LAND VALUES AND VALUATION: A LANDLORD APPROACH

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ABSTRACT

LAND VALUES AND VALUATION: A LANDLORD APPROACH

by

Harry Bruce Huff

The rapid rise in post-war farm real estate prices has intrigued both economists and farmers. The magnitude of the real estate input emphasizes the importance of their concern. The first step in diagnosing this phenomena is to estimate the return from this resource. This step, however, involves the complex problem of separating the income streams from land, labor and capital. This study examines the landlord method which allows an independent estimate of the income stream from farm real estate. The focus of this study was to determine whether or not regularly published, secondary sources of data were sufficient to enable reasonably reliable estimates of the income stream from farm real estate.

The landlord approach uses actual net rental received by the landlord from rented land as an estimate of the income stream from all farm real estate. There are two main shortcomings in this approach. First, the majority of farmland is rented on some type of share basis and these lease terms are not published. Second, there is a small and declining acreage rented by tenants (renters who own no farmland) and, even though the acreage rented by part-owners (renters who own some farmland) is increasing, census data are combined from both rented and owned portions of their farms. This study attempts to solve the above problems by estimating suitable parameters to enable the landlord method to be used

with only secondary sources of data required for its computations. Primary data was required to estimate these parameters. These were collected in a mailed survey of 88 landlords in Huron and Hillsdale Counties (in Michigan) concerning their rental practices in 1965.

The procedure of this study was divided into three phases. First, actual rates of return from the respondent landlords' investments were calculated, using the landlord method to estimate net income. Second, estimates of the shares of produce which landlords receive from share leases were established. Third, farming activities of part-owners and tenants were compared in five key areas, to enable generalizations of available tenant parameters to include the rented portion of part-owner farms.

The results of the study showed that landlords received a return of 5.46 percent on their investment, with a standard deviation of 3.76 (on 87 observations). Thirteen variables were tested and only 'type of lease' was found to significantly affect this rate of return. The average rate of return from share-crop leases was 40 percent higher than that of cash leases. To enable future calculations of net rents, estimates were established of per acre costs to the landlord for each type of lease by tenure group. These cost figures can be updated by using price indices of those commodities for which survey landlords paid.

Benchmarks of shares of produce received by landlords from share leases were established. These values found in this study were similar to estimates obtained for Michigan by a USDA survey in 1956.

Part-owners and tenants were found to yield similar rates of return to the landlord's investment, to have similar acreages devoted to seven

major crops, and to give similar shares of produce to landlords. Differences in production per acre could not be established. The ratio of acreages devoted to lease types was decidedly different.

Therefore, with the estimates derived in this study and the minimum additional data collected in the census of acreages of lease types on the rented portion of part-owner farms, the landlord method can be used to calculate the income stream from farm real estate, in the future, using only secondary sources of data.

Substantial evidence was found of inflexibilities in the rental market. This ensures that estimates obtained in the survey will remain useful for many years.

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I alone am responsible for the content and any errors or omissions found in this thesis.

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CHAPTER I

INTRODUCTION

Section A: The Problem Setting

Steadily rising farm real estate prices have intrigued economists for nearly three decades. The fact that farm real estate comprises 78 percent of the dollar value of all physical assets in U.S. agriculture emphasizes the importance of understanding these price changes. An analysis of the income stream from farm real estate would seem to be the most logical first step in an effort to explain these price changes. This, however, involves the complex problem of obtaining independent estimates of the income stream to farm real estate. The difficulty encountered is that of separating net farm income into its component income streams: to farm real estate, to labor, and to other capital. This study examines one method for obtaining independent estimates of the income stream to farm real estate. It focuses on the data requirements necessary to estimate this income stream, over time, using regularly published, secondary sources of data.

(1) The income stream to farm real estate--Iden[1] proposes three approaches which may be used to estimate the income stream to farm real estate. These three approaches are the residual, the pro rata share, and the landlord method.

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[1]George Iden, "Farmland Values Reexplored", Agricultural Economics Research (USDA, E.R.S., April 1964) p. 42.

The residual method involves the estimation of the value productivity of operator and family labor and the estimation of the value productivity of non-real estate capital. These estimates, when subtracted from net farm income, yield a residual which is an estimate of the return of farm real estate. Implicit in this procedure is the selection of a wage rate and a rate of return to capital that is of necessity, somewhat arbitrary. In fact, in many years this method has yielded unrealistically low, zero, or in some cases even negative returns to the investment in farm real estate.

The pro rata share method is similar to the residual method. It involves estimating value productivity for farm real estate, labor and other capital. Any residual left by subtracting these estimates from net farm income is then allocated to these three classes of inputs in proportion to their previously estimated contribution to total productivity. The shortcoming of this approach is similar to the residual method. It requires an arbitrary allocation of return to the different classes of inputs.

The landlord method, on the other hand, involves an independent estimation of the income stream to farm real estate, based on actual net rental payments received by the landlord for the use of his farmland and buildings. Where land is rented and the landlord's gross income and his share of the rental costs, plus the costs associated with land ownership (such as taxes) are known, the net income stream to farm real estate can be calculated independently of the return to labour or other capital used on that land. The importance of these results, as an indicator for all farm real estate, rests on the inference that the rate of return on rented land is comparable to the return on owner-operated land.

(2) The data problem--A principle objective of this study was to determine whether or not regularly published data were sufficient to calculate reasonably reliable rates of return on rented farm real estate. If available data are not sufficient, then what is the minimum additional information needed?

Rental or leasing arrangements can be divided into two broad categories: cash leases and share leases. For the landlord approach, it is essential that estimates of the landlord's gross income and his expenses be available.

For cash rented land, these estimates are not difficult to obtain. The USDA does record the cash rent of entire farms rented for cash. This, however, is a very small percentage of farms on which to base a rate of return value for all farm real estate.[1] Moreover, it is questionable whether or not landlords receive, from cash rented farms, a rate of return on their investment comparable to other types of leasing arrangements.

Share rented land is much more common than cash rented land, but data problems are more acute. Data are not published on the terms of these leases--in particular the landlord's value of the share of produce[2] and the landlord's share of the costs associated with this tract of rented land. Therefore, estimates of net rental payments cannot be accomplished using only present secondary sources of data.

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[1] Tenant cash rented farms accounted for only 1.2 percent of all Michigan farmland in 1959.

[2] The USDA did collect some data on shares of crops paid to the landlords in Michigan. This was done in a 1956 survey and these estimates may now be out of date. The estimates were only for share-crop and share-crop-cash tenant farms. Moreover, the results obtained were not adequate to use on a county basis.

There are two main types of renters: tenants and part-owners. A tenant rents all of the farmland that he operates, while a part-owner rents some farmland in addition to what he owns. The number and acreage of tenant operated farms is small and is rapidly decreasing, in Michigan. On the other hand, the acreage rented by part-owners has been increasing. Census data, collected on the farming activities of part-owners, do not include complete information on both the rented and owner portions of these farms. In most cases, the data are combined for both of these parts. Therefore, it is necessary either to collect information on both parts of part-owner farms or to establish the fact that there are sufficient similarities between tenant and part-owner farms, that information now published concerning tenant farming activities can be generalized to part-owner farms.

Section B: Scope of the Study

The principle objective of this study was to develop estimates of parameters that are necessary to enable independent estimates of the income stream from farm real estate, in the future, while using only regularly published sources of data. In order to establish these estimates of parameters, it was necessary to collect primary data. These data were obtained from a mailed survey of landlords in two Michigan counties, concerning their rental practices in 1965.

This study was divided into three phases. First, the landlord method was used to calculate actual rates of return received by those landlords in the survey from their investment in farm real estate. For this study, the rate of return to farm real estate was a ratio of

actual net (contract) rental payments to the owner's estimation of the market value of his real estate. Statistical tests were conducted to check whether or not various characteristics of the landlord, the renter, or the lease terms affected this rate of return. In addition, this rate of return was compared with alternative investments open to the landlord, involving comparable risks. The two alternatives compared, were farm mortgages and common stock. To check the reliability of the landlord's estimate of the market value of his real estate, an extrapolation of the value for land and buildings from census data was calculated for 1965.

The second phase of the study was an estimation of the benchmarks of the shares of crops received by the landlords from seven major crops in Michigan. These benchmark values were necessary to calculate gross income from share rented land, received by the landlord. In addition, present cost-sharing arrangements and trends between the landlord and the tenant were estimated. With these additional data, net rental income from the tenant share rented farms can be derived. Another feature of this phase, was an analysis of the process by which lease terms change. Because of rapid technological change and economic conditions in agriculture leases must change to maintain a fairly constant rate of return to landlords over a period of time.[1]

The third phase of this study was an examination of the necessary conditions for the inclusion of the rented portion of part-owner farms in the landlord method, while using only secondary data. This involved a comparison of the rented portion of part-owner farms with tenant farms

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[1]Roger Chisholm observed this constant rate of return in a 1964 survey in South Dakota. He was unaware of any information available on this process of changing lease terms.

in certain key areas, to examine the feasibility of generalizing available estimates of parameters from tenant operated farms to part-owner farms. There were five key areas for which these two tenure groups were compared. These were:

(1) Rate of return to real estate

(2) Production per acre

(3) Acreages devoted to different crops

(4) Leasing arrangements (ratio of lease types)

(5) Landlord share of produce.

An additional important feature of this test is its support of the validity of the landlord method. If no significant differences exist between the tenant and the rented portion of the part-owner farms and if the link could be established that the income stream to farm real estate is similar on both the rented and owned portions of part-owner farms, then generalizing an income stream from rented land to all farm land could be made with more confidence.

Income from investment in farmland frequently involves more than a nominal flow of income. Real gains to the owners are also an important source of income. For example, Boyne found that land owners in the U.S. received yearly real wealth gains averaging two percent during the period 1940-1960.[1] Other difficult to measure values exist which influence the land purchaser's decision as to how much he could pay. These will be examined briefly in Chapter III. This study, however, was concerned only with the nominal income from contract rents and the nominal rate of return which the landowner receives from his investment.

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[1]David H. Boyne, Changes in the Real Wealth Position of Farm Operators 1940-1960, Technical Bulletin 294 (Michigan State Agricultural Experiment Station, 1964) p. 43.

Section C: Procedure for the Study Survey

Two counties in Southern Michigan were selected as testing areas. The counties selected were Huron (located in crop reporting district six) and Hillsdale (located in crop reporting district eight).

A mailed questionnaire was sent to a randomly selected number of landowners. Names and addresses of these landowners were obtained from the Agriculture Stabilization and Conservation offices in the respective counties. A 10 percent random selection of all farms on file in these offices was used for the sample, giving approximately 800 names and addresses. Calculating that slighly over one-quarter of all landowners are also landlords, [1] and estimating that 40 percent would reply,[2] this would yield approximately 80 usable questionnaires. It was estimated that this sample size would be sufficient to give statistically significant results.

The counties of Huron and Hillsdale were selected with certain criteria in mind. It was desirable to select areas where there was a high percentage of farmland being leased. Moreover, the study was to examine commercial agriculture, so that the results would not be typical only of the state of Michigan. Therefore, the survey would be limited to only the southern part of Michigan. The study was to focus on farmland values, and therefore it was desirable to minimize the influence of urbanization. The seven crops to be studied were mainly cash crops. The heterogenity of the fruit and vegetable leasing arrangements would

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[1] From Census data, Table II:3.

[2] This estimate was arrived at by comparing results of other mailed surveys and from consultation with members of the Sociology and Agricultural Economic Departments.

make it difficult to reach any meaningful results with a small sample. Thus, the western counties of Michigan were also eliminated as possible candidates. Since generalizations from the results obtained, were to apply to a more extensive farming area than just the state of Michigan, it was desirable to have the survey areas separated by some distance.

Therefore, examining counties in the remaining crop reporting districts six, seven and eight, using a criteria of a high percentage of leasing, a large number of farms, a large acreage of the seven desired crops to be analysed, and in consultation with farm management people for counties to fit these criteria, Hillsdale and Huron were chosen to be the most appropriate for this study.

CHAPTER II

THE FARMLAND RENTAL MARKET

Section A: Introduction

The landlord method of real estate valuation is an intricate part of this study. Therefore it is essential that certain of its implicit assumptions be thoroughly understood. One of the main assumptions is that the rental market functions as the perfectly competitive model suggests it would. Therefore, in this chapter, some of the imperfections in the rental market are examined. In order to do this, areas that were studied were: the ability of the rental payments to reflect changes in prices, costs and production; the effect of tenure on production and efficiency of resource use; and the characteristics of operators and leases which could affect efficiency. In this study, data are gathered from rented land and the results will be generalized to all owned land. It is therefore essential to be aware of any limitations of this generalization in the landlord method of valuation.

A second reason to examine the rental market is to obtain a better understanding of the terminology and of the procedure that was used in this study. To do this, characteristics of the types of leases were examined for their relative importance, effect on production and any of their shortcomings.

It is also important to get some idea of the magnitude of the rental market to realize the size of the population from which the sample will

be drawn for the landlord method. Therefore, importance, trends and other relative characteristics of the tenure market will be examined. In addition, some idea of factors affecting both suppliers and demanders of rental land make possible additional insights as to the functioning of the rental market.

Section B: Importance of Renting

Renting farmland is the main alternative to full owner-operated farms. According to the 1959 Census of Agriculture, rental agreements in Michigan involved 3.4 million acres of farmland which were operated by 7803 tenants and 26,232 part-owners. The trends in leasing by part-owners and tenants that has occurred in the past 40 years are illustrated in Table II:1.

Table II:1--Number of tenants and part-owners and proportion of tenants by type of lease, in Michigan, 1920-59 (a)

Year	Part-owners (number)	Tenants (number)	Proportion of tenant operators (and proportion of acreage) by lease type				
			Cash	Share cash	Share crop	Livestock share	Other
			Percent (b)				
1920	19,532	34,722					
1925	18,813	29,119					
1930	22,719	26,195					
1935	25,345	37,334					
1940	21,383	31,800	36(27)	3(3)	47(57)(c)		14(12)
1945	27,096	20,536	30(22)	2(3)	55(63)(c)		13(12)
1950	27,232	13,952	21(16)	8(9)	19(18)	32(42)	20(15)
1954	29,163	10,347	19(13)	8(10)	26(23)	31(42)	16(11)
1959	26,232	7,803	20(17)	10(13)	25(22)	24(35)	19(13)

(a) U.S. Census of Agriculture, 1959, Michigan, Vol. 1, Part 13, Table 3, p.6.

(b) Census data was incomplete for the years 1925, 1930, 1935. Definition for cash rent included some share cropping in 1920.

(c) Share-crop and livestock-share leases were combined until 1950.

Farmland renting by tenants has been decreasing quite rapidly in Michigan, while the acreage rented by part-owners has been slowly increasing. Between 1954 and 1959, the number of tenants declined 2,544 while the acreage they operated decreased by 350,117 acres. During this same period, the number of part-owners decreased by 2931, but the acreage they rented increased by 95,600 acres.

The number of livestock-share leases has been declining both absolutely and relative to other types of leases. This has partly been the result of the decrease in the livestock industry in Michigan and the decrease in the number of tenant operated farms. However, due to the nature of this lease type and its operation (described in Section G), livestock-share farms tend to be larger than other types of leasing arrangements and this differential appears to be increasing (as shown in Table II:2).

The number of share-crop-cash leases has increased steadily during the period 1945-59. There was a rapid decline in the use of cash leases during the 1940's. This trend has reversed and the acreage operated under this type of lease appears to be increasing.

Both part-owners and tenants operate larger sized units than do owner-operators (as shown in Table II:2). The main reason for this, probably, is that tenants and part-owners earn the major portion of their income from farming. Owner-operators, on the other hand, likely receive a larger proportion of their income from nonfarm sources. Share-crop tenants are most likely to be discouraged from doing off-farm work.[1] Part-owners and tenants are more likely to operate a commercial farm than their corresponding owner-operator, because the resources of two individuals are combined. The relative size of farms by tenure groups is found in Table II:2.

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[1] This concept will become clearer when the conflict of interests between the landlord and tenant is illustrated in Section E.

Table II:2--Average size of farms, by tenure type, in Michigan, 1950-59 (a)

Type of tenure	1950	1954	1959
		Acres	
All farms	111.0	118.7	132.2
Full owners	91.7	95.5	104.0
Part owners	171.6	181.4	204.3
Managers	456.7	470.0	457.4
All tenants	138.6	150.0	154.3
Cash	104.6	140.0	121.1
Share-cash	168.7	193.0	211.4
Livestock-share	178.7	202.8	225.0
Other and Unspecified	104.5	299.6	107.3
Crop-share	130.8	138.8	131.1

(a) U.S. Census of Agriculture, 1950, 1954, 1959, Michigan Counties, Vol. 1.

Examining the rental practices for the United States and various regions, it can be seen that Michigan and the North East region have a very low percentage of tenant farms, compared to other regions. In 1959, however, 23 percent of Michigan farmland was rented. An illustration of the relative importance of the tenure groups in the United States, four regions and Michigan is given in Table II:3.

Table II:3--Proportion of farms by tenure of operator for U.S. and regions, 1959 (a)

Region	Full owners	Part owners	All tenants
		Percent	
United States	57.1	22.5	20
North East	71.6	21.4	6
North Central	52.9	25.3	21
South	57.5	19.6	22
West	61.6	25.0	12
Michigan	69.2	22.5	7

(a) U.S. Census of Agriculture, 1959, Farm Tenure (Vol. V, Part 6, Ch.6) p.6.

Since different tenure groups operate various sized farms, acreage operated by these groups gives a better indication of their relative importance.

Table II:4--Acreage in farms by tenure of operator for the United States, 1959 (a)

Type of tenure	Millions of acres	Percent
Full owners	346	30.8
Part-owners	504	44.8
Managers	110	9.8
All tenants	163	14.5
All farms	1123	100.0

(a) U.S. Census of Agriculture, 1959, Farm Tenure (Vol. V, Part 6, Ch. 6) P.6.

Section C: Supply and Demand for Rented Land

Farmland renting is a means of utilizing the combined resources of two parties who possess resources of different types. A capital intensive party (the landlord) and a labor intensive party (the renter) each contribute resources to and share income from their joint farm enterprise with both realizing greater returns than if they operated individually.

In order for a market to exist, both suppliers and demanders are necessary. This appears to be a logical framework to explain the existence of the farmland rental market.

Looking first at the demand side of the rental market, one of the main reasons for renting is that a certain parcel of land cannot be bought, but is available for rental purposes. When the supply side of the farmland rental market is examined, some of the reasons for this irregularity will be made clear. Secondly, the rising price of land, coupled with the high capital

requirements for mechanization, may force today's farm operator to start farming on a unit containing insufficient acreage to operate economically. The operator may become trapped on this undersized farm and never save, or be able to acquire from other sources, sufficient capital to expand to an economic unit. He may look toward tenancy or part-ownership to solve his land requirement problems. Renting has traditionally been a rung on the agricultural ladder on which the young farmer climbs toward full ownership. This aspect of renting has been gaining in importance for the potential farmer because of the increasing difficulties encountered, trying to accumulate sufficient capital to start farming, from off-farm employment. Moreover, renting can also be a considerable asset to the established farmer. It enables a more flexible unit, since acreage can be expanded (or contracted) to compliment other capital resources and needs of the farm enterprise and the labor available to the farm operator. Thus, renting can create a more efficient operation and eases the problems of fixity of the land input.

These factors, contributing to the demand for rented land, suggest that the amount of land rented should be increasing significantly. This, however, is not the case. One reason why farmland rentals have not increased substantially is connected with the desire of many farmers to own all the land that they operate. They are also very concerned about maintaining a debt-free position.[1] Another reason is the element of uncertainty involved with a leasing agreement. Neither the renter nor the landlord is sure of what the other party's long-term objectives are and whether or not the lease will be continued for another year. This often results in both

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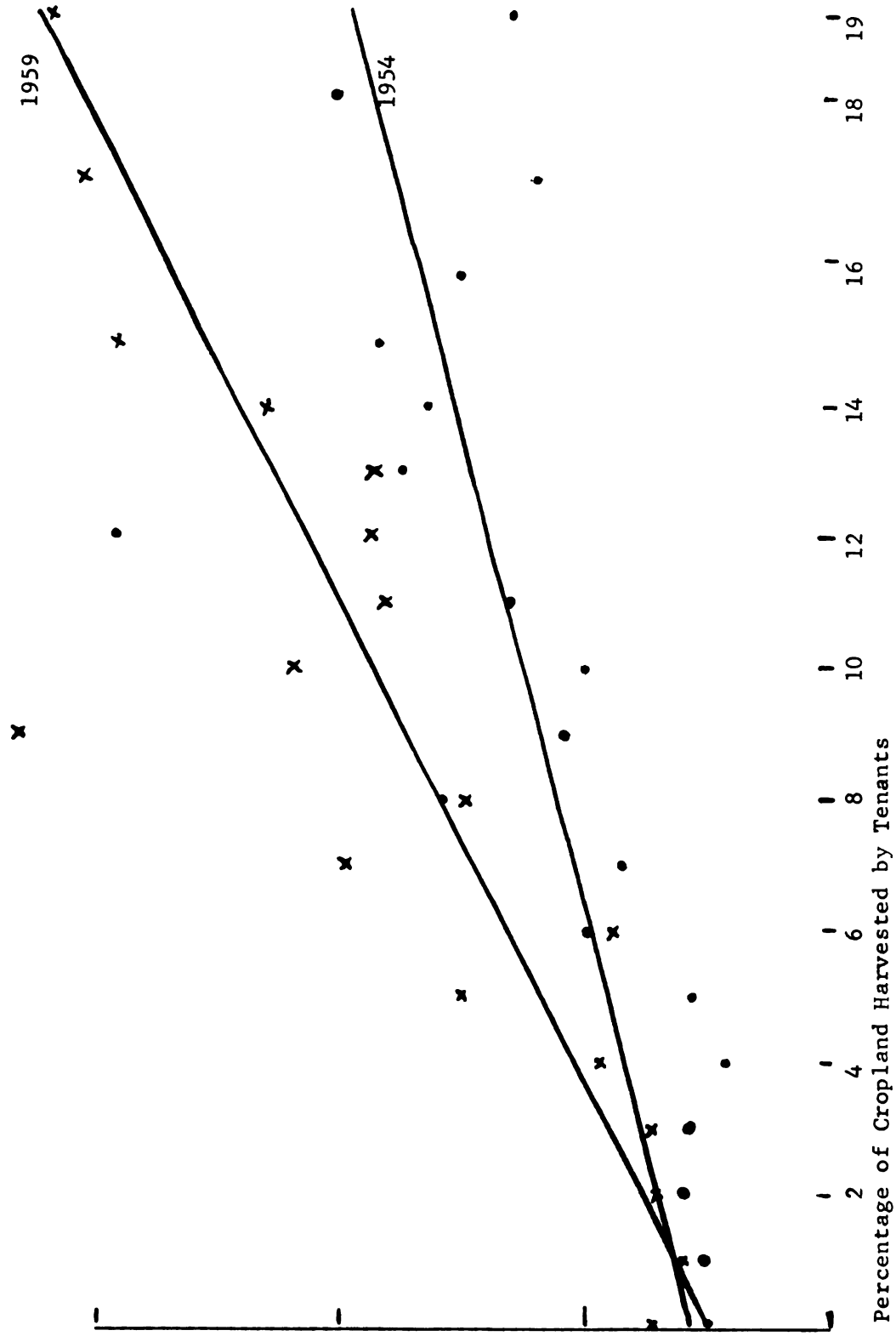
[1]65 percent of all farmers 'agreed completely' that 'a farmer should be proud if he says he owes money to no one', Michigan Farmers in the Mid-Sixties, Research Report 54, Michigan State Experiment Station, 1966.

parties being unwilling to contribute any specialized resources to the farm enterprise, particularly if their costs have to be spread over a number of years. Thus, as more specialized resources are required, land rentals decrease. Moreover, factors which enable easier ownership of farmland tend to cause leasing to diminish. For example, the easier and the lower the cost of obtaining credit, the quicker the rate of the turnover of land ownership.

The other side of the farm rental market is the suppliers of farmland for renting. One of the main sources of supply of land for renting is retired farmers. They are trying to ease out of active farming and renting is generally the easiest step. They also rent out their land because they are concerned with a retirement income, a place to live or just wish to remain in their community. Widows, too, rent out their land for many of these same reasons. Renting may also be a waiting stage before the sale of the property. Recent, fast-rising land prices have encouraged the speculating owner. This group wishes to maintain ownership of the land, but often rents it out to others to farm. Land is also considered a hedge against inflation by some non-operating owners, creating additional land for rental purposes.

In the analysis of the rental market, it was implied that as the price of land increased, intensity of renting correspondingly increased. In order to test whether or not this correlation was, in fact, verified in actual practice, the values of land and buildings were plotted against the percentage of cropland harvested by tenants, for Michigan counties for 1954 and 1959 Census of Agriculture data. The results are shown in Graph 1. The positive slope of the regression line in Graph 1 indicates, that these two factors are positively correlated.

Graph 1: The Relationship Between Real Estate Value and Cropland Rented



Section D: Rent Inflexibilities

The reliability of the landlord method depends on the functioning of the rental market according to the 'rules of the game.' This means that payments to the landlord should reflect any changes in production, prices or costs involved with the farm enterprise. Unfortunately, one of the major problems in the rental market is the 'stickiness' or inflexibility of rental payments.

This stickiness of rental payments may cause large inequities in the allocation of income, to either party, since each contributes different types of resources. This discourages maximum output from the farm unit as will be shown in section E of this chapter. Less than maximum output occurs when either party is not financially reinforced to contribute his share of inputs until the optimum output for the firm is reached.

Chryst and Timmons[1] give five main reasons for this stickiness in rental payments:

(1) Community customs--A specific level of rental payment and type of share arrangement is established and becomes deeply ingrained by custom throughout a certain district and deviations from this traditional arrangement are rare. These rental payments are likely to be similar over a wide area even though the farmland varies greatly in soil type, farm size, location, productivity, etc. Moreover, the share arrangements may have been established under a completely different set of farming conditions. These payments resist extreme changes in production, product prices and costs without being revised.

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[1]Walter E. Chryst and John F. Timmons, "Adjusting Farm Rents to Changes in Prices, Costs and Production", page 11 of Special Report #9, Agricultural Experiment Station, Iowa State College, April 1955.

(2) Differences in resources contributed by each party--Generally the landlord and tenant each contribute a different type of resource, and accordingly, their expenses are of a different nature. Those inputs contributed by the landlord are usually of a fixed cost or durable nature, and are very static in terms of price fluctuations. On the other hand, the tenant contributes inputs which are of variable cost or nondurable nature, and are quite susceptible to price fluctuations. Therefore, in a period of changing prices (either up or down) while the terms of the lease remain the same, there are bound to be income inequities resulting for one of the parties in terms of income shared in proportion to inputs contributed. The tenant is adversely affected during periods of rising costs or falling product prices, while conversely, the landlord receives greater than his proportional share of income during these periods. Thus the ratio of rent paid to the share of net farm income can have some very wide fluctuations for both the cash and share leases.

(3) The rental contract--The terms of the rental contract are generally decided before the production period begins. This fact, itself, introduces a minimum adjustment lag of one year. Share arrangements do attempt to adjust for changes in production during the life of the lease. However, even this type of lease, fails to take into account the cost and price fluctuations.

(4) State laws--Laws may enforce inflexibilities making tenants liable for their rent payments.

(5) Unpredictable changes in prices, costs and production--One method that would ensure that the net return ratio for each party would remain the same is for all prices, costs and production to remain constant. Also, this ratio would remain constant if the production remains constant while costs

and prices changed in the same proportion. Moreover, this would be equally true if prices and costs changed but any production change was divided equally between the landlord and the tenant. However, these situations are quite rare and the result being the net rent ratio varies greatly over a period of time.

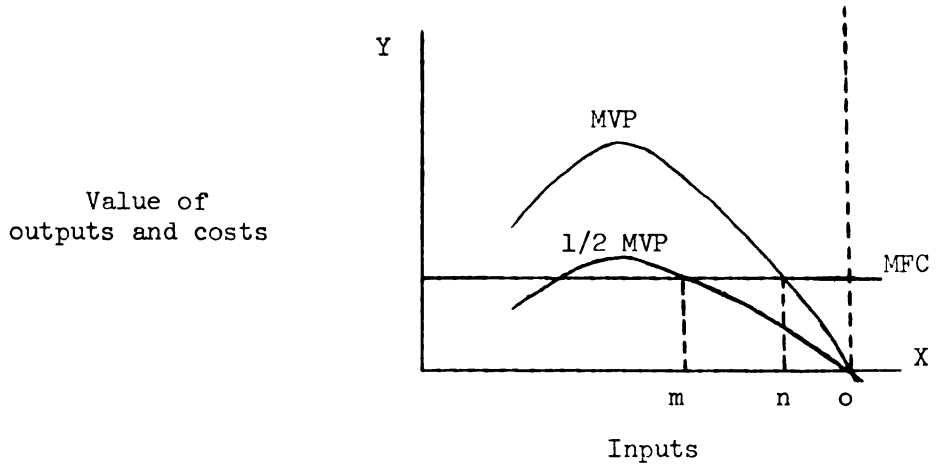
Section E: Production on Rented Land

A major concern when calculating a rate of return on investment in real estate for landlords and generalizing from this to a rate of return for all land owners is whether or not production per acre is similar for owner-operators and renters. A theoretical analysis of the effects of tenure and empirical evidence on productivity and revenue use is required to give a complete picture.

If it can be assumed that owner-operators produce at an optimum efficiency level (i.e., each factor input is increased to that point where its cost equals its marginal value product), then do renters operate their farms at a less efficient point? A theoretical framework using a simple production model may illustrate the problems that face landlords and tenants, that owner-operators are not concerned with.

For an illustration, examine a farm operating under a share-crop lease, say, a 50-50 share with the landlord contributing only durable inputs of land and improvements and receiving one-half of the crop produced and the renter contributing all the variable inputs and also receiving one-half of the crop.

This situation creates a conflict of interests for the firm, since both the landlord and the renter try to maximize their individual returns.



For the optimum output of the firm, inputs should be increased to the point 'n' (in the above diagram) where MFC equals MVP. Theoretically, this is the position of the owner-operator. For the landlord to maximize his returns, he considers his resource inputs as fixed and wishes the renter to contribute variable inputs to the point 'o' where the MVP of the renter's inputs are zero. On the other hand, the renter, since he receives only one-half of the MVP wansts to contribute inputs to the firm only to the point 'm'. The renter will wish to rent additional land, however, until the MVP of the land input is zero.

From this illustration it can be seen why landlords may be reluctant to supply durable assets even when it is obviously economical for the firm. They are even more reluctant to supply non-productive improvements like living accomodations beyond that point necessary to attract good tenants. Also, renters are reluctant to utilize such variable inputs as fertilizer and weed spray to the point of optimum intensity for the firm since they receive only one-half of the return.

In what way do share leases differ from cash leases? In share leases, the rental payment is a function of the crop yield, so it is a

marginal cost. In cash leases, the rental payment, on the other hand, is not a function of the yield and hence is a fixed cost for any production period. This means that cash renting should allow the firm to be more efficient than with share renting. The landlord, however, still will only increase his durable inputs to the point where marginal cost of those inputs are equal to the marginal increment of rent which the renter is willing to pay for them. Since the point where this occurs is usually less than the optimum, theory would suggest there is below maximum efficiency with cash renting.

Not only do inefficiencies occur because of inequities of sharing costs and production between renter and landlord, but also there are problems of equating marginal returns of all factors used. Because of the uncertainty of occupancy, the cash renter (and share renter also) tries to maximize his income from rented land over the life of the lease (frequently one production period). This means that the operator emphasizes short-term enterprises, even though long term planning will yield significantly higher returns. Thus, the renter is not achieving the optimum balance in his enterprises to give him a maximum return.

Timmons suggests legal restrictions, uncompensated resources and higher rent[1] may stop the renter from making improvements that would clearly pay for themselves. Any improvements made on the rented land become the property of the landlord at the termination of the lease. The renter is never sure whether his occupancy will be long enough to completely depreciate the resource, nor is he certain of any compensation for the unused portion of the resource. Moreover, improvements by the renter enable the landlord

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[1] John F. Timmons, "Improving Farm Rental Arrangements in Iowa", P. 86, Iowa Agricultural Experiment Station, Research Bulletin 393, 1953.

to find other renters who are willing to pay more than the present renter is and so he may find his rent increased if he wishes to remain.

Imperfections in sharing arrangements which reduce the efficiency of the farm's operations may be improved by splitting the costs of the variable factor inputs between the two parties in the same proportions as is the product.

There have been several empirical studies made in this area of comparing production and efficiency of tenure types. Some of their conclusions can be examined to see whether or not the hypothesis from the theoretical considerations are, in fact, confirmed.

From Agriculture Census data, for Michigan in 1959, the production per acre can be calculated for the tenure classes: all commercial farms, tenants, share-crop and share-crop-cash tenants. This has been compiled into an index in Table II:5 comparing the other classes with all commercial farms.

Table II:5--Index of production per acre by tenure class in Michigan, 1959 (a)

Crop	All commercial farms	All tenants	Share and share-cash tenants	Cash tenants
Corn (for grain)	100	102	105	102
Wheat	100	98	98	101
Oats	100	106	105	108
Barley	100	90	97	85
Rye	100	112	116	97
Soybeans	100	89	105	62
Dry beans	100	101	103	108
Hay	100	107	108	103
Potatoes	100	92	74	94
Wt. Ave. (acres)	100	102	103	101

(a) Own calculations from U.S. Census of Agriculture, 1959, Michigan Counties, Table 21, p. 126-7.

The above results do not support the preceding theoretical economic analysis. The production per acre of share-crop and share-crop-cash tenants should be lower than the cash tenants. However, this is not found to be true. Also, all commercial farm operators do not produce, on the average, a higher yield per acre than do tenant operators.

Hurlburt conducted a study looking at the effects of tenure on the amount of resources used, their allocation within the firm, and the earnings received from the farm business by the tenant and the landlord.[1] The three that were studied were owner-operators, cash-crop-share and livestock-share tenants. One of the observations he made was "in essence, dollars invested in owner-operator farms earned the same rate of returns [for the year 1957] as did the tenant operated unit."[2] It is difficult from this to argue that owner-operators are more efficient than tenants. This study also suggests the claim that, "There are few differences between general tenure forms [owner-operator, crop-share-cash, livestock share] as to the efficiency of resource use."[3] With regards to the organizational structure within the farm, it was observed that, "Tenants and owner-operators follow essentially the same farming practices for the same size of business."[4] Another finding of this study was the lack of incentive to make improvements on the rented land. "...there is little to encourage investments by landlords or tenants in buildings.... Both the landlord and tenant are dissatisfied with this fact of the farm rental market; yet few depart from the customary practice to solve the problem."[5] To emphasize

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[1] V.L. Hurlburt, "Use of Farm Resources as Conditioned by Tenure Arrangements", Research Bulletin #215, Agricultural Experiment Stn., U. of Nebraska, 1964.

[2] Ibid., p. 30.

[3] Ibid., p. 29.

[4] Ibid.,

[5] Ibid., p. 31.

this point it was observed that, "improvements to buildings on tenant-operated farms lagged behind those on owner-operated units."[1]

Another study on the resource allocations, "was to observe the way in which resources are used within agricultural firms under different farm tenure classes."[2] The tenure classes studied were owner-operators, crop-share-cash and livestock-share tenants. From the theoretical analysis, it was argued that there was a conflict of interests between the landlord and renter on the amount of land that should be used and how intensively it should be farmed. The Miller et al study found that, "Tenants are most efficient in the use of labor services but they are excessive in capital services and deficient in land...[for share leases] all marginal returns are higher than opportunity costs assumed. Land is the most limited resource."[3] The owner-operators, because they have purchased their farm, normally carry high debt charges--particularly in early years of farming. Therefore, it is not surprising that, "For owner-operators the marginal return to labor is low and the return to capital services is high in relation to opportunity costs assumed...owner-operators should have used less of both land and labor and more capital to achieve optimum combinations. Owner-operators are the only ones to show a deficit in capital services."[4] Comparing the different types of

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[1] Ibid., p. 32.

[2] Walter G. Miller, Walter E. Chryst and Howard W. Ottoson, "Relative Efficiencies of Farm Tenure Classes in Intra-firm Resource Allocation," Research Bulletin 461, Iowa Agricultural Experiment Station, November, 1958.

[3] Ibid., p. 320.

[4] Ibid.

of leases (Section G of this chapter), the livestock-share leases are said to be the most efficient. This study also bears out this fact, "The analysis of resource combinations at the respective mean value of outputs for each tenure group showed that...the livestock-share renters are the most efficient [in terms of]...deviation of actual costs from the minimum costs obtainable."[1]

Barlowe appears to have found a major factor in comparing the productivities of these two tenure groups. He argues that the renter may act in a similar manner to an owner-operator. "Like other farm operators, he has great difficulty in predicting the exact combination of inputs that will give him his maximum return. At times he may be unaware of the fact that he can maximize short-run interest by operating differently than owner-operators."[2] It may also help him to extend his lease for another year.

From these studies, empirically, there is little evidence between rates of return on owner-operated and rented land. This evidence gives added confidence to the use of the landlord method of estimating the income stream from real estate.

Barlowe and Hurlburt imply that because of the uncertainty and imperfect knowledge factors, both owners and tenants operate their farm in a very similar manner. Hurlburt does partially support the earlier theoretical analysis, that investment in buildings on tenant farms is decidedly lower. Miller et al maintains there are differences in efficiency of resource use, for the different tenure groups. Of the three groups studied, the livestock-share were the most efficient.

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[1] Ibid.

[2] Raleigh Barlowe, Land Resource Economics, p. 427.

Section F: Age of Landlords, Owner-Operators and Tenants

Age is a very important factor in the results of the survey associated with this study. There are no data collected on the age of landlords, but by examining the age distribution of owner-operators, tenants, part-owners and managers we may be able to make some generalizations.

We can observe from the Table II:6 that full owner-operators are, on the average, several years older than other types of tenure operators. This is shown both by the average age (51.9) and the age distribution (44 percent of full owners compared to only 11 percent of the tenants are over 55 years old).

Table II:6--Age distribution of commercial farm operators by tenure class in Michigan, 1959 (a)

Age (in years)	Full owners	Part-owners	Managers	All tenants	All commercial farms
			Percent		
Under 25	1	1	2	10	2
25-34	7	13	18	31	12
35-44	20	29	24	28	24
45-54	28	31	25	20	28
55-64	30	19	28	9	25
65 and over	14	6	3	2	10
Total	100	100	100	100	100
Ave. Age	51.9	46.7	46.2	38.7	49.0

(a) U.S. Census of Agriculture, 1959, Michigan, Vol. 1, part 13, Table 21, p. 118.

Since landlords are most likely to be either full owners or retired full owners, their average age should be higher than that of full owners. This may have a major bearing on this survey's results, since many landlords

are too old to respond to the questionnaire or may be past the stage of realizing or caring what is being produced on their farm. This may also affect the farm's output since their management capacity is limited.

An additional important point from the age differentials between tenants and full owners is their production potential. Since only 28 percent of the full owners as compared to 69 percent of the tenants are below 45 years of age, on the average labor would be expected to be more productive on the tenant farms.

Section G: Types of Agricultural Leases

Michigan renters operate under four main types of leases. The lease may be written or oral, cover a few months or several years and often becomes established community custom.

(1) Cash leases--21 percent of Michigan tenants operate under a cash lease. This type of renting provides for a specified cash payment to the landlord for the duration of a particular time period (usually one year, but there may also be several payments during a year). In most cases this payment is for the land and buildings only.

Since cash rent payments are predetermined before the production period, this allows both the renter and the landlord to budget expenses and income further in advance. The landlord is also guaranteed a certain rate of return on his investment. The renter assumes most of the risk and uncertainties involved with the operation of the enterprise. Therefore, on the average, the income which the landlord receives from cash rented farms should be lower than from share rented farms since the extra risk involved with share renting requires a greater return. If there is a minimum share rent clause, it is usually 70-80 percent of a normal cash payment.

A major problem arises from this procedure of predetermined rents. They are normally determined over a year in advance of the end of the production period. This does not allow for changes in prices, costs or production to affect the rental payment. This results in inequalities to the renter or the landlord. In a period of rising product prices, the landlord receives a smaller share of net returns than if prices were constant. Another problem is the fact that the rental payment tends to be determined by local custom rather than by economic considerations.

Tenants operating under a cash lease usually have more freedom in the operation of the farm, since the landlord's income remains relatively unaffected by the activities of the tenant. Cash leases give the tenant more incentive to maximize the production from the farm. Since the rent payment can be considered a fixed cost, for that production period, the tenant can allocate his inputs as he sees fit, knowing he will receive all of the return from his marginal inputs. This does give him, however, a greater opportunity to exploit the resources of the farm and less incentive to make any long term improvements.

A modification of the standard cash lease is the sliding scale or flexible payment cash lease. In this case, rental payments are varied according to prices received and paid and the production of the period. This allows for a more equitable shareing of income for both the landlord and the tenant.

(2) Crop-share lease--A crop-share lease involves payments in kind of a portion of the crops produced on the rented land. The sharing arrangement of both the crop and the expenses is determined before the start of the production period by mutual agreement of the landlord and the renter. This type of lease is used by 26 percent of Michigan's tenant farmers.

In this type of lease, the landlord assumes a greater share of the risk of low production, along with the renter. Therefore, with average production conditions, the landlord should receive a larger net income than under cash renting. Share-crop leases are also more responsive to price and production changes than are cash leases.

In Section E, the problem of share leases encouraging less than maximum production (compared with owner-operator firms) was examined. This involved the problem of sharing income and expenses from fixed and variable inputs and the different types of inputs contributed by each party.

(3) Crop-share-cash lease--Crop-share-cash lease is a modification of the crop-share lease. It is being used more frequently in Michigan over the past few years. Presently, about 10 percent of Michigan's tenants operate under this type of lease.

With the crop-share-cash lease, both parties share the crops produced in a certain predetermined manner. The difference of this type of lease is that the tenant pays an additional cash sum for such things as pasture, farm buildings, other improvements or simply a premium for the farm.

This type of rental agreement is an attempt to achieve a more efficient use of certain types of cropland and to enable the maintainance of additional livestock on the rented farm. This lease also gives the tenant increased incentive to enlarge his livestock enterprise since he receives the full return from the variable inputs that he contributes. The landlord, on the other hand, becomes less concerned with maintaining those farm improvements necessary only for the tenant's livestock.

The crop-share-cash lease is again, less responsive to price changes than crop-share leases, varying directly with the percent of rent paid in cash.

(4) Livestock-share lease--This lease is one of the most popular lease types in Michigan, covering 24 percent of the tenants and 35 percent of the acreage operated by tenant farmers.

Livestock-share leases have many variations as to the sharing arrangements involved. Most of the crops grown on the farm are fed to the livestock. In some cases, however, sales of certain major crops (especially cash crops) may be shared by both the landlord and the renter. In most cases the main item shared is the sale of livestock.

Both the landlord and renter usually have a share in the ownership of all or a large part of the farm's productive livestock. The landlord generally owns in addition, the land, some of the equipment and pays a larger part of the operating expenses than with other lease types.

Of all the renting arrangements, livestock-share usually is the most efficient (close to that of owner-operator farms). Because of the nature of the sharing agreement, both parties work closely together and therefore understand the others problems more readily. Both parties also contribute more capital to the farm enterprise, resulting in a larger operation than with the other lease types.

(5) Other types of leases--20 percent of the tenants in Michigan operate under the Census of Agriculture definition as 'other or unspecified'. These may be some special arrangement that can not be classified into the above four types.

CHAPTER III

THE REAL ESTATE MARKET

Section A: Introduction

The method by which the farm real estate market functions is an important element of this study. The price determining factors for farmland and buildings, resulting from the actions of this market, is an intricate part of the estimation and the interpretation of the income stream from the owner's investment.

The intended use of farmland will dictate, to a large extent, the price that the buyer will or can afford to pay. Theoretically, in a perfectly competitive industry, a buyer will pay a price for land that is equal to the discounted expected future income stream from that parcel of land. The land market, however, does not operate in a perfectly competitive manner. It must cope with problems of irrational human behavior, indivisibilities, imperfect knowledge and uncertainties of income.

The landlord method of estimating the income stream from farm real estate gives a money income stream for the use of the real estate. In Section B, several factors are examined which affect the value of farm real estate but may not affect the money flow of income from these assets. Most of these factors, however, do have an affect on the asset position of the owner. This is the second source of

income. This income source is the change in real wealth due to changes in the current market value of real estate.[1] The stronger the influence of real wealth changes, the more unrealistic is the use of only the landlord method to indicate income from farm real estate. It is essential that both sources of income be combined to present a complete picture.

Section B: Supply and Demand Factors for Farmland

In this section, several of the important variables which affect the demand and supply (and hence the price) for farmland but may not directly influence the income stream from current farm use of real estate are studied. Thus, aggregate price statistics of farmland do reflect these changes, but they may be insensitive to changes in farm income.

Non-farm or external influences are becoming an increasingly important factor affecting farm real estate values. For example, "The average value per acre of farm real estate in 1959 was about twice as high in counties containing metropolitan areas."[2] To visualize how extensive an area this is, Gale states, "In the U.S. there were just over 200 metropolitan areas of fifty thousand or more population in 1960.... If 30 miles were arbitrarily selected as a reasonable commuting distance, roughly 20 percent of the land in the U.S. would lie within a 30 mile radius of the metropolitan areas."[3] "About a million acres are taken

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[1]Changes in real wealth are those changes in the current value of farm real estate (or any other assets) above which are necessary to preserve their purchasing power as measured by a general price level index.

[2]John F. Gale, "What Makes Farm Real Estate Prices", Agriculture Finance Review, June, 1963, p. 8.

[3]Ibid.

by residential and industrial uses, highways and other non-farm uses yearly. A somewhat larger area is withdrawn from the farm real estate market and held for such future use."[1] Facts like this indicate the extensive influence non-farm uses can have on the farmland market, both in forcing land prices up and reducing the supply of land for farming. Moreover, farmers who have recently sold their land for residential uses have ready cash and are often willing to pay higher prices for farms which they desire in other areas.

As mobility and leisure time increase, demand for recreational use of land becomes more important, and consequently boosts the price of suitable land, even though this land may have limited farming potential.

The expansion buyer (a purchaser who is increasing the size of his farm unit) has been accounting for an increasingly larger percentage of the land transfers. In 1963, the expansion buyer purchased 51 percent of all farms transferred.[2] In most cases, the expansion buyer is making above average net income per acre. Therefore he can afford to pay a higher price than the average farmer for farmland. An even more important aspect associated with the expansion buyer is that some external change, usually technology, often creates a situation where the operator is deficient in the land resource in relation to other inputs such as machinery or labor. In this situation, he will wish to increase his land input. It may be, in this case, economically feasible to pay above

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[1]Paul Holm and William Scofield, "The Market for Farm Real Estate", The 1958 Yearbook of Agriculture, p. 202.

[2]Farm Real Estate Market Developments, ERS, USDA, 1964.

average prices to increase the land input of the farm enterprise. This is because the operator may now be able to spread the (fixed) costs of existing inputs (such as machinery and labor) over a larger land input, while increasing only certain variable inputs. Therefore, if he allocates all of the increased income from this newly purchased tract of land, then he would be willing to pay a higher price for that land than would a potential new farmer. Moreover, he may pay a price for land that appears to be irrational, but a technological change may have occured which makes this a very rational decision.

Scofield emphasizes this ability of the expansion buyer to pay higher prices for land, "land prices in commercial areas today are chiefly set by the expansion buyer who can compete effectively with the non-farm investor-buyer. Farmers, themselves, have been chiefly responsible for the upward trend in land prices over the last decade."[1]

Technology is a difficult variable to assign a value for its affect on the income stream to farm real estate. It does affect both the money income and real wealth income of the landowner. Technology has allowed increased production while decreasing per unit costs. In addition, technology has negatively affected prices, through increased production with highly inelastic demand for farm products. The argument that technology has increased the net income stream from farming can be very simply analysed. Given that technology has occured, what is the change in the absolute income stream to landowners and what is the change in the income stream relative to comparable non-farm workers. If only commercial

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[1] W. H. Scofield, "Forces and Trends in the Farm Real Estate Market", Factors in the Farmland Market, p. 37.

farmers are examined, and if both nominal and real income are included, then during the past several years the absolute income has increased while the relative income has stayed approximately the same.

Government programs often influence land values. Price supports may encourage marginal farms to remain in production longer than they otherwise may have. Price supports also insure landowners a certain minimum price (in the short run, at least), even if production increases. Therefore, it may become profitable to increase production and therefore increase the income stream to land. Acreage allotments, which restrict output in order to increase total revenue, may simply inflate the land values of those that are fortunate enough to have an allotment. Expectations about the continuance of these programs may have important effects on land values. With acreage allotments, it is essential that the owner be relatively certain that this program will be maintained in order to pay the higher land prices, for farmland with non-transferrable allotments.

Present tax laws may contribute to higher land values. Since the tax rates on capital gains are lower than on income, high income range individuals are looking for an investment with relatively low income and high capital appreciation.

Expectations may cause land values to increase. Owners may expect income not only to increase, but with a constant increment each year. This yields a much higher discounted present value (DPV) for that tract of land than the DPV of a simple once-and-for-all increase in revenue. This fact generates a higher increase of land prices than the corresponding flow of income would suggest that it should. Gaffney explains this phenomena, "land values respond to [that] higher capacity immediately; actual production comes along much more slowly....Since only 2-3 percent

of farms...turn over each year, these few purchases by aggressive innovators loom large in the sales figure which we blow up to estimate the aggregate value of all land."[1]

Credit facilities available to land purchasers and the cost of obtaining that agricultural credit are reflected in land prices. As credit becomes easier to obtain, the number of potential buyers increases for a tract of land. The cost of credit affects the cost of the total package amount that the buyer must pay for land in credit. Therefore, if he pays less for the cost of credit, he may be willing to pay an additional amount for the farm real estate.

Land has many non-monetary and amenity values associated with its ownership. Many investors would rather have this tangible asset which can be walked on, seen, or identified with, instead of a piece of paper indicating ownership--an agrarian fundamentalism attitude. Also, since a farm is both a business and a home, the amenity values associated with the latter will cause the market value to rise above those justified by productive value alone.

This section has examined some of the major factors affecting land values that do not affect the money income stream to farmland, arising from farm uses. It is important to recognize that these factors do exist and that the landlord method does not give the complete income stream from farm real estate.

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1 Mason Gaffney, "The Benefits of Farm Programs: Incidence, Shifting, and Dissipation," Journal of Farm Economics, December, 1965, p. 1260.

with the value of real estate obtained in the survey.

Section A: Rates of Return

There are two main purposes for calculating rates of return on investments. The first is to calculate an aggregate value for all rented farmland, and the second is to examine the affects of various factors on this value. The procedure for the calculation of the rates of return is described as follows:

(a) For each observation from the survey[1] a net rent figure can be calculated:

Cash lease:	(government payments)(landlord share) + (cash rent) - (landlord expenses)
Crop-share lease:	(acres)(production/acre)(product price)(landlord share) - (landlord costs) + (government payments)(landlord share)
Crop-share-cash:	(cash payment) + (crop share) - (landlord expenses) + (government payments)(landlord share)
Livestock-share:	(sales of crops and livestock)(landlord share) - (landlord costs) + (government payments)(landlord share)

(b) Rate of return equals (net rent) divided by (value of farm real estate)[2]. Using this procedure, a rate of return on investment for each farm was calculated. Thirteen variables from the survey were tested by a chi-square distribution (one-tailed test) to see if they significantly affect the rate of return on investment.

To develop an aggregate rate of return for all rented land, in Michigan, appropriate weighting procedures must be used. This means, if there are

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[1]See Appendix A for a copy of the questionnaire.

[2]This value is an estimation by the landlord. It includes land and buildings, plus landlord's share of machinery and livestock (where applicable).

significant factors affecting the rate of return they must be accounted for. For example, if lease type affected this value, aggregation of rates of return would be as follows. A simple average return is found for each lease type. These values are then weighted by acreages of tenant operated farms in Michigan. In this case, it is assumed that no differences exist between tenants and part-owners, since acreages of land rented by part-owners according to lease type are not available. Thus, rate of return values received by the landlord from tenant cash, crop-share, crop-share-cash and livestock-share leasing arrangements are weighted by the acreage of each lease type. This weighted value is an aggregate rate of return for all rented land in Michigan. This aggregate rate of return value can then be compared to opportunity costs--other investments that farm (or non-farm) investors could have made. These include the 1965 farm mortgage loan rates and the 1965 rates of return from common stock.

For future estimates of rates of return, using the landlord method, data on the landlord's gross income and costs are needed. It is desirable, at this stage to outline briefly, what data are available and what parameters need to be estimated to fill any missing gaps. Data are needed for both part-owner and tenants. Since part-owners and tenants are compared for similarities in farming practices later in this chapter, only tenant farms will be examined for data needs. U.S. Census of Agriculture records the acreage of tenant operators by type of lease.

Gross cash rent per acre is recorded by the USDA, by state, each year.[1] If required, these can also be obtained by region, within states.

For share-crop leases, the number of acres rented by tenants, and their production per acre is recorded in the U.S. Census of Agriculture. Bench-

[1] Farmland Real Estate Market Developments, E.R.S., USDA.

mark shares of crops received by the landlord will be established using the method developed in Section B of this chapter. Therefore, with this information and a selection of appropriate farm prices, gross income to the landlord can be calculated.

Gross income from share-crop-cash leases is derived in a manner similar to crop-share leases. The only difference is the estimation of the amount of cash payment. One method for doing this is using a per-acre cash adjustment.

Livestock-share leases are the most difficult from which to estimate a gross income. For the crops sold, a total cash amount is recorded in the agricultural census. From the bench marks of landlord shares, the amount of this received by the landlord can be estimated. For livestock sold, the best estimate that this study obtained was a per-acre value received by the landlord. There is strong reason to believe (from some survey comments) that the percentage that the landlord receives is between one-third and one-half of the livestock sales.

For the landlord costs, estimates of per-acre costs, by type of lease, by tenure group were developed. A method to observe changes in costs, over time, was developed by collecting the expenses which were paid by the landlord and these expenses were divided into different categories for each lease type. Land ownership costs can be updated from state estimates of such items as taxes.

With this framework, net rents by type of lease for each tenure group can be obtained. In Chapter V, those parameters which are presently not regularly published will be estimated. This will enable the landlord method to estimate the return to farm real estate while using only secondary data.

Section B: Establishing Landlord-Share Benchmarks for Different Crops

The main purpose in developing benchmarks for landlord shares from various crops is to estimate net rental income to landlords in some future period without collecting this primary information from landlords.

To establish these benchmarks for average landlord shares for each of the seven crops, calculations from the survey data are made using the formula below. This procedure weights the landlord share by acreage. It is also easily adapted to test for differences in the landlord shares for part-owners and tenants or for the seven survey crops. The computational formula for weighting landlord shares is:

$$\frac{\Sigma[(\text{Number of Acres})(\text{landlord share})]}{\Sigma(\text{Number of Acres})}$$

Scofield obtained estimates of landlord shares for share-crop and share-crop-cash tenant operated farms for the state of Michigan, which were compiled in a 1956 survey.[1] Tests for significant differences between means for these two groups can be done by Wilcox's Signed Rank Test.[2] In this test, the hypothesis is that the median of the population of differences is zero. Expectations of the sum of positive and negative differences are equal with this test. The testing procedure is to rank the differences between the two groups from the smallest to the largest and assign positive or negative values to these (according to the sign of the original difference). The sum of the positive or negative numbers--whichever is the smallest--is compared with the table value.[3] The deviations are not

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[1]Published report of this survey is not available. Data was obtained from W.H. Scofield, leader of Agricultural Organization and Structure Group, Farm Production Economics Division, USDA.

[2]Merle W. Tate, Richard C. Celland, Nonparametric and Shortcut Statistics, Interstate printers and publishers inc., Danville, Illinois. p.101.

[3]Ibid., p. 141.

CHAPTER IV

THEORETICAL FRAMEWORK FOR DATA ANALYSIS

The purpose of this chapter is to establish a logical framework for the analysis of data from the 'Farmland Rental Survey.' This includes procedures for basic computations from questionnaire data, types of statistical tests that will be used and method of presenting the data in Chapter V.

In Chapter I, the three phases of this study were outlined. These were (1) actual calculations of rates of return, (2) comparison of part-owner and tenant operators and (3) establishment of benchmarks of landlord shares of crops. These three phases were all linked together by the fact that they dealt with some aspect of the landlord method of real estate valuation.

This chapter devotes a section to each of these phases. In Section A, the method of calculation of rates of return on investment is outlined and the factors which affect this value are analysed. In addition, an outline of the data required to calculate net rents is given. The techniques are developed to derive the benchmarks for landlord shares from share leases in Section B. In Section C, the procedures are shown to test for similarities and differences between the two tenure groups of part-owners and tenants. In Section D, a procedure is developed to make possible a comparison of census data on the value of farm real estate

significant unless the calculated sum is less than the corresponding tabulated value.

It is also possible to test the deviations between the landlord share , for each crop, by lease type. In order to do this, it is possible to use a procedure developed by Tate and Celland based on the 'Yates correction for continuity' of a chi-square test. Using this, they have synthesized a table to test "Absolute Differences Between Proportions in Two Independent Samples of Equal Size."[1] "The table shows the smallest absolute difference between proportions significant at four levels [20, 10,5,1 percent] as closely as can be approached from below. They are conservative in the sense that a tabled difference is significant at or below the indicated level."[2] This test should indicate whether or not landlord shares are changing over time and if so, the direction and magnitude of change, if compared with Scofield's 1956 estimates.

Section C: Comparisons between Part-Owner and Tenant Farmers

Five tests using the survey data have been devised to compare farming activities of part-owners and tenants to see if estimates of parameters from the tenant group can be used for the rented portion of the part-owner group. The methods used in each of the five tests are described below.

(1) Rate of return--Using the formula developed in Section A, differences in the rate of return to the landlord and his investment for these two tenure types can be examined. Using a one-tailed chi-squared test to test

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[1] Ibid., p. 135.

[2] Ibid., p. 86.

independence of rows and columns (e.g., effect of tenure on rate of return).[1] A t-test can be used to see if there is any significant difference between mean rates of return for part-owners and tenants.[2] In certain cases, these two tests yield different results. Appendix B explains the reason for this difference between the chi-square and t-test.

(2) Leasing patterns--Differences in the percentage of acreage devoted to the four lease types between these two groups can be tested. The test is performed by obtaining deviations between the percentages for these two groups for each of the lease types. Using these deviations, significant differences can be tested by using the table of absolute differences between proportions.[3]

A comparison of the survey with census data can be made. The proportions of part-owners and tenant-operators from survey data, for each lease type, can be aggregated using appropriate acreage weights. Comparable census data can be obtained by using County values of 1964 Census of Agriculture for Huron and Hillsdale. Total acreages of the four main lease types (cash, crop-share, crop-share-cash, livestock) can be proportioned as a percentage totalling 100 percent.[4] These percentages can then be compared with survey data and deviations in percentages can be tested for significant differences in the same manner as were part-owners and tenants above.

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[1] $X^2 = \Sigma[(\text{theoretical frequency} - \text{observations}) \div \text{observations}]$. Test is one-tailed since deviations of observations from theoretical frequency are squared and summed so they are always positive.

[2] $$t = \frac{m_1 - m_2}{\sqrt{s_1^2/n_1 + s_2^2/n_2}}$$

[3] Ibid., Tate and Celland, p. 135.

[4] This simply deletes the category of "other" lease types.

(3) Acreage devoted to certain crops[1]--To test differences in the acreage devoted to certain crops for the seven crops surveyed, the acreages of each crop grown can be calculated as a percentage of the total for each of the two groups--part-owners and tenants. Deviations can be tested for significant differences using the procedure developed by Tate and Celland.[2]

Comparisons of tenants (from the survey) and all farms can be made in a similar manner. From 1966 Michigan Agricultural Statistics, data are available for acreages of crops grown in all Michigan for 1965. Using acreages of the seven surveyed crops and finding percentages (of the total acreage for these seven crops), comparisons between survey and census data can be made. Deviations can be tested as were part-owners and tenants above.

(4) Landlord shares--Differences between landlord shares for these two groups for the seven crops can be tested by Wilcox's Signed Rank Test.[3] Deviations for each crop will also be tested by the absolute difference in proportions method.[4]

Another test to compare landlord shares for these two groups was developed based on count data. A table was constructed showing the number of occurences of different landlord shares for each crop for part-owners and tenants. The landlord shares were: less than one-third, one-third, more than one-third but less than one-half, one-half, more than one-half.

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[1]Scofield collected data on a 1956 Midwest Leasing Survey which tends to support the assumption that these patterns are similar. Nothing significant was obtained on a state basis.

[2]Ibid., Tate and Celland.

[3]Ibid., p. 101.

[4]Ibid., p. 135.

These frequency values were tested by a chi-square distribution for significant differences in shares going to the landlord between these two tenure groups. Because of the infrequent occurrence of many of these share values and since each cell should have at least five observations for a chi-square test, many of these columns had to be collapsed and combined with other columns.

(5) Production per acre--Calculation of a production per acre value for part-owners and tenants can be made by weighting the survey production data by acreages.

$$\text{Production per acre} = \frac{\Sigma[(\text{Acres})(\text{Production per Acre})]}{\Sigma(\text{Acres})}$$

The test for differences between means was done by Wilcox's signed rank test.

Section D: Farm Real Estate Values

Landlords were asked to estimate the market value of their land and buildings in the 'Farmland Rental Survey'. In order to get some measure for comparison, purposes of this estimate, an extrapolation of census data for value of these two counties was made. Data used for this extrapolation are for the years 1945-1964. A least squares regression equation was constructed from the data in Table IV:1. The projected values are shown in Graph 2.

In Chapter V, the projected values obtained from the least squares regression equation, are compared with the actual values obtained in the survey, from the landlord's estimated market value of his land and buildings in both Huron and Hillsdale Counties.

Table IV:1--Value of farmland in Hillsdale and Huron Counties, 1945-64 (a)

Year	X(b)	Huron (Y_1)(c)	Hillsdale (Y_2)(c)
		Dollars per acre	
1945	-9	74.27	59.40
1950	-4	105.16	92.38
1954	0	156.87	125.83
1959	5	198.23	182.13
1964	10	247.94	190.12

(a) U.S. Census of Agriculture, Michigan Counties, 1950, 1954, 1959, 1964.

(b) X is the time variable..

(c) Y_1, Y_2 are the value of farmland (in dollars) for Huron and Hillsdale counties (respectively).

Regression equations for these two counties were computed as follows:

(1) Huron County

$$Y_1 = 153.8 + (9.36)X$$

Therefore, if X = 11 (time variable for 1965), then $Y_1 = 256.7$.

Thus, the value of farmland in Huron County for 1965 is projected to be $256.76 per acre.

(2) Hillsdale County

$$Y_2 = 127.0 + (7.45)X$$

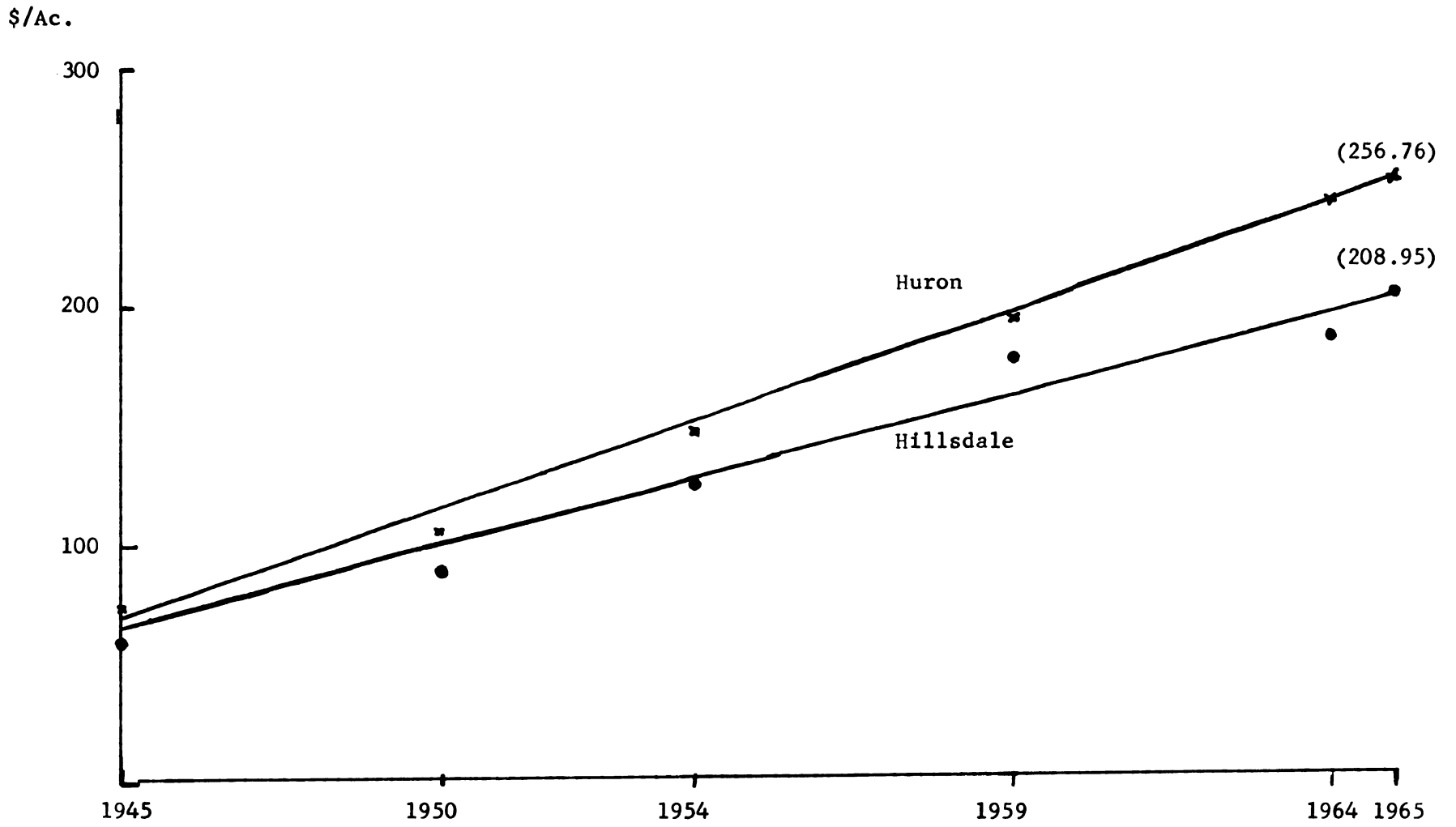
Therefore, if X = 11 (time variable for 1965), then $Y_2 = 208.95$.

Thus, the value of farmland in Hillsdale County for 1965 is projected to be $208.95 per acre.

Summary

The framework for analysing the data collected in the 'Farmland Rental Survey' has been established in this chapter. In Section A, the formula for calculating the rate of return, using the data from the survey,

Graph 2: 1965 Projected Value For Land And Buildings For Land And Buildings For Huron And Hillsdale Counties



Source: Census of Agriculture, Michigan Counties 1950, 1954, 1959, 1964.

was developed. Also in this section, the parameters that were necessary for future calculations of net rent from secondary data were given. Estimates of those parameters that were unavailable are developed in Chapter V. In Section B, a computational procedure was outlined for establishing the benchmarks for landlord shares for different crops. In Section C, procedures for the five tests for comparing part-owner and tenant operators were given. An extrapolation of farm real estate values from census data was made in Section D. These values were derived for the purpose of checking the reliability of the landlord's estimates.

In Chapter V, the framework developed in this chapter will be used to analyse and to provide the format for presenting the data from the 'Farmland Rental Survey'.

CHAPTER V

ANALYSIS OF DATA

In this chapter, the information which was collected in the Farmland Rental Survey is analysed. The chapter is organized into four major sections. In Section A, the characteristics of the respondent group are examined. In Section B, there is a comparison of the part-owners and tenants in certain key farming operations. In Section C, the development of landlord shares received from seven major Michigan farm crops are given. Factors affecting the rates of return that the farm landowners receive from their investment in farm real estate are shown in Section D.

Section A: Nature of the Survey Respondents

Before analysing the observations which were collected, it is advisable to be aware of the nature of the group that was interviewed. The human element, for example, may inject many peculiarities into the variables in the study. An analysis of this observation group may show whether or not there are any peculiar characteristics which are unrepresentative of the population from which they were selected.

In this section, the mean and distribution of the important variables of the 88 respondents (observations) are examined and, where possible, comparisons are made with census data. The results of these tests give some indication of the degree of confidence that can be placed in the survey

data. It also gives a clearer understanding of the limitations encountered with the group studied.

Fourteen variables from the survey are analysed in the remainder of this section. Each subsection is concerned with a specific question from the survey.

(1) Size of landlord's holdings and number of acres rented--Landlords were asked, "How many acres of farmland did you own in 1965 [and] how many of those acres did you rent to others?" A comparison of these replies was made with agricultural census data and the results are shown in Table V:1.

Table V:1--Size of farms owned and size of tracts rented out by respondent landlords in comparison with all farms in Hillsdale and Huron Counties, 1964

Size of tract (acres)	Survey Tracts		Size of farm (acres)	All farms in 1964 Census (a)
	Owned	Rented		
	Percent			Percent
0 - 50	18.60	33.33	10 - 49	14.18
51 - 75	10.45	18.39	50 - 69	6.30
76 - 100	32.55	24.13	70 - 99	17.85
101 - 150	15.11	9.19	100 - 139	16.22
151 - 200	15.11	6.89	140 - 179	15.07
over 200	8.15	8.04	180 and over	30.34
Average size		78.8 acres		152.3 acres

(a) Total farms for Huron and Hillsdale Counties from preliminary County data, 1964 U.S. Census of Agriculture.

Part of the reason for renting out their land may be shown by the fact that 61 percent of the landlords owned 100 acres or less. Thus, in many cases this had become too small a unit to operate economically. Only 38 percent of all farm operators in the 1964 census had smaller than 100 acre farms. It would also appear that these rented tracts were an addition to existing farms, in the majority of cases, since only 24 percent of the tracts

rented were larger than 100 acres. Smaller than census average-sized farms would probably be expected if owners were nearing retirement age.[1] (See analysis of present occupations later in this section).

The landlords, on the average, rented out less land than they owned (assuming no subleasing). This may be accounted for in many cases by off-farm workers or retired farmers maintaining small tracts of land for personal use. Also, renting to others could be used as a means of reducing the farm size. Since a small farm is often inefficient, the owner may accept a lower rate of return from the renter, but this might still be higher than if he were operating the farm himself.

(2) Estimated value of land and buildings--The mean value of the landlord's response to the question, "What would you estimate to be the selling price of this rented parcel of land and buildings, per acre?" was $216.63 per acre in Hillsdale County and $324.81 per acre in Huron County. The average for the survey was $273.93 per acre. These comparable values of the 1965 projection of census data[2] for the value of land and buildings in Hillsdale County are $208.95 per acre and in Huron County are $256.76 per acre. The two values differed only by 4 percent for Hillsdale County, but by 23 percent for Huron County. This discrepancy for Huron County may be due to several reasons. One may be a tendency to underestimate the value of land and buildings when being personally interviewed by a local enumerator or when reporting to a U.S. agency. This high

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[1]See Everett M. Rogers, Social Change in Rural Society, p. 195--(quotes Iowa Agricultural Experiment Station, Research Bulletin 398, 1953).--shows steady increase in farm size to age 52 and then steady decrease in farm size until retirement.

[2]For the calculations of the regression equation, see Section D, Chapter IV, p. 46.

estimation may also be partly due to a higher value of buildings per acre, since the average-sized farms in the survey were smaller than those found in the census data. Moreover, it is often dangerous to predict from regression equations beyond the original data. If the owner's estimation, obtained from the survey is, in fact, an over-estimation, then the rates of return which are calculated are too low. In this case, the under-estimation would substantially decrease (by approximately one-fifth) the rate of return from real estate for Huron County.

(3) Number of tenants--The landlords were asked "To how many different individuals did you rent farmland in 1965?" The purpose of this question was to see whether or not lease terms may have been established for one landlord-renter situation and these terms extended to several renters whose situations may have been quite different. Thus, renting to several operators could result in inequities in income to one of the parties involved. This weakens the landlord method of estimating the income stream from farm real estate.

Table V:2--Number of tenants to which respondent landlords rented land

Number of renters	Respondent landlords
	Percent
1	79.54
2	18.18
3	1.13
4	1.13

Since four out of five landlords rented to only one tenant, this would imply that in most cases the terms of the lease had been estab-

lished for this particular landlord-tenant situation.

(4) Buildings on the rented tract--Whether or not a major set of buildings existed on the rented tract has several important implications for this study. Over two-thirds of the tracts were rented without buildings.

Table V:3--Number of rented tracts that included a major set of buildings

Included set of buildings	Respondent landlords
	Percent
Yes	30.12
No	69.67

The high percentage of flat land (no buildings) rented may indicate that the tract of land was rented either to a cash-crop-farmer and the buildings were not desired or to another landowner (part-owner) who had sufficient buildings and only needed additional land.

In subsection (2), a reason suggested for the higher value of land and buildings in the survey than in the census data was that there may have been a higher value of buildings per acre. The results shown in Table V:3 do not support this suggestion and the converse may be true, that the survey tracts actually have a lower value of buildings per acre. An additional discrepency may have occurred. Landlords may have valued their land and buildings as they stand--since this might be their only basis for estimation. The buildings, however, may not be included in the rental agreement. This fact could have resulted in an overestimation of the value of land and buildings on the rented tract.

(5) Part-ownership and tenancy--Since this relationship is an intricate part of this study, a comparison of the ratio of tenants to part-owners from the survey with census data is made.

Table V:4--Number of part-owners and tenants from the survey and from agricultural census data for Huron and Hillsdale Counties, 1964

Tenure	Respondents from survey	Census data (a)
	Percent	
Part-owner	79.31	78.24
Tenant	20.68	21.76

(a) From preliminary county data of 1964 Census of Agriculture, Huron and Hillsdale Counties.

The results obtained in the survey match very closely to the census data. These data emphasize the relative importance of the part-owner group to the the tenant group.

(6) Relationships between landlords and tenants--If there is a significant amount of intra-family leasing, this may have an affect on rates of return on investment to the landlord. In Table V:5, the relationships found in the survey are shown.

There is a substantial amount of leasing in which both parties are members of one family. Almost 16 percent of all leases involve father and son (or son-in-law). This would appear to be an important step intransferring land from one generation to another. It may also mean that the parent is receiving a lower rate of return on his investment than if he were renting to a non-relative.

Table V:5--Kinship relationship between respondent landlords and tenants

Relationship	Respondent landlords
	Percent
Landlord not related to the tenant	76.13
Landlord related to the tenant	23.86
Son or son-in-law	15.9
Brother	6.8
Other	1.1

(7) Present occupation of landlord--The present occupation of the landlord could have an influence on the rate of return on investment that he would be willing to accept.

Table V:6--Present occupation of respondent landlords

Present occupation	Respondent landlords
	Percent
Retired	54.54
Farming	3.40
Off-farm self-employed	14.77
Off-farm not self-employed	27.27

The high percentage (over one-half) of the landlords presently retired may have an influence on the results of the income from farm real estate found in the survey. Rent, to them, may simply be a retirement income. From personal contacts with several landlords it was found that many of these older individuals and widows appeared to be out of touch with present business conditions, and in some cases may have had a weak bargaining position. If this is generally true, then rates of return they receive from their investment could be lower than average. The 42 percent of off-farm

workers may be the result of part-time farmers or non-farm investors. Again, from personal contacts with owners, it was found that the part-time farmers appeared to be the more important of these two groups.

(8) Farm and non-farm owners--An attempt was made to see whether or not present owners previously farmed their rented tract. This would be an indication of whether or not the owners were non-farm investors. As shown in Table V:7, almost one-third of the owners had not farmed this tract, indicating that the non-farm investor group was substantial, if we use this criterion as a measurement.

Table V:7--Number of owners who had farmed the tract of rented land

Had farmed tract	Respondent landlords
	Percent
Yes	68.96
No	31.03

Since non-farm investors are more likely to be aware of alternative investments, one may expect that this group would be getting a higher return on its investment than farm investors in real estate. Thus, if 31 percent of the investors are non-farm, then farm real estate investment should be yielding average returns comparable to alternative farm and non-farm investments.

(9) Length of time that tract was farmed--The number of years that the owner had farmed the land that he rented would give reassurance that an affirmative response in Table V:7 indicated that the owner was actually

a farm investor. The high proportion of farmers that had farmed the tract for several years is illustrated in Table V:8.

Table V:8--Number of years that the owner had farmed the rented tract

Number of years	Respondent landlords
	Percent
1	0
2 - 4	3.77
5 -10	16.98
Over 10	79.24

Over 96 percent had farmed the rented tract for five years or more. Therefore, an affirmative response in Table V:8 could be concluded as representative of a farmer owner.

(10) Landlord supplies machinery--In some leases, inputs supplied by the landlord include machinery. In this study, the interest in machinery was concentrated on the magnitude of this feature in leases and its effect on the rate of return to the landlord's investment.

Table V:9--Number of landlords who supplied machinery to tenants

Supplied machinery	Respondent Landlords
	Percent
Yes	17.04
No	82.95

The percentages in Table V:9 seem to match those percentages of part-owners and tenants found in Table V:4. The part-owners would be more likely to have their own machinery than would tenants. Also, the length of time a tract of land is leased by the same tenant (See Table V:12) would indicate the likelihood of the landlord supplying some machinery. The longer the tenant stays on the same tract, the less likely the landlord would be to supply machinery if he had previously farmed the tract. This also depends on the useful life of the machinery supplied.

It is difficult to predict how the rate of return on the landlord's investment is affected when the landlord also supplies machinery as well as real estate. In Section D, a test will be made to see if there is any significant difference in this rate of return on investment whether or not the landlord supplies machinery.

The average investment in machinery by those 17 percent of the landlords who did supply some machinery under the rental contract was $1991.70.

(11) Government payments--Government payments were a source of income to many landlords. The average payment, to those receiving some payments, was $489.40. 47.2 percent of this payment was retained by landlords as their share of the income from government payments.

Table V:10--Number of respondent landlords receiving government payments

Received government payments	Respondent landlords
	Percent
Yes	28.40
No	71.59

It is difficult to obtain the amount of payments for individual farms or for lease types. For future gross income calculations, an estimate of government payments is needed. Results of this study provide one such estimate.

(12) Type of lease--The type of lease under which renters operate is an important variable in this study. A comparison with census data is desirable in order to check whether or not the survey was a representative sample.

Table V:11--Number of renters and acreage of land rented by type of lease from the survey and agricultural census data, 1959

Type of lease	Respondent landlords		Agricultural census data	
	Number	Acreage	Number (a)	Acreage (b)
	Percent		Percent	
Cash	21.59	21.7	18.68	24
Share-crop	61.36	37.4	31.86	28
Share-crop-cash	5.68	10.9	9.89	19
Livestock-share	11.36	30.1	28.87	32

(a) 1959 U.S. Census of Agriculture, totals of Huron and Hillsdale (for tenants only) with the four types of leases as percentage of their total. The lease type "other", 18.75 percent of total number of tenants was deleted.

(b) 1959 U.S. Census of Agriculture, state pattern for leasing (for tenants only). The acreage of "other" types of leases (24 percent) was deleted and the four lease types acreages were totaled to 100 percent.

In Table V:11, there is a very large proportion (over 60 percent) of share-crop renters, but the proportion of the acreage that they rent is much lower, relative to the other lease types. The converse is true of share-crop-cash and livestock-share leases. This is also true, but to a lesser extent in the census data.

Differences in the results obtained from the survey and the data found in the agricultural census, may occur for several reasons. Renters in the survey include both tenants and part-owners. The agricultural census data shown in Table V:11 includes only tenants (since acreages for part-owners are not available). As is shown in Table V:15, tenants are more likely to rent under a share-crop-cash or livestock-share lease than are part-owners. Therefore, this accounts for the lower number of these types of leases, relative to cash and share-crop leases than is found in the census data. Another reason for the difference is that there is a six year time differential. To observe the affect of this time differential, Table II:1, shows the amount of change, over time, in the relative acreage rented under these lease types.

Even after allowing for the above problems, there may be over-weighting of share-crop farms and an under-weighting of share-crop-cash farms (by acreage). This could either decrease or increase the rate of return on investment that is obtained. This can occur if there are significant differences in rates of return between these two tenure types, while the direction of the change depends on which type of lease had the highest rate of return.

(13) Length of time tract was rented--Rent inflexibilities often develop if a tenant remains for a long period of time with the same landlord. Rental payments become customary and renegotiations are difficult. Changes in rental contracts occur most often with changes in tenants. In Table V:12, the length of time that the landlord has rented this tract of land is shown and also the length of time it was rented to the same individual. This may give some indication of the extent of 'stickiness' of rental payments that can occur. The landlord method operates on the principle that

these inflexibilities do not exist. Therefore, the extent of these inflexibilities is an important factor in the reliability of the landlord method.

Table V:12--Number of years landlords have rented this tract of land and number of years to the same renter

Number of years	Rented this tract	Rented this tract to same individual
	Percent	
1	5.79	9.09
2	2.89	
3 - 4	24.63	38.63
5 - 10	37.68	38.63
Over 10	28.98	13.63

Since two-thirds of the landlords have rented this tract for five years or more, and over 52 percent have rented it to the same individual for five years or more, it is quite possible that inflexibilities could occur if no provisions for change were allowed within the lease. In subsection (14), it will be seen that changes in the lease are rather infrequent.

(14) Changes in the terms of the lease--In subsection (13) it was concluded that rental payment inflexibilities would develop unless there was provision for changes in the terms of the lease.

Table V:13 illustrates infrequent changes in lease terms since the tract was rented. This infrequency becomes even more pronounced when it is recalled that two-thirds of the landlords (Table V:12) have been renting this tract for five years or more.

Table V:13--Type of change in lease terms since the tract was rented

Type of change	Yes	No (or does not apply)
	Percent	
Landlord share of the crop	14.28	85.71
Share of expenses	8.69	91.30
Cash rental payment	4.00	96.00

In Chapter II, it was indicated that rent inflexibilities may affect the income stream from farm real estate investment and therefore weaken the generalization from rented land to all owned land. It is not known in which direction returns are affected by rental inflexibilities unless each individual case is examined. There could be a great deal of balancing, when rates of return are aggregated from a number of farms.

A main purpose of this section was to test whether or not the sample was representative of the population from which it was drawn. No major discrepancies were found. The number of part-owner and tenant operators coincided very closely to census data. There were, however, some deviations in the ratio of lease types from census data. Share-crop leases may have been under-sampled. The size of the landlord's farms were substantially smaller than farms from census data.

Several factors from the survey were examined,in this section, for their affect on the rate of return on investment. Those factors which were thought to depress the rate of return included: the small size of landlords' farms, the high estimated value of land and buildings, the small number of sets of buildings on the rented tract, the rather extens-

ive intra-family leasing, and the large proportion of retired farmers. There were, in addition, some factors which were thought to affect the rate of return, but it was not certain in which direction. These factors were; variables causing rent inflexibilities, non-farm investors, and contributions of machinery by the landlord.

Another important feature was the extensive inflexibilities in the rental market. The length of a tenant's stay and the infrequency of change in contract terms were two major examples.

Section B: Comparison of Part-Owners and Tenant Farmers

This section provides a comparison of various farming practices on the tenant farms and the rented portion of part-owner farms. The purpose of this comparison is to test whether or not the estimates of parameters for the tenant group can be used for the rented portion of the part-owner farms. This is important since there is limited data collected in the census on part-owners, and since the part-owners rent considerably more acreage than tenants and are increasing in importance. Their inclusion will allow a larger group to be used for a sample in the landlord method of estimating the income stream to farm real estate. In addition, if it can be established that the rented and the owned portions of these farms are operated in a similar manner to give equal rates of return, then generalizations from rented land to all owned land can be accepted with more confidence.

Five statistical tests were made to compare the farming practices of these two groups. These tests included: rates of return on investment, acreage devoted to crops, leasing patterns, landlord shares and production per acre.

(1) Rate of return[1]--The formula for calculating the rate of return on investment in farm real estate was developed in Chapter IV. In Table V:14, a comparison of the rate of return that the landlord receives from his investment in farm real estate is made between these two tenure groups.

Table V:14--Rate of return to real estate from part-owners and tenants (a)

Rate of return	Part-owner		Tenant
		Percent	
Less than 2.5%	24		22
2.5% to 4.0%	22		11
4.01% to 8.0%	32		45
Greater than 8.01%	22		22
	100		100

(a) Chi-square value was 1.514 with three degrees of freedom. It was not significant. A t-test between the two mean rates of return was not significant (t=.55).

The rate of return received by the landlord on his investment did not appear to be affected by the tenure status of his renter.

The rate of return varies directly as net rent, which in turn is influenced by production (in share type leases). Therefore, if the rate of return is similar, it suggests that production would also be similar between these two groups. More important for this study, is, that if both groups have similar investments in inputs, then the income stream

[1]This is a rate of return on the landlord's investment. Since information collected in the survey was total income, this includes a return on machinery (for 18 percent of landlords), and on livestock (for most livestock-share leases) as well as on farm real estate. A test is made in Section D to see if supplying machinery affects the rate of return to the landlord.

for these two groups should also be similar.

(2) Leasing patterns--The ratio of types of leases can give some indication of the general type of farming that is carried on by the renter on his tract of land. By comparing the leasing patterns for tenants and part-owners, certain insights about operational patterns may be gained. Establishing that similarity of leasing patterns does exist, is also very important for the landlord method. If differences in leasing patterns do exist between these two groups, then census information must be collected on the acreages of each type of lease on the rented portion of part-owner farms to allow them to be used in the landlord method of estimating income streams.

Table V:15--Acreage rented by type of lease by part-owners and tenants, from the survey and from the agricultural census

Tenure type	Part-owners	Tenants	Deviation	Survey total	Census pattern(a)	Deviation
		Percent				
Cash	25.7	17.17	8.6	22.7	28	-5
Share-crop	62.1	12.7	49.6 (b)	44.0	36	8
Crop-share-cash	3.7	18.1	-14.4 (c)	8.9	12	-2
Livestock-share	8.6	51.5	-42.9 (d)	24.2	24	--

(a) Calculated from preliminary 1964 Census of Agriculture, for Huron and Hillsdale Counties where the four lease types were taken as proportions of 100 percent.
(b) Significant at the one percent level (Tate and Celland, p. 135).
(c) Significant at the one percent level (Tate and Celland, p. 135).
(d) Significant at the five percent level (Tate and Celland, p. 135).

Leasing patterns for all the share leases were found to be significantly different between tenants and part-owners. The largest deviations

were the result of a higher percentage of tenants operating under livestock-share leases, and a higher percentage of part-owners operating under share-crop leases. This deviation, however, is quite plausible. Livestock-share leases usually require the full time services of a farm manager, a situation more suitable to the tenant. Part-owners, on the other hand, have additional land to manage, and thus, would be less likely to operate under a livestock-share lease. As will be shown in subsection (3) part-owners grow more cash crops and therefore a higher percentage of part-owner leases would be a crop-share type.

If survey acreages for both of these groups are added together, there appears to be no statistically significant difference (at the 20 percent level) between these values and the 1964 U.S. Census of Agriculture preliminary data for the counties of Hillsdale and Huron.

This test suggests that the Census of Agriculture should collect data on acreages of each type of lease for the rented portion of part-owner farms. This is necessary if this group (the part-owners) is to be used for the landlord method of estimating the income stream from farm real estate.

(3) Acreage devoted to crops--Acreages devoted to specific crops are important for two reasons. First, if the portion of specific crops grown is the same, this will increase the confidence that landlords are receiving the same income stream from their real estate investment from both groups. Second, this is another important factor in establishing the link between rented and owned farms. If these two groups grow similar crops and in addition, part-owners grow similar crops on both portions of their farm, then more confidence can be placed in the landlord method of estimating the income stream from real estate.

Table V:16--Acreages devoted to seven crops for survey part-owners and tenants

Crop	Tenants		Part-owners		Deviation in percent (a)
	Acreage	Percentage	Acreage	Percentage	
Wheat	169	17.17	390	21.54	-4.37
Corn	321	32.62	446	24.64	7.98
Oats	54	5.49	108	5.97	- .48
Soybeans	64	6.50	118	6.52	- .02
Sugarbeets	--	--	44	2.43	-2.43
Hay	185	18.80	214	11.82	6.98
Navybeans	191	19.41	490	27.07	-7.66

(a) None of these deviations were significant at the 20 percent level (Tate and Celland p. 135).

The results of Table V:16 suggest that the pattern of the seven crops surveyed are not significantly different on tenant operated and rented portions of part-owner operated farms. The deviations in percentages observed are consistant with the leasing patterns that were examined in subsection (2). Since more tenants operate under livestock-share leases than do part-owners, this could account for a higher percentage of hay and corn grown on these farms. On the other hand, since more part-owners rent land on share-crop leases, this could account for the higher percentage of navybeans, sugarbeets, and wheat (cash crops) grown on these farms.

In order to strengthen the link between all rented farm land and all owned farmland, it may be desirable at this point to make a comparison between the tenant farms (from survey data) and all Michigan farms (from census data) to see if major differences exist in the cropping patterns.

Table V:17--Acreages devoted to seven crops for survey tenants and all Michigan farmers in 1965

Crop	Tenants	All farms (a)	Deviation (b)
Wheat	17.17	13.29	3.88
Corn	32.62	31.76	.86
Oats	5.49	8.51	-3.02
Soybeans	6.50	7.31	- .81
Sugarbeets	--	1.09	-1.09
Hay	18.80	27.97	-9.17
Navybeans	19.41	10.05	9.36

(a) 1966 Michigan Agricultural Statistics, Michigan Dep't. of Agriculture, p. 6. (Selected crops were allocated percentage of all selected crops.)

(b) None of these deviations were significant at the 10 percent level, (Tate and Celland, p. 135).

The deviations that appear in Table V:17 are that tenants grow a lower percentage of their acreage in hay (they grow a larger proportion than part-owners) and a higher percentage of acreage in navy beans (they grow a lower percentage than did part-owners). It appears that deviations observed between the survey tenants and part-owners in Table V:16 are now reversed when comparing survey tenants with all Michigan farms, indicating that there may be a significant difference in certain crops between part-owners and all farm operators.

Thus, in Table V:18 there appears to be significant differences between these two groups. However, this is not conclusive evidence. The comparisons between these two groups are made for two different populations. The part-owner group is drawn from Huron and Hillsdale Counties, whereas the all farm group is drawn from the whole state. The two counties in the survey grow a higher percentage of navybeans and a lower percentage of hay per acre cropped than does the state as a whole. Thus,

although the populations are not identical, much of the difference may be explained by the particular counties sampled. There may still be some reservations about the similarity of the cropping pattern of these two groups, and thus, the generalization of rented to owned land.

Table V:18--Acreages devoted to seven crops for survey part-owners and all Michigan farmers in 1965

Crop	Part owner	All farms (a)	Deviations
		Percent	
Wheat	21.54	13.29	8.25
Corn	24.64	31.76	- 7.12
Oats	5.97	8.51	- 2.54
Soybeans	6.52	7.31	- .79
Sugarbeets	2.43	1.09	1.34
Hay	11.82	27.97	-16.15 (b)
Navybeans	27.07	10.05	17.02 (c)

(a) 1966 Michigan Agricultural Statistics, Michigan Dep't of Agriculture, p. 6, (selected crops were allocated percentage of all selected crops).

(b) Significant at the five percent level (Tate and Celland, p. 135).

(c) Significant at the one percent level (Tate and Celland, p. 135).

(4) Landlord shares-- Procedures for calculating the average rental share that the landlord receives were developed in Chapter IV. The purpose of this subsection is to test whether or not there are significant differences in the shares of crops received by landlords from tenants and part-owners. The purpose of testing for significant differences in landlord share benchmarks, between the two tenure groups, is to see if there is any difference in this aspect of the relationship between the landlord and renter. If not, then the benchmarks of shares

for all rented land need not be weighted by acreage operated by these two groups. Moreover, similarity in these benchmark share values will give additional evidence of the similarity of the farming practices of these two groups.

Table V:19--Landlord shares of crops received from survey part-owners and tenants

Crop	Part-owner	Tenant	Deviation (a)	Rank of deviation (b)
Wheat	.420	.397	.023	4
Corn	.430	.437	-.007	-2
Oats	.455	.453	.002	1
Soybeans	.473	.484	-.011	-3
Sugarbeets	.357	--	--	--
Hay	.453	.500	-.047	-6
Navybeans	.372	.330	.042	5

(a) No significant differences in shares for any of the crops using table of absolute proportions.
(b) No significant differences were found between these two groups using Wilcox's signed rank test (value of t=+10, N=6).

The results of the statistical tests in Table V:19 show that there is no difference, for any of the seven crops tested, in the shares received by the landlord from these two tenure groups. Therefore, this is an additional reason for assuming that the income stream from farm real estate for both of these groups is similar.

A further test for significant differences in the landlord shares of crops between part-owners and tenants can be made by using count data and the method introduced in Chapter IV, This is a comparison of numbers of landlords who rent on a particular share basis.

Table V:20--Numbers of respondent landlords receiving a certain share of the seven crops from part-owners and tenants

Crop	Tenure	≤ one-third(a) Obs.(b)	Exp.(c)	≥ one-half(a) Obs.	Exp.	Total	X^2(d)
Wheat	P (e)	14	14.3	16	15.7	30	
	T (e)	5	4.7	5	5.3	10	.06
Corn	P	8	7.4	12	12.6	20	
	T	22	2.6	5	4.4	7	.30
Oats	P	5	4.3	5	5.7	10	
	T	1	1.7	3	2.3	4	.80
Soybeans	P	3	2.7	5	5.3	8	
	T	1	1.3	3	2.7	4	.14
Sugarbeets	P	2	2.0	2	2.0	4	
	T	0	0	0	0	0	0
Hay	P	5	3.9	10	11.1	15	
	T	0	1.1	4	2.9	4	1.90
Navybeans	P	14	14.5	5	4.5	19	
	T	2	1.5	0	.5	2	.73

(a) One-third, one-half are the shares to the landlord.
(b) Obs. is the observed number of landlords operating under this type of lease.
(c) Exp. is the expected number of landlords operating under this type of lease.
(d) X^2 is the chi-square value for each crop. None of these values were significant.
(e) P is part-owner and T is tenant.

The conclusion drawn from the frequency distribution of landlord shares is that tenure has no affect on landlord shares. This conclusion is consistant with the tests made in Table V:19.

(5) Production per acre--The production per acre for each of the seven surveyed crops can be compared for part-owners and tenants. From the formula developed in Chapter IV, Table V:21 can be derived, showing the

production for each of the seven crops.

Table V:21--Production per acre for respondent part-owners and tenants

Crop	Part-owner	Tenant	Difference	Rank(a)
Wheat	34.28 bu.	28.08 bu.	6.20	2
Corn	61.40 bu.	69.41 bu.	- 8.01	-4
Oats	42.69 bu.	73.14 bu.	-30.45	-6
Soybeans	19.92 cwt.	28.88 cwt.	- 8.96	-5
Sugarbeets	17.93 cwt.	--	--	--
Hay	2.26 tons	2.34 tons	- .08	-1
Navybeans	12.31 cwt.	18.96 cwt.	- 6.65	-3

(a) Production per acre was significantly higher for the tenant group at the ten percent level of significance, using the Wilcox's signed rank test (T=+2, N=6).

From the results shown in Table V:21, production by tenants was significantly higher than by part-owners at the 10 percent level. Therefore, from the survey data it can be concluded that production per acre is higher under tenant operated farms.

In this section, five tests were conducted to compare key farming operations of part-owners and tenants. It was concluded that the landlord received the same return on his investment. In addition, acreages devoted to specific crops and the shares of crops paid to the landlord were the same. The ratio of acreage devoted to types was decidedly different. Production per acre was found to be different but these results are questionable for two reasons. First, they were only significant at the 10 percent level, and secondly, these are probably the least reliable figures gathered from the landlord, since the information was

collected almost a year after crops were harvested.

Therefore, additional information that must be gathered by the U.S. Census of Agriculture is the acreage of different lease types for part-owners. Other estimates of parameters for part-owners can be generalized from the tenant group for the landlord method of estimating income from farm real estate.

Section C: Benchmarks for Landlord Shares

The benchmarks for landlord shares give the average share of crops or produce which the landlord receives from share rented land. The purpose for establishing these benchmarks is that they are a necessary value for making estimations of future net rent payments.

This section is concerned with developing an aggregate coefficient for each crop. To do this, it is necessary to see if there are significant differences in the coefficients between the three types of share leases. If, in fact, differences do exist, the coefficients for each lease type must be weighted by acreages. Otherwise, a simple average of the three values will be sufficient. Also, a comparison of estimates obtained by Scofield in a 1956 USDA survey will be compared with the values obtained from this survey.

(1) Landlord shares--Table V:22 contains the benchmarks of landlord shares from the survey using the formula developed in Chapter IV. These benchmark shares are for each type of share lease. If there are significant differences between the benchmark values for each of the share leases, then in order to develop an aggregate benchmark for all rented land, these values will have to be weighted.

Table V:22--Shares of seven crops to respondent landlords by lease type

Crop	Share-crop	Share-crop-cash	Livestock-share
Wheat	.424	.333	.500
Corn	.442	.333	.500
Oats	.444	.333	.647
Soybeans	.480	.333	.500
Sugarbeets	.500	.200	.500
Hay	.460	.500	.500
Navybeans	.359	.333	.500

In order to test the significant differences between these landlord shares, it is necessary to calculate deviations or differences between each of these values and rank them. The test is Wilcox's signed rank test.

Table V:23--Differences between shares of crops to respondent landlords for share leases

S.C.-S.CC.(a)	Rank(b)	S.C.-L.S.	Rank(c)	S.CC.-L.S.	Rank(d)
.091	3	-.076	-5	.167	3.5
.109	4	-.058	-4	.167	3.5
.111	5	-.243	-7	.354	7.0
.147	6	-.020	-2	.167	3.5
.300	7	0	1	.300	6.0
-.040	-2	-.040	-3	0	1.0
.026	1	-.141	-6	.167	3.5

(a) S.C. is share-crop, S.CC. is share-crop-cash and L.S. is Livestock-share.

(b) These two values were significantly different at the five percent level using the Wilcox's signed rank test (T=-2).

(c) These two values were significantly different at the one percent level using the Wilcox's signed rank test (T=+1).

(d) These two values were significantly different at the one percent level using the Wilcox's signed rank test (T=+1).

Since there are significant differences in the coefficients between these three types of share leases, in order to develop an aggregate benchmark of landlord shares for each crop, these values for each of the share leases must be weighted by acreage. The acreages that are to be used for weighting are the number of acres of each type of lease in the survey. The reason is simply, that a benchmark for all rented land is desired. There were no differences in this value between part-owners and tenants. Moreover, there are no acreages published for part-owners by lease types. It was found, however, that these acreages were significantly different between part-owners and tenants. Hence, survey estimates of acreages are used for weighting. The weighted values of landlord shares are recorded in Table V:24.

Table 24-- Aggregate shares of seven crops to respondent landlords, weighted by type of lease acreage

Crop	Coefficient
Wheat	.413
Corn	.446
Oats	.455
Soybeans	.477
Sugarbeets	.473
Hay	.475
Navybeans	.360

Scofield obtained estimates of landlord shares in a 1956 survey for share-crop and share-crop-cash tenant farms in Michigan. The corresponding group from the Farmland Rental Survey is compiled below in Table V:25 for comparison.

Table V:25--Landlord shares of seven crops from share-crop and share-crop-cash tenants from the survey and 1956 USDA survey

Crop	Scofield's estimates	Survey estimates	Differences(a)	Rank(b)
Wheat	.490	.381	.109	6
Corn	.441	.434	.007	1
Oats	.388	.439	-.051	-3
Soybeans	.377	.480	-.103	-4
Sugarbeets	.450	--	--	--
Hay	.393	.500	-.107	-5
Navybeans	.377	.330	.047	2

(a) Using the test of absolute difference in proportions, wheat, soybeans and hay were significantly different at the 20 percent level.
(b) No significant differences between these two groups using Wilcox's signed rank test (T=-3, N=6).

The results of these tests shown in Table V:25 suggest that there has been very little change over time, in the shares going to the landlord. The reason that the tests are not conclusive is the fact that they are drawn from two different populations. Scofields's estimatese were for the whole state of Michigan while the survey estimates were for only Huron and Hillsdale Counties.

Significant differences in the shares of crops going to the landlord were found between the three types of share leases. These shares were then aggregated by weighting with acreages of the share leases from the survey data.

A comparison with a 1956 survey showed that shares going to landlords from share-crop and share-crop-cash tenants had changed very little. This shows the static nature of the rental market.

Section D: Rate of Return

It is important, if the rate of return values are to be used for some future calculations, or any other analysis, to understand which variables affect these values and to know the direction in which they would be shifted with future changes. For example, if it is known that the rate of return from farm real estate varies directly with the size of the rented tract, then using census data collected on this variable, estimates of the change in rate of return can be made.

In this section, the rate of return is tested against 13 other variables from the Farmland Rental Survey using a chi-square distribution. These 13 variables include various characteristics of the land owners, the renters, the rented tract, the lease itself and other exogenous factors. Using this method, it may be determined whether or not these variables, do, in fact, influence the rate of return. The results from this test might enable us to generalize about a common rate of return for all rented land. Also, if these variables do influence the rate of return then they must be weighted accordingly in order to obtain an aggregate figure.

In the second part of this section, a brief outline will be given of these estimates, that were calculated in the survey, needed for gross rent and cost calculations.

(1) Factors affecting rate of return--In Chapter IV, procedures were developed for calculating the rate of return. The source of income and farm real estate values were also given. It is worth repeating and emphasizing that the value of farm real estate used was an estimate by the farm owner, himself, on how much he thought his property was worth.

For this analysis, the rate of return values were classified into four categories of farms:

(1) less than 2.5%, which included 21 farms;

(2) 2.51% to 4.0%, which included 17 farms;

(3) 4.1% to 8.0%, which included 31 farms;

(4) greater than 8.0%, which included 19 farms.

Table V:26--Rate of return on investment by survey farm size(a)

Rate of return (percent)	Size of farm (acreage) 0-50	51-75	76-100	101-150	151-200	>200
Less than 2.5	9	1	4	2	2	3
2.51 - 4.00	6	2	5	3	0	1
4.01 - 8.00	12	9	6	1	1	2
Greater than 8.00	8	3	4	3	1	0
	35	15	19	9	4	6

(a) The chi-square value was 13.642, with 15 degrees of freedom. It was not significant.

The size of tract rented out did not significantly affect the rate of return that the landlord received from his investment. This was undoubtedly due to the fact that many renters were adding to already owned land and therefore had efficient sized units.

Whether or not a major set of buildings was included on the rented tract did not significantly affect the rate of return to the landlord. A t-test (t=.2) on the mean rates of return for these two variables also yielded no significant difference. This may have been accounted for by the fact that if the buildings were not functional, they were not included in the lease contract.

Table V:27--Rate of return on investment with and without a major set of buildings on the rented tract(a)

Rate of return (percent)	Includes set of buildings	Does not include set of buildings
Less than 2.5	6	13
2.51 - 4.00	4	13
4.01 - 8.00	9	19
Greater than 8.00	6	13
	25	58

(a) The chi-square value was 0.444, with three degrees of freedom. It was not significant.

Table V:28--Rate of return on investment by price of land(a)

Rate of return (percent)	Price per acre ($) 0-200	201-250	251-300	301-400	Over 400
Less than 2.5	5	4	3	5	4
2.51 - 4.00	3	7	4	1	2
4.01 - 8.00	6	9	10	4	2
Greater than 8.00	11	2	6	0	0
	25	22	23	10	8

(a) The chi-square value was 23.186 with 12 degrees of freedom. It was significant at the 5 percent level.

The rate of return was found to be affected by land price. This result was expected since the formula for developing the rate of return, in Chapter IV, included the owner's estimation of the value of his land and buildings. Therefore, rate of return varies directly with the price of real estate.

In Table V:14, it was shown that tenure status did not significantly affect the rate of return. Both the t-test (t=.55) and the chi-

square test (X^2_3=1.514) supported the fact that there is no significant difference between the rate of return for these two groups. The conclusion increases the confidence of the inclusion of the part-owner group in the landlord method of estimating the income stream to farm real estate, using secondary data.

Table V:29--Rate of return on investment by relationship between landlord and renter(a)

Rate of return (percent)	Related	Not related
Less than 2.5	4	17
2.51 - 4.00	4	13
4.01 - 800	8	23
Greater than 8.00	5	14
	21	67

(a) The chi-square value was 0.396, with three degrees of freedom. It was not significant.

Whether or not the renter and landlord were related did not significantly affect the rate of return. Therefore, even though the survey found that there was extensive intra-family leasing, it apparently does not bias the income stream from real estate.

In Table V:30, it was shown that the rate of return was not significantly affected by the kinship relationship between landlord and renter. Therefore, even for these particular relationships, (son or son-in-law, brother, and other relatives) results obtained were not biased downward as might be expected. Another similar factor that may have influenced the rate of return was whether or not the renter was a close neighbor.

Table V:30--Rate of return on investment by kinship related landlord and renter(a)

Rate of return (percent)	Son or son-in-law	Brother	Other
Less than 2.5	2	2	0
2.51 - 4.00	4	0	0
4.01 - 8.00	5	2	1
Greater than 8.00	3	2	0
	14	6	1

(a) The chi-square value was 4.56, with six degrees of freedom. It was not significant.

Table V:31--Rate of return on investment by length of tenure by same renter(a)

Rate of return (percent)	1 yr.	2-4 yrs.	5-10 yrs.	More than 10 yrs.
Less than 2.5	1	7	9	4
2.51 - 4.00	0	10	5	2
4.01 - 8.00	5	9	12	5
Greater than 8.00	2	8	8	1
	8	34	34	12

(a) The chi-square value was 8.599, with nine degrees of freedom. It was not significant.

The length of tenure did not have a significant affect on the rate of return which the landlord received from his investment in farm real estate. A t-test on the mean rate of return for 1 year and for more than 10 years was not significant at the 10 percent level.

In Table V:32, it was found that the occupation of the landlord did significantly affect the rate of return on investment. It is difficult,

however, to place too much weight on this test since nearly 90 percent of the chi-square value comes from cells with less than five observations.

Table V:32--Rate of return on investment by present occupation of landlord(a)

Rate of return (percent)	Retired	Farming	Off-farm self-employed	Off-farm not self-employed
Less than 2.5	11	0	3	7
2.51 - 4.00	12	0	2	3
4.01 - 8.00	16	0	4	11
Greater than 8.00	9	3	4	3
	48	3	13	24

(a) the chi-square value was 15.177, with nine degrees of freedom. It was significant at the 10 percent level.

Table V:33--Rate of return on investment by landlords who had farmed the rented tract(a)

Rate of return (percent)	Had farmed	Had not farmed
Less than 2.5	13	8
2.51 - 4.00	13	4
4.01 - 8.00	19	11
Greater than 8.00	15	4
	60	27

(a) the chi-square value was 2.266, with three degrees of freedom. It was not significant.

Whether or not the owner had farmed this rented tract should give some indication as to whether or not the owner is a nonfarm investor. This

variable did not significantly affect the rate of return on investment. Therefore, it would appear that non-farm investors do not receive a higher rate of return on their investment than do farm investors. This conclusion assumes that this variable is an appropriate criteria for separating farm and non-farm investors.

Table V:34--Rate of return on investment with and without machinery supplied by the landlord(a)

Rate of return (percent)	Supplied machinery	Supplied no machinery
Less than 2.5	4	17
2.51 -4.00	6	11
4.01 - 8.00	3	28
Greater than 8.00	2	17
	15	73

(a) The chi-square value was 5.824, with three degrees of freedom. It was significant at the 25 percent level.

If the landlord supplied some machinery under the rental contract, it appeared to have a slightly negative affect on the rate of return on his investment. However, since the test was only significant at the 25 percent level, and only 18 percent of the landlords supplied machinery, the aggregate affect would be slight, if any.

In Table V:35, it was found that government payments did not appear to be a very important factor in affecting rates of return on investment. A t-test comparing the mean rates of return for these two groups (those receiving and those not receiving government payments) was only significant at the 25 percent level (t=1.14). Moreover, only 28 percent of the landlords received any government payments, so the effect on the aggre-

gate rate of return would be even less.

Table V:35--Rate of return on investment and landlord received government payments(a)

Rate of return (percent)	Yes	No
Less than 2.5	6	15
2.51 - 4.00	1	16
4.01 - 8.00	11	20
Greater than 8.00	7	12
	25	63

(a) The chi-square value was 5.699, with three degrees of freedom. It was significant at the 25 percent level.

Table V:36--Rate of return on investment by type of lease(a)

Rate of return (percent)	Cash	Share-crop	Share-cash	Livestock
Less than 2.5	7	9	2	3
2.51 - 4.00	7	7	1	2
4.01 - 8.00	3	23	2	3
Greater than 8.00	2	15	0	2
	19	54	5	10

(a) The chi-square value was 13.475, with nine degrees of freedom. It was significant at the 25 percent level.

Although the chi-square test was only significant at the 25 percent level, a t-test found the differences between the mean rates of return to be more significant.[1] Returns from share-crop farms were significantly

[1] Appendix B explains why a t-test is a stronger test than the chi-square test.

higher than from cash leased farms at the one percent level. Share-crop leased farms also had a significantly higher rate of return than did share-crop-cash farms at the 10 percent level. Lease types may be one of the most important factors in determining the rate of return.

Table V:37--Rate of return on investment by number of years tract was rented

Rate of return (percent)	1 yr.	2 yrs.	3-4 yrs.	5-10 yrs.	Over 10 yrs.
Less than 2.5	1	1	3	8	3
2.51 - 4.00	1	1	2	5	6
4.01 - 8.00	1	0	5	9	7
Greater than 8.00	1	0	7	4	4
	4	2	17	26	20

(a) The chi-square value was 8.772, with nine degrees of freedom. It was not significant.

The chi-square test did not show any significant differences in the rate of return on investment for the different lengths of time that the landlord had leased this tract. Moreover, differences that were found by comparing the mean rates of return by a t-test found no general trends. The three to four year group returned the highest average rate of return on the landlord's investment. This apparent inconsistency may be the result of rental inflexibilities, which create income inequities for one of the rental parties, depending on cost and price situations.

Of the thirteen variables tested, only the type of lease was found to have any significant affect (at the 10 percent level) on the rate of return to the landlord's investment. Therefore, to develop an aggregate rate of return on all rented land, the individual values for each lease

would have to be weighted by the acreages of each of these lease types.

For the 88 observations from the survey, the rate of return to the landlord's investment ranged from -.84 percent to 51.88 percent. The mean rate of return was 5.99 percent and the standard deviation was 6.18 percent for the survey. If the extreme high value was dropped, the range became -.84 percent to 20.03 percent. For this range, the mean rate of return was 5.46 percent and the standard deviation was 3.76 percent.

It may seem very naive to calculate an opportunity cost when only dealing with nominal rates of return from farmland. However, stock (dividend) yields are also nominal rates of return. A comparison can also be made with farm mortgage loan rates. It was found that "Farm mortgage interest rates remained generally stable during the first half of 1965. On July 1st, 10 of 12 Federal Land Banks were charged 5.5 percent on their farm mortgage loans [the same rates were in effect on January 1, 1966]....Rates charged by life insurance companies on their farm mortgage loan commitments averaged 5.7 percent in the second quarter of 1965, very little changed since the first quarter of 1965.... Federal Land Banks and life insurance companies are the largest institutional sources of farm mortgage credit".[1]

(Nominal) stock yields for 1965 were 3.06 percent for Moody's composite annual yield[2] and 4.33 percent for Standard and Poors'.[3]

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[1]The Farm Cost Situation, E.R.S., USDA, November 1965, p. 31.

[2]Survey of Current Business, U.S. Department of Commerce, Vol. 46, Number 9, September 1966, p. s21.

[3]Ibid.

If real wealth income is included with the nominal income from real estate, then the rate of return to farm real estate is undoubtedly higher than the farm mortgage loan rate. The calculations necessary for the comparison between common stock and farmland is beyond the scope of this study.

(2) Future estimations of net rent--In Chapter IV, an outline was given of the data that was missing or needed to estimate net rents by the landlord method using only secondary data. From the data collected in the survey, estimations of required parameters can now be made.

For crop-share-cash leases, the additional cash payments made by the renter, averaged $235 per tract. For future gross rent calculations, a value of $1.77 per acre can be used as an estimate of the cash payment which is paid in addition to the landlord's share of the crops.

For livestock-share leases, the landlord received an average of $4329.60 from livestock sales on each farm. This means a $26.10 return to the landlord, per acre, from livestock sales.

A total cost per acre that the landlord paid was found for each type of lease, for part-owners and renters. These costs are recorded in Table V:38.

Table V:38--Respondent landlord costs per acre for part-owner and tenant renters, by type of lease

Lease type	Part-owners	Tenants
	Dollars	
Cash	4.75	7.27
Share-crop	8.99	12.15
Share-crop-cash	6.73	4.93
Livestock	12.31	19.00

From the framework developed in Chapter IV, gross income and costs can be calculated, with one additional parameter. The additional data that are needed are the acreages of lease types for the rented portion of part-owner farms. With this information, the landlord method of estimating the income stream from farm real estate can be calculated using only secondary sources of data, for all rented land.

It has been shown in several instances that rental contracts and rental payments are rather inflexible (See especially Section A of this chapter). One main method of change of rental income occurs with the changing cost of inputs which the landlord furnishes. In the rental survey, the landlords supplied information about the various types of expenses which they paid. By using price indices for those items for which the landlord is largely responsible, changes in the cost per acre to the landlord can be calculated. Thus, the cost figures in Table V:38 can be updated, periodically.

Table V:39--Expenses which respondent landlords paid, by type of lease

Type of expense	Cash	Share-crop	Share-cash	Livestock-share	All Farms
			Percent		
Hired labor	0	7.41	0	50.0	10.2
Feed purchased	0	3.70	40.0	90.0	14.8
Seeds, plants, and spray materials	5.26	44.40	60.0	80.0	40.9
Machine hire	0	33.30	20.0	80.0	30.7
Supplies purchased	0	9.26	20.0	70.0	14.5
Livestock expense	0	0	0	70.0	8.0
Fertilizer	0	42.60	40.0	90.0	38.6
Gasoline, fuel and oil	5.26	9.26	0	80.0	15.9

The categories of expenses in Table V:39 were obtained from the Michigan State University Farm Income Tax Record Book. These categories were quite broad and therefore did not illustrate the complete story. For cash leases, none of the expenditure items paid by the landlord were significant. For share-crop and share-crop-cash leases, seeds, plants, and spray materials, machine hire, and fertilizer were important expenditures. Share-crop-cash landlords were also significant purchasers of feed and supplies. Livestock-share landlords were significant purchasers in all categories.

Summary

Type of lease was the only variable which significantly affected the rate of return. As was hypothesized in Chapter II, cash leases were found to yield the lowest return to the landlord. This occurred during a very dry year in which production and thus shares to the landlord would be below normal.

The other variables that were tested for their affect on the rate of return may be significant, but with a sample of this size, it could not be detected.

An aggregate rate of return on investment value can be obtained by weighting rates of return be acreages of the different lease types.

Nominal rates of return from real estate yield a higher return than investment in farm mortgages. These returns are also higher than stock yields, but these results are not realistically comparable.

Additional data was supplied on the income and costs to landlords. This means that the net rental income can be calculated if data on the acreages of lease types is available for part-owner farms.

CHAPTER VI

SUMMARY AND CONCLUSIONS

Section A: The Problem Setting

Rapidly rising post-war farm real estate prices have caused considerable speculation concerning their future trends. To analyse this phenomenon, a logical procedure would be to examine the income stream from farm real estate. To accomplish this, one must overcome the complex problem of separating net farm income into its component income streams: to farm real estate, to labor, and to other capital. This study examined one method, the landlord approach, for obtaining independent estimates of the income stream to farm real estate. It focused on the data requirements necessary to estimate this income stream, over time, using regularly published, secondary sources of data. One part of this study involved the collection of primary data to supply the minimum additional estimates that were necessary to complement secondary sources, in order that reasonably reliable estimates of the income stream to farm real estate could be calculated,using the landlord approach.

The necessity of collecting primary data to supplement secondary sources of data was due to the predominance of share leasing. Terms of these leases are not recorded--in particular, essential data on shares of crops received by the landlord and his share of the costs required to calculate net income. Another problem, associated with the use of the landlord method was the existance of part-owner groups, who rented almost

twice as much farmland, but had more acute data problems, than did tenants. In order to include this part-owner group in the landlord method, it involved more data estimates than required for tenants. This is due to the fact that most of the information collected by the agricultural census combines both the rented and owned portions of part-owner farms.

Section B: Data Requirements for Future Estimates of Net Rents

This section draws together all the estimates required to calculate future net rent. Sources of these estimates are those developed in this study and from regularly published, secondary sources of data. This section is divided into two parts. The first includes the data required for calculations of the landlord's gross income. The second includes the data for estimates of the landlord's costs.

(1) Gross income sources--Cash rent is recorded by the USDA for "farms rented wholly for cash...[and for] pasture land...for the Corn Belt, Lake States, and Northern Plains",[1] each year.

For share leases, this survey established benchmarks of landlord shares of production on rented land. The U.S. Census of Agriculture includes crop production for the different lease types for tenant farms.[2] With these benchmarks of landlord shares and the productivity data, gross income to the landlord can be calculated by selecting appropriate commodity prices. For crop-share-cash leases, this study developed an estimate of the cash payment per acre. This is a payment in addition to the payment from the crops. For livestock-share leases, this study estimated a per-

[1] Farm Real Estate Market Developments, E.R.S., USDA.

[2] Michigan Counties, Table 21, 1959.

acre value of livestock sales accruing to the landlord. This is a very crude estimate. Most indications were that the landlord received one-third or one-half of the sale of livestock. Data on this estimate, however, are not available.

Government payments to particular farms, or groups of farms, are difficult to obtain. This study found that 28.4 percent of landlords received average payments of $489.40 of which 47.2 percent was kept by the landlord as his income share.

This outline is a rough sketch of gross income sources to the landlord from rented land.

(2) Landlord costs--This study estimated per-acre costs, for each type of lease, for both part-owners and tenant farms. Estimates were also established for the percentage of landlords who paid a portion of certain expenses, categorized into eight groups and by type of lease. Therefore, the landlord estimates can be updated periodically by using price (or cost) indices for these categories. Land ownership costs can be updated from state, census, or USDA estimates.

From these gross income and cost data, reasonably reliable estimates of an income stream from rented land can be obtained. Moreover, because of the considerable 'stickiness' in the rental market the estimates of parameters, such as those dealing with shares of produce received by the landlord, should remain useful for several years.

Section C: Summary of Study Procedures

In order to solve parts of the problem introduced in Section A, and to obtain estimates required in Section B to calculate future net rents, this study was divided into three phases, each dealing with one aspect of

the landlord method.

(1) Rate of return--Actual rates of return on investment were calculated, using the landlord method to estimate the net income stream to farm real estate. Data for these computations were collected in a 'Farmland Rental Survey' of 88 Michigan landlords in Huron and Hillsdale Counties concerning their 1965 rental practices. These nominal rate of return values, when combined with real wealth gains to farm real estate, can be used to compare the efficiency of the allocation of the land input with other farm and non-farm inputs.

(2) Landlord shares--Benchmarks of shares of crops that the landlord received from seven major Michigan crops were established. These values were required so that in future periods, gross rental income from share rented land could be calculated from published production data. In addition, estimates of costs which accrue to the landlord resulting both from rental contract and from land ownership, were derived. These are necessary in order to obtain net rental income figures from rented land.

(3) Part-owners and tenants--In order that data from the rented portion of part-owner farms be used in the landlord method, it was necessary to establish whether or not this group was sufficiently similar to tenant operators in its farming practices, in certain key areas. If this was in fact, the case, data available for tenants could be generalized to include the part-owner group.

There were two basic reasons for the inclusion of this group. First. this group rented more land than did tenants, and almost tripled the size of the group from which to sample. Second, this group may provide the link between the sample of rented farmland and the population of all

farmland. If the owned and rented portions of part-owner farms are compared and it is found that they are operated in a manner, such that similar returns result from the land input, then generalizations about the income stream from the sample to the population can be made with more confidence.

Section D: Summary of Results and Conclusions

(1) Rate of return--Thirteen variables from the survey were tested for their affect on the rate of return from investment in farm real estate. Only one of these variables, type of lease, was found to have any significant affect. There were two other variables tested, that were marginal in the fact that they were significant, but only at a low level of significance. These variables were--whether or not the landlord received government payments or supplied machinery. The test for the landlord's present occupation was inconclusive since 90 percent of the contributions to the chi-square value came from cells with less than five observations.

Although the chi-square test for lease types was only significant at the 25 percent level, a t-test showed that share-crop rented land yielded a significantly higher rate of return to real estate, on the average, than cash rented land (at the 1 percent level) and share-crop-cash rented land (at the 10 percent level). The mean rate of return for share-crop leases was 40 percent higher than for cash leases. In Chapter II, share and cash leases were compared. It was hypothesized that with average production, the landlord would receive a larger net income from share renting than from cash renting, since the risks were higher with share leases. 1965 was a very dry year for Central Michigan, considerably reducing crop

yields. Nevertheless, significant differences were still found between the rates of return for these two lease types. If these differences are, in large part, attributable to a risk factor, this risk could undoubtedly be covered equally well by some form of crop insurance. Moreover, if the difference found in the survey is the actual difference, then crop insurance would be a cheaper form of insuring a certain minimum income than cash renting.

For 87 observations from the survey, the mean rate of return from the landlord's investment was found to be 5.46 percent, with a standard deviation of 3.76 percent. In Chapter V, this value was compared with two other alternative investments, with comparable risks, that were open to landlords. These comparisons showed that farm mortgage loans yielded slightly higher returns (less than .6 percent difference) while common stock yields (dividends) were substantially lower. In Chapter III, the effects of real wealth gains were introduced. Real wealth gains can accrue to both the owners of farmland and common stock.[1] Therefore, comparisons of the nominal returns from these investments do not lend themselves to satisfactory conclusions. Moreover, for these reasons, the rate of return values are not precisely opportunity costs. A combination of both nominal and real wealth income is required to compare efficiency of allocation of inputs.

(2) Part-owner and tenant farms--These two tenure types were analysed in five key areas. Landlord shares from rented land, acreage devoted to certain crops and rate of return on investment were found to be similar

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[1]For further explanation of this problem see W. E. Kost, Investing in Farm and Non-farm Equities, M.S.U. unpublished M.S. thesis, 1967.

for both groups. Leasing patterns or acreage devoted to various types of leasing arrangements were significantly different. Whether or not there were differences in productivity between these two groups was inconclusive from the sample data.

These results indicate that parameters for the rented portion of part-owner farms can, in most cases, be derived from existing secondary sources of data published for tenant farms. The minimum essential additional census data required to allow a reasonably reliable estimate of the income stream from farm real estate, using the landlord approach is the acreage of lease types for part-owners. If data on production per acre for both the rented and owned portions of part-owner farms could also be collected this would improve the landlord method in two ways. First, this study did not reject the hypothesis that there was no difference in productivity between tenants and part-owners, but additional evedence is desirable. Census data could resolve this question. Second, this could strengthen the link of similarity between rented and owned land.

(3) Landlord shares--Shares of crops going to landlords were analysed for significant differences between types of share rented farms. Significant differences were found between the three types of share leases. This result is not inconsistant with the descriptions of lease types in Chapter II. The conditions under which each lease operates and the terms of the leases do vary considerably. In order to develop an aggregate value for each of the seven crops, the landlord shares for each of the share leases had to be weighted by acreage. This weighted value, therefore, does have shortcomings similar to any aggregate value, and assumes that the values used will remain reasonably stable.

A comparison of the survey shares was made with estimates obtained in 1956 for Michigan by a USDA survey. These share values, as a group, were not found to be significantly different at the 20 percent level. There were significant differences, however, at the 20 percent level between the individual landlord shares for wheat, soybeans and hay. A 20 percent level does leave a considerable margin for type I errors. Moreover, the different populations used for this comparison may account for some of this difference. The comparison would indicate, nevertheless, that there has been little change in the shares going to the landlord, over time. This conclusion is also supported by the results, shown in Table V:13, which indicated that only 14 percent of the landlords had changed the share of crop they received since they had started renting a specified tract of land.

(4) Rental inflexibilities--In Chapter II, four main reasons were given for the occurances of inflexibilities in the rental market. In this survey, there were several illustrations of this 'stickiness' of rental income.

For the purpose of this study, inflexibilities in the rental market have important consequences. In order to estimate the income stream from farm real estate, a sample of farms is taken. The sample, in this case, is all rented farms. Rental inflexibilities, however, may cause income inequities to one of the rented parties. Therefore, using the landlord method, which estimates the net rents received by landlords, the results obtained may not be representative of the returns to all farm real estate. The extent to which these inflexibilities are present reflects the confidence that can be placed in the results of the landlord method. One of

these inflexibilities found in the survey was the static nature of the landlord shares. There was little change in these share values between 1956 and 1965. Also, 52 percent of the landlords had rented to the same individual for over five years. Major changes in leasing arrangements occur with change in tenants. During this period of renting this tract of land, only 18 percent of the landlords, who rent on a share basis, had made a change in the landlord shares, only 11 percent had made a change in the cash rental payments--even though two-thirds of these landlords had been renting this tract of land for five years or more. An examination of the frequency of different landlord shares shows that only 3.6 percent are not of the 50:50 or one-thirds:two-thirds type of share arrangement. These illustrations emphasize the extent of inflexibilities that were found in the 'Farmland Rental Survey.'

Three studies were examined in Chapter II which involved comparisons between owned and rented land. The empirical evidence presented indicated that there was little difference in resource use between owners and renters. These studies remove part of the uncertainty that differences exist, and suggest that rental inflexibilities do not affect the income stream from rented land.

(5) Data Weakness--An analysis in only as good as its data. There were some shortcomings with the data from the survey used in this study and allowances must be made for them. Some of the problems were:

(a) The sample size (88 observations) was fairly small. The statistical tests of certain subcategories could not be too strong. Moreover, conclusions about certain infrequently produced crops became rather hazardous.

(b) The mailed survey may not have been as accurate as would a personal interview questionnaire. It is not known who completed the mailed questionnaire and how reliable their mental recall was if their farm records were incomplete.

(c) Characteristics of the respondent group may affect the results. Factors such as age, sex, apathy and general ignorance of the farming operations tend to limit the accuracy of responses.

(d) A major shortcoming in doing research in the rental market is the lack of knowledge of livestock-share leases. Although this type of lease is the most popular in Michigan, because of its heterogeneous nature, few generalizations can be made. Volume of sales of livestock is not known (replies to the questionnaire were particularly weak in this area). Indications were that the landlord received 1/2 or 1/3 of the gross receipts. All income from crops is not recorded since part of the crop production becomes an input for the livestock enterprise. Some of the cash crops are sold and the income is shared.

Section E: Further Research in this Area

This study has developed the necessary estimates to allow the income stream from farm real estate to be calculated by the landlord method, while using only regularly published secondary data. If these estimates, obtained in this study, are not significantly different from estimates derived by other existing methods, then for estimation purposes, it may not be desirable to undertake these additional computations. This method

however, does give a clearer understanding of the processes involved in deriving an income stream from farm real estate.

There is much additional work needed to refine and expand the estimates obtained in this study. These refinements would improve the reliability of the results obtained from the landlord method. For example, data collected in this survey, on the terms of the livestock-share leases are inadequate. Due to the heterogeneous nature of these leases, it is difficult to design a reasonably simple, inexpensive questionnaire to collect needed information. This heterogenity is further complicated by the fact that livestock-share landlords derive their income from two almost separate classes of farm enterprises--crop production and livestock production. More comprehensive data from improved collection techniques (perhaps interviewing only livestock-share landlords) are required to obtain reliable landlord net rents, using only secondary sources of data. This is particularly important in Michigan, where a high proportion of renting is done under livestock-share leases.

This study did not collect any information as to why cash payments were made in share-crop-cash leases. A clearer understanding of the purpose and the amount of these payments may enable a more accurate estimation of future trends.

A finer breakdown on cost data, indicating more specifically each expenditure, may enable a better estimate of landlord costs and how they change over time. These refinements would considerably improve the confidence in the estimates of the income stream to the owners of farm real estate.

APPENDICES

APPENDIX A

SURVEY PROBLEMS AND PROCEDURE

The four page questionnaire (P. 105 to 109) was mailed to a randomly selected sample of 800 farmland owners in two Michigan Counties--Huron and Hillsdale. A list of names of owners was obtained from the Agriculture Stabilization and Conservation office in these two counties at a cost of six cents per name.

In order to increase the response to the questionnaire several techniques were tried. The survey was printed on a bright yellow paper. Postage stamps were placed on the return evvelopes. Two follow-up mailings were sent to non-respondents. Telephone prompts to non-respondents were used in both counties.

The total cost of the survey, which included names, materials used, printing and assembling time, and postage amounted to approximatesly six dollars for each usable questionnaire.

The graph on the following page (103) shows the daily flow of questionnaires returned. A large response occured immediately after each mailing of the questionnaire. The second mailing produced a larger response than did the first mailing. Telephone prompts increased the response to a limited degree.

(1) Telephone prompts--Prompting non-respondents by telephone was carried out in both counties. Reaching landowners was often a problem. This was due to the fact that a large number of these people had no telephones, unlisted numbers, disconnected phones, or were listed under another name. Many were indignant about being called by telephone and some refused to answer. Others promised to mail the questionnaires.

Table A-1--Tabulation of telephone results(a)

County	Non-Renters	Assumed Renters	Uncooperative	Died	Sold Farm	Unable to locate
1) Hillsdale	22	15	6	2	2	24
2) Hillsdale	10	7	3	1	0	15
1) Huron	15	7	4	0	2	22
2) Huron	1	5	2	0	2	6

(a)Author contacted non-respondents at two different times in each county.

(2) Reasons for poor response to questionnaire--There are many reasons why the group interviewed did not respond.

(a) Many of them were quite old, many over eighty years of age (as was discovered with telephone prompts). These people no longer took an active part or interest in their farms and also, many were incapable of completing the questionnaire.

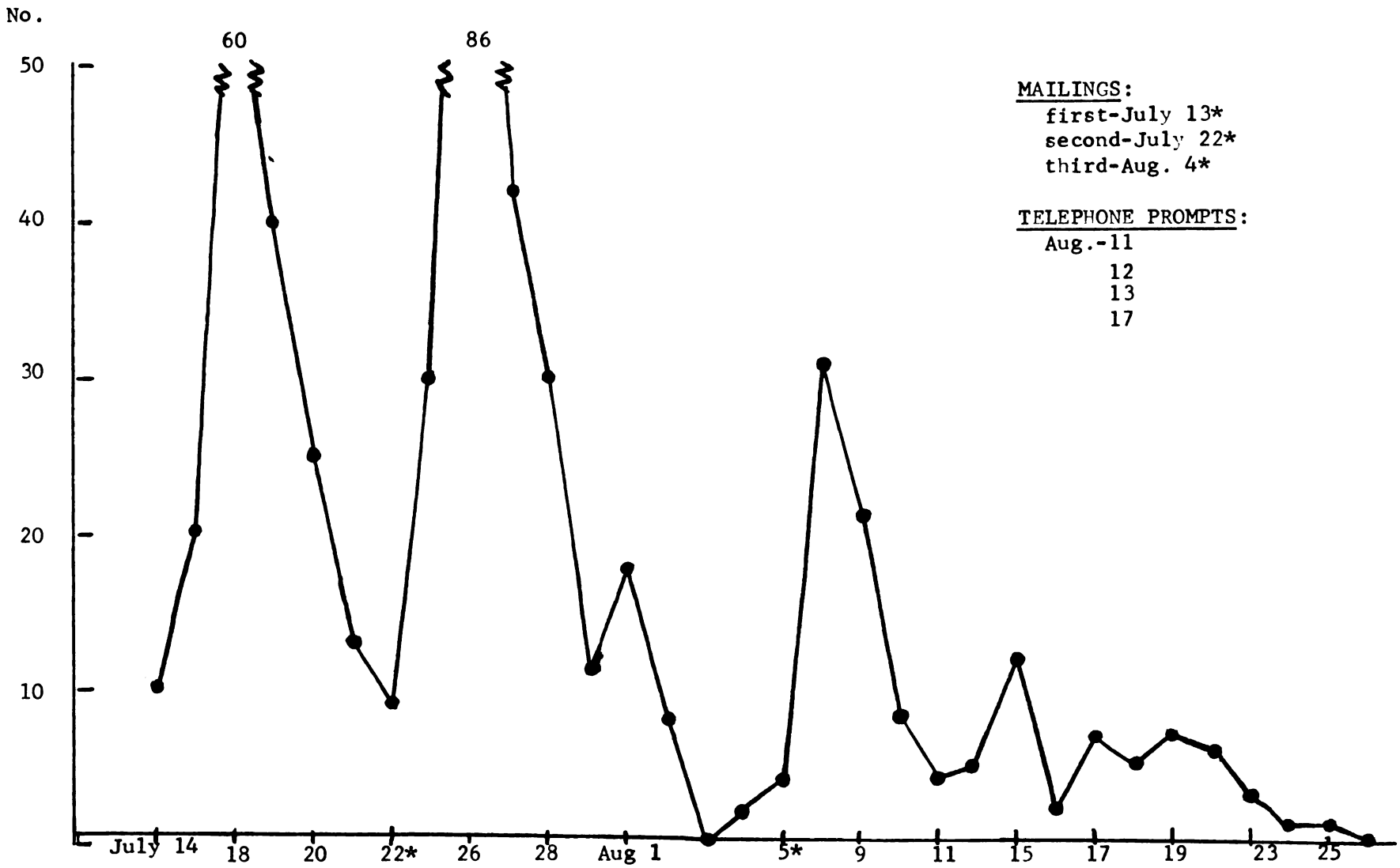
(b) Many owners were widows and had very little understanding of the operation of the farm business.

(c) Some owners let the renter make all the decisions about crops grown, and about what expenses were to be taken out of gross income. These landlords only had knowledge of their net income from the share-rented tract.

(d) Many owners did not keep records and the completion of the questionnaire, therefore, depended on their recall ability.

(e) Some felt that income information was too personal to divulge (particularly with a telephone check to complete missing information).

Graph 3: Daily Flow of Questionnaires (July 14 to Aug. 25)



(f) There was antagonism towards completing the questionnaire in the fact that they could see no benefit to themselves. Some people were antagonistic towards anything associated with the university and also towards the present farm situation.

(g) Many were too busy to complete the questionnaire as it was sent in late July and early August.

(h) Some misinterpreted the questionnaire, for instance, they thought that share-renting was not a form of renting.

(i) The survey was designed to analyse only the four main types of leases. Certain special types of leases could not exactly fit the pattern of questions, so landlords did not respond.

Computer Code No. J_____

Farmland Renting Practices in 1965

1. Did you rent any farmland (including forest, pasture and all waste-land) to others in 1965? (check) Yes___ No___

   IF YOU DID NOT RENT ANY FARMLAND TO OTHERS, this is all the information required. Please return this questionnaire in the enclosed envelope. IF YOU DID RENT FARMLAND TO OTHERS, please complete the following questions.

2. (a) How many acres of farmland did you own in 1965? _____(acres)
   (b) How many of those acres did you rent to others? _____(acres)

3. To how many different individuals did you rent farmland in 1965? _____

   Note: Answer the remaining questions for only ONE rental agreement. Answer for that rental agreement involving the largest parcel of land.

4. (a) How many acres were in this largest rented parcel of land? _____(acres)
   (b) Does this parcel of land include a dwelling and/or major farm buildings that are included under the rental agreement? Yes_____ No_____

5. What would you estimate to be the selling price of this rented parcel of land and buildings? $_____per acre

6. Does the person to whom you are renting also own some farmland in addition to the land that he rents from you? Yes_____ No_____

7. (a) Is the renter related to you? (check) Yes___ No_____
   (b) If yes, what is the relationship
   (i) Son or son-in-law _____
   (ii) Brother _____
   (iii) Other _____

8. How many years have you rented this parcel of land to the same individual? (check one)
   (i) 1 year ____ (iii) 5-10 years ____
   (ii) 2-4 years ____ (iv) more than 10 years ____

9. What is your present occupation? (check one)
   (i) Retired____ (iii) Off-farm, self employed ____
   (ii) Farming____ (iv) Off-farm, not self employed____

10. Have you ever farmed this rented parcel of land yourself? Yes___ NO___
    If yes, how many years did you farm this parcel? _____(years)

11. (a) Do you own any machinery used on this parcel of land? Yes___ No___
    (b) What would you estimate to be the value of your share of the machinery used on this farm? $_____

12. (a) Did you receive any government payments from this parcel of land in 1965? Yes___ No___
    (b) (i) What was the amount of government payments received from this parcel of land in 1965? $_____
    (ii) Of this amount, what share went to the renter? (example: none, 1/3, 1/2, 2/5, all) _____

13. Cash Renting

Was this parcel of land rented on a cash basis in 1965? Yes___ No___

If the answer is no. . .skip to question number 14.

If the answer is yes, was thif farm rented on:

(a) a whole farm basis? Yes___ No___

or (b) a field basis, Yes___ No___

(A) If whole farm basis,what was the cash payment for the total farm? $_____ Were there different payments for different qualities of land? Yes___ No___ If yes, what would be the approximate income from:

(i) Cropland ____ acres at $_____/acre

(ii) Permanent pasture ____ acres at $_____/acre

(iii) Orchard ____ acres at $_____/acre

or (B) If field basis, how much did you receive from:

(i) Cropland ____ acres at $_____/acre

(ii) Permanent pasture ____ acres at $_____/acre

(iii) Orchard _____ acres at $_____/acre

14. Share Rental Agreement

Was this parcel of land rented on any type of share basis? (example: livestock-share, crop-share, or crop-share-cash lease, etc.?)
Yes___ No___

If the answer is yes, how much was received for

(i) Permanent pasture_____acres $_____paid

(ii) Buildings $_____paid

(iii) Other (specify) _____acres $_____paid

14. (b) Crop Shares

If you received income as a share of crops grown on this rented parcel, indicate to the best of your knowledge the use of land on this rented parcel and your income share (example: 1/3, 2/5, 1/2, etc.) for 1965.

Acres (number)	Crop	Approximate 1965 yield	Approximate price received	Landlord's fractional share
_____	Wheat	_____bu/acre	$_____/bu	_____
_____	Corn	_____bu/acre	$_____/bu	_____
_____	Oats	_____bu/acre	$_____/bu	_____
_____	Soybeans	_____cwt/acre	$_____/cwt	_____
_____	Sugarbeets	_____ton/acre	$_____/ton	_____
_____	Hay	_____ton/acre	$_____/ton	_____
_____	Potatoes	_____cwt/acre	$_____/cwt	_____
	(other)			
_____		_____	_____	_____

(c) Livestock-Share Rental

(I) Did you receive any income from livestock or livestock products covered by this rental agreement in 1965? Yes___ No___

If the answer is yes, indicate the total sales and your fractional share of the total sales. (example: 1/3, 2/5, 1/2, etc.)

		1965 Total sales (in dollars)	Landlord's fractional share of sales
(i)	Dairy cattle	$_____	_____
	Beef cattle	$_____	_____
	Hogs	$_____	_____
	Sheep & wool	$_____	_____
	Poultry & Eggs	$_____	_____
	Dairy products	$_____	_____
	(other)		
	_____	$_____	_____

(II) What would your best estimate of the selling price of your share of all livestock on this farm be as of December 31, 1965? $_____

15. Landlord's Expenses: Expenses occurring from this parcel of land in 1965.

(a) Annual expenses	Cash amount paid by landlord
Hired labor	$_____
Feed purchased.....	$_____
Seeds, plants, spray material.....	$_____
Machine hire.....	$_____
Supplies purchased.....	$_____
Livestock expense.....	$_____
Fertilizer.....	$_____
Gasoline, fuel & oil.....	$_____
Real estate taxes.....	$_____
Farm personal property tax.....	$_____

Insurance (weather, fire, etc.)....$_____

Depreciation.....$_____

Other farm expenses.....$_____

(b) Nonannual expenses made in 1965

Lime $___ What would be an average annual amount $_____

Repairs & maintenance $___What would be an average annual amount $_____

(other)_____ $___What would be an average annual amount $_____

16. How many years have you been renting this parcel of land?_____(years)

17. (a) During this period, has there been any change in the fractional share of income you received? Yes___ No___ Does not apply___

(b) If the answer is yes, how has this share changed?_____

_____

_____

18. (a) During this period, has there been any change in the sharing of expenses? Yes___ No___

(b) If the answer is yes, what has been the change? _____

_____

19. (a) During this period, has there been a change in the cash rental payment to you? Yes___ No___ Does not apply___

(b) If the answer is yes, what has been the change? _____

_____

APPENDIX B

USE OF CHI-SQUARE TEST AND t-TEST

In Section D of Chapter V, both t-tests and chi-square tests were used on many of the 13 variables. In only one case did the results of the two tests widely differ. When comparing the rate of return from different types of leases, the chi-square test was only significant at the 25 percent level. The t-test found that returns to crop-share leases were significantly higher at the one percent level and higher than crop-share-cash leases at the ten percent level.

The t-test is a stronger test. In this case the mean rates of return for cash and share-crop leases were quite different. The mean rates of return for the other two types of leases, however, were in the interval, so that none of them were very farm apart. This accounts for the conclusion using the chi-square test.

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