AN ANALYSIS OF SIZE OF FARM AND CAPACITY TO USE
CREDIT FOR SELECTED FARMERS IN CENTRAL KANSAS

by

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A MASTER'S THESIS
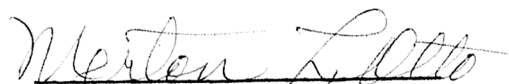
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INTRODUCTION

Modern agriculture is an industry which requires large amounts of capital. This situation is different from that of past years when very little labor-saving equipment was used and investment per man in capital equipment was low. Therefore a person could become established in farming with very little capital or risk. Agriculture of today presents a different problem to the farmer. Technological improvements in the past 25 years such as tractors, combines, fertilizers and new crop varieties have not only relieved the farmer of the heavy back-breaking labor but they have also made it necessary for him to accumulate and control substantial amounts of capital.

The majority of farmers do not possess large reserves of capital, therefore, this increased need has of necessity caused the farmer to make use of credit facilities. This has caused the increase in farm debt which is demonstrated in Table 1. The increase in total farm debt in the United States was 330% from 1940 to 1964, while the debt growth in Kansas from 1950 to 1964 was 267%.

It is evident from observing the table that there has been a substantial increase in farm debt which also infers that there was also an increase in credit. The purpose of

TABLE 1

FARM DEBT IN THE UNITED STATES AND KANSAS IN $1,000[*]

	United States			Kansas		
Year	Non Real- estate Debt	Farm Mortgage Debt	Total Farm Debt	Non Real- estate Debt	Farm Mortgage Debt	Total Farm Debt
1940	1,949,078	6,586,399	8,535,477	NA	309,602	NA
1950	4,554,811	5,579,278	10,124,089	168,288	156,499	324,787
1960	8,375,727	12,082,409	20,458,136	304,116	345,837	649,953
1964	11,403,113	16,803,505	28,206,618	438,704	428,792	867,496

[*]Source: United States Department of Agriculture, Agricultural Research Service, Agricultural Finance Review (Washington: U.S. Government Printing Office).

this thesis was to analyze the farmer's financial condition to determine his capacity to use credit.

Several objectives served as guidelines throughout this thesis. The first of these was to examine those factors which affect the loan carrying capacity and to observe their growth or decline over a number of years. A second objective was to carry out a detailed financial analysis of the sample farms to discover their actual financial condition. Part of this objective was to determine if farm class had any effect on the financial condition of the farms. The third objective was to conduct a multiple regression analysis to determine which of all the factors selected for the study were the most important in determining the amount of credit which was used. The fourth objective was to examine the progress that commercial banks made in developing their assets in order that they can meet the increased demand of the farmers for credit.

SCOPE OF STUDY

There were six Farm Management Associations in Kansas in 1963. The beginning of these Farm Management Associations was in 1931 when two of them were organized by the Extension Service of Kansas State College. The other four were added in later years. Each association employs one or more fieldmen whose responsibilities are to assist the farmers in keeping records and making financial analyses of their farms.

Association 1, which is located in the north central part of the State, and Association 2, which is located in the south central part were selected for this study. Association 1 covers 21 counties with a total of 324 farms while Association 2 is composed of 11 counties with a total of 329 farms.

TABLE 2

NUMBER OF FARMS IN ASSOCIATION 1 AND 2 BY COUNTIES, 1963

| | Association 1 | | | Association 2 | |
County	Number farms in sample	Per cent Farm Management farms in sample	County	Number farms in sample	Per cent Farm Management farms in sample
Clay	6	50	Barton	12	46
Cloud	3	21	Harper	7	54
Dickinson	17	68	Harvey	10	31
Ellis	5	56	Kingman	4	22
Ellsworth	7	50	McPherson	10	30
Jewell	5	29	Pratt	9	31
Lincoln	6	38	Reno	16	30
Marion	4	31	Rice	8	27
Marshall	16	67	Sedgwick	16	43
Mitchell	5	42	Stafford	5	18
Osborne	3	23	Sumner	7	24
Ottowa	3	38			
Phillips	4	29			
Republic	8	38			
Riley	12	52			
Rooks	2	40			
Russell	5	56			
Saline	3	27			
Smith	3	14			
Washington	20	65			
Total	137	42		104	32

TABLE 3
LOCATION OF FARM MANAGEMENT ASSOCIATIONS 1 AND 2
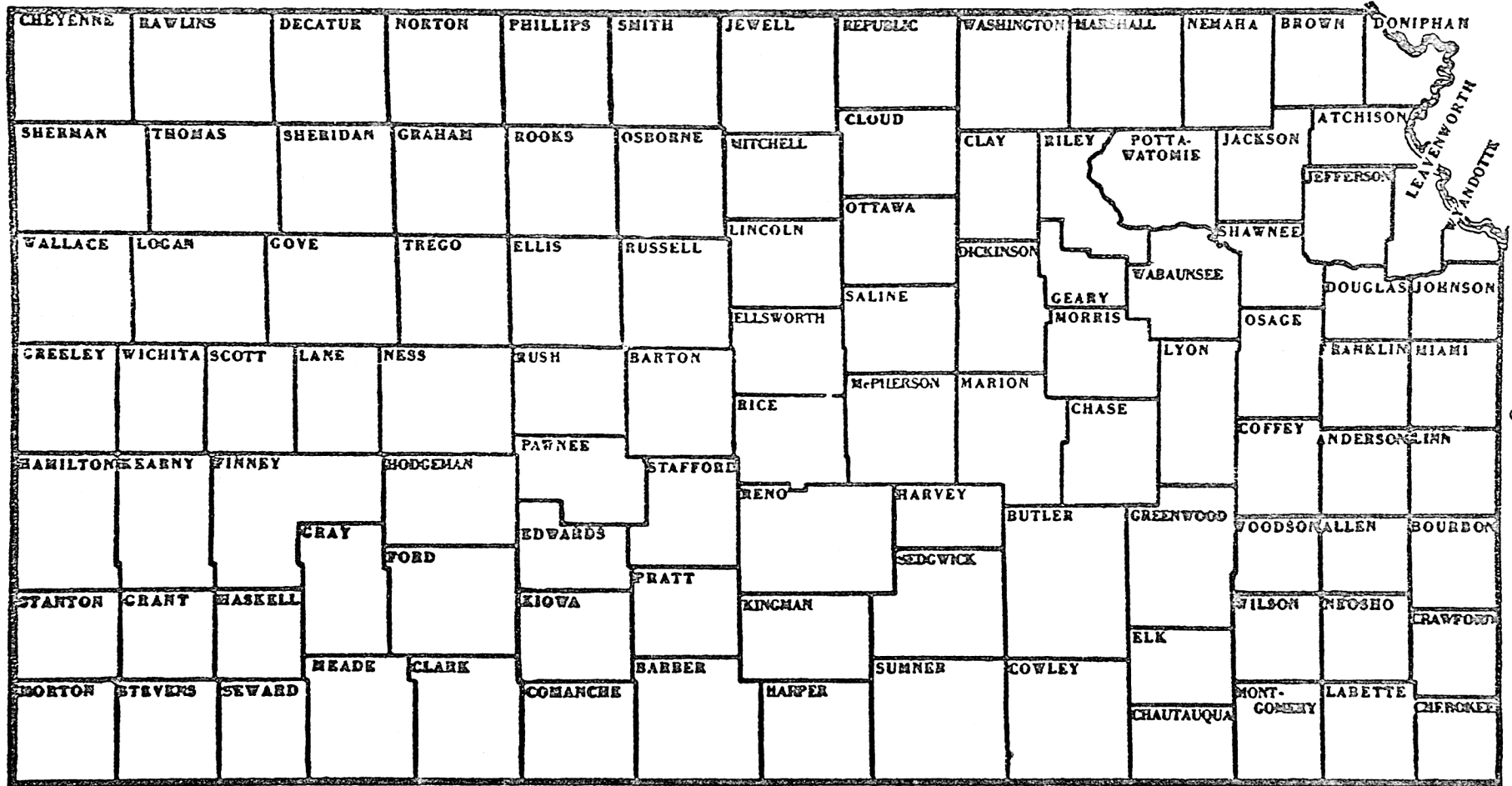
METHOD OF PROCEDURE

The sample for this study was composed of those farms which were in the two Associations at least eight out of the nine years from 1955 to 1963. The reason for selecting a sample which covered a span of years was to have enough data available for time series analysis. Total investment managed was selected as the criterion for dividing the sample into classes because this appeared to be the most important variable at the time of classification. The best frequency distribution was achieved by establishing the classes at $25,000 intervals. The class boundaries are shown in Table 4.

TABLE 4

FARM CLASS INTERVALS

Class	Total Investment Managed
Class 1	$ 0 - $ 24,999
Class 2	25,000 - 49,999
Class 3	50,000 - 74,999
Class 4	75,000 - 99,999
Class 5	100,000 - 124,999
Class 6	125,000 - 149,999
Class 7	150,000 - 174,999
Class 8	175,000 - 199,999
Class 9	over $200,000

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The method of solving objective 1 was to select those factors which affect the amount of credit a farmer would use and trace their development over the nine years of the study. The factors selected were total investment managed, real-estate managed, working capital managed, net farm income, off-farm income, operator's return to labor and management, and total farm debt. However, farm debt is only included for the years 1960 to 1963 because the Farm Management data does not give sufficient information to calculate debt before this time. The real-estate managed factor includes both real-estate owned and rented. Some analysis was done to determine the movement from class to class over the years of the study. Time series analysis was also calculated for all of the factors to determine if their average size increased significantly.

The second objective was to present a more detailed analysis of those factors affecting loan capacity for only the year 1963. In particular, the factors of total investment owned, real-estate owned, working capital owned, gross farm income, net farm income, outside income, equity in working capital, equity in fixed capital and equity in total capital were examined to determine how each was related to the farm class. Several ratios such as net worth, and fixed assets to fixed liabilities were calculated to assist in the determination of the financial condition of the farmers in each class. The purpose of this procedure was to determine if some classes were in better financial condition than others. By using net

farm income as a measure of capital efficiency some analysis was done for the purpose of determining if there was a point of diminishing returns to this factor as total investment managed increased. The amount of additional loans which each farm could support from total net farm income was also determined by class. The final work done on the objective was to determine the actual debt per class in 1963.

The third objective was accomplished by selecting ten factors for analysis by multiple regression. Total farm debt was used as the dependent variable and the analysis was designed to determine how the other factors were related to it.

The information for solving objective four was obtained from two sources. A questionnaire was sent out to the farmers in the sample which requested information on the financial institutions from which they were receiving both long and short term credit. The farmers were asked to rank the institutions according to their importance as sources of credit and to indicate whether their major source of credit had changed since 1959. Credit insurance is important in loan making and the questionnaire requested information regarding its use by the farmers.

The next source of information was the Kansas Bankers Association in Topeka. The information was obtained for the purpose of determining the growth in the capital structure of those banks which the farmers mentioned on the questionnaire as their suppliers of credit.

In the Appendix are several tables containing tests of equality of the means and variances of each of the selected factors. The tests were to determine if these means and variances were different between associations. This knowledge can be of assistance to farm management research because it will indicate whether data from each of the associations should be kept separate or whether it can be analyzed by grouping the data from the associations together.

REVIEW OF LITERATURE

Much literature has been written in the farm finance area in general but a more limited amount is available which deals specifically with the capacity of the farmer to use credit.

James Gray[1] examined how the size of investment affects the amount of debt held with various credit institutions. He used a simple linear regression model in which dollars of total debt was used as the dependent variable and dollars of total investment was the independent variable. The relationship for the Farmers Home Administration was $Y = 697 + .2720x$ and the $r = .8920$. The Federal Land Bank Associations in the study had an equation of $Y = -1292 + .1887x$ and $r = .8641$. The effects of both gross farm income and net farm income in relation to the amounts of the loan were also studied. Gray also found what he considered as significant relationships between total investment, gross farm income and net farm income in determining total debt.

In a study of farms in the Southern Piedmont in North

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[1]James R. Gray, "Factors Affecting Sizes of Agricultural Loans in New Mexico," Agricultural Experiment Station, New Mexico State University, Research Report 42, August, 1960, pp. 1-18.

Carolina, J. Gwyn Sutherland, C. E. Bishop and B. A. Hannush[1]
did some work related to the problem of determining the
profitability of the use of credit in the farming enterprise.
The purpose of their study was to analyze the economic
conditions that families on small farms would likely face in
the future and to specify under what conditions such families
should (1) engage in full-time farming, (2) engage in part-
time farming, and (3) shift to full-time non-farm employment.

One aspect of the study examined the effect that
varying amounts of borrowed capital had on the profitability
of the small farm. With an initial capital investment of
$5,500 to which an additional $4,500 is added, they determined
that the net productivity of the additional investment capital
would be 4.3%. With another $10,000 of additional investment
capital, the net marginal productivity would still be 4.3%.
They concluded that, considering the initial investment of
$4,500, the farmer could borrow up to $16,456 at 5% interest
and still have a profitable investment.

In an Iowa study, Earl Heady and Earl Swanson[2]
examined resource productivity in Iowa agriculture for the

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[1] J. Gwyn Sutherland, C. E. Bishop and B. A. Hannush,
"An Economic Analysis of Farm and Non-farm Uses of Resources
on Small Farms in the Southern Piedmont, North Carolina,"
North Carolina Agri. Experiment Station and Farm Economics
Research Division Agricultural Research Service, Technical
Bulletin, Vol. 138, May, 1959, pp. 1-55.

[2] Earl O. Heady and Earl Swanson, "Resource Produc-
tivity in Iowa Farming With Special Reference to Uncertainty
and Capital Use in Southern Iowa," Department of Economics and
Sociology, Agricultural Experiment Station, Iowa State College
Research Bulletin 388, June, 1952, pp. 751-784.

purpose of determining why farmers do not use more capital
resources. In the study they used marginal analysis as a tool
for finding returns to capital on their sample farms. Their
major conclusion was that the farmers in the study were not
using credit to the extent that its marginal return was equal
to the marginal cost.

Henry A. Wadsworth[1] examined the use of capital
budgeting to analyze the rate of return on potential farm
investments. Although the analysis was concerned with dairy
farm investments, the conclusion was that this technique can
be applied to any farm investment involving capital as a
factor.

A study by Lee R. Martin, Arthur J. Couter and
H. S. Singh[2] examined the feasibility of more land and capital
as a method of raising farm incomes. Linear programming
procedures were used to determine optimum resource use
combinations for certain sets of resource restrictions. With
the use of these different resource situations, the potential
income for each situation was calculated. The results
indicated that management was the most important single
determinant of potential farm income. However, a high degree
of complementarity between capital and management levels was

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[1]Henry A. Wadsworth, Jr., "Evaluating Farm Investments
by Capital Budgeting," Journal of Farm Economics, Vol. 44,
December, 1962, pp. 1444-1449.

[2]Lee R. Martin, Arthur J. Couter and H. S. Singh,
"The Effects of Different Levels of Management and Capital on
the Incomes of Small Farmers in the South," Journal of Farm
Economics, Vol. 42, February, 1960, pp. 90-102.

discovered. They concluded that the greatest increases in net revenue can be achieved by enhancing the managerial ability and by increasing the use of available investment capital.

DEFINITION OF TERMS

The term "total investment managed" consists of both
real-estate managed and working capital managed. Included in
this is the value of all land and buildings which were rented
during the course of the accounting period. Real-estate
includes all land and improvements such as farm buildings,
irrigation improvements and etc., but the home and household
goods are not considered as part of the real-estate capital.
Real-estate capital and fixed capital were used synonomously
throughout this thesis. The value of the real-estate listed
in the records was approximately 15-25% below the market land
prices.

Working capital consists of machinery, livestock, feed,
seed, fertilizer, automobile (farm share), cash in the bank,
and all accounts receivable which might include coop stock and
Federal Land Bank stock. Working capital was valued at the
market prices.

The terms "total investment owned" and "real-estate
owned" were also used in some sections of the thesis. These
differed from total investment managed and real-estate managed
only in that they did not include the value of rented land and
buildings.

The term "net farm income" is the net return to the

farming enterprise. It was calculated by totaling all income from livestock, crops, supplies, and miscellaneous receipts such as custom work; and then either adding or subtracting the value for changes in inventory. All cash expenses such as feed bought, fuel and oil, veterinary and livestock expense, are then deducted. Finally depreciation allowances for buildings and machinery are deducted and the remaining figure is net farm income. After net farm income is determined, interest charges of 6% on net working capital and 4% on net fixed capital along with an estimate of unpaid family labor are deducted and the residual figure is operator's return to labor and management.

Outside income includes all income which is independent of the farm itself, such as off-farm work done by the wife. However, custom work done by the farm machinery is not included in outside income but the receipts are used as a deduction from machinery expenses and hence enter into the determination of farm income.

Also, total net income was used in one section and this consists of both net farm income and outside income.

LIMITATIONS OF STUDY

The most important limitation of this study is its applicability to farms in Kansas in general. A popular concensus of opinion is that Farm Management farms are not representative of what might be called a "random" sample of farms. Milton L. Manuel concluded that caution should be used when comparing Association farms with a random sample of Kansas farms.[1]

Other limitations arise due to the nature of the available data. Farm mortgage figures were not available before 1960 so this made it impossible to determine total farm debt before this time. The lack of these figures also caused a problem in that no values for total investment owned and fixed capital owned could be calculated prior to 1960.

Off-farm income was not included in the data until 1960, so there weren't enough years to compute a suitable time series analysis such as was done with other factors.

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[1]Milton Lloyd Manuel, "The Representativeness of Kansas Farm Management Association Farms," (Unpublished Master's Thesis, Department of Agricultural Economics, Kansas State College, 1948).

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GROWTH OF FACTORS AFFECTING AGRICULTURAL LOANS

The purpose of this section was to analyze the growth of the factors which affected both the farmer and the lender in making decisions on loans. Table 5 contains the values for total investment managed and average investment managed for each class and year considered in the study. However, of interest is the fact that there was a tendency for the class averages to increase from 1955 to 1963. This fact is particularly true for class 6 of Association 1 which increased from an average of $125,086 in 1955 up to $138,864 in 1963. Also of particular interest are the total figures at the bottom of the table. The total for Association 1 was $9,023,759 in 1955 and this increased every year except for 1957 until it reached the total of $13,895,558 in 1963. This amounted to a 54.0% increase for this time period. There was a larger increase in Association 2 which started with a total of $10,207,403 in 1955 and increased to $16,720,536 by 1963. This amounted to a percentage increase of 63.8%. The totals for this Association increased in every year except 1960.

A fact of significance is the change in the totals for each class for the various years. In Association 1 in 1955, class 3 had the greatest amount of total investment managed, however by 1964 this had changed and class 4 contained the

TABLE 5
TOTAL INVESTMENT MANAGED SUMS AND MEANS FOR ASSOCIATION 1, 1955-1963

Class		1955	1957	1959	1960	1961	1962	1963
					Year			
				Total Investment Managed				
1	average	20,255	20,294	0	0	0	0	0
	total	40,509	81,174	0	0	0	0	0
2	average	41,469	39,437	41,335	41,177	44,675	45,063	41,206
	total	1,492,893	1,735,224	909,362	617,651	580,774	585,814	536,851
3	average	61,831	60,174	61,573	58,544	61,034	61,722	60,552
	total	3,153,368	2,888,333	2,770,770	2,999,683	2,746,519	2,345,452	2,240,413
4	average	84,184	83,822	84,801	85,939	88,106	86,034	87,145
	total	2,441,349	1,760,256	2,798,444	2,750,052	3,171,821	2,667,062	3,224,374
5	average	111,121	113,962	111,862	109,872	112,081	111,667	110,644
	total	777,850	683,771	2,125,384	1,648,074	1,905,369	2,791,672	1,438,367
6	average	125,086	132,784	134,707	134,493	132,842	137,861	138,864
	total	125,086	398,352	673,537	1,479,425	1,461,266	1,654,334	2,082,956
7	average	152,703	161,737	158,388	163,482	163,425	153,450	158,586
	total	152,703	323,474	701,042	817,411	653,701	306,900	1,585,860
8	average	188,774	175,801	197,092	199,702	185,380	187,796	183,236
	total	377,547	175,801	394,183	199,702	556,141	751,185	732,945
9	average	231,227	220,550	229,426	235,146	236,928	256,852	256,724
	total	462,454	220,555	688,277	1,175,729	1,421,568	2,311,667	2,053,792
All Class-es	average	68,884	63,592	83,223	86,893	92,572	100,105	101,427
	total	9,023,759	8,266,940	11,151,899	11,687,727	12,497,159	13,414,086	13,895,558

TABLE 5 (CONT.)
TOTAL INVESTMENT MANAGED SUMS AND MEANS FOR ASSOCIATION 2, 1955-1963

Class		1955	1957	1959	1960	1961	1962	1963
		Total Investment Managed						
1	average	24,429	24,052	0	0	0	0	0
	total	24,429	24,952	0	0	0	0	0
2	average	42,573	41,051	47,349	43,911	46,975	47,185	48,750
	total	298,011	205,255	142,047	175,642	140,926	141,556	48,750
3	average	62,298	62,873	62,650	63,006	58,673	62,957	64,329
	total	1,432,862	1,068,832	563,847	630,064	410,710	251,827	321,645
4	average	87,380	88,265	89,929	91,169	91,696	89,471	91,872
	total	2,534,026	2,294,882	1,618,720	1,002,858	1,192,045	894,708	1,102,459
5	average	113,610	113,209	110,096	110,424	110,850	111,946	112,800
	total	2,044,972	2,830,227	3,412,989	3,423,131	2,660,398	2,686,702	3,045,598
6	average	137,393	137,322	133,976	134,849	134,874	135,777	136,224
	total	1,648,714	1,785,179	1,071,811	1,753,038	2,292,863	2,172,431	1,907,139
7	average	158,288	162,722	159,233	159,889	161,858	159,845	161,186
	total	949,726	1,464,495	2,070,030	1,598,885	1,942,290	2,237,833	2,095,415
8	average	192,011	196,034	185,537	186,964	185,522	187,444	192,441
	total	384,021	392,068	1,855,365	1,121,787	1,484,176	1,874,444	1,731,969
9	average	396,881	315,562	302,194	265,059	387,833	275,888	281,198
	total	890,642	1,893,373	3,626,322	3,975,887	4,893,152	5,517,765	6,467,561
All Classes	average	101,063	114,993	138,088	136,813	148,679	156,210	160,774
	total	10,207,403	11,959,263	14,361,131	13,681,292	15,016,560	15,777,266	16,720,536

greatest amount of investment. The totals for all farm classes with the exceptions of classes 1, 2 and 3 increased and of significance are the percentage increases of 1,565.2%, 938.5% and 344.1% in classes 6, 7 and 9.

In Association 2 the same pattern was evident that was discovered in the analysis of Association 1. The totals for classes 1, 2, 3 and 4 all decreased while the remainder of the classes increased substantially. The largest percentage increases were in classes 8 and 9 which increased by 351.0% and 626.2% respectively.

Number in Farm Class. Table 6 shows the number of farms in each class for each year in the study. From 1955 to 1963 the number of farms in the first three classes gradually decreased while there were increases in the other classes. It is evident therefore that farmers were moving from the smaller to the larger investment managed classes. Some later tables will demonstrate this movement in a more detailed manner. In Association 2 the same trends were evident. In 1955, class 4 contained the largest number of farms, but after this time the number in the first four classes decreased while concurrently the number in the last five classes increased.

Land Value Increases. Many times, increases in the total value of farm assets is the result of increases in land values and not from the acquisitions of new assets. In order to determine the increase in land values, information was used which was obtained from the Federal State Statisticians

TABLE 6

TOTAL INVESTMENT MANAGED, THE NUMBER AND PERCENT OF FARMS IN EACH CLASS

Class	Year	Association 1							Association 2						
		1955	1957	1959	1960	1961	1962	1963	1955	1957	1959	1960	1961	1962	1963
1	Number of farms	2	4	0	0	0	0	0	1	1	0	0	0	0	0
	Percent of total	1.5	3.1	0	0	0	0	0	1.0	1.0	0	0	0	0	0
2	Number of farms	36	44	22	15	13	13	14	7	5	3	4	3	3	1
	Percent of total	27.5	33.8	16.4	11.3	9.6	9.7	10.2	6.9	4.8	2.9	4.0	3.0	3.0	1.0
3	Number of farms	51	48	45	49	45	38	35	23	17	9	10	7	4	5
	Percent of total	38.9	36.9	33.6	36.8	33.3	28.4	25.6	22.8	16.3	8.7	10.0	6.9	4.0	4.8
4	Number of farms	29	21	33	32	36	31	37	29	26	18	11	13	10	12
	Percent of total	22.2	16.2	24.7	24.1	26.7	23.1	27.0	28.7	25.0	17.3	11.0	12.9	9.9	11.5
5	Number of farms	7	6	19	15	17	25	13	18	25	31	31	24	24	27
	Percent of total	5.3	4.6	14.2	11.3	12.6	18.6	9.5	17.8	24.0	29.8	31.0	23.8	23.7	26.0
6	Number of farms	1	3	5	11	11	12	15	12	13	8	13	17	16	14
	Percent of total	.8	2.3	3.7	8.3	8.2	9.0	10.9	11.9	12.5	7.7	13.0	16.8	15.8	13.5
7	Number of farms	1	2	5	5	4	2	10	6	9	13	10	12	14	13
	Percent of total	.8	1.5	3.7	3.7	3.0	1.5	7.3	5.9	8.7	12.5	10.0	11.9	13.9	12.5
8	Number of farms	2	1	2	1	3	4	4	2	2	10	6	8	10	9
	Percent of total	1.5	.8	1.5	.8	2.2	3.0	2.9	2.0	1.9	9.6	6.0	7.9	9.9	8.6
9	Number of farms	2	1	3	5	6	9	9	3	6	12	15	17	20	23
	Percent of total	1.5	.8	2.2	3.7	4.4	6.7	6.6	3.0	5.8	11.5	15.0	16.8	19.8	22.1
	Total number of farms	131	131	134	133	135	134	137	101	104	104	100	101	101	104
	Total percent of farms	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Office. The index of land and improvements was based on

1957-1959 as 100 and was arranged according to sections of the

State. An average was made for those areas which were in

Associations 1 and 2 and the resulting figures are given in

Table 7.

TABLE 7

INDEX OF LAND VALUES CAPITAL IMPROVEMENTS

Year	Average Index Value
1955	93.7
1956	96.5
1957	98.5
1958	99.8
1959	101.8
1960	107.0
1961	105.5
1962	110.0
1963	114.5

*Basic data from Federal-State Statisticians Office.

By observing the table, it is apparent that the land values

have been on a steady increase. A time series analysis was

used in order to determine if the increase over these years

was significantly greater than zero. When 1959 was used as

the midpoint, the equation was $Y = 103.0 + 2.42x$ which implies

that the increase in values was 2.42 per cent per year. A

t-test was run to determine the significance of this figure

and it was significant at either the 5% or 10% level. The

possible reasons for this increase are enumerated in a study

done at Kansas State University.[1] They are (1) farmers
enlarging their farms, (2) farmers' participation in the Soil
Bank Program, (3) guaranteed supports for farm products,
(4) the desire for non-farm persons to acquire land for a
long-term investment, (5) tax considerations such as capital
gains, and (6) some of the increased productivity has been
capitalized into land values.

There can be no doubt that some of the increase in
total investment managed was due to these increases in land
values. But there was also evidence that not all of it was
due to these increases. In Table 7 the land values index
slowly increased from 93.7 to 114.5 for a total percentage
increase of 20.8% or a 2.3% annual increase. The analysis of
Table 5 showed that total investment managed, when averaged
over all the classes for each association, had an increase of
54.0% in Association 1 and 63.8% in Association 2. If the
land value increase of 20.8% is subtracted from these
figures, this leaves the remaining values of 33.2% for
Association 1 and 43.0% for Association 2. This difference
amounts to an annual increase in total investment managed
of 3.7% and 4.8% for the two associations. Caution
should be exercised here because the Farm Management data did
not reflect the market value of the land and improvements
because of the conservative valuation. Due to this procedure

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[1]Harold R. Ramsbacher, Wilfred H. Pine, Merton L. Otto
and J. E. Palleson, "Trends in Land Values in Kansas,"
Agricultural Experiment Station, Kansas State University,
Bulletin 422, May, 1960.

the net figures of increase listed above are likely to be
smaller than the true net increase. It was concluded that
only a lesser part of the increase in total investment managed
could be attributed to the increase in land values. Farmers
have acquired more real-estate and working capital over this
period which exceeds the increase in land values.

Class Movement. After there was indication that there was a
tendency for farms to move up in the classes several questions
arose. First, did those farms which were in the small
investment managed classes in 1955 move up through the classes
into the high classes in 1963? Did most of the farms just
move up to the next higher class? Did some farms move up
classes and did some move down? Which classes showed the
largest increase in total investment managed? The information
in Table 8 gives the answers to these questions. The
procedure used in making this table was to take the number of
farms which were in each farm class in 1955 and determine
which class they were in 1963. In both associations those
farms that were in class 9 in 1955 were still there in 1963
and the two farms in class 8 had moved up to class 9.
However, the table demonstrates that most of the movement was
done by those farmers which were in the smaller investment
managed classes in 1955. In Association 1, class 2 showed the
most movement because of those in the class in 1955 only six
remained in 1963. The table shows that 11 had moved up to
class 3, 16 had moved to class 4, one to class 5 and two to
class 6. Class 3 was next in amount of movement but

approximately one-half the farmers showed no class movement. A point of interest in this class is that 6 farmers dropped to the next lower class and two farmers made jumps up to classes 8 and 9 which are increases in investment managed of at least $150,000. The greatest number of farms which showed any movement generally moved up just one class.

TABLE 8

MOVEMENT IN FARM CLASS

| Class in 1955 | Class Same Farms were in 1963 | | | | | | | | | | | | | | | | | |
	Association 1 class									Association 2 class								
	1	2	3	4	5	6	7	8	9	1	2	3	4	5	6	7	8	9
	Number of Farms																	
1		1	1							1								
2		6	11	16	1	2				2	1	1	1					2
3		6	23	10	3	6		1	1	1	2	6	6	3	2	1	2	
4			1	8	7	5	6	2	1			2	11	5	4	3	4	
5					1	2	2	1	1			1	4	4	4	1	4	
6							1					1	3			1	2	5
7									1						1	1	2	2
8									2									2
9									2									2

An interesting difference between the associations is evident here. Generally in Association 1 there was a tendency for a large percentage of the farms to remain stationary over the nine years. The situation was different in Association 2

and in no case did the largest percentage remain in the same class. There was a tendency in this association for the farms to move up one class although many moved up more than this. Class 6 in Association 2 is interesting to observe because none of the farms which were in the class in 1955 were still there in 1963. Of those in class 3 in 1955, some were in every class except class 1 in 1963 and two farms were in class 9 which infers they had a very large increase in their investment managed. In Association 2, a far larger number of farms moved up to class 9 by 1963 than was the case in Association 1.

The conclusion derived from the analysis of these tables was that in Association 1, the largest group of farms made no class movement and the next largest group moved up one class. While in Association 2, the largest group was the one which moved up one class. There was some tendency for a few farms to move down one class but this situation was more evident in Association 1. Most of those who advanced to class 9 in Association 1 were the ones who had large investment managed in 1955 but in association 2, it appeared that class distinction in 1955 played little effect on those who were in class 9 in 1963. The highest number of those in this high class in 1963 came from the middle classes in 1955.

In Table 9 the movement from class to class between years is shown. This table substantiated the conclusions that were drawn from the analysis of the previous table and it helped in gaining a better understanding of the year to year fluctuations. The table shows the high percentage of farms

TABLE 9

YEAR TO YEAR MOVEMENT IN TOTAL INVESTMENT MANAGED

	Negative movement	No movement	Increased 1 class	Increased 2 classes	Increased 3 classes	Increased 4 classes	Increased 5 classes	Increased 6 classes	Increased 7 classes
Association 1									
1955-1957	34	80	13	2	1				
1957-1959	2	53	65	12		2			
1959-1960	13	91	28	3					
1960-1961	9	94	29	3					
1961-1962	12	89	30	2			1	2	
1962-1963	14	92	27	3					
Association 2									
1955-1957	12	55	20	10	2	1			1
1957-1959	8	39	29	15	6	3	1		
1959-1960	15	67	15	3	1				
1960-1961	11	60	23	5				1	
1961-1962	5	72	17	6	1				
1962-1963	9	74	14	2	1		1		

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in each association which had no class movement. In Association 1 it appeared as though 1955-1957 was an adverse period. It appeared this way because of the large number of farmers who showed negative movement. In 1957-1959, the trend was reversed because only two farms showed a decrease in total investment managed while 79 experienced an increase. The remainder of the years followed the same general pattern with most farms showing no movement, a few farms experiencing negative movement and a larger group showing an upward class movement.

In Association 2 a much wider pattern was evident. Whereas in Association 1 most of the movement was either one class forward or backward, in this association the tendency was for farmers to make larger increases although even here the largest majority of those who showed any movement moved up just one class. In this association, there was no large backward movement like that which occurred in Association 1 from 1955-1957. However, the pattern for the period 1957-1959 was the same for both and this appeared to be the year in which the most expansion took place. Like Association 1, the remainder of years showed the same general pattern.

This table supported the conclusion that most of the movement in farm class occurred one class at a time although there was a tendency for some farms to move up more than one class in a single year. In only one instance did a farm increase as much as seven classes.

<u>Growth</u> <u>in</u> <u>Factors</u>.   After the movement in farm class had been analyzed and it was determined that total investment managed did increase it was necessary to examine the growth of other factors which affect the use of credit. The factors selected were average total investment managed, average investment in real-estate capital, average investment in working capital, average net farm income, and average returns to labor and management. The growth of these factors is shown in Table 10. The averages used here were calculated by summing over all the classes for each association and then dividing by the number of farms in the association.

Because these selected factors play an important part in the use of credit, we can assume that if these factors increased then also the farmers capacity to use credit will have increased. All of the factors selected increased a considerable amount but average net farm income showed the largest percentage increase. This growth is important because if any of the farmers were to incur more debt the payment of interest and principle would have to come from net farm income. Average net farm income for Association 2 increased by 111.6% and at the same time the figure for Association 1 increased by 88.5%. The returns to labor and management also had a substantial increase. The growth of the other three factors also is important because they are often furnished as security for a loan and generally the larger is the investment the greater are the possibilities for a suitable loan. Association 2 showed the largest increase in average total

TABLE 10

GROWTH IN FACTORS AFFECTING DEBT CAPACITY

	1955	1957	1959	1960	1961	1962	1963	Per cent of Increase
Average Total Investment Managed								
Association 1	68,884	63,592	83,233	86,893	92,572	100,105	106,063	54.0
Association 2	101,063	114,993	138,088	136,813	148,679	156,211	160,774	59.1
Average Real-estate Investment Managed								
Association 1	43,505	41,978	52,162	57,073	59,801	65,184	69,198	59.1
Association 2	75,336	89,505	100,647	101,334	109,622	115,820	119,833	59.1
Average Investment Working Capital Managed								
Association 1	25,387	21,646	31,285	30,490	32,774	33,856	36,872	45.2
Association 2	27,299	25,393	37,438	35,479	37,141	40,391	42,158	54.4
Average Net Farm Income								
Association 1	3,307	5,234	4,801	6,247	6,137	6,795	6,235	88.5
Association 2	3,599	4,882	5,744	7,103	9,012	8,179	7,615	111.6
Average Return to Labor & Management								
Association 1	3,052	4,119	3,539	4,617	4,246	4,999	4,746	55.5
Association 2	4,223	3,855	4,368	4,977	6,698	5,779	5,958	41.1

investment managed, average real-estate managed and average
working capital managed. This was true in both percentage and
absolute terms.

Time Series Analysis. In order to determine the significance
of these increases, a time series analysis was calculated for
each factor over the period of years of the study. The uneven
spacing of the years due to the ommission 1956 and 1958
created some problems in selecting the x variables for the
time series analysis. This was overcome by assigning 1955 as
1, 1957 as 3 and 1959 as 5 and then assigning consecutive
numbers for the remainder of the years.

The equation of the trend line was calculated for each
factor and then a t-test was used to determine the
significance of the beta value which in this case represents
the yearly increase. This was tested by the hypothesis that
(beta = 0). The results are shown in Table 11.

A salient feature of this table is the highly
significant t-tests from testing the beta value. For both
associations, average investment in real-estate managed was
the most highly significant factor. There was also the
tendency for Association 2 to show a higher degree of
significance than Association 1. It was concluded from this
analysis that all of these factors increased significantly.

Debt Growth. After it was apparent that the factors which
influence the capacity to use credit increased significantly,
the next problem was to determine the actual growth in debt

TABLE 11

TESTS OF SIGNIFICANCE OF THE FACTORS AFFECTING DEBT CAPACITY

	Estimated Regression	$H_O(B = 0)$ t-value	Decision at 5 per cent level
Average Total Investment Managed			
Association 1	Y = 55,985.6 + 5,370.3x	7.10	s
Association 2	Y = 92,794.8 + 7,833.1x	16.10	s
Average Real-estate Investment Managed			
Association 1	Y = 34,160.7 + 3,840.0x	8.61	s
Association 2	Y = 70,630.1 + 5,581.7x	17.32	s
Average Investment Working Capital Managed			
Association 1	Y = 20,892.6 + 1,693.9x	4.66	s
Association 2	Y = 23,157.1 + 2,133.3x	5.51	s
Average Net Farm Income			
Association 1	Y = 3,384.3 + 386.3x	4.50	s
Association 2	Y = 3,051.6 + 635.2x	4.96	s
Average Return to Labor and Management			
Association 1	Y = 3,006.0 + 212.2x	3.61	s
Association 2	Y = 3,394.9 + 310.1x	3.19	s

over this period. Table 12 shows the debt by farm class since 1960. Due to lack of information on farm mortgage debt prior to 1960 total debt could not be calculated previous to this date. The table has three classifications. One is the average for all farms and was determined by dividing the total number of farms in the class into the total class debt. Another classification is an average for just those farms with debt and was calculated by dividing the total number of farms with debt into the total amount of debt. The final information available from this table is the total indebtedness per class.

The total column indicated that the total debt for each association increased from 1960 to 1963. Each year total debt increased in each association and in no year did it diminish. Later tests of significance will be run to determine the significance of the increases. In Association 1, the individual classes did not show uniform behavior but, in fact, the totals were very erratic. Class 8 was the only one in which the total increased each year. This behavior was likely due to the movement from class to class over the years. The average for only those farms in class 9 increased each year.

In Association 2, the same general pattern existed. Only in classes 8 and 9 did the totals increase each year over the previous total. Class 6 was the only class in which the average for all farms with debt increased each year. The only class for which the average for all farms increased each year

TABLE 12
DEBT PER CLASS

				CLASS					
Association 1	2	3	4	5	6	7	8	9	Total
1960 All Farms	7,464	13,405	19,633	25,124	21,025	47,468	12,319	30,477	18,135
Farms with Debt	9,330	14,298	21,668	31,405	25,697	59,335	12,319	50,795	20,816
Total	111,964	643,435	628,248	376,864	231,273	237,340	12,319	152,386	2393,829
1961 All Farms	10,564	11,624	18,926	29,476	14,102	57,876	32,872	44,288	19,286
Farms with Debt	12,911	13,042	21,979	33,406	15,512	57,876	49,308	44,288	21,900
Total	116,198	534,702	681,350	501,087	155,126	231,505	98,617	265,727	2584,312
1962 All Farms	9,485	11,493	18,964	30,476	24,978	28,055	27,723	54,470	21,385
Farms with Debt	10,215	13,792	23,515	36,571	27,249	28,055	36,964	70,032	25,430
Total	132,792	413,756	587,871	731,419	299,734	56,110	110,893	490,230	2822,805
1963 All Farms	10,850	13,673	19,543	22,549	37,146	42,274	45,005	58,824	24,023
Farms with Debt	12,823	16,320	20,659	26,649	39,800	42,274	45,005	78,431	27,200
Total	141,052	505,912	723,076	298,133	557,196	420,274	180,020	470,591	3291,254
Association 2									
1960 All Farms	6,932	5,724	13,416	11,719	15,728	35,038	19,530	47,754	19,443
Farms with Debt	9,243	11,448	16,398	14,063	15,728	35,038	29,295	51,428	23,236
Total	27,728	57,241	147,580	351,565	220,192	315,342	117,181	668,558	1905,387
1961 All Farms	8,739	9,262	11,045	9,445	13,485	23,678	20,067	44,388	18,635
Farms with Debt	8,739	16,226	11,966	13,118	19,103	28,414	25,800	50,306	23,696
Total	26,218	64,902	143,588	236,127	229,240	284,139	180,601	754,594	1919,409
1962 All Farms	15,069	0	13,760	8,254	17,918	18,747	24,415	41,546	2001,802
Farms with Debt	15,069	0	15,289	12,656	20,477	23,860	27,128	48,878	25,738
Total	30,138	0	137,598	189,845	286,681	262,463	244,148	830,925	1981,798
1963 All Farms	12,415	10,605	12,053	12,147	18,589	20,695	34,481	46,315	23,427
Farms with Debt	12,415	26,513	24,106	18,896	24,166	26,903	44,332	48,420	32,059
Total	12,415	53,025	144,633	340,120	241,659	269,031	310,325	1,065,243	2436,451

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was class 8. In both associations, there was a tendency for
the highest classes to have the greatest increase in total
debt. In Association 1, six out of the nine classes
experienced increases in the totals although only in classes 8
and 9 were there any great changes in the average indebted-
ness. However, in Association 2, only classes 6, 8 and 9
increased in total. In this case, however, class 9 showed no
increase in average such as was the case in Association 1.
Class 8 was the only class in Association 2 which had a
significant increase in average debt for all farms. We can
conclude that there was a tendency for both total and average
debt to increase in the higher investment classes and decrease
in the lower investment managed classes. This was due to the
movement from the lower to higher farm classes.

The tests of significance which were calculated for
each average are shown in Table 13 and they indicate some
interesting results.

Association 1 showed significant increases for both
average debt for all farms in the sample and for the average
for farms with debt. However, in Association 2, neither
average was significantly different from the hypothesis that
beta was equal to zero. The reason for this was the large
variance which was associated with the Association 2 averages.
In Association 1 the t-tests were very highly significant
being 8.8354 and 7.180. It is evident that both average debt
for all farms and the average for farms with debt increased
significantly for Association 1 but due to the large variance

TABLE 13

SIGNIFICANCE OF AVERAGE DEBTS

	Estimated Regression	H_o(Beta = 0)	
		t-value	Significance
Average Debt, All Farms			
Association 1	Y = 15,766.0 + 1,976.6x	8.354	s
Association 2	Y = 17,047.0 + 1,333.5x	2.003	ns
Average for Farms with Debt			
Association 1	Y = 18,166.5 + 2,268.2x	7.180	s
Association 2	Y = 19,055.0 + 2,850.9x	.302	ns

in Association 2 neither average was significantly different from zero.

Table 14 shows the number of farms with and without debt by class. As might be expected in Association 1 all classes with the exceptions of classes 1, 2 and 3 had increases in the number of farms with debt. This was partially explained by the fact that there was an exodus from the lower to the higher investment managed classes. Association 2 revealed more of a pattern of debt change than did Association 1. The first six classes all experienced decreases in the number of farms with debt in each class. The last three classes had the greatest increase in number of farms with debt and this particularly applies to class 9. However, in the last two classes the number of farms without debt remained constant. When the totals for the entire Association summed over all classes was examined, it was evident that the number of farms without debt increased. This is partially explained by the greater number of farms in this association in 1963.

From the analysis of this table we can see that the number of farms with debt in the low investment managed classes decreased while the number of farms with debt in the high investment managed classes was on the rise.

After it was determined that both average debt and average total investment managed increased, it was of interest to observe how debt reacted as a percentage of total investment managed. For table 15 the debt figures were the average

TABLE 14

NUMBER OF FARMS WITH DEBT BY CLASS

Class		Association 1				Association 2			
		1960	1961	1962	1963	1960	1961	1962	1963
		Number of Farms							
1.	With Debt	0	0	0	0	0	0	0	0
	Without Debt	0	0	0	0	0	0	0	0
2.	With Debt	12	9	13	11	3	3	2	1
	Without Debt	3	2	1	2	1	0	0	0
3.	With Debt	45	41	30	31	5	4	0	2
	Without Debt	3	5	6	6	5	3	4	3
4.	With Debt	29	31	25	34	9	12	9	6
	Without Debt	3	5	6	2	2	1	1	6
5.	With Debt	12	15	20	12	25	18	15	18
	Without Debt	3	2	4	3	5	7	8	10
6.	With Debt	9	10	11	13	14	12	14	10
	Without Debt	2	1	1	1	0	5	2	3
7.	With Debt	4	4	2	10	9	10	11	10
	Without Debt	1	0	0	0	0	2	3	3
8.	With Debt	1	2	3	4	4	7	9	7
	Without Debt	0	1	1	0	2	2	1	2
9.	With Debt	3	6	7	6	13	15	17	22
	Without Debt	2	0	2	2	1	2	3	1
All Classes									
	With Debt	115	118	111	121	82	81	77	76
	Without Debt	17	16	21	16	16	22	22	28

TABLE 15

AVERAGE DEBT AS PER CENT OF AVERAGE TOTAL INVESTMENT MANAGED

| | Year | Class | | | | | | | |
		2	3	4	5	6	7	8	9
Association 1	1960	18.1	22.9	22.8	22.9	15.6	29.0	6.2	13.0
	1961	23.6	19.0	21.5	26.3	10.6	35.4	17.7	18.7
	1962	21.0	18.6	22.0	27.3	18.1	18.3	14.8	21.2
	1963	26.0	22.5	24.0	21.1	28.4	26.7	24.6	19.2
Association 2	1960	15.8	9.1	14.7	10.6	11.7	21.9	10.4	18.0
	1961	18.6	15.8	12.0	8.5	10.0	14.7	10.8	15.4
	1962	31.9	0	15.4	7.4	13.2	11.7	13.0	15.1
	1963	25.5	16.5	13.1	10.8	13.6	12.9	17.9	16.5

for all farms. There appeared to be a slight increase in debt
as a percentage of total investment managed from 1960 to 1963
in both associations.

In Association 1 there were large increases in the
percentages for Classes 2, 6, 8 and 9. Class 8 increased from
6.2% in 1960 to 24.6% in 1963 which represented the largest
percentage increase for any class. The percentages for
Classes 3, 4, 5 and 7 remained fairly constant. For this
Association it was evident that the higher classes not only
increased in number of farms with debt but the percentage of
debts to total investment managed also increased.

In Association 2, the percentages increased in
Classes 2, 3, 6 and 8. Class 2 had the greatest percentage
increase but due to the presence of only one farm in the class
this increase cannot be regarded as the most significant. The
percentage increased in Class 8 from 10.4 in 1960 to 17.9 in
1963 for a 7.5% increase. The percentages remained somewhat
constant in Classes 4, 5 and 9. There was a large drop in
percentage for Class 7 over the four year period. The
tendency for the percentages to increase in the higher classes
was not as evident in this Association as it was in
Association 1.

ANALYSIS OF FACTORS BY CLASS

The previous section of this thesis examined the
growth of the credit influencing factors over the period of
nine years. This section will be a detailed analysis by class
for only the year 1963. The purpose will be to determine the
financial condition of farmers in each of the classes.

Table 16 consists of the totals and averages for total
investment owned, real-estate capital owned and working
capital owned. The terms investment "owned" are used here
instead of investment "managed" which was used in the previous
section. The reason for this is that investment owned could
be calculated for 1963, while it couldn't for the years 1955
and 1957. A similar table using investment managed can be
located in the appendix. Class 4 in Association 1 had the
largest amount of total investment owned with a total of
$2,308,598 or 22.2% of the association total. The next in
size was class 3 with 17.1% of the total and followed by class
9 with 16.3%. In the first five classes was contained 53.4%
of the association total, which means that 46.6% remained in
the last four classes. In the smaller investment managed
classes there was a tendency for investment in real-estate
capital to be greater than the investment in working capital.
However, starting with class 6, this tendency was reversed and

TABLE 16
TOTAL INVESTMENT OWNED, REAL-ESTATE OWNED, AND WORKING CAPITAL OWNED FOR 1963

	Total Investment Owned			Real-estate Owned			Working Capital Owned		
			Per Cent of			Per cent of			Per cent of
	Total	Average	total	Total	Average	total	Total	Average	total
Class 2									
Association 1	411,577	31,660	3.9	189,110	14,547	3.5	222,467	17,113	4.4
Association 2	18,750	18,750	0.2	0	0	0	18,750	18,750	0.4
Class 3									
Association 1	1,776,457	48,012	17.1	978,535	26,447	18.3	797,923	21,566	15.8
Association 2	179,831	35,966	1.9	118,895	23,779	2.2	60,936	12,187	1.4
Class 4									
Association 1	2,308,598	62,395	22.2	1,200,215	32,438	22.4	1,108,383	29,956	21.9
Association 2	677,980	56,498	7.0	357,238	29,770	6.7	320,742	26,729	7.3
Class 5									
Association 1	1,058,254	81,404	10.2	586,114	45,086	11.0	472,130	36,318	9.3
Association 2	1,841,549	68,206	19.0	1,131,826	41,920	21.2	709,723	26,286	16.2
Class 6									
Association 1	1,447,398	96,493	13.9	661,804	44,120	12.4	785,594	52,373	15.6
Association 2	1,023,195	73,085	10.5	571,175	40,798	10.7	452,020	32,287	10.3
Class 7									
Association 1	1,225,325	122,533	11.8	553,800	55,380	10.3	671,525	67,153	13.3
Association 2	1,380,433	106,187	14.2	879,212	67,632	16.5	501,221	38,556	11.5
Class 8									
Association 1	479,738	119,935	4.6	257,731	64,433	4.8	222,007	55,502	4.4
Association 2	1,248,234	156,029	12.8	703,731	78,192	13.2	544,503	60,500	12.4
Class 9									
Association 1	1,697,293	212,162	16.3	926,890	115,861	17.3	770,403	96,300	15.3
Association 2	3,346,134	145,484	34.4	1,569,157	68,224	29.5	1,776,977	77,260	40.5
Total									
Association 1	10,404,640	75,946	100.0	5,354,199	39,082	100.0	5,050,432	36,865	100.0
Association 2	9,716,106	93,424	100.0	5,331,234	51,262	100.0	4,384,872	42,162	100.0

working capital became a greater part of the total than was real-estate capital.

In Association 2, the largest total amount of investment owned was in class 9 with a total of $3,346,134 or 34.4% of the Association total. The class with the next largest percentage was class 5 with 19.0%. In contrast to Association 1, this association had only 28.1% of the total investment in the first five classes and 71.9% in the last four classes. In this association the amount of real-estate owned was greater than the amount of working capital owned up through the first eight classes. Then in class 9 the amount of working capital exceeded the amount of real-estate capital.

This table indicated that in Association 1 the largest amount of investment owned was clustered in the middle classes, while in Association 2 it was skewed off towards the higher classes. Also, there was the tendency for working capital to increase faster than real-estate capital as investment managed increased.

Statistical analysis was run on the class averages to determine if they were equal in each association and these results can be found in Appendix Table 35. The first thing which was done was to test the H_0 ($\sigma^2_1 = \sigma^2_2$) by means of the F-test. If from the F-test it was determined that the variances were equal then the next step was to test $H_0(\mu_1 = \mu_2)$ by means of the t-test. If it turned out that the variances of the two associations were not equal, then an

approximate t-test devised by Cochran and Cox was used.[1] In this table most of the classes were not significantly different. This same procedure was used on all other tables in the appendix which were testing the equality of the means and variances for the classes between associations.

Farm Income. Farm income, whether it be gross, net, or off-farm income is an important factor in any situation involving credit. Table 17 gives the totals and averages of the various types of farm income for each class. In Association 1 class 7 had the highest average gross farm income of $51,617. However, class 9 was close with $49,728. When the totals were considered, class 4 had the highest amount with the total of $875,057 or 24.7% of the association total. Next was class 3 with $632,474 or 17.9% of the total. Class 9 had the largest average net farm income of $14,620 and the next was class 8 with an average of $12,448. Both the average gross farm income and average net farm income were larger in the higher farm classes. Both of these averages increased up to class 7 and then showed a drop to class 8. In class 9 average gross farm income was still not as large as it was in class 7.

The average outside income figures would have showed a u-shaped pattern if they were graphed. The averages started at $2,212 for class 2, gradually declined to $446 in class 6 and then climbed to the highest average of $5,702 in class 9.

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[1]This was the suggested test to use in an unpublished book by H. C. Fryer, Experimental Statistics, Kansas State University, 1963, p. 240.

TABLE 17
CROSS FARM INCOME, NET FARM INCOME AND OUTSIDE INCOME FOR 1963

Class	Gross Farm Income			Net Farm Income			Outside Income		
	Total	Average	Per cent of total	Total	Average	Per cent of total	Total	Average	Per cent of total
Class 1									
Association 1	0	0	0	0	0	0	0	0	0
Association 2	0	0	0	0	0	0	0	0	0
Class 2									
Association 1	188,650	14,512	5.3	36,545	2,811	4.3	28,752	2,212	14.0
Association 2	12,682	12,682	0.4	5,691	5,691	0.7	869	869	0.3
Class 3									
Association 1	632,474	17,094	17.9	182,872	4,943	21.4	47,882	1,294	23.4
Association 2	63,204	12,641	2.1	21,291	4,258	2.7	4,650	930	1.3
Class 4									
Association 1	875,057	23,028	24.7	173,683	4,694	20.3	43,093	1,165	21.0
Association 2	218,972	18,248	7.3	57,965	4,830	7.3	33,807	2,817	9.7
Class 5									
Association 1	349,442	26,880	9.9	82,775	6,367	9.7	11,845	911	5.8
Association 2	518,015	19,186	17.4	170,423	6,312	21.5	71,025	2,631	20.3
Class 6									
Association 1	432,272	30,877	12.2	102,327	6,822	12.0	6,687	446	3.3
Association 2	338,080	24,149	11.3	93,015	6,644	11.8	37,671	2,691	10.8
Class 7									
Association 1	516,166	51,617	14.6	124,478	12,448	14.5	10,920	1,092	5.3
Association 2	389,421	29,956	13.1	128,574	9,890	16.2	39,659	3,051	11.3
Class 8									
Association 1	144,209	36,052	4.1	34,664	8,660	4.1	9,967	2,492	4.9
Association 2	287,948	31,994	9.7	64,928	7,214	8.2	44,190	4,910	12.6
Class 9									
Association 1	397,827	49,728	11.3	116,957	14,620	13.7	45,615	5,702	22.3
Association 2	1,152,194	50,211	38.7	250,114	10,875	31.6	117,958	5,129	33.7
Total									
Association 1	3,536,097	25,811	100.0	854,310	6,234	100.0	204,761	1,495	100.0
Association 2	2,980,516	28,659	100.0	792,001	7,615	100.0	349,829	3,364	100.0

In Association 2 the average gross farm income figures showed a gradual increase from the first to the last class. Class 9 not only had the largest average but it contained the highest percentage since it contained 38.7% of the association gross farm income. Of course, this was to be expected due to the high number of farms in this class. The net farm income averages did not increase as did those for gross farm income. After a small decline from $5,691 in class 2 to $4,258 in class 3, the averages climbed until they reached $9,880 in class 7. Then they decreased in class 8 and reached the highest average for this association of $10,875 in class 9. The relative percentages were the same as for gross income. The outside income averages showed a gradual climb from $869 in class 2 to $5,129 in class 9. This was in contrast to the u-shaped pattern discovered in Association 1. By far the largest per cent of the association total was in class 9 which contained 33.7% of the total.

It was concluded that the averages for both gross and net farm were larger in the higher investment managed farm classes. For some reason there was the tendency for both of these figures to reach a semi-climax at class 7 and then decrease in class 8 and then show another rise in the last class. A person might expect that outside income would decrease as the investment managed increased, but this was not the case. The averages increased the higher was the total investment managed.

In Appendix Table 36 some statistical analysis was run

to test the equality of the class means and variances. With
gross farm income, only class 5 showed any difference in means
while with off-farm income, both classes 5 and 6 showed
significant differences.

Equity. Another important factor which lending agencies
analyze carefully is equity and these figures are given in
Table 18. Average equity in working capital in Association 1
starts at $10,339 in class 2 and gradually increased through-
out the higher classes until it reached $31,695 in class 7.
It then dropped to $28,917 in class 8 and reached its highest
value of $64,986 in class 9. This was the same pattern which
was evident in the investment owned table. Just as the
largest amount of working capital owned was in class 4, so was
the greatest dollar amount of equity, 21.9% of the total,
found in the same class. The equity in total capital reached
an average of $80,505 in class 7, declined in class 8 and then
jumped to an average of $153,339 in class 9. The largest
percentage of the association total was in class 4 with 22.1%.

In Association 2, the average equity in working
capital increased from $6,335 in class 2 to a value of $44,181
in class 9. The largest per cent of the association total was
also in class 9 where 36.2% was contained. In real-estate
capital, an unusual situation was present because the average
equity reached a maximum of $66,922 in class 8 and then
decreased to $54,988 in class 9. One would expect class 8 to
be greater than 9 because the average investment in real-

TABLE 18
EQUITY IN TOTAL DOLLARS FOR WORKING CAPITAL, FIXED CAPITAL AND TOTAL CAPITAL FOR 1963

	Equity in Working Capital Owned in Dollars			Equity in Fixed Capital Owned in Dollars			Equity in Total Capital Owned in Dollars		
	Total	Average	Per cent of total	Total	Average	Per cent of total	Total	Average	Per cent of total
Class 2									
Association 1	134,400	10,339	4.5	135,375	10,414	3.3	269,775	20,752	3.8
Association 2	6,335	6,335	0.2	0	0	0	6,335	6,335	0.1
Class 3									
Association 1	521,116	14,084	17.6	758,250	20,493	18.3	1,279,266	34,575	18.0
Association 2	36,431	7,286	1.3	90,375	18,075	2.0	126,806	25,361	1.7
Class 4									
Association 1	648,128	17,517	21.9	918,975	24,837	22.2	1,567,103	42,354	22.1
Association 2	230,470	19,206	8.2	309,875	25,823	6.9	540,345	45,092	7.4
Class 5									
Association 1	300,900	23,146	10.2	464,225	35,710	11.2	765,125	58,856	10.8
Association 2	509,411	18,867	18.2	992,076	36,744	22.1	1,501,467	55,610	20.6
Class 6									
Association 1	402,531	26,835	13.6	487,675	32,512	11.8	890,206	59,347	12.5
Association 2	321,298	22,950	11.5	470,175	33,584	10.5	791,473	56,534	10.8
Class 7									
Association 1	316,951	31,695	10.7	488,100	48,810	11.8	805,051	80,505	11.3
Association 2	346,552	26,658	12.4	764,850	58,835	17.0	1,111,402	85,493	15.2
Class 8									
Association 1	115,668	28,917	3.9	184,050	46,013	4.4	299,718	74,930	4.2
Association 2	335.609	37.290	12.0	602.300	66.922	13.4	937.869	104.208	12.9
Class 9									
Association 1	519,884	64,986	17.6	706,625	88,328	17.0	1,226,709	153,339	17.3
Association 2	1,016,166	44,181	36.2	1,264,725	54,988	28.1	2,280,891	99,169	31.3
Total									
Association 1	2,959,578	21,603	100.0	4,143,275	30,243	100.0	7,102,953	51,846	100.0
Association 2	2,802,272	26,945	100.0	4,494,376	43,215	100.0	7,296,588	70,160	100.0

estate owned was larger in class 8 than in class 9. However, due to the larger number of operators class 9 contained the largest amount of total equity in real-estate or 28.1% of the total. The equity in total capital also increased until it reached a peak average of $104,208 in class 8 and then it decreased to an average of $99,169 in class 9. The total investment owned figures for these two classes were $156,029 in class 8 and $145,484 in class 9.

Appendix Table 37 contains the statistical analysis of the equality of the means and variances. In this case, none of them were significantly different with the exceptions of the averages for the entire associations.

Equity Ranges. Table 19 gives the number of farms in each class which were in one of several equity ranges, namely 0-24.9; 25.0-49.9; 50-74.9 and 75.0-100.0. Most of the farms fell into the higher brackets which indicated a desirable situation. William Murray wrote about equities, "Equities of less than 25% are usually scrutinized with extreme care by lenders."[1] This table indicated that the majority of the farmers are in excellent financial condition if the above statement is used as a criterion. In both associations there were a greater number of the farms in the high equity ranges on their real-estate capital than existed in the high ranges on working capital. In fact only two classes, class 2 and 3

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[1]William G. Murray and Aaron G. Nelson, Agricultural Finance, 4th ed., (Ames, Iowa: The Iowa State University Press, 1960), p. 11.

TABLE 19
NUMBER OF FARMS IN EQUITY RANGES

	Working Capital Owned				Fixed Capital Owned				Total Capital Owned			
	0-24.9	25.0-49.9	50-74.9	75.0-100	0-24.9	25.0-49.9	50-74.9	75.0-100	0-24.9	25.0-49.9	50-74.9	75.0-100
Class 2												
Association 1	4	1	1	7	2	2	2	7	1	2	6	4
Association 2	0	1	0	0	1	0	0	0	0	1	0	0
Class 3												
Association 1	7	3	6	21	6	4	5	22	3	4	10	20
Association 2	1	0	1	3	1	2	0	2	2	0	0	3
Class 4												
Association 1	9	7	6	15	2	5	12	18	4	7	10	16
Association 2	1	2	1	8	2	0	3	7	1	1	2	8
Class 5												
Association 1	1	3	4	5	1	1	3	8	1	1	6	5
Association 2	3	3	6	15	2	0	4	21	0	2	6	19
Class 6												
Association 1	3	6	0	6	1	0	8	6	1	4	5	5
Association 2	3	4	2	5	0	3	2	9	1	3	4	6
Class 7												
Association 1	2	3	2	3	1	0	2	7	1	2	3	4
Association 2	0	3	4	6	1	0	1	11	0	1	3	9
Class 8												
Association 1	0	1	3	0	0	1	2	1	0	1	2	1
Association 2	1	1	4	3	1	0	2	6	0	2	3	4
Class 9												
Association 1	1	1	3	3	1	1	2	4	0	3	1	4
Association 2	1	8	7	7	3	2	4	14	2	4	7	10
Total												
Association 1	27	25	25	60	14	14	36	73	11	24	43	59
Association 2	10	22	25	47	11	7	16	70	6	14	25	59

in Association 2, had fewer farms in the 75.0-100.0 range on fixed capital than they had on working capital. In the total capital column, the number of farms increased in the high equity ranges so that the last range contained far more farms than any other range. The totals for all classes in Association 1 showed 59 in the 75.0-100 range, 43 in the 50.0-74.9 range, 24 in the 25.0-49.9 range and 11 in the 0-24.9 range. The same totals were 59, 25, 14 and 6 for Association 2.

Ratios as Percentages. A highly useful tool in analyzing a farm business is the ratio or percentage of various items to each other. Table 20 contains the figures for six percentages by class and association. The first is total assets to total liabilities and this percentage gives a picture concerning the overall financial condition of the farm. As was mentioned previously, most lenders look with scrutiny at ratios of less than 25%, and, none of the classes here were approaching this borderline. In fact, with the exception of class 2 in Association 2, none of the percentages were less than 60. The likely reason for the low figure in this class was the small number of observations in the class. In Association 1, the percentages ranged from 61.5 in class 6 to 72.3 in both classes 5 and 9. The percentages ranged from 33.8 in class 2 to 80.5 in class 7 for Association 2. A fact that is demonstrated here is that generally there was no relationship between size of farm operation and ratio of assets to

TABLE 20
ASSET TO LIABILITY PERCENTAGES

	Total net worth as a per cent of total assets	Fixed net worth as a per cent of fixed assets	Working capital net worth as a per cent of working capital assets	Total Debts as a per cent of equity	Net income to total investment managed	Net income to total investment owned
Class 2						
Association 1	65.5	71.6	60.4	52.3	6.8	8.9
Association 2	33.8	0	33.8	196.0	11.7	3.0
Class 3						
Association 1	72.0	77.5	65.3	39.5	8.2	10.3
Association 2	70.5	76.0	59.8	41.8	6.6	11.8
Class 4						
Association 1	67.9	76.6	58.5	46.1	5.4	7.5
Association 2	79.7	86.7	71.9	26.8	5.3	8.5
Class 5						
Association 1	72.3	79.2	63.7	38.3	5.8	7.8
Association 2	81.5	87.7	71.8	22.7	5.6	9.3
Class 6						
Association 1	61.5	73.7	51.2	62.6	4.9	7.1
Association 2	77.4	82.3	71.1	30.5	4.9	9.1
Class 7						
Association 1	65.7	88.1	47.2	52.2	7.8	10.2
Association 2	80.5	87.0	69.1	24.2	6.1	9.3
Class 8						
Association 1	62.5	71.4	52.1	60.1	4.7	7.2
Association 2	75.1	85.6	61.6	33.1	3.7	5.2
Class 9						
Association 1	72.3	76.2	67.5	38.4	5.7	6.9
Association 2	68.2	80.6	57.2	46.7	3.9	7.5
Total						
Association 1	68.3	77.4	58.6	46.3	6.1	8.2
Association 2	75.1	84.3	63.9	33.4	4.7	8.2

liabilities.

The percentages of fixed assets to fixed liabilities and working capital assets to working capital liabilities were for the purpose of determining whether debts were properly distributed between long and short term. In this case, the most favorable situation was to have the percentages of working capital assets to working liabilities higher than the percentage of fixed assets to fixed liabilities. The reason for this is that nearly all loans on working capital are of short term nature and if they fall due in times when credit is difficult to obtain this could cause serious problems. However, from some observation of the table, the opposite to the preceding statement existed. In no case in either association was the working capital percentage greater than the fixed percentage, but the converse was true. This indicated that farmers were going in debt farther in relation to their assets on working capital than they were on fixed capital. Most of the fixed percentages were very high and, except for class 2 in Association 2, there was not a percentage below seventy. In Association 1, they ranged from 71.4 in class 8 to 88.1 in class 7. The working capital percentages were much lower. The lowest was 47.2% in class 7 and the highest was 67.5% in class 9. Class 7 had the highest fixed percentage and the lowest working percentage.

In Association 2, the fixed percentages were generally higher than in Association 1 and, excluding class 2, they ranged from 76.0% in class 3 to 87.7% in class 5. The working

capital percentage ranged from 57.2% in class 9 to 71.9% in
class 4.

The next percentage is total debts to total equity and
was calculated by dividing the total equity in dollars for
each particular class into the total debt for the class. This
percentage tells what per cent the debt was to the equity and
served as an indicator as to whether too much debt existed for
the equity in the farm business. For this percentage, the
lower percentages represent the healthiest situation. In only
one class in both associations was the debt greater than the
equity and this was in class 2 in Association 2. The reason
for this was undoubtedly due to the existence of only one farm
in the class. In Association 1, the highest percentage was in
class 6 where the value was 62.6%. The lowest values were
38.3% in class 5 and 38.4% in class 9. The values were
generally lower in Association 2 and disregarding class 2,
they ranged from a high of 46.7% in class 9 to 22.7% in class
5. Those classes with the most favorable percentages were
classes 5 and 9 in Association 1 and class 5 in Association 2.

The next two columns of percentages in the table
analyze the amount of net income per dollar of investment.
The first column is net income to total investment managed and
the other is net income to total investment owned. Actually,
these percentages are good indicators of efficiency. The net
income to total investment managed percentages for Association
1 showed a range from 4.7 in class 8 to the highest of 8.2 in
class 3. The Association 2 values ranged from 3.7 in class 8

to 11.7 in class 2. The investment owned figures for Association 1 ranged from the high values of 10.3 in class 3 and 10.2 in class 7 to the low value of 6.9 in class 9. In Association 2, they ranged from 5.2 in class 8 to 11.8 in class 3. In Association 1, the highest value for fixed assets was in class 7. This same class also had nearly the highest value for net income to total investment managed. Indications here showed that size makes some influence on efficiency. The values for both associations in classes 8 and 9 were smaller than for the rest of the classes.

By using these percentages some analysis was done to determine if the law of diminishing returns applies to the amount of investment managed. The rational behind this law can be found in Earl O. Heady's book.[1] Theoretically it states that if the input of one resource is increased by equal increments per unit of time, while inputs of other resources are held constant, total product output will increase, but beyond some point the resulting output increases will become smaller and smaller. If this law applies to net income as a percentage of total investment managed, then we would expect to find a point where the values in the column begin to decline. There was some indication that likely this point was either at class 3 or class 7 because the percentages reached peaks at these classes in both associations. Actually the

[1]Earl O. Heady, Economics of Agricultural Production and Resource Use, (Englewood Cliffs, N. J.: Prentice-Hall, 1964), p. 90.

values for class 3 in both Associations were higher than the
values for class 7. However after they reached a peak in
class 3 the values declined but they reached another high
point in class 7. In the last two classes the percentages
once again declined in both Associations.

Class 7 appeared to be the point where the law of
diminishing returns, when applied to net farm income as a
percentage of total investment managed, indicated that
efficiency was at its optimum point. Although class 3 was the
point of the highest percentage a farmer could earn more
income by expanding to class 7.

Loan Carrying Capacity. Table 21 is an analysis of the amount
of additional debt each farm class could carry. A value of
70% of total net income, which includes both off-farm income
and actual farm income, was used as the amount required for
living expenses. This would leave 30% available for principle
and interest payments on a loan. This value was chosen after
a Farm Management Association report was examined which had a
breakdown of living expenses that amounted to 70% of total net
income.[1] Some economists contend that the percentage of
income required for living expenses declines as income rises,
which is probably correct. But this discussion was avoided in
this thesis and 70% was used as a representative figure.
Wilfred H. Pine in a Masters thesis used this general idea for

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[1]Farm Management Summary and Analysis Report,
Extension Service, Kansas State University, 1963.

TABLE 21

AMOUNT OF REAL-ESTATE LOANS POSSIBLE AT 5½% INTEREST FROM TOTAL NET INCOME

Class	Amount of Loan Supportable Without 5½% Principle Payment		Amount of Loan Possible with Prepayment on 20 Year Basis		Amount of Loan Possible Without Principle Payment at 7%		Amount of Loan Possible at 7% with 3 Year Prepayment	
	Total	Average	Total	Average	Total	Average	Total	Average
Class 2								
Association 1	356,185	27,399	186,571	14,352	279,863	21,528	48,978	3,768
Association 2	35,782	35,782	18,743	18,743	28,115	28,115	4,920	4,920
Class 3								
Association 1	1,258,630	34,017	659,276	17,818	988,934	26,728	173,070	4,678
Association 2	141,492	28,298	74,114	14,823	111,173	22,235	19,037	3,807
Class 4								
Association 1	1,182,467	31,959	619,382	16,740	929,091	25,111	161,644	4,369
Association 2	500,587	41,716	262,209	21,851	393,323	32,777	68,833	5,736
Class 5								
Association 1	516,132	39,703	270,354	20,797	405,537	31,195	70,970	5,459
Association 2	1,271,814	47,104	689,753	25,546	1,034,647	38,320	198,165	7,339
Class 6								
Association 1	594,641	39,643	311,474	20,765	466,508	31,101	81,766	5,451
Association 2	711,408	50,815	372,636	26,617	558,968	39,926	97,822	6,987
Class 7								
Association 1	738,334	73,833	387,266	38,727	569,910	56,991	98,939	9,803
Association 2	959,937	73,841	502,819	38,678	754,245	58,019	131,993	10,153
Class 8								
Association 1	241,730	60,433	126,619	31,655	189,932	47,483	31,572	7,893
Association 2	595,188	66,132	311,762	34,640	467,653	51,961	81,497	9,055
Class 9								
Association 1	786,955	98,369	412,209	51,526	618,328	77,291	106,991	13,374
Association 2	1,953,200	84,922	1,019,288	44,317	1,534,673	66,725	268,566	11,677
Total								
Association 1	5,675,074	41,424	2,973,151	21,702	4,448,103	32,468	773,021	5,643
Association 2	6,169,408	59,321	3,251,324	31,263	4,882,797	46,950	870,833	8,373

determining debt carrying capacity from net income but this analysis will be considerably different from his thesis.[1]

In order to determine debt carrying capacity for each farm in the sample, a formula was devised using four factors. All of them are self-explanatory with the exception of total net income and it is equal to net farm income plus outside income. If we assume that the investment for which credit is used will not yield a return, then:

$$\text{Loanable amount} = \frac{(\text{total net income})(\% \text{ required for living exp.})}{(\text{interest rate}) + \left(\frac{1}{\text{number of years of loan}}\right)}$$

The first section of the table gives the amount of a loan which could be supported at $5\frac{1}{2}\%$ interest. This section was devised to represent a real-estate loan and the interest figure was considered to be representative of the interest rate on most such loans. In this case, it was assumed that no payment would be made on the principle. In Association 1, class 9 could support an average loan of \$98,369 if the present net income was used only to pay the interest on the loan. The largest value of \$84,932 in Association 2 was also in class 9.

The next section was designed to show the size of real-estate loans which could be supported if both a $5\frac{1}{2}\%$ interest rate payment and a principle payment based on a 20 year retirement were met out of total net income. It was

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[1]Wilfred H. Pine, "The Debt Carrying Capacity in Relation to Cash Income of North Central Kansas Farms," (Unpublished Master's thesis, Department of Agricultural Economics, Kansas State College, 1938).

assumed here that the investment yielded nothing but all
interest and principle payments came from existing total net
income. Again, class 9 in both associations had the highest
average. This class in Association 1 could have supported an
average loan of $51,526 and in Association 2 it could have
supported one of the average size, $44,317.

The last two sections of the table analyze working
capital loans. Here an interest rate of 7% was chosen to be
representative of the rate charged on working capital loans
and the repayment was established at 3 years. Of course, if
either the interest rate were higher or the repayment time
shorter, this would decrease the size of the possible loan.
In the third section, the values are given for a loan if only
total net income was used to pay interest on the loan. The
last section shows the amount of working capital loan which is
possible at 7% with a 3 year repayment plan. Once again, this
would be on the assumption that the investment would make no
returns on which to pay anything on either principle or
interest. In Association 1, the high value was $13,374 in
class 9 and the high value in Association 2 was $11,677 in
class 9.

This table was probably a conservative estimate of the
amounts which could have been loaned to farmers in each class
but it does serve as a guideline to approximate amounts which
could have been loaned in addition to what they were carrying.
The results showed that the amounts increased as total
investment managed also increased.

<u>Debt</u> <u>for</u> <u>1963</u>. Table 22 shows the amount of debt which was carried by the farms in each class in 1963. One fact that showed up from the table was that most classes throughout both associations were not carrying real-estate debts equal to even the most conservative estimates in Table 21. As an example, class 9 had average debts on real-estate of $27,533 in Association 1 and $13,236 in Association 2. The estimate in which the existing total net income was used to pay both interest and principle showed that class 9 in Association 1 could support an additional loan of $51,526 and in Association 2, an additional loan of $44,317. The table shows that farmers were not even approaching the limit if total net income was used to pay interest only. For example, in class 9, the Association 1 average of debt was $31,291 and Association 2 was $33,079. If total net income was used for only principle payment they could have supported loans in this class of $77,291 in Association 1 and $66,725 in Association 2.

In Association 1, class 7 had the highest ratio of income to total investment owned. It also had the highest average debt on working capital and was among those classes with the lowest average debt on real-estate capital. This indicated that the most efficient farmers were spending more money on working capital than they were on real-estate capital. The analysis also indicated that farmers could handle considerably more debt than they were using if they were so inclined to do so.

TABLE 22
DEBT ON WORKING CAPITAL, MORTGAGE DEBT AND TOTAL DEBT FOR 1963

Class	Debt on Working Capital			Mortgage Debt			Total Debt		
	Total	Aver-age	Per cent of Total	Total	Aver-age	Per cent of Total	Total	Aver-age	Per cent of Total
Class 2									
Association 1	87,317	6,717	4.2	53,735	4,134	4.4	141,052	10,850	4.3
Association 2	12,415	12,415	0.8	0	0	0	12,415	12,415	0.5
Class 3									
Association 1	286,427	7,741	13.6	220,385	5,956	18.2	505,912	13,673	15.4
Association 2	24,505	4,901	1.5	28,520	5,704	3.4	53,025	10,605	2.2
Class 4									
Association 1	459,962	12,431	21.9	281,200	7,600	23.2	723,076	19,543	21.9
Association 2	90,270	7,523	5.7	54,363	4,530	6.4	144,633	12,053	5.9
Class 5									
Association 1	171,244	13,173	8.2	121,889	9,376	10.1	293,133	22,549	8.9
Association 2	200,310	7,419	12.6	139,750	5,176	16.6	340,120	12,147	14.0
Class 6									
Association 1	383,068	25,538	18.2	174,129	11,609	14.4	557,196	37,146	16.9
Association 2	140,661	10,047	8.8	101,000	7,214	12.0	241,659	18,589	9.9
Class 7									
Association 1	354,574	35,457	16.9	65,700	6,570	5.4	420,274	42,274	12.8
Association 2	154,669	11,898	9.7	114,362	8,791	13.5	269,031	20,695	11.1
Class 8									
Association 1	106,339	26,585	5.1	73,681	18,420	6.1	180,020	45,005	5.5
Association 2	208,894	23,210	13.1	101,431	11,270	12.0	310,325	34,481	12.7
Class 9									
Association 1	250,326	31,291	11.9	220,265	27,533	18.2	470,591	58,824	14.3
Association 2	760,811	33,079	47.8	304,432	13,236	36.1	1,065,243	46,315	43.7
Total									
Association 1	2,099,257	15,323	100.0	1,210,984	8,839	100.0	3,291,254	24,024	100.0
Association 2	1,592,535	15,313	100.0	843,858	8,111	100.0	2,436,451	23,427	100.0

Appendix Table 37 is the results of statistical

analysis on the farm debt means or averages.

MULTIPLE REGRESSION ANALYSIS

For the multiple regression analysis nine of the factors which were used in the previous sections of this thesis were analyzed to determine their relative importance as determinants of total farm debt. The variables are listed in the following table.

TABLE 23
VARIABLES FOR MULTIPLE REGRESSION ANALYSIS

Variable	Identification
X_1	Working Capital Owned
X_2	Real-estate Owned
X_3	Total Investment Owned
X_4	Equity in Working Capital
X_5	Equity in Real-estate Capital
X_6	Equity in Total Capital
X_7	Net Farm Income
X_8	Off-Farm Income
X_9	Age of Operator
Y	Total Farm Debt

Each of the variables, except age of operator, was expressed in total dollars. No farm classes were used in this

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breakdown so the analysis consisted of all farms in each association lumped into one group with no class distinction such as existed in the previous sections.

Simple Correlations. Table 24 contains simple correlations between each of several variables in the problem. Only the simple correlations between each of the variables and total farm debt were included in this table. In the table, the figures are the correlation coefficients between each variable and total farm debt and they indicate the degree of correlation between each pair. If for example a perfect correlation existed, then the value for "r" would equal 1.

The correlations between working capital owned and total farm debt were very highly correlated. The values were .5818 for Association 1 and .7086 for Association 2. There was nearly twice the correlation between working capital and total debt as existed between real-estate capital and total debt. The values for real-estate capital were .3290 in Association 1 and .2724 in Association 2, which were approaching the region of rejection while the values for working capital were highly significant. Therefore it was concluded that working capital was a more important determinant of loans than was real-estate capital.

The interpretation of the correlations between the equity figures and total farm debt lead to some interesting conclusions. Only one of the equity in working capital correlations proved to be significant. It might therefore

TABLE 24
SIMPLE CORRELATIONS BETWEEN SELECTED VARIABLES

Variables	Association 1 r	Association 2 r
Working capital owned and total farm debt	.5818*	.7086*
Real-estate capital owned and total farm debt	.3290*	.2724*
Total capital owned and total farm debt	.5231*	.5374*
Equity in working capital owned and total farm debt	.0280	.2340*
Equity in real-estate capital owned and total farm debt	.0061	.0093
Equity in total capital owned and total farm debt	.0173	.0982
Net farm income and total farm debt	.0773	.2866*
Off-farm income and total farm debt	.1937*	-.0159
Age of operator and total farm debt	-.2197*	-.0268

*Denotes significance at 5% level.

r = 137 for Association 1
r = 104 for Association 2

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have been concluded that there was no relationship between equity and farm loans, but likely this would have been a fallacious conclusion. If a farmer had a given amount of capital and he borrowed money then his equity would decrease. If we reason from this, it would mean that there should be a negative correlation but this was not demonstrated. Of course, a problem here is that the debt had already been incurred before the calculation of the correlations. Therefore, it was not possible to ascertain the equity position before the incurrence of the debt. But, once again, it should be emphasized that the debt was already incurred and, hence, equity lowered before the correlation was calculated.

Another observation of interest is the correlation between net farm income and total debt. In Association 1, the value was .0773 which is insignificant. In Association 2, the value was .2866, which is significant but yet not highly so. There were several interesting points to consider with respect to this correlation. Once again it appeared that there was no correlation between net farm income and farm debt. But, this appears to be contrary to reason because lenders when determining the desirability of a loan, surely observe the net income figures. Another point considered here was that once a loan is incurred then interest and principal payments are deducted from gross income to obtain net income. Consequently, this would diminish net farm income. However, a loan which is not profitable enough to pay interest and principle payments after expenses are met and then increase net farm income

cannot be considered as suitable. It could be possible that many of the loans then were marginal or submarginal in nature.

The correlation between off-farm income and total farm debt showed some interesting results. The value of .1937 in Association 1 was just significant at the 5% level while the value of -.0159 for Association 2 was insignificant. Therefore it is doubtful if off-farm income was of importance in farm debt determination.

In the case of age of operator and farm debt, the relationship which one would expect to find was evident. Reason would indicate that as a farmer's age increases he will use less and less credit. Therefore, a negative correlation should have existed between these variables. There were negative correlations of -.2197 in Association 1 and -.0268 in Association 2 of which only Association 1 was significant. We have some indication that credit used in Association 1 did decrease as age of operator increased.

Multiple Correlations. The analysis of these variables was not terminated with the simple correlations but was analyzed farther in the multiple regression analysis. When these variables were considered in groups instead of one pair at a time like was done in the simple correlations there were many different conclusions.

Each of the following tables is composed of different combinations of variables of which either the equity figures or the investment owned figures were excluded. The F-values

on the left hand side are for testing the significance of each variable in explaining the total variation. The R^2 is a measure of how much of the total variation is explained by the factor of concern. R simply indicates the closeness of fit of the multiple regression line to the data. The beta value explains how much the dependent variable increases when there is an increase in the independent variable. The beta prime figures are for determining the relative importance of the beta values. This is important because often the variables are expressed in different units and, hence, there needs to be some standard for comparison. These values are sometimes called standard partial regression coefficients. The T-test is for testing the significance of each of the factors but it tests them in a different manner than does the F-test. When the F-test was used, it was for determining how much one variable adds after another had been included. For example, if three variables, X_1, X_2 and X_3, were used and they were used in the analysis in this order, then the F-test would indicate the amount of the variation which X_2 explained after X_1 was considered and how much X_3 explained after X_1 and X_2 had been considered. However, the T-test indicates how much each variable adds to the explanation of the total variation irrespective of the order in which it was used. In the F-test the amount of variation which a variable explained after the previous variables had been included can be found by subtracting its R^2 value from the one just preceding it in the table. The F-test, R^2 and R values in the right hand part of

the tables are for the purpose of testing the entire equation
for significance. The beta values were put into equation form
at the bottom of the information for each association.

The multiple regression problem involving the variables
of working capital owned, real-estate capital owned, net farm
income, off-farm income and age of operator is shown in Table
25. The first point of interest in the table was that the
F-test for the entire equation did prove highly significant.
This means that the above mentioned variables did have a
definite effect on debt. The R values were also significantly
high for both associations and this also substantiated the
above conclusion. In fact, the R value for Association 1 was
.6894 and for Association 2 it was .7329. The highly
significant F-test of 69.0787 in Association 1 clearly
indicated that working capital owned exerted a substantial
amount of influence on debt. But, the next F-test indicated
that it was not worthwhile to bring in real-estate capital
owned after working capital owned had been included. The next
highly significant F-value of 18.2979 clearly indicated that
it was worthwhile to bring in net farm income after the
inclusion of the two preceding variables. Therefore, net farm
income was highly significant variable but the beta value
indicates that it was negatively significant. The beta value
of -1.2769 means that as net farm income increased by one
dollar, then total farm debt decreased by approximately $1.28.
If this was actually the case, then farm investments were not
returning enough to pay interest and principle payments. The

TABLE 25
MULTIPLE REGRESSION FOR SELECTED FACTORS

Variable	F	R^2	R	Beta	Beta Prime	T	Entire Equation F	R^2	R
Association 1									
1	69.0787*	.3385	.5818	.5921	.6346	8.1043*	23.7311*	.4753	.6894
2	1.0508	.3436	.5862	.1529	.1883	2.3467*			
7	18.2979*	.4230	.6504	-1.2769	-.3017	-3.9269*			
8	1.5468	.4297	.6555	.7806	.0951	1.4002			
9	11.3783*	.4753	.6894	-583.8562	-.2232	-3.3732*			

$$Y = 33,837.6110 + 5921x_1 + .1529x_2 - 1.2769x_3 + .7806x_4 - 583.8562x_5$$

Variable	F	R^2	R	Beta	Beta Prime	T	Entire Equation F	R^2	R
Association 2									
1	102.8574*	.5021	.7086	.6496	.7203	9.0060*	22.7518*	.5372	.7329
2	.7086	.5056	.7110	.0060	.0087	.1020			
7	1.7587	.5141	.7170	.2899	.0691	.9510			
8	3.4135	.5303	.7282	-.8522	-.1440	-1.9455			
9	1.4627	.5372	.7329	-205.6019	-.0883	-1.2094			

$$Y = 6,766 + .6496x_1 + .0060x_2 + .2899x_3 - .8522x_4 - 205.6019x_5$$

*denotes significance at 5% level

next variable off-farm income was also insignificant when it was added after the previous three variables. The age of operator was another highly significant variable but, like net farm income, the significance was also negative in nature. This also implied that as age of operator increased, then debt decreased. If each of the R^2 values are subtracted from the one just on top, this indicates how much of the total variation was explained by the particular variable. For example, variable 1 explained 33.85% of the variation while variable 2 explained 34.36% minus 33.85% which equals .51%. It is evident why it proved insignificant. The T-tests also indicated some interesting results. As indicated before this test is for testing each variable by itself and not after another variable or variables have already been used in the model. Once again, working capital owned was the most highly significant variable but with this test real-estate capital proved significant. This inferred that real-estate capital did have some importance but not after working capital owned was considered. Therefore, working capital owned was the most important variable followed in importance by the negatively correlated variables net farm income and age of operator.

In Association 2 only one of the variables, working capital owned, proved significant with an F-value of 102.8574. However, the entire equation was significant with an F-value of 22.7518. It appeared as though working capital was so highly significant that it was able to overcome the insignificance of the other variables. The first variable

explained 50.21% of the variation and the remaining four explained only 3.51%. Off-farm income had a negative beta value which indicated that as it increased, then debt decreased and vice versa.

The variables in Table 26 consist of the following: equity in working capital, equity in real-estate capital, net farm income, off-farm income and age of operator. Probably the first note of importance are the F-tests for the entire equations in both associations which are insignificant. This is in contrast to the highly significant values for the entire equations in the previous table. In Association 1, the only individual variables of significance were off-farm income and age of operator. The F-tests and T-tests for these variables were both significant which indicated that they were important by themselves and also in conjunction with the other variables. The R^2 column indicated the insignificance of the relationship between equity and farm debt because both equity figures together only explained .09% of the variation. But once again, caution was exercised in this interpretation. This was due to the fact that the debt had already been incurred when these equity figures were calculated. This does not mean that the individual lender did not look at equity. Even so, there still appeared to be no relationship either positive or negative in nature between equity and farm debt in this association.

In Association 2 only two variables, equity in working capital and net farm income, were significant. These were

TABLE 26
MULTIPLE REGRESSION FOR SELECTED FACTORS

Variable	F	R^2	R	Beta	Beta Prime	T	Entire Equation F	R^2	R
Association 1									
4	.1061	.0008	.0280	-.0017	-.0014	-.0121	3.1027	.1059	.3254
5	.0163	.0009	.0301	-.0195	-.0215	-.2013			
7	.8497	.0072	.0851	.4548	.1074	1.0003			
8	5.7727*	.0488	.2210	1.7978	.2191	2.5496*			
9	8.3570*	.1059	.3254	-658.4078	-.2516	-2.8908*			

$$Y = 53,856.8150 - .0017x_4 - .0195x_5 + .4548x_7 + 1.7978x_8 - 658.4078x_9$$

Variable	F	R^2	R	Beta	Beta Prime	T	Entire Equation F	R^2	R
Association 2									
4	5.9102*	.0548	.2340	.3791	.2751	2.4919*	3.1174	.1372	.3704
5	1.6588	.0700	.2647	-.0954	-.1328	-1.1342			
7	7.6580*	.1362	.3690	1.0690	.2548	2.6507*			
8	.0716	.1368	.3699	-.1745	-.0295	-.2866			
9	.0466	.1372	.3704	-50.2618	-.0216	-.2159			

$$Y = 12,318.6750 + .3791x_4 - .0954x_5 + 1.0690x_7 - .1745x_8 - 50.2618x_9$$

*denotes significance at 5% level

different from those that were significant in the preceding
analysis of Association 1. These two variables also were
important by themselves and in conjunction with all the
others. Here equity in working capital owned explained 5.48%
of the total variation. The net farm income figures in
Association 1 were significant with the capital owned figures
and insignificant with the equity figures, while in
Association 2 they were generally insignificant with the
capital owned and significant with the equity figures.

In Table 27 is another combination of variables
consisting of only net farm income, off-farm and age of
operator. The reason for using this set of variables with all
of the others excluded was to determine what relationship only
these had on total farm debt. Here is a case where the entire
equation for Association 1 was significant and was not for
Association 2. The same general pattern of significance
between the variables that was evident in Table 26 was also
evident here. In Association 1, neither the F-test nor the
t-test proved significant for net farm income. Both off-farm
income and age of operator were significant when both tests
were used. The R^2 column indicated that off-farm income
explained 3.56% of the variation after net farm income was
included. Age of operator explained 6.40% after the previous
two variables were included. Once again the negative beta
value appeared for age of operator indicating that as one
increased then the other decreased. In Association 2 only net
farm income was significant in this table. It explained 8.21%

TABLE 27
MULTIPLE REGRESSION FOR SELECTED FACTORS

Variable	F	R^2	R	Beta	Beta Prime	T	Entire Equation F	R^2	R
Association 1									
7	.8117	.0060	.0773	.4143	.0979	1.1798	5.2317*	.1056	.3249
8	4.9742*	.0416	.2039	1.7600	.2145	2.5961*			
9	9.5161*	.1056	.3249	-671.8674	-.2568	-3.0848*			

$$Y = 54,256.5000 + .4143x_7 + 1.7600x_8 - 671.8674x_9$$

Variable	F	R^2	R	Beta	Beta Prime	T	Entire Equation F	R^2	R
Association 2									
7	9.1279*	.0821	.2866	1.2009	.2862	2.9779*	2.9901	.0823	.2869
8	.0015	.0822	.2866	.0246	.0042	.0433			
9	.0181	.0823	.2869	-30.0673	-.0129	-.1346			

$$Y = 15,715.9340 + 1.2009x_7 + .0246x_8 - 30.0673x_9$$

*denotes significance at 5% level

of the variation and the other two explained only .02%.

Other combinations of variables which might be of interest to the reader can be found in the appendix. They were not included in this section because of some unnecessary duplication which would be involved.

LENDER GROWTH

The purpose of this section was to determine if the lending capacity of banks had kept pace with the farmer's demand for credit. The information was obtained from a questionnaire which was sent to the sample farms and from information on record at the Kansas Bankers Association office in Topeka. There were 56 questionnaires returned by the farmers in Association 1 and 76 returned by those in Association 2.

The banks which the farmers listed as their sources of credit were broken down into six classifications according to their total deposits. The classifications were made according to the 1955 data and all percentages used in Table 28 are based on these figures. The largest number of banks in both associations were in the lower classes, and actually the first three classes in both associations contained practically all the banks. In Association 1, 22 banks were in the first three classes and the last three classes contained two farms. The same general pattern was evident in Association 2 because the first three classes contained 25 banks and the remaining three had only seven. There were no banks in the 6.0-7.9 class for either association in 1955. The next column in the table deals with the capital and surplus of the banks. Capital and

TABLE 28
CHANGES IN SELECTED ITEMS ON BANK STATEMENTS 1955-1963

Size of Bank in Millions of Dollars	Number in Class	Percentages in all cases				Ratio of Loans to Deposits	
		Capital and Surplus	Total Size of Bank	Total Deposits	Total Loans	1955	1963
0-1.99	8	79.4	81.3	80.5	198.6	31.0	51.3
2-3.9	10	84.2	62.4	61.7	263.7	31.2	70.2
4.0-5.9	4	70.5	49.6	44.7	103.9	34.6	48.8
6.0-7.9	0	0	0	0	0	0	0
8.0-9.9	1	66.7	48.7	42.9	100.4	31.6	44.3
10.0 and over	1	170.0	67.7	63.1	159.1	31.9	50.6
All Classes	24	87.6	60.5	57.5	177.5	32.2	56.8
Association 2							
0-1.99	11	65.2	78.2	76.9	118.6	39.4	48.7
2-3.9	6	100.7	47.8	45.9	92.7	32.6	43.1
4.0-5.9	8	92.9	56.1	54.0	165.3	26.3	45.2
6.0-7.9	0	0	0	0	0	0	0
8.0-9.9	3	100.0	57.1	54.8	90.9	39.2	48.4
10.0 and over	4	159.6	62.1	55.2	270.9	30.1	71.9
All Classes	32	99.8	36.8	32.3	168.4	30.9	62.6

Percentage increases from 1955 to 1963 are of 1955 figures

surplus are very important because they determine the size of a loan which can be granted to any one individual. Section 5200 of the National Bank Act limits the size of a loan to any customer at 25 per cent of capital and surplus on feeder-cattle loans and at 10 per cent on real-estate loans. Because the amount of investment required for a satisfactory farming operation has been increasing, this implies that banks' capital and surplus must also increase if they are going to be able to make loans of sufficient size to farmers. The data from the banks used here indicated that there was an increase in their capital and surplus. For example in Association 1 the percentage increase for all classes was 87.6. The percentages ranged from a high of 170.0 in the last class to 66.7 in the next to the last class. In Association 2 the average of 99.8 for the entire Association indicated that the capital and surplus had doubled from 1955 to 1963. This means essentially that the size of a loan which could be granted to any one customer had also doubled. These values ranged from a high of 159.6 in the last class to the low of 65.2 in the first class. These percentages indicated that there had been a substantial increase in the capital and surplus of the banks which allows for the possibility of larger individual loans.

The table also indicated that bank size had increased substantially. In Association 1 the largest increase was 81.3 per cent in the first class and the average increase for all classes was 60.5 per cent. The percentages for Association 2 followed approximately the same pattern. The

largest increase was 78.2 per cent in the first class with the next highest being 62.1 per cent in the last class. However, the percentage increase for the entire Association was only 36.8 per cent as compared to the 60.5 per cent increase in Association 1. The increase in bank size is of importance because this allowed the banks to do a larger volume of loaning business in 1963 than was possible in 1955.

Part of the explanation of the increase in bank size was evident in the total deposits column since total deposits is the major determinant of bank size. These figures contain both checking account deposits and savings account deposits. Since total deposits are the greatest determinant of size therefore, the amount of total deposits determines the number and amount of direct loans which can be made by a bank. Due to the fact that total deposits are the major determinant of size it would be expected that the two columns of total size and total deposits would increase about the same amount. This proved to be true because in no case was the difference between the two columns greater than 4.9 per cent.

The total loans column indicated that the percentage increase in loans was greater than the percentage increase in total deposits. In fact total loans increased for all classes by 177.5 per cent in Association 1 and 168.4 per cent in Association 2. This represented an annual increase of 19.8 per cent in Association 1 and 18.7 per cent in Association 2. The largest percentage increases were 263.7 per cent in the second class in Association 1 and 270.9 per cent in the last

class in Association 2. The lowest percentage increase for either Association was 90.9 per cent in Association 2. In all the classes loans increased more than deposits. Part of the reason for the larger increase in loans as compared to deposits was due to large amounts of excess reserve in these banks in 1955. The next column which shows the ratio of loans to deposits indicated that these excess reserves diminished from 1955 to 1963.

A high ratio of loans to deposits is looked upon with scrutiny by bank examiners and some of the classes in both associations were approaching the limit. Some of these ratios indicated that many of the banks were already loaning at full capacity. This may infer that farmers may find it more difficult to get loans from these banks unless the banks can establish correspondent relationships or find other means to obtain funds. In 1955 with the exception of one class all other classes had ratios ranging between 30-39 per cent. By 1963, the lowest ratio was 43.1 per cent and the highest was 71.9 per cent in the last class in Association 2. The second class in Association 1 also had a ratio of 70.2 per cent. These ratios are very high and it is questionable whether these banks should push these ratios any higher. Excluding these two high classes there were two classes in Association 1 which were in the 40 per cent range and two in the 50 per cent range. In Association 2 with the exception of the high value in the last class all other classes were in the 40 per cent range. While it is evident that the ratio of loans to

deposits increased from 1955 to 1963, some classes could still
expand their loans while others had already exceeded the limit
and others were approaching it. However, there were more
banks in Association 2 which could expand than was the case in
Association 1.

Lender Importance. Table 29 lists the various types of
agencies which were mentioned on the questionnaire. The
farmers were asked to rank each institution as to whether it
was the first of second most important source of credit. This
was done for both real-estate and short-term loans. Twenty-
one farmers in Association 1 listed the Federal Land Banks as
their most important source of real-estate credit. Individuals
were the next most important source for the association
followed by insurance companies and commercial banks. In
Association 2 a total of 15 farmers listed the Federal Land
Banks as their most important source, 11 listed insurance
companies, eight listed individuals and six listed commercial
banks. It is evident from the study that the Federal Land
Banks were supplying a largest amount of real-estate credit.

Commercial banks were the most important source of
short-term loans. For example in Association 1, thirty-one
farmers listed commercial banks as their primary suppliers of
short term credit. The P.C.A.'s were listed by 17 and
merchants, dealers, individuals and credit unions were listed
as the most important source by only five farmers. The
numbers for Association 2 show that 53 used commercial banks,

TABLE 29

LISTING OF VARIOUS LENDING AGENCIES ACCORDING TO THEIR IMPORTANCE

Real-estate Loans

	Commercial Bank		Federal Land Bank		Insurance Company		Mortgage Company		Individuals		Others	
	Most important source	Second important source	Most important source	Second important source	Most important source	Second important source	Most important source	Second important source	Most important source	Second important source	Most important source	Second important source
Number of Farms Listing												
Association 1	3	2	21	1	5	0	0	0	8	2	0	1
Association 2	6	0	15	0	11	1	3	0	8	0	3	0

Short-Term Loans

	Commercial Bank		Production Credit Association		Merchants, Dealers, Individuals, Credit Unions		Other	
	Most important source	Second important source	Most important source	Second important source	Most important source	Second important source	Most important source	Second important source
Number of Farms Listing								
Association 1	31	1	17	0	5	4	0	1
Association 2	53	1	3	2	1	7	2	1

three used P.C.A.'s and three used other sources. The
questionnaire thus indicated that commercial banks were
unquestionably the principal source of short-term credit and
Federal Land Banks were the most important source of real-
estate credit.

Credit Source Changes. The purpose of Table 30 was to
determine if the farmers major source of credit changed from
1959 to 1963.

TABLE 30
CHANGES IN SOURCES OF CREDIT FROM 1959-1963

	Did Your Major Source of Credit Change from 1959 to 1963?		
	No	Yes	No Response
	Number of Farmers Answering		
Association 1	43	3	10
Association 2	49	2	5

The data showed that the major sources remained virtually
unchanged from 1959 to 1963. In Association 1, only three
farmers indicated that they had changed major sources for
either real-estate or short-term while 43 farmers indicated
that they had not changed. In Association 2 only two farmers
changed sources of credit while 49 remained with the same major
source. Of these five farmers in both Associations which
changed sources, one used no credit in 1959 and he obtained it
from an insurance company in 1963, one changed from a bank to

a P.C.A., another used no credit and went to a bank, another changed from a P.C.A. to a bank and the last used no credit in 1959 and obtained his from a credit union in 1963.

Credit Insurance. Another facet of credit which was analyzed in this study was the availability and use of credit insurance and this is shown in Table 31. This type of insurance provides that the debt will be paid off should something happen which would make it impossible for the operator to repay the loan. In Association 1, there were 36 farmers who reported it was available, 5 reported it was unavailable and 15 farmers made no response to the question. Thirty farmers reported the insurance was available on short-term loans and 11 said it was available on real-estate loans. The next question was to determine how many of the farmers were actually using the insurance. It was discovered that 20 were using it, 26 were not using it and there was no response from 10 farmers.

In Association 2, thirty-three reported that credit insurance was available while 12 reported it was unavailable and 31 did not respond to the question. Once again a larger number reported it was available on short-term capital. Only a small percentage of the Association 2 farmers used it. Only 11 out of the 76 farms reporting used the insurance, 48 did not use it and there was no response from 17 of them.

This indicated that credit insurance was available for the majority of the farmers if they wished to use it. However,

TABLE 31

CREDIT INSURANCE AVAILABILITY AND USE

	Questionnaire Returned	Is Credit Insurance Available?			Which type of loan		Do You Use it?		
		Yes	No	No Response	Operating	Real-estate	Yes	No	No Response
		Number of Farmers Reporting							
Association 1	56	36	5	15	30	11	20	26	10
Association 2	76	33	12	31	21	12	11	48	17

the indications were that the largest per cent of them did not

consider it worthwhile to purchase the insurance.

SUMMARY AND CONCLUSIONS

This thesis was comprised of several different sections each of which analyzed the farmer's capacity to use credit. The first of these was concerned with the growth of factors affecting agricultural loans. The second section analyzed the factors by class and provided a much more detailed examination of the financial condition of the farmers. The third section was multiple regression analysis which was included to provide more concrete information on the importance of the factors. The final section analyzed the growth of those institutions which lend to farmers.

The nine year analysis of total investment managed indicated that the averages for the both Associations increased by a significant amount. It also showed that the amount of investment managed in the lower investment managed classes decreased while there were large percentage increases in the higher investment managed classes.

The fact that total investment managed increased shows that the farmers moved into higher farm classes during the later years of the study. However, in Association 1 the largest group of farmers made no class movement and the next largest group moved up one class. In Association 2 the greatest movement was up one class. There was the tendency

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for class movement in Association 1 to fluctuate more widely than the movement in Association 2.

In Association 1 the working capital investment tended to level off between the $60,000-$79,999 level. In Association 2, no such leveling off point was evident and in fact the over $80,000 class showed substantial increases in numbers from 1955-1963.

Often increases in total investment managed can be attributed to increases in the price level and land values. Information obtained from the State Statisticians office supported the hypothesis that land values did increase, but not all of the increase in total investment managed and real-estate managed could be attributed to increased land values. Total investment managed increased more than the rise in land values. Most of the increases in total investment owned was due to the increases in working capital.

The factors, average total investment managed, average real-estate investment, average working capital investment, average net farm income and average returns to labor and management were analyzed by time series analysis to determine the significance of their increases. All of the factors did show a significant increase. Since each of these factors plays an important part in determining the amount of credit which can be used we can conclude that the farmer's capacity to use credit did increase.

Total debt for both Associations increased over the nine years. There was a tendency for both total and average

debt to increase for the higher investment managed classes and decrease for the lower investment managed classes. Time series analysis showed that average farm debt increased significantly in Association 1 but although it increased in Association 2 the test did not prove significant due to the large variance in this association. Debt as a percentage of total investment managed increased more in the higher investment managed classes than it did in the lower investment managed classes.

The next section of the thesis was a detailed analysis of the factors for only the year 1963. In Association 1 the greatest amount of total investment owned was clustered around the middle classes. Investment in real-estate capital was greater than the investment in working capital in the first five classes. Starting with class 6 investment in working capital became larger than the investment in real-estate capital. The largest amount of total investment owned in Association 2 existed in the higher investment owned classes. In this Association working capital owned was smaller than real-estate owned up through the first eight classes. This suggested that a large amount of real-estate was rented by the larger operators.

Average net farm income increased along with the increase in total investment managed. Average off-farm income followed a U-shaped pattern because it was higher in both the lower and higher investment managed classes than it was in the middle classes.

In both associations there were more farmers in the
higher equity ranges in real-estate capital than in working
capital. The 75-100.0 equity range contained more farmers
than any other range.

The analysis of the various percentages led to the
following conclusions. There was no relationship between size
of operation and ratio of assets to liabilities. The working
capital assets to working capital liabilities and the fixed
assets to fixed liabilities indicated that farmers were
incurring more debt in relation to working capital assets than
they were in relation to fixed assets. A percentage which
indicated the efficiency of the business was the amount of net
income per dollar of investment. There was some indication
that size and efficiency were related. The highest value for
net income to total investment managed was in class 7. Net
income as a per cent of total investment managed was used to
determine if there was a point of diminishing returns to
capital investment. If such a point existed it was most
likely at Class 7 which was the range between $150,000-
$174,999 investment managed.

The analysis of the section dealing with the amount of
a loan which would be supported from net income after a
deduction of 70% for living expenses showed that the amount of
net income available for debt retirement increased as the
total investment managed also increased. It was shown that
those farmers with the largest investment managed could
support the largest amount of additional loans.

The following are the conclusions from the section containing the multiple regression problem. The simple correlations demonstrated that working capital was a more important determinant of loan than was real-estate capital or total capital. There was no correlation between equity and debt which was likely due to the fact that debt was already incurred before the data was obtained. This made it impossible to determine the effect of equity at the time the loan was granted. It is doubtful if off-farm income had any effect on debt. The amount of credit used showed an inverse relationship to age of operator.

The multiple regression problem involving working capital owned, real-estate capital owned, net farm income, off-farm income and age of operator indicated that all of these variables with the exception of real-estate owned were important determinates of debt in Association 1. However, net farm income and age of operator were negatively related indicating that as debt increased there was a decrease in these variables. In Association 2, only the working capital owned figure proved to be significant.

When the same combination was used except that equity figures were used in place of working capital owned and real-estate capital owned the regression once again showed that equity had neither a positive or negative effect.

The tables contained in the appendix testing the equality of the means and variances for the different classes of the two Associations indicated some interesting results.

In a few instances the means and variances were significantly different but in most cases there were no significant differences between Associations. Therefore, in future research instead of keeping the Associations separate as was done in this thesis they can be grouped into one group and not alter the results. Only in a few instances were the average values for any variable in the two Associations proven to be significantly different. This fact can be of value to future research with Farm Management data.

The section on lending agencies lead to some interesting conclusions. The banks increased their capital and surplus which means they could make larger loans to any one individual in 1963. There was also an increase in bank size which was largely due to the increased demand deposits. A fact which needs serious consideration is that from 1955 to 1963 the percentage increase in loans was greater than the percentage increase in total deposits. This means that in 1963 banks had a higher ratio of loans to deposits than they did in 1955. Some banks had expanded to their limit but the majority were still capable of increasing their loans.

This study also revealed that Federal Land Banks were handling the largest number of real-estate loans while commercial banks were handling the greatest number of working capital loans.

The final part of the thesis investigated the availability and use of credit insurance. Although credit

insurance was available to the majority of the farmers only

a few made use of the service.

ACKNOWLEDGEMENTS

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APPENDIX

TABLE 32
INVESTMENT IN WORKING CAPITAL BY NUMBER AND PERCENTAGE OF FARMS IN EACH CATEGORY

Class	Association 1							Association 2						
	1955	1957	1959	1960	1961	1962	1963	1955	1957	1959	1960	1961	1962	1963
I. ($0-19,999)														
Number of farms	59	74	48	51	42	42	38	35	46	27	28	31	21	20
Per cent of total	45	57	36	38	31	31	28	35	44	26	28	30	21	19
II. ($20,000-39,999)														
Number of farms	60	49	51	52	59	54	57	53	45	48	44	41	44	44
Per cent of total	46	38	38	39	43	40	42	53	43	46	44	40	44	43
III. ($40,000-59,999)														
Number of farms	8	3	26	19	25	26	20	8	9	15	11	14	16	18
Per cent of total	6	2	19	14	18	19	15	8	9	14	11	14	16	18
IV. ($60,000-79,999)														
Number of farms	1	1	4	6	5	8	16	2	2	5	8	10	11	10
Per cent of total	1	1	3	5	4	6	12	2	2	5	8	10	11	10
V. (over $80,000)														
Number of farms	3	3	5	5	5	5	6	2	2	9	8	6	9	11
Per cent of total	2	2	4	4	4	4	5	2	2	9	8	6	9	11
Total														
Number of farms	131	130	134	133	136	135	137	100	104	104	99	102	101	103
Per cent of farms	100	100	100	100	100	100	100	100	100	100	100	100	100	100

TABLE 33
REAL-ESTATE MANAGED BY THE NUMBER AND PER CENT OF FARMS IN EACH CLASS

Class	Association 1							Association 2						
	1955	1957	1959	1960	1961	1962	1963	1955	1957	1959	1960	1961	1962	1963
I.														
Number of farms	22	27	10	9	7	7	11	2	2	0	1	0	1	0
Per cent of total	17	21	8	7	5	5	8	2	2	0	1	0	1	0
II.														
Number of farms	72	68	68	60	57	52	46	25	14	11	9	10	7	5
Per cent of total	55	52	51	45	42	39	34	25	14	11	9	10	7	5
III.														
Number of farms	27	25	41	39	41	38	39	31	34	22	18	16	13	16
Per cent of total	21	19	31	29	30	28	29	31	33	21	18	16	13	15
IV.														
Number of farms	5	6	6	15	18	20	23	24	22	29	29	23	24	26
Per cent of total	4	5	5	11	13	15	17	24	21	28	29	23	24	25
V.														
Number of farms	4	4	5	7	6	7	9	13	18	22	23	22	22	21
Per cent of total	3	3	4	5	5	5	7	13	17	21	23	22	22	20
VI.														
Number of farms	1	0	3	1	2	3	1	3	8	11	9	17	17	14
Per cent of total	1	0	2	1	2	2	1	3	8	11	9	17	17	14
VII.														
Number of farms	0	0	1	2	3	6	5	2	2	3	3	6	8	7
Per cent of total	0	0	1	2	2	5	4	2	2	3	3	6	8	7
VIII.														
Number of farms	0	0	0	1	1	1	1	0	0	3	3	1	2	7
Per cent of total	0	0	0	1	1	1	1	0	0	3	3	1	2	7
IX.														
Number of farms	0	0	0	0	0	1	2	1	4	3	5	7	7	8
Per cent of total	0	0	0	0	0	1	2	1	4	3	5	7	7	8
Total														
Number of farms	131	130	134	134	135	135	137	101	104	104	100	102	101	104
Per cent of farms	100	100	100	100	100	100	100	100	100	100	100	100	100	100

TABLE 34
TOTAL INVESTMENT MANAGED, REAL-ESTATE MANAGED AND WORKING CAPITAL MANAGED FOR 1963

Class	Total Investment Managed			Real-estate Managed			Working Capital Managed		
	Total	Average	Per cent of total	Total	Average	Per cent of total	Total	Average	Per cent of total
Class 1									
Association 1	0	0	0	0	0	0	0	0	0
Association 2	0	0	0	0	0	0	0	0	0
Class 2									
Association 1	536,851	41,296	3.9	314,414	24,186	3.5	222,467	17,113	4.4
Association 2	48,750	48,750	0.3	30,000	30,000	0.2	18,750	18,750	0.4
Class 3									
Association 1	2,240,413	60,552	16.1	1,479,296	39,981	16.7	797,923	21,566	15.8
Association 2	321,645	64,329	1.9	260,709	52,142	2.1	60,936	12,187	1.4
Class 4									
Association 1	3,224,374	87,145	23.2	2,115,992	57,189	23.8	1,108,383	29,956	21.9
Association 2	1,102,459	91,872	6.6	781,717	65,143	6.3	320,742	26,729	7.3
Class 5									
Association 1	1,438,367	110,644	10.3	966,227	74,325	10.9	472,130	36,318	9.3
Association 2	3,045,598	112,800	18.2	2,335,875	86,514	18.9	709,723	26,286	16.2
Class 6									
Association 1	2,082,956	138,864	15.0	1,297,362	86,491	14.6	785,594	52,373	15.6
Association 2	1,907,139	136,224	11.4	1,482,119	105,866	12.0	452,020	32,287	10.3
Class 7									
Association 1	1,585,860	158,586	11.4	914,335	91,434	10.3	671,525	67,153	13.3
Association 2	2,095,415	161,186	12.5	1,594,194	122,630	12.9	501,221	38,556	11.5
Class 8									
Association 1	732,945	183,236	5.3	510,938	127,735	5.8	222,007	55,502	4.4
Association 2	1,731,969	192,441	10.4	1,187,466	131,941	9.6	544,503	60,500	12.4
Class 9									
Association 1	2,053,792	256,724	14.8	1,283,389	160,424	14.4	770,403	96,300	15.3
Association 2	6,467,561	281,198	38.7	4,690,584	203,938	38.0	1,776,977	77,260	40.5
Total									
Association 1	13,894,448	101,427	100.0	8,881,953	64,832	100.0	5,050,432	36,865	100.0
Association 2	16,720,536	160,774	100.0	12,362,664	118,872	100.0	4,384,872	42,162	100.0

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TABLE 35
TESTS OF EQUALITY OF μ AND σ^2 FOR INVESTMENT OWNED AT 5% LEVEL

	Average Total Investment Owned				Average Fixed Capital Owned				Average Working Capital Owned			
	$H_0(\sigma_1^2 = \sigma_2^2)$		$H_0(\mu_1 = \mu_2)$		$H_0(\sigma_1^2 = \sigma_2^2)$		$H_0(\mu_1 = \mu_2)$		$H_0(\sigma_1^2 = \sigma_2^2)$		$H_0(\mu_1 = \mu_2)$	
	F Value	Significance	T Value	Significance	F Value	Significance	T Value	Significance	F Value	Significance	T Value	Significance
Class 1	--	--	--	--	--	--	--	--	--	--	--	--
Class 2	--	--	--	--	--	--	--	--	--	--	--	--
Class 3	2.03	NS	.919	NS	1.78	NS	.264	NS	4.06	NS	1.717	NS
Class 4	5.54	S	.667	NS	3.04	S	.413	NS	3.19	S	.568	NS
Class 5	1.04	NS	1.574	NS	1.32	NS	.358	NS	1.82	NS	2.412	S
Class 6	1.05	NS	1.878	NS	1.02	NS	.329	NS	2.74	NS	3.672	S
Class 7	1.35	NS	1.051	NS	1.15	NS	.857	NS	5.73	S	2.252	S
Class 8	1.93	NS	1.321	NS	1.16	NS	.545	NS	1.14	NS	.411	NS
Class 9	2.92	NS	2.240	S	2.46	NS	2.363	S	1.84	NS	1.101	NS
Total	1.42	Accept	2.462	S	1.59	NS	2.657	S	1.21	NS	1.419	NS

TABLE 36

TESTS OF EQUALITY OF μ AND σ^2 FOR FARM INCOME AT 5% LEVEL

	Gross Farm Income				Net Farm Income				Average Farm Income			
	$H_o(\sigma_1^2 = \sigma_2^2)$		$H_o(\mu_1 = \mu_2)$		$H_o(\sigma_1^2 = \sigma_2^2)$		$H_o(\mu_1 = \mu_2)$		$H_o(\sigma_1^2 = \sigma_2^2)$		$H_o(\mu_1 = \mu_2)$	
Class	F Value	Signif-icance	T Value	Signif-icance	F Value	Signif-icance	T Value	Signif-icance	F Value	Signif-icance	T Value	Signif-icance
Class 1	Can't	Compare	Can't	Compare	Can't	Compare	--	--	Can't	Compare	Can't	Compare
Class 2	Can't	Compare	Can't	Compare	Can't	Compare	--	--	Can't	Compare	Can't	Compare
Class 3	1.84	NS	1.690	NS	2.85	NS	.564	NS	6.42	NS	.28	NS
Class 4	2.03	NS	1.427	NS	1.01	NS	.130	NS	3.28	S	2.19	NS
Class 5	2.17	NS	3.187	S	1.83	NS	.048	NS	8.15	S	2.18	S
Class 6	1.68	NS	1.664	NS	1.72	NS	.108	NS	10.04	S	3.29	S
Class 7	17.61	S	.800	NS	3.58	S	.778	NS	6.31	S	1.57	NS
Class 8	1.19	NS	0.371	NS	1.18	NS	.344	NS	5.93	NS	.501	NS
Class 9	1.07	NS	0.501	NS	2.19	NS	.852	NS	1.50	NS	.245	NS
Total	1.00	NS	1.355	NS	1.01	NS	.556	NS	2.32	S	1.98	NS

TABLE 37
TESTS OF EQUALITY OF ω AND σ^2 FOR EQUITY VALUES AT 5% LEVEL

	Equity in Working Capital Owned in Dollars				Equity in Fixed Capital Owned in Dollars				Equity in Total Capital Owned in Dollars			
	$H_o(\sigma_1^2 = \sigma_2^2)$		$H_o(\omega_1 = \omega_2)$		$H_o(\sigma_1^2 = \sigma_2^2)$		$H_o(\omega_1 = \omega_2)$		$H_o(\sigma_1^2 = \sigma_2^2)$		$H_o(\omega_1 = \omega_2)$	
Class	F Value	Signif- icance	T Value	Signif- icance	F Value	Signif- icance	T Value	Signif- icance	F Value	Signif- icance	T Value	Signif- icance
Class 1	--	--	--	--	--	--	--	--	--	--	--	--
Class 2	--	--	--	--	--	--	--	--	--	--	--	--
Class 3	3.36	NS	1.457	NS	1.07	NS	.286	NS	1.04	NS	.854	NS
Class 4	1.33	NS	.422	NS	2.31	NS	.164	NS	1.98	NS	.315	NS
Class 5	6.79	S	1.146	NS	1.02	NS	.124	NS	2.52	S	.314	NS
Class 6	1.03	NS	.635	NS	1.76	NS	.123	NS	1.70	NS	.218	NS
Class 7	2.64	NS	.727	NS	2.00	NS	.766	NS	2.24	NS	.309	NS
Class 8	2.17	NS	.920	NS	1.52	NS	1.248	NS	2.74	NS	.998	NS
Class 9	3.17	S	1.538	NS	1.01	NS	1.480	NS	1.23	NS	1.769	NS
Total	1.06	NS	2.047	S	1.80	NS	3.053	S	1.40	NS	3.041	S

TABLE 38
TESTS OF EQUALITY OF ω AND σ^2 FOR FARM INVESTMENT AT 5% LEVEL

Class	Total Farm Investment				Real-estate Managed				Working Capital Managed			
	$H_0(\sigma^2_1 = \sigma^2_2)$		$H_0(\omega_1 = \omega_2)$		$H_0(\sigma^2_1 = \sigma^2_2)$		$H_0(\omega_1 = \omega_2)$		$H_0(\sigma^2_1 = \sigma^2_2)$		$H_0(\omega_1 = \omega_2)$	
	F Value	Signif-icance	T Value	Signif-icance	F Value	Signif-icance	T Value	Signif-icance	F Value	Signif-icance	T Value	Signif-icance
Class 1	--	--	--	--	Can't Compare		Can't Compare		--	--	--	--
Class 2	--	--	--	--	Can't Compare		Can't Compare		--	--	--	--
Class 3	1.20	NS	1.164	NS	1.53	NS	2.931	S	4.06	NS	1.717	NS
Class 4	1.01	NS	2.228	S	2.47	S	1.700	NS	3.19	S	.568	NS
Class 5	1.03	NS	.927	NS	2.21	NS	2.643	S	1.82	NS	2.412	S
Class 6	1.38	NS	1.101	NS	1.33	NS	3.039	S	2.74	NS	3.672	S
Class 7	1.41	NS	.826	NS	2.66	NS	3.266	S	5.73	S	2.252	S
Class 8	1.78	NS	2.445	S	1.09	NS	.115	NS	1.14	NS	.411	NS
Class 9	5.22	S	.954	NS	4.16	S	2.197	S	1.84	NS	1.101	NS
Total	2.41	S	6.197	S	2.87	S	1.977	S	1.21	NS	1.419	NS

TABLE 39
TESTS OF EQUALITY OF ω^1 AND σ^{-2} FOR FARM DEBT AT 5% LEVEL

	Debt on Working Capital, 1963				Debt on Real-estate Capital				Total Debt			
	$H_o(\sigma^2_1 = \sigma^2_2)$		$H_o(\omega_1 = \omega_2)$		$H_o(\sigma^2_1 = \sigma^2_2)$		$H_o(\omega_1 = \omega_2)$		$H_o(\sigma^2_1 = \sigma^2_2)$		$H_o(\omega_1 = \omega_2)$	
Class	F Value	Signif-icance	T Value	Signif-icance	F Value	Signif-icance	T Value	Signif-icance	F Value	Signif-icance	T Value	Signif-icance
Class 1	Can't	Compare	--	--	Can't	Compare	Can't	Compare	Can't	Compare	Can't	Compare
Class 2	Can't	Compare	--	--	Can't	Compare	Can't	Compare	Can't	Compare	Can't	Compare
Class 3	1.41	NS	.638	NS	1.49	NS	.056	NS	1.06	NS	.425	NS
Class 4	1.44	NS	1.430	NS	1.01	NS	1.259	NS	1.93	NS	1.449	NS
Class 5	1.14	NS	1.753	NS	1.78	NS	1.126	NS	1.79	NS	1.844	NS
Class 6	5.52	S	2.409	S	1.05	NS	1.082	NS	2.82	NS	2.275	S
Class 7	4.66	S	3.086	S	2.42	NS	.438	NS	2.91	NS	2.212	S
Class 8	2.30	NS	.335	NS	2.48	NS	.907	NS	4.42	NS	.737	NS
Class 9	1.79	NS	.157	NS	2.46	NS	1.504	NS	2.40	NS	.681	NS
Total	1.27	NS	.005	NS	1.02	NS	.428	NS	1.14	NS	.175	NS

TABLE 40
MULTIPLE REGRESSION FOR SELECTED FACTORS

Variable	F	R^2	R	Beta	Beta Prime	T	F	R^2	R
Association 1									
3	50.8519*	.2736	.5231	.3535	.6951	8.3331*	23.3029*	.4139	.6433
7	12.4896*	.3355	.5793	-1.1245	-.2657	-3.3083*			
8	.0721	.3359	.5796	.3595	.0438	.6243			
9	17.5616*	.4139	.6433	-742.4838	-.2838	-4.1907*			

$$Y = 42{,}812.0880 + .3535x_3 - 1.1245x_7 + .3595x_8 - 742.4838x_9$$

Variable	F	R^2	R	Beta	Beta Prime	T	F	R^2	R
Association 2									
3	41.4234*	.2888	.5374	.2790	.6146	6.7643*	14.6851*	.3724	.6102
7	3.9968*	.3159	.5620	.5033	.1200	1.4352			
8	4.5673*	.3458	.5880	-1.1560	-.1953	-2.2937*			
9	4.1983*	.3724	.6102	-396.2452	-.1703	-2.0490*			

$$Y = 17{,}412.7730 + .2790x_3 + .5033x_7 - 1.1560x_8 - 396.2452x_9$$

*Denotes significance at 5% level

TABLE 41
MULTIPLE REGRESSION FOR SELECTED FACTORS

Variable	F	R^2	R	Beta	Beta Prime	T	Entire Equation F	R^2	R
Association 1									
6	.0405	.0003	.0173	-.0131	-.0220	-.2027	3.9058*	.1058	.3253
7	.9379	.0072	.0851	.4660	.1101	1.0713			
8	5.6772*	.0479	.2188	1.7888	.2180	2.5736*			
9	8.5533*	.1058	.3253	-660.3890	-.2524	-2.9246*			

$$Y = 53,968.6450 - .0131x_6 + .4660x_7 + 1.7888x_8 - 660.3890x_9$$

Variable	F	R^2	R	Beta	Beta Prime	T	Entire Equation F	R^2	R
Association 2									
6	.9923	.0096	.0982	.0473	.0881	.7889	2.3897	.0881	.2967
7	8.4527*	.0861	.2935	1.1399	.2717	2.7710			
8	.0580	.0866	.2944	-.1732	-.0293	-.2782			
9	.1525	.0881	.2967	-92.7265	-.0398	-.3905			

$$Y = 16,690.8760 + .0473x_6 + 1.1399x_7 - .1732x_8 - 92.7265x_9$$

*Denotes significance at 5% level

AN ANALYSIS OF SIZE OF FARM AND CAPACITY TO
USE CREDIT FOR SELECTED FARMERS IN CENTRAL KANSAS

BY

FARRELL ELVON JENSEN

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AN ABSTRACT OF A MASTER'S THESIS

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ABSTRACT

The purpose of this thesis was to analyze farmer's capacity
to use credit. The first objective was to examine factors which affect
the loan carrying capacity of farmers and to observe their growth or
decline over a number of years. Factors selected were total invest-
ment managed, real-estate managed, working capital managed, net farm
income, off-farm income, returns to labor and management and total
farm debt. Time series analysis was used to determine the signifi-
cance of the increases in these factors.

The second objective was to present a more detailed analysis
of these factors for only 1963 by farm class. Several percentages
were calculated for each class to assist in the determination of the
farmer's capacity to use credit. Net income as a percentage of total
investment owned and managed was used to determine if this percentage
either increased or decreased as total investment owned or managed
became larger.

The third objective was to conduct a multiple regression
analysis to determine which of all the factors selected for the
study were the most important in determining the amount of credit
which was used by farmers.

The fourth objective was to examine progress of commercial
banks in developing their assets to meet the demand of farmers for

for credit.

The sample for the study was composed of those farmers in
the Kansas Farm Management Associations I and 2 who were in these
Associations at least eight out of the nine years from 1955 to
1963.

Data used were obtained from three sources. The major
part was obtained from Farm Management records. A questionnaire
was sent to the farmers to obtain information concerning the agen-
cies from which they received their credit. The final source of
information was the Kansas Bankers Association in Topeka.

The analysis showed that total investment managed in-
creased by a significant amount for both Associations. The largest
group of farmers who had increases just increased one class. This
amounted to an average approximate increase of $25,000 because the
classes were established at $25,000 intervals starting with class
I which ranged from $0 to $24,999.

It was discovered that working capital increased at a
faster rate than did real-estate capital. This caused working cap-
ital to be the larger part of total investment managed in the higher
classes. The other factors used in objective I also increased sig-
nificantly which was tested by time series analysis.

The next section indicated that the largest number of farmers
had high net worth ratios. Farmers were incurring more debt in rela-
tion to their working capital assets than they were in relation to
real-estate assets. Net income as a percentage of total investment

managed indicated that if there was a point of maximum efficiency for these farms it was at class 7.

Most of the farmers could have supported additional loans from their net farm income after deductions for living expenses.

The section on the multiple regression analysis indicated that all of the variables with the exception of real-estate owned were important determinants of debt and credit.

The section on lending agencies shows that banks increased their capital and surplus from 1955 to 1963 which indicates that in the later years of the study they could make larger loans to any one individual. The percentage increase in loans was greater than the percentage increase in total deposits. This means that in 1963 banks were lending nearer full capacity than they were in 1955.

It was also discovered that Federal Land Banks were handling the largest number of real-estate loans while commercial banks were handling the greatest number of working capital loans.

The general conclusion from the thesis based on the analysis was that the farmer's capacity to use credit did increase over the years from 1955 to 1963.