FINANCIAL CONDITIONS FACILITATING GROWTH

IN

LOCAL FARMER COOPERATIVES

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A Thesis

Presented to

the Faculty of the Graduate School

University of Missouri - Columbia

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In Partial Fulfillment

of the Requirements for the Degree

Master of Science

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by

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May 1976

ACKNOWLEDGEMENTS

Mr. and Mrs. Emory L. Mathis, my parents, for their encouragement, support, and prayers throughout my educational journey.

Finally, my wife, Nancy, for her help in collecting the data for this study. And, more importantly, for her moral support and willingness to make sacrifices on my behalf. She has helped to make my graduate studies an enjoyable adventure.

I am thankful that God blessed my life with the presence of these people.

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CHAPTER I

INTRODUCTION

The future of every farmer cooperative depends upon growth.
Survival in a constantly changing economy requires growth. Without
growth, a cooperative cannot adequately serve the changing needs of
its member patrons or meet the changing demands of the business
environment. Growth is essential to the livelihood of a viable, on-
going cooperative business operation.

Cooperatives must grow to meet the needs of their members.
Farmer members are demanding more services and better quality ser-
vices from their cooperative. No longer can the cooperative busi-
ness just supply fertilizer to the farmer. The cooperative is
expected to run soil tests, suggest the appropriate fertilizer
application, and have the manpower and equipment to get the fertil-
izer on the fields at the best time. No longer can the cooperative
business just provide grain storage to the farmer. The farmer
member expects the cooperative to provide him with reliable market
information and dry his high moisture grain before it spoils.
Cooperatives will either grow to meet demands such as these or go
out of business. If cooperatives go out of business, their replace-
ments may not exhibit the same concern for farmers that a cooperative
would show.

Cooperatives must grow if they are to continue operating
in the changing business environments of today and the future. Price

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controls, fertilizer shortages, petroleum shortages, economic reces-
sion, inflated expenses, and excess inventories are examples of the
situations which must be faced by every cooperative business. Failure
to grow to meet the demands of this changing business environment can
leave a cooperative useless to its member farmers and bring death to
that cooperative.

How can cooperatives achieve the growth required of them?
They must identify the conditions which support growth and, with
knowledge of those conditions, develop plans which will enable them
to meet those conditions and achieve growth. In writing about
cooperative growth, Martin A. Abrahamsen states:

> A growth strategy involves such factors as underlying
> basic philosophy, operating plans, designs or procedures,
> role of new services, and financial plans. To be most
> effective, a growth strategy must be planned and adapted
> carefully to special and specific situations that confront
> each cooperative.[1]

Financial institutions which provide funds for farmer cooper-
atives examine each cooperative's financial conditions before making
a loan. It is common practice for financial institutions such as the
Banks for Cooperatives to scrutinize a cooperative's financial con-
ditions by making a detailed ratio analysis. A problem arises, however,
when agreement is sought on what financial ratios and conditions are
necessary for growth. The different financial institutions (Banks for

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[1] Martin A. Abrahamsen, Cooperative Growth: Trends, Compar-
isons, Strategy, Farmer Cooperative Service, U.S. Department of Agri-
culture, FCS Information 87 (Washington, D.C.: U.S. Government Printing
Office, March, 1973), p.87.

Cooperatives, local banks, insurance companies, some regional cooperatives, etc.) will suggest differing standards. This can easily confuse the management of a cooperative which is attempting to make plans for growth.

Financial management literature points to the importance of ratios in the financial management of a business. Financial ratios are used to describe the financial conditions of a business. They show what happened in the past, they tell what financial conditions presently exist, and they indicate where the business may be going in the future. An examination of the financial ratios of growing firms versus those of non-growing firms will give a description of the financial conditions present in growing business operations versus those present in non-growing business operations. Descriptions of these different conditions will aid the financial manager who is attempting to plan for growth.

Objectives

The main objective of this study is to identify and describe the financial conditions which support growth in local farmer cooperatives in the Plains States and the Midwestern States. Achieving the following sub-objectives is essential to achievement of the main objective.

1. Determine a growth measure for local farmer cooperatives and identify financial ratios which have a strong relationship to growth in local farmer cooperatives.

2. Construct a model for predicting growth in local

farmer cooperatives. The hypothesis inherent in this

sub-objective is: A growth model constructed from

financial ratios can predict growth or non-growth of a

local farmer cooperative.

3. Use financial ratios to describe the financial

conditions which support growth in local farmer

cooperatives.

Literature Review

Cooperative Growth

Research examining cooperative growth with respect to

finances falls into three categories. There are statistical reports

about changes in business volume, assets, and savings. There are

studies which compare these statistics between geographic regions

and between different types of cooperatives such as marketing or

supply. Also, there are research findings which deal with the

financial methods and techniques used to enhance growth. All of

these are pertinent to this study which is attempting to describe

the financial conditions supportive to growth.

The Farmers Cooperative Service publishes information

about cooperatives. Griffin, an agricultural economist for FCS, has

constructed a financial profile of cooperatives in the United States

for 1970.[2] Her report shows how this profile has changed since 1962.

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[2]Nelda Griffin, A Financial Profile of Farmer Cooperatives in the United States, Farmer Cooperative Service, U.S. Department of Agriculture, FCS Research Report No. 23 (Washington, D.C.: U.S. Government Printing Office, October, 1972).

The report also disaggregates this information to correspond with the different types of cooperatives, the twelve farm credit districts, and the fifty states. She noted that the net assets of cooperatives increased from $4.8 billion in 1962 to $7.7 billion in 1970 and that the volume of business had grown from $17 billion to $24 billion.[3]

Abrahamsen, former Deputy Administrator of the Farmer Cooperative Service, made a report dealing specifically with cooperative growth. He showed the basic trends in cooperative growth noting that from 1950-51 to 1969-70 the number of marketing, farm supply, and related services cooperatives declined from 10,064 to 7,790 and the number of cooperative memberships decreased from 7.1 million to 6.4 million. During the same time period, however, he reported that the proportion of farm products marketed through cooperatives increased from 20 percent to 26 percent and the proportion of farm supplies provided by cooperatives increased from 12 percent to 16 percent.[4] Abrahamsen also compared cooperative growth by industry and developed some strategies for cooperative growth. He encouraged cooperatives to search for ways to facilitate growth.[5]

Recent studies examining financing methods and techniques which are useful to cooperatives planning growth include works by Fenwick, Dahl, and Garoian and Cramer. Fenwick found that a revolving fund period of six years interacting with growth rates of 5 percent or

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[3]Ibid., p.11-12.

[4]Abrahamsen, pp.92-94.

[5]Ibid., p.87.

8 percent could result in substantial savings for cooperatives which were using other revolving fund periods.[6] Dahl used linear programming models to find an optimal capital mix for Wisconsin cooperatives which, if achieved, would reduce capital costs and increase cash patronage refunds. Of the nine models used, he suggested that a model combining a forty percent cash patronage refund and a five year revolving fund plan might be most feasible for cooperatives to follow.[7] Garoian and Cramer examined the impact of merger on cooperative growth. They found that external growth accounted for 13 percent of the cooperative growth between 1940 and 1964. They also found both regional and local cooperatives expanded at a lower rate after merger.[8]

Financial Ratios as Predictors

The following summary about the present state of financial analysis is made by James Horrigan.

> From a negative viewpoint, the most striking aspect of
> the present state of ratio analysis is the absence of an

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[6] Richard S. Fenwick, Jr., "Capital Acquisition Strategies for Missouri Farm Supply Cooperatives," (Ph.D. dissertation, University of Missouri-Columbia, 1972), pp.119-124.

[7] Wilmer A. Dahl and W.D. Dobson, "Alternative Financing Strategies for Farm Supply Cooperatives," paper presented at annual meeting of the American Agricultural Economics Association, Columbus, Ohio, August, 1975.

[8] Leon Garoian and Gail L. Cramer, "Merger Component of Growth of Agricultural Cooperatives," American Journal of Agricultural Economics Vol. 50 (December, 1968):1472-1482.

explicit theoretical structure. Under the dominant approach of "pragmatical empiricism," the user of ratios is required to rely upon the authority of an author's experience. As a result, the subject of ratio analysis is replete with untested assertions about which ratios should be used and what their proper levels should be; and, similarly, the expected relationships of the various ratios with a quantification of some desired, or undesired, end have generally not been formulated. Studies have been conducted on the efficiency of ratios in predicting financial difficulties; but these have not been incorporated into literature. The bulk of the ratios analysis literature consists of instructions on how to compute ratios. All of these short-comings are unfortunate because a quantitative, utilitarian activity such as ratio analysis could lend itself very well to a rigorous development.

However, there is a positive side to ratios. A need does exist for analytical devices which will enable analysts to compare financial statements between firms and over time periods. The ratio fills that need as a simple, quick method of comparison. In addition, the available evidence suggests that ratios do have predictive value, at least in respect to financial difficulties. Thus, the ratio is certainly a very admirable device because it is simple and it has predictive value.[9]

In recent years, more studies have been made on the use of financial ratios as predictors.

Beaver found evidence that financial ratios could predict firm failure as early as five years prior to the event. He also found the predictive ability of different ratios to vary.[10]

Altman used multiple discriminant analysis to predict corporate bankruptcy. His model, which utilized four ratios, was

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[9]James C. Horrigan, "A Short History of Financial Ratio Analysis," Accounting Review XLIII (April, 1968):294.

[10]William H. Beaver, "Alternative Accounting Measures as Predictors of Failure," The Accounting Review XLIII (January, 1968): 113-122.

accurate up to two years prior to bankruptcy. He was encouraged by the improvement of his technique over the more common techniques of sequential ratio comparisons.[11]

Five different methods of analysis were tested by Edmister as he attempted to use a discriminant function to predict small business failure. He found that an average of the information from three consecutive financial statements would give a more highly discriminant function than would the information from any one single year. He used this averaging technique to smooth the ratios into a more representative figure than could be calculated from only one statement. Edmister also noted that a small group of ratios predicted better than any single ratio; but, ratios also tend to be related and thereby cause multicollinearity to become a problem.[12]

Elam, in a study of the effect of lease data on predictive ability, used linear probability models to predict the probability of bankruptcy. He found linear probability models to be more accurate predictors than multiple discriminant models. In both types of multivariate analysis, financial ratios were used to predict bankruptcy.[13]

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[11]Edward I. Altman, "Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy," The Journal of Finance XXIII (September, 1968):589-609.

[12]Robert O. Edmister, "An Empirical Test of Financial Ratio Analysis for small Business Prediction," Journal of Financial and Quantitative Analysis VII (March, 1972):1477-93.

[13]Al R. Elam, "The Effect of Lease Data on Predictive Ability," (Ph.D. dissertation, University of Missouri-Columbia, 1973).

Methodology

Sample Selection

The cooperatives selected for use in this study were from the states of Kansas and Iowa. Kansas cooperatives were chosen because they represent the type of agriculture found in the Plains States. Iowa cooperatives were chosen because they represent the more diversified agriculture of the Midwestern States. These two groups of cooperatives also represent differing cooperative philosophies and operate under differing legal restrictions.

The farmer cooperatives used in the study were selected through use of a random numbers table. In an effort to make the cooperatives selected comparable, regional cooperatives, livestock marketing cooperatives, and cooperatives specializing in only petroleum or fertilizer were excluded from each state's cooperative population. The Kansas population included all of the farmer cooperatives in the state except those mentioned above. The Iowa population included all of the farmer cooperatives which used the services of a particular auditing firm except for the previously mentioned exclusions. The auditing firm serves approximately 50 percent of the cooperatives in Iowa. All of the cooperatives selected from both states had a grain elevator operation and one or more of the following operations: feed and seed, petroleum, fertilizer, other farm supplies.

In 1965-66, the total number of grain and farm supply

cooperatives in Kansas was 299 and in Iowa was 393.[14] For this study, sixty cooperatives were selected from each state. In Kansas, fifty of the sixty agreed to participate. In Iowa, forty-nine of the sixty agreed to participate.

The geographic distribution of the two populations and the geographic distribution of the samples are shown in Figures 1 and 2. Both samples were representative of the cooperatives in their respective state.

In Kansas, it is interesting to note the void in the east central part of the state. No cooperatives have been organized in that area because it is the grassland of the Flint Hills. The agriculture of the area does not require the services of a farm supply or grain marketing cooperative. There is a similar void in the southeastern part of Iowa. It is also due to an agriculture which is mostly grassland and livestock.

The financial information on farmer cooperatives used in the study came from four annual audits. The audits were from fiscal years ending in these time periods:

Time Period A
{
Time Period 1 - Annual audit between

April 1, 1965 and March 31, 1966

Time Period 2 - Annual Audit between
}

April 1, 1966 and March 31, 1967

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[14] The total number of grain and farm supply cooperatives was found by adding the cooperatives classified as grain to those classified as farm supply in Statistics of Farmer Cooperatives 1965-66, FCS Research Report 1, FCS, USDA (Washington, D.C.: U.S. Government Printing Office, July, 1968), pp.4,6.
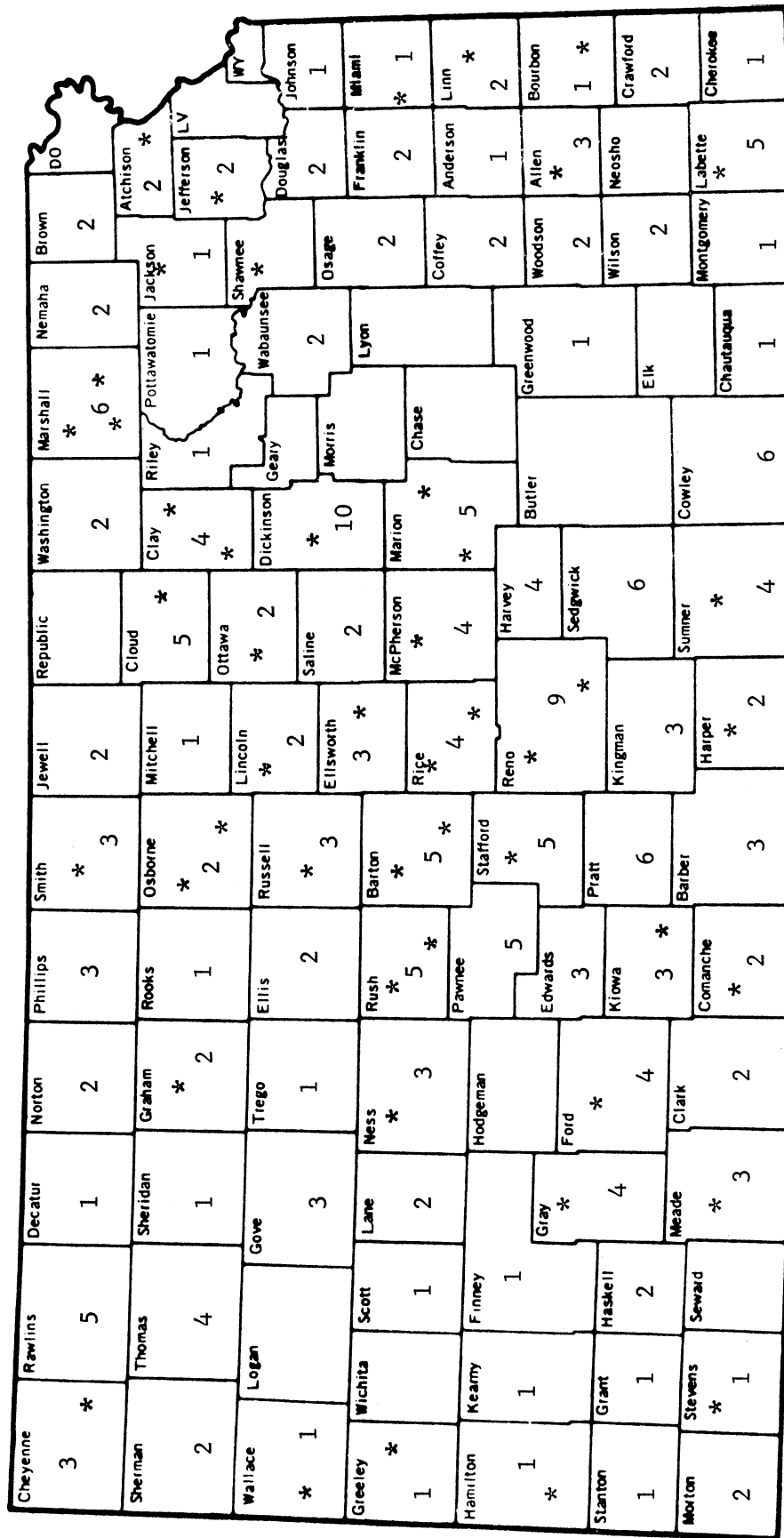
Note: Arabic numerals indicate the total number of grain and farm supply cooperatives in each county. Asterisks indicate the county location of the cooperatives participating in the study.

Figure 1.--Geographic Distribution of Grain and Farm Supply Cooperatives in Kansas by County, 1975.
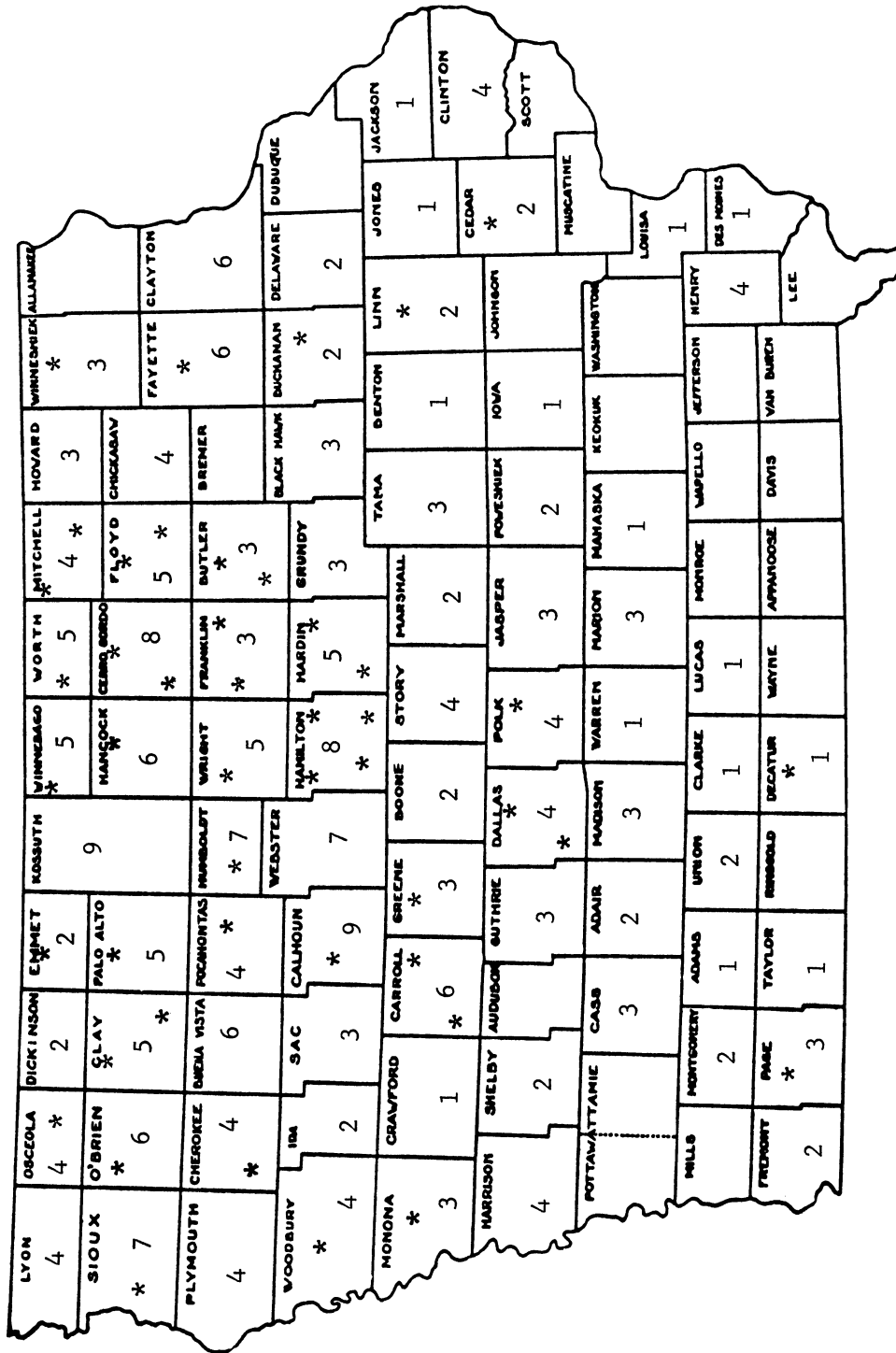
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Note: Arabic numerals indicate the total number of grain and farm supply cooperatives in each county. Asterisks indicate the county location of the cooperatives participating in the study.

Figure 2.--Geographic Distribution of Grain and Farm Supply Cooperatives in Iowa by County, 1975.

Time Period B

Time Period 3 - Annual audit between

April 1, 1973 and March 31, 1974

Time Period 4 - Annual audit between

April 1, 1974 and March 31, 1975

Before analyzing the audit information, data from the first two time periods was averaged[15] and data from the second two time periods was averaged. Averaging, a simple technique previously used by Edmister,[16] was done to minimize the year to year fluctuations caused by such things as farmers holding grain in anticipation of higher prices. The averaged information used in this research consisted of financial information from two time periods (A and B) approximately eight years apart.[17]

The specific financial information available for analysis is shown in Appendix A. All of the items listed on the mock balance sheet and statement of operations were obtained directly from the annual audits of the sample cooperatives.

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[15]There was one exception to this in both states. In Kansas, due to the unavailability of a December 1965 audit, audit information from December 1966 and December 1967 was used for time periods 1 and 2. In Iowa, due to the unavailability of a June 1965 audit, audit information from June 1966 and June 1967 was used for time periods 1 and 2. These substitutions had no significant effect since the information in time periods 1 and 2 was averaged.

[16]Edmister, p.1481.

[17]In seven cases in Kansas and four cases in Iowa, the audit date was changed between the first two time periods and the second two time periods. This caused the averaged information to be slightly more or slightly less than eight years apart.

Growth Measures

A measure which can be used to define growth must be established before a description of financial conditions supportive to growth can be made. After consulting with officers of several financial institutions and examining the literature on cooperative growth, six financial items were chosen for consideration as a growth measure. From these six, percent change in total assets was selected as the growth measure to be used in this research. The selection process included examinations of the statistical characteristics of the six measures and the correlation among the six measures.

Financial Ratios

The financial ratios used in this study were selected through a three-step process. A list of fifty-seven financial ratios dealing with many aspects of the balance sheet and operating statement was compiled from a review of financial management literature, discussions with officers of financial institutions, and the author's own creation. From this list, eighteen ratios advocated by the literature and people in financial management as having strong relationships to growth of the cooperative business were chosen for analysis. Based, in part, upon each ratio's significance in simple regression models, eleven ratios were selected for inclusion in the predictive growth model.

Growth Models

Two types of multivariate analysis were used to predict growth. Both types of analysis were applied to the Kansas sample and the Iowa sample.

The first type of analysis applied was multiple regression. The dependent variable was the growth measure, change in total assets. Eleven financial ratios were the independent variables. This analysis produced a growth model which was applied to the financial ratios of the sample cooperatives to predict the amount of growth expected to occur during the next eight years.

The second type of analysis involved a linear probability model. This technique of analysis is discussed by Goldberger[18] and, was used by Elam.[19] The coefficients resulting from the model were applied to the financial ratios to predict a conditional probability of growth occurring.

Financial Conditions

A descriptive analysis of the financial conditions existing in local cooperatives during Time Period A was made. Six groups of cooperatives were examined. They were:

1. The entire Kansas sample -- 50 cooperatives.

2. The entire Iowa sample -- 49 cooperatives.

3. The Kansas non-growth group -- 15 cooperatives.

4. The Kansas growth group -- 15 cooperatives

5. The Iowa non-growth group -- 15 cooperatives.

6. The Iowa growth group -- 15 cooperatives.

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[18] Arthur S. Goldberger, Econometric Theory (New York: John Wiley & Sons), pp.248-250.

[19] Elam, pp.42-44.

Most of the analysis was based upon average information in each group. In the four smaller groups, medians were compared with means to determine the skewness of each groups' distribution. Also, F-ratios were calculated to determine the significance of differences in means of the non-growth and growth groups. The last step in the analysis of financial conditions was an examination of the characteristics which were common to both Kansas and Iowa.

CHAPTER II

SELECTION OF A GROWTH MEASURE AND

RELATED FINANCIAL RATIOS

In this chapter, an examination is made of the financial
items considered for inclusion in a growth model. The growth
measure selected will be the dependent variable in the growth model.
The financial ratios strongly related to growth will be the inde-
pendent variables in the growth model.

Analysis of Growth Measures

Six financial items were selected for consideration as
the growth measure to be used in this research. In examining these
six items, growth was defined as the percent change in that financial
item from the base time period (Time Period A) to the ending time
period (Time Period B). The six measurements examined were:

1. Percent Change in Total Assets -- Total assets was
considered because of its broad acceptance in financial management
literature and by people in the field of finance. The total growth
and performance of a business organization is shown by its ability
to control an increasing amount of assets. Total assets shows the
book value of all assets (current, intermediate, and long term)
which are controlled by the cooperative to provide the facilities
and services needed by its members.

2. Percent Change in Total Assets Less Grain Inventories --
Grain inventories were excluded from this measure in an effort to
eliminate fluctuations caused by unusual phenomena such as the
holding of grain by farmers in expectation of higher prices. It
would also partially eliminate the comparability problem which occurs
between cooperatives ending their fiscal year at different points in
the seasonal marketing cycle.

3. Percent Change in Total Assets Less Investments -- The
performance of a regional cooperative is reflected in the investment
section of the total assets as investments in regional cooperatives.
Investments were excluded from this measure in an effort to minimize
the outside influence of regional cooperatives. This is often done
by financial institutions in order that a closer examination of the
local cooperative's performance can be made.

4. Percent Change in Total Assets Less Grain Inventories
and Investments -- Grain inventories and investments were both ex-
cluded from this measure in an effort to eliminate fluctuations and
outside influences. This measure is representative of the permanent
equipment and facilities which the cooperative controls.

5. Percent Change in Total Sales -- Like total assets,
total sales was considered because of its wide acceptance in finan-
cial management literature and by people in the field of finance.
Sales are an indication of a business organization's ability to
utilize the resources they have to provide products and services to
their patrons. Volume increases in sales would indicate that the

cooperative is more fully meeting the needs of the members for whom they do business.

6. Percent Change in Gross Operating Income -- Gross operating income is a measure which examines the efficiency of the business operation. It was included for consideration because of its relationship to the livelihood of a cooperative. Before a business can continue operation, it must be making a margin on the products handled. Otherwise, the asset base will be destroyed by losses. The ability to achieve and maintain growth depends upon the generation of gross operating income.

Table 1 shows the mean and variance of the six growth measures considered. In Kansas, the average growth ranged from 120 percent for the total assets measure to 268 percent for the total sales measure. Total assets less grain inventories had the lowest variance of 13680.5. Total assets' variance of 14016.0 was only slightly greater.

In Iowa, the average growth ranged from 131 percent for the total assets less grain inventories and investments measure to 230 percent for the total sales measure. Total assets less investments had the lowest variance of 5196.1. Total assets' variance of 5363.6 was only slightly greater.

The total sales measure had the greatest variance in both states. The mean growth in gross operating income was the same in both states -- 199 percent.

In Iowa, the four measures which were based upon total assets exhibited similar statistical characteristics. The same was

Table 1.--Mean and Variance of Growth Measures for Fifty Grain and Farm Supply Cooperatives in Kansas and Forty-nine Grain and Farm Supply Cooperatives in Iowa, Time Period A[a]

Growth Measure	KANSAS		IOWA	
	Mean	Variance	Mean	Variance
Total Assets	120%	14016.0	154%	5363.6
Total Assets Less Grain Inventories and Investments	144%	33706.1	131%	5963.1
Total Assets Less Grain Inventories	122%	13680.5	140%	5781.1
Total Assets Less Investments	142%	36682.6	149%	5196.1
Total Sales	268%	37274.7	230%	10324.7
Gross Operating Income	199%	16311.3	199%	9440.0

[a]Time Period is averaged financial information from the two annual audits between April 1, 1965 and March 31, 1967.

not true for Kansas, however, due to the wide range of variances present in the four measures. The inclusion of investments in the growth measure seemed to keep the variance at a minimum.

To gain more insight into the six growth measures' relationships to one another, correlation analysis was performed. Table 2 shows the correlation matrix for the Kansas sample. Table 3 shows the correlation matrix for the Iowa sample.

In both states, the correlation between the four growth measures based upon total assets was very high. In examining the correlations of the entire matrix, only the correlation between total sales and gross operating income (0.49349) was less than 0.5. This indicated that the six measures were highly related and could be expected to fluctuate similarly.

To discover the degree to which each measure was correlated to the total group, each of the column vectors in the correlation matrix were added. The last row of the correlation matrices, added correlation, gives this figure. The closer this number is to 6.0, the more highly correlated is the growth measure to the total group of six.

In Kansas, total assets less grain inventories and investments had the highest added correlation of 5.5423. This was closely followed by total assets with an added correlation of 5.53297. Gross operating income had the lowest added correlation, 4.96953.

In Iowa, total assets had the highest added correlation of 5.02149. Total sales had the lowest added correlation, for both

Table 2.--Correlation Between Growth Measures in Fifty Grain and Farm Supply Cooperatives in Kansas, Time Period A[a]

	Total Assets	Total Assets Less Grain Inventory and Investments	Total Assets Less Grain Inventories	Total Assets Less Investments	Total Sales	Gross Operating Income
Total Assets	1.00	.97759	.99089	.96753	.79855	.79841
Total Assets Less Grain Inventories and Investments	.97759	1.00	.96769	.99317	.82856	.77529
Total Assets Less Grain Inventories	.99089	.96769	1.00	.94224	.77129	.79354
Total Assets Less Investments	.96753	.99317	.94224	1.00	.84070	.76586
Total Sales	.79855	.82856	.77129	.84070	1.00	.83643
Gross Operating Income	.79841	.77529	.79354	.76586	.83643	1.00
Added Correlation	5.53297	5.5423	5.46565	5.5095	5.07553	4.96953

[a]Time Period A is averaged financial information from the two annual audits between April 1, 1965 and March 31, 1967.

Table 3.--Correlation Between Growth Measures in Forty-nine Grain and Farm Supply Cooperatives in Iowa, Time Period A[a]

	Total Assets	Total Assets Less Grain Inventory and Investments	Total Assets Less Grain Inventories	Total Assets Less Investments	Total Sales	Gross Operating Income
Total Assets	1.00	.88089	.92524	.98656	.60652	.62228
Total Assets Less Grain Inventories and Investments	.88089	1.00	.97984	.89835	.52870	.71554
Total Assets Less Grain Inventories	.92524	.97984	1.00	.91245	.56953	.72203
Total Assets Less Investments	.98656	.89835	.91245	1.00	.58586	.60421
Total Sales	.60652	.52870	.56953	.58586	1.00	.49349
Gross Operating Income	.62228	.71554	.72203	.60421	.49349	1.00
Added Correlation	5.02149	5.00332	5.0076	4.98743	3.7841	4.15755

[a]Time Period A is averaged financial information from the two annual audits between April 1, 1965 and March 31, 1967.

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samples, of 3.7841.

Since the scope of this study was limited to the use of
one growth model, only one of the six growth measures could be
selected for use. The analysis performed led to the selection of
percent change in total assets as the growth measure. It was se-
lected for three reasons. First, in the review of financial
management literature and in discussions with officers of financial
institutions, the change in total assets was indicated to be the
most acceptable growth measure. Second, the analysis of the statis-
tical characteristics showed percent change in total assets to be the
more stable measure. It had the second lowest variance in both states.
Third, percent change in total assets proved to be a good represen-
tative of the six measures considered. In Kansas, it had the second
highest added correlation and in Iowa, it had the highest added
correlation. These three reasons combined to strongly support the
selection of percent change in total assets as the most represen-
tative and most acceptable measure of growth.

Analysis of Financial Ratios

The second step in building the growth model was to de-
termine the independent variables to be used in predicting growth,
the dependent variable. From a group of fifty-seven financial ratios,
eighteen financial ratios expected to have a strong relationship to
the growth of a local farmer cooperative were chosen for further
examination. The calculation of these eighteen ratios is given in
Appendix B.

The decision to include or not to include the ratio in the final growth model was based upon two criterion:

1. The financial ratio's statistical significance.

2. The credibility which the financial ratio contributed to the model.

To determine the statistical significance of each financial ratio, simple regression models were estimated using each of the eighteen ratios. The dependent variable in the models was the growth measure, percent change in total assets. The independent variable in each case was one of the eighteen financial ratios. The financial ratios were all calculated on the averaged financial information of the base time period (Time Period A). The t-ratios and R^2 results of the simple regression analyses are shown in Tables 4 and 5.[20]

From the eighteen ratios examined, eleven ratios were selected for inclusion in the predictive growth model.

1. Current ratio

2. Debt/equity ratio

3. Member investment/total assets

4. Return on investments

5. Local return on local assets

6. Total return on total assets

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[20] The same type of analysis was performed with beginning total assets being used as the independent variable. The resulting t-ratio was not significant. Therefore, the conclusion was reached that the beginning size of a cooperative had no important relationship to growth.

Table 4.--The t-Ratio and R^2 Results of Simple Regressions on
Financial Ratios of Fifty Grain and Farm Supply Cooperatives
in Kansas, Time Period A[a]

	Financial Ratio	t-Ratio	R^2
1.	Current Ratio	5.24265**	.36411
2.	Working Capital/Total Assets	1.93450	.07233
3.	Debt/Equity	-1.50536	.04508
4.	Member Equity/Total Assets	2.56915*	.12089
5.	Member Investment/Total Assets	2.79394**	.13988
6.	Gross Margin on Sales	1.70676	.05722
7.	Return on Investments	-0.01277	.00000
8.	Local Return on Local Assets	4.40014**	.28742
9.	Total Return on Total Assets	3.79850**	.23112
10.	Fixed Assets/Total Assets	-2.70077**	.13192
11.	Fixed Assets/L.T. Liabilities	.34425	.00246
12.	Collateral Value	.64723	.00865
13.	Productivity Ratio	1.35866	.03703
14.	Sales/Net Fixed Assets	6.60358**	.47602
15.	Sales/Total Assets	1.12780	.02581
16.	Deferred Patronage/Member Equity	-0.54223	.00609
17.	Local Return on Net Fixed Assets	8.38723**	.59441
18.	Investments/Total Assets	2.53379*	.11797

[a]The dependent variable used in the regression models was percent change in total assets from 1965-66 to 1973-75. The independent variables, financial ratios, were calculated from the average of financial information taken from the two annual audits between April 1, 1965 and March 31, 1967.

*Significant at the 5 percent level.

**Significant at the 1 percent level.

Table 5.--The t-Ratio and R^2 Results of Simple Regressions on
Financial Ratios of Forty-nine Grain and Farm Supply Cooperatives
in Iowa, Time Period A[a]

	Financial Ratio	t-Ratio	R^2
1.	Current Ratio	1.92686	.07321
2.	Working Capital/Total Assets	2.11147*	.08664
3.	Debt/Equity	-2.47547*	.11534
4.	Member Equity/Total Assets	2.33369*	.10384
5.	Member Investment/Total Assets	1.99036	.07774
6.	Gross Margin on Sales	-0.53347	.00602
7.	Return on Investments	3.81144**	.23611
8.	Local Return on Local Assets	2.52012*	.11904
9.	Total Return on Total Assets	3.18643**	.17765
10.	Fixed Assets/Total Assets	.90782	.01723
11.	Fixed Assets/L.T. Liabilities	.84320	.01490
12.	Collateral Value	.80933	.01374
13.	Productivity Ratio	2.26713*	.09858
14.	Sales/Net Fixed Assets	1.52656	.04722
15.	Sales/Total Assets	3.22272**	.18098
16.	Deferred Patronage/Member Equity	-0.55112	.00642
17.	Local Return on Net Fixed Assets	2.28451	.09994
18.	Investments/Total Assets	-1.41274	.04073

[a]The dependent variable used in the regression models was percent change in total assets from 1965-67 to 1973-75. The independent variables, financial ratios, were calculated from the average of financial information taken from the two annual audits between April 1, 1965 and March 31, 1967.

*Significant at the 5 percent level.

**Significant at the 1 percent level.

7. Fixed assets/total assets

8. Productivity ratio

9. Sales/net fixed assets

10. Sales/total assets

11. Local return on net fixed assets

The current ratio was included for two reasons. First, it was very significant in the Kansas sample and also important in the Iowa sample.[21] Second, it adds credibility to the model because it is a measure of the liquidity of the business.

Working capital to total assets was not included. It was significant in the Iowa sample and important in the Kansas sample. This ratio is also a measure of liquidity and was, to a degree, duplication of the current ratio. Multiple regressions containing both the current ratio and the working capital to total assets ratio were run. In Kansas, the sign of the working capital to total assets ratio's regression coefficient became negative indicating that it was acting as a countervailing force against the effect of the current ratio. The correlation between the two ratios was 0.69865 in Kansas and 0.87139 in Iowa. Therefore, working capital to total assets was not included because most of its effect was included in the current ratio.

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[21] For the purpose of this discussion, very significant will mean statistically significant at the 1 percent level, significant will mean statistically significant at the 5 percent level, and important will mean statistically significant at the 10 percent level.

The debt to equity ratio was included in the model because of the credibility it adds. This ratio is widely accepted and used in the finance field. It was important to incorporate this measure of financial leverage into the model. The debt to equity ratio was significant in Iowa.

The member equity to total assets ratio was not included even though it was significant in the single regression analysis in both Kansas and Iowa. This ratio was highly correlated with the member investment to total assets ratio (0.92601 in Kansas and 0.93825 in Iowa). Therefore, the member equity to total assets ratio was not included because the member investment to total assets ratio adequately incorporated its effect into the model.

The member investment to total assets ratio was included in the model. It was very significant in the Kansas sample and important in the Iowa sample. This ratio is important in describing the capital structure of the cooperative. It also has a somewhat qualitative connotation in that it represents the members' support of their cooperative. It shows their willingness to invest funds in the business operation.

The gross margin on sales ratio was not included. It was important in the Kansas sample but was of negligible significance in the Iowa sample.

The return on investments ratio was included. This ratio and the local return on local assets ratio function together in varying combinations to generate the total return on total assets ratio. The return on investments is a measure of the performance of a local

cooperative's regional affiliates. The return on investments ratio was very significant in the Iowa sample.

The local return on local assets ratio was included in the model. The local return on local assets ratio was very significant in Kansas and significant in Iowa. This ratio is particularly important to the model because it shows the earnings ability within the local cooperative business entity.

The total return on total assets ratio was included. It was the only ratio which achieved the highest degree of significance in both states. It was very significant in both samples. This ratio is a strong indicator of a firm's overall performance which is strongly related to a firm's growth abilities. The total return on total assets is a weighted measure of the two sources of income to a cooperative, return from investments and return from local operations. An analysis of the correlation among the three ratios showed the correlation between the return on investments and the other two ratios to be low. The correlation between the local returns and the total returns ratios was very high, approximately 0.95 in both samples. This caused the value of including both ratios in the model to be questionable. However, both ratios were included because of their high significance in at least one state, the wide acceptance and use of both in financial analysis, and the additional descriptive credibility they give to the model.

The fixed assets to total assets ratio was included in the model. This ratio is used to describe the make-up of the asset

structure of the business. It was very significant in the Kansas sample.

The fixed assets to long term liabilities ratio was not included in the model. It was of negligible significance in both samples.

The collateral value ratio was not included in the model. It was also of negligible significance in both samples. The collateral value ratio and the fixed assets to long term liabilities ratio were highly correlated, 0.97786 in Kansas and 0.97289 in Iowa.

The productivity ratio was included in the growth model. This ratio is a measurement of the production efficiency of a business. It is descriptive of the degree to which a business is using its factors of production to generate earnings. It was significant in the Iowa sample.

The sales to net fixed assets ratio was included in the model. It shows the intensity with which the business is using its fixed assets to generate sales. This ratio was very significant in Kansas. In Iowa, it was not significant.

The sales to total assets ratio was included in the growth model. It was very significant in the Iowa sample. This ratio shows the intensity with which a business is using its total assets to generate sales. The sales to total assets ratio is a turnover ratio which is frequently used in financial analysis.

The deferred patronage to member equity ratio shows, in part, the structure of the equity section of the business. It was of negligible significance in both states and was, therefore, not

included in the model.

The local return on net fixed assets ratio was included in the growth model. This ratio was very significant in Kansas and significant in Iowa. The local return on net fixed assets ratio is a measure of the ability of a business to utilize its fixed assets to generate earnings.

The last ratio considered was the investments to total assets ratio. It is a ratio which describes, in part, the asset structure of a business. This ratio was significant in Kansas but not important in Iowa. It was not included in the growth model.

In total, eleven financial ratios were selected to be used as independent variables in the growth model. Seven of the ratios chosen were very significant in simple regression analyses on the Kansas sample. Three of the ratios chosen were very significant in simple regression analyses on the Iowa sample. Two of the ratios selected were not very significant in either state but, were significant at the 5 percent level in the Iowa sample. These two ratios, the debt to equity ratio and the productivity ratio, contribute to the credibility of the growth model.

It should be noted that several of the financial ratios included were not important in one state but were significant in the other state. Since this research was limited to the use of only one growth model, it was necessary to construct a model which would be applicable to both states. Therefore, the model included eleven ratios when a smaller number of ratios might have worked nearly as well for only one state. The additional ratios do not have

a negative effect on the accuracy with which the model can predict

growth. They, in fact, make it possible to compare and contrast

the model's performance in the two states. Such an analysis would

be less meaningful if different growth models were used in the dif-

ferent states.

CHAPTER III

MODELS FOR PREDICTING GROWTH

Models based upon the relationships among several variables
are often used to explain real world events. In this chapter, models
based upon the relationship between a growth measure and eleven
financial ratios are used to explain or predict growth in local
farmer cooperatives. Two types of predictive models are constructed.
Both test the hypothesis that: A growth model constructed from
financial ratios can predict growth or non-growth of a local farmer
cooperative.

Application of the Multiple Regression Model

Goldberger defines a classical linear regression model as
a model in which the value of one observable random variable is ex-
pressed as a linear function of several observable nonstochastic
variables and an additive nonobservable disturbance.[22] For application
of multiple regression, it is assumed that the growth measure is a
linear function of the financial ratios and an error term.

$$Y = f\ (X_1,\ X_2,\ \ldots\ldots\ X_{11}) + e$$

where:

Y = growth measurement

X_1 to X_{11} = financial ratios

e = error term

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[22] Goldberger, p.156.

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The conventional least-squares assumptions concerning the error or disturbances and the properties of the exogenous X variables are made.[23]

The ordinary least squares technique was used to perform multiple regression analysis. This estimated an equation which was used to predict the amount of growth a cooperative was expected to achieve in the following eight years. The form of the resulting equation was:

$$\hat{Y} = b_0 + b_1 X_1 + b_2 X_2 + \ldots b_{11} X_{11}$$

where:

$\hat{Y}$ = the predicted amount of growth

b_0 = the intercept term of the regression line

b_1 to b_{11} = the estimated partial regression coefficients of the respective X's

X_1 to X_{11} = the financial ratios of the cooperative being examined

The equations calculated for the two states were:

(Kansas) $\hat{Y}$ = -0.139174 - 0.226239 X_1 + 0.586004 X_2 +

4.35228 X_3 + 0.673818 X_4 - 4.57258 X_5 -

13.0971 X_6 - 2.81975 X_7 - 0.461158 X_8 -

0.357246 X_9 + 0.987988 X_{10} + 13.1253 X_{11}

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[23] A description of these assumptions is given in Edward J. Kane, Economic Statistics and Econometrics (New York: Harper and Row Publishers, 1968), p.355.

(Iowa) $\hat{Y} = 0.194658 - 0.0207982 \, X_1 - 1.11115 \, X_2 -$

$0.479035 \, X_3 + 6.08693 \, X_4 + 29.57 \, X_5 -$

$16.0021 \, X_6 - 0.321577 \, X_7 + 0.31236 \, X_8 +$

$0.102052 \, X_9 + 0.111894 \, X_{10} - 7.68297 \, X_{11}$

The multiple coefficient of determination (R^2) of each model tells the percentage variation in the dependent variable which is explained by the model. The R^2 of the Kansas model was 0.68577 and the R^2 of the Iowa model was 0.55572. This means that the Kansas model was explaining 68 percent of the variation occurring in the dependent growth measurement and the Iowa model was explaining 55 percent of the variation in the growth variable. Tables 6 and 7 compare the actual growth achieved by the individual cooperatives examined with the growth which the model predicted for each cooperative.

As a predictor of the actual growth achieved, the model was not highly accurate. This was indicated by the R^2 of the models. The model was, however, able to distinguish between growth and non-growth cooperatives more accurately than it was able to predict actual growth. An analysis of the predicted growth versus the actual growth shown in Tables 6 and 7 shows that the growth predicted by the model was on the correct side of the sample average in 76 percent of the cases in Kansas and 71 percent of the cases in Iowa. The average growth was 120 percent in Kansas and 154 percent in Iowa.

Examination of Models Applicable to a Dichotomous Situation

The actual growth prediction made by the multiple regression

Table 6.--Actual Percent Growth in Total Assets Between 1965-67 and 1973-75 Versus Percent Growth Predicted by Multiple Regression Model for Fifty Grain and Farm Supply Cooperatives in Kansas

Co-op ID	Actual Growth	Predicted Growth	Residual	Co-op ID	Actual Growth	Predicted Growth	Residual
1	0.7510	1.0275	-0.2764	26	0.9122	0.7807	0.1314
2	0.3684	1.2341	-0.8656	27	4.0092	1.2896	2.7195
3	0.3424	-0.1247	0.4672	28	0.3383	0.6070	-0.2687
4	0.5684	1.1510	-0.5826	29	1.0428	0.8562	0.1865
5	0.8758	1.2073	-0.3315	30	1.3676	1.3334	0.0341
6	1.1114	0.5739	0.5375	31	0.4013	0.5183	-0.1170
7	1.7089	1.0212	0.6876	32	1.6554	1.0934	0.5620
8	1.2841	0.9034	0.3806	33	0.1239	0.4313	-0.3073
9	1.4349	1.2123	0.2226	34	1.0850	1.6159	-0.5308
10	0.3962	0.4774	-0.0811	35	1.2142	1.6429	-0.4286
11	0.8956	1.1043	-0.2087	36	3.3110	2.3518	0.9591
12	1.3416	1.4681	-0.1264	37	0.6795	1.0255	-0.3460
13	0.4131	1.1983	-0.7851	38	0.2224	1.1663	-0.9439
14	0.7876	1.6539	-0.8663	39	1.8816	0.6875	1.1940
15	1.3263	1.7588	-0.4325	40	0.4495	0.9566	-0.5070
16	1.2916	1.1641	0.1275	41	-0.2610	0.8490	-1.1101
17	0.6753	1.4343	-0.7590	42	0.7726	0.6026	0.1699
18	0.1641	1.1819	-1.0177	43	1.6167	1.8786	-0.2619
19	0.0166	-0.0496	0.0662	44	0.9686	0.8990	0.0696
20	1.5400	1.5088	0.0312	45	3.5276	2.4945	1.0330
21	0.5444	0.8558	-0.3113	46	0.9940	0.6256	0.3683
22	2.0884	1.0893	0.9990	47	1.4178	0.9137	0.5041
23	0.2773	0.1436	0.1336	48	0.7959	1.0153	-0.2193
24	1.9808	1.4839	0.4968	49	7.0535	7.0481	0.0054
25	0.6802	0.9575	-0.2773	50	1.7057	1.8304	-0.1247

Table 7.--Actual Percent Growth in Total Assets Between 1965-67 and 1973-75 Versus Percent Growth Predicted by Multiple Regression Model for Forty-nine Grain and Farm Supply Cooperatives in Iowa

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Co-op ID	Actual Growth	Predicted Growth	Residual	Co-op ID	Actual Growth	Predicted Growth	Residual
51	1.3974	1.6002	-0.2027	76	2.2588	2.0751	0.1836
52	2.2081	2.1687	0.0394	77	1.6330	1.4805	0.1524
53	0.5794	0.6684	-0.0890	78	1.6519	1.7746	-0.1226
54	1.3511	1.6170	-0.2659	79	0.9764	1.4836	-0.5071
55	0.2498	0.6310	-0.3812	80	0.8978	1.5131	-0.6152
56	1.7067	1.3467	0.3600	81	1.1776	0.9788	0.1987
57	3.0092	2.6064	0.4027	82	0.9795	0.7834	0.1961
58	1.6464	1.4238	0.2225	83	2.1162	2.3253	-0.2090
59	1.4073	1.5039	-0.0965	84	1.5201	1.5072	0.0128
60	2.6393	1.3333	1.3060	85	1.4602	1.0808	0.3793
61	0.3408	1.2007	-0.8599	86	1.6198	2.1994	-0.5795
62	1.6788	1.2342	0.4446	87	2.2073	1.8417	0.3656
63	1.8717	1.4916	0.3801	88	0.9745	0.9933	-0.0187
64	2.0399	2.1369	-0.0969	89	0.8531	0.9058	-0.0527
65	1.4894	1.3690	0.1203	90	1.4143	1.4639	-0.0496
66	1.7062	1.5318	0.1744	91	2.0379	1.1746	0.8632
67	3.5078	2.6704	0.8374	92	1.4275	1.6573	-0.2298
68	0.7299	1.2673	-0.5373	93	0.4134	0.7410	-0.3276
69	1.2947	1.5032	-0.2085	94	0.6083	0.6263	-0.0179
70	2.5080	2.7826	-0.2746	95	0.8519	1.1208	-0.2688
71	3.1712	2.5815	0.5897	96	0.9195	1.5006	-0.5810
72	1.0496	1.1088	-0.0591	97	1.3751	2.6946	-1.3195
73	0.3857	1.3225	-0.9367	98	2.1503	1.7628	0.3874
74	1.4020	1.6316	-0.2296	99	2.1754	1.3315	0.8438
75	2.4182	1.7408	0.6774				

model is of interest to those who are analyzing the financial conditions of a cooperative. However, the first consideration is whether or not a cooperative is going to grow. Being able to estimate the actual amount of growth is of secondary importance. Therefore, the second type of model applied was concerned with a dichotomous classification: cooperatives which are expected to grow versus cooperatives which are not expected to grow. Two approaches were considered.

Multiple Discriminant Analysis

Multiple discriminant analysis is a method of determining a linear combination of the independent variables which best discriminates between two classes. (In this study, growth vs. non-growth.) This is accomplished by computing a linear function of the difference between the means of the variables for each group. The process results in a set of weights k_i which are used to compute the discriminant value of Z.[24]

$$Z = k_1X_1 + k_2X_2 + \ldots k_iX_i$$

where:

k_1, k_2, ...,k_i = discriminant coefficients

X_1, X_2, ...,X_i = independent variables

The Z score for each observation determines the group to which that observation will be assigned. A cutoff value for Z is selected. Then, observations with Z scores below that value will be assigned to one group and observations with Z scores greater than that value

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[24] Elam, p.39.

will be assigned to another group.[25]

In multiple discriminant analysis, the explanatory variables (financial ratios) are assumed to come from two normal populations. A common variance-covariance matrix is also usually assumed.[26] Each group (growth and non-growth) is assumed to have a different mean vector for the explanatory variables. A chi-square test for goodness of fit was used to test for normality of the financial ratios. This test was made on eleven of the forty-four ratios. (Eleven in each sample: Kansas growth and non-growth; Iowa growth and non-growth.) In one of the eleven ratios examined, the normality assumption was not valid.

Linear Probability Model

The term "linear probability function" is used to denote a regression function in which the dependent variable has the value of zero or one.[27] The linear probability model is readily adaptable to analysis where the outcome is dichotomous (such as growth or non-growth) rather than continuous. The linear probability model requires no assumption about the distribution of the independent X variables.[28]

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[25]A more complete discussion of classification by discriminant analysis is given in T.W. Anderson, *Introduction to Multivariate Statistical Analysis* (New York: John Wiley and Sons, Inc., 1958), pp. 126-152.

[26]George W. Ladd, "Linear Probability Functions and Discriminant Functions," *Econometrica* 34 (October, 1966):884.

[27]Ladd, p.873.

[28]Ladd, p.884.

It does, however, assume that the error terms are normally distri-
buted with a mean equal to zero and have a common variance (are
homoscedastistic).

The linear probability model can be estimated by ordinary
least squares (OLS). The linear probability function is shown by
the following equation.

$$Y = b_0 + b_1X_1 + b_2X_2 + \ldots b_iX_i + e$$

where:

Y = 0 or 1

b_0 = the intercept

b_1 to b_i = regression coefficients

X_1 to X_i = independent variables

e = the error term

The resulting predicted value of Y is interpreted as a
conditional probability of the event (growth) occurring. The regres-
sion coefficients estimated in the model indicate the change in the
conditional probability resulting from a one unit change in the inde-
pendent variable.[29]

A difficulty arises in this procedure when the classical
assumption of homoscedasticity is untenable. Thus, the OLS estima-
tors are inefficient. Goldberger suggests a two-step procedure which
can be used to improve the situation.[30]

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[29]Lowell D. Hill, "Use of Weighted Regression in
Estimating Models of Binary Choice," Canadian Journal of Agricul-
tural Economics 18 (November, 1970):65.

[30]Goldberger, pp.249-250.

A second difficulty arises when not all of the Y values predicted by the linear probability model lie between 0 and 1. This is inconsistent with the definition of Y as a conditional probability.[31] Given this situation, Goldberger suggests the application of an alternative model such as probit.[32]

After considering the multiple discriminant analysis and linear probability models as two alternative methods for examining the dichotomous situation of growth or non-growth, the linear probability model was decided upon as the better approach for this study. First, the normality assumption required by discriminant analysis did not hold for ten percent of the financial ratios examined. Definitional aspects of financial ratios which restrict observations to positive values is an additional reason for questioning the validity of the normality assumption. Second, the probability model is more flexible in terms of applying numerical results.[33] Interpretation of the conditional probabilities predicted by the model gives the user a more genuine feel for the feasibility of the classification procedure. The linear probability model allows the user to easily adjust the

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[31]Hill, p.65.

[32]Goldberger, p.250.

[33]Al R. Elam and S.R. Johnson, Linear Probability Models: A Technique for Testing the Usefulness of Accounting Measures, p.9. An unpublished manuscript based upon a Ph.D. dissertation by Al R. Elam, University of Missouri-Columbia, 1973.

classification cutoff point to minimize the cost associated with misclassification in the two classes. This flexibility is discussed and illustrated by Elam[34] and will be further explained in the next section of this study.

Application of the Linear Probability Model

The first step in applying the linear probability model was to classify the cooperatives into three categories. Tables 8 and 9 show this classification. The fifteen cooperatives with the highest percent growth were classified as growth and assigned the value of one. The fifteen cooperatives with the lowest percent growth were classified as non-growth and assigned the value of zero. This arrangement allowed the conditional probabilities predicted by the model to be interpreted as the probability that growth would occur. The "medium" growth cooperatives, 20 in Kansas and 19 in Iowa, were excluded to enhance the model's ability to distinguish between the characteristics of growth and non-growth cooperatives.

After classification of the cooperatives was made, OLS regression was performed on the two samples of thirty. The Y's predicted by this model were then used to transform the data so that the classical assumption of homoskedasticity could be met. This was done by multiplying the data by $\dfrac{1}{\sqrt{Y_i*(1-Y_i*)}}$ for the ith cooperative.

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[34] Elam, pp.43-46

Table 8.--Classification of Fifty Grain and Farm Supply Cooperatives
in Kansas According to Percent Growth in Total Assets from 1965-67
to 1973-75

Classification	Non-Growth	Medium Growth	Growth
Number of Cooperatives	15	20	15
	-26.1	67.5	136.8
	1.7	68.0	141.8
	12.4	68.0	143.5
	16.4	75.1	154.0
	22.2	77.3	161.7
Percent	27.7	78.8	165.5
Growth	33.8	79.6	170.6
in	34.2	87.6	170.9
Total	36.8	89.6	188.2
Assets	39.6	91.2	198.1
	40.1	96.9	208.8
	41.3	99.4	331.1
	45.0	104.3	352.8
	54.4	108.5	400.1
	56.8	111.1	705.3
		121.4	
		128.4	
		129.2	
		132.6	
		134.2	

Table 9.--Classification of Forty-nine Grain and Farm Supply
Cooperatives in Iowa According to Percent Growth in Total
Assets from 1965-67 to 1973-75

Classification	Non-Growth	Medium Growth	Growth
Number of Cooperatives	15	19	15
	25.0	117.8	187.2
	34.1	129.5	203.8
	38.6	135.1	204.0
	41.3	137.5	211.6
	57.9	139.7	215.0
Percent	60.8	140.2	217.5
Growth	73.0	140.7	220.7
in	85.2	141.4	220.8
Total	85.3	142.7	225.9
Assets	90.0	146.0	241.8
	92.0	148.9	250.1
	97.5	152.0	263.9
	97.6	162.0	300.9
	98.0	163.3	317.1
	105.0	164.6	350.8
		165.2	
		167.9	
		170.6	
		170.7	

where:

$$Y_i* = \left(\frac{.45}{D}\right)\left(Y_i - .5\right) + .5^{35}$$

D = the largest deviation of the Y's from 0.5.

This transformation achieves results similar to the two-step pro-

cedure discussed by Goldberger.[36] It is different from the Goldberger

transformation in that it adjusts the data to meet the homoskedasticity

assumption and then uses OLS whereas Goldberger uses an equivalent

generalized least squares procedure.

After transforming the data matrix, OLS regression was

again performed. The regression equation was:

$$Z = b_0W_0 + b_1W_1 + b_2W_2 + \ldots + b_{11}W_{11} + e$$

where:

Z = the transformed dependent variable

W_0 = the transformation factor applied to the original data[37]

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[35] This equation forces the Y value to be in the 1-0 range.
It would not be necessary if all of the Y values fell within the 1-0
range. The decision to select .45 for use in the Y* equation was
somewhat arbitrary. It avoided the heavy weighting of extremes which
can be caused by arbitrarily assigning the Y's with negative values
the value of zero and the Y's with values greater than one the value
of one. This was avoided because all Y values were proportionately
moved toward the center value of .5. The values of .475 and .425
were also tried in the equation to test its sensitivity to change.
They produced a negligible amount of change in the Y* value.

[36] Goldberger, pp.244-245.

[37] In the normal application of linear regression, the inter-
cept term is the regression coefficient calculated for a column vector
of ones which are added on the left of the matrix of independent
variables. Due to the transformations made in this study, the column
vector of ones has been replaced by a column vector containing the
transformation factor associated with the different observations.
The intercept term calculated is the regression coefficient for this
column vector.

W_1 to W_{11} = the transformed X variables

b_0 to b_{11} = the regression coefficients

e = the error term

The two resulting equations were:

(Kansas) $P = -0.640989 - 0.049188 X_1 + 0.671396 X_2 +$

$3.13502 X_3 - 0.634087 X_4 + 0.598563 X_5 -$

$7.05191 X_6 - 2.92551 X_7 + 0.195425 X_8 -$

$0.240028 X_9 + 0.435711 X_{10} + 4.92346 X_{11}$

(Iowa) $P = -0.0742384 + 0.0527527 X_1 - 0.812782 X_2 -$

$1.31982 X_3 + 2.24837 X_4 + 20.4985 X_5 -$

$4.63168 X_6 + 2.35985 X_7 - 0.509484 X_8 +$

$0.228326 X_9 - 0.125175 X_{10} - 6.15823 X_{11}$

where:

P = the predicted probability of growth

The predicted growth probabilities are shown in Tables 10 and 11. These probabilities were predicted by applying the above equations to the financial ratios of the 99 cooperatives in the two samples. It should be noted that in seven cases in Kansas and ten cases in Iowa the predicted probability of growth was outside of the 1-0 range. At this point, Goldberger suggests probit analysis. For the purpose of this study, however, those predictions are interpreted as extremely high (low) probabilities of growth. This does not distract from the analysis because it is mainly concerned with distinguishing between growth and non-growth cooperatives (p.39).

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Table 10.--Probability of Growth Occurring During Next Eight Years as Predicted by Linear Probability Model Applied to Time Period A Financial Ratios of Fifty Grain and Farm Supply Cooperatives in Kansas[a]

Cooperative Identification	Probability of Growth	Cooperative Identification	Probability of Growth
1	0.44	26	0.22
2	0.71	27	0.49
3	0.00	28	0.44
4	0.30	29	0.24
5	0.40	30	0.85
6	0.11	31	0.12
7	0.54	32	0.48
8	0.41	33	0.15
9	0.36	34	1.69
10	0.03	35	0.86
11	0.23	36	0.92
12	0.76	37	0.18
13	0.48	38	0.28
14	0.65	39	0.70
15	1.23	40	0.53
16	0.52	41	0.31
17	0.86	42	0.22
18	0.47	43	0.88
19	-0.01	44	0.15
20	1.01	45	1.08
21	0.51	46	0.35
22	0.63	47	0.62
23	-0.13	48	0.18
24	0.75	49	1.00
25	0.34	50	0.80

[a]Time Period A financial ratios were based on average of financial information taken from the two annual audits between April 1, 1965 and March 31, 1967.

Table 11.--Probability of Growth Occurring During Next Eight Years as Predicted by Linear Probability Model Applied to Time Period A Financial Ratios of Forty-nine Grain and Farm Supply Cooperatives in Iowa[a]

Cooperative Identification	Probability of Growth	Cooperative Identification	Probability of Growth
51	0.70	76	0.49
52	1.07	77	0.33
53	0.11	78	0.19
54	0.34	79	0.38
55	0.07	80	0.27
56	0.59	81	0.14
57	0.98	82	0.03
58	0.04	83	0.99
59	0.48	84	0.62
60	0.64	85	-0.01
61	0.24	86	1.25
62	0.45	87	1.00
63	0.60	88	0.08
64	0.90	89	0.00
65	0.36	90	0.37
66	0.39	91	0.45
67	0.96	92	0.58
68	0.23	93	-0.12
69	0.60	94	0.00
70	1.05	95	0.09
71	1.09	96	0.65
72	0.12	97	1.54
73	0.60	98	0.78
74	0.44	99	0.61
75	0.66		

[a]Time Period A financial ratios were based on average of financial information taken from the two annual audits between April 1, 1965 and March 31, 1967.

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As mentioned on page 42, the linear probability model offers a flexibility not readily available in other forms of analysis. This is the ability to adjust the classification cutoff point to minimize the cost associated with the misclassification of growth cooperatives as non-growth and vice versa. For example, if 50 percent were selected as the cutoff point, Cooperative 1 (see Table 10) would be classified as non-growth and Cooperative 2 would be classified as growth. If, however, 30 percent were selected as the cutoff point, both cooperatives would be classified as growth. Given this flexibility, the user must know the accuracy of the model at the different cutoff points in order to select the cutoff point which will minimize his cost of misclassification.

For the purpose of testing the "accuracy" of the model, the following analysis was performed. The cooperatives in the two samples were classified as growth if their actual growth was greater than the average growth of the sample or non-growth if their actual growth was less than the average growth of the sample. (The average growth was 120 percent in Kansas and 154 percent in Iowa.) These classifications were assumed to be "correct." The predictions of the linear probability model were then used to classify each cooperative as growth or non-growth at the eleven cutoff percentages of 0, 10, 20, ..., 100 percent. The resulting classifications were then compared to the above assumed "correct" classifications. The "accuracy" of the probability model at each of the eleven cutoff percentages is shown by the curves shown in Figures 3 and 4. The model maximizes its accuracy (minimizes the number of cooperatives misclassified) at the point where the two curves intersect. Thus,
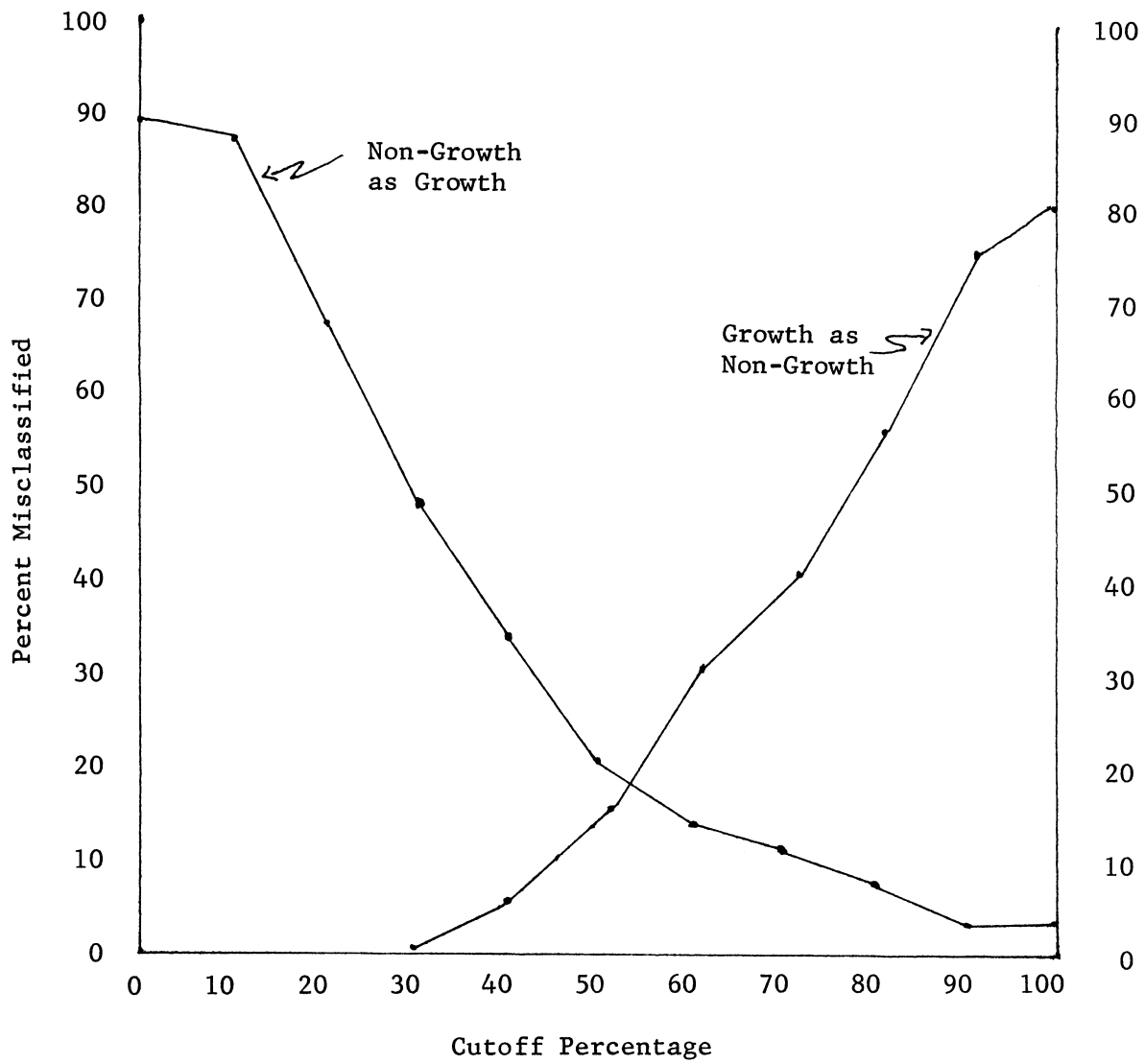
Figure 3. Growth Misclassification of Cooperatives in Kansas Made
By Linear Probability Model Using Varying Cutoff Percentages
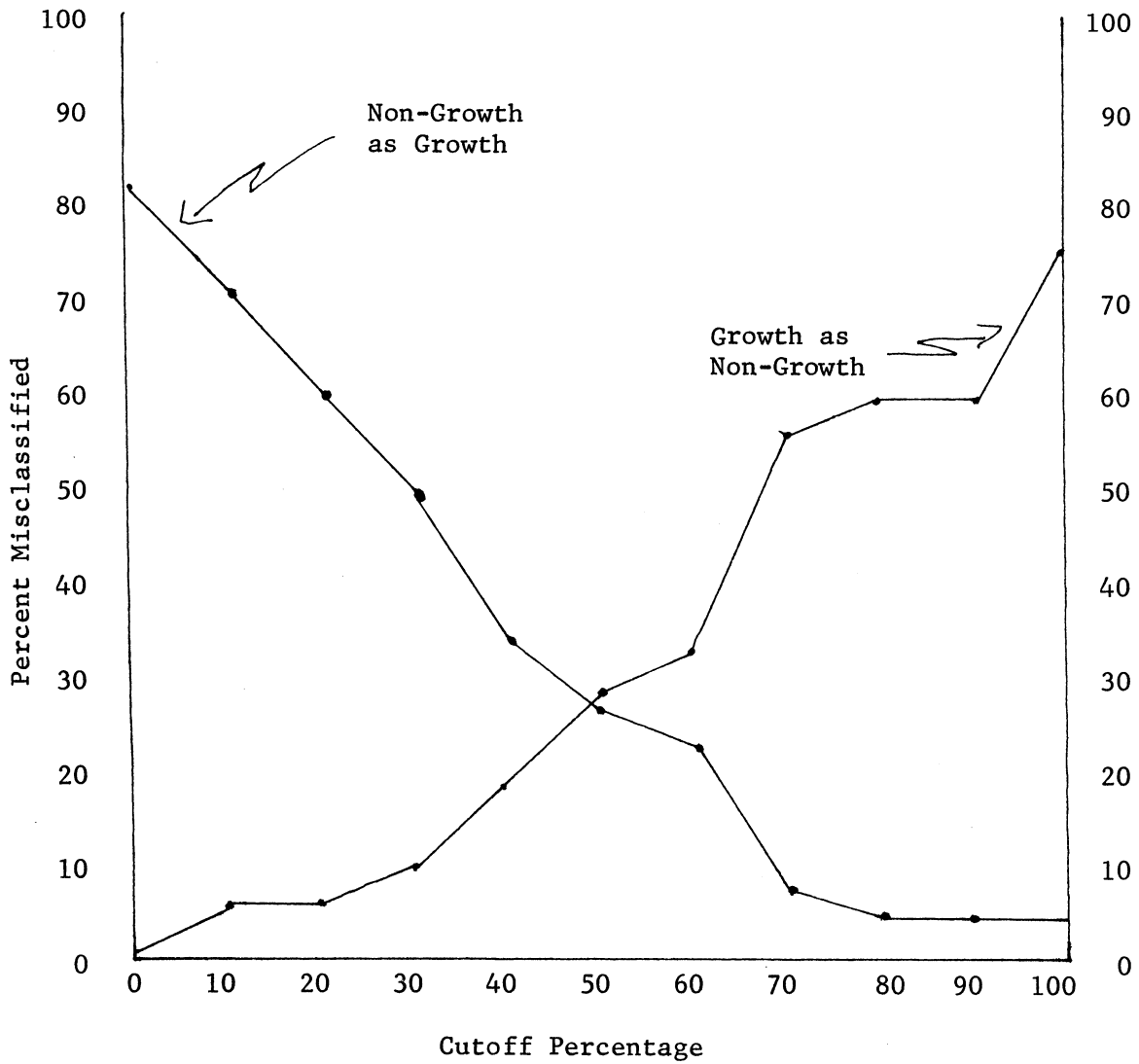
Figure 4. Growth Misclassification of Cooperatives in Iowa Made
By Linear Probability Model Using Varying Cutoff Percentages

Table 12.--Misclassification of Growth by Linear Probability Model Applied in Kansas and Iowa

CUTOFF PERCENTAGE	0	10	20	30	40	50	60	70	80	90	100
KANSAS											
% Non-Growth Misclassified as Growth	90	87	67	47	33	20	13	10	7	3	3
% Growth Misclassified as Non-Growth	0	0	0	0	5	15	30	40	55	75	80
% of Total Misclassified	54	52	40	28	22	18	20	22	26	32	32
IOWA											
% Non-Growth Misclassified as Growth	81	70	59	48	33	26	22	7	4	4	4
% Growth Misclassified as Non-Growth	0	5	5	9	18	27	32	55	59	59	77
% of Total Misclassified	47	41	35	31	27	27	27	29	29	29	37

for both models, selection of the cutoff percentage of 50 percent would most nearly minimize the number of misclassifications. Table 12 shows the total percent of the cooperatives which were misclassified at each cutoff percentage.

If the user feels it is more costly to misclassify a non-growth cooperative as a growth cooperative than to misclassify a growth cooperative as a non-growth cooperative, the cutoff percentage might be moved to 70 or 80 percent. This would increase the total possibility of misclassifying a cooperative but would decrease the possibility of misclassifying a non-growth cooperative as a growth cooperative. An adjustment such as this might be advisable for a financial institution which has many lending opportunities and can ill afford to loan funds to a cooperative which is not growing and may therefore have repayment problems.

It should be noted that the curves in Figures 3 and 4 do not always reach from 0 to 100 percent on the vertical axis. This is a result of projected probabilities which fall outside the 1-0 range. As previously discussed, this was of little consequence to this study (p. 47).

Summary

The multiple regression technique was able to accurately predict whether a cooperative would be above or below the average growth of the sample in 76 percent of the cases in Kansas and 71 percent of the cases in Iowa. The linear probability model was able

to predict whether a cooperative would be above or below the average

growth of the sample in 82 percent of the cases in Kansas and 73 per-

cent of the cases in Iowa. (See Table 12, 50 percent cutoff: 18 per-

cent misclassified in Kansas and 27 percent misclassified in Iowa.)

This was not interpreted as a greatly significant increase in accuracy.

However, the flexibility in application and ease of interpretation

which was exhibited by the linear probability model strongly support

its use as a method for classifying cooperatives into expected growth

or non-growth categories. The more important discovery of the research

on the two models was that both were able to distinguish between

growth and non-growth over 70 percent of the time. This suggested

acceptance of the hypothesis that a growth model constructed from

financial ratios can predict growth or non-growth of a local farmer

cooperative.

CHAPTER IV

ANALYSIS OF FINANCIAL CONDITIONS

An examination of the financial conditions of local farmer cooperatives in Kansas and Iowa is made in this chapter by identifying the values of financial items in the two state groups and the non-growth and growth sub-groups in each state. The study is most concerned with the financial conditions existing in local cooperatives prior to the occurrence of growth. The results of this examination should be helpful to financial managers who are trying to place their cooperatives in a financial position conducive to growth.

Balance Sheet and Statement of Operations

The condensed balance sheet and operating statement for local cooperatives in Kansas and Iowa are shown in this section. The two state groups, Kansas and Iowa, are examined and the two sub-groups in each state, non-growth and growth, are examined. Each examination is based upon averaged information taken from Time Period A.

Table 13 shows that the Kansas cooperatives were approximately 37 percent larger in size, as measured by total assets, than the Iowa cooperatives. Kansas had larger amounts in every category of the balance sheet. The relationships among the categories is considered in the ratio analysis which follows later in this chapter.

The operating statement shows the Iowa cooperatives had greater sales than the Kansas cooperatives and over two times the net

Table 13.--Average Balance Sheet and Statement of Operations for Fifty Grain and Farm Supply Cooperatives in Kansas and Forty-nine Grain and Farm Supply Cooperatives in Iowa, Time Period A[a]

	Kansas	Iowa			Kansas	Iowa
Current Assets	314,133	299,931	Current Liabilities		211,217	142,970
Investments	173,644	85,007	Long Term Liabilities		146,771	70,120
Fixed Assets	429,326	279,657	Member Equity		558,666	453,898
Total Assets[b]	914,798	667,560	Total Liabilities and Member Equity[b]		916,653	666,988

	Kansas	Iowa
Sales	1,511,671	1,782,105
Cost of Goods Sold	1,388,424	1,653,540
Gross Margins	123,247	128,565
Other Operating Income	69,387	55,380
Gross Operating Income	192,626	183,945
Total Operating Expense	178,176	146,494
Net Local Savings	14,450	37,655
Dividend Income	32,108	19,199
Total Savings	46,199	56,650

[a]Time Period A is averaged financial information from the two annual audits between April 1, 1965 and March 31, 1967.

[b]In some cases, the Total Assets and the Total Liabilities and Member Equity may not exactly balance. The situation may also exist where the items in the column may not exactly sum to the total. These situations occur because of rounding errors and peculiarities in the computer programs used to average the information.

local savings of the Kansas cooperatives. The dividend income was greater for the Kansas group. The total savings, however, averaged approximately $10,000 greater in Iowa.

Table 14 shows that the non-growth cooperatives in Kansas had, on the average, 29 percent more total assets, 22 percent more sales, and $13,000 more dividend income than the growth cooperatives. The growth cooperatives averaged $23,000 more in net local savings and over $8,000 more in total savings.

In Iowa, the non-growth cooperatives had, on the average, 9 percent more total assets, Table 15. An examination of the operating statement shows that the growth cooperatives were using a smaller amount of assets to generate 22 percent more sales, $20,000 more net local savings and $23,000 more total savings than the non-growth cooperatives.

Financial Ratios: Kansas and Iowa

The average financial ratios of Kansas and Iowa are shown in Table 16. These ratios are based upon the samples from both states, 50 cooperatives in Kansas and 49 cooperatives in Iowa. The computation of these ratios is shown in Appendix B.

There was little difference between the current ratios of the two states. Iowa cooperatives exhibited a slightly stronger liquidity position.

The debt-equity ratio indicated that Kansas cooperatives were operating in a more highly leveraged position than the Iowa cooperatives. Their 0.75 debt-equity ratio was 47 percent greater than the 0.51 debt-equity ratio of Iowa.

Table 14.--Average Balance Sheet and Statement of Operations for Thirty Grain and Farm Supply Cooperatives in Kansas, Time Period A: Fifteen non-growth and fifteen growth cooperatives[a]

	Non-Growth	Growth
Current Assets	340,516	246,076
Investments	227,615	129,476
Fixed Assets[b]	458,679	345,168
Total Assets[b]	1,016,907	721,321

	Non-Growth	Growth
Current Liabilities	232,454	137,983
Long Term Liabilities	171,050	63,585
Member Equity	612,024	526,420
Total Liabilities[b] and Member Equity	1,015,527	727,988

	Non-Growth	Growth
Sales	1,667,139	1,285,777
Cost of Goods Sold	1,541,115	1,159,334
Gross Margin	126,024	125,443
Other Operating Income	89,480	56,608
Gross Operating Income	215,504	182,027
Total Operating Expense	205,146	148,780
Net Local Savings	10,358	33,246
Dividend Income	38,080	25,066
Total Savings	48,489	56,905

[a]Time Period A is averaged financial information from the two annual audits between April 1, 1965 and March 31, 1967.

[b]In some cases, the Total Assets and the Total Liabilities and Member Equity may not exactly balance. The situation may also exist where the items in the column may not exactly sum to the total. These situations occur because of rounding errors and peculiarities in the computer program used to average the information.

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Table 15.--Average Balance Sheet and Statement of Operations for Thirty Grain and Farm Supply Cooperatives in Iowa, Time Period A: Fifteen non-growth and fifteen growth cooperatives[a]

	Non-Growth	Growth
Current Assets	300,265	266,113
Investments	77,000	65,193
Fixed Assets	265,554	258,013
Total Assets	649,225	589,334

	Non-Growth	Growth
Current Liabilities	176,771	110,032
Long Term Liabilities	81,284	55,517
Member Equity	381,171	423,786
Total Liabilities and Member Equity	649,226	589,334

	Non-Growth	Growth
Sales	1,439,059	1,766,800
Cost of Goods Sold	1,324,109	1,647,569
Gross Margins	114,950	119,230
Other Operating Income	48,655	51,084
Gross Operating Income	163,605	170,314
Total Operating Expense	143,152	130,171
Net Local Savings	20,452	40,143
Dividend Income	14,924	18,062
Total Savings	35,378	58,205

[a]Time Period A is averaged financial information from the two annual audits between April 1, 1965 and March 31, 1967.

Table 16.--Averaged Financial Ratios of Fifty Grain and Farm Supply Cooperatives in Kansas and Forty-nine Grain and Farm Supply Cooperatives in Iowa, Time Period A[a]

Financial Ratio	KANSAS	IOWA
Current Ratio	2.19 to 1.0	2.46 to 1.0
Debt/Equity Ratio	.75	.51
Member Investment/ Total Assets	73.5%	72.2%
Return on Investments	19.1%	22.9%
Local Return on Local Assets	2.4%	6.0%
Total Return on Total Assets	5.7%	7.9%
Fixed Assets/Total Assets	45.4%	42.3%
Productivity Ratio	1.60 to 1.0	1.86 to 1.0
Sales/Net Fixed Assets	4.63 times	6.75 times
Sales/Total Assets	1.74 times	2.69 times
Local Return on Net Fixed Assets	6.7%	13.4%

[a]Based upon averaged financial information from the two annual audits between April 1, 1965 and March 31, 1967.

Member investment as a percent of total assets was approximately 73 percent for both states. In general, the member investment came from two sources, member equity and the sale of debt instruments to members. Most of the member equity was in some type of stock or in deferred patronage refunds. The common classifications of the debt instruments were certificates of indebtedness or building notes.

Since the member investment was the same in both states but the debt-equity ratio was different, a conclusion about the combination of the two types of member investment was possible. The Kansas cooperatives (0.75 debt-equity ratio) had more member investment in the form of debt than did the Iowa cooperatives (0.51 debt-

equity ratio). The Iowa cooperatives, therefore, had more member investment in the form of member equity than did the Kansas cooperatives. One reason for this was the difference in the state laws governing the payment of cash patronage refunds. Iowa state law limits cash refunds to 20 percent of total current patronage refunds for cooperatives which have deferred patronage refunds from prior years. This is not a stipulation in Kansas. Therefore, Iowa cooperatives tend to accumulate greater amounts of equity in the form of deferred patronage refunds. Thus, the need for members to make additional investments by purchasing debt instruments is decreased.

The percent return on investments, which is mostly patronage refunds from regional cooperatives divided by the local cooperative's stock in the regional, was 19.1 percent in Kansas and 22.9 percent in Iowa. This difference could be due to different product mixes sold in the two states, different earnings of the regional cooperatives, a smaller investment base by Iowa cooperatives, or any combination of these and other factors.

The local return on local assets shows that the Iowa cooperatives were achieving more than twice the percent return on local assets that the Kansas cooperatives were achieving. The percent return on total assets was also higher for the Iowa cooperatives. However, the difference between the two states declined from 3.6 percent at the local returns level to 2.2 percent at the total returns level. This means the Kansas cooperatives were receiving a greater percent of their total savings from investment income. Whether these differences were due to different management abilities, differing

products and product margins, different competitive situations, or
perhaps different cooperative business philosophies can only be
speculated from the available information.

The fixed assets as a percent of total assets was approx-
imately the same for both states. This ratio does not, however,
reveal anything about the particular types of fixed assets.

The productivity ratio, which shows the efficiency with
which the cooperative is using its main factors of production, was
16 percent greater in Iowa.[38] This greater efficiency was one of
the reasons why the percent returns were higher in Iowa.

The sales to fixed assets and the sales to total assets
turnover ratios were both higher in Iowa. The Iowa cooperatives
were getting greater utilization from their assets. One possible
reason for this is the difference in the type of agriculture found
in the two states. Kansas agriculture is built around wheat. There-
fore, the facilities of the Kansas cooperatives will be highly used
at planting time and harvest time. Iowa agriculture, in contrast,
is more diversified. Since several cropping activities are spread
more evenly throughout the year, the facilities of the Iowa cooper-
atives can be more fully utilized.

The local return on net fixed assets in Kansas was half of
the local return on net fixed assets in Iowa. Not only were the Iowa

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[38]The productivity ratio was developed by the Cooperative
Finance Association, Inc., a division of Farmland Industries. It is
presently being used in loan analysis by C.F.A. and several of the
Banks for Cooperatives. Its suggested standard is 2.0 to 1.0.

cooperatives using their facilities to handle larger sales, they were also maintaining a margin of savings on those sales.

Financial Ratios: Non-growth and Growth

An analysis of the financial ratios of the non-growth and growth groups is made in this section. Due to the reduction in the number of cooperatives in the groups from fifty per group to fifteen per group, the median of each group and the F-ratio of each financial ratio are shown. By comparing the mean of each group with the median of each group, an indication of the skewness of the group's distribution can be seen. The F-ratio of each financial ratio indicates the significance of any difference between the mean of the non-growth group and the mean of the growth group.

Kansas

The mean, median, and F-ratio for the two groups from Kansas, non-growth and growth, are shown in Table 17. They are based upon the financial ratios from the fifteen cooperatives with the least amount of growth and the fifteen cooperatives with the greatest amount of growth (see Table 8).

The average current ratio for the non-growth cooperatives was one-third less than that of the growth cooperatives. This indicates the non-growth cooperatives were operating in a less liquid position. They were relying more on short-term debt for their financing needs than were the growth cooperatives. The medians showed that the average current ratio in both groups had been increased because of

Table 17.--Mean, Median, and F-ratio of Financial Ratios on Thirty Grain and Farm Supply Cooperatives in Kansas, Time Period A: Fifteen non-growth and fifteen growth cooperatives[a]

	Mean		Median		F-ratio[b]
	Non-growth	Growth	Non-growth	Growth	
Current Ratio	2.07 to 1.0	2.93 to 1.0	1.62 to 1.0	2.06 to 1.0	1.4022
Debt/Equity Ratio	0.80	0.41	0.49	0.24	2.6809
Member Investment/Total Assets	70.0%	83.4%	71.9%	82.6%	6.5721
Return on Investments	18.9%	18.1%	17.8%	17.7%	0.1515
Local Return on Local Assets	0.04%	6.2%	0.4%	3.6%	10.5926
Total Return on Total Assets	4.2%	8.6%	4.4%	7.1%	7.4737
Fixed Assets/Total Assets	45.3%	44.3%	44.3%	45.3%	0.051
Productivity Ratio	1.46 to 1.0	1.84 to 1.0	1.34 to 1.0	1.65 to 1.0	6.7932
Sales/Net Fixed Assets	4.01 times	6.20 times	3.45 times	3.71 times	1.1832
Sales/Total Assets	1.7 times	1.8 times	1.54 times	1.84 times	0.6332
Local Return on Net Fixed Assets	-0.45%	19.3%	0.77%	6.0%	4.2240

[a]Based upon averaged financial information from the two annual audits between April 1, 1965 and March 31, 1967.

[b]F-ratios greater than 4.2 indicate the hypothesis that the mean of the non-growth group equals the mean of the growth group is rejected at the 5% level of significance. The critical values at the 10% and 25% levels are 2.89 and 1.38 respectively.

a few extremely large ratios in the distribution. The relationship between the medians was similar to the relationship between the means. The F-ratio showed the means to be significantly different at the 25 percent significance level.

The average debt-equity ratio showed that the non-growth cooperatives were more highly leveraged than the growth cooperatives. With a ratio of 0.80, 56 percent of their financing was coming from member equity. The growth cooperatives, however, were obtaining 71 percent of their financing from member equity. The medians showed the debt-equity ratios to be lower but, the between group relationship was unchanged.

The average member investment to total assets ratio was 70.0 percent in the non-growth cooperatives and 83.4 percent in the growth cooperatives. The F-ratio indicated that the two means were significantly different at the 5 percent significance level. These findings support the idea that members are more willing to personally finance a growing operation than a non-growing operation which, in turn, makes growth easier to achieve.

The return on investments was 18 percent for both groups. This is not unexpected since most cooperatives in the state of Kansas conduct business with and through the same regional marketing and supply cooperatives. The average local return on local assets was 0.0 percent for non-growth cooperatives and 6.2 percent for the growth cooperatives. This difference was also born out by the medians. The F-ratio for the local return on local assets was the largest of any

Kansas ratio. These findings affirm the idea that savings are necessary for a cooperative business to grow. They provide a strong case against the idea held by some that cooperatives should operate at cost and not have a margin of savings.

Average total return on total assets was 4.4 percentage points greater for the growth cooperatives. There was a similar spread between the medians and, the F-ratio showed the difference between means to be significant at the 5 percent level. These again point out the need for savings if growth is to be achieved.

The fixed assets to total assets ratio was approximately 45 percent for both groups. Although nothing can be said about the makeup of these fixed assets, it is important to note that the asset structure is similar for both groups.

The average productivity ratio was 1.46 in the non-growth cooperatives and 1.84 in the growth cooperatives. A similar relationship was shown by the medians. The difference between the average productivity ratios was significant at the 5 percent level. As might be expected, the growth cooperatives were making more efficient use of the factors of production. This directly relates to the higher savings generated by the growth cooperatives.

The two average sales turnover ratios were greater for the growth cooperatives. In both cases, the growth cooperatives were more fully utilizing the assets available to them to generate sales. The medians also showed a difference between the growth and non-growth groups. However, both turnover ratios had small F-ratios

which indicated that the differences were not significant.

The non-growth cooperatives had a slightly negative per-cent local return on net fixed assets. On the average, they were generating essentially zero savings on the net fixed assets employed in their business. The growth cooperatives, however, were using their fixed assets to generate a 19.3 percent average return or a 6.0 percent median return. The difference between the averages was significant at the 5 percent significance level.

Iowa

The mean, median, and F-ratio for the two samples from Iowa, non-growth and growth, are shown in Table 18. As in Kansas, the information is based upon the financial ratios of the bottom fifteen and top fifteen growth cooperatives (see Table 9).

The average current ratio of the non-growth cooperatives was 2.06 to 1.0 and the current ratio of the growth cooperatives was 2.78 to 1.0. The non-growth cooperatives were using more short-term debt in relation to the current assets and were less liquid than the growth cooperatives. The medians of the two groups indicated that a few large current ratios had caused the average to be somewhat high. However, the difference between groups was near the same for both means and medians and, the F-ratio indicated that the difference between the means was significant at the 10 percent significance level.

The growth cooperatives' debt-equity ratio was one-third less than the 0.69 of the non-growth cooperatives. The non-growth cooperatives were more leveraged than the growth cooperatives. At

Table 18.--Mean, Median, and F-ratio of Financial Ratios on Thirty Grain and Farm Supply Cooperatives in Iowa, Time Period A: Fifteen non-growth and fifteen growth cooperatives[a]

Financial Ratio	Mean		Median		F-ratio[b]
	Non-growth	Growth	Non-growth	Growth	
Current Ratio	2.06 to 1.0	2.78 to 1.0	1.62 to 1.0	2.10 to 1.0	3.1657
Debt/Equity Ratio	0.69	0.43	0.61	0.33	3.9753
Member Investment/Total Assets	66.0%	74.1%	66.6%	71.9%	3.0710
Return on Investments	19.7%	28.8%	19.0%	26.1%	6.9545
Local Return on Local Assets	3.7%	7.5%	4.8%	6.3%	7.7143
Total Return on Total Assets	5.6%	9.7%	6.2%	8.8%	9.1429
Fixed Assets/Total Assets	41.1%	43.7%	38.9%	41.2%	0.5532
Productivity Ratio	1.71 to 1.0	1.94 to 1.0	1.72 to 1.0	1.89 to 1.0	8.0845
Sales/Net Fixed Assets	5.96 times	7.49 times	5.25 times	7.0 times	3.9946
Sales/Total Assets	2.24 times	3.04 times	2.07 times	2.95 times	20.7540
Local Return on Net Fixed Assets	8.8%	16.8%	9.0%	12.02%	5.0632

[a]Based upon financial information from the two annual audits between April 1, 1965 and March 31, 1967.

[b]F-ratios greater than 4.2 indicate the hypothesis that the mean of the non-growth group equals the mean of the growth group is rejected at the 5% level of significance. The critical values at the 10% and 25% levels are 2.89 and 1.38 respectively.

0.69, they were using debt to finance 41 percent of their operations. The difference between the means of the two groups was significant at the 10 percent level.

Member investment to total assets was 66.0 percent in the non-growth group and 74.1 percent in the growth cooperatives. The difference between the means was significant at the 10 percent level. Again, member investment was greater in a growing business than in one which was not in a position to grow.

The average return on investments was 46 percent greater and the median return on investments was 37 percent greater in the growth cooperatives than in the non-growth cooperatives. The reasons for this are not clear from the information available. Possibly, the growth cooperatives in Iowa do a greater volume of business with regional cooperatives and thereby have larger patronage refunds than the cooperatives which do a greater percent of their business with non-cooperative businesses. The return on investments may also differ because of the different regional cooperatives with which the local cooperatives conduct business.

The average local return on local assets was 3.7 percent in the non-growth group and 7.5 percent in the growth group. This difference was significant at the 5 percent level. As in Kansas, the cooperatives which were achieving the higher returns on assets were better able to grow.

The average total returns on total assets was also greater for the growth cooperatives. This difference was also significant at

the 5 percent level. Unlike the Kansas cooperatives, the difference between the non-growth and growth cooperatives' average returns increased at the total returns level over what they were at the local returns level. This was because the growth cooperatives were obtaining greater returns from both sources of returns, investments and local savings, than were the non-growth cooperatives.

The asset structure was similar for both groups. This was indicated by the average fixed asset to total asset ratio which was 41.1 percent and 43.7 percent for the non-growth and growth cooperatives respectively.

The average productivity ratio for the growth cooperatives was near the suggested standard of 2.0 to 1.0. It was 1.94 to 1.0. The non-growth cooperatives were less efficient in their use of production factors. Their ratio was 1.71 to 1.0. Even though the difference between the mean of the two groups was only 0.23 to 1.0, it was significant at the 5 percent significance level as shown by the F-ratio.

The average sales to fixed assets turnover was 26 percent greater and the average sales to total assets turnover was 36 percent greater in the growth cooperatives. The F-ratios showed the difference between the means of the sales to fixed asset ratio to be significant at the 10 percent level and the difference between the means of the sales to total assets ratio to be significant at the 1 percent level. Both ratios indicated that the non-growth cooperatives were not utilizing their assets as intensely as were the growth cooperatives.

The difference between the means of the local return on net fixed assets ratio was significant at the 5 percent level. The average local return on net fixed assets was approximately twice as much for the growth cooperatives as for the non-growth cooperatives. Iowa non-growth cooperatives were able to generate returns on net fixed assets but, were not producing returns near those of the growth cooperatives.

Common Characteristics of Financial Conditions

Throughout this study, the cooperatives in the two states have been examined separately. This is not, however, a reason to overlook the importance of identifying those characteristics which are common to both states. These more general discoveries may be the ones which are easiest to adopt and apply by financial institutions which are dealing with cooperatives in more than one state.

Table 19 shows those characteristics of non-growth conditions and growth conditions which were common to both Kansas and Iowa. The descriptions are necessarily quite broad and are, therefore, more general than specific in nature.

The average current ratio for the non-growth group was approximately 2.0 to 1.0 while it was 2.75 to 1.0 for the growth group. The central tendency of the current ratio, as noted in Tables 17 and 18, was small. Therefore, it would not be appropriate to suggest any general standard.

The debt-equity ratio was about one-third less for the growth groups than for the non-growth groups. Both groups averaged

Table 19.--Common Characteristics of Financial Conditions Present
in Grain and Farm Supply Cooperatives in Kansas and Iowa, Time
Period A[a]

Financial Ratio	Non-Growth[b]	Growth[c]
Current Ratio	$\approx$2.0 to 1.0	>2.75 to 1.0
Debt/Equity Ratio	$\leq$.80 but, $\geq$.69	<.45
Member Investment to Total Assets	$\approx$70%	> 74%
Return on Investments	$\approx$19%	no common characteristics
Local Return on Local Assets	<4.0%	>6.0%
Total Return on Total Assets	<6.0%	>8.5%
Fixed Assets to Total Assets	$\approx$42%	$\approx$44%
Productivity Ratio	<1.75 to 1.0	>1.8 to 1.0
Sales to Net Fixed Assets	< growth	>non-growth
Sales to Total Assets	< growth	>non-growth
Local Return on Net Fixed Assets	< 9%	>16%

[a]Time Period A is based on averaged information from the two
annual audits between April 1, 1965 and March 31, 1967.

[b]Based upon average ratios of the two non-growth groups, Kansas
and Iowa. There were fifteen cooperatives in each group.

[c]Based upon average ratios of the two growth groups, Kansas
and Iowa. There were fifteen cooperatives in each group.

well below the maximum of 1.0 which is mentioned by some financial

management literature. This standard has been frequently challenged

in the past and may, indeed, be less meaningful in current financial

practices. In fact, by Time Period B, the growth cooperatives had

increased their average debt-equity ratio to more than 1.0 (see

Appendix C, Table 22). Nevertheless, in Time Period A, a low debt-

equity ratio was a positive factor in the conditions conducive to

growth.

As noted in the previous sections, the growth cooperatives

had a larger percent of member investment than the non-growth cooper-

atives. This situation had reversed itself after growth occurred but,

those cooperatives which grew still maintained an average member in-

vestment in excess of 50 percent of total assets (see Appendix C,

Table 22).

The return on investments were peculiar to each state.

Therefore, no general statement was appropriate.

The difference between the average local return on local

assets in the non-growth versus the growth cooperatives was at least

2 percentage points. Even though the general economic conditions had,

by Time Period B, allowed the local return to increase for even the

non-growth cooperatives, the 2 percentage points difference was main-

tained (see Appendix C, Table 22). Generation of healthy local

returns was a desireable growth condition.

The average total return on total assets for the growth

cooperatives was at least 2.5 percentage points greater than the total

return on total assets for the non-growth cooperatives. This emphasizes

again the important role that earnings play in the growth process.

The average fixed asset to total asset ratio was essentially the same for all groups. Due to the inflation of current assets, the ratio had decreased to approximately 28 percent by Time Period B. However, it was still near the same level for all groups.

The average productivity ratio was less than 1.75 to 1.0 in the non-growth groups but, was approaching 2.0 to 1.0 for the growth groups. The growth groups were using the factors of production more efficiently. By Time Period B, the non-growth cooperatives had increased their average productivity ratio to 2.0 to 1.0. The growth cooperatives, however, had increased their average productivity ratio to 2.3 to 1.0. In Time Period A, the 2.0 to 1.0 standard was very desireable if growth was a cooperative's objective. Time Period B productivity ratios indicate, however, that this standard may need to be increased as the general economic conditions demand greater earnings and efficiency from any business.

The sales turnover ratios varied within the groups a great deal as shown by the mean versus median analysis in Tables 17 and 18. Only a very general observation that the average turnover for the growth groups was greater than the turnover of the non-growth groups can be made.

The average local return on net fixed assets was at least 7 percentage points greater in the growth groups. This spread was maintained and even increased during the transition from Time Period A to Time Period B (see Appendix C). Again, savings were shown to be an essential aspect of the conditions for growth. The amount, however, must be determined in relationship to the general economic conditions.

CHAPTER V

SUMMARY AND CONCLUSIONS

Growth influences the future of every farmer cooperative. Cooperatives must grow to meet the needs of their members and the demands of a constantly changing business environment. If they do not grow, cooperatives can become useless to their members. To avoid stagnation, a growth strategy which includes financial plans for growth should be developed.

A common management tool used to analyze financial plans and their results is financial ratio analysis. However, agreement among financial institutions and financial management literature on the standards for financial ratios is lacking. This leads to confusion for cooperatives which are trying to construct and analyze plans for growth. Therefore, a description of the different financial conditions present in growth and non-growth cooperatives would aid cooperatives which are attempting to sort through the confusion and plan for growth.

Objective

The main objective of this study was to identify and describe the financial conditions which support growth in local farmer cooperatives in the Plains States and the Midwestern States.

Methodology

Two states having different types of agriculture were

selected for this study. Kansas represented the Plains States and Iowa represented the Midwestern States.

Fifty cooperatives in Kansas and forty-nine cooperatives in Iowa participated. These samples were 17 percent of the grain and farm supply cooperatives in Kansas and 12 percent of the grain and farm supply cooperatives in Iowa. All of the cooperatives had a grain elevator operation and one or more of the following operations: feed and seed, petroleum, fertilizer, other farm supplies.

The financial information used in the study came from four annual audits. In analyzing this information, two types of multivariate growth models were constructed.

Variables in the Predictive Growth Models

The same variables were used in both types of models and in both states. The dependent variable was the growth measure, percent change in total assets from the beginning to the ending of the time period examined. The independent variables were eleven financial ratios based upon the financial information of the beginning time period. The ratios used were:

1. Current ratio

2. Debt/equity ratio

3. Member investment/total assets

4. Return on investments

5. Local return on local assets

6. Total return on total assets

7. Fixed assets/total assets

8. Productivity ratio

9. Sales/net fixed assets

10. Sales/total assets

11. Local return on net fixed assets

The Models for Predicting Growth

Two types of multivariate models were used to predict
growth, multiple regression and linear probability. Both models
assume the growth measurement is a linear function of the financial
ratios and an error term.

$$Y = f(X_1, X_2, \ldots, X_{11}) + e$$

where:

Y = growth measurement

X_1 to X_{11} = financial ratios

e = error term

Multiple Regression

The multiple regression model was used to predict the
actual percent change in total assets over an eight year time period.
The equations were estimated by OLS. The multiple regression model
explained 68 percent of the growth measure's variation in Kansas and
55 percent of the variation in Iowa. The model correctly predicted
whether a cooperative's growth would be greater than or less than
the average growth of the sample in 76 percent of the cases in Kansas
and 71 percent of the cases in Iowa.

Linear Probability

The linear probability model was used to predict a conditional probability of growth occurring. Based upon the predicted probabilities, cooperatives were classified as non-growth or growth. At its most efficient level, the linear probability model correctly classified the cooperatives in 82 percent of the cases in Kansas and 73 percent of the cases in Iowa. This was an improvement over the multiple regression model. Also, the linear probability model was more applicable to real world situations because it was more flexible than the multiple regression model.

Financial Conditions of Farmer Cooperatives

The balance sheet, operating statement, and financial ratios of the cooperatives used in this study were examined in three ways. One, a comparison of the Kansas and Iowa cooperatives was made. Two, a comparison of the non-growth cooperatives and growth cooperatives was made in both states. Three, common characteristics of the non-growth cooperatives in both states and common characteristics of the growth cooperatives in both states were noted.

Kansas and Iowa

The average total assets of the Kansas cooperatives in Time Period A was larger than the average total assets of the Iowa cooperatives. The Iowa cooperatives, however, used their assets to generate more sales and greater savings than the Kansas cooperatives. The Kansas group used more debt financing. The average amount of all types of member investment was, however, approximately

73 percent in both states. The profitability and efficiency ratios were better for the Iowa cooperatives as a group.

Non-growth and Growth in Kansas

In Time Period A, the non-growth cooperatives had more assets, sales, and dividend income. The growth cooperatives had larger amounts of savings. The non-growth cooperatives had a higher average debt-equity ratio, less member investment, zero local returns and an average productivity ratio less than 1.5 to 1.0. The growth cooperatives had, on the average, 83 percent member investment, total returns of 8.6 percent, a productivity ratio of 1.84 to 1.0, and a local return on net fixed assets of nearly 20 percent.

Non-growth and Growth in Iowa

The non-growth cooperatives had more average total assets in Time Period A while the growth cooperatives had more sales, local savings, and total savings. The non-growth cooperatives were using more debt financing, had less member investment, had smaller returns, and were less efficient in their operations. The growth cooperatives averaged almost 10 percent in total returns on total assets and had a productivity ratio of 1.94 to 1.0.

Common Characteristics

In Time Period A, the non-growth cooperatives of both states were using more debt financing than the growth cooperatives which had a low debt equity ratio of less than 0.45. The growth cooperatives had average member investment greater than 74 percent. The average

profitability ratios of the non-growth cooperatives were small while the growth cooperatives' profitability ratios were more than 6.0 percent on their local operations and 8.5 percent on their total operations. The growth cooperatives' activity ratios showed them to be more fully utilizing their assets. This was best shown by the productivity ratio and the local return on net fixed assets which were greater than 1.8 to 1.0 and 16 percent respectively. In general, in Time Period A, the cooperatives which later grew were using their assets more efficiently and generating more returns than were the non-growth cooperatives.

Implications for Future Research

Two major developments resulted from this study. First, a growth model which can predict growth or non-growth of a local grain and farm supply cooperative was developed. Second, a description was made of the financial conditions of local grain and farm supply cooperatives in Kansas and Iowa. Both of these discoveries present several challenges to those who may further research and/or apply the results of this study.

The Growth Model

The linear probability model is the more useable of the two types of growth models developed. It is a financial management tool which can be utilized by cooperatives which are planning for growth and by financial institutions which are analyzing loan requests from cooperatives. Like most newly developed models, additional

testing is needed to determine the best application of the model under different situations.

In this study, the growth model was used to predict growth for a period of time eight years in length and, for cooperatives representing large geographic regions. Refinement of the model would be desireable for those who might use the model to predict growth for shorter periods of time or for those who might limit use of the model to smaller geographic regions. To make these refinements, financial information from different time periods and smaller geographic regions would be necessary. If this information were available, the growth model could be made even more flexible in application than it is at present.

The accuracy of the growth model depends upon the correctness of the estimated variable coefficients used in the model. The variable coefficients were estimated from financial information taken from Time Period A. Therefore, the financial structure of local farmer cooperatives in Time Period A determined the variable coefficients. If the financial structure of local farmer cooperatives changes, the growth model is made less accurate unless the coefficients are re-estimated based upon the changed conditions. Any user of the growth model should, therefore, be satisfied that the financial structure of the local farmer cooperatives on which the model is being applied is similar to the financial structure of the local farmer cooperatives in Time Period A. (See Chapter IV for a description of the financial conditions present in local farmer cooperatives in Time Period A.)

<u>The Description of Financial Conditions</u>

The descriptive analysis of this research dealt mostly with the financial conditions existing in cooperatives approximately ten years ago. The conclusions made from the analysis are, therefore, dependent upon the type of financial structure which existed during Time Period A. Before stringently applying the concluded results of this research to other time periods, one should be certain that the financial structure of the cooperatives being examined is similar to the financial structure of local farmer cooperatives in Time Period A. Changes in financial structure can result from changes in general economic conditions or changes in accepted financial practices. Therefore, further research on the financial conditions of local farmer cooperatives in more recent time periods is needed to assure that this research is indeed relevant under current situations.

<div align="center">Conclusion</div>

This study has shown that some financial ratios are representative of the financial conditions supportive to growth of local farmer cooperatives. It has shown that these ratios can be combined into a model which can predict the occurrence of growth. Also, this study has used an analysis of ratios as a means of describing the financial conditions necessary for growth. This financial information and the new financial management tool, the growth model, should both be helpful to those who are examining the growth potential of local farmer cooperatives.

APPENDIX A

APPENDIX A

BALANCE SHEET AND STATEMENT OF OPERATIONS

The mock balance sheet and statement of operations in
Appendix A show the financial information collected from the annual
audits of the cooperatives used in this study.

Balance Sheet

Assets

Current Assets

Accounts Receivable _____

Grain Inventory _____

Other Inventory _____

Total Inventory _____

Other Current Assets _____

Total Current Assets _____

Investments

Total Investments _____

Fixed Assets

Fixed Assets at Cost _____

less: Accumulated Depreciated _____

Net Fixed Assets _____

Real Estate _____

Total Fixed Assets _____

Total Assets _____

Liabilities and Member Equity

Current Liabilities

Current Notes Payable _____

Current C of I's Due _____

Other Current Liabilities _____

Total Current Liabilities _____

Long Term Liabilities

Notes Payable _____

Certificates of Indebtedness _____

Total Long Term Liabilities _____

Member Equity

Common Stock and Memberships _____

Preferred Stock _____

Deferred Patronage Refund _____

Accelerated Amortization _____

Retained Earnings _____

Total Member Equity _____

Total Liabilities and Member Equity _____

Statement of Operations

	Sales	Cost of Sales	Gross Margins
Grain	_____		
Other Products	_____		
Totals	=======	=======	=======
Other Operating Income			_____
Gross Operating Income			=======

Expenses

Rent and Lease Expense	_____	
Labor Expense	_____	
Depreciation Expense	_____	
Interest Expense	_____	
Property Taxes	_____	
Other Operating Expenses	_____	
Total Operating Expenses		=======
Net Local Savings		_____
Dividend Income		_____
Total Savings		=======

APPENDIX B

APPENDIX B

COMPUTATION OF FINANCIAL RATIOS

The computation of the eighteen financial ratios examined
in Chapter II is shown in Table 20. These ratios were expected to
be related to the growth of a local farmer cooperative. Eleven of
the ratios were included in a model used to predict growth.

Table 20.--Eighteen Financial Ratios and their Computation

Ratio	Computation
1. Current Ratio	$\dfrac{\text{total current assets}}{\text{total current liabilities}}$
2. Working Capital to Total Assets	$\dfrac{\text{total current assets} - \text{total current liabilities}}{\text{total assets}}$
3. Debt to Equity	$\dfrac{\text{total current liabilities} + \text{total long term liabilities}}{\text{total member equity}}$
4. Member Equity to Total Assets	$\dfrac{\text{total member equity}}{\text{total assets}}$
5. Member Investment to Total Assets	$\dfrac{\text{C of I's} + \text{total member equity}}{\text{total assets}}$
6. Gross Margin on Sales	$\dfrac{\text{total gross margin}}{\text{total sales}}$
7. Return on Investments	$\dfrac{\text{dividend income}}{\text{total investments}}$
8. Local Return on Local Assets	$\dfrac{\text{net local savings}}{\text{total assets} - \text{total investments}}$
9. Total Return on Total Assets	$\dfrac{\text{total savings}}{\text{total assets}}$
10. Fixed Assets to Total Assets	$\dfrac{\text{total savings}}{\text{total assets}}$

Table 20.--Eighteen Financial Ratios and their Computation
            (continued)

Ratio	Computation
11. Fixed Assets to Long Term Liabilities	$\dfrac{\text{total fixed assets}}{\text{total long term liabilities}}$
12. Collateral Value	$\dfrac{\text{total assets} - \text{total current liabilities}}{\text{total long term liabilities}}$
13. Productivity Ratio	$\dfrac{\text{rent \& lease expense} + \text{depreciation expense} + \text{interest expense} + \text{labor expense}}{\text{gross operating income}}$
14. Sales to Net Fixed Assets	$\dfrac{\text{total sales}}{\text{net fixed assets}}$
15. Sales to Total Assets	$\dfrac{\text{total sales}}{\text{total assets}}$
16. Deferred Patronage to Member Equity	$\dfrac{\text{deferred patronage refunds}}{\text{total member equity}}$
17. Local Return on Net Fixed Assets	$\dfrac{\text{net local savings}}{\text{net fixed assets}}$
18. Investments to Total Assets	$\dfrac{\text{total investments}}{\text{total assets}}$

APPENDIX C

APPENDIX C

AVERAGE FINANCIAL INFORMATION

The average balance sheet, statement of operations, and
financial ratios for six groups of cooperatives are shown in Tables
21 and 22. The information for Time Period A is shown in Table 21.
The information for Time Period B is shown in Table 22.

Table 21.--Average Financial Information of Grain and Farm Supply Cooperatives in Kansas and Iowa, Time Period A[a]

	Kansas	Kansas Non-Growth	Kansas Growth	Iowa	Iowa Non-Growth	Iowa Growth
Number in Group	50	15	15	49	15	15
Assets[b]						
Accounts Receivable	64,563	79,267	50,449	78,238	79,288	90,429
Grain Inventory	72,877	77,384	39,938	75,639	80,386	52,664
Other Inventory	92,543	110,067	81,510	74,608	75,039	69,490
Total Inventories	166,567	187,452	121,458	150,247	155,426	122,153
Other Current Assets	83,003	73,798	74,169	71,446	65,552	53,530
Total Current Assets	314,133	340,516	246,076	299,931	300,265	266,113
Total Investments	173,644	227,615	129,476	85,007	77,000	65,193
Fixed Assets at Cost	669,321	685,039	595,264	458,336	443,238	413,164
Accumulated Depreciation	246,045	232,712	254,952	185,089	188,214	160,016
Net Fixed Assets	423,276	452,327	340,312	273,247	255,024	253,148
Real Estate	6,054	6,352	4,856	6,491	10,564	4,865
Total Fixed Assets	429,326	458,679	345,168	279,657	265,554	258,013
Total Assets	914,798	1,016,907	721,321	667,560	649,225	589,334
Liabilities and Member Equity						
Current Notes Payable	114,828	141,499	36,905	64,159	97,432	49,209
Current C of I's Due	7,544	6,264	11,963	3,332	4,568	560
Other Current Liabilities	88,845	84,691	89,114	75,479	74,770	60,264
Total Current Liabilities	211,217	232,454	137,983	142,970	176,771	110,032
Notes Payable	84,101	125,913	22,631	47,490	56,299	46,219
Certificates of Indebtedness	62,475	45,450	40,888	22,630	24,985	9,298
Total Long Term Liabilities	146,771	171,050	63,585	70,120	81,284	55,517
Common Stock and Memberships	128,958	136,204	148,916	11,387	10,523	12,120
Preferred Stock	102,388	119,912	98,679	32,368	40,408	11,272
Deferred Patronage Refund	179,428	212,844	110,581	259,476	208,475	263,169
Accelerated Ammortization	37,533	37,993	42,356	43,080	37,532	26,403
Retained Earnings	114,299	122,108	122,027	108,052	94,234	110,488
Total Member Equity	558,666	612,024	526,420	453,898	391,171	423,786
Total Liabilities and Member Equity	916,653	1,015,527	727,988	666,988	649,226	589,334

Table 21.--Average Financial Information of Grain and Farm Supply Cooperatives in Kansas and Iowa, Time Period A[a] (continued)

	Kansas	Kansas Non-Growth	Kansas Growth	Iowa	Iowa Non-Growth	Iowa Growth
Number in Group	50	15	15	49	15	15
Statement of Operations						
Grain Sales	911,819	1,030,680	675,074	1,197,740	938,722	1,227,769
Other Sales	599,852	636,459	609,703	584,365	500,337	539,031
Total Sales	1,511,671	1,667,139	1,284,777	1,782,105	1,439,059	1,766,800
Cost of Goods Sold	1,388,424	1,541,115	1,159,334	1,653,540	1,324,109	1,647,569
Gross Margin on Total Sales	123,247	126,024	125,443	128,565	114,950	119,230
Other Operating Income	69,387	89,480	56,608	55,380	48,655	51,084
Gross Operating Income	192,626	215,504	182,027	183,945	163,605	170,314
Rent & Lease Expense	750	1,429	415	885	776	857
Labor Expense	82,942	98,686	70,348	67,578	61,923	61,161
Depreciation Expense	30,827	32,053	25,215	23,969	24,308	21,667
Interest Expense	12,738	15,403	6,368	6,996	8,805	5,321
Property Taxes	8,039	9,539	6,481	8,258	7,875	7,649
Other Operating Expense	42,879	48,036	39,952	38,808	39,464	33,516
Total Operating Expense	178,176	205,146	148,780	146,494	143,152	130,171
Net Local Savings	14,450	10,358	33,246	37,655	20,452	40,143
Dividend Income	32,108	38,080	25,066	19,199	14,924	18,062
Total Savings	46,199	48,489	56,905	56,650	35,378	58,205

Table 21.--Average Financial Information of Grain and Farm Supply Cooperatives in Kansas and Iowa, Time Period A[a] (continued)

	Kansas	Kansas Non-Growth	Kansas Growth	Iowa	Iowa Non-Growth	Iowa Growth
Number in Group	50	15	15	49	15	15
Financial Ratios						
Current Ratio	2.19	2.07	2.93	2.46	2.06	2.78
Working Capital to Total Assets (%)	14.83	15.33	18.11	24.22	19.94	27.32
Debt/Equity	.75	.80	.41	.51	.69	.43
Member Equity (%)	65.08	62.64	77.05	68.89	61.72	72.52
Member Investment (%)	73.49	69.95	83.44	72.17	66.15	74.14
Gross Margin on Sales (%)	8.08	7.93	8.88	7.42	8.06	7.05
Return on Investments (%)	19.10	18.89	18.13	22.86	19.75	28.78
Local Return on Local Assets (%)	2.43	0.04	6.22	6.04	3.74	7.54
Total Return on Total Assets (%)	5.71	4.23	8.58	7.94	5.61	9.74
Fixed Assets/Total Assets (%)	45.42	45.26	44.30	42.27	41.09	43.73
Productivity Ratio	1.60	1.46	1.84	1.86	1.71	1.94
Sales/Net Fixed Assets	4.63	4.02	6.20	6.75	5.96	7.49
Sales/Total Assets	1.74	1.70	1.84	2.67	2.24	3.04
Deferred Patronage/Mem. Eq. (%)	32.57	30.24	30.47	56.12	53.45	57.01
Local Return on Net Fixed Assets (%)[b]	6.73	-0.45	19.29	13.40	8.81	16.82
Investments/Total Assets (%)	20.94	22.10	22.91	12.00	12.08	10.63
Growth in Total Assets (%)	120.30	29.10	242.00	154.06	72.07	242.13

[a]Based on the average of the two annual audits between April 1, 1965 and March 31, 1967.

[b] Assets may not exactly balance with liabilities and member equity due to peculiarities in the computer program used to average the annual audit information of the cooperatives.

Table 22.--Average Financial Information of Grain and Farm Supply Cooperatives in Kansas and Iowa, Time Period B[a]

	Kansas	Kansas Non-Growth	Kansas Growth	Iowa	Iowa Non-Growth	Iowa Growth
Number in Group	50	15	15	49	15	15
Assets[b]						
Accounts Receivable	163,166	150,064	173,637	177,766	126,702	229,285
Grain Inventory	116,784	71,195	109,818	276,793	170,855	311,956
Other Inventory	245,183	217,170	281,683	174,687	137,936	205,543
Total Inventories	361,968	288,464	391,401	451,273	308,801	517,165
Other Current Assets	566,175	217,793	985,174	283,873	167,627	335,022
Total Current Assets	1,091,309	656,322	1,550,213	912,912	603,130	1,081,472
Total Investments	284,663	318,864	237,364	233,263	183,626	256,412
Fixed Assets at Cost	966,025	845,090	1,005,442	937,430	704,294	1,036,387
Accumulated Depreciation	488,620	440,703	515,722	446,428	394,004	452,780
Net Fixed Assets	477,405	404,386	489,720	491,002	310,289	583,606
Real Estate	9,459	6,826	12,517	17,478	17,026	15,575
Total Fixed Assets	486,864	411,213	502,237	508,719	327,523	600,127
Total Assets	1,866,024	1,387,285	2,294,912	1,669,453	1,123,227	1,960,940
Liabilities and Member Equity						
Current Notes Payable	152,690	129,797	116,415	214,379	152,665	231,339
Current C of I's Due	39,791	28,486	63,990	4,555	6,852	4,525
Other Current Liabilities	584,405	235,456	1,025,937	353,991	206,476	452,667
Total Current Liabilities	776,886	393,739	1,206,342	572,925	365,993	688,531
Notes Payable	103,700	107,211	75,402	163,755	81,754	192,531
Certificates of Indebtedness	79,852	34,365	70,226	60,893	52,712	66,202
Total Long Term Liabilities	185,218	141,577	151,179	224,648	134,466	258,733
Common Stock and Memberships	169,303	146,865	199,686	51,588	10,532	29,790
Preferred Stock	124,146	150,498	80,429	30,481	51,247	9,822
Deferred Patronage Refund	406,515	375,338	415,828	581,891	397,190	755,780
Accelerated Ammortization	27,659	26,074	35,172	26,815	19,851	15,287
Retained Earnings	177,190	153,108	209,407	181,023	143,949	202,965
Total Member Equity	903,920	851,970	937,391	874,367	622,769	1,013,642
Total Liabilities and Member Equity	1,866,024	1,387,285	2,294,913	1,671,940	1,123,227	1,960,905

Table 22 .--Average Financial Information of Grain and Farm Supply Cooperatives in Kansas and Iowa, Time Period B[a] (continued)

	Kansas	Kansas Non-Growth	Kansas Growth	Iowa	Iowa Non-Growth	Iowa Growth
Number in Group	50	15	15	49	15	15
Statement of Operations						
Grain Sales	3,717,050	3,647,870	3,558,963	4,411,037	2,814,439	5,212,948
Other Sales	1,430,733	1,109,002	1,873,602	1,258,551	1,030,014	1,620,759
Total Sales	5,147,783	4,756,873	5,432,565	5,669,588	3,844,453	6,833,706
Cost of Goods Sold	4,733,037	4,411,783	4,942,527	5,261,400	3,549,196	6,343,127
Gross Margin on Total Sales	414,746	345,089	490,038	408,187	295,297	490,580
Other Operating Income	124,297	121,646	133,616	122,938	97,132	128,349
Gross Operating Income	539,043	466,735	623,654	530,922	391,723	618,928
Rent & Lease Expense	1,658	1,041	1,522	4,330	3,165	5,605
Labor Expense	174,067	170,261	183,200	155,758	129,733	165,672
Depreciation Expense	45,668	38,956	52,339	49,729	37,983	56,399
Interest Expense	28,688	22,755	33,377	40,446	26,443	45,579
Property Taxes	11,050	11,027	10,549	15,080	10,872	15,720
Other Operating Expense	101,179	86,919	122,240	95,584	78,994	105,171
Total Operating Expense	362,308	330,959	403,227	360,926	287,190	394,145
Net Local Savings	175,797	135,775	220,426	169,995	104,532	224,784
Dividend Income	82,254	76,615	76,065	64,359	44,186	76,028
Total Savings	253,484	212,405	296,624	234,354	148,719	300,812

Table 22.--Average Financial Information of Grain and Farm Supply Cooperatives in Kansas and Iowa, Time Period B[a] (continued)

	Kansas	Kansas Non-Growth	Kansas Growth	Iowa	Iowa Non-Growth	Iowa Growth
Number in Group	50	15	15	49	15	15
Financial Ratios						
Current Ratio	1.57	1.79	1.45	1.75	1.89	1.61
Working Capital to Total Assets (%)	17.23	18.81	16.13	21.09	22.33	20.24
Debt/Equity	1.03	.71	1.28	.97	.83	1.02
Member Equity (%)	52.34	61.40	46.80	53.49	57.06	51.34
Member Investment (%)	58.27	66.71	51.56	57.68	61.88	55.55
Gross Margin on Sales (%)	8.21	8.09	8.48	7.31	7.72	7.34
Return on Investments (%)	25.64	19.77	27.64	26.34	22.28	29.32
Local Return on Local Assets (%)	11.03	9.91	11.35	11.32	10.56	13.10
Total Return on Total Assets (%)	13.43	12.28	13.44	13.50	12.60	15.31
Fixed Assets/Total Assets (%)	26.27	27.13	24.09	30.11	28.11	29.87
Productivity Ratio	2.18	1.97	2.31	2.14	1.98	2.34
Sales/Net Fixed Assets	11.94	13.34	11.94	12.49	14.21	12.52
Sales/Total Assets	2.91	3.19	2.68	3.44	3.42	3.53
Deferred Patronage/Mem. Eq. (%)	41.99	38.19	42.46	67.15	64.06	72.92
Local Return on Net Fixed Assets (%)	36.22	26.11	45.33	35.49	35.00	42.16
Investments/Total Assets (%)	17.89	24.56	13.25	14.09	16.50	13.06
Growth in Total Assets (%)	120.30	29.10	242.00	154.06	72.07	242.13

[a]Based on the average of the two annual audits between April 1, 1973 and March 31, 1975.

[b]Assets may not exactly balance with liabilities and member equity due to peculiarities in the computer program used to average the annual audit information of the cooperatives.

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IX (Autumn 1971): pp.389-95.

The undersigned, appointed by the Dean of the Graduate Faculty, have

examined a thesis entitled

   Financial Conditions Facilitating Growth In
   Local Cooperatives

presented by
         Stephen Emory Mathis

a candidate for the degree of   Master of Science

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