny that returns-to-scale do exist.

Heady, however, does recognize scale economies as a factor in national agricultural adjustments (6). "... with a decrease in the supply price for capital relative to labor under economic development, a transition from a labor technology to larger and fewer farms or a greater machine technology in agriculture represents the transition in structure of agriculture." Heady continues, "Since capital of machines comes in large 'chunks' with per unit costs declining over greater acreage, farms will continue to be larger." According to Heady, the advantages of returns-to-scale or increased farm size are gained primarily through the use of large-capacity machines. Therefore, he states, "Capital requirements will grow not only because of the large investments required in the 'lumpy inputs' represented by large-capacity

machines, but also because the potential scale economies are possible only if the operator has the necessary amount of acres, animals, and supplies to realize them."

Edith Penrose published a book containing a somewhat different approach to firm size as well as a semi-dynamic treatment of firm growth and the rate of firm growth (17). Penrose states that three probable limits to firm size are: managerial ability, product or factor markets, and uncertainty and risk. The first limit is an internal restriction while the others are external to the firm. Penrose, after discussing limits to firm growth, discusses the inducements and directions of firm growth. Inducements for growth can be both external and internal in nature. Penrose's external inducements include a growing demand for particular products, changes in technology which call for production on a larger scale than before, exploitation of new discoveries and inventions, and special opportunities to obtain a better market position or achieve some monopolistic advantage. Conversely, external obstacles to growth or expansion also exist. These include keen competition in markets for particular products, the existence of patent rights on the use of knowledge and technology, high costs of entry into new areas, and difficulties of obtaining new materials and labor or managerial services. Penrose, by making several assumptions, is able to avoid any problems posed by these external forces and concentrate upon internal forces of expansion. The focus of the book is on the following hypothesis: as long as expansion can provide a way of using the services of its resources more profitably than they are presently being used, a firm has incentive to expand. As Penrose states, "Unused productive

services available from existing resources are a 'waste', sometimes an unavoidable waste (that is, to say, it may not pay to try to use them) but they are 'free' services which, if they can be used profitably, may provide a competitive advantage for the firm possessing them." The next question becomes: how are unused resources proliferated? Penrose maintains that unused resources most likely arise from the indivisibility of resources, although specialization of resources can also give rise to unused services if the firm size is not large enough to fully use these specialized capital or human resources.

Penrose drew several ideas from a work of E. A. G. Robinson (18). Robinson has categorized the firm's functional activities into five major groups: (1) technical production activities, (2) marketing activities, (3) managerial activities, (4) financial activities and (5) risk-absorption activities. For each functional activity there is an optimum (lowest cost) level of the activity. When all activities are functioning simultaneously at optimum levels, the firm is producing at the optimum firm scale in that the firm enjoys the lowest average total cost of production per unit. An adjustment of the various optima of the firm is necessary because it is unlikely: "that all the functions of the firm reach their optimum size at one and the same total output of product." For example, the optimum technical production unit might be represented by X units of output, while the optimum marketing unit would require that X + 100 units of output be produced. Thus, at a scale of X units of output the marketing activity would contain "excess capacity" or "unused resources" in that the same amount of marketing resources could be employed in marketing additional product.

B. Dynamic Models

Immediately following the publication of Penrose's book, a flurry of research activity began in the area of growth. Dynamic research methods, such as linear programming, game theory and stochastic models, became useful in looking at growth and rate of growth of farm firms. In looking at the many dynamic approaches to firm growth, one discovers that each person making this type of study prefers to use his own definitions, his own assumptions and his own method of study. Needless to say, unanimity is not a trademark of firm growth research. The following discussion presents a survey of growth research by several selected researchers in this relatively new area of dynamic study.

Renborg undertook the study of economic growth of agricultural firms with the following four starting points: "(1) an awareness of our poor knowledge of the growth problems of the agricultural firms, (2) the practical experience that large farms are generally more profitable than small ones and the knowledge that not only size itself but also the growth process per se affords economic advantages, (3) the fact that if he wants to be successful on a full-time basis the farmer will have to increase his input of capital progressively over time; this prediction is based on neo-classical marginal analysis, and on the fact that economic progress generally lowers capital/labor price ratios, thus favoring substitution of capital for labor, and (4) the unsatisfactory way in which our planning methods are today used in practical planning on the micro-level--as a rule, the practical planning is aimed more at finding

the best possible plan within now available resources than at the more important goal of building up a plan which gives the best possible basis for future development or growth." (4).

According to Renborg the problems of growth and therefore, the areas in which this research is concentrated, can be summarized under five headings: (1) goals of farmer concerning his economic activity, (2) the acquisition of funds necessary for growth, (3) the acquisition of farmland, (4) the increasing risk and certainty connected with the growth process, (5) the farmer's lack of knowledge (4). Renborg approached the problem within a framework of linear programming. He also included some aspects of risk and uncertainty.

Walker and Martin have presented a firm growth research package (22). This package emphasizes research on how (1) finance, (2) managerial ability, (3) imperfect knowledge, (4) time and (5) the metabolism of the farm affects the growth process. More specifically, Walker and Martin have listed several variables which they consider important in the formulation of a growth model. Their list includes: family consumption and aspirations, income and social security tax structures, firm-family relationships, external employment and investment alternatives, credit restraints, family-farm life cycle, capital or estate transfer, business structure, yield and price variability, management, economies of size and financial institutions. Their method of research is dynamic linear programming which necessarily limits the number of variables in the model to those which can be quantified. Their primary objectives are: (1) to compare alternative strategies for growth and (2) to estimate minimum levels of resources required for firm survival and growth.

Irwin, commenting on the Walker and Martin treatise, offered several additional factors which affect growth (11). Irwin listed inter-farm land transfer and externalities such as factor markets outside of the agricultural sector, product markets outside of agriculture, the institutional effects of farm programs, the institutional effects of tax laws and capital gains and depreciation schedules as factors which affect firm growth. Also, Irwin believes that, since firm growth is running against a land restraint (with extensive growth) and against an inelastic food demand (with intensive growth), one should also consider the exit process of farmers being replaced. Irwin states, "If we accept the notion that exits are as much a pull of off-farm opportunities as a push from unfavorable farm situations, then forces external to agriculture come to a central role in governing the overall growth rate."

Halter in 1966 proposed a simulator model which implies a linear and homogenous production function, provides for a subsistence income for the family and assumes that costs associated with expanding farm size increase as the firm's rate of growth increases (5). Halter's interest in the farm-firm growth process arose from: (1) an inadequacy of static firm theory to explain observed differential rates of growth of different farms and (2) the lack of confirmation of a U-shaped, long-run cost curve in empirical studies of farm size. Hutton, criticizing Halter's journal article, suggested that a growth model should include five other aspects (10). Hutton brought forth the following thoughts: (1) control variables--the farmer can control somewhat his household expenditures and borrowing policy, (2) accumulation is affected by income level and stage of family-farm cycle, (3) consideration should be given

to internal capital rationing as well as external rationing, (4) effect of taxes on availability of equity funds, and (5) allowances for nonlinearity in the relation of size to net returns.

Johnson, when presenting his stochastic model of growth, states that growth of the farm-firm is necessitated by: (1) evidence of the "price-cost squeeze," (2) the need for increased capital investment in machinery per farm, (3) increased technology as shown by machinery suitable to large farms, and (4) evidence that the average per capita incomes of farmers is less than the national per capital average income (4). The economic objectives of growth study are to answer questions of economies of size and scale, to solve problems of entry as capital requirements rise and problems associated with increasing firm size or growth. Johnson believes that the existence of constant or decreasing long-run average cost curves is one of the necessary conditions for firms to grow. Also, time is an element in the study of firm growth. Johnson treats the growth problem in a stochastic model which incorporates a probability distribution of crop yields within a transformation matrix. The model has the following components: initial asset position, a consumption function, income tax rate, technical input/output relationships, investment policy, crop yields and variability and an objective function to maximize accumulated wealth.

Bailey's article makes an attempt to reconcile the static theory of the firm and the more dynamic concepts of growth (1). Bailey states, "Our research traditionally emphasized resource allocation in a static firm. The allocative problem is greatly changed when all resources are variable as assumed under firm growth. Strategies for growth exploit

the higher return enterprises, net cash returns in the short-run and emphasize the purchase of productive services rather than ownership of resources." Bailey also presents five necessary conditions for growth: (1) excess managerial capacity, (2) profitable enterprises in the long-run, (3) a minimum starting size, (4) some unused resources and (5) procurable resources.

Nelson, in 1964, added two other considerations to newly-emerged thought on firm growth (1). He indicates that depreciation reserves and the size of the farm are two major factors in growth of the farm-firm. Nelson contends that depreciation reserves are becoming more important on farms because of increasing wage rates and uncertain labor supply which encourages machinery use. Furthermore, the rapid technological changes in agriculture encourage a rapid turnover in machines and, therefore, add to depreciation expenditures. Current depreciation reserves contribute cash flow for purchase of new items to maintain the machinery inventory, and facilitate growth of the machinery inventory. Nelson asserts also that returns to land and improvements increase as the size of the farm increases due to cost economies related to size. Therefore, greater returns facilitate more rapid growth by larger farms.

J. R. Martin proposed using linear programming to study capital accumulation over time (4). He suggests that growth is dependent on the point at which growth analysis begins (i.e., no equity vs. full equity). Continuing, he states that capital levels and capital rationing are important aspects--external rationing by credit institutions should be realistically built into the model, and furthermore, a growth model should treat collateral or security as a resource. In addition, capital

withdrawals affect growth. Consumption is a capital withdrawal; therefore, a consumption function is necessary. Growth rates are affected by whether land is purchased or rented, and the income tax structure is also a relevant consideration. Martin continues by stating that research should be oriented toward evaluating credit use, resource investment, and capital withdrawal within an environment of risk and uncertainty. Changes in technology and prices, the planning horizon, and the fact that eventually one must deal with the problem of competition and disequilibrium of the agricultural industry are other variables discussed by Martin.

C. Definition and Measurement

Up to this point very little has been said of the definition of growth or measurement of growth. This was intentional. The broad characteristics of growth have been revealed in the preceding pages. Perhaps at this early stage of study on the growth process, an exact definition need not, or even should not, be necessary. However, each of the aforementioned authors proceeded to hypothesize and conjecture about firm growth only after explicitly defining growth. Therefore, the following is a descriptive section on the various forms of growth definition and growth mensuration.

Ottoson, in a 1956 Nebraska study, not specifically related to scale relationships, observed that several factors influenced the capital accumulation, and therefore, growth of the farm-firm (15). Ottoson's variables included operator's age, years of operator's education, number of years in farming, credit knowledge index, family consumption expenses per year and number of children raised. Other hypoth-

esized factors affecting capital accumulation were the effect of the time when the operator started farming, size of the farm in acres, effect of the livestock enterprises and resources at the time of starting. Ottoson also noted, "Net worth explained twice as much of the variation in family living expenditures as did size of family."

Due to the tremendous effect the household has upon the farm-firm an article by E. O. Heady will be reviewed at this point (9). Heady found that the size, value and productivity of the firm were affected by the farm life cycle. Age was a particularly-significant variable affecting acres farmed, assets managed, gross income and to a lesser extent livestock value and machinery value per farm. It would, therefore, appear that any study of firm growth would necessarily include an age factor.

Davis classifies measures of size or scale into two groups (1). They are area or number, and intensity; both of which result in measuring increased volume or output. The common measures Davis lists are number of acres, number of tillable acres, number of animals (breeding stock), number of animal units, gross value of production, number of workers, total investments, total receipts, total costs, net returns and size of main enterprise. Scale studies commonly use one or more of the above measures in evaluating farm size.

Penrose, in a journal article, attempted to develop theories of growth based on analogies of biologic organism (16). However, such theories were rejected solely on the basis that no human decisions are involved. Penrose then proceeded to propose that the firm is motivated by profits; therefore, when a profitable opportunity appears, the firm

will expand in that direction. Consequently, growth is measured by an increase in total output by the firm.

Renborg is concerned about the expansion process, particularly in acquiring land, and ultimately greater output (4). Walker and Martin base growth on accumulated net worth and survival in the short-run (22) Irwin's treatment of expansion implies accumulation of resources resulting from reinvestment of net savings by the operator; where net saving equals (per unit price minus per unit variable cost) (volume) minus fixed cost minus consumption plus off-farm income (11). Halter's model maximized reinvestment capital or capital accumulation (5). However, Halter suggests other criteria for the growth process: (1) maximizing utility of consumption, (2) maximizing or minimizing equity (the former means increased net worth), (3) maximizing net revenue or output, or (4) maximizing the growth rate.

Johnson defines growth as an increase in the worth of the firm (1). This eliminates growth measurement problems caused by output variability from year to year. Bailey measures growth of the firm by acquisition of additional resources (1). And furthermore, the rate of growth is maximized when net cash returns are maximized in the short-run. Nelson associates growth with farm size measured by greater accumulation of asset inventory (1). Martin's linear programming studies reconciled several conflicting views (4). His results were approximately the same when he maximized the following objective functions: (1) present value of net returns (6% discount rate), (2) discounted value of gross sales (6% discount rate), (3) undiscounted value of net returns, (4) level of

owned capital at the end of the planning horizon, (5) level of land operated in the last production period, and (6) level of land operated throughout the planning horizon. Martin also implies that objective functions to maximize returns, sales, farm size, owned capital, reinvestment capital, or even consumption tend to require maximization of capital accumulation.

III. OBJECTIVES OF THE STUDY

A. The Problem

As stated in the introduction, it is projected that the number of farms will decline significantly in the years ahead. The depressed incomes in farming, the inelasticity of demand for farm products and continued introduction of new technology all combine to encourage larger farms. The question to be answered is: how is one to explain how and why certain firms grow and others decay. Obviously some farm-firms become extinct when the operator dies or retires and is not replaced. Inheritance and marriage also become important considerations concerning growth and decay. Nor can one deny that random factors such as climate, illness, etc., have encouraged and/or retarded the rates of growth on particular farms. Land, buildings, machinery and equipment purchases, livestock buying and selling activities and a myriad of other decisions a farmer makes throughout his lifetime can spell success or failure. Ironically, making the right decision for the right reasons may, in time, prove no better than making the right decision for the wrong reason.

Given this sphere of uncertainty and personality-management interactions, one is hard pressed to even formulate a hypothesis on the highly complex process of growth. Consequently, a growth analyst, of necessity, restricts the research to planned or controlled growth. This is an obvious restriction, which is implicit in all sciences, and a basis for generalizations. Unless the same event occurs time after time given the same assumptions, conditions and/or restrictions for each

attempt, science cannot exist. Or as M. Friedman states, "The function of a scientific hypothesis is to enable us to 'predict' phenomena not yet observed..."

B. The Hypotheses

One of the plausible approaches to firm growth, given in the review of literature, was that of Bailey (1). Bailey's presentation attempted to bring together some basic ideas connected with the growth process. The hypothesis put forth was: "Strategies for growth exploit the higher return enterprises, net cash returns in the short-run and emphasize the purchase of production services rather than ownership of resources." The study reported here is an embryonic attempt to investigate this supposition. Particular emphasis will be placed on the aspect of purchasing productive services rather than ownership of resources.

Bailey's hypothesized necessary conditions for growth will be observed in a limited way. "Excess managerial capacity" appears to be a very nebulous term in view of the present "state of arts" concerning management study. However, excess managerial ability is an implicit assumption of any growth study. The conditions of "minimum starting size and profitable enterprises," at least in the long run, are intuitively obvious aspects of growth, but neither of these points are specific areas of concern in this analysis. However, profitable enterprises can be assumed for most farmers or they would not, presumably, still be farming. The same supposition applies to a minimum starting size. Those farms not large enough for a viable existence were specifically excluded from the sample. Unused resources, as defined by Penrose, offer much

greater potential when looking for growth factors (17). Several complexities arise when quantifying unused resources, but hopefully at least a small insight will be gained from such an analysis. The condition of "procurable resources" will be given a limited amount of attention. Here again quantification becomes a problem.

In addition to investigating various parcels of Bailey's hypothesis, several other possible growth factors are to be examined. A probable aspect of firm growth is variability of income. An erratic annual income flow could conceivably affect various characteristics of a family farm which in turn are reflected in the growth pattern of a firm. Another area which a priori would seem of concern is that of farm type. Perhaps a differential growth rate exists between farms depending on the growth measure used. At least, an identification of various operational differences appears appropriate. The last area to be studied is that of internal restraints. Although Bailey mentions "excess managerial ability" as a necessary condition for growth, he does little to elucidate or alleviate this enigma. However, since any growth strategy can be thwarted entirely by the manager's psychological makeup, this aspect needs at least cursory treatment.

C. The Objectives

The general objective of this analysis is to determine whether a growth strategy, such as described by Bailey, is actually being employed by farmers. More specific objectives are: (1) to ascertain the effect, if any, of income variation on the farm operation, (2) to describe several differing characteristics of various types of Iowa farms from a random survey, (3) to determine if, as farms grow larger in sales and

acres, farmers actually use production services rather than owning resources, (4) to appraise the prevalence of unused resources on Iowa farms, (5) to construct a regression equation to predict crop acres and gross sales given selected variables, (6) to estimate the availability of resources that enable the firm to grow, (7) to determine the extent of internal restraints as they might effect the goals or strategies of growth.

D. The Limitations

Nearly any piece of research necessarily abstracts from the real world, and thus, the results and conclusions are no stronger than the weakest assumption or condition imposed on the study. This study likewise contains several implicit and explicit assumptions and conditions.

The survey represents only a "snapshot" of current values, current thinking and current expectations. One could argue that given a different year and/or different economic conditions the answers received, especially the subjective answers, might change markedly. But one must begin somewhere, and after alerting the reader to this fact one must forge ahead. Moreover, subjective answers rely on the same perception of a particular question by all respondents; which is, of course, not necessarily a true assumption. Perhaps the best way to elicit an answer from people, and particularly farmers, is not to ask them to think of an answer but to ask them to choose between several alternative choices specified a priori.

Ideally, for growth studies, data should be available from at least two points in time. However, appropriate time series data of this kind were not available. Notwithstanding this deficiency, cross-section data

hopefully will lend itself to revealing insights into the growth process. The present thinking is that this piece of research will be a pilot study which will establish data for one point in time, thus enabling future researchers to have a point of reference. Implicit within the use of cross-section data, is the fact that different sizes of firms represent a continuum of growth. Thus the small and medium firms of today may be seen as only stages a firm passes through on its journey toward a large firm of tomorrow. This is perhaps the least defensible assumption, and reiterates the value of having time-series data. Numerous variables obviously affect the growth path of a firm, and this study does not purport to have identified even a majority of growth factors.

Another closely-related aspect is that of managerial ability. The study of managerial ability appears to be a somewhat nebulous science, and moreover, concrete data on the operator's ability to organize and operate a larger firm are sorely lacking. Therefore, many firm growth studies simply assume unlimited managerial ability, thereby eliminating a very enigmatic factor.

IV. PROCEDURE

A. Obtaining the Data

This study was designed to obtain completed survey schedules from male farm operators who satisfied each of the following conditions:

1. He must have farmed at least 80 acres in 1968.
2. He must have been a farm operator for at least one year (that is, he must have operated a farm continuously since January 1, 1968).
3. The operator must have been 55 years old or younger as of December 31, 1968.
4. He must not have been a co-owner of any of the land or buildings in such a way that it was not possible to distinguish which land and/or buildings were owned by him and which by others.
5. The farm operation must not have been incorporated.
6. He must have derived at least 50 percent of his income in 1968 from the farm operation, including government payments.
7. He must have been the decision-maker of the farm.

After the above criteria were specified the sampling staff of the Iowa State University Statistics Department was consulted and their recommended sampling procedure was followed.

A total of about 300 such operators was expected in the sample, this number being determined primarily by the amount of funds available for the study. Since operators meeting these requirements could not be sampled directly, the procedure followed was to select a sample from the general population of farm operators and by means of a screening process which located and interviewed those operators meeting the eligibility requirements. In order to assure a diversity in the types of

farming operations and, at the same time, to conserve field costs, it was decided to concentrate the sample in the major cattle, hog, and cash grain-producing counties rather than to sample the entire state. Consequently, using 1964 census data for commercial farms, the counties were ranked on each of the following characteristics:

1. Total value of field crops sold per farm.
2. Total number of cattle and calves sold per farm.
3. Total number of hogs and pigs sold per farm.

The 12 counties ranking highest in each category were included in the universe to be sampled. Since Clinton county was in the top 12 for both hog and cattle sales, the universe actually consisted of 35 counties. These counties are shown on the accompanying map (Figure 1).

In order to set a sampling rate which could be expected to yield an adequate number of completed schedules, it was necessary first to estimate the total number of eligible operators in the universe. This could be a rough approximation at best. Data were available from the 1964 Census of Agriculture on (1) number of farms by size classes, (2) number of farm operators by age categories, and (3) number of farm operators who worked 100 or more days off the farm. It had been estimated that in any given year about 2 percent of the farm operators in Iowa are in their first year as an operator. Data from the U.S.D.A. indicated that the number of all farms in Iowa had declined 9.3 percent since 1964. Using these data and considerable guesswork, an estimate of the total number of eligible farm operators was made for the 35-county area. On the basis of these estimates it appeared that a sampling rate of 1 out of 104 would yield the desired number of eligible operators.

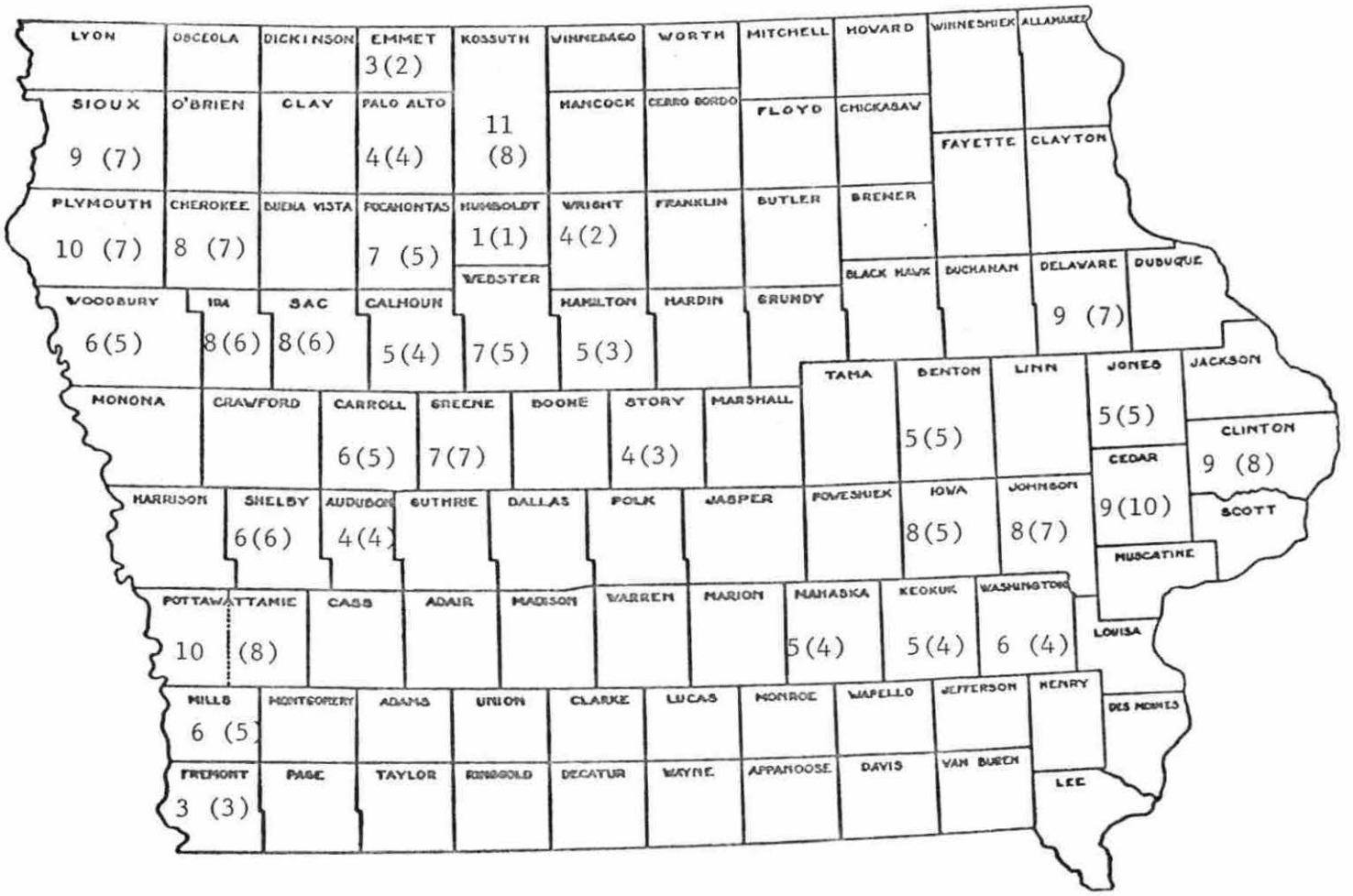

Figure 1. Number of operators eligible and number of completed schedules (in parentheses) for each county surveyed in Iowa.

As mentioned previously, eligible operators could not be sampled directly. Instead, the sampling rate of 1 out of 104 was applied to the universe of all farm operators in the area and a screening procedure employed to determine which of the operators in the sample met the eligibility requirements. A sample of area segments or clusters was selected from each of the 35 counties at the prescribed rate using Master Sample of Agriculture materials. All eligible operators living in these area segments were designated to be interviewed. The total sample consisted of 104 area segments expected to contain on the average slightly less than 3 eligible operators each. Since sampling was independent within counties, the counties can be considered as strata. The sample was self-weighting in that every eligible operator had the same chance (1 in 104) of being selected in the sample.

Approximately three to five segments were identified in each of the counties selected for the sample. Interviewers, who were employed and supervised by the Statistics Sampling Department at Iowa State University, were thoroughly briefed and then sent to personally interview each resident of the selected segments.

A total of 418 farm operators were identified in the sample of whom 221 were eligible to be interviewed. The number of total eligible farms is the summation of total interviewed, total refused and those farmers not at home. Both the total number of farms identified and the number eligible as a proportion of the number identified were less than expected. However, since the expectation was based on a very rough estimate of the total number of eligible operators in the universe, it is quite probable that the expected number was too high. Interviews were obtained

from 177 of the 221 eligible operators for a response rate of 80 percent. Of the remaining 44, 34 refused to be interviewed and 10 could not be found at home after repeated call-backs. Table 2 summarizes the sampling results.

The screening sheet and the survey schedule appear in Appendix C. The screening sheet identifies the respondent either as eligible or ineligible according to the aforementioned criteria. The schedule questions, which pertain to this study, were directed toward such aspects of the farm organization as the land owned and operated, buildings used, and the farm machinery and equipment used. Socio-economic questions about education of members of the household, inheritance and the number of years as a farm operator were also included. Crop sales, livestock numbers sold and dollar sales, miscellaneous farm income, estimates of net farm and non-farm income and liabilities were other aspects which the questionnaire was designed to obtain. Another section of the questionnaire dealt with custom work hired as well as custom work done for others and the amount of labor used on and off the farm. The last few pages of the schedule attempted to ascertain the prevalence of unused resources, the availability of resources to a particular farm, and internal restraints on growth.

B. Method of Analysis

A Nemisis of many studies concerned with annual operation of a business unit, is that of assuring that the particular year of the study did not greatly influence the structure of operation. Even though a large sample will decrease the chance of large deviations from normal, this does not preclude deviations from year to year which would give abnormal

Table 2. Sampling results and reasons for ineligibility

Reason for Ineligibility

Non Farm	Female Operator	< 80 Acres	Didn't Farm in 1968	> 55 Yrs. of Age	Partner-ship	Corpor-ation	<½ of In-come From Farm	Not De-cision Maker	Total Ineligible
202	2	23	3	109	25	1	34	0	399

Farm Operators

Total Interviewed	Total Refused	Not at Home	Total Eligible	Total Households in Segments Contacted
177	34	10	221	620

results. Examples might include such phenomena as illness in the family, unusual weather conditions, disease, farming less or more land than usual in a particular year and other variables which would affect the true functions of the farm. To ascertain if this is a sizeable factor in this study, a question on net income over the last three years was included in the questionnaire. A coefficient of variability for net farm income was found for each schedule thus enabling a division of schedules based on this calculation. Several selected variables were subjected to statistical analysis; which included analysis of variance tables using F-ratios to test treatment mean differences (objective 1).

To enable a more specific analysis and recognizing that different farm types do exist, an analysis of different farm types was included (objective 2). Farms with greater than 50% of total sales from crops were considered as crop farms, greater than 50% of total sales from beef were designated beef farms, greater than 50% of total sales from swine were called swine farms. Those remaining had greater than 50% of sales from livestock and were referred to as general livestock farms. Again, selected variables were compared among these farms; resulting in identification of differences among these farm types. Analysis of variance and F-tests were employed in the same manner as before.

The next several objectives are to explain why and to what extent different sizes of farms vary with respect to the dependent growth variables, gross sales including miscellaneous farm income and crop acres in the place. Crop acres in place is defined in this study as crop acres owned plus crop acres rented in minus crop acres rented out. These two growth measures, crop acres in place and gross sales, were chosen for

three reasons. Firstly, they are both well-known measures of farm size. Secondly, gross sales is a measure of output, which is one of the most noted criteria by which growth is measured, while crop acres in places measures one of the most important inputs of an agricultural firm. Thirdly, both these measures are only remotely related to the household. To investigate these dependent variables a large number of variables were to be tested for significance, and given that multiple regression is an efficient method of testing a large number of variables, the multiple regression framework was chosen as the technique of analysis. Such an analysis not only constructs a regression equation (objective 5) but also examines the variates used to elucidate two other tenets (objectives 3 and 4). A problem which frequently arises with a large number of independent variables is that of multicollinearity (2). By observing the correlation matrix a priori, the problem of intercorrelations can be greatly reduced. A further extension of the multiple regression analysis is to subject the variables used in the aforementioned multiple regression to a stepwise regression algorithm. This algorithm searches for the most satisfactory equation to explain the sample data.

Objectives 6 and 7 are to be analyzed solely on their own merits; no statistical tests are to be performed other than observing means and constructing frequency tables. Inferences made therefrom are, therefore, based on an intuitive rather than analytic process.

Since the sample was self-weighting, population means and proportions were estimated directly by the corresponding sample means and proportions. Thus,

$$\hat{\bar{Y}} = \frac{1}{177} \sum_{i=1}^{177} y_i \quad .$$

This procedure assumed that the 44 individuals who did not respond did not differ as a group from the 177 who did respond.

Estimates of population totals for the 35-county area were obtained by

$$\hat{Y} = (104)\left(\frac{221}{177}\right) \sum_{i=1}^{177} y_i = (104)(221)\ \hat{\bar{Y}}$$

where 104 is the reciprocal of the sampling fraction and 221/177 is an adjustment for nonresponse.

Approximate estimates of variance were made using formulas for simple random sampling ignoring the fact that the sample unit was the area segment rather than the individual farm operator and the fact that counties were actually strata. Thus,

$$\text{var}\left(\hat{\bar{Y}}\right) = \left(\frac{1}{177}\right)\left(\frac{1}{176}\right) \sum_{i=1}^{177} \left(y_i - \hat{\bar{Y}}\right)^2$$

and

$$\text{var}\left(\hat{Y}\right) = (104)^2\ (221)^2\ \text{var}\left(\hat{\bar{Y}}\right) \quad .$$

For any subgroup in the sample, the variance of the mean was computed by

$$\text{var}\left(\hat{\bar{Y}}_1\right) = \left(\frac{1}{n_1}\right)\left(\frac{1}{n_1 - 1}\right) \sum_{i=1}^{n_1} \left(y_i - \hat{\bar{Y}}_1\right)^2$$

where n_1 = number of operators in the subgroup,

$$\hat{\bar{Y}}_1 = \frac{1}{n_1} \sum_{i=1}^{n_1} y_i \quad .$$

For comparing the means of two subgroups, the variance of the difference was estimated by the sum of the variances. Thus,

$$\text{var}\left(\hat{\bar{\gamma}}_1 - \hat{\bar{\gamma}}_2\right) = \text{var}\left(\hat{\bar{\gamma}}_1\right) + \text{var}\left(\hat{\bar{\gamma}}_2\right) .$$

V. ANALYSIS OF DATA AND RESULTS OF THE STUDY

A. Variation of Income Analysis

Table 3 contains the relevant variables used to identify differences between four levels of net farm income variation. The variation measure is the coefficient of variation[1] of net farm income calculated for the past three years. The objective is to determine the effects, if any, of variable income on the current modus operandi of the farm. Treatment one consists of all farms with a coefficient of zero, treatment two contains all coefficients greater than zero but less than or equal to one, treatment three designates those farms with coefficients greater than one but less than two and treatment four is all coefficients of variation two or over. As usual, the larger the coefficient, the greater the variability. The statistical model used was a random effects model of the following form: $Y_{ij} = \mu + T_i + \epsilon_{ij}$. Subsequently, an analysis of variance (ANOV) table was constructed for each of the selected variables thus enabling differences between the treatment means to be detected by observing the significant F-ratios.[2] The total sum-of-squares degrees of freedom equaled 171; within and between sum-of-squares degrees of freedom were 168 and 3 respectively. Table 3 exhibits the treatment means, within mean squares and F-ratios of the selected variates.

[1] The coefficient of variation is defined as the standard deviation divided by the mean.

[2] In the remainder of this thesis the term significant is used only in the statistical sense. The term "significant" is used to indicate the results of an analysis of variance; namely, that the F-value calculated from the mean squares is greater than the F-value for the corresponding degrees of freedom taken from the table of points for the distribution of F. In the case of "significant" t-tests reported later, the t-values squared equal the F-values.

Table 3. Variables relating to income variation using four classes of coefficients of variation (C.V.)

Characteristic:	Trt. 1 C.V.=0 n=61 Mean	Trt. 2 0<C.V.≤1 n=79 Mean	Trt. 3 1<C.V.≤2 n=25 Mean
Age of operator (yrs.)	44.6	41.7	39.9
No. yrs. in farming	20.2	18.3	16.7
Adjusted inheritance	6177	12214	20373
Estimate of 1968 net farm income ($)	7533	7873	9900
Estimate of 1968 total net income ($)	8250	8230	10060
Gross sales plus misc. farm income ($)	41673	33728	56311
% of gross sales which is net farm income	29.9	31.4	25.9
% of total sales which are crops	26.9	24.0	16.4
% of total sales which are beef	39.3	31.2	42.3
% of total sales which are swine	25.7	33.8	35.9
Acres in place (A)	318.9	306.7	394.9
Total value of acres in place ($)	139616	134290	158334
Crop acres in place (A)	277.6	261.0	326.0
Participation in feed grain program	.72	.71	.68
% of acres in place rented in	61.4	58.8	57.3
% crop acres in place rented in	61.9	59.2	57.2
Hired labor in 1968 (wk.)	7.75	7.73	9.56
Respondent's labor used off farm in 1968 (wk.)	3.41	1.87	0.80
Total value of all bldgs. used ($)	16216	14673	22357
Total value of all machinery used ($)	15835	15063	15365
Value self-propelled machinery used ($)	10157	9018	9179
% value of bldg. used but not owned	46.6	45.5	46.4
% value of bldg. used but no rent paid	39.7	31.7	39.8
% value of machines used but not owned	6.0	10.4	13.4
% value of machines used but no rent paid	3.0	6.7	7.3

[a] = computer overflow number.

* Significant at $\alpha = 0.025$, which means that the calculated F-values so displayed exceeds the F-value for the corresponding degrees of freedom from a table of points for the distribution of F, while α is the probability of rejecting the hypothesis that there is no difference in treatment means if the hypothesis is true.

Trt. 4 C.V.>2 n=7 Mean	Sample Mean n=172	Within Mean Square	F-value
44.9	42.6	78	2.28
19.3	18.8	70	1.19
3639	10910	7.20×10^{8}	1.90
10500	8154	2.21×10^{7}	2.19
11360	9630	2.20×10^{7}	1.91
63435	41037	1.81×10^{9}	2.50
24.9	29.8	363	0.70
22.7	23.9	726	0.89
34.5	35.8	875	1.31
32.4	31.1	520	1.91
279.3	322.7	26662	2.06
127860	139412	6.55×10^{9}	0.60
236.1	275.3	19682	1.55
.43	.70	X[a]	0.88
44.9	58.9	1625	0.37
46.0	59.3	1630	0.36
10.86	8.13	249	0.51
13.71	2.74	341	7.15*
29521	16941	2.30×10^{8}	3.29*
18317	15513	1.06×10^{8}	0.24
9978	9484	6.14×10^{7}	0.26
21.6	45.0	2172	0.62
21.3	35.3	2078	0.66
13.3	9.41	367	1.19
1.1	5.6	315	0.85

The age of the operator and the number of years farming are closely related variables. The average age of commercial Iowa farm operators in 1964 was 47.5 as reported by the Agricultural Census, which is somewhat higher than the sample average of 42.6. This was expected as the survey, a priori, excluded all farmers over the age of 55. By subtracting the average number of years in farming (18.8) from the average age of farmers (42.6) one finds that farm operators entered farming at approximately 24 years of age. The respondents supplied information on any inheritance received and its value at the time of transfer. To allow for the different time spans over which operators had use of inherited capital and to convert all inheritance to a 1968 price basis, a land and money index was calculated. Appendix B outlines the procedure involved in arriving at the value of adjusted inheritance. The average adjusted inheritance of the sample was $10,910, while the average unadjusted inheritance, as reported later, is $5835. None of the overall F-ratios of the above three variables, age, number of years in farming and adjusted inheritance, are significant (α = .025), indicating that there is no statistical difference between the means of the four treatments.

The respondents estimated their average 1968 net farm income as $8154, while the average 1968 family net income was $9630. The latter figure includes all family income earned off the farmstead; however, any custom work done for others is considered farm income. The estimation procedure was deemed more desirable than asking the respondent to give a detailed list of all debits and credits for the entire year as well as accounting for any inventory changes. Moreover, the questionnaire was of

sufficient length to discourage further additions, particularly since many of these transactions occurred nearly a whole year before the survey was taken. Net income is derived from gross sales which, therefore, becomes an essential quantity to measure. Gross sales is the aggregation of all livestock, crop and livestock product sales in 1968 disregarding any inventory changes. Added to gross sales is miscellaneous farm income which refers to any cash income received from the sources listed on page 11 of the questionnaire. The average of gross sales plus miscellaneous farm income in 1968 is $41,037. The most notable portion of miscellaneous farm income is that of government payments. One could assert that gross sales are understated due to diverted acres payment which, on a per acre basis, is less in total than the farmer would have received had he raised a crop and sold the produce from that acre.

The percent of gross income which is net income (29.8% average) is merely the estimated 1968 net farm income divided by gross sales plus miscellaneous farm income. The resulting percent is sometimes referred to as the profit margin. The percent of total sales which is composed of crop sales, beef sales and swine sales are variables which are self-explanatory. Beef sales (35.8%), followed by swine (31.1%) and crops (23.9%), were the largest parcel of gross sales. The F-ratios for income measures, gross sales and the respective percents of gross sales were not statistically significant ($\alpha = .025$). This indicates no statistical difference among farms with different income variations.

Acres in place, total value of acres in place and crop acres in place are highly intercorrelated variables with intercorrelations over .90. A place is defined as acres owned plus acres rented in minus acres rented out. Average acres in place for the sample was 322.7 acres while the average crop acres in place was 275.3 acres. The F-values for these two variables, as well as for the total value of acres in place variable, indicate no differences among the means of the four treatments. The average percent of total acres in place leased from someone was 58.9 while the average percent of crop acres in place rented from someone was 59.3. The former was derived by dividing the total acres rented in by the total number of acres in the place while the latter quantity is crop acres rented in divided by crop acres in place. The measures detect the extent of land leasing on particular farms. Apparently, on the average, almost 60 percent of the total acres as well as nearly 60 percent of the crop acres on a farm are not owned by the farm operator. Related to this aspect of crop acres is participation in the government feed grains program. Dummy variables were used in the mensuration of participation; those partaking in the program were assigned the number one and those abstaining were given a zero. Therefore, the quantities presented in the table as means are merely averages of one's and zero's within each treatment. A value close to one indicates a high level of participation while a low level of participation is specified by a value nearer zero. The sample mean (.70) reveals a definite majority (70 percent of total) of government program

participants. These six characteristics had insignificant overall F-values; again showing no differences among the treatment means of these six variables.

Hired labor refers to farm labor other than that provided by the family and also some type of remuneration must have occurred. The average amount of labor hired was eight weeks. The respondent's off-farm employment was one of two significant variables. Off-farm employment does not include exchange labor or custom work done for others where a machine and operator are provided. The primary source of such employment would be in a nearby urban center or farm work done for a neighbor for wages. The fourth treatment, with a coefficient of variation greater than 2, embraces those respondents who worked off the farm for an average of 13.7 weeks during 1968. One might conjecture that as the variability of farm income increases, the incentive to work off the farm increases. This would be true in the cases where an exogenous force such as climate or illness caused a drastic reduction in net farm income in 1966 or 1967.

The last category analyzed in this section is that of building and machinery assets. The total value of buildings used is the aggregated figures for entirely-owned, partially-owned and rented building facilities; whereas the total value of machinery consists of self-propelled and field machines that are entirely and/or partially owned. The average investment of buildings used was $16,941 while the average total value of machinery used was $15,513 per farm. In addition, the average value of self-propelled machinery is $9484. An adjunct to these figures is the percent value of total machines, which is self-propelled machines.

This percent figure is very stable over all crop acres and gross sales categories with an average of approximately 55 percent. The second significant variable in the series is that of total value of buildings used. The group of respondents with the high income variation also had much higher average amounts ($29,521) of capital tied up in the form of buildings owned. This is deduced from looking at the percent of buildings used but not owned characteristic. The first three treatments indicate approximately 45-46 percent of the value of buildings used are not owned while the fourth treatment has only 21.6 percent of the value of buildings used that are not owned. Therefore, those respondents with the greatest variability of income tend to have high fixed costs in the form of building facilities. Another related possibility is that these buildings were of the labor-saving automated type which allowed the respondent to work off-farm an average of 13.7 weeks during 1968.

The percent of building value used but not owned is merely the share of partially-owned buildings not owned, plus the entire value of leased buildings used. The sample average was 45 percent. The average percent of building value used rent-free (35.3 percent) is precisely the value of non-owned buildings used for which no rent is paid, divided by the total value of buildings used. These two measures should be one indication of the extent to which farmers purchase productive services rather than own resources. Apparently a large number of leased buildings are used rent-free. In this study buildings that were located on land rented from someone with only a crop share lease, and no mention of remuneration for the buildings, were considered as rent-free. Cash rent for buildings is, of course, not considered rent-free. The same ration-

ale applies to the percent of machinery used and not owned as well as the percent of machinery used rent-free. Only 9.4 percent of the value of machines is used and not owned while only 5.6 percent of the value of machines was used rent-free. It seems likely that many of these rent-free situations would occur most commonly among family members.

B. Analysis of Farm Types

Table 4 contains those characteristics whose means were not significantly different from each other. Therefore, since the average values of those characteristics were discussed in Section A, any further explanation at this point would be repetitive. However, Table 5 is of some import. Obviously, beef farms with average sales of $66,073 had, by far, the largest sales; this characterizes a high turnover (sales ÷ capital). In 1968, crop farms had only one-third as much average sales ($22,956) as did beef farms, while swine farms ($27,319) and other farms ($30,485) had somewhat less than half the average sales that beef farms enjoyed. The percent of gross sales which is net farm income denotes the profit margin for the different farm types. Although orthogonal or nonorthogonal comparisons would be required to statistically establish differences between individual treatment means, one could surmise that the profit margin of 21.5 percent for beef farms is significantly lower than the other treatment means. Meanwhile, crop farms have almost twice (39.8 percent) the profit margin as do beef farms. Given the following equation:

$$\text{Return on investment equals } \underbrace{\frac{\text{Profit}}{\text{Sales}}}_{\text{(profit margin)}} \times \underbrace{\frac{\text{Sales}}{\text{Capital}}}_{\text{(turnover)}}$$

Table 4. Nonsignificant variables relating to farm type

Characteristic:	Trt. 1 Crop Farms n = 27 Mean	Trt. 2 Beef Farms n = 60 Mean	Trt. 3 Swine Farms n = 37 Mean	Trt. 4 Other Farms n = 48 Mean	Sample Mean n = 172	Within Mean Square	F-value
Age of operator (yrs.)	41.1	43.2	41.2	43.7	42.6	80.2	.89
No. yrs. in farming	18.5	19.5	16.8	19.5	18.8	70.2	1.00
Adjusted inheritance ($)	8716	15485	9634	7409	10910	7.33×10^8	.93
Estimate of 1968 farm income ($)	7870	9116	6743	8197	8154	2.22×10^7	1.98
Estimate of 1968 total income ($)	8720	9470	7390	8500	8630	2.18×10^7	1.52
Coefficient of variation of 3 yrs. income	.38	.53	.63	.47	.51	0.385	.94
Hired labor in 1968 (wk.)	6.5	9.2	2.1	7.8	6.8	244.3	1.68
Total value of all buildings used ($)	12889	20200	14666	16901	16941	2.34×10^8	1.79
Total value of all machines used ($)	17276	16893	13494	14353	15513	1.04×10^8	1.32
Value self-propelled machines used ($)	11544	10072	7643	9010	9484	6.01×10^7	1.51
% of acres in place rented in	65.6	59.9	61.5	52.0	58.9	1613.5	.79
% of crop acres in place rented in	65.1	60.0	62.5	52.9	59.3	1620.5	.68
% value of bldg. used but not owned	43.6	50.8	48.0	36.4	45.0	2160.8	.92
% value of bldg. used but no rent paid	29.4	42.4	36.4	28.9	35.3	2066.4	.97
% value of machines used but not owned	12.7	7.9	11.5	7.8	9.4	370.9	.65
% value of machines but no rent paid	9.0	4.5	6.6	4.5	5.6	317.0	.50

Table 5. Significant variables relating to farm type

Variable:	Trt. 1 Crop Farms n = 27 Mean	Trt. 2 Beef Farms n = 60 Mean	Trt. 3 Swine Farms n = 37 Mean	Trt. 4 Other Farms n = 48 Mean	Sample Mean n = 172	Within Mean Square	F-ratio
Gross sales plus misc. farm income ($)	22956	66073	27319	30485	41037	X[a]	12.67**
% of gross sales which is net income	39.8	21.5	30.8	33.8	29.8	322	7.89**
Acres in place	384.4	350.7	249.3	309.7	322.7	25514.9	4.67**
Total value of land in place ($)	185604	145852	102306	133982	139412	X	6.29**
Crop acres in place (A)	334.3	297.8	209.5	264.7	275.3	18502.3	5.22**
Participation in feed grain program	.93	.58	.68	.73	.70	0.2	3.71*
Respondent's labor used off farm (wk.)	6.67	2.05	2.68	1.46	2.74	50.7	3.45*

[a]Computer overflow number.

*Significant at .975.

**Significant at .995.

one may make further deductions. If one assumes the return on investment to be approximately equal among all farm types and since the profit margin is known for the specific farm types, it would appear reasonable to expect that beef farms have a faster turnover of capital but a lower profit margin (21.5 percent). Conversely, crop farms have a greater profit margin (39.8 percent) but a lower turnover of capital.

Acres in place, total value of land in place and crop acres in place, as stated before, are highly correlated, and thus one would expect all three to be significant simultaneously. To repeat, a place, as defined in this study, is acres owned plus acres rented in minus acres rented out. As anticipated, crop farms, with 384.4 acres in place, are larger than any of the livestock farms which tend to have less acres in place; particularly, swine farms which have only 249.3 acres in place. This is perhaps a verification of the tendency of crop farms to be more extensive while livestock farms tend to be intensive in nature. The same rationale applies to crop acres in place, where crop farms have an average of 334.3 acres, while beef farms have 297.8 acres and swine farms have 209.5 acres in place. Related to crop acres is the aspect of the government's feed grain program. As Table 5 reveals, crop farms have a much greater participation score (.93) than do the livestock farms such as beef (.58) and swine (.68). To repeat, dummy variables were used, where a one equals participation and zero equals non-participation. Whereas livestock farms require large amounts of grain, and the government program requires a reduction in acres planted to feed grains, one can conclude that livestock farmers have less incentive to affiliate with the feed grains program.

The last significant variable under examination is that of respondent's off-farm labor. Manifested in Table 5 is the fact that there are large differences among farm types with respect to respondent's off-farm labor. Crop farmers worked an average of 6.67 weeks off the homestead in 1968 while the other types of farmers worked an average of only 1.46 weeks off the farm. Beef and swine farm operators were about even with an average of two weeks each. Thus, crop farmers participate in nearly three times as much off-farm employment as do livestock farmers. A cogent point is the distribution of labor requirements. While crop farms have a concentration of labor use during planting and harvest, livestock farms evidently have a more equitable distribution of labor needs. Thus, during slack periods crop farmers are able and evidently willing to work off their homestead.

C. Purchase of Productive Services

Acquiring legal control of resources is accomplished in basically three ways: purchase, inheritance, or leasing. This aspect of the analysis purports to identify the extent to which farmers have used the third alternative (i.e., renting or more euphemistically, the purchase of productive services rather than ownership of resources). The variables used were primarily designed to measure either the proportion of assets used and not owned or the absolute amount of a productive service hired. Table 6 is a presentation of variables means, their standard deviations, beta values and respective t-values which were calculated concommitantly with the remaining multiple regression equation variables given in Sections D and E. The indented variables were deleted

Table 6. Variables used to study purchased services with their respective beta values, t-values, means and standard deviations

Independent Variable No. and Description	r	Dependent Variable 1: Beta Value	t-value
9 % of crop acres in place which is rented in		315.5071	-1.65
% acres in place rented in	.99	X[a]	X
12 % value of bldgs. used but not owned		190.3383	1.40
13 % value of bldgs. used rent-free	.82	X	X
14 % value of machines used but not owned		-400.9749	-0.61
44 % value of machines used rent-free	.87	X	X
45 % value of equipment used but not owned		-462.0044	-0.25
40 % of crop acres in place which were preparation acres hired		-1078.0381	-0.65
20 No. of preparation acres custom hired	.88	X	X
41 % of crop acres in place which were P-C-S acres hired		-1922.3696	-0.98
21 No. of P-C-S acres custom hired	.90	X	X
42 % of crop acres in place which were harvest acres hired		-688.3992	-0.38
22 No. of harvest acres custom hired	.88	X	X
23 No. of preparation acres custom done for others		-35.4160	-1.13
24 No. of P-C-S acres custom done for others		112.4731	1.34
25 No. of harvest acres custom done for others		-3.1776	-1.02

[a] = variable not allowed in the regression calculation.

*** Significant at $\alpha = .05$.

Dependent Variable 2: Beta Value	t-value	Mean	Standard Deviation
X	X	59.3	40.1
X	X	58.9	40.1
0.4254	1.49	45.0	46.5
X	X	35.3	45.4
-0.3179	-1.85***	9.4	19.2
X	X	5.6	17.7
-3.2686	-0.74	25.3	30.1
X	X	9.3	18.5
X	X	25.8	59.1
X	X	6.5	16.5
X	X	19.4	57.6
X	X	14.5	18.3
X	X	37.8	51.0
0.0303	0.38	16.4	95.4
-0.0839	-0.42	7.1	36.6
-0.0710	-1.29	52.9	147.8

from the regression analysis due to the high correlation among these particular variates (multicollinearity). The r associated therewith reflects the correlation with the variable immediately above the indented variate. Dependent variable number 1 refers to gross sales plus miscellaneous farm income in the first regression equation while the second equation has crop acres in place (number 2) as its dependent variable. Both regression equations are exhibited but not all independent variables are used in both equations due to the problems arising from entering the dependent variable as a denominator of an independent variable.

The percent crop acres in place rented in is the first of the index variables used to ascertain the frequency of purchasing productive services as opposed to owning resources. The same explanation applies to the index of buildings, machinery, and equipment. In each case, the value of the asset owned or partially owned is divided by the total value of the respective asset class. The percent of crop acres in place rented in (59.3 percent average) and the percent of acres in place rented in (58.9 percent average) are highly correlated (.99) indicating that crop acres are the most frequently leased type of land. The percent of value of buildings used but not owned and percent value of buildings used rent-free are another pair of highly-correlated (.82) variables. This is to be expected since only those buildings that were leased from someone could require rent payment. However, from the differences of the averages of these two measures (45.0% - 35.3% = 9.7%) one would conclude that only 9.7% of the value of all buildings used has some type of rental fee. Or in different terms, approximately 78 percent of all rented building facilities are used without a specific fee

being charged. The t-values of the indices, for the acres and buildings leased, are not significant which is indicative that these practices do not increase or decrease as farms grow in gross sales or crop acres in place.

The next pair of variables, percent value of machines used but not owned and the percent value of machines used rent-free have a correlation value of .87. The percent value of machines used but not owned has a significant t-value of -1.85 in the second regression. This denotes a decreasing tendency for operators to use or lease someone else's machines and conversely, an increasing tendency to own one's machines as crop acres in place increase. The beta value reveals that a one percent increase in the percent of machines used but not owned will decrease the number of crop acres in place by .3179 acres. Leasing or using machines other than those owned does not appear to be a prevalent practice as only an average of 9.4 percent of the value of machines used was not owned. The percent of machinery assets, as well as building assets, mentioned above, which were used rent-free is a measure of the extent to which, most likely, relatives and, to a lesser extent, neighbors had use of building and machinery without mandatory monetary remuneration to the owner. The percent of farm equipment used but not owned is also an indication of purchasing productive services rather than owning resources. An average of 25.3 percent of the value of farm equipment was used and not owned by the respondent. This evidently reflects the large number of respondents who did not own the farmstead from which they based their main operation. The distinction between ma-

chinery and equipment is best made by studying the respective lists in the questionnaire (Appendix C), but basically machines were mechanisms used in the field while farm equipment is found almost exclusively on the farmstead.

The last category of variables deals extensively with custom services hired as well as custom services performed for others. Preparation covers all field operations up to planting. P-C-S is an abbreviated notation for planting, cultivating and spraying. The harvest variable is self-explanatory. Each of the first three pairs of variables describe the amount of custom services hired. The ratio of preparation, P-C-S and harvested acres to crop acres in place reveals the extent of hiring custom services on Iowa farms. An average of 25.3 acres per farm of preparation acres were hired in 1968, but this represented only an average of 9.3 percent of the crop acres in place. P-C-S acres custom hired averaged 19.4 acres per farm which represented only 6.5 percent of the crop acres in place, while the harvested acres averaged 37.8 acres per farm which portrayed 14.5 percent of the crop acres in place. None of the three index variables were significant which denies any increasing or decreasing trends in custom hiring as farms grow in gross sales. One qualification must be made: the number of acres actually custom hired or done for others may be less than the number shown due to the double counting when multiple fertilizing, spraying, cultivating, etc., operations are done on the same acre of land. In Section E the number of preparation acres and harvest acres were found to be significant as crop acres increase; therefore, further comments on custom services hired will be reserved for that section.

The last three variables refer to custom services done by the respondent for other farm operations. Even though the t-values indicate these variables are not greatly influenced by increasing gross sales or crop acres in place, the means are of some import. The average preparation acres (16.4) and P-C-S acres (7.1) are somewhat small but referring to the standard deviations of 95.4 and 36.6 respectively, the reader will observe large amounts of variation about the mean. The harvest acres average of 52.9 acres is much larger than the other categories, but the coefficient of variation is much smaller than for the other two classes of custom services done for others.

The reader will note that the majority of the partial regression coefficients are negative, which in turn reveals that a majority of these variates decrease as farms grow larger. In fact, the only significant characteristic, the percent of machines used but not owned, has a negative coefficient. This fact in conjunction with the variable means indicate that farmers still prefer ownership of resources rather than purchasing productive services.

Evidence in one additional aspect of purchasing productive services is supplied in Table 7. A possible source of capital in the form of machines is available through leasing. The most common practice using leased machines appears to be that of applying anhydrous ammonia with an applicator rented from a local distributor. The measurement unit is thousand-dollar days. This unit is simply the total value of the machine or machines used, divided by 1,000 and multiplied by the number of days used. This gives some indication of intensity of use among the various classes of the two growth measures. Each measure has

Table 7. Distribution of thousand-dollar days by growth measures

Sales Class	Average No. Thousand-Dollar Days	No. in Each Class	Crop Acre Class	Average No. Thousand-Dollar Days	No. in Each Class
(000)			< 120	0.0	10
< 10	0.5	13	120-200	3.0	54
10-20	1.3	47	200-280	1.6	45
20-30	20.4	32	280-360	18.7	32
30-40	3.5	32	360-440	3.7	18
40-50	0.6	13	440-520	4.4	6
50-60	0.8	10	520-600	3.0	5
60-90	1.3	10	7600	1.7	7
90-120	1.9	10			
120-150	4.4	5			
> 150	10.2	5			
Total	5.4	177	Total	5.4	177

a class of relatively heavy concentration of this type of purchased productive service. The gross sales class of $20 - $30,000 and the crop acres in place class of 280 - 260 acres appear to have the most intensive use of leased machines.

D. Unused Resource Analysis

Unused resources, as explained in the review of literature, have received considerable attention as a potential and even necessary condition for growth. The theorized necessary condition for growth, excess managerial ability, is a well-known concept among economists. Does the same logic apply to resources? Namely, do unused resources exist and secondly, do these unused resources encourage growth? The approach taken to test the hypothesis is both analytic and subjective; or less succinctly, some questions were answered on the basis of what the firm actually accomplished in 1968, while others were answered on the basis of what farmers thought could have been accomplished. Again the multiple regression technique was used to ascertain any significant decreasing or increasing quantity of unused resources as the dependent variables increased. One might expect unused resources to decrease as the firm grows, but growth does not preclude a new resource from becoming unused, particularly in the case of lumpy inputs.

The measures devised to study unused resources are listed in Table 8. The number of custom acres provided for others is an initial indication of unused resources, in the form of machinery and labor. Providing custom services for others could be an attempt to mitigate the problem of insufficient land resources. In traditional economic theory,

Table 8. Beta values, t-values, means and standard deviations of variables related to unused resources and extended data concerning those variables

Independent Variable No. and Description	Dependent Variable 1: Beta Value	t-value
23 No. of preparation acres custom done for others	-35.4160	-1.13
24 No. of P-C-S acres custom done for others	112.4731	1.34
25 No. of harvest acres custom done for others	-3.1776	-0.13
10 Acres rented out	192.7343	0.32
39 No. of additional acres which the respondent could have farmed in 1968	6.3876	0.14
26 Participation in the feed grains program; 1 = yes and 0 = no	-10744.1500	-1.02
36 Respondent's off-farm labor	-389.2964	-0.84
37 Wife's off-farm labor	-2.1250	-0.01
38 Children's off-farm labor	1064.7664	1.41
55 Respondent cares for livestock which he doesn't own; 1 = yes and 0 = no	-3277.1428	-0.34
54 Respondent owns livestock which is cared for by someone else; 1 = yes and 0 = no	57390.1923	1.87***
47 No. of additional beef cows the respondent could have cared for in 1968	-384.0483	-1.46
46 No. of additional feeder cattle the respondent could have cared for in 1968	160.9244	2.45**
48 No. of additional dairy cows the respondent could have cared for in 1968	-433.8413	-0.60
49 No. of additional sows and gilts the respondent could have cared for in 1968	-147.8189	-0.25
50 No. of additional feeder pigs the respondent could have cared for in 1968	3.7220	-0.15
51 No. of additional sheep the respondent could have cared for in 1968	-10.1357	-0.11
52 No. of additional poultry the respondent could have cared for in 1968	173.5700	0.67

[a]Not applicable.

**Significant at $\alpha = .025$.

***Significant at $\alpha = .05$.

Dependent Variable 2: Beta Value	t-value	Mean	Standard Deviation	% of Total Respondents Which Gave Non-zero Answers	Mean of Group Which Gave Non-zero Answers
0.0303	0.38	16.4	95.4	7.3	217
-0.0839	-0.42	7.1	36.6	7.3	125
-0.0710	-1.29	52.9	147.8	31.6	164
-0.3960	-0.74	1.83	14.7	1.7	105
0.0689	0.61	101.5	105.3	89.3	114
59.6047	2.56**	0.70	0.46	70.1	N.A.[a]
0.6039	-0.54	2.74	7.3	41.8	6
.6396	0.71	2.53	8.4	12.4	20
-2.6229	-1.44	1.16	4.4	11.9	11
6.2673	0.28	0.20	0.40	20.3	N.A.
-130.9220	-1.79***	0.02	0.13	1.7	N.A.
-.2661	-0.42	3.6	13.8	10.7	32
-.2430	-1.44	34.0	58.8	40.7	87
1.7250	0.98	0.71	4.39	5.1	14
0.0131	0.03	7.8	19.2	26.6	31
0.0853	1.45	64.3	150.3	28.2	242
.3636	1.58	3.9	32.3	4.5	85
-.3863	-0.64	2.2	12.9	5.6	375

one would explain such a phenomenon as decreasing the fixed cost per acre. Hence, one might propose that farmers who are providing those services would have incentive to add crop acres to their present operation and that they could thus expand at a lower per unit cost than could a farmer with no excess machinery and labor. Had any of the three variables been positively significant, one might surmise that a number of large farms are overburdened with machinery and labor. However, since none of the betas were significantly different from zero, one cannot distinguish with this aggregate analysis, whether these farms as a whole are under-utilizing their equipment and machinery, and are in need of greater land resources. The low proportion of farmers engaged in providing custom services for others, particularly preparation acres and P-C-S acres, indicates a rather insignificant trend in this direction. Only 7.3 percent of the operators engaged in such practices, but the average per operator jumped from 16.4 preparation acres for the entire sample to 217 acres for only those who performed such services. Average P-C-S acres done for others was 7.1 acres per farm for the entire sample, but the average rose to 125 acres when only the non-zero responses were calculated. Custom harvesting done for others, however, appears to be a rather common practice. The average number of harvest acres custom done was 52.9 acres while the average for the 31.6 percent of the sample who did the entire amount of custom harvest was 164 acres. Since high-capacity harvest machines are higher-fixed cost items than machines used in tillage operations, one would expect owners of harvest machines to actively seek work off their home farm to reduce the fixed cost per unit.

The above conclusion regarding under-utilized labor and machinery, would have even greater validity were these same farmers attempting to rent or buy land or at least not leasing out any owned land. The trivial average amount of land rented out per farm (1.8 acres) and the large average number of acres rented in (167.4 acres) would seem to substantiate this tenet. The reader will note that less than two percent (1.7 percent to be exact) of the respondents rented out land; therefore, active farmers under 55 years of age are not renting land to others. However, the fact that farmers are leasing in substantial amounts of land probably indicates a desire to increase income through greater output as well as balance the land input with excess machinery and/or labor resource as hypothesized above. On a particular farm, the resource in oversupply would appear to be a function of whichever lumpy resource was added last. For example, land, either purchased or leased, normally comes in multiples of 80 acres. Thus, adding a quarter of land requires greater labor and/or capital in the form of machinery. These added productive services are derived either from formerly underemployed or newly-purchased or newly-leased sources. Ultimately, one can visualize a cyclical behavior as farm firms increase output.

A related point is the question referring to the number of acres which could have been farmed in 1968, given the machinery and labor available in 1968. The mean value of 101.5 acres is an aggregation of diverted acres which could have been farmed plus any additional acres which could have been farmed by both participants and non-participants of the government program. Table 9 gives a breakdown of unused land by participants and non-participants. Further calculations from Table 9 re-

Table 9. Unused land of participants and non-participants in government program

	Number	% of Total
Number participants	124	70.1
Number non-participants	53	29.9
Total	177	100.0
Part A. Participants		
No. who could farm diverted acres	119	96.0
No. who could not farm diverted acres	5	4.0
Total	124	100.0
No. who could farm more than diverted acres	83	69.7
No. who could not farm more than diverted acres	36	30.3
Total	119	100.0
Part B. Non-Participants		
No. who could farm more land	39	73.6
No. who could not farm more land	14	26.4
Total	53	100.0

veal that 89.3 percent of the total respondents stated they could have farmed more land in 1968, at the least in the form of diverted acres. However, only 68.9 percent of the total respondents could farm more land in addition to diverted acres. Table 9 also reveals that 96 percent of the participants could have farmed their diverted acres, but only 69.7 percent could have farmed more than their diverted acres in 1968 given their labor and equipment in 1968. Table 10 designates the reasons given by farmers for not acquiring more farmland even though they indicated capacity to operate more farmland. As the data illustrates, land apparently was not available for full utilization of labor and machinery in 1968. The percentage (81.7) of those respondents in the government program mentioned land was not available as the reason for not adding more crop acres, while 87.2 percent of those not in the feed grains program mentioned this as a reason for not adding more land. An incidental fact is that diverted acres tend to relieve already-overloaded labor and capital resources or more plausibly, to create an excess resource in the form of labor and/or equipment.

Data present in Table 8 indicates that the number of participants in the feed grains program significantly increase as the crop acres in the place increase, but again, the increased income is incentive enough to allow some excess capacity. Some researchers have advanced the tenet that this excess labor and/or machinery is a driving force in per farm acreage increases (21). Table 8 reveals that over 70 percent of the respondents enrolled in the feed grains program in 1968.

Another measure of excess resources is the series of questions on family off-farm employment. Obviously, off-farm employment reduces the

Table 10. Reasons for not acquiring more farmland

Part A. Those in Government Program

	Land Not Available	Farming All I Care To	Added Return Not Great Enough for Added Work	Health Problem	Total
Number	67	12	2	1	82
% of Total	81.7	14.7	2.4	1.2	100.0

Part B. Those not in Government Program

Number	34	3	2	0	39
% of Total	87.2	7.7	5.1	0.0	100.0

total labor supply available for farming which is in excess if the level of livestock and crops is insufficient to keep the family labor fully employed. However, this does not account for the distribution of labor used on the home farm. For example, a crop farm has peak labor use periods during planting and harvest. Throughout other parts of the year the labor, which was used to maximum capacity during planting and harvest, is then available for off-farm employment. The breakdown by labor quality reveals a differential in off-farm employment. The last two columns of Table 8 show that over 40 percent of the respondents worked off-farm during 1968 for an average of 6 weeks. However, only slightly more than 10 percent of the families have a wife or any of their children working off-farm. But the wives and children work off-farm for extended periods of time; 20 weeks and 11 weeks, respectively.

The next two characteristics were designed to detect any emerging trends in the management of livestock systems. The first aspect was concerned with operators who cared for livestock other than those they owned. One could conjecture that excess labor is thus dissipated by caring for another's livestock and receiving either monetary or in-kind remuneration. Of course, some qualifications must be made. A beginning farmer may tend his landlord's livestock and thus an exchange of the tenant's excess labor resource for a parcel of capital, in the form of livestock, occurs. In other cases, poor health of the livestock owner precludes his caring for his livestock and, therefore, a man with excess labor and/or livestock equipment is sought. Apparently, this practice is relatively common as over 20 percent of the respondents engaged in

such activity. However, this arrangement does not appear to be important as gross sales or crop acres in place increase because the beta values are not significantly different from zero. The second characteristic is the converse of the first. To what extent did the respondents, who owned livestock, have others care for these livestock? Evidently this type of arrangement is quite rare as less than two percent of the sample answered affirmative to the question.

To ascertain any unused resources in the form of livestock equipment and labor, a question was posed to farm operators that asked how much additional livestock could have been cared for with 1968 resources of equipment, labor and land. The results of such a question not only reflects unused resources, but probably also the preferences of the operator since only those enterprises, which the operator deems most profitable, given his likes and dislikes, would even be considered for expansion. The only statistically-significant species of livestock which could have been added, as farms grow larger in gross sales, is that of feeder cattle. The average number of additional feeder cattle which could have been cared for in 1968 is 34 head for the entire sample while the average of 40.7 percent of total respondents who had a non-zero response was 87 head per farm. One could surmise that the larger firms tend to have greater excess capacity; at least the operators of these larger firms think they have excess capacity. One could logically argue that this attitude is necessary for growth to occur. Again, the last two columns of Table 8 offer some interesting insights. Beef cattle, dairy cattle, sheep and poultry were overwhelmingly rejected as activities which could have been expanded. This is deduced from the fact

that a high proportion of respondents could not or perhaps would not expand these enterprises. Only 10.1 percent of the total respondents would have more beef cows, only 5.1 percent would have more dairy cows, 4.5 percent would have more sheep and 5.6 percent of the total respondents would have more poultry. However, the average number more these respondents could have cared for is dramatically increased from the sample mean, as Table 8 indicates. Conversely, feeder cattle, feeder pigs and sows and gilts have a much greater potential as growth enterprises. The respective percent of total respondents adding feeder pigs was 28.2 and the percent of those adding sows was 26.6 percent. These figures are nearly triple the number of respondents who would have added beef cows and over five times greater than those who would have added dairy, sheep or poultry.

E. Constructing Multiple Regression Equations

The primary purpose in using multiple regression was to detect any relationship between the two dependent variables, gross sales and crop acres in place, and their respective selected independent variables. The preceding two sections have presented numerous variables which enabled the researcher to make inferences about selected elements of a growing firm. In this section, the analysis of the previous two sections is brought together with additional data to construct an overall regression equation. As stated before, working with a large number of independent variables, a researcher will many times encounter multicollinearity. An associated predicament is that of a singular $X'X$ matrix which cannot be inverted. To circumvent these obstacles, two multiple regression

analyses were performed. One regression analysis was executed with the intercorrelation (r) of all variables reduced to less than .80. The results in sections C and D were taken from this regression. To further supplement the first regression a stepwise regression algorithm was applied to nearly the same variables as were in the first regression. However, several pairs of highly correlated variables were allowed in the analysis to ascertain which of the two variables added the most to the correlation index (R^2) should either one enter the final equation. The purpose of stepwise regression, in oversimplified terms, is to maximize R^2 with a minimum number of variables. Stepwise regression is also a tool which enables a researcher to select the most relevant variables to be included in the final regression equation; this is particularly helpful in this type of study where a large number of variables were examined in the initial regression analysis. However, the reader is cautioned that the regression equation thus calculated is the best fit for the sample, not necessarily the population.

Table 11 displays the remaining variables which were not presented in Sections C and D, while Table 12, Part A and Part B give the ANOV tables for the respective dependent variables. These variables relate primarily to socio-economic characteristics as well as to several of the physical assets of the farm which were not previously examined. As noted earlier, this regression restricts the intercorrelation of variables to r less than .80. The first equation regresses on gross sales (1) while the second regresses on crop acres in place (2). The indented variables are highly correlated with the variate listed immediately above them. Therefore, the indented variables were deleted from the re-

Table 11. Remaining regression variables, beta values, t-values, means and standard deviations

Independent Variable No. and Description	r	Dependent Variable 1: Beta Value	t-value
1 % of gross sales plus misc. farm income which is net farm income		X[a]	X
2 Coefficient of variation of past three years of farm income		-3563.22	-0.65**
3 Net farm income for 1968		2.4881	3.44**
4 % of gross sales which is crop sales		X	X
5 % of gross sales which is swine sales		X	X
6 % of cattle sales which is beef sales		X	X
7 Acres of cropland owned		-10.4659	-0.02
53 Acres owned by respondent	.98	X	X
8 Crop acres rented in		65.9721	0.10
11 Total value of machines used		0.1239	0.27
15 Age of respondent		-354.9444	-0.83
16 No. of yrs. respondent has been farming	.89	X	X
17 Adjusted inheritance		-0.2742	-1.98**
18 Unadjusted inheritance	.93	X	X
19 Total farm liabilities		-0.3424	2.42**
27 Respondent's last grade of school		244.1750	0.12
28 Respondent's No. yrs. of college		10085.2768	2.03**
29 Wife's last grade of school		-1603.1508	-1.35
30 Wife's no. yrs. of college		-549.7500	-0.12
31 Gross sales plus misc. farm income		X	X
32 Crop acres in place		-6.4301	-0.02
33 Value of bldgs. owned entirely		0.6727	1.42
34 Labor provided by the landlord in 1968		-329.5980	-0.85
35 Hired labor in 1968		102.7559	0.38
43 Total value of bldgs. used		0.0080	-0.02
Intercept 1 = 40507.7931			1.31
Intercept 2 = -6.5884			

[a] = variables not included in calculation.

* Significant at $\alpha = 0.005$.

** Significant at $\alpha = 0.025$.

Dependent Variable 2:			
Beta Value	t-value	Mean	Standard Deviation
-0.5930	-0.93	29.79	18.99
16.9453	1.26	0.51	0.62
0.0019	0.76	8154	4750
1.4632	2.87*	23.88	26.92
-0.0815	-0.16	31.18	22.98
0.7984	1.81	35.83	29.66
X	X	109.26	128.47
X	X	129.00	151
X	X	167.38	144.56
0.0053	5.27*	15513	10243
0.3924	0.38	42.58	8.94
X	X	18.76	8.37
0.0009	2.76*	10910	27054
X	X	5835	13219
0.0012	4.00*	21427	29186
4.1661	0.87	10.87	1.76
-10.4032	-0.86	0.20	0.71
2.8941	1.03	10.83	2.86
-9.2506	-1.07	0.47	1.02
-0.0001	-0.21	41037	43155
X	X	275	140
-0.0017	-1.63	9216	12995
0.5238	0.59	2.12	9.13
5.8889	4.38*	6.87	15.72
0.0010	1.18	16941	15488
	-0.65		

Table 12. Regression ANOV's with intercorrelations (r) reduced to less than .80

Part A.

Dependent Variable: Gross Sales and Miscellaneous Farm Income

Variation Source	DF	Mean Square	F-ratio
Total	171		
Regression	42	3599050000.00	
Residual	131	1305850000.00	2.79*

Multiple R^2 = 0.476

Part B.

Dependent Variable: Crop Acres in Place

Variation Source	DF	Mean Square	F-ratio
Total	171		
Regression	40	60236.18	
Residual	131	7546.96	7.98*

Multiple R^2 = 0.709

*Significant at α = .005

gression calculations. 1968 net farm income (3) was the first significant variable and, as would be expected, the beta coefficient was positive. Since net income is derived from gross sales an increase in net income would necessitate a greater gross sales figure. More specifically, ceteris paribus, an increase in net income of one dollar means an increase in gross sales of $2.49. Other significant variables with positive coefficients were total farm liabilities (19) and respondent's number of years of college (28). Every dollar increase of liabilities, ceteris paribus, increases gross sales by $.34, while every added year of college increases gross sales by $10,148. This latter point has many implications with respect to future education of farm operators. The relationship between gross sales and adjusted inheritance (17) seems somewhat unclear. The adjusted inheritance variable is significant, but with a negative beta coefficient indicating less inheritance as gross sales increase. Increasing inheritance by one dollar means a decrease in gross sales of $.27; everything else held constant. However, the reader will note that as crop acres in place increase, the adjusted inheritance is significant with a positive beta coefficient. Apparently inheritance is more prevalent among crop farmers, and perhaps concentrated among those who own crop land, than it is among those farmers with large sales as in the case of beef farms. One could surmise that a larger dollar amount of inheritance is in the form of land rather than livestock. The remainder of the variable's beta coefficients were not significantly different from zero ($\alpha = .05$) which implies gross sales did not increase or decrease as the variates increased. Therefore, the means and standard deviations of these

variables are of greatest importance. The R^2 of this equation (Table 12, Part A) is 0.476, which means over half the variation of gross sales has not been explained.

The second equation with crop acres in place as a dependent variable enjoyed a somewhat better R^2 (0.709) as Table 12, Part B indicates. Table 11 also presents the remaining variables, which were surmised to effect crop acres in place, and were not presented in Sections C and D. The percent of gross sales which is crop sales, variable (4), and the total value of machines used, variable (11), are both positively significant. As the percent of crop sales increases by one percent, the crop acres in places is augmented by 1.46 acres. A dollar expansion of machines used reflects an increase in crop acres of only .0052 acres. Again, adjusted inheritance (17) and total farm liabilities (19) were significant. In this case, both partial regression coefficients were positive which is indicative of increasing inheritance and liabilities as the number of crop acres in place increases. However, a $100 positive increment of inheritance would augment crop acres only by .08 of an acre, while a $100 increase in liabilities means only a .12 acre increase in crop acres in place. In addition, hired labor (35) is frequently used in increasing quantities as the number of crop acres increases. One additional week of labor induced a 2.57 increase in crop acres in place. The reader will note that all of these one-unit increases are valid only with a ceteris paribus assumption.

Tables 13 and 14 exhibit the second regression. The stepwise regression algorithm selects those variables which have an F-value above some specified level. In this situation, 2.5 was the specified F-value below which variables would no longer be allowed to enter the final equation. The algorithm simultaneously attempts to maximize the R^2. Thus the presentation on Table 13 gives the variable added at each iteration as well as the increase in R^2 as each variable enters. The last column states the F-level which would preclude that variable from entering the final equation. Several pairs of highly-correlated variables were permitted to be considered with the intent of finding which of the two were of most value in explaining the variation of the dependent variable. The reader is cautioned that the variable not selected may explain as much, although probably not more, than the variable actually selected. The following highly-correlated pairs of variables were allowed in the stepwise regression calculations with the respective dependent variables:

Dependent Variable: Gross Sales (1) Independent Variable:		r	Dependent Variable: Crop Acres in Place (2) Independent Variable:	
7	Acres of cropland owned			
	and			
53	Acres owned by respondent	.986		
12	% value of buildings used but not owned		12	% value of bldgs. used but not owned
	and			and
13	% value of buildings used rent-free	.815	13	% value of bldgs. used rent-free
15	Age of respondent		15	Age of respondent
	and			and
16	No. of yrs. respondent has been farming	.890	16	No. of yrs. respondent has been farming
17	Adjusted inheritance		17	Adjusted inheritance
	and			and
18	Unadjusted inheritance	.932	18	Unadjusted inheritance
14	% value of machines used but not owned		14	% value of machines used but not owned
	and			and
44	% value of machines used rent-free	.868	44	% value of machines used rent-free
22	No. of harvest acres custom hired			
	and			
42	% of crop acres in place which were harvest acres hired	.884		
21	No. of P-C-S acres custom hired			
	and			
41	% of crop acres in place which were P-C-S acres hired	.897		
20	No. of preparation acres custom hired			
	and			
40	% of crop acres in place which were preparation acres hired	.876		

Table 13. Summary of stepwise regression algorithm (F-level = 2.5)

Part A.

Dependent Variable: Gross Sales and Miscellaneous Income

Step No.		Variable Entered	Multiple R^2
1	19	Total farm liabilities	0.199
2	3	Net farm income for 1968	0.295
3	46	No. of additional feeder cattle respondent could have cared for in 1968	0.321
4	43	Total value of buildings used	0.342
5	18	Unadjusted inheritance	0.357
6	14	% value of machines used but not owned	0.370
7	28	Respondents' no. of yrs. of college	0.386
8	44	% value of machines used rent-free	0.405

Part B.

Dependent Variable: Crop Acres in Place

Step No.		Variable Entered	Multiple R^2
1	11	Total value of machines used	0.333
2	35	Hired labor in 1968	.453
3	26	Participation in the feed grains program; 1 = yes and 0 = no	0.513
4	20	No. of preparation acres custom hired	0.557
5	19	Total farm liabilities	0.587
6	22	No. of harvest acres custom hired	0.612
7	5	% of gross sales which is swine sales	0.634
8	18	Unadjusted inheritance	0.650
9	12	% value of buildings used but not owned	0.669
10	54	Respondent owns livestock which is cared for by someone else; 1 = yes; 0 = no	0.680
11	4	% of gross sales which is crop sales	0.688

Increase In R^2	F to Remove
0.199	12.72
0.096	20.29
0.026	9.68
0.021	5.65
0.015	4.28
0.013	9.72
0.016	5.22
0.019	5.11

$$Y_1 = 3760.336 + 2.714\ X_3 - 878.088\ X_{14} - 0.449\ X_{18} + 0.361\ X_{19} + 8997.18\ X_{28} + 0.444\ X_{43} + 679.971\ X_{44} + 151.811\ X_{46}$$

Increase In R^2	F to Remove
0.333	69.14
0.120	29.17
0.060	24.64
0.044	8.51
0.031	18.78
0.024	5.01
0.022	5.83
0.017	13.27
0.019	8.93
0.010	7.79
0.008	4.32

$$Y_2 = 57.658 + 0.562\ X_4 - 0.723\ X_5 + 0.006\ X_{11} + 0.459\ X_{12} + .002\ X_{18} + .001\ X_{19} + 0.323\ X_{20} + 0.289\ X_{22} + 71.706\ X_{26} + 2.462\ X_{35} - 141.51\ X_{54}$$

Table 14. Regression ANOV's using stepwise algorithms

Part A.

Dependent Variable: Gross Sales and Miscellaneous Farm Income

Variation Source	DF	Mean Square	F-ratio
Total	171		
Regression	8	161227952260.48	
Residual	163	1162421504.00	13.87*

Multiple R^2 = 0.405

Part B.

Dependent Variable: Crop Acres in Place

Variation Source	DF	Mean Square	F-ratio
Total	171		
Regression	11	212495.88	
Residual	160	6628.17	32.06*

Multiple R^2 = 0.688

*Significant at α = .005

As could be expected, the stepwise regression equation to explain gross sales contains the same variables as the preceding equation as well as others (Table 13, Part A and Table 14, Part A). The first variable to enter the equation was total farm liabilities, followed by net farm income for 1968. The respective beta values were 0.361 and 2.714. The variables, respondents' years of college, and the number of additional feeder cattle the respondent could have cared for in 1968, joined the final equation with the respective beta's of 151.811 and 8,977.18. Again, each year of college added a substantial amount to gross sales; in this case, $8,997. The total value of buildings used was a plausible addition to the final equation. As gross sales increase one would expect a concomitant increase in building facilities utilized.

Of the eight pairs of highly-correlated variables which were allowed to enter the equation, only two pairs had any effect on the final regression equation. These were the inheritance variables and the machine variables. The result of adding the unadjusted inheritance (18) variable was to replace adjusted with unadjusted inheritance. The explanation is quite obvious if one observes the partial correlation coefficients of these two variables with the dependent variable

$r_{1*18} = .0587$ $r_{1*17} = .05717$ $r_{17*18} = .9317$

$r_{1*18.17} = .0152$ $r_{1*17.18} = .0069$

After removing their respective common association, unadjusted inheritance (18) is more highly correlated with the dependent variable than is adjusted inheritance (17). Therefore, unadjusted inheritance is a better predictor of gross sales and ultimately was included in the final regression equation.

The second pair of highly-correlated variables, percent value of machines used but not owned (14) and percent value of machines used rent-free (44), both entered the final equation but with opposite beta values, -878.088 and 679.671, respectively. This appears very confusing since these variables were positively correlated. However, the partial correlation coefficients again explain the apparent paradox.

$r_{1*14} = -0.1514$ $r_{1*44} = -0.0898$ $r_{14*44} = 0.8684$

$r_{1*44.14} = 0.0851$ $r_{1*14.44} = -0.1486$

After removing its common association with variable 44, variable 14 is still negatively correlated with the dependent variable. But after removing the effect of variable 14, variable 44 is positively correlated with the dependent variable. In addition, even after fitting variable 14 in the regression equation, variable 44 explains enough additional variation to be included in the final equation also. Therefore, increasing the percent value of machines used but not owned (14) decreases gross sales but if these machines are used rent-free (44), gross sales are increased.

The second stepwise regression with crop acres in place as the dependent variable is given in Table 13, Part B and Table 14, Part B. The first two variables to enter the final equation were total value of machines used (11) and hired labor in 1968 (35). The respective beta values indicate that a $1,000 addition to value of machinery used would augment crop acres by 6 acres, while another week of labor would mean an increase of 2.46 crop acres in place. Participation in the feed grain program (26) would, mathematically, lead to an increase in crop acres in place of 71.706 acres.

The two custom services hired variables, total preparation-acres hired (20) and total harvest-acres hired (22), refer most appropriately to the productive services hired analysis of Section C. This inclusion in the regression equation is an indication that crop acres in place increases concomitantly with custom services in the form of preparation-acres and harvest-acres. This strategy is perhaps used by farmers in response to the peak labor and machine requirements at these two points of the crop year. The total farm liabilities variable (19) was present in this final equation just as it was in the above equation; thus, one could conclude that credit use is crucial as both crop acres in place and gross sales increase. The unadjusted inheritance variable (18), replaced the formerly-used adjusted inheritance variable (17) for the identical reasons stated in the above discussion. The percent value of buildings used but not owned (12) enters the equation with a positive beta value of 0.459. Since nearly 60 percent of the crop acres in place are rented in, one would assume a large number of buildings are included in this leased acreage, which therefore accounts for an increasing percent of unowned buildings used as crop acres in place increase.

Two other percentage variables are the percent of gross sales which is swine sales (5) and percent which is crop sales (4). An increase of one percent of crop sales reflects a 0.562 crop-acreage increase. The percent of swine sales is one of two variables with negative beta's. This emphasizes the tenet that livestock farms tend to be less extensive, and in this study swine farms appear to be the most intensive. A one percent increase in swine sales results in a 0.723

acre decrease in crop acres. The other negative beta refers to those operators who own livestock but have others caring for this livestock. A dramatic decrease of 141.51 crop acres occurs when this type of arrangement is present.

F. Availability of Resources

The central concern of this section is resource supply. These in the order studied are the land, labor, and credit markets. As opposed to the preceding section, this and the following section rely on less statistical sophistications and more on a heuristic approach. Table 15, the key to succeeding tables, gives frequency distributions by gross sales plus miscellaneous farm supply and by crop acres in place. Table 15 also gives an indication that the sampling units approach a normal distribution, although perhaps with a slight skewness to the left

Table 15. Key to succeeding tables using the growth measures

Gross Sales Classes	Number in Each Class	Crop Acres in Place Classes	Number in Each Class
1. < $10,000	13	1. < 120	10
2. $10,000-$20,000	47	2. 120-200	54
3. $20,000-$30,000	32	3. 200-280	45
4. $30,000-$40,000	32	4. 280-360	32
5. $40,000-$50,000	13	5. 360-440	18
6. $50,000-$60,000	10	6. 440-520	6
7. $60,000-$90,000	10	7. 520-600	5
8. $90,000-$120,000	10	8 > 600	7
9. $120,000-$150,000	5		
10. > $150,000	5		
Total	177		177

The availability of the land resource was studied from the viewpoint of both seller and buyer. Each respondent was asked the dollar amount above the current market price at which he would sell his land (Table 16, Part A.). An equal number of respondents would sell at the current price per acre (22 percent) as would never sell (22 percent). Also, at $25 and $150 above current market value, a relatively large percent, 18.3 percent and 16.5 percent, respectively, of the respondents would contemplate selling land. Of the 177 in the sample, 109 respondents are landowners. To add refinement to the above presentation, the average amount above current market price at which the respondent would sell is broken down by gross sales (Table 16, Part B.) and crop acres in place (Table 16, Part C.). Part B demonstrates a large amount of variability in the average dollar amount above current market price as one looks at the different sales classes. The high is $300 per acre above the current price in category seven while the low is $70 per acre above the current price in category eight. In Part C, however, as one moves from less than 120 crop acres in place to greater than 600 crop acres in place, one finds a decreasing average dollar amount above current market prices at which the respondents would sell. With the exception of category seven, which has only two observations, this trend reflects an increasing willingness of farm operators to part with owned land. The first category reported an average of $258 per acre above the current market price while the sixth and eighth categories responded with an average of $66 per acre above the current market price at which the respondents would sell an acre of crop land.

Table 16. Distribution of sampling units among alternative selling prices of land

Part A.

Dollar Amount Above Current Market Price at Which Respondent Would Sell an Acre of Crop Land

	Sell Now	$25	$50	$100	$150	$200	$300	$400	$500	Never Sell	Total
Number	24	20	1	3	18	9	11	8	5	24	109
% of Total	22.0	18.3	.9	2.8	16.5	8.3	10.1	7.3	4.6	22.0	100.0

Part B.

Distribution by Gross Sales of Average Dollar Amount Above Current Market Prices at Which Respondents Would Sell an Acre of Crop Land

Class Number	1	2	3	4	5	6	7	8	9	10	Total
Avrg. $ amt. above current price	266	167	102	164	233	170	300	70	100	150	175
No. selling	9	20	12	17	9	5	5	5	2	1	65
No. selling at current prices	(1)	(7)	(3)	(5)	(1)	(1)	(1)	(1)	(0)	(0)	(20)
No. never selling	3	9	5	3	1	1	1	0	0	1	20
No. not landowner	1	18	15	11	3	4	4	5	3	3	67
Total	13	47	32	31	13	10	10	10	5	5	176

Part C.

Distribution by Crop Acres in Place of Average Dollar Amount Above Current Market Price at Which Respondents Would Sell an Acre of Crop Land

Class Number	1	2	3	4	5	6	7	8	Total
Avrg. $ amt. above current price	258	196	175	126	180	66	400	66	175
No. selling	6	25	19	17	10	3	2	3	65
No. selling at current price	(1)	(6)	(5)	(4)	(1)	(1)	(0)	(2)	(20)
No. never selling	3	8	6	1	3	0	1	2	24
No. not land owner	1	21	19	14	5	3	2	2	67
Total	10	54	44	32	18	6	5	7	176

Parts B and C also contain the distribution by gross sales and by crop acres in place of those respondents selling at current prices, those respondents who would never sell and those who are not landowners.

An adjunct to selling land is Table 17, where the exit process in the sense of plans after selling, is observed. Over 32 percent of the people who would sell their land would move to an urban job. Another 16.7 would retire and invest the money received in some type of stocks outside of agriculture, while 14.3 of the respondents would continue to farm by purchasing comparable farmland. The miscellaneous categories includes those with no such plans, those who would continue to farm through renting and those who would provide custom services after selling their land.

Turning to Table 18 (Part A.) and the buyer's side of the land market, the same format is used as above. Thirty percent of the operators state that land is available at present prices while 29 percent said land is not available at any price. In regard to this latter figure, several interviewers commented that these people often mentioned that land in their area had been owned by certain families for years and that it would be nearly impossible to purchase any of this closely-held land. The modal dollar amount above market price at which respondents thought land could be purchased is $100 and for that amount, 34.7 percent of the respondents indicated land could be purchased. This quantity, of course, is only a reflection of the respondent's current expectations. As before, the average dollar amount is broken down by gross sales (Table 15, Part B) and crop acres in place (Table 15, Part C).

Table 17. Distribution of sampling units among different plans after selling land

Plan	Number	% of Total
1. Buy better farmland	10	11.9
2. Buy other comparable farmland	12	14.3
3. Buy cheaper farmland	8	9.5
4. Retire and invest the money in stocks	14	16.7
5. Move to an urban job	27	32.2
6. Buy land as an investment	4	4.8
7. Miscellaneous	9	10.6
Total	84	100.0

Table 18. Distribution of sampling units among alternative purchasing prices of crop land

Part A.

Dollar Amount Above Market Price at Which an Acre of Crop Land Can Be Purchased

	Available at Present Prices	$25	$50	$100	$200	Not Available at Any Price	Total
Number	30	12	23	60	19	29	173
% of Total	17.3	6.9	13.3	34.7	11.0	16.8	100.0

Part B.

Distribution by Gross Sales of Average Amount Above Current Market Price at Which Respondents Could Buy an Acre of Crop Land

Class Number	1	2	3	4	5	6	7	8	9	10	Total
Avrg. $ amt. above current price	71	83	72	83	90	55	106	45	95	62	78
Number	7	40	25	25	11	9	8	10	5	4	114
No. who could buy at present price	(0)	(9)	(4)	(6)	(2)	(3)	(1)	(4)	(0)	(1)	(30)
Not available at any price	4	5	7	7	2	1	2	0	0	1	29
Total	11	45	32	32	13	10	10	10	5	5	173

Part C.

Distribution by Crop Acres in Place of Average Amount Above Current Market Price at Which Respondents Could Buy an Acre of Crop Land

Class Number	1	2	3	4	5	6	7	8	Total
Avrg. $ amt. above current price	125	88	88	50	96	45	45	65	78
Number	5	42	38	28	15	6	4	5	144
No. who could buy at present prices	(0)	(7)	(7)	(10)	(1)	(2)	(2)	(1)	(30)
Not available at any price	5	8	6	4	3	0	1	2	29
Total	10	51	44	32	10	6	5	7	173

The most striking aspect of these two presentations is the variance of the average dollar amount; from $45 per acre to $106 per acre among the gross sales classes and from $45 per acre to $125 per acre among the crop acres classes. Part B and Part C also give the distribution of respondents who believe they could buy land at present prices and those who think land is not available at any price. A notable aspect is the comparison of the average dollar amount to buy crop land with the average dollar amount needed to persuade the landowner to sell as given in the previous discussion. The average dollar amount above the current market price at which the responding landowners would be enticed to sell is $175 per acre. However, if these same respondents were contemplating buying land, they would be willing to offer only $78 per acre above the current market price. Therefore, one can conclude a certain amount of bargaining is necessary, and in a competitive market desirable, before an agreement between the buyer and seller can be reached.

Another route to gaining control of resources is through leasing. Table 19 reveals the current thinking of farmers concerning land leasing; both at current cash rent rates and at current crop share rates.

Table 19. Land availability through leasing

	Cash Rent			Crop Share		
	Yes	No	Total	Yes	No	Total
Is cropland available at current cash rent rates?	16	161	177			
% of Total	9.0	91.0	100.0			
Is cropland available at current crop share rates?				13	164	177
% of Total				7.3	92.7	100.0

The opinion of the farmers in most cases was a resounding "no," land is not readily available through leasing. The percent of respondents answering no for cash rent rates was 91 percent while the proportion of those answering no to crop share rates was 92.7 percent. Of the 16 who replied that land was available at current cash rates, the current average cash rent rate for crop land was $33.20 per acre. Of the 161 who could not get crop land at current cash rent rates, 134 said they would have to pay an average of $39.82 per acre to get crop land to farm. Due to the complexities introduced with leasing by crop share, this aspect was given limited treatment. The breakdown by gross sales and crop acres in place did not appear to produce any significant insights and, therefore, was not included.

The focus of the second phase of this section is the labor supply. The respondents were questioned as to the farm labor situation in their respective areas. Table 20 summarizes the results of this aspect.

Table 20. Labor availability

	Yes	No	Total
Is labor available at current wages?	14	162	177
% of Total	8.0	92.0	100.0

An average of 171 replied that the current wage rate in their respective areas was calculated to be $1.65 per hour. When asked what rate of pay would be necessary to secure good quality labor, 101 answered with an average of $2.47 per hour. Sixty-two respondents were unaccounted for,

apparently for two reasons: (1) they misunderstood the question and gave the same rate for both questions, or (2) the conversion factors used in the study biased the answers and the rates thus calculated were the same as given in the first question. In respect to the latter point, any monthly rates, housing, food, etc., were converted to an hourly basis. The monthly wage was based on 250 hours per month. Any "extras" per month in the form of housing, food, etc. were given an additional value of $100 per month.

The final phase of this section deals with credit in general and financing problems in particular. Table 21, Part A condenses much of the data into an understandable form. The fact that interest rates were higher than average was the answer given most frequently (37) as a financing problem. Higher than average (22) security requirements and unreasonable repayment terms (11) were the next most frequent financing problems. However, the number of respondents experiencing these problems were not overwhelming. Because more than one reason can be checked by any one respondent, the totals of Table 21 inflate the number of respondents experiencing financing problems. The first line under total gives the true number of respondents with credit restrictions as well as the respective percents of total respondents. Only 8.5 percent of the respondents experienced machinery and/or equipment credit problems. Merely 5.6 percent of the respondents had difficulties with feed, fertilizer, etc., financing and the same percentage of the respondents had problems with land financing. Livestock financing posed a problem for 7.3 percent of the respondents. Apparently very few farm

Table 21. Credit availability and credit problems

Part A: Financing Problems

Number of Respondents with Specific Finance Problems vs. Causes of These Problems

	Loan for Mchry. and/or Eqptmt.	Loan for Fert., Feed, Seed, Etc.	Loan for Land Financing	Loan for Livestock	Loan for Other	Total
Higher than average interest rates	9	7	6	9	6	37
Unreasonable repayment terms	4	4	1	1	1	11
Large dn.pymt. rqmnts.	1	0	4	1	0	6
Creditor required chg. of farm operations	1	0	0	1	0	3
Security rqmnt. higher than average	6	3	3	5	3	22
Reluctance of lender to loan sufficient funds	3	1	1	2	2	9
Other	1	0	0	1	0	2
Total	25	18	15	20	12	
No. of Respondents with financing problems	15	10	10	13	7	
% of Total	8.5	5.6	5.6	7.3	4.0	
No. of Respondents with no financing problems	162	167	167	164	169	
% of Total	91.5	94.4	94.4	92.7	96.0	

Part B: Credit Availability

	Yes	No	Total
Could you get more credit?	168	7	175
% of Total	96.0	4.0	100.0

operators are hindered by credit restraints. Part B of Table 21 summarizes the responses about credit availability. Even though the question is perhaps "ego-loaded," only 4 percent of the total stated any apprehension about lending institutions providing them with adequate credit.

G. Internal Restraints

Another barrier to firm growth, particularly in the agricultural firm, is that of internal restrictions. This aspect of management is perhaps more psychologically-based than economically-oriented. However, as in many sciences, human behavior is a real variable and must eventually be reckoned with. The farm operators were asked to evaluate and quantify their personal restraints as to crop acres, hired labor, livestock and credit use. The answers represent only their present thinking based upon past experiences and current expectations. The quantities expressed are proposed only as first approximations and the numbers in the tables should be viewed as such, but the overall inclination of data is of greatest consequence.

The respondents were questioned as to whether they had any personal limits to crop acres and if so, what this personal limit was. Of the 176 respondents, 94.9 percent revealed they did have a personal limit to the number of crop acres they would farm. Table 22 expresses the quantities involved in the second question in tabular form by designating the average personal limit by gross sales and crop acres in place. Both of the growth measures indicate that farm operators have a larger personal limit as the farm increases in gross sales or in crop

Table 22. Average personal limit and average difference between personal limit of crop acres and crop acres actually farmed by growth measures

Gross Sales Class ($) (1)	No. in Each Class (2)	Personal Limit to Crop Acres (3)	Difference Between Actual and Personal Limit of Crop Acres (4)	Acres Class (1)	No. in Each Class (2)	Personal Limit to Crop Acres (3)	Difference Between Actual and Personal Limit of Crop Acres (4)
(000)		(A)	(A)			(A)	(A)
< 10	12	429	263	< 120	9	561	467
10-20	46	447	231	120-200	53	384	224
20-30	31	471	224	200-280	42	499	254
30-40	30	587	282	280-360	31	495	179
40-50	12	625	319	360-440	17	918	510
50-60	9	850	542	440-520	6	1008	539
60-90	9	633	240	520-600	4	625	76
90-120	9	733	347	> 600	5	1000	279
120-150	4	738	412				
< 150	5	510	213				
Overall average		544	275	Overall average		544	275
Total	167			Total	167		

acres in place. The gross sales classification exhibits a low average personal limit of 429 crop acres among farmers with less than $10,000 in gross sales, whereas the peak average personal limit is 850 crop acres which is reached at $50,000-$60,000 gross sales. The crop acres in place distribution of personal limits is more variable, and ranges from an average of 384 crop acres to 1,008 crop acres. The average for the entire sample is 544 acres, which is approximately double the present per farm crop acreage. The fourth columns in Table 22 indicates the difference between the crop acres currently being farmed and the personal limit. A widening gap or difference as crop acres or gross sales increase would indicate a lessening internal restraint and vice versa. Neither of the two growth measures has a pronounced increasing or decreasing gap. The average gap for the sample is 275 acres, which seems to preclude any internal restraint in crop acres operated. More precisely, the farmers are willing to double the average size of farm in acres, given sufficient machinery and labor to care for the additional acres.

Tables 23 and 24 summarize the labor restraints, distribution of restraints and the comparison between present and maximum labor use respectively. A fairly high proportion (89.2 percent) of respondents expressed having a personal limit on hired labor. Table 23 illustrates a cogent point: nearly 40 percent of the respondents would never hire a full-time hired man while almost another 40 percent would employ only one full-time hired man. This fact is reflected in Table 24 where the average personal limit of hired men is exemplified. The average limit for all respondents is 48 weeks; where a full-time hired man represents 52 weeks of

Table 23. Number of full-time hired men respondents would employ

	Maximum Number of Hired Men Respondents Would Hire							
	0	1	2	3	4	5	Over 5	Total
Number	60	63	24	4	2	0	2	155
% of total	38.7	40.6	15.5	2.6	1.3	0	1.3	100.0

labor per year. The fourth column of the gross sales and acres in place classification depict the average difference between present labor use and the personal limit. The fourth column of the crop acres in place classification exhibits a large amount of variation, from 93 weeks to 24 weeks, whereas the gross sales classification indicates a higher willingness to hire more labor in the center of the distribution ($30,000-$60,000 categories) and less of a desire to hire additional labor near the tails of the distribution.

Next in the sequence of internal restraints, consideration is given to the livestock sector. A large percentage of operators (91.5 percent) indicated a personal limit with respect to this point. Table 25 offers numerous insights into the thinking of farmers. The breakdown by gross sales and acres in place protrays much variation within each livestock category. The large variation in the crop acres in place classification is especially noticeable. This is perhaps due to a tenuous relationship between crop acres farmed and livestock numbers. The gross sales measure appears to delineate at least probable trends as gross sales increase. Disregarding the $90,000-$120,000 bracket feeder cattle seem to be coming under an internal restraint; the same holds

Table 24. Average personal limit and average difference between personal limit of hired labor and actual amount of hired labor by growth measures

Gross Sales Class($) (1)	No. in Each Class (2)	Personal Limit to Hired Labor (3)	Difference Between Actual and Personal Limit of Hired Labor (4)	Acres Class (1)	No. in Each Class (2)	Personal Limit to Hired Labor (3)	Difference Between Actual and Personal Limit of Hired Labor (4)
(000)		(wk.)	(wk.)			(wk.)	(wk.)
< 10	12	35	30	< 120	9	58	58
10-20	42	40	38	120-200	51	38	34
20-30	29	38	34	200-280	37	41	39
30-40	30	50	45	280-360	28	30	24
40-50	11	66	60	360-440	16	85	75
50-60	7	82	63	440-520	6	113	93
60-90	8	59	37	520-600	4	65	44
90-120	8	65	57	> 600	4	91	32
120-150	3	69	40				
< 150	3	52	30				
Overall average		48	42	Overall average		48	42
Total	155			Total	155		

Table 25. Average difference between December 31, 1968 inventory of livestock and stated limit by growth measures

Sales Class ($)	No. No	Having Limit	Feeder Cattle	Beef Cows	Dairy Cows	Feeder Pigs	Sheep	Poultry	Sows and Gilts	No. in Class
(000)										
< 10		0	231	55	-7	544	0	-89	22	11
10-20		3	127	38	0	207	6	246	24	37
20-30		2	286	25	-2	509	-1	308	48	28
30-40		1	141	43	-1	323	30	244	18	21
40-50		0	128	12	-6	248	0	-69	19	10
50-60		1	128	-4	-5	362	-4	37	36	8
60-90		3	55	8	-3	177	0	-80	95	4
90-120		3	460	14	0	100	0	-12	88	7
120-150		2	30	-1	0	28	0	0	3	2
> 150		0	-49	0	0	66	0	0	-29	1
Average Total*		(15)	188	30	-2	320	6	162	34	(130)

Acres Class	No. No	Having Limit	Feeder Cattle	Beef Cows	Dairy Cows	Feeder Pigs	Sheep	Poultry	Sows & Gilts	No. in Class
< 120		0	222	20	0	116	9	-25	31	10
120-200		2	262	55	-2	550	-1	-33	39	38
200-280		3	115	20	-2	234	0	513	30	35
280-360		4	168	21	-2	365	18	4	16	19
360-440		2	245	18	-4	199	1	-27	42	16
440-520		1	241	23	0	19	0	0	48	4
520-600		1	2	4	-4	2	-2	0	70	4
> 600		2	35	14	-3	297	106	1250	21	4
Average Total*		(15)	188	30	-2	320	6	162	34	(130)

*Minus those respondents caring for others' livestock (32) and those having no limit (15).

true for beef cows where farmers in the group with the smallest amount of sales would increase herd-size by 55 head while the largest category would have no beef cows. Notwithstanding within variation, comparisons between the livestock classes proffers several insights. Observing the average total line, the reader will note several plateaus or differences between present practice and the maximum private limit. For example, respondents would add an average of another 188 head of feeder cattle, 34 head of sows and gilts, 320 head of feeder pigs, and 30 beef cows per farm before reaching their expressed personal limit. Meanwhile, these operators would decrease the number of dairy cows by 2 head per farm, increase sheep by only 6 head per farm, and increase poultry by 162 head per farm. If Table 25 can be interpreted as the livestock species in which growth will occur, one can surmise that feeder cattle and feeder pigs, accompanied by a concomitant increase in sows and gilts, have the greatest growth potential. Conversely, dairy cows, sheep, and to a lesser extent, poultry apparently are less desirable expansion enterprises. In order that the quantities in Table 25 truly reflect the operator's own preferences, those operators who cared for someone else's livestock were excluded from the calculations.

Table 26 presents the final phase of the internal restraints section and deals with attitudes toward credit use. A very high proportion (91.5 percent) of the respondents expressed a personal limit to liabilities. As opposed to the limit on livestock, the personal limit on credit varies relatively little as gross sales and crop acres in place increase. Both growth measures, crop acres in place and gross sales,

Table 26. Average personal limit and average difference between personal limit of credit and current liabilities by growth measures

Gross Sales Class ($) (1)	No. in Each Class (2)	Personal Limit to Credit (3)	Difference Between Actual and Personal Limit of Credit (4)	Acres Class (1)	No. in Each Class (2)	Personal Limit to Credit (3)	Difference Between Actual and Personal Limit of Credit (4)
(000)							
< 10	13	33,923	26,610	< 120	9	34,167	27,169
10-20	43	33,279	25,218	120-200	52	37,962	23,513
20-30	31	54,645	39,198	200-280	40	75,100	59,067
30-40	30	67,067	50,929	280-360	30	66,117	45,096
40-50	12	112,958	84,528	360-440	18	142,194	121,692
50-60	9	101,389	76,092	440-520	5	154,000	87,000
60-90	8	67,188	34,425	520-600	5	78,000	43,525
90-120	8	169,688	101,563	> 600	3	71,667	37,667
120-150	3	250,000	233,333				
< 150	5	142,500	95,700				
Total	162	69,157	50,240	Total	162	69,157	50,240

indicate an increasing willingness to accept larger amounts of liability as the firm increases in size in gross sales and crop acres. As gross sales increase from less than $10,000 to $120,000-$150,000 the personal limit on liability increases from $33,923 to $250,000. This is a fairly continuous trend with the exception of the $60,000-$90,000 bracket. As crop acres increase the personal limit on liability increases from a low of $34,167 at less than 120 acres, to $154,000 at the 440-520 acre bracket and then decreases again in the last two categories of 520-600 acres and greater than 600 acres. Both columns 4 indicate the gap between liabilities as of December 31, 1968 and the respondent's personal limit. This gap appears to be increasing, particularly as gross sales increase. By subtracting column 4 from column 3 one can approximate the average present level of liabilities per farm. Doing so for the first category of gross sales and crop acres, one finds that the present level of borrowing is $7313 per farm and $6990 per farm respectively. Therefore, the respondents state their average personal limit as $33,923 and $34,167, respectively, for gross sales and crop acres, but are currently only borrowing approximately $7,000. Therefore, these operators are operating well below their personal limit or, perhaps, external rationing is a factor. Nevertheless, one can conclude that the larger farms, particularly in gross sales, tend to be more willing to use more credit than the smaller firms.

VI. SUMMARY AND CONCLUSION

Income variation over the past three years did not affect the majority of farm characteristics in 1968. Since orthogonal comparisons are needed to ascertain which of the treatment means are significantly different from the others, one can only conjecture as to those treatments which are different from others. Even so, the primary objective was accomplished; to find if different levels of income variation modified the farm operation in 1968 and thus the growth process of the firm. Only two characteristics, respondents' off-farm employment and the total value of all buildings used, had treatment means which were significantly different over the four classes of variation. Off-farm employment is much higher (13.71 weeks) in the fourth treatment which has the highest variation. It seems quite plausible that a tremendous drop in net farm income during 1966 or 1967 would encourage off-farm employment. The large change in net farm income could not have occurred in 1968 as this variable mean was not significantly different from the other treatment means in 1968. In addition, this work off the farm does not result in a significant increase in total net family income. Therefore, if it is assumed that this off-farm labor receives some type of remuneration, the added gross income is offset by some added expense. The other characteristic which was significant over the four treatments was total value of buildings used. Apparently the farms with the lowest variation of income, treatments one and two, use much less building facilities than treatments three and four with higher net income variation.

Some significant differences were found between the following types of farms: beef farms, crop farms, swine farms and other farms. Gross sales plus miscellaneous farm income was over twice as large on beef farms as it was on any of the other farm types. This reflects a high turnover of capital on beef farms. However, the percent of gross sales which is net income (21.6 percent) is the lowest among beef farms. The swine farms tend to have less intensive units (249.3 acres in place average) than do crop farms (384.4 acres in place average) and the beef farms (350.7 acres in place average). Another significant variable was participation in the feed grain program. Crop farms tend to have more incentive to join the feed grain program than do livestock farms. The final characteristic which differed between farm types was respondents' labor used off the farm. Crop farmers worked off the farm an average of 6.6 weeks, while livestock farmers on beef farms, swine farms and other farms, averaged from 1.5 weeks to 2.6 weeks off the farm in 1968. This appears to be due to the different distributions of labor requirements.

The purchasing of productive services rather than owning resources is dependent upon the type of productive service being used. For example, renting in land is a fairly common occurrence with nearly 60 percent of the crop acres per farm being unowned, while only 9.4 percent of the machines used are not owned. However, land leased from someone else does not increase as crop acres in place increase or as gross sales increase, while increasing the value of machines used and not owned causes a decrease in crop acres in place. The high cost of purchasing farmland might be the cause of the large proportion of the farmers leas-

ing land from others. Leasing machines from others is not prevalent due, perhaps, to the availability of custom operators. As crop acres in place increase the number of preparation acres and harvest acres increase. However, the percent of crop acres in place which were preparation acres hired and the percent of crop acres in place which were harvest acres hired does not affect crop acres in place or gross sales. Therefore, hiring custom services increases absolutely, but not relatively, as the dependent variable, crop acres in place, is allowed to increase.

The average percent value of buildings used but not owned, 45.0 percent, is probably the result of renting in a large proportion of crop land. The 25.3 percent average of equipment used and not owned is also a result of renting in a high percent of acres. The percent value of machine and buildings used rent-free indicates the extent of inter-family and close-neighbor lending of machines and buildings. Since remuneration for buildings, in this study, does not occur if only a crop share lease is in effect, the percent value of buildings used rent-free may be inflated. The thousand-dollar days calculation to find the extent of machines leased, indicated that this practice is concentrated in the $20,000-$30,000 bracket of gross sales and the 280-360 acre bracket of crop acres in place.

Unused resources were hypothesized to exist on a particular farm when the operator did custom services for others, rented out crop land, could have cared for additional crop acres, the respondent, wife or children worked off the farm, the respondent cared for someone else's livestock, or the respondent could have cared for more livestock in 1968.

None of the regression equations detected a positive or negative relation between the independent and dependent variables with the exception of the positive relationship between gross sales and the number of feeder cattle which could have been cared for. The simultaneous analysis was to look at the proportion of the sample which gave zero replies to these questions. Over 30 percent of the respondents did custom harvesting for others. Nearly 90 percent of the total sample indicated they could have farmed more crop land in 1968 while 70 percent of the respondents participated in the feed grains program, which left some formerly-used labor and machines in excess. However, the farm operators indicated that a barrier to adding more acres was present in the form of additional land not being available. A substantial proportion (41.8 percent) of the respondents worked off the farm for an average of 6 weeks in 1968. Over 20.3 percent of the total sample was caring for livestock they did not own. The last category of unused resources, livestock, revealed the preferences of farmers for the species of livestock whose production they would expand. Feeder cattle, sows and gilts and feeder pigs were the areas in which expansion could have taken place. Therefore, this type of analysis reflects a definite potential for growth as long as these unused resources exist.

Significant variables positively related to gross sales were net farm income, total farm liabilities and the respondent's number of years of college. A significant negative relation was found between gross sales and adjusted inheritance. Inheritance is not a factor in increasing one's gross sales in farming. The significant variables which were

positively related to crop acres in place were the percent of gross sales which were crop sales, total value of machines used, total farm liabilities, adjusted inheritance and finally, the total value of buildings used. The intercept term (-6.5884) of crop acre in place indicates that if all the variables were zero, no crop acres in place would be possible. However, the gross sales intercept ($40,507.79) is indicative of a rather poor predictive model for gross sales has been explained. The crop acres in place equation resulted in a much higher R^2; namely, 0.709. The stepwise regression narrowed the number of variables in each equation to workable proportions. The R^2 of each equation was near that given for the normal regression, but the number of variables were reduced by 34 variables in the first equation and reduced by 29 variables in the second equation.

The lack of available resources is conceivably a monumental barrier to growth for many farms. Gaining control of resources, or more precisely, the productive services of resources is a necessary condition for growth. The land market apparently is kept quite competitive by farmers themselves. The respondents indicated they would sell an acre of their crop land only if they received an average of $175 above the current market price, but they would give only $78 per acre above the current market price when buying land. The investigation on gaining control of land resources through leasing showed that only 9.0 percent of the respondents could get crop land at current cash rent rates, and only 7.3 percent of the respondents indicated they could acquire crop land at current crop share rates. Those respondents who could not ac-

quire crop land at current cash rent rates said they would have to pay an additional $6.62 per acre on the average to acquire such crop land.

Labor was also unavilable at current rates according to the respondents. They thought that $2.47 per hour would be necessary to attract good quality labor, whereas farmers were presently paying an average of $1.65 per hour. The final external restraint of growth studied was that of capital in the form of credit. Credit was the least-limiting resource examined. Only 8.5 percent of the respondents noted any restriction on machinery and/or equipment financing, 5.6 percent had problems with operating capital, 5.6 percent were hampered with securing land financing and only 7.3 percent had problems with livestock financing. This analysis is perhaps one indication that capital in the form of credit is a much easier resource to gain control of than is land or labor. This conclusion seems to support movement toward a capital-intensive agriculture rather than a labor-intensive industry.

The final selected element in the growth of the farm-firm was that of internal restraints. This aspect of the study is within the realm of personal goals, personal management problems and internal credit rationing of farm operators. The personal limit on acres averaged nearly twice the present per farm crop acreage. This indicates at least a willingness, if not a desire of farm operators, to increase their farm acreage. Operators of the larger farms indicated a larger personal limit than did those from smaller farms in terms of both gross sales and crop acres in place.

Respondents in general revealed an aversion to hiring large amounts of labor. Nearly 40 percent of them would not hire a full-time hired man, while 40.6 percent would hire only one full-time hired man. This would seem to show an internal or psychological restraint in dealing with hired labor. The internal restraint on livestock analysis resulted in conclusions similar to those concerning unused resources. Feeder cattle, feeder pigs, sows and gilts and to a lesser extent, beef cows, are potential growth activities as indicated by the difference between the December 31, 1968 inventory and the stated limit of the respondent. Conversely, dairy cows and sheep appear to be in for a period of declining activity.

Internal credit restraints, on the average, do not appear to be severely limiting. The average limit to liabilities was $69,157 while the difference between liabilities as of December 31, 1960 and the stated personal limit was $50,240. This indicates, on the average, that farmers are willing to more than double their present liabilities ($21,427) if the opportunity arises. As farms grow larger in gross sales and acres in place, the operators specified a larger personal limit on credit.

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IX. APPENDIX A: PRICES USED FOR GROSS SALES

Hay	$ 19.30/ton
Corn	1.01/bushel
Oats	.65/bushel
Wheat	1.29/bushel
Soy Beans	2.49/bushel
Popcorn	2.60/hundred weight
Straw	.50/bale
Whole Milk	4.45/hundred weight
Butterfat	.66/pound
Wool	.34/pound
Sweetcorn	25.50/ton

X. APPENDIX B. PROCEDURE FOR ADJUSTED INHERITANCE

A. Consumer Price Index

For Use on Money Inherited

Procedure:

Multiply money inheritance by the appropriate factor listed for each year in which the inheritance was received. Then find 4% of original inheritance and multiply this figure by the number of years ago the inheritance was received. Then add this figure to that amount calculated in the first sentence.

1935	$\frac{47.8}{120.9} = .395$	1949	$\frac{83.0}{120.9} = .686$
1936	$\frac{48.3}{120.9} = .399$	1950	$\frac{83.8}{120.9} = .693$
1937	$\frac{50.0}{120.9} = .413$	1951	$\frac{90.5}{120.9} = .748$
1938	$\frac{49.1}{120.9} = .406$	1952	$\frac{92.5}{120.9} = .765$
1939	$\frac{48.4}{120.9} = .400$	1953	$\frac{93.2}{120.9} = .771$
1940	$\frac{48.8}{120.9} = .404$	1954	$\frac{93.6}{120.9} = .774$
1941	$\frac{51.3}{120.9} = .424$	1955	$\frac{93.3}{120.9} = .772$
1942	$\frac{56.8}{120.9} = .470$	1956	$\frac{94.7}{120.9} = .783$
1943	$\frac{60.3}{120.9} = .499$	1957	$\frac{98.0}{120.9} = .810$
1944	$\frac{61.3}{120.9} = .507$	1958	$\frac{100.7}{120.9} = .833$
1945	$\frac{62.7}{120.9} = .519$	1959	$\frac{101.5}{120.9} = .839$
1946	$\frac{68.0}{120.9} = .562$	1960	$\frac{103.1}{120.9} = .853$
1947	$\frac{77.8}{120.9} = .643$	1961	$\frac{104.2}{120.9} = .862$
1948	$\frac{83.8}{120.9} = .693$	1962	$\frac{105.4}{120.9} = .872$

1963 $\frac{106.7}{120.9} = .882$

1964 $\frac{108.1}{120.9} = .894$

1965 $\frac{109.9}{120.9} = .909$

1966 $\frac{113.1}{120.9} = .935$

1967 $\frac{116.3}{120.9} = .962$

1968 $\frac{120.9}{120.9} = 1.000$

B. Land Index Values

For Use on Land Inherited

Procedure:

Multiply total value of land inherited by the below-appropriate factor. Then multiply original total value by 4%, and multiply this figure by the number of years since inheritance occurred. Add this figure to the value obtained in the first sentence.

Section 1. North Central Grain Reporting Region

1935	5.22	1952	1.84
1936	5.07	1953	1.79
1937	4.92	1954	1.77
1938	4.77	1955	1.71
1939	4.62	1956	1.65
1940	4.47	1957	1.59
1941	4.32	1958	1.53
1942	4.01	1959	1.50
1943	3.70	1960	1.61
1944	3.39	1961	1.60
1945	3.08	1962	1.56
1946	2.77	1963	1.49
1947	2.46	1964	1.40
1948	2.15	1965	1.27
1949	1.84	1966	1.11
1950	1.91	1967	1.03
1951	1.87	1968	1.00

Section 2. Western Livestock Reporting Region

1935	5.10	1952	1.73
1936	4.95	1953	1.72
1937	4.80	1954	1.71
1938	4.65	1955	1.66
1939	4.50	1956	1.61
1940	4.35	1957	1.57
1941	4.20	1958	1.54
1942	3.89	1959	1.50
1943	3.58	1960	1.60
1944	3.27	1961	1.57
1945	2.96	1962	1.53
1946	2.65	1963	1.45
1947	2.34	1964	1.37
1948	2.03	1965	1.25
1949	1.72	1966	1.11
1950	1.75	1967	1.03
1951	1.74	1968	1.00

Section 3. Eastern Livestock Reporting Region

1935	5.08	1952	1.81
1936	4.93	1953	1.80
1937	4.78	1954	1.79
1938	4.63	1955	1.69
1939	4.48	1956	1.59
1940	4.33	1957	1.49
1941	4.18	1958	1.48
1942	3.89	1959	1.45
1943	3.60	1960	1.52
1944	3.31	1961	1.54
1945	3.02	1962	1.51
1946	2.73	1963	1.48
1947	2.44	1964	1.41
1948	2.15	1965	1.28
1949	1.90	1966	1.15
1950	1.87	1967	1.02
1951	1.84	1968	1.00

XI. APPENDIX C: COPY OF SCHEDULE USED IN CONDUCTING SURVEY

Iowa State University
Project 1616
112

CAPITAL USE IN FARMING AND ITS ROLE IN GROWTH OF THE FARM FIRM

unty_____ Interviewer_____
g. No. _____ Date_____
H. No._____
spondent's Name_____
Address_____

1. Qualification Criteria

1 Did you or anyone else living here have any crops in 1968? Yes_____ No_____
Any livestock in 1968? Yes_____ No_____
(Terminate the interview if both responses are "no".)

2 Were you the operator or one of the operators of a farm in 1968? Yes_____ No_____
(Terminate interview if answer is "no" or if operator is female.)

3 Acres in place in 1968
(a) How many acres of land did you own in 1968? ----------_____acres.
(b) How many acres did you rent from others or work on shares for others in 1968? ----------_____acres.
(c) How many acres of farm land did you operate for others as a hired manager in 1968? ----------_____acres.
(d) How many acres did you rent to others, including land worked on shares for you in 1968? ----------_____acres.
NOTE 1: Adding acres owned and acres rented from others, then subtracting acres rented to others we get acres in place; that is, (a) plus (b) minus (d) equals acres in place. If hired manager, (c) minus (d) equals acres in place.
NOTE 2: If a person owns land or rents land from others and also acts as a hired manager, check to see if a person operates 2 farms.
(e) (Interviewer: Compute acres in place) _____acres in place in 1968.
(Terminate interview if less than 80 acres)

4 Have you operated a farm continuously since January 1, 1968? Yes_____ No_____
(Terminate interview if "no")

5 What is your age? _____ years. (Terminate interview if respondent is over 55.)

6 Are you a partner in the ownership of your farm land and buildings so it is not possible to say which acres or which buildings are yours and which ones belong to some other partner? Yes_____ No_____ (Terminate interview if answer is "yes".)

7 Are you in a farm corporation and, therefore, a stockholder of shares in this farm business? Yes_____ No_____ (Terminate interview if answer is "yes".)

8 What percent of your family net income in 1968 came from:
Wages_____ Rent_____ Farm Profits plus Government Payments _____
Other (specify)_____ (Total should equal 100 percent. Terminate interview if farm profits plus government payments are not over 50%.)

9 Did you decide or help to decide what crops were grown on the above farm in 1968?
Yes_____ No_____

10 If livestock were raised or fed on the above farm in 1968, did you decide or help to decide when and where these livestock were sold? Yes_____ No_____
(Terminate interview if answer is "no" to both 1.9 and 1.10.)

ASK AT ALL HOUSEHOLDS:

11 Did anyone else living here have any crops or livestock in 1968 (separate from yours)? Yes_____ No_____
(If yes, complete separate blue form etc. for this person)

CAPITAL USE IN FARMING AND ITS ROLE IN GROWTH OF THE FARM FIRM

nty_____ Interviewer_____
. No._____ Date_____
. No._____
pondent's Name_____
Address _____

2. General Information

Are you married? Yes_____ No_____

I am now going to ask for some information about each member of your household and his education. We'll begin by listing the members of your household in 1968.

	1968 Household Members	Age	Last Grade of School Completed	Years of College or Equivalent	Do you claim these people as dependents	
					Yes	No
.)	Respondent	xxx			xxx	
)						
)						
.)						
)						
)						
)						
)						
)						
)						
)						
)						

3 In what year did you begin operating a farm? _____

4 Have you been operating a farm continuously since you began to farm? Yes_____ No_____ (If no:) Specify the years during which you were not farming. _____

5 Did you receive any inheritance or large gifts (over $1000) since you started farming? Yes_____ No_____ (If yes:) We would like you to indicate when you received this inheritance or gift and the approximate total value at that time. (We are interested only in the total, therefore, a breakdown is necessary only as a convenience in finding the total.)

Item (Money, Land, etc.)	Year Received	Value then

3. Assets: Kind, Number and Value

I am now going to be asking you fairly detailed information on your land, buildings, machinery, equipment, livestock and supplies. We will begin with land and try to arrive at a value for it as of the end of 1968. We'll first consider the land you own and then any you rent.

3.1 Land Acres and Valuation as of December 31, 1968

3.1.1 Land Owned

Let us start off by listing the total acres you and/or your wife own.

	Acres Owned	Per Acre Value of This Owned Land	Farm Acres You Own that were Rented to Others in 1968	Per Acre Value of Owned and Rented-Out Land
1) Crop acres (acres tilled including rotation pastures and hayland)	_____	_____	_____	_____
2) Permanent Pasture Acres	_____	_____	_____	_____
3) House & building lots, lanes, feedlots, and waste acres, etc.	_____	_____	_____	_____
4) Other Acres Harvested (prairie land, orchards, etc.)	_____	_____	_____	_____
5) Total Acres Owned (Match with 1.3-a)	_____	xxx	_____ (Match with 1.3-d)	xxx

3.1.2 Land Rented or Leased from Someone

How many total acres, crop acres, pasture acres or miscellaneous acres did you rent <u>from</u> someone in 1968?

	Acres You Rented	Per Acre Value of This Rented Land
1) Crop Acres	_____	_____
2) Permanent Pasture Acres	_____	_____
3) House & buildings lots, lanes, feedlots, and waste acres, etc.	_____	_____
4) Other Acres Harvested	_____	_____
5) Total Acres Rented in (Match with 1.3-b)	_____	xxx

.2 Number, Kind and Market Value of Farm Buildings as of December 31, 1968

3.2.1 Farm Buildings Owned

3.2.1.1 Now I need to list all the farm buildings you own and their market value. This list should include any houses and buildings you provide for hired labor and tenants but not your personal residence or garage or other non-farm buildings. If you and someone else own any buildings on shares, please tell me which ones and what percentage of it you own. (To interviewer: age, depreciation schedule and insurance may be helpful guidelines in securing the value of buildings. Do not include non-farm buildings such as personal residence and garage; but do include houses and buildings for hired labor and tenants.)

	Buildings (description or types; i.e. barn, bin, garage, loafing shed, etc.)	Average Market Value	Total Market Value	Respective Share (%) if partly owned
(1)				
(2)				
(3)				
(4)				
(5)				
(6)				
(7)				
(8)				
(9)				
(10)				

3.2.2 Farm Buildings Rented and/or Used

Now please tell me what farm buildings you rented from someone else in 1968, or used rent-free in 1968, and the market value of each.

	Building type	Market Value	Rent Paid	
			Yes	No
(1)				
(2)				
(3)				
(4)				
(5)				

3 Number, Kind and Market Value of Farm Machinery and Equipment as of 12/31/68.

3.3.1 Machinery Owned or Machinery Used but not Rented

I now need to list the various kinds of farm machinery and equipment you own or use and get from you what you think is a fair market value of each. If you and someone else own any machinery on shares please tell me which ones and what percentage of it you own. (Machinery which you use but do not own will have a zero % share.) (To interviewer: If market value seems difficult to determine, ask for age and size, otherwise disregard those columns and fill out only market value and respondent's share.)

3.3.1.1

Self-Powered Machines Brand or Make	Average Market Value	Total Market Value	Size	Age	If partly owned give the respondent's share, %
. Tractors			HP.		
(1)					
(2)					
(3)					
(4)					
(5)					
. Self-Propelled Combines			Width		
(1)					
(2)					
(3)					
. Self-Propelled Corn Pickers			No.Rows		
(1)					
(2)					
(3)					
. Trucks			Tons		
(1)					
(2)					
(3)					
(4)					
(5)					
. Pick-ups			Tons		
(1)					
(2)					
. Self-Propelled Forage Choppers			No.Rows		
(1)					
(2)					
. Self-Propelled Windrowers			Width		
(1)					
(2)					
. Others Self-Powered Machines			Specify		
(1)					
(2)					
(3)					
(4)					
(5)					

3.3.1.2

Non-Self-Powered Machines as of 12/31/68

Brand or Make	Average Market Value	Total Market Value	Size	Age	If partly owned give the respondent's share, %
Stalk-cutter			Width		
(1)					
(2)					
Disk					
(1)					
(2)					
Anhydrous Applicator			Width		
(1)					
(2)					
Chisel Plow			Width		
(1)					
(2)					
Plows			Bottoms		
(1)					
(2)					
(3)					
(4)					
Harrows			Width		
(1)					
(2)					
Planters (with attachments)			No.Rows		
(1)					
(2)					
(3)					
Listers (with attachments)			No.Rows		
(1)					
(2)					
(3)					
Cultivators			No. Rows		
(1)					
(2)					
Drills (Grass and Grain)			Width		
(1)					
(2)					
Mowers			Width		
(1)					
(2)					
Rakes			Width		
(1)					
(2)					
Balers					
(1)					
(2)					

Brand or Make	Average Market Value	Total Market Value	Size	Age	If partly owned give the respondent's Share %
. Wagons, Trailers, Feed Wagons, Flatbeds and Hayracks					
(1)					
(2)					
(3)					
(4)					
(5)					
(6)					
. Forage Choppers			No.Rows		
(1)					
(2)					
. Rotary Hoes			Width		
(1)					
(2)					
. Manure Spreaders					
(1)					
(2)					
. Corn Pickers			No.Rows		
(1)					
(2)					
. Picker-Sheller			No.Rows		
(1)					
(2)					
. Combines			Width		
(1)					
(2)					
. Sprayers			Width		
(1)					
(2)					
. Other Non-Self-Powered Field Machines (e.g. haying equipment) Excluding Tools and Small Equipment					
(1)					
(2)					
(3)					
(4)					
(5)					

3.3.2 Machines rented or leased from others in 1968.
I will now need a list of any farm machines you rented or leased from others in 1968 and the fair market value of each. (To interviewer: Exclude custom machines where the machine operator was provided. Again if respondent has difficulty determining value, list the size and age.)

Description	Size	Estimated Age	Time Used	Fair Market Value
)				
)				
)				

3.3.3 Farm Equipment Used, Owned or Rented

Please give the estimated value of other farm equipment you own, rent or use rent-free as of December 31, 1968. (Again, if the respondent used this equipment but pays no rent, place a zero in the % share.)

Description	Estimated Market Value of Farm Equipment Owned or Used Rent-Free	If partly Owned give Respondents Share, %	Estimated Market Value of Farm Equipment Rented From Someone
1. Moveable Livestock Equipment (Oilers, feed bunks, tanks, feeders, etc.)			
2. Manure Handling Equipment (Excluding Manure Spreader)			
3. Fixed Livestock Equipment (Lots, fences, paving, etc.)			
4. Water System (Pumps, lines, motors)			
5. Poultry Equipment			
6. Portable Buildings			
7. Grain Drying Equipment			
8. Elevators			
9. Blowers			
10. Sheller			
11. Feed or Grain Handling Equipment (Including augers, grinders, mixers, etc. but excluding Feed Wagons and Trailers)			
12. Milk Equipment			
13. Power Units (Including electric motors and generators)			
14. Tools & Small Equipment (Including welder, etc.)			
15. Other Farm Equipment			

.4 Farm Inventories of Supplies, Crops & Livestock

We now need to consider your inventories of supplies, crops and livestock. We will take them in that order; first your farm supplies as of December 31, 1968.

3.4.1 Farm Supplies Inventory as of December 31, 1968
(On hand, even though not fully paid for or stored off farm.)

	12/31/68 Value
a) Fertilizer	
b) Chemicals	
c) Feed Supplements (protein, mineral additives)	
d) Miscellaneous (gas, oil, grease, repairs, etc.)	

3.4.2 Crop Inventories and Sales for 1968.

		Corn		Oats		Soybeans		Other (e.g. grain, straw, etc) Specify:				Silage		Hay	
		Farm	Resp.* Share	Farm	Resp.* Share	Farm	Resp.* Share	Farm	Resp.* Share	Farm	Resp.* Share	Farm	Resp.* Share	Farm	Resp.* Share
1968 Sales**	Dollars or														
	Quantity														
On hand 12/31/68 (exclude sealed) (quantity)															

* In quantity or percent of farm total.

** Include market sales, grain placed under loan, and purchase agreement grain delivered to government during 1968.

3.4.3 Livestock Inventories and Sales for 1968

3.4.3.1 Hogs for 1968

This should include all livestock on this place whether you own them or not. Also, your livestock which is cared for by someone else under lease or contract and livestock not owned but cared for by you on this place as of December 31, 1968.

On Hand, 12/31/68

Type	Number		Average Value per Head
	Farm	Resp. Share No. or %	
(1) Breeding Stock: Sows & Gilts			
(2) Boars			
(3) Market hogs: under 6 months			
(4) Over 6 months			

	Number		Value	
	Farm	Resp. Share No. or %	Total or Ave. per hd.*	Resp. Share No. or $
(6) Sows sold in 1968				
(7) Pigs sold in 1968				
(8) Other hogs sold in 1968				

3.4.3.2 Cattle for 1968

On Hand, 12/31/68

Type	Number		Average Value per Head
	Farm	Resp. Share No. or %	
(1) Milk cows			
(2) Beef cows			
(3) Heifers (breeding)			
(4) Calves (under 300 lbs.)			
(5) Feeder Cattle			
(6) Bulls			

	Number		Value	
	Farm	Resp. Share No. or %	Total or Ave. per hd.*	Resp. Share No. or $
(8) Fed cattle sold in 1968				
(9) Feeders sold in 1968				
(10) Cows sold in 1968				
(11) Calves & vealers sold in 1968				
(12) Other cattle sold in 1968				

* see footnote page 10

3.4.3.3 Sheep for 1968

On Hand, 12/31/68

Type	Number		
	Farm	Resp. Share No. or %	Average Value per Head
(1) Ewes			
(2) Lambs			
(3) Rams			
(4) Feeders			

	Number		Value	
	Farm	Resp. Share No. or %	Total or Ave. per hd.*	Resp. Share No. or $
(6) Lambs sold in '68				
(7) Sheep sold in '68				

3.4.3.4 Poultry for 1968

On Hand, 12/31/68

Type	Number		
	Farm	Resp. Share No. or %	Average Value per Head
(1) Hens & Pullets			
(2) Roosters			
(3) Other poultry			

	Number		Value	
	Farm	Resp. Share No. or %	Total or Ave per hd.*	Resp. Share No. or $
(5) Chicken sold in 1968				
(6) Other poultry sold in 1968				

3.4.3.5 Miscellaneous Livestock

On Hand, 12/31/68

	Number			Sold in 1968		
	Farm	Resp. Share No. or %	Average Value per head	Number	Resp. Share	Ave. Value per head*
(1) Horses						
(2) Ponies						
(3) Goats						
(4) Other (specify)						

* (To interviewer: If farmer wishes to give total value rather than per head value, indicate this by writing total in the column heading.)

4. Sales of Livestock Products and Miscellaneous Farm Income

I would now like to get a record of any livestock products you sold off the
:m in 1968, and any miscellaneous farm income you may have received during 1968.

4.1 Livestock products sales for 1968

Item	Value of Sales	
	Farm	Resp. Share
Butterfat	$	$
Milk		
Eggs		
Wool		
Honey		
Other		
_____		

4.2 Miscellaneous farm income for 1968*

Item	Farm Receipts	Resp. Share
1. Machine work off farm	$_____	$_____
2. Cash rent from farm land & farm buildings	_____	_____
3. Cash sale of old machinery**	_____	_____
4. Sale of wood and lumber	_____	_____
5. Crop or livestock insurance indemnity	_____	_____
6. Cooperative dividends	_____	_____
7. Wool subsidy	_____	_____
8. ACP Payment (Agricultural Conservation Payment)	_____	_____
9. Government payment under feed grain and wheat program (include diverted acres payments but excluding CCC loans (Commodity Credit Corporation).	_____	_____
10. Soil Bank Payment	_____	_____
11. Storage payments if not included above (item 10)	_____	_____
12. Other (specify) _____	_____	_____

xclude gas tax refund

Exclude value of machinery traded in on other machinery.

1 I have a card here I would like you to examine. I would like you to give me an estimate of the range into which your net farm income fell during the past three years, beginning with 1968, then 1967 and finally 1966. Net farm income is cash income minus farm expenses before taxes and before personal exemptions.
(To interviewer: Show respondent green card)

5.2 Now we will do the same for the total of your net income from farming plus any non-farm net income you may have had during those three years.

	Family's Net Farm Income			Farm plus Family Non-Farm Net Income		
	Your Estimate for 1968	Your Estimate for 1967	Your Estimate for 1966	Your Estimate for 1968	Your Estimate for 1967	Your Estimate for 1966
. Less than $2000						
. $2000-$2999						
. $3000-$3999						
. $4000-$4999						
. $5000-$5999						
. $6000-$6999						
. $7000-$7999						
. $8000-$8999						
. $9000-$9,999						
. $10,000-$10,999						
. $11,000-$11,999						
. $12,000-$12,999						
. $13,000-$13,999						
. $14,000-$14,999						
. $15,000-$15,999						
. $16,000-$16,999						
. $17,000-$17,999						
. $18,000-$18,999						
. $19,000-$19,999						
. $20,000-$20,999						
. over $21,000						

6. Personal and Other Business Property as of December 31, 1968

We would now like to list your personal property and any other you may own
t we haven't listed already. We are only interested in the total but if a
akdown will help we can always add the numbers later. Insurance may be used
a guide to the value of these items.

	Fair Market Value	Respondent's respective share if partly owned %
Your home, garage		
Clothing & personal items		
Household equipment and furnishings (furniture, appliances, etc.)		
Accounts receivable (notes owed to respondent) (include crops sealed but payments not received)		
(1)		
(2)		
(3)		
Savings Accounts		
(1)		
(2)		
Stocks		
(1)		
(2)		
Bonds		
(1)		
(2)		
Cash value of Life Insurance (Not face value, but cash surrender or loan value)*		
(1)		
(2)		
(3)		
(4)		
(5)		

If respondent is not able to give these figures and the interviewer is unable
to find them, the face value of the policy and how long the policy has been in
in effect should be written on the back of this page. Also list the kind of
policy if known; i.e. ordinary or straight life, limited pay, or endowment or other.

	Fair Market Value	Respondent's respective share if partly owned %
9. Cash on hand and in checking accounts.		
(1)		
(2)		
10. Family Auto (s)		
(1)		
(2)		
(3)		
11. Recreation assets (boats, planes, etc.)		
(1)		
(2)		
(3)		
12. Trust Funds		
(1)		
(2)		
13. Non-Farm Real Estate Residential Properties (include house and/or lot)		
(1)		
(2)		
(3)		
14. Business Properties (other than farm property)		
(1)		
(2)		
(3)		
(4)		

7. Liabilities as of December 31, 1968

Now we can turn to consideration of your various liabilities or what you have yet to repay your lenders on various credit services you have used.

I'll need to list each loan, note or account separately but if any are partly someone else's responsibility we will list only your share. We need also to distinguish between farm liabilities or debts and any others you may have.

Credit Source And Purpose	amt. still owed 12/31/68	Check one: Farm	Check one: Non-farm
1. Commercial Bank			
(1)			
(2)			
(3)			
(4)			
(5)			
2. PCA (Production Credit Association			
(1)			
(2)			
(3)			

Credit Source And Purpose	Amt. still owed 12/31/68	Check one: Farm	Check one: Non-Farm
4. Insurance Company			
(1)			
(2)			
(3)			
4. Federal Land Bank			
(1)			
(2)			
(3)			
5. Machinery Dealer			
(1)			
(2)			
(3)			
6. Feed Dealer			
(1)			
(2)			
7. Fertilizer & Chemical Dealer			
(1)			
(2)			
8. Other Dealer Credit			
(1)			
(2)			
(3)			
9. FHA Loan (Farmers' Home Administration)			
(1)			
(2)			
(3)			
0. Land Contract			
(1)			
(2)			
(3)			
1. Relatives or Friends			
(1)			
(2)			
2. Consumer Credit (furniture, clothes, (doctor bills, cars, appliances, etc.)			
(1)			
(2)			
3. Loan Company (Home, etc.)			
(1)			
(2)			
4. Unpaid bills as of 12/31/68 (unpaid rent, unpaid vet. bills. unpaid feeding bills, fertilizer)			
(1)			
(2)			
(3)			
(4)			
(5)			

8. Custom Work for 1968

3.1 Custom services hired.

We would like to know what custom services and how many acres of custom services you hired in operating your farm in 1968. By custom services we mean that someone else provided both the machine and an operator to run it. Examples might be for such things as plowing, combining, hay baling and so on.

Operation — Units so Performed

3.1.1 Seed bed preparation & fertilization (fertilizing, plowing, disking, stalk cutting, etc.)

(1)_____ Acres
(2)_____ Acres
(3)_____ Acres
(4)_____ Acres

3.1.2 Planting & cultivation & spraying (spraying, listing, planting, cultivation, rotary hoe, etc.)

(1)_____ Acres
(2)_____ Acres
(3)_____ Acres
(4)_____ Acres
(5)_____ Acres

3.1.3 Harvesting (cornpicking, picker-sheller, combining)

(1)_____ Acres
(2)_____ Acres
(3)_____ Acres
(4)_____ Acres

3.2 Livestock Leases for 1968

3.2.1 Did anyone else care for your livestock other than the livestock that is at this place? (cattle, hogs, sheep, etc.)

(1)_____ Hd.
(2)_____ Hd.
(3)_____ Hd.
(4)_____ Hd.
(5)_____

Were all of these animals included in the livestock inventory preceding this page?
Yes_____ No_____

If the answer is no, those animals which were not included should now be accounted for under the livestock inventory.

8.3 Custom services provided for other people.
Now let us consider what, if any, custom services were performed by you or members of your family using your equipment and labor.

Operation	Units so Performed
Seed bed preparation & fertilization	
(1)	Acres
(2)	Acres
(3)	Acres
(4)	Acres
Planting, cultivation, & spraying	
(1)	Acres
(2)	Acres
(3)	Acres
(4)	Acres
(5)	Acres
Harvesting	
(1)	Acres
(2)	Acres
(3)	Acres
(4)	Acres

8.4 Labor used
Approximately how many months or hours of labor did the following people provide for your farm in 1968?

	Hours	or	Months
8.4.1 Operator's family: (Relation to respondent) Respondent			
8.4.2 Landlord			
8.4.3 Hired Labor			
(Exclude labor hired with custom operator) What was this hired labor used primarily for?			
a) Cropping activities	XXX		XXX
b) Livestock activities	XXX		XXX
c) Both a) and b)	XXX		XXX

8.5 Family labor used off farm

8.5.1 If operator or operator's family worked off the farm or for another farm, indicate the number of months or hours involved. Operator's family: (Relation to respondent) Respondent			

1 Present Resource Situation

9.1.1 Did you participate in the Feed Grain Program in 1968? Yes_____ No_____

9.1.1.1 (If yes was answered to 9.1.1:)

(1) How many diverted acres did you have in 1968? _____Acres
(If 0 , go to 9.1.1.2)

(2) If the Feed Grain Program was cancelled, could you have farmed these diverted acres with the equipment and labor supply you had in 1968? Yes_____ No_____

(3) (Ask only if yes was the answer to the above questions.) In addition to your diverted acres and with the machinery and labor supply that you had in 1968, could you have farmed more crop acres? Yes_____ No_____

(4) (If yes) How many more crop acres? _____Acres

(5) Why didn't you add these additional acres?

_____

_____

9.1.1.2 (If no was answered to 9.1.1:)

(1) With the machinery and labor supply you had in 1968 could you have farmed more crop acres? Yes_____ No_____

(2) (If yes:) How many more crop acres? _____Acres

(3) Why didn't you add these additional acres?

_____

_____

_____

9.1.2 With the labor supply, equipment and land you had in 1968, how many additional head of livestock could you have cared for?

(1) Feeder Cattle _____hd.
(2) Beef Cows _____hd.
(3) Dairy Cows _____hd.
(4) Sows & gilts _____hd.
(5) Feeder Hogs _____hd.
(6) Sheep _____hd.
(7) Poultry _____hd.

9.1.3 (If you are a farmowner) Would you consider selling any or all of your land at present land prices in your area? Yes____ No____(stop when you have checked one yes)

1) $25/A above current land prices		
2) $50/A above current land prices		
3) $100/A above current land prices		
4) $150/A above current land prices		
5) $200/A above current land prices		
6) $300/A above current land prices		
7) $400/A above current land prices		
8) $500/A above current land prices		

(If yes was answered to any part of 9.1.3:) Which of the following plans would you follow after you sold your land: (To interviewer: Show respondent pink card.)

	Yes	No
1) Buy better farmland		
2) Buy other comparable farmland		
3) Buy cheaper farmland		
4) Retire and invest the money in stocks and bonds		
5) Move to an urban job and invest the money in stocks or bonds		
6) Buy land as an investment		
7) Other (specify)		

9.2 We would like now for you to tell us something about how easily or with what difficulty land and labor are available in this area.

9.2.1 In your area, is land readily available for sale to be added to your present unit at current land prices? Yes_____ No_____

9.2.2 (If the answer to 1 was no) Would land be available for sale in your area if you offered:

(1) $25/acre above average mkt. value? Yes_____ No_____ (Stop when you have checked one yes.)
(2) $50/acre above average mkt. value? Yes_____ No_____
(3) $100/acre above average mkt. value? Yes_____ No_____
(4) $200/acre above average mkt. value? Yes_____ No_____

9.2.3 Is crop land readily available for renting or leasing in your area at current:

cash rent rates? Yes_____ No_____
crop share rates? Yes_____ No_____

(If yes was answered for cash rent) What is that rate for crop land?
$_____/acre

(If no was answered for cash rent:) How much would you have to offer to rent more land? $_____

9.2.4 What is the current wage rate for hiring labor in your area? $_____
(Wages in this sense also includes food and housing.)

Is good quality labor readily available in your area at current wages?
Yes_____ No_____

(If the answer above was no) How much would you have to pay to get such labor? $_____

9.2.5 In the past three or four years, did you experience any of the following problems when applying for credit? (Problems either with friends or relatives or from commercial sources.)

	Yes	No
(1) Higher than average interest rate		
(2) Unreasonable repayment terms		
(3) Large down payment requirements		
(4) Creditor required change of farm operations		
(5) Security requirements higher than average		
(6) Reluctance on part of lender to loan sufficient funds		
(7) Other (specify)		

(If yes to any of the above) Which of the following types of loans were these experiences associated with?

	Yes	No
(1) Loan for machinery & equipment		
(2) Loan for fertilizer, feed, and seed		
(3) Loan for land financing		
(4) Loan for livestock		
(5) Loan for other (specify)		

9.2.6 If you needed to borrow money or borrow more money do you feel that you could obtain it without undue delay? Yes_____ No_____

.3 Internal Resource Restriction

9.3.1 Do you have some personal limit to the number of crop acres you would operate given sufficient machinery and labor? Yes_____ No_____
(If yes) What would be this approximate upper limit in actual crop acres?
(To interviewer: Show respondent blue card.)

(1) 100-200 Acres _____
(2) 200-300 Acres _____
(3) 300-400 Acres _____
(4) 400-500 Acres _____
(5) 500-600 Acres _____
(6) 600-700 Acres _____
(7) 700-800 Acres _____
(8) 800-900 Acres _____
(9) 900-1000 Acres _____
(10) 1000-1200 Acres_____
(11) 1200-1400 Acres_____
(12) 1400-1600 Acres_____
(13) 1600-1800 Acres_____
(14) 1800-2000 Acres_____
(15) Over 2000 Acres_____

9.3.2 Do you have a personal limit to hiring additional good quality labor? Yes_____ No_____ This assumes you would have sufficient work for this additional labor.
(If yes) What would be the maximum number of men you would hire (check one) on a full time basis.

Number	Full Time Labor
(1) None	_____
(2) 1 man	_____
(3) 2 men	_____
(4) 3 men	_____
(5) 4 men	_____
(6) 5 men	_____
(7) Over 5 men	_____

9.3.3 Do you have a personal limit to the amount of livestock you would feed or care for given sufficient credit, equipment, good labor, and land? Yes_____ No_____
(If yes) What would be your approximate upper limit to each of the following classes of livestock considered together at any one time. In other words, what would be your combination of livestock at maximum numbers? (Depending on personal preference, some categories will never be produced.)

(1) Feeder Cattle (raised or purchased)_____Hd.
(2) Beef Cows _____Hd.
(3) Dairy Cows_____Hd.
(4) Sows and Gilts_____Hd.
(5) Feeder Pigs (raised or purchased_____Hd.
(6) Sheep_____Hd.
(7) Poultry_____Hd.

9.3.4 Given the opportunity to use as much credit as you would like would there be some personal limit to the amount you would borrow even though more investment opportunities exist? Yes_____ No_____(If yes,)what would be your upper limit at any one time? (To interviewer: Show respondent yellow card.)

(1) Under $1000_____
(2) $1000-$2000_____
(3) $2000-$3000_____
(4) $3000-$4000_____
(5) $4000-$5000_____
(6) $5000-$10,000_____
(7) $10,000-$15,000_____
(8) $15,000-$20,000_____
(9) $20,000-$25,000_____
(10) $25,000-$30,000_____
(11) $30,000-$35,000_____
(12) $35,000-$40,000_____
(13) $40,000-$50,000_____
(14) $50,000-$75,000_____
(15) $75,000-$100,000_____
(16) $100,000-$150,000_____
(17) $150,000-$200,000_____
(18) $200,000-$300,000_____
(19) $300,000-$400,000_____
(20) $400,000-$500,000_____
(21) Over $500,000_____