INFORMATION TO USERS

This material was produced from a microfilm copy of the original document. While the most advanced technological means to photograph and reproduce this document have been used, the quality is heavily dependent upon the quality of the original submitted.

The following explanation of techniques is provided to help you understand markings or patterns which may appear on this reproduction.

1. The sign or "target" for pages apparently lacking from the document photographed is "Missing Page(s)". If it was possible to obtain the missing page(s) or section, they are spliced into the film along with adjacent pages. This may have necessitated cutting thru an image and duplicating adjacent pages to insure you complete continuity.

2. When an image on the film is obliterated with a large round black mark, it is an indication that the photographer suspected that the copy may have moved during exposure and thus cause a blurred image. You will find a good image of the page in the adjacent frame.

3. When a map, drawing or chart, etc., was part of the material being photographed the photographer followed a definite method in "sectioning" the material. It is customary to begin photoing at the upper left hand corner of a large sheet and to continue photoing from left to right in equal sections with a small overlap. If necessary, sectioning is continued again — beginning below the first row and continuing on until complete.

4. The majority of users indicate that the textual content is of greatest value, however, a somewhat higher quality reproduction could be made from "photographs" if essential to the understanding of the dissertation. Silver prints of "photographs" may be ordered at additional charge by writing the Order Department, giving the catalog number, title, author and specific pages you wish reproduced.

5. PLEASE NOTE: Some pages may have indistinct print. Filmed as received.

Xerox University Microfilms
300 North Zeeb Road
Ann Arbor, Michigan 48106
PADMARAJAN, Nelliyank Appadurai, 1933-
COST EFFICIENCY AND PROFIT PERFORMANCE OF
SAVINGS AND LOAN ASSOCIATIONS: THE MUTUALS
VERSUS STOCK ASSOCIATIONS IN OHIO.

The Ohio State University, Ph.D., 1976
Economics, finance

Xerox University Microfilms, Ann Arbor, Michigan 48106

Copyright by
Nelliyank Appadurai Padmarajan
1976
COST EFFICIENCY AND PROFIT PERFORMANCE OF SAVINGS AND LOAN ASSOCIATIONS: THE MUTUALS VERSUS STOCK ASSOCIATIONS IN OHIO

DISSERTATION

Presented in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy in the Graduate School of The Ohio State University

By

Nelliyan Appadurai Padmarajan, B.Com (Hons), M.A., M.B.A.

* * * * *

The Ohio State University

1976

Reading Committee:

Dr. Wilbur A. Rapp
Dr. Ronald L. Racster
Dr. Kenneth R. Gordon

Approved By

Wilbur A. Rapp
Adviser
Department of Finance
ACKNOWLEDGEMENTS

In reviewing my first attempt at a major research project, I find the contribution of numerous individuals to the design and successful completion of this dissertation has been very great. From its very inception, the research orientation, and conceptual basis embodied in this work have been very severely, but always fairly, subjected to the critical eye of my most demanding and stimulating critic, Professor Wilbur A. Rapp. His efforts in guiding me to look at various savings industry's issues in their perspectives and his help in obtaining the data have been indispensable to the fulfillment of this research task, for which I will always be grateful.

Professor Ronald L. Racster and Professor Kenneth R. Gordon contributed to the wealth of constructive criticism and guidance that has been very valuable in completing the project. Professor Racster's help and encouragement, especially during many spells of 'dissertation blues' have been invaluable. Professor Gordon's insight on statistical aspects of regression technique avoided many of the pitfalls that could have unnerved me.

Professor David W. Cole's help at the proposal stage is highly appreciated. In allowing me to use his regression program and readily clarifying my innumerable program related doubts anytime I approached him, Professor Jon Cunyngham has shown the quality of a true professor, and I am indebted to him forever.
A special word of thanks is extended to both Mr. Jim Hoy of Bowling Green State University Computer Center and Ms. Virginia E. Smiley of the Ohio State University Commerce Library for their help ungrudgingly extended to me in various ways.

Access to the computer facilities provided by the Bowling Green State University's J.Preston Levis Regional Computer Center was indispensable.

The help of two important federal institutions, the Federal Home Loan Bank of Cincinnati and the Federal Home Loan Bank Board, Washington, D.C., in providing the individual associations' data is very much appreciated. In making special arrangements to furnish me with the required data Dr. Alan R. Winger of the FHLB of Cincinnati and Dr. Donald M. Kaplan of FHLBB, Washington, D.C., have demonstrated clearly how enlightened public officials can be great assets to a country in general, and to the academic community in particular.

Mr. Francis Paul of FHLBB, Washington, D.C., has been very helpful in procuring the data in tape form and providing additional information on branches and SMSA's.

Finally, my wife, Kausalya, was a continued source of help in preliminary typing, proof reading, and goading me for more clarity. My children, Sashikala and Satish, who postponed joining their father so that he can get the great task of dissertation done, deserve my heartfelt and unlimited thanks.
VITA

November 14, 1933... Born - Nelliyankulam, Tamil Nadu, India

1955............... B.COM (HONS), Pachaiyappa's College, University of Madras, India

1962............... M.A., Banaras University, India

1955-1965........ Assistant Professor, Pachaiyappa's College, University of Madras, India

1965-1969........ National Cadet Corps Service, Madras, India

1969-1971......... Graduate Assistant, Department of Marketing, Bowling Green State University, Bowling Green, Ohio

1971............... M.B.A., Bowling Green State University, Bowling Green, Ohio

1971-1974......... Teaching Associate, Department of Finance, The Ohio State University, Columbus, Ohio

1974............... Assistant Professor, Department of Finance and Insurance, Bowling Green State University, Bowling Green, Ohio

FIELD OF STUDY

Major Field: Finance

Financial Institutions: Professors Wilbur A. Rapp and David W. Cole
Managerial Finance: Professor William H. Jean
Investments: Professor Roger K. Harvey
Real Estate: Professor Ronald L. Racster
Quantitative Economics: Professors Jon Cunyngham and Kenneth R. Gordon
# Table of Contents

## Acknowledgements

## Vita

## List of Tables

## List of Figures

### Chapter

1. **Introduction**
   - Objectives of the Study
   - Overview of Methodology
   - Qualifications of the Study
   - Overview of Presentation

2. **Review and Evaluation of Related Studies**
   - The Hester Study
   - The Brigham and Pettit Study
   - The Benston Study
   - The Nicols Study
   - Justification of the Study

3. **Model Specification and Experimental Design**
   - The Cost Model
   - Specification of Variables
   - Form of the Cost Model
   - Form of the Profit Model
   - Source and Reliability of Data

4. **Analysis of Regression Results: Cost and Profit Models**
   - Analysis of Cost Regression Results
     - General results
     - Specific results
   - Analysis of Profit Regression Results
     - General results
     - Specific results
   - Statistical Testing of the Model
# TABLE OF CONTENTS

V. SUMMARY ....................................................................................... 99  
Summary  
Hypotheses Tested  
Comparison of Findings with Other Studies

APPENDIX

A................................................................. 109
B................................................................. 112
C................................................................. 113
D................................................................. 114
E................................................................. 115
F................................................................. 116
G................................................................. 118
H................................................................. 119

BIBLIOGRAPHY ................................................................. 120
## LIST OF TABLES

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Number of Reporting Ohio Associations by SMSA's, 1967 through 1970</td>
<td>7</td>
</tr>
<tr>
<td>2.</td>
<td>Dollar Assets of Stock Savings and Loan Associations: Stock Predominant States</td>
<td>25</td>
</tr>
<tr>
<td>3.</td>
<td>Net Worth of Permanent Stock Savings and Loan Associations: Stock Predominant States</td>
<td>26</td>
</tr>
<tr>
<td>5.</td>
<td>Variables Used in the Regression Models</td>
<td>50</td>
</tr>
<tr>
<td>6.</td>
<td>Regression Results: Cost Model: Type, Branch and NSVGSN Interaction with Type-dummies (T-values in Parentheses)</td>
<td>51</td>
</tr>
<tr>
<td>7.</td>
<td>Fitted Response Function: Cost Model: NSVGSN Interaction with Type-dummies</td>
<td>54</td>
</tr>
<tr>
<td>8.</td>
<td>New Savings: Mean and Range: Cost Model</td>
<td>58</td>
</tr>
<tr>
<td>10.</td>
<td>Regression Results: Cost Model: By SMSA, 1968</td>
<td>68</td>
</tr>
<tr>
<td>11.</td>
<td>Regression Results: Cost Model: By SMSA, 1969</td>
<td>69</td>
</tr>
<tr>
<td>12.</td>
<td>Regression Results: Cost Model: By SMSA, 1970</td>
<td>70</td>
</tr>
<tr>
<td>13.</td>
<td>Regression Results: Cost Model: Total Assets Interaction with Type-dummies (T-values in Parentheses)</td>
<td>86</td>
</tr>
<tr>
<td>14.</td>
<td>Regression Results: Profit Model: Net Profit Margin Interaction with Type-dummies (T-values in Parentheses)</td>
<td>90</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Average and Marginal Costs, Federal and State Mutual, Selected Years: 1968 and 1970</td>
<td>57</td>
</tr>
<tr>
<td>3.</td>
<td>Average and Marginal Costs, State Mutual and State Stocks, Selected Years: 1968 and 1970</td>
<td>64</td>
</tr>
<tr>
<td>4.</td>
<td>Average and Marginal Costs, Cincinnati SMSA: Federal and State Mutual, Selected Years, 1968 and 1970</td>
<td>73</td>
</tr>
<tr>
<td>6.</td>
<td>Average and Marginal Costs, Columbus SMSA: Federal and State Stocks, 1968 and 1969</td>
<td>81</td>
</tr>
<tr>
<td>7.</td>
<td>Average and Marginal Costs, Dayton SMSA: Federals and State Mutuals, 1967 and 1969</td>
<td>83</td>
</tr>
</tbody>
</table>
CHAPTER I

INTRODUCTION

Among the major types of financial intermediaries operating in the U.S. economy the savings and loan associations occupy an important place both in terms of number and dollar value of assets. These S.& L.'s receive savings deposits from thousands of depositors and lend most of the deposits as mortgage money for home purchases. In view of their importance as repositories of community savings and suppliers of credit, their performance in terms of cost efficiency and profit performance has always been legitimate subject both for public scrutiny and critical research.

An important aspect of research has compared the relative cost efficiency and profit performance of mutual and stock S. & L.'s. Some researchers, like Hester\(^1\) and Nicols,\(^2\) have concluded that certain performance measures indicate that the stock savings and loan associations are relatively superior to mutuals. Brigham and Pettit,\(^3\)

---


and Benston, however, were unable to come to similar conclusions since they failed to find a consistently superior performance by the stock firms. Moreover, these authors indicated that the performance of any type of association is not so much due to the type of charter possessed, but is instead dependent upon its location. On the other hand, Nicols contended that mutuals are poor performers and identified management as the cause.

The mutual savings and loan association controlled by a professional management while subject to some constraints with respect to disposal of the association's income, is entirely free from interference from saver-member. The original enthusiasm has been replaced by a self-perpetuating bureaucracy which successfully preserves its perquisites in a manner similar to that of medieval monasteries.

He noted further that

...in every instance, mutuals not only behaved differently they lagged behind the stock in reducing expenses, increasing profits and growth... By insulating themselves from market competition, the managers have suppressed the possibility that inefficiency will be penalised and eliminated...

Divergence in the findings of these above studies might be due to, among other things, the regression models used, the data analysed and the geographical areas in which S.& L.'s studied were located. It is perhaps these inconsistent findings that made Brigham and Pettit, and Benston advocate further research be done using firms from other locations. This dissertation is in response to the

---


5 Nicols, op.cit., p. 297.

6 Ibid., p. 299.
above suggestion and is primarily concerned with an analysis of performance of different types of savings and loan associations located in the State of Ohio, for the years 1967 through 1970.

OBJECTIVES OF THE STUDY

The study proposes to make a detailed comparative cost and profit performance analysis of Ohio FSLIC insured stock and mutual associations on the basis of relative operating costs by year, by important SMSA locations, by total asset size and by return on net worth for the period, 1967 through 1970. Generally it will be determined whether mutuals behaved differently from stock firms in terms of cost efficiency and profit performance in those years.

Statement of Hypotheses

The relative efficiency of selected Ohio federally chartered mutuals, state chartered mutuals, and state chartered stock associations will be examined by regression analysis of the following hypotheses:

Hypothesis 1: There is no difference in cost efficiency between different types of charter of insured Ohio savings and loan associations for the years, 1967 through 1970.

Hypothesis 2: There is no difference in cost efficiency between different types of charter of insured Ohio savings and loan associations by SMSA locations within Ohio for the years, 1967 through 1970.

Hypothesis 3: There is no difference in cost efficiency between different types of charter of insured Ohio savings and loan associations as per total asset size for the years, 1967 through 1970.

Hypothesis 4: There is no difference in profit performance (return on net worth) between different types of charter of insured Ohio savings and loan associations for the years, 1967 through 1970.
OVERVIEW OF METHODOLOGY

The study uses a single equation multiple regression technique to compare the cost efficiency and profit performance of mutual and stock associations. Based upon annual data, 1967 through 1970, obtained from reports of individual associations submitted to the Federal Home Loan Bank Board, multiple regression runs were made as stated below:

1) analysis on the data of associations differentiated by years with the type of associations classified by dummy variables

ii) analysis on the data of associations differentiated by important SMSA location- Cincinnati, Cleveland, Columbus and Dayton- for the years, 1967 through 1970

iii) analysis on the data of associations by total asset size for the years, 1967 through 1970

iv) analysis on the data of associations on the basis of return on net worth for the years, 1967 through 1970.

Selection of the Appropriate Model

The classification of savings associations into federal, state mutual and state stock associations was done by the use of dummy variable technique. This method has the advantage of utilising information about all available observations with minimum sacrifice in degrees of freedom. The first model, which included two type dummy variables (stock being default dummy) in addition to other explanatory variables, failed to show any cost differences between the associations. Adding a branch dummy variable to the first model (associations having branches = 1, associations having home office only = 0) did not change the results significantly, although the branch dummy was proved to be an important variable and should be included in any model.

The next step was to use a type-interaction model to determine the cost and profit performance differences between S.& L.'s. Due to its
greater power in explaining the variations in the dependent variable (operating costs of an association), the variable 'new savings,' was selected to interact with type dummies. Cost and profit performance differences between associations could be determined by this model more specifically than other models. Certain other variables were tested for significant interactions but were discarded based on their inconsistent and less significant results. The use of one variable to interact with type dummies has also the advantage of simplicity in explaining the regression results. In view of its ability to discriminate among associations on the basis of costs, the new savings interaction model was adopted as the basic cost model. Certain modifications in the model were made to test hypotheses. These adjustments satisfied statistical requirements.

The fourth model, which added a branch dummy interaction variable to the third model, was not found to provide more information than already available from the previous one and was dropped from further consideration.

The profit model uses the return on net worth, an important industry measure, as the dependent variable and three ratios (net profit margin, asset utilization and equity multiplier), together with type of charter, branch and interactions as independent variables. The net profit margin was allowed to interact with type dummies in the profit model.

QUALIFICATIONS OF THE STUDY

The mutual associations as a group are the dominant firms in Ohio in terms of number. To the extent that one type of association dominates
the industry any general conclusions based upon the analysis of data of Ohio S.& L.'s are less likely to be applicable to associations elsewhere. In fact, a criticism of Nicols' study was that his conclusions were based upon the analysis of stock dominant California associations but were generalised as applicable to other states with low proportions of stock firms in their association mix.

The data of stock associations include the data of a number of companies which are affiliates of savings and loan holding companies. The attraction of such an affiliation is said to be the sharing of certain economies of scale in their operations. These economies could obscure the relative performance of companies to a certain degree. However, it is doubtful whether there are significant behavioral differences between stock firms that are affiliates of savings and loan holding companies and the others that are not. Many research studies found either very little or no synergetic benefits from such affiliation.

Finally, the small number of associations in certain SMSA's precluded analysing those areas. Table 1 gives the number of associations by Ohio SMSA's for which the data were available. The regression technique fails to produce statistically valid results when the number of independent variables exceed or even equal the number of observations. Since the regression model envisages at least six to eight explanatory

---

<table>
<thead>
<tr>
<th>Ohio SMSA's Number and Name</th>
<th>1967</th>
<th>1968</th>
<th>1969</th>
<th>1970</th>
</tr>
</thead>
<tbody>
<tr>
<td>008 Akron</td>
<td>12</td>
<td>12</td>
<td>11</td>
<td>13</td>
</tr>
<tr>
<td>116 Canton</td>
<td>10</td>
<td>10</td>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>148 Cincinnati</td>
<td>136</td>
<td>133</td>
<td>131</td>
<td>127</td>
</tr>
<tr>
<td>152 Cleveland</td>
<td>33</td>
<td>33</td>
<td>33</td>
<td>33</td>
</tr>
<tr>
<td>168 Columbus</td>
<td>21</td>
<td>21</td>
<td>21</td>
<td>21</td>
</tr>
<tr>
<td>184 Dayton</td>
<td>22</td>
<td>22</td>
<td>22</td>
<td>22</td>
</tr>
<tr>
<td>300 Hamilton-Middletown</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>320 Huntington</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>404 Lima</td>
<td>9</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>416 Lorain-Elyria</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>449 Mansfield</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>736 Springfield</td>
<td>4</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>748 Steubenville</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>776 Toledo</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>823 Wheeling</td>
<td>6</td>
<td>6</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>860 Youngstown-Warren</td>
<td>8</td>
<td>8</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>900 Non-SMSA's</td>
<td>113</td>
<td>112</td>
<td>112</td>
<td>111</td>
</tr>
<tr>
<td>Number deleted due to mergers, errors and incomplete data</td>
<td>42</td>
<td>36</td>
<td>30</td>
<td>25</td>
</tr>
<tr>
<td>Total number of reporting firms</td>
<td>445</td>
<td>434</td>
<td>425</td>
<td>417</td>
</tr>
</tbody>
</table>

Source: FHLBB data
variables, including indicator and interaction variables, the SMSA's having data for only a few associations were excluded from analysis despite the fact that these firms represent the entire population in the respective SMSA's.

OVERVIEW OF PRESENTATION

The literature relevant to the study is examined in chapter II. Chapter III contains the model specification and experimental design. The description of variables and the reasons for their inclusion in the model also are stated.

Chapter IV reports the statistical results of various regression runs. Chapter V consists of summary and a statement of acceptance or rejection of the various hypotheses. In addition, a comparison of the present study with other S.& L. studies is given.
CHAPTER II

REVIEW AND EVALUATION OF RELATED STUDIES

Significant research studies comparing the cost efficiency and profit performance of stock and mutual savings and loan associations were done by

(i) Donald D. Hester
(ii) E.F. Brigham and R.R. Pettit
(iii) George J. Benston
(iv) Alfred Nichols

THE HESTER STUDY

The Hester study, entitled "Stock and Mutual Associations in the Savings and Loan Industry," was sponsored by the Federal Home Loan Bank Board.

---


Loan Bank Board and was released in 1968. It was the first study to compare the relative operating performance of stock and mutual savings and loan associations.

**Major Conclusions of Hester Study**

The principal conclusion of the study was that stock and mutual associations, when facing similar market situations, have different behavioral characteristics. Stock associations were observed to grow much more rapidly and to have a higher risk portfolio of assets than mutuals during the period of study, 1961 through 1964. The stock associations were also found to be willing to operate with smaller net income margins when compared with mutuals. However, relatively minor differences were found when income and balance sheet items were compared for federally chartered and state chartered associations. In short, he concluded that...

...for a number of reasons, theory lends precious little insight into expected differences in behavior by stock and mutual associations. It is likely that stock associations will be more aggressive than mutuals in exploiting opportunities. It seems plausible that stock associations should be observed to grow faster and take more risks...

**Hester's Research Methodology**

Using regression technique Hester analysed the data of 4000 S. & L.'s for the years, 1961 through 1964. A number of dummy variables were included in the regression equations to serve two

---

5Hester, op. cit., p. 21.
important purposes. First, to classify associations into stock and mutual firms in order to provide a basis for analysing associations' comparative operating efficiency and second, to adjust for locational impact in associations' output mix.

Evaluation of Hester Study

The Hester study can be criticized on many grounds. First, the use of the state dummy to account for the impact of the whole state on dependent variable presupposes that a state is one homogenous geographic area, which is not necessarily true. Also, his other variable, cash to assets ratio, which was supposed to measure liquidity of the association, might very well reflect cash needed for transaction activity. Hester also failed to account for growth rate, size of associations, number of branches etc., in his output mix. The failure to hold constant the important operating differences among associations in the analysis could have led Hester to conclude that stock associations' performance was superior to that of mutuals.

THE BRIGHAM AND PETTIT STUDY

The Brigham and Pettit study was a part of the "Study of the Savings and Loan Industry," directed by Irwin Friend for the FHLBB in 1969.\(^6\)

\(^6\) Brigham and Pettit, loc. cit., pp. 971-1209.
Major Conclusions of Brigham and Pettit Study

Brigham and Pettit's main conclusion was that the operations of stock and mutual associations reflected no substantial differences. However, when other variables were included in the regression equation to hold constant the important operating differences among associations, the authors found a somewhat favorable result for the stock firms. Specifically, the stock sector of savings and loan industry was found to

1) exhibit a faster rate of growth

2) have slightly lower cost ratios when other factors such as size, growth, number of branches etc., were held constant, and

3) show up as more risky than mutuals. 7

Based upon the interpretation of their profit model, in which the ratio of net income before taxes to average deposits and net worth was taken as the dependent variable, Brigham and Pettit concluded that both stock and mutual S. & L.'s were equally profitable when they were operating under similar market conditions. 8

Research Methodology used in the Study

The model used by Brigham and Pettit to study the relative performance of the savings associations was a single equation multiple regression model of the form

\[ Y = a + \sum b_i X_i + e \]

7Ibid., pp. 1177-1181.
8Ibid., pp. 1182-1185.
where \( Y = \) ratio of operating costs to average assets in the cost model and ratio of income before taxes plus interest on deposits to total average deposits and average net worth in the profit model.

\( x_i \)'s included in both the models are defined as follows:

1) Ratio of fixed assets to total assets
2) Ratio of fee income to total income
3) Growth
4) Ratio of scheduled items to specified items
5) Size of association (log of assets)
6) Number of branches
7) Stock-mutual dummy: 1 = stock, 0 = mutual
8) Other factors and \( e \) = error term

Regression equations for both the models were run for a total of three selected SMSA's in the country. The selected SMSA's were Chicago, Los Angeles and Detroit-Cleveland. The data analysed were for the years 1962 through 1966. In addition to the use of dummy variables to distinguish between stock and mutual associations, regression runs also were made separately for these associations. From these separate runs, it was found that stock and mutual associations had about the same operating costs when other things were held constant. The authors concluded further that the observed differences between stock and mutual firms were quite small and could easily have resulted simply by random chance.\(^9\)

**Evaluation of Brigham and Pettit Study**

The Brigham and Pettit Study made extensive use of ratios in the regression models. The use of ratios as dependent and independent variables has been criticized on many grounds.\(^10\)

---

\(^9\) Ibid., pp. 1179-1180.

First, the ratios are statements of relationships between two numbers. They do not tell us the magnitude of the actual data. Second, if the ratio of operating expenses to average assets form the basis of comparison among different types of associations, then the denominator must represent activities that are sufficiently uniform among all types of associations. Failure to ensure uniformity in the activities represented by the denominator can make the conclusions less acceptable.

The use of assets as a variable for comparative purposes has been criticized as unfit by Nicols. He made a strong case for not using assets as a variable in any study:

There is no necessity for considering an aggregate such as either assets or liabilities. Indeed assets is not a good variable because it includes the two functions that are more properly treated separately—loan acquisitions and their servicing. Thus, the inclusion along with new loans and the number of mortgages is to double count, since the actual activities for which assets is at best a proxy variable, are new loans and their servicing.11

The study, like Hester's, did not use any interaction variable in the analysis. If no interaction effects were present, that is, if the slopes of the regression lines were same, then the failure to utilize the interaction technique poses no serious problem. However, if slopes of the lines were not identical, as has been found in the present study, then further analysis is required before

11Nicols, op.cit., p.98.
definite conclusions about the type dummy variables could be stated. The study combined for the most part, the state mutuals and federals as a group for comparison with stock firms. Analysis, comparing the performance of federals with state mutuals, state mutuals with stocks and between associations having branches or home office only was not done.

THE BENSTON STUDY

The primary purpose of Benston's study was to examine costs incurred by savings and loan associations in performing various tasks such as the making and servicing of mortgages and holding and transferring of savings. An additional objective of the study was to determine statistically which specific factors were related to the operating costs of all types of savings and loan associations. In short, the study attempts to answer the following two related questions: Are stock associations more 'efficient' than mutual associations? Do the costs incurred by federally-chartered associations differ from those incurred by state-chartered associations?

One of the important findings of Benston's study was the presence of economies of scale over the entire size range of output for the S. &L.'s in the country. Another finding was that "for the country as a whole outside of California, mutual associations may have lower operating costs than stock associations." The study also found that the reverse was true in the case of California associations. Specifically he found that

...on the average, federally-chartered mutuals have total costs that are eight percent higher than state-chartered mutuals, while stock associations have sixteen percent higher total costs than state mutuals. Thus, stock firms' costs average eight percent more than federally-chartered mutuals.14

Other conclusions were that a measure of risk15 (the ratio of borrowings to mortgages) was positively related to operating costs while another measure16 (the percentage of scheduled items to mortgages) was not. Also, the relatively newly incorporated associations were found to incur higher costs of operation than the associations incorporated much earlier.17

13Benston, G.J., loc. cit., p.43.
14Ibid., p.710.
15Ibid., p.714
16Ibid., p.714
17Ibid., p.713.
Research Methodology Used in the Study

The theoretical basis for Benston's study is the cost function,

\[ C = f(Q, M, P, U) \]

where

- \( C \) = operating costs
- \( Q \) = level of output
- \( M \) = managerial factors
- \( P \) = locational factors and
- \( U \) = unspecified factors

under the assumption that

1. the goal of the firm is to minimize costs for a level of output; and
2. the level of output is exogenously determined.

Benston's cost function form is a reduced form of the Cobb-Douglas production function,

\[ C = b_0 Q^{b_1} M^{b_2} P^{b_3} U^{b_4} \]

The above specification allowed Benston to use the multiplicative form of regression because he believed that all the variables specified in the model bear a multiplicative relationship to one another. His cost model, after converting all the variables to natural logarithm became\(^{18}\)

\[
\ln C = \ln a + b \ln Q P + \sum c_i \ln QD_i + \sum d_i \ln QN_i + \\
\sum e_i \ln M_i + \sum f_i \ln P_i + \ln U
\]

where \( C \) = operating costs (either salaries, occupancy expenses, miscellaneous expenses or total expenses),

\(^{18}\text{Ibid.}, p. 698.\)
QP = Primary output variables (either number of loans made per year, average of number of loans serviced per month, or number of savings accounts serviced per month)

QD = Variables that account for different proportions of output (percentage of loans made to the number serviced, percentage of average borrowings to average mortgage balances outstanding)

QH = Output homogeneity variables:

i) PPM = Percentage of purchase to total mortgages made
ii) SCM = Average dollar size of construction loans made
iii) PCS = Percentage of conventional to total mortgages serviced
iv) SPM = Average dollar size of purchase loans made
v) PAS = Percentage activity in savings accounts \((\text{annual investments + withdrawals}) ÷ \text{average savings balances} \times 100(\%)
vi) SSA = Average size of savings accounts

M = Management variables (dummy variables):

i) Federal S.& L.'s = \(\log_e 2.3\) = 1
   State stock or mutual = \(\log_e 1\) = 0

ii) State stock S.& L.'s = \(\log_e 2.3\) = 1
    Federal or state mutual = \(\log_e 1\) = 0

Thus, the regression coefficients estimated for federal and stock savings and loan associations measure the differences between state mutual firms and other types of associations. Similar dummy variables for incorporation periods and for supervisory authority ratings used were as follows:

OFF = \(\log_e\) number of offices (main plus branches)

F = Input prices and other cost homogeneity variables (growth and rate of change of growth variables). Variables included under this category are:

W = wage per employee in banking and related financial industries in the county in which association is located. Rate of change of output previous year; rate of change of output current year; an increase and decrease in
rate of change; variability of output past years; same of current year; percentage of average mortgage balances outstanding; cost of foreclosing in the state and percentage of average real estate owned to average total assets were other variables under this listing.

Evaluation of the Benston Study

The Benston study is one of the most detailed and in-depth studies of cost analysis ever undertaken for financial intermediaries. While the Brigham and Pettit and the Nicols studies used only one dependent variable for cost analysis, the ratio of operating costs to average total assets (Brigham and Pettit), and the total operating costs (Nicols), Benston used three components of cost as well as total costs separately as dependent variables in his study. The main reason given by Benston for such a breakdown of costs was that

Salaries and wages, occupancy costs, and miscellaneous operating expenses may be differentially related to the output and other variables and as such it is necessary that each group is analysed separately. 19

Benston, therefore, used three different variables as alternative output variables. They were 'the number of loans made,' 'the average number of loans serviced per month,' and the 'average number of savings accounts serviced per month.' To account for the differences in output mix, Benston included in the model various output homogeneity variables in multiplicative form.

19 Ibid., p.685.
The operating costs of associations also may differ because they incur costs for reasons that may not be directly related to their output or mortgages. To account for the effects of such factors, Benston identified many locational or cost homogeneity variables and included them in his model (the P's shown earlier).

Benston deducted advertising expenses from his dependent variable, the operating expenses, because he believed that the former is not a part of operating expenses. In his view, the advertising expenses was determined primarily by market conditions rather than by the operations and, therefore, should not be included in the variable to be explained. However, the advertising expenses is part of operating expenses and should be taken to reflect at least in part, the aggressiveness or ability of the management to increase the level of operations in such associations.

Benston's major assumption was that the management in the mutual S.& L.'s attempts to minimize costs. If Nicols' argument that the management in the mutual associations do not attempt to minimize costs were taken as realistic, then Benston's cost model becomes less appropriate.

THE NICOLS STUDY

Nicols set out to examine 'the promise and the reality of mutuality.' The promise that a mutual institution is superior to an enterprise solely devoted for profits. The reality, however, is that the management in the mutuals has created a proprietary infrastructure with an elaborate relationship between the associations and their
organizations in order to divert the former's income for their personal benefits. This diversion of income is made possible because the mutual firms lack internal ownership interests.

Major Conclusions of the Study

Based upon the analysis of empirical evidence, Nicols concluded that the stock associations in California outperformed the mutual firms in terms of various cost and profit measures. Specifically, he found that

(a) stock associations grew faster than mutuals;
(b) mutuals had higher expenses than stock firms;
(c) the stock associations reported more profits than mutuals in each of the years under study;
(d) only in mortality rates were mutuals slightly higher;
(e) the California federals have lost their market share substantially;
(f) the stock associations paid higher dividends and made more aggressive use of advertising; and
(g) the stock associations placed greater reliance on FHLB and other borrowings.

Research Methodology Used in the Study

Nicols, using the data of stock and mutual associations in thirty-five states, compared the results with those obtained from the analysis of the data of less than one-hundred Los Angeles savings and loan associations. Nicols used the regression analysis technique to test the various hypotheses. The cost model used was of the form

\[ Y = a + b_1 A_0 + b_2 A_1 + b_3 A_2 + b_4 D_0 + b_5 D_1 + b_6 D_2 + b_7 L + b_8 N_0 + b_9 N_1 + b_{10} P + b_{11} F + b_{12} M + b_{13} S + b_{14} T + b_{15} G + b_{16} H + b_{17} J + b_{18} K + b_{19} U + b_{20} l + b_{21} E + b_{22} F + b_{23} W + b_{24} Q + e \]

where

\[ Y = \text{total operating expenses} \]
\[ a = \text{regression coefficient} \]
\[ b_i = \text{regression coefficient of } i\text{th variable, } i = 1, \ldots, 24 \]
\[ A_0 = \% \text{ of assets held by associations larger than } \$100 \text{ million} \]
\[ A_1 = \% \text{ of assets held by associations larger than } \$50 \text{ million} \]
\[ A_2 = \% \text{ of assets held by associations larger than } \$25 \text{ million} \]
\[ D_0 = \text{value of construction loans during the period} \]
\[ D_1 = \text{value of home purchase loans during the period} \]
\[ D_2 = \text{value of other loans during the period} \]
\[ L = \text{value of the total loans made} \]
\[ N_0 = \text{value of total new savings} \]
\[ N_1 = \text{value of total savings withdrawn} \]
\[ P = \text{value of participation purchases to date, 1959-1964} \]
\[ F = \text{fees, premiums and commissions} \]
\[ M = \text{average number of mortgage accounts} \]
\[ S = \text{average number of savings accounts} \]
\[ T = \text{average value of real estate owned plus contracts of sale} \]
\[ G = \text{number of associations} \]
\[ H = \text{average size of association in the area} \]
\[ J = \text{average value of investment in buildings and furnishings} \]
\[ K = \text{net additions to total savings during the year} \]
\[ U = \text{percent of conventional mortgages} \]
I = spread

E = value of average mortgages

F = value of average assets

W = average size of mortgages

Q = organized as a permanent stock company.

His final cost model was as follows:

$$Y = a + b_1L + b_2N_0 + b_3S + b_4T + b_5(QL)$$

where the variables are as described above.

In running the regression equation for associations in thirty three SMSA's the variables, 'number of savings accounts,' 'new savings,' 'value of new loans made,' and 'average value of real estate owned' were found to be important explanatory variables in his cost model. In the profit model, the most important explanatory variables were 'value of new loans made,' 'average number of mortgages,' and 'average value of real estate owned.'

**Evaluation of the Nicols study**

Nicols' study is unlike the other three studies in that it concluded unequivocally that stock associations were superior to mutuals in terms of cost efficiency and profit performance. On the basis of his cost and profit regression results he concluded that federally chartered associations cost about thirty per cent more than stock associations while the difference of additional profits

---


attributable to the latter ranged from 117 per cent to 157 per cent. In his view the savers lost quite substantially in each of the five years analysed as a consequence of the mutual organizational structure. 23

No other researcher before Nicols could make an unqualified assertion about the superiority of stock associations over mutuals. All they found was a superior but inconsistent performance of one type of associations over the others during the years sampled. Moreover, his selection of 'net profits' and not 'return on net worth' as dependent variable for his profit regression model is at variance with industry practice. It was also not clear whether any statistical problems such as auto-correlation, heterogeneity and multicollinearity among independent variables were present in the data and the nature of any corrective steps taken to deal with them.

JUSTIFICATION OF THE STUDY

Nicols' assertion that stock associations were superior to mutuals was based mainly upon the analysis of California associations' data. He overlooked the fact that California stock associations differ from savings associations in other states in terms of both number of associations and dollar value of their assets. Table - 2 and table - 3 compare the dollar value of assets and net worth of California's permanent stock associations with those of the stock companies in other stock predominant states as well as the United States total for the

23Ibid., p.291.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>$18,548</td>
<td>61%</td>
<td>$19,563</td>
<td>61%</td>
<td>$20,448</td>
<td>60%</td>
<td>$21,606</td>
<td>59%</td>
</tr>
<tr>
<td>Texas</td>
<td>3,516</td>
<td>11</td>
<td>3,751</td>
<td>12</td>
<td>4,049</td>
<td>12</td>
<td>4,449</td>
<td>12</td>
</tr>
<tr>
<td>Ohio</td>
<td>3,513</td>
<td>11</td>
<td>3,299</td>
<td>11</td>
<td>3,942</td>
<td>12</td>
<td>4,316</td>
<td>12</td>
</tr>
<tr>
<td>Illinois</td>
<td>1,163</td>
<td>4</td>
<td>1,076</td>
<td>3</td>
<td>1,145</td>
<td>3</td>
<td>1,243</td>
<td>3</td>
</tr>
<tr>
<td>Other States</td>
<td>3,894</td>
<td>13</td>
<td>4,250</td>
<td>13</td>
<td>4,472</td>
<td>13</td>
<td>5,016</td>
<td>14</td>
</tr>
<tr>
<td><strong>U.S. TOTAL</strong></td>
<td><strong>$30,634</strong></td>
<td><strong>100%</strong></td>
<td><strong>$31,939</strong></td>
<td><strong>100%</strong></td>
<td><strong>$34,056</strong></td>
<td><strong>100%</strong></td>
<td><strong>$36,630</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

*aIn millions of dollars.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>California</td>
<td>$1,310</td>
<td>68%</td>
<td>$1,399</td>
<td>65%</td>
<td>$1,523</td>
<td>67%</td>
<td>$1,526</td>
<td>65%</td>
</tr>
<tr>
<td>Texas</td>
<td>170</td>
<td>9</td>
<td>235</td>
<td>11</td>
<td>213</td>
<td>9</td>
<td>240</td>
<td>10</td>
</tr>
<tr>
<td>Ohio</td>
<td>216</td>
<td>11</td>
<td>234</td>
<td>11</td>
<td>252</td>
<td>11</td>
<td>271</td>
<td>11</td>
</tr>
<tr>
<td>Illinois</td>
<td>43</td>
<td>2</td>
<td>50</td>
<td>2</td>
<td>52</td>
<td>2</td>
<td>69</td>
<td>3</td>
</tr>
<tr>
<td>Other States</td>
<td>178</td>
<td>10</td>
<td>238</td>
<td>11</td>
<td>247</td>
<td>11</td>
<td>283</td>
<td>11</td>
</tr>
</tbody>
</table>

| Total      | $1,917                        | 100%                        | $2,156                        | 100%                        | $2,287                        | 100%                        | $2,389                        | 100%                        |

\(^a\)In millions of dollars

Source: U.S. Savings and Loan League: Savings and Loan Fact Book, Various years.
years, 1967 through 1970. The California stock associations had more than one half of the assets of all U.S. stock associations during this period. In terms of net worth, the California stock associations had more than sixty percent of the net worth of all U.S. stock total. Table-4 shows the comparison of dollar assets of California stock and mutual S.& L.'s with that of U.S. total. It can be seen that as a percentage of total assets of all S.& L.'s in the U.S. the assets of all California's stock associations were more than twice that of California mutuals' assets to the U.S. total for all the years, 1967 through 1970.

The substantial differences that exist both in dollar value of assets and in number of associations between California stock and mutual S. & L.'s could have provided the California stock associations with benefits in the form of lower costs and increased profits due to their predominant position in the industry. Thus, extending the conclusions obtained from the analysis of California data to other states' associations where the stock S. & L.'s are relatively less predominant could prove to be less meaningful.

Benston clarifies the situation further:

Perhaps of greater interest, the comparison reveals that in California the stock associations do not have highest costs than the state mutuals, nor in most regression are the costs of the federally chartered mutuals significantly higher than those of the state mutuals. But, since there are only seven state mutuals in the California data, this
<table>
<thead>
<tr>
<th>Year</th>
<th>Assets of California Associations</th>
<th>Assets of U.S. Associations</th>
<th>Percent of California</th>
<th>Percent of U.S.</th>
<th>Percent of all U.S.</th>
<th>Percent of California</th>
<th>Percent of U.S.</th>
<th>Percent of all U.S.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>STOCK</td>
<td>MUTUAL</td>
<td>TOTAL</td>
<td>STOCK</td>
<td>MUTUAL</td>
<td>TOTAL</td>
<td>stock</td>
<td>mutual</td>
</tr>
<tr>
<td>1967</td>
<td>$18,548</td>
<td>$9,383</td>
<td>$27,931</td>
<td>$30,633</td>
<td>$112,969</td>
<td>$143,602</td>
<td>61%</td>
<td>8%</td>
</tr>
<tr>
<td>1968</td>
<td>19,563</td>
<td>10,122</td>
<td>29,685</td>
<td>31,940</td>
<td>120,950</td>
<td>152,602</td>
<td>61%</td>
<td>8%</td>
</tr>
<tr>
<td>1969</td>
<td>20,448</td>
<td>10,371</td>
<td>30,819</td>
<td>34,056</td>
<td>128,093</td>
<td>162,149</td>
<td>60%</td>
<td>8%</td>
</tr>
<tr>
<td>1970</td>
<td>21,606</td>
<td>11,133</td>
<td>32,739</td>
<td>36,630</td>
<td>139,553</td>
<td>176,183</td>
<td>59%</td>
<td>8%</td>
</tr>
</tbody>
</table>


In millions of dollars.
comparison may be misleading...Thus, it appears that the additional costs found for stock compared to state mutuals associations are due to the non-California stock associations while the data for the federal associations are not very different between California and the balance of the United States. Further inquiry into the nature of the operations of stock associations in California compared to the other states is necessary before more can be said.

Brigham and Pettit also cautioned about placing too much emphasis on the analysis of Los Angeles associations' data and extrapolating the findings to all other areas.

In Los Angeles, the data suggest that in 1965 stock companies had operating cost ratios that were about 0.17 per cent points lower than those of mutual savings and loans, other things held constant. This difference is not trivial, but in view of the lack of any relationship between form of organization and costs in other two cities (Chicago and Detroit-Cleveland) it would be hazardous to make very much of the Los Angeles findings...

Thus, an analysis on associations' data in another state where stock S.& L.'s are less predominant in the industry is necessary to confirm or deny the results obtained by Nicols from California associations. Since Ohio has more mutuals than stock associations, an examination of Ohio S.& L.'s data for several years can be significant in terms of results obtained.

An underlying aspect in previous research was an emphasis on the performance of stock compared with mutual associations as a group. Neither Hester, Brigham and Pettit nor Nicols related cost efficiency and profit performance aspects of the three types of

\[\text{Benston, loc. cit., p. 711.}\]

\[\text{Brigham and Pettit, loc. cit., p. 1179.}\]
associations with one another. Comparisons of associations on the basis of whether they had branches or not was not separately carried out. Moreover, if interaction variables were included in their studies possibly both Hester and Brigham and Pettit would have found considerable evidence to reject the hypothesis of no significant differences in cost and profit performance between associations.

The present study not only compared the associations in groups of twos but made branches or lack of it as another method of analysis. An important task of the study was to compare the associations' operating performance as the basis of stratification of data not undertaken by the previous researchers.

A total of four different cost models consisting of i) type dummies only, ii) type and branch dummies, iii) type and branch dummies plus interaction with type dummy variables and iv) type and branch dummies and interaction with type and branch dummies were used. The details of analysis are as follows:

i) Regression analysis of associations for each year, 1967 through 1970, using dummy variables for different types of charter-federals, state mutuals and stocks.

ii) Separate regression runs on firms' data by selected SMSA's using type and branch dummies and interaction variables. This is an extension of research from previous studies.

iii) Separate regression runs on associations' data by total asset size and its interaction with type dummies.

iv) Separate regression runs on associations' data for each of the years, 1967 through 1970, to determine the profit performance of S.& L.'s on the basis of return on net worth using selected ratio measures as explanatory variables along with type and branch dummies and interaction variables. Analysis of this nature was not done before.
Thus, this research study comprises of both extension of present studies and new analysis on stratified data. The underlying purpose in carrying out such detailed analysis on stratified data of a large number of associations is that it will provide us with results that might be valuable both for management and government regulators for policy considerations.
CHAPTER III

MODEL SPECIFICATION AND EXPERIMENTAL DESIGN

The primary objective of the cost model specified in this chapter is to determine the relationship between the annual operating costs of a savings and loan association and certain other explanatory variables. A second objective is to determine similar relationships between an association's return on net worth and other explanatory variables. The cost as well as the profit model are tested using cross-sectional data of a large number of associations in the state of Ohio for the years, 1967 through 1970.

THE COST MODEL

The operating costs \( C \) of a financial intermediary such as the savings and loan associations for a given time period depend mainly upon the number of mortgages and savings accounts \( A \) they make and service. In addition, variables such as the organizational structure, management \( M \), location \( L \), and other factors \( U \) are likely to affect costs and so should be included in the analysis. Without specifying the exact form of the variables or their relationship to cost, the cost function may be stated as follows:

\[
C = f (A, M, L, U)
\]

The general factors given in the above equation are specified in the following section.
SPECIFICATION OF VARIABLES

Dependent Variable

Total operating expenses. The annual operating costs can be taken as a measure of annual activities of a savings and loan association. Regardless of charter, all savings associations incur expenses. The more efficient firms, however, incur costs relatively less proportionately than the less efficient ones. The cost efficiency of different types of associations is thus, reflected upon how well these firms control their costs. Another justification for the use of operating costs as the dependent variable is that the researchers in the past have used it with satisfactory results. For example, Nicols' dependent variable in his main cost model was total operating expenses. Brigham and Pettit used the ratio of operating costs to total assets as the dependent variable to be explained. Benston used operating costs as well as other components of it, such as salaries and wages, occupancy expenses, and miscellaneous expenses, as dependent variables in his various cost models. Therefore, the variable, operating expenses, is chosen as the dependent variable in this study.

Externalities

It is assumed that savings and loan associations do not impose any, or very little externalities on others. In other words, it is assumed that there is no problem of externalities influencing the results.
Output Variables

Value of new loans made. The measurement of output of service is a difficult task in the case of a savings and loan association. Brigham and Pettit, following industry usage, specified the level of assets as a measure of an association's output. The item, level of assets, appeared to them to be the definition of output that most closely measures the relevant social product.\(^1\) Although Benston defined the S.& L.'s output as being related to their functions, the absence of detailed functional cost analysis in S.& L.'s made it tenuous for him to relate specific functions to identifiable costs. In the final analysis, however, variables, 'average number of loans,' 'average number of savings accounts,' or 'average number of loans serviced' appeared to provide the necessary basis to define output variables.\(^2\) Along the same lines, Nicols found that the variables, 'value of new loans made,' 'average number of savings accounts' and 'loans serviced' to serve as appropriate output measures. More specifically, he found that the value of new loans made as the most significant index of total output.\(^3\) Its three main components, construction loans, home purchase loans, and other loans when individually tested, did not alter the results significantly and thus, were discarded in all of his other models. In view of the above, the variable, 'value of new loans made' is treated as one of the primary output variables.

\(^{1}\) Brigham and Pettit, loc.cit., p.1002.

\(^{2}\) Benston, loc.cit., pp.703-704.

\(^{3}\) Nicols, loc.cit., pp.224-225.
Value of new savings. Another primary explanatory variable is the value of new savings obtained by a savings and loan association during the year. It is included in the analysis because the value of new savings an association obtains over time is directly related to its very survival and provides a basis for its long run growth. As a matter of necessity then, an association provides facilities to collect the savings of the community, incurring expenses in doing so. In fact, one of the major items of expenses of a savings association is in getting new savings. An association, which is cost efficient incurs relatively less amount on the provision of these facilities, other things remaining equal, than the one which is not. Therefore, the variable, 'new savings,' is included as another measure of output.

Adjustment for Differences in and Homogeneity of Output Variables

To account for the different proportions of output which might cause differences in expenses, additional variables have to be introduced. For example, variations both in size and activities of new loans made and new savings received should be accounted for to provide homogeneity to the primary output variables. If two associations in two different areas lend a million dollars each with an average loan size of $30,000 and $15,000 respectively, the firm having a lower average loan size is bound to incur more expenses. For very large high risk loans the costs might be higher.
Similarly, a savings account with more transactions per given time period imposes a heavier expense burden on the individual savings and loan association. It is, therefore, necessary to include certain additional variables to ensure the homogeneity of output variables. The variables so included here are 'average size of savings accounts,' 'average size of mortgage balances,' and 'percentage of withdrawals to savings balances at the end of previous year.'

Value of foreclosed 'real estate owned,' 'contract of sale;' and 'loans to facilitate sale of foreclosed real estate.' Expenses of an association will, in part, depend on the dollar volume of foreclosures of real estate property and on their subsequent resale. Loan foreclosures contribute to expenses. For example, when a loan is defaulted, it may be eventually foreclosed and transferred at a later date to another borrower under a 'contract of sale.' Such activities relating to defaulted loans involve more expenses for an association than the loans for which payments are maintained. Services of specially qualified persons with considerable experience and technical skill might be needed to carry out the foreclosure and related tasks. In their analysis, Brigham and Pettit used the ratio of scheduled items to specified assets as a variable to account for those expenses. Scheduled items consist largely of delinquent loans and real estate acquired by foreclosure, while specified assets mainly consist of the loan portfolio. ¹ Benston used the percentage

¹Brigham and Pettit, loc. cit., p. 1175.
ofscheduled items to mortgages outstanding as an additional measure to account for homogeneity of output variables.\(^5\) Nicols also used the value of real estate owned plus contract of sale in the cost model as a variable to indicate other possible sources of differences in the operating costs of an association.\(^6\) Collecting delinquent loans by itself can not be considered as an 'output' of an association, but rather an activity associated with making and servicing of mortgages. Accordingly, 'the real estate items' variable is included in the equation as a cost homogeneity variable.

**Managerial and Structural Variables**

**Form of Organization.** While some of the managerial factors such as management ability, experience, and aggressiveness are not easily quantifiable, their influences on an association's performance, however, can be tested. Many researchers in the past have used the charter (the form of organization) as a proper test measure to evaluate the differences in managerial ability, aggressiveness, etc., between various types of associations. The basic purpose for such tests is to determine whether the management in one type of association outperforms its counterparts in the other in terms of various efficiency measures.

Benston, and Brigham and Pettit had certain reservations about singling out the stock associations as being the most cost efficient.


Their conclusions notwithstanding, Nicols stated that the stock form of organization (and thus, its management) was found to be far more cost efficient than mutuals. Since it is important to determine which type of associations operated more efficiently, the variable 'form of organization' is included in the analysis by the dummy variable technique to account for the managerial differences among the various types of associations.

Branches. A structural variable requiring inclusion in the model is the number of branches an association has. In their cost studies, both Benston and Bell and Murphy used the 'number of branches' or the log of that variable as one of the explanatory variables. Operating an association with branches was found to be subject to considerable additional costs over unit operations with the same output. Benston stated that

... branch banks and associations have higher operating costs than unit banks and associations of the same size. The savings and loan analysis also shows higher salaries and miscellaneous as well as occupancy expenses for branch over unit associations with the same level of output...

Therefore, the variable 'number of branches' will be included and accounted for in the analysis by the use of dummy variable technique.

---


8 Benston, 'Economies of Scale of Financial Institutions,' loc.cit., p.335.
Number of employes. Another variable that would cause differences in expenses is the number of employes in an association. It can be contended that an able and efficient management in an association will have just sufficient number of employes to carry out the firm's tasks most effectively and economically. On the other hand, a management that is not directly answerable to the ultimate owners in a firm is less likely to bestow as much care in employing minimum number of persons in the firm. Such has been the criticism in the case of the management in the mutual associations.\(^9\)

It is probably an exaggeration to link the number of employes directly to nepotism in an association, but labor is the largest factor of production of savings associations. It is, therefore, considered that the variable, 'number of employes' is relevant and included as such in the model.

Input and Cost Homaogeneity Variables

Certain other variables that might be causing the differences in expenses of associations should be specified so that the differences in operating expenses attributable to efficiency can be isolated. An important variable in this group is the growth rate of an association.

Growth. Inclusion of growth in either assets size, savings capital, or loans made, has always been an important aspect of cost studies discussed earlier. As Brigham and Pettit pointed out growth is an important factor in the cost analysis:

\(^9\)Nicols, loc.cit., pp.18-19, 138 and 300.
Growth is expensive — it requires advertising expenditures, expansion of facilities and personnel, appraisals and loan recording costs, and so on. Clearly then, growth must be included in the operation cost equation as a central variable if one is to isolate the effect of organizational form on costs.¹⁰

But their findings indicated that the growth variable was not uniformly significant for the associations in all SMSA locations. For example, it was positive and highly significant for Los Angeles S.& L.'s, but was negative and insignificant for the other two SMSA associations.¹¹ Benston included rate of change of output (growth) of an association and variability of output variables as growth variables. Both of these were found to be highly correlated with respect to some other explanatory variables (loans made, number of savings accounts, etc.) and they were also found to be significant. Although Nicols did not specify growth variables separately, he did acknowledge its importance. In his view, the impact of growth was reflected in the variable 'loans made,' and therefore, inclusion of an additional 'growth variable' was unnecessary.

Nevertheless, when associations grow faster, higher operating costs follow such growth, sooner or later. For example, when experiencing a continuous higher savings growth a firm incurs additional costs in hiring and training more personnel, buying or hiring additional equipment, increasing supplies etc., to keep pace with the increased activities. In order to determine the differences

¹⁰Brigham and Pettit, loc. cit., p. 1175.
¹¹Ibid., p. 1177.
in efficiency between associations, the influence of growth should be held constant. Therefore, a growth variable 'growth of new loans made' is included in the analysis.

Interaction variables. In using dummy variables in a regression analysis the problem of interaction effects must be considered. Except Nicols, all other researchers had implicitly assumed that there were no interaction effects, that is, the differences between stock and mutual S.& L.'s are contained only in the intercept term. If the assumption is incorrect, as shown by the results from the present study, it can seriously affect the conclusions.12

Of all the explanatory variables the interaction between new savings and the .type-dummy variables was found to be most significant and therefore, the model in the present study includes two additional variables (explanatory variable, 'new savings' interacted with federal as well as state mutual type-dummies, default variable being stock dummy). In the case of the profit model, the federal and mutual type dummies are interacted with net profit margin. It must be pointed out here that Nicols, in his efforts to select an appropriate interaction variable, found 'new loans' as the most important one to do the task of interacting with type-dummy variables. Since he combined the federals and state mutuals into one group for comparison with stock associations, all he needed was a

12Brigham and Pettit, loc.cit., p.1193.
single interaction type dummy. The results showed that this variable was generally found to be statistically significant.

FORM OF THE COST MODEL

It is not clear that the effect on costs that all these variables will be multiplicative or additive. All the research studies except Benston have adopted the additive form. Benston used the multiplicative design because

There also is some question as to whether the effect on cost... is additive or multiplicative. Since there is no obvious reason for choosing one form over another the multiplicative form is used...

However, in this study it is assumed that the independent variables have an additive effect on the dependent variable and therefore, the additive form of regression is used.

The following is the general form of the single equation cost regression model adopted to test the various hypotheses. Some modifications, however, were made in the model to test the second and the third hypotheses. A totally different model is used for testing the profit hypothesis.

Main Cost Model

\[ Y = a + b_1S_n + b_2F + b_3E + b_4R_w + b_5L + b_6G + b_7D_f + b_8D_m + b_9D_b + b_{10}S_{nf} + b_{11}S_{nm} + b_{12}S_{nb} + b_{13}S_s + b_{14}S_m + e \]

\(^{13}\text{Benston, loc. cit., p.698.}\)

\(^{14}\text{Ibid., p.698.}\)
where: $Y$ = Total operating costs of an association for a year  
$S_n$ = Value of new savings  
$F$ = Average value of real estate owned and contracts of sale  
$E$ = Number of employees  
$R_w$ = Percentage of savings withdrawn to savings balance at the end of the last year  
$L$ = Value of new loans made  
$G$ = Percentage of growth of new loans made  
$D_f$ = Dummy variable: 1 = FSLIC-insured federal mutual S.& L.'s  
$0$ = other types of associations (i.e. state mutual and stock associations)  
$D_m$ = Dummy variable: 1 = FSLIC-insured state mutual S.& L.'s  
$0$ = other types of associations (i.e. state stock and federal associations)  

(Thus, the stock S.& L.'s (the default dummy) are represented by the constant and federal and state mutual firms by their respective regression coefficients adjusted with constant)  

$D_b$ = Dummy variable: 1 = Associations with branches  
$0$ = Associations with home office only  
$S_{nf}$ = Interaction variable: New savings with federal S.& L.'s  
$S_{nm}$ = Interaction variable: New savings with state mutual firms  
$S_{nb}$ = Interaction variable: New savings with branch dummy  
$S_s$ = Average size of savings account  
$S_m$ = Average size of mortgage account

The variables'average size of savings account' and 'average size of mortgage account' were dropped from the final model because they were found to be statistically insignificant in most of the years' results. As stated above, even the final model was modified so that it will be statistically suitable for the second and the third hypotheses testing. This change was necessitated by the nature of variables included, high correlation between certain variables and small sample size. The modified models for the SMSA hypothesis and total assets (size) hypothesis testing are given below:
**SMSA Cost Model**

\[ Y = a + b_1 S_n + b_2 E + b_3 L + b_4 D_f + b_5 D_m + b_6 D_b + b_7 S_{nf} + b_8 S_{nm} + e \]

where the variables are as defined before.

**Total Assets Size Cost Model**

\[ Y = a + b_1 TA + b_2 F + b_3 E + b_4 R_w + b_5 G + b_6 D_f + b_7 D_m + b_8 D_b + b_9 TA_f + b_{10} TA_m + e \]

where:

- \( TA \) = Total assets in dollars
- \( TA_f \) = Total assets interaction with federal S.& L.'s
- \( TA_m \) = Total assets interaction with state mutual S.& L.'s

and other variables as defined before.

**FORM OF THE PROFIT MODEL**

Following the industry practice, the profit model uses return on net worth as the dependent variable and three ratio measures (net profit margin, asset utilization and equity multiplier) as the main explanatory variables. Net profit margin is the ratio of net income after taxes and dividends on savings capital to gross operating revenue. This introduces a dollar measure of profit and indicates a degree of expense control. Asset utilization, which is the relationship between gross operating revenue and average assets, indicates how well the assets are exploited by an association to generate revenue. Unproductive or excessive assets will clearly depress this ratio. The third composite measure, equity multiplier, is the ratio of average assets to average equity. It shows the firm's use of leverage in producing revenues and indicates how much the firm relies on non-equity funds to finance its assets.15

---

Brigham and Pettit used a slightly different profit measure while Benston confined his analysis only to cost models. Nicols, however, used net income after taxes and dividends as the profit variable to be explained. The basis for allowing net income and not return on net worth as the dependent variable in his analysis, was that the latter is a misleading measure since the mutual firms do not generally have the same incentive in its expansion as management and owners in a stock association. The mutual firms do not build net worth as do the stock S.& L.'s because when a mutual maximizes net worth, it is at the expense of managerial compensation, amenities and the diversion mechanism.

The shortcoming in using a measure such as net income is two-fold: (i) it does not relate dollar profits to either dollar revenues or dollar investment and (ii) it does not readily permit comparison of profit performance between various types of associations which is the purpose of this model.

A problem in using the return on net worth criterion is the question of its appropriateness as a common measure for evaluating profit performance of mutual and stock S.& L.'s. Technically, net worth belongs to savers and not to a separate group of owners in a mutual as it does in a stock firm. Nevertheless, since the return on net worth is a well recognised industry yardstick and

---

net income does not readily permit easy comparison between associa-
tions, this variable is used as the dependent variable in the
following model:

\[
ROE = a + b_1NPM + b_2AU + b_3EM + b_4D_f + b_5D_m + b_6D_b \\
+ b_7NPM_f + b_8NPM_m + e
\]

where:
- \( ROE \) = Return of equity (net worth)
- \( NPM \) = Net profit margin (ratio of net income to total operating revenue)
- \( AU \) = Asset utilization (ratio of average assets to total operating revenue)
- \( EM \) = Equity multiplier (ratio of average assets to average equity)
- \( NPM_f \) = Net profit margin interaction with federal dummy
- \( NPM_m \) = Net profit margin interaction with state mutual dummy
and other variables as defined above.

SOURCE AND RELIABILITY OF DATA

As indicated earlier, the data for the analysis consists of the income statement and balance sheet items of the insured individual associations in Ohio for the years, 1967 through 1970. The data are obtained from the periodical individual association's reports to the FHLBB. There were a number of associations in each year whose data could not be included in the analysis due to mergers and incomplete data.

The data are taken to be quite reliable since they were taken from the reports filed with the FHLBB. All items of data were obtained in the form of a computer tape which was later transferred to the computer disk at Bowling Green State University Computer center and used directly to make the regression runs. The details of the data items are given in appendix A.
CHAPTER IV

ANALYSIS OF REGRESSION RESULTS: COST AND PROFIT MODELS

The purpose of this chapter is to report and analyse the statistical results of various cost and profit regression models. The central idea of this thesis has been to identify and describe the cost and profit differentials, if any, among Ohio savings and loan associations for the years, 1967 through 1970. This idea is facilitated by presenting the various multiple regression results and the associated analysis in the following manner:

(i) Costs and Types of Associations

Regression equations are presented with operating costs as the dependent variable and a set of factors discussed earlier as the independent variables for all insured associations. The types of associations are identified by appropriate dummy variables.

(ii) SMSA's and Types of Associations

Regression equations are presented with operating costs as the dependent variable and a reduced set of factors as the independent variables for four Ohio's SMSA's—Cincinnati, Cleveland, Columbus and Dayton.

(iii) Total Assets and Types of Associations

Regression equations are presented with operating costs as the dependent variable and total assets as the main independent
variable for all insured associations for the years, 1967 through 1970.

(iv) Return on Net Worth and Types of Associations

Regression equations are presented with return on net worth as the dependent variable and net profit margin, asset utilization, and equity multiplier as the independent variables for the insured associations for the years, 1967 through 1970.

Basic Model Selected for the Cost Equations

A total of four regression models, distinguished by the inclusion or non-inclusion of interaction variables were tested for all four years. The first model included only those dummy variables which classified the types of associations. This model invariably failed to differentiate associations on the basis of costs. The second model included an additional branch dummy variable and although this model was able to show that branches are an important explanatory variable and should be included in any model; it failed, however, to identify any cost differences among the different types of associations. The difference between the second and the third model is that one of the explanatory variables, 'new savings;' was allowed to interact with federal and state mutual type-dummies (stock being default dummy).

The use of the variable, 'new savings,' to function as the interacting variable is justified on two grounds. First, it explained most of the variations in the dependent variable and second, inclusion of others to interact with type-dummies, besides
producing inconsistent results, would have added unnecessary complexity to the model making it rather difficult to interpret the results. For this reason, the fourth model was eliminated. The addition of a branch interaction variable to this model added no useful information other than what is provided by the third model. Thus, it was the third model with type and branch dummies and 'new savings' interaction variables which became the basic cost model to be adopted.

**ANALYSIS OF COST REGRESSION RESULTS**

Table-5 lists the set of explanatory variables that were found generally to be significant in explaining the variations in the dependent variable, operating costs. Table-6 presents the regression results of the interaction model together with t-values for the years, 1967 through 1970.

**GENERAL RESULTS**

Based upon its explanatory power, 'new savings' should be considered as the most important variable in all four years, followed by 'new loans' and 'number of employes.' The signs and the magnitudes of the regression coefficients indicate that they were important factors in the insured associations' costs.

The constant value of regression coefficients of 'new savings' in spite of declined savings inflows in 1968 and 1969, appear to have been caused by a larger percentage of savings associations offering variable rates accounts and increasing the dividend rates on pass book accounts to their allowable maximum. The severe
<table>
<thead>
<tr>
<th>Mnemonic Symbols</th>
<th>Name and Method of Measurement</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dependent Variables</strong></td>
<td></td>
</tr>
<tr>
<td>OPEXP</td>
<td>Operating costs of an association, Cost Models, ($000)</td>
</tr>
<tr>
<td>ROE</td>
<td>Return on Equity, Profit Model, (%)</td>
</tr>
<tr>
<td><strong>Explanatory Variables</strong></td>
<td></td>
</tr>
<tr>
<td>NSVGSN</td>
<td>New savings, ($000)</td>
</tr>
<tr>
<td>AREF</td>
<td>Average value of real estate items, ($000)</td>
</tr>
<tr>
<td>EMPE</td>
<td>Number of employees</td>
</tr>
<tr>
<td>WSVGRW</td>
<td>Percentage of savings withdrawn to savings capital at the end of last year, (%)</td>
</tr>
<tr>
<td>NLONSL</td>
<td>New loans, ($000)</td>
</tr>
<tr>
<td>GLONSG</td>
<td>Growth of new loans, (%)</td>
</tr>
<tr>
<td>TA</td>
<td>Total assets, ($000)</td>
</tr>
<tr>
<td>AU</td>
<td>Asset utilization, (ratio of operating revenue to average assets, %)</td>
</tr>
<tr>
<td>EM</td>
<td>Equity multiplier, (ratio of average assets to average equity, number)</td>
</tr>
<tr>
<td>NPM</td>
<td>Net profit margin, (ratio of net income after taxes to operating income, %)</td>
</tr>
<tr>
<td>FEDDY</td>
<td>Federal mutuals, (dummy variable)</td>
</tr>
<tr>
<td>SMUDY</td>
<td>State mutuals, (dummy variable)</td>
</tr>
<tr>
<td>STKDY</td>
<td>State stock firms, (default dummy)</td>
</tr>
<tr>
<td>BRNHDY</td>
<td>Branch, (dummy variable)</td>
</tr>
<tr>
<td>NSVINTFED</td>
<td>New savings interaction with federal dummy</td>
</tr>
<tr>
<td>NSVINTSMU</td>
<td>New savings interaction with state mutual dummy</td>
</tr>
<tr>
<td>TAINTFED</td>
<td>Total assets interaction with federals</td>
</tr>
<tr>
<td>TAINTSMU</td>
<td>Total assets interaction with state mutuals</td>
</tr>
<tr>
<td>NPMINTFED</td>
<td>Net profit margin interaction with federals</td>
</tr>
<tr>
<td>NPMINTSMU</td>
<td>Net profit margin interaction with state mutuals</td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------</td>
</tr>
<tr>
<td>NSVGSN</td>
<td>0.011</td>
</tr>
<tr>
<td>AREF</td>
<td>0.075</td>
</tr>
<tr>
<td></td>
<td>(4.897)</td>
</tr>
<tr>
<td>EMPLÉ</td>
<td>6.589</td>
</tr>
<tr>
<td></td>
<td>(14.244)</td>
</tr>
<tr>
<td>WSVGRW</td>
<td>-2.184</td>
</tr>
<tr>
<td></td>
<td>(3.614)</td>
</tr>
<tr>
<td>NLONSL</td>
<td>0.024</td>
</tr>
<tr>
<td></td>
<td>(5.891)</td>
</tr>
<tr>
<td>GLONSG</td>
<td>-4.822</td>
</tr>
<tr>
<td></td>
<td>(3.054)</td>
</tr>
<tr>
<td>FEDDY</td>
<td>-3.648</td>
</tr>
<tr>
<td></td>
<td>(0.226)</td>
</tr>
<tr>
<td>SMUDY</td>
<td>-50.117</td>
</tr>
<tr>
<td></td>
<td>(3.061)</td>
</tr>
<tr>
<td>BRNHDY</td>
<td>41.993</td>
</tr>
<tr>
<td></td>
<td>(3.124)</td>
</tr>
<tr>
<td>NSVINTFED</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(1.234)</td>
</tr>
<tr>
<td>NSVINTSMU</td>
<td>0.010</td>
</tr>
<tr>
<td></td>
<td>(7.602)</td>
</tr>
<tr>
<td>INTERCEPT</td>
<td>96.576</td>
</tr>
<tr>
<td></td>
<td>(4.108)</td>
</tr>
<tr>
<td>R-SQ ADJUSTED</td>
<td>96.87%</td>
</tr>
<tr>
<td>No. of ASSNSS.</td>
<td>324</td>
</tr>
</tbody>
</table>
competition for savings funds from among the depository institutions and higher yields on marketable securities were responsible in bringing about this increase in the costs of savings and other funds. In 1970, the S.& L.'s received a large volume of net savings which moved the total costs upward through increased interest charges.

The positive and significant regression coefficients of the variable, 'new loans,' show that expenses related to loan origination, credit checking, maintenance of loan accounts, etc., are also an important source of costs to S. & L.'s.

An increase in the number of employees and higher wages over the years were responsible for the coefficients of the variable, 'number of employees,' to show increasingly higher values.

The percentage of growth of new loans and new savings withdrawn as a per cent of savings capital show negative costs. It means that as associations increase loans, costs increase at a decreasing rate because the initial costs of making loans are higher than the costs of maintaining existing loans. Similarly, the more savings capital withdrawn, the less interest charges that the associations have to pay. Since the associations experienced highest withdrawals in 1969, the magnitude of the negative coefficient of the variable, 'percentage of withdrawn savings to savings capital,' was the highest in that year.

Another interesting variable is the branch dummy, which, besides being statistically significant in each year, shows that it is expensive to maintain branches as opposed to having only a home office.
The unwavering positive signs of its coefficients clearly demonstrate this conclusion.

Several additional observations can be made on the results:

(i) the signs of the coefficients of all the variables did not change over time, permitting confidence in the nature of relationships between variables and costs.

(ii) the high t-values generally found for those significant variables indicate the variables' reliability of their explaining power and

(iii) the high R-square values for all years' results are indicative of the appropriateness of the model in explaining the variations in the dependent variable.

SPECIFIC RESULTS

Costs and Types of Associations

The 'new savings' interaction model, in addition to providing a general list of significant variables, also demonstrated its usefulness by showing which types of associations were cost efficient. The fitted response function for the above model is shown in table- 7. The table shows that an association belongs to any one of the three types -- federal, state mutual or stock -- and may or may not have branches. Thus, the efficiency comparisons are made between any two types of firms as shown below:
**TABLE - 7**  
FITTED RESPONSE FUNCTION: COST MODEL: NSVGSN INTERACTION WITH TYPE DUMMIES

<table>
<thead>
<tr>
<th>Year</th>
<th>Type of Charter</th>
<th>Intercept $X_0$</th>
<th>NSVGSN $X_1$</th>
<th>AREF $X_2$</th>
<th>EMPLE $X_3$</th>
<th>WSVGRW $X_4$</th>
<th>NLONSL $X_5$</th>
<th>GLONGS $X_6$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>FEDDY Home+Branches</td>
<td>134.921 + 0.012($X_1$)</td>
<td>92.928 + 0.012($X_1$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Home Office</td>
<td>88.452 + 0.021($X_1$)</td>
<td>46.459 + 0.021($X_1$)</td>
<td>+0.075($X_2$)</td>
<td>+6.59($X_3$)</td>
<td>-2.18($X_4$)</td>
<td>+0.024($X_5$)</td>
<td>-4.822($X_6$)</td>
</tr>
<tr>
<td></td>
<td>STKDY Home+Branches</td>
<td>138.569 + 0.011($X_1$)</td>
<td>96.576 + 0.011($X_1$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1968</td>
<td>FEDDY Home+Branches</td>
<td>154.870 + 0.010($X_1$)</td>
<td>87.012 + 0.010($X_1$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Home Office</td>
<td>107.297 + 0.020($X_1$)</td>
<td>39.439 + 0.020($X_1$)</td>
<td>+0.100($X_2$)</td>
<td>+7.44($X_3$)</td>
<td>-1.79($X_4$)</td>
<td>+0.032($X_5$)</td>
<td>-5.401($X_6$)</td>
</tr>
<tr>
<td></td>
<td>STKDY Home+Branches</td>
<td>152.162 + 0.010($X_1$)</td>
<td>84.304 + 0.010($X_1$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1969</td>
<td>FEDDY Home+Branches</td>
<td>177.122 + 0.016($X_1$)</td>
<td>97.765 + 0.016($X_1$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Home Office</td>
<td>144.672 + 0.022($X_1$)</td>
<td>65.315 + 0.022($X_1$)</td>
<td>+0.109($X_2$)</td>
<td>+7.19($X_3$)</td>
<td>-2.37($X_4$)</td>
<td>+0.029($X_5$)</td>
<td>-7.058($X_6$)</td>
</tr>
<tr>
<td></td>
<td>STKDY Home+Branches</td>
<td>224.378 + 0.010($X_1$)</td>
<td>145.020 + 0.010($X_1$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1970</td>
<td>FEDDY Home+Branches</td>
<td>171.091 + 0.016($X_1$)</td>
<td>102.325 + 0.016($X_1$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Home Office</td>
<td>117.443 + 0.026($X_1$)</td>
<td>48.777 + 0.026($X_1$)</td>
<td>+0.252($X_2$)</td>
<td>+7.21($X_3$)</td>
<td>-1.92($X_4$)</td>
<td>+0.011($X_5$)</td>
<td>-5.320($X_6$)</td>
</tr>
<tr>
<td></td>
<td>STKDY Home+Branches</td>
<td>208.072 + 0.013($X_1$)</td>
<td>139.306 + 0.013($X_1$)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(i) federals compared with state mutuals both with branches

(ii) federals compared with state stocks both with branches

(iii) state mutuals compared with state stocks both with branches

(iv) federals compared with state mutuals both with home office only

(v) federals compared with state stocks both with home office only

(vi) state mutuals compared with state stocks both with home office only.

The fitted response function indicates that the regression coefficients of 'new savings' of any one type of associations with or without branches are same and this means that the difference between any two types of associations with or without branches requiring statistical testing is also the same. Therefore, the following analysis combines all the six groups into three groups without losing the explanatory value.

Average and marginal costs for federal and state mutual associations with and without branches

The state mutual firms incurred lower average costs than federals in all years. This statement assumes that new savings are zero and that other variables are kept at their mean levels. A state mutual with branches would have incurred an average cost of $88,452 in 1967, $107,297 in 1968, $144,672 in 1969 and $117,443 in 1970 compared to $134,321, $154,870, $177,122 and $171,091 for a federal with branches respectively. Since the zero new savings assumption is unrealistic, the finding that
average costs are lower or higher for one type of association is of no practical significance. Marginal costs, the costs that increase or decrease for a given change in new savings, should be the focal point of analysis. The changes in marginal costs are indicated by the slope of the cost curve when associations incur costs for a given change in new savings, other things remaining same.

Figure 1 shows the average costs at zero new savings and marginal costs for increasing levels of new savings (when all other variables are kept at their mean level values) for federals and state mutuals for 1968 and 1970. The horizontal axis describes the incremental new savings received by an association and the vertical axis depicts the firm's average operating costs. The average costs of state mutuals with branches were less than those of federals. As new savings inflows increase, however, the cost lines of both types of associations move upward, with that of federal rising at a slower rate. The two cost lines intersect in 1968 at a new savings level of about $4,757 million. Beyond this point, the cost differences between the two types begin to widen.

Table-8 presents the mean and range of new savings for all years. When the intersection point is compared with the mean values of new savings, the state mutuals' marginal costs rise rapidly. If the level of new savings is equal to intersection amount or within its close range, then the difference in cost increases between these two types of associations is negligible.
FIGURE - 1

AVERAGE AND MARGINAL COSTS, FEDERAL AND STATE MUTUALS, SELECTED YEARS: 1968 AND 1970

<table>
<thead>
<tr>
<th>Costs ($000)</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>250</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>200</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>171.1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>154.9</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>117.4</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>107.3</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

New savings (millions of dollars)
### Types and Costs

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>$8.89</td>
<td>$92.89 -- $0.016</td>
</tr>
<tr>
<td>1968</td>
<td>$8.83</td>
<td>$84.79 -- $0.090</td>
</tr>
<tr>
<td>1969</td>
<td>$10.21</td>
<td>$107.91 -- $0.083</td>
</tr>
<tr>
<td>1970</td>
<td>$13.07</td>
<td>$147.74 -- $0.069</td>
</tr>
</tbody>
</table>

### Types and SMSA's

#### CINCINNATI (148)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>$3.90</td>
<td>$63.25 -- $0.522</td>
</tr>
<tr>
<td>1968</td>
<td>$4.60</td>
<td>$84.24 -- $0.352</td>
</tr>
<tr>
<td>1969</td>
<td>$5.50</td>
<td>$93.13 -- $0.433</td>
</tr>
<tr>
<td>1970</td>
<td>$6.80</td>
<td>$132.03 -- $0.356</td>
</tr>
</tbody>
</table>

#### CLEVELAND (152)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>$27.90</td>
<td>$92.89 -- $2.110</td>
</tr>
<tr>
<td>1968</td>
<td>$24.80</td>
<td>$84.79 -- $1.710</td>
</tr>
<tr>
<td>1969</td>
<td>$28.20</td>
<td>$91.35 -- $2.120</td>
</tr>
<tr>
<td>1970</td>
<td>$36.10</td>
<td>$96.29 -- $2.520</td>
</tr>
</tbody>
</table>

#### COLUMBUS (168)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>$11.90</td>
<td>$46.53 -- $1.460</td>
</tr>
<tr>
<td>1968</td>
<td>$11.80</td>
<td>$47.80 -- $0.820</td>
</tr>
<tr>
<td>1969</td>
<td>$15.90</td>
<td>$67.37 -- $1.250</td>
</tr>
<tr>
<td>1970</td>
<td>$24.90</td>
<td>$96.07 -- $3.700</td>
</tr>
</tbody>
</table>

#### DAYTON (184)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mean</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>$8.60</td>
<td>$57.84 -- $0.291</td>
</tr>
<tr>
<td>1968</td>
<td>$9.60</td>
<td>$63.67 -- $0.605</td>
</tr>
<tr>
<td>1969</td>
<td>$10.70</td>
<td>$72.44 -- $0.601</td>
</tr>
<tr>
<td>1970</td>
<td>$12.50</td>
<td>$89.51 -- $0.574</td>
</tr>
</tbody>
</table>
Further analysis of the data reveal several reasons for the cost differences. The state mutuals were smaller in size relative to federals. The average asset size of a federal is slightly more than twice that of a state mutual. During the four years, the state mutuals had higher average growth in new savings than federals (14.8% compared to 13.6%). This growth in savings increased the state mutuals' total interest charges. Furthermore, the average interest rates paid on savings by the state mutuals was about one-tenth of one per cent to one and one-tenth per cent higher than what federals paid during the period of analysis. The state mutuals also made use of more borrowed funds than before; they increased their borrowing rate at an average of 73% a year.

Two other factors also contributed to the high cost differentials. The compensation expenses and advertising costs were growing at a faster rate for mutuals than for federals. For example, the annual average growth rate in compensation expenses for mutuals was 9.2% compared to 8.9% for federals and the growth rate in advertising costs were 16.2% and 15.3% respectively. In the area of lending activities, federals increased all kinds of loans at a much faster rate than did the state mutuals. One reason was that the loan repayments were always higher for federals, making funds available to them at less costlier rates. These various factors contributed to the higher operating costs of the state mutuals relative to the federal associations.
Average and marginal costs for federal and stock firms with and without branches

The cost differences between federals and stock associations were not statistically significant for the years, 1967 and 1968. For the remaining years, 1969 and 1970, the stock associations demonstrated that they were more cost efficient at levels of new savings beyond $7.9 million and $12.3 million. The average costs of federals were much lower than those of stock firms in the two significant years but had higher rates of increase in marginal costs than stock firms.

Figure 2 shows the average costs (costs when new savings equal zero dollars), cost lines, and the intersection points for the years, 1969 and 1970. When the means of new savings and dollar ranges are considered, the stock associations exhibit a clear cost supremacy over federals. Note, however, that the cost differences were not as great as those between federals and state mutuals. Note also that the intersection point moved to the right in 1970, indicating that the cost differentials were narrowing between these two types of associations.

The cost efficiency of the stock associations over federals was the consequence of a combination of many important factors. An average stock firm had more assets, more savings capital, paid lower rate of interest on savings, employed fewer people and received more loan repayments than an average federal in all the four years under study. In 1967, for example, a stock firm had total assets of about $39.4 million to federal's $34.7 million.

Costs ($000)

1969 Stock
1969 Federal
1970 Stock
1970 Federal

New savings (millions of dollars)
This gap widened in 1970 ($52.1 million for a stock firm compared to $42.2 million for a federal). The larger asset size permits an association to employ cost saving devices and to reap certain economies of scale.

The stock associations had a higher average amount of savings capital in all years (for example, $39.4 million for stocks compared to $34.7 million for federals in 1967, and $42.5 million compared to $36.1 million in 1970 respectively). Although the total interest charges of stock firms increased, the lower average interest rates that stocks paid on savings produced an end result favorable to stock firms. In 1968, for example, stocks paid an average interest rate of 4.312% on their savings capital and federals paid 4.408%. In 1970, the rates were 4.897% and 4.908% respectively. Thus, the costs of obtaining savings capital were always higher for federals. One reason for this difference could be the effective use of advertising carried out by the stock firms. Although the stock associations spent increasing amounts on advertising (an annual growth rate of about 18.4% for stocks compared to 15.3% for federals) they did seem to attract more savers than the other associations. In 1969, for example, when new savings funds were difficult to obtain, stock associations increased their advertising budget by about 29% and federals by 15.3%. The number of savings accounts in a stock association increased considerably, by about 37.8%, from 13,446 to 18,532 accounts, while federals increased by 9.2%, from 4559 to 4981 accounts. As a per cent of savings capital, the advertising costs
of a stock company were higher relative to a federal. In 1969, for example, the ratio of advertising costs to savings capital of a stock association was 0.13 of 1% compared to federal's 0.115 of 1%. That stock associations generally sought the savings dollars aggressively is beyond question.

Additional factors that favored the stock associations were higher levels of loan repayments and a resultant increase in mortgage lending activities. The stock firms were able to secure more loan repayments than other types of associations, which enabled them to reinvest the funds in new mortgages with higher yields or take advantage of investing in higher yielding marketable securities. The mortgage loan activities for federals and state mutuals increased at an average annual rate of about 7.2%, while the rate of increase for stocks was slightly less than 10%. Also, stocks increased their investments in purchased loans by about 55% a year compared to 8.4% annual rate for federals. Loan purchases have lower average costs per loan.

The above combination of favorable factors affecting costs enabled the stock S.& L.'s to show better cost performance than federals in 1969 and in 1970.

(iii) Average and marginal costs for state mutuals and stock associations with and without branches

The average costs of a state mutual were much lower than those of a stock firm for all years, 1967 through 1970. Their marginal costs, however, increased much faster. Figure - 3 shows the cost differences with new savings interaction points
FIGURE - 3

AVERAGE AND MARGINAL COSTS: STATE MUTUAL AND STATE STOCKS,
SELECTED YEARS: 1968 AND 1969

New savings (millions of dollars) vs. Costs ($000)
for the years, 1968 and 1970. The observations made earlier about these two types of associations in conjunction with other types of firms are equally applicable here. The differences in costs between state mutuals and stocks were statistically significant for all years, as they were between federals and state mutuals.

A factor that widened the cost differences between these firms was the number of savings account holders having more than $15,000 in their accounts. The number of such accounts for a stock firm averaged about one and one-half to two times the number that mutuals had. Moreover, the average size of savings accounts was larger for a stock association than for a mutual, which made the stock firms recipient of more savings dollars per unit of service. A second factor that helped reduce the costs for stocks was the lower average interest rates they paid on savings funds (4.3127% in 1967 and 4.897% in 1970 for a stock firm compared to 4.4648% and 4.920% for a state mutual respectively). Due to their larger size, stock associations were perhaps able to use on-line computers or similar facilities more effectively. Smaller associations have attempted to use on-line computer facilities and other programs recently but their small size do not appear to produce the same cost reduction benefits as obtained by the stock firms.\^1

To summarise, the stock associations showed clearly more favorable cost trends than mutuals. A short-coming in such a model is that no general statement can be made to the effect that stock firms showed cost superiority over all other types of associations without appending a proviso about new savings being the one variable permitted to interact with type indicator variables. Nevertheless, since the variable, 'new savings,' explained most of the variations in an association's operating costs, a broad statement that stocks exhibited a better performance in cost efficiency has merit and is supported by evidence.

**SMSA's and Types of Associations**

Tables-9 through 12 present the cost regression results for four selected SMSA's, Cincinnati (SMSA 148), Cleveland (SMSA 152), Columbus (SMSA 168) and Dayton (SMSA 184). The very small number of associations in the other SMSA's prohibited any regression analysis on their data that could provide statistically valid results. Even for the selected SMSA's, the new savings interaction model was modified to include fewer explanatory variables (new savings, number of employes and new loans only) to adjust for their available sample sizes.

The 'new savings,' which was the most important explanatory variable in the previous model, was found to be significant only in three out of four years for Cincinnati and Cleveland associations and in none of the years for the other two SMSA's. Small number of associations in these SMSA's and high multicollinearity between variables, 'new savings,' and 'new loans,'
### Table - 9

#### Regression Results: Cost Model: By SMSA, 1967

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>SMSA 148 (Cincinnati)</th>
<th>SMSA 152 (Cleveland)</th>
<th>SMSA 168 (Columbus)</th>
<th>SMSA 184 (Dayton)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSVGSN</td>
<td>0.006 (1.495)</td>
<td>0.020 (3.948)</td>
<td>0.001 (0.064) a</td>
<td></td>
</tr>
<tr>
<td>EMPLE</td>
<td>0.655 (0.483)</td>
<td>6.544 (3.305)</td>
<td>8.640 (2.594) (2.425)</td>
<td></td>
</tr>
<tr>
<td>NLONSL</td>
<td>0.038 (4.739)</td>
<td>0.008 (0.609)</td>
<td>0.013 (0.555) a</td>
<td></td>
</tr>
<tr>
<td>FEDDY</td>
<td>-83.855 (2.416)</td>
<td>-8.337 (0.079)</td>
<td>-124.099 (1.544) (1.211)</td>
<td></td>
</tr>
<tr>
<td>SHUDY</td>
<td>-70.100 (2.288)</td>
<td>b b</td>
<td>b -169.729 (1.278)</td>
<td></td>
</tr>
<tr>
<td>BRNHDY</td>
<td>31.133 (1.660)</td>
<td>126.507 (1.420)</td>
<td>19.799 (0.280) (1.193)</td>
<td></td>
</tr>
<tr>
<td>NSVINTFED</td>
<td>0.025 (5.246)</td>
<td>-0.000 (0.931)</td>
<td>0.019 (3.040) (0.976)</td>
<td></td>
</tr>
<tr>
<td>NSVINTSMU</td>
<td>0.010 (1.936)</td>
<td>b b</td>
<td>b 0.022 (1.798)</td>
<td></td>
</tr>
<tr>
<td>INTERCEPT</td>
<td>88.306 (3.071)</td>
<td>-77.158 (1.023)</td>
<td>96.923 (1.495) (1.074)</td>
<td></td>
</tr>
<tr>
<td>R-SQ ADJUSTED</td>
<td>93.77%</td>
<td>95.74%</td>
<td>95.37%</td>
<td>99.29%</td>
</tr>
<tr>
<td>NO. OF ASSOCIATIONS</td>
<td>74</td>
<td>33</td>
<td>19</td>
<td>22</td>
</tr>
</tbody>
</table>

- **a** Dropped out of regression equation
- **b** Very few or no state mutual firms
### TABLE - 10

**REGRESSION RESULTS: COST MODEL: BY SMSA, 1968**

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>SMSA 148 Cincinnati</th>
<th>SMSA 152 Cleveland</th>
<th>SMSA 168 Columbus</th>
<th>SMSA 184 Dayton</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSVGSN</td>
<td>0.020</td>
<td>0.017</td>
<td>-0.003</td>
<td>-0.003</td>
</tr>
<tr>
<td></td>
<td>(8.726)</td>
<td>(2.519)</td>
<td>(0.348)</td>
<td>(0.178)</td>
</tr>
<tr>
<td>EMPLE</td>
<td>-0.724</td>
<td>11.152</td>
<td>9.948</td>
<td>14.495</td>
</tr>
<tr>
<td></td>
<td>(0.625)</td>
<td>(4.257)</td>
<td>(3.049)</td>
<td>(6.715)</td>
</tr>
<tr>
<td>NLONSL</td>
<td>0.018</td>
<td>0.001</td>
<td>0.030</td>
<td>0.021</td>
</tr>
<tr>
<td></td>
<td>(1.935)</td>
<td>(0.062)</td>
<td>(1.926)</td>
<td>(0.823)</td>
</tr>
<tr>
<td>FEDDY</td>
<td>-112.272</td>
<td>51.241</td>
<td>-137.636</td>
<td>a</td>
</tr>
<tr>
<td></td>
<td>(3.446)</td>
<td>(0.416)</td>
<td>(1.770)</td>
<td></td>
</tr>
<tr>
<td>SMUDY</td>
<td>-67.470</td>
<td>b</td>
<td>b</td>
<td>26.070</td>
</tr>
<tr>
<td></td>
<td>(2.342)</td>
<td></td>
<td></td>
<td>(0.824)</td>
</tr>
<tr>
<td>BRENHDY</td>
<td>8.321</td>
<td>85.529</td>
<td>-0.630</td>
<td>43.064</td>
</tr>
<tr>
<td></td>
<td>(0.454)</td>
<td>(0.839)</td>
<td>(0.009)</td>
<td>(1.243)</td>
</tr>
<tr>
<td>NSVINTFED</td>
<td>0.033</td>
<td>-0.004</td>
<td>0.021</td>
<td>0.005</td>
</tr>
<tr>
<td></td>
<td>(7.876)</td>
<td>(0.991)</td>
<td>(3.585)</td>
<td>(0.349)</td>
</tr>
<tr>
<td>NSVINTSMU</td>
<td>0.004</td>
<td>b</td>
<td>b</td>
<td>0.008</td>
</tr>
<tr>
<td></td>
<td>(0.992)</td>
<td></td>
<td></td>
<td>(0.571)</td>
</tr>
<tr>
<td>INTERCEPT</td>
<td>102.608</td>
<td>-19.325</td>
<td>97.943</td>
<td>-57.272</td>
</tr>
<tr>
<td></td>
<td>(3.913)</td>
<td>(0.216)</td>
<td>(1.730)</td>
<td>(2.136)</td>
</tr>
<tr>
<td>R-SQ ADJUSTED</td>
<td>96.44%</td>
<td>94.59%</td>
<td>96.06%</td>
<td>99.51%</td>
</tr>
<tr>
<td>NO. OF ASSOCIATIONS</td>
<td>74</td>
<td>33</td>
<td>19</td>
<td>22</td>
</tr>
</tbody>
</table>

a. Dropped out of regression equation
b. Very few or no state mutual firms
<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>SMSA 148 Cincinnati</th>
<th>SMSA 152 Cleveland</th>
<th>SMSA 168 Columbus</th>
<th>SMSA 184 Dayton</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSVGSN</td>
<td>0.045 (13.926)</td>
<td>0.004 (0.809)</td>
<td>-0.009 (1.647)</td>
<td>a</td>
</tr>
<tr>
<td>EMPL</td>
<td>5.047 (3.199)</td>
<td>12.682 (5.406)</td>
<td>4.585 (1.644)</td>
<td>14.346 (6.983)</td>
</tr>
<tr>
<td>NLONSL</td>
<td>-0.063 (8.385)</td>
<td>0.026 (1.803)</td>
<td>0.090 (4.608)</td>
<td>0.001 (0.210)</td>
</tr>
<tr>
<td>FEDDY</td>
<td>-38.429 (0.922)</td>
<td>40.037 (0.320)</td>
<td>-137.937 (2.528)</td>
<td>-12.720 (0.411)</td>
</tr>
<tr>
<td>SMUDY</td>
<td>-11.177 (0.291)</td>
<td>b</td>
<td>b</td>
<td>a</td>
</tr>
<tr>
<td>BRNHDY</td>
<td>26.643 (1.251)</td>
<td>110.855 (1.118)</td>
<td>-9.153 (0.178)</td>
<td>39.962 (1.357)</td>
</tr>
<tr>
<td>NSVINTFED</td>
<td>0.013 (3.518)</td>
<td>0.001 (0.319)</td>
<td>0.021 (7.314)</td>
<td>0.010 (2.664)</td>
</tr>
<tr>
<td>NSVINTSMU</td>
<td>-0.009 (1.906)</td>
<td>b</td>
<td>b</td>
<td>0.015 (3.804)</td>
</tr>
<tr>
<td>INTERCEPT</td>
<td>33.437 (0.981)</td>
<td>11.459 (0.122)</td>
<td>116.674 (3.090)</td>
<td>-45.276 (2.328)</td>
</tr>
<tr>
<td>R-SQ ADJUSTED</td>
<td>97.09%</td>
<td>94.93%</td>
<td>98.62%</td>
<td>99.49%</td>
</tr>
<tr>
<td>NO. OF ASSOCIATIONS</td>
<td>74</td>
<td>33</td>
<td>18</td>
<td>22</td>
</tr>
</tbody>
</table>

*a*Dropped out of regression equation

*b*Very few or no state mutual firms
**TABLE - 12**

**REGRESSION RESULTS: COST MODEL: BY SMSA, 1970**

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>SMSA 148 Cincinnati</th>
<th>SMSA 152 Cleveland</th>
<th>SMSA 168 Columbus</th>
<th>SMSA 184 Dayton</th>
</tr>
</thead>
<tbody>
<tr>
<td>NSVGSN</td>
<td>0.013 (6.517)</td>
<td>0.012 (3.742)</td>
<td>-0.002 (0.746)</td>
<td>-0.009 (0.431)</td>
</tr>
<tr>
<td>EMPLE</td>
<td>6.242 (3.860)</td>
<td>11.650 (6.585)</td>
<td>22.475 (7.208)</td>
<td>20.863 (8.026)</td>
</tr>
<tr>
<td>NLONSL</td>
<td>0.033 (3.983)</td>
<td>0.006 (0.634)</td>
<td>0.006 (1.726)</td>
<td>0.017 (1.320)</td>
</tr>
<tr>
<td>FEDDY</td>
<td>-125.739 (2.362)</td>
<td>59.106 (0.587)</td>
<td>-23.601 (0.336)</td>
<td>a</td>
</tr>
<tr>
<td>SMUDY</td>
<td>-103.871 (2.091)</td>
<td>b</td>
<td>b</td>
<td>52.691 (1.326)</td>
</tr>
<tr>
<td>BRNHDY</td>
<td>24.161 (0.791)</td>
<td>122.678 (1.412)</td>
<td>-23.602 (0.332)</td>
<td>33.186 (0.992)</td>
</tr>
<tr>
<td>NSVINTFED</td>
<td>0.007 (2.071)</td>
<td>-0.002 (0.944)</td>
<td>0.000 (0.143)</td>
<td>0.001 (0.051)</td>
</tr>
<tr>
<td>NSVINTSMU</td>
<td>-0.006 (1.253)</td>
<td>b</td>
<td>b</td>
<td>0.002 (0.124)</td>
</tr>
<tr>
<td>INTERCEPT</td>
<td>132.047 (2.864)</td>
<td>-44.710 (0.611)</td>
<td>3.094 (0.061)</td>
<td>-55.352 (1.606)</td>
</tr>
<tr>
<td>R-SQ ADJUSTED</td>
<td>95.27%</td>
<td>97.29%</td>
<td>98.21%</td>
<td>99.38%</td>
</tr>
<tr>
<td>NO. OF ASSOCIATIONS</td>
<td>74</td>
<td>33</td>
<td>19</td>
<td>22</td>
</tr>
</tbody>
</table>

*a* Dropped out of regression equation

*b* Very few or no state mutual firms
might account for the variable's lack of statistical importance. Another probable cause for its insignificance is the negligible difference in new savings found among average Columbus associations (federals and stocks) and Dayton associations (federals and state mutuals) in all years.

The variable which generally retained its significance for all SMSA's is the 'number of employes,' the main exception being Cincinnati SMSA for the years 1967 and 1968. The large number of small associations in Cincinnati, employing mostly part-time workers, might account for this deviation.

The 'new loans' variable is not found to be statistically significant in all years for all SMSA's except for Cincinnati. Below average growth rates in mortgage loan commitments among associations in the other SMSA's might account for the poor showing of this variable.

Except for Cincinnati associations, both the type and branch dummy variables did not show any significant results. The results of interaction variables are mixed, significant for certain SMSA's for some years and not for others. As indicated earlier, the main cause of important variables becoming statistically insignificant in the SMSA's results appears to be the small samples per SMSA.

**Cincinnati SMSA**

(i) Average and marginal costs for state mutual and federal associations with and without branches

There were about fifty three state mutuals, fourteen federals and seven stock associations included in the regression analysis.
Between state mutuals and federals, the state mutuals had higher average costs but lower marginal costs in all years, 1967 through 1970. Statistically, the differences in the marginal costs between these firms were significant throughout the period.

Figure - 4 shows the new savings intersection points between these two associations for 1969 and 1970. For the four year period the intersection values ranged from $0.917 million (1967) to $1.68 million (1970). When the means and ranges of new savings (table - 8 ) are compared with the above values, the state mutuals for most of the levels of new savings controlled costs rather effectively.

A detailed analysis of the data reveals the following as the probable reasons for the state mutuals to show lower rate of increase in marginal costs. An ordinary state mutual had smaller average net savings inflows ($2.4 million in 1967 and $3.9 million in 1970 compared to $4.2 million and $5.5 million respectively for a federal); made less use of FHLL and other advances. ($0.067 million in 1967 and $0.170 million in 1970 for a state mutual compared to $0.46 million and $1.15 million respectively for a federal) and paid less both in compensation expenses and advertising costs as a per cent of new savings obtained. (Compensation expenses: 1.80% in 1967 and 1.41% in 1970 for state mutuals compared to 1.98% and 2.04% for federals; advertising costs: 0.24% in 1967 and 0.19% in 1970 for state mutuals compared to 0.38% and 0.51% respectively for federals).

The loan repayments declined for both institutions but federals suffered the most (an yearly decline of about 11.5% for the
FIGURE - 4

AVERAGE AND MARGINAL COSTS, CINCINNATI SMSA: FEDERAL AND
STATE MUTUAL: 1968 AND 1970

Costs
($000)

New savings (millions of dollars)
state mutuals compared to 17.23% for federals). The higher loan repayments (or conversely, the slower rate of decline) enabled the associations to restructure its assets with higher yielding mortgages and marketable securities.

The federal associations were helped, however, by certain favorable factors. They were much larger in asset size ($14.4 millions in 1967 and $17.3 millions in 1970 to $9.4 and $10.7 millions for state mutuals in these two years respectively) and paid, on an average, lower rate of interest on savings capital (4.423% in 1967 and 4.75% in 1970 for federals compared to 4.48% and 4.97% respectively for state mutuals). But the state mutuals on the whole, paid out much smaller amounts in total operating expenses for every dollar of assets it possessed. For example, federals spent 1.65% and 1.68% of every dollar of its assets in 1969 and 1970 on operating expenses compared to 1.22% and 1.23% respectively for state mutuals. To conclude, a cost comparison between federals and state mutuals shows that state mutuals generally increased their costs at a much lower rate for every increase in new savings obtained. This cost advantage was brought about by smaller net savings inflows, lower compensations and advertising costs and smaller FHLB and other advances.

(ii) Average and marginal costs for federals and state stock associations with and without branches

The costs relationships found between federals and state mutuals over the four year period were repeated here as well.
The average costs of stock S.& L.'s were higher compared to federals but the rate of increase in costs for a given change in new savings was smaller.

Figure 5 shows these cost comparisons together with mean levels of new savings for 1969 and 1970. Except for 1970, when new savings inflows were very high, the new savings intersection point in every other year was below its mean level. This lower intersection level indicates that generally for most of the increases in new savings, federals incurred much higher costs than the stock associations.

To what factors the stock firms could attribute their smaller increases in marginal costs. Stock companies were by far the largest in total asset size dwarfing the federal firms ($46.2 million in 1967 and $69.2 million in 1970 for stocks compared to $14.4 million and $17.3 million for federals) and obviously could procure economies of scale which smaller associations could not achieve. Although an average stock firm paid more in salary and advertising costs in absolute dollars, these costs, as a proportion of new savings obtained, were significantly lower. In 1967, for example, for every dollar of new savings received by a stock association, it paid out 1.11 cents in compensation expenses to 1.98 cents for a federal association. In 1970, the situation was much the same, 0.81 cents for stock firms and 2.1 cents for federal firms. With regard to advertising outlays, in 1967 stock associations spent 0.25% of its new savings, but federal associations spent much more—about 0.38%—of their new savings. In 1970, these advertising costs were 0.41% and 0.61%
FIGURE - 5


New savings (millions of dollars)

Costs ($000)

1969 Federal 1969 Stock

1970 Stock

1970 Federal
for stocks and federals respectively. The stock firms showed small percentages of new savings as compensation and advertising expenses inspite of larger rate of annual growth in these expenditure categories. The compensation expenses of stocks grew at the phenomenal rate of 40% per annum whereas the annual growth rate for federals was only 12.6%. The largest growth rate is noticed in advertising expenses, about 86% per year for stocks and 41% for federals. One reason for such a high growth rate was the intra-industry and inter-thrift institutions' competition prevalent in Cincinnati market area for the consumers' savings dollar. Obviously the stock firms appear to be successful in seeking out more new savings.

In the area of loan repayments, not only the stock associations received higher dollar repayments but the growth in their annual loan repayments was also sharply higher (17.2% for stocks to 11.6% for federals). Such larger inflows made it relatively cheaper for stocks to obtain funds without resorting to costlier methods. Moreover, stock firms in Cincinnati area reduced U.S. government and other securities at an average annual rate of 26.5% compared with 2.7% for federals.

To summarize, for the various reasons stated above, such as larger assets size, low costs of compensation and advertising per savings dollar, larger loan repayments, reduced borrowings, etc., the stock associations were able to achieve what federals and state mutuals could not achieve, namely smaller increases in marginal costs for a given increase in new savings, an
Important cost incurring factor to a savings and loan association.

(iii) Average and marginal costs for state mutuals and stock associations with and without branches

The cost differentials between state mutuals and stocks, although noticeable in regression results, were minor and statistically insignificant in all years and so indicated by the rigorous statistical tests carried out. Further analysis, therefore, was not carried out.

Cleveland SMSA

Average and marginal costs for federal and stock associations with and without branches

There were only very few state mutuals and their data could not be effectively utilized by the regression technique to make any meaningful cost comparisons between them and other types of associations. Therefore, a comparison between federals and stock firms only could be made, but even here, the regression results and statistical tests indicated clearly that the differences were only superficial and insignificant. A further analysis of data indicated that both federals and stocks were not too different from each other in many of their characteristics. For example, when the entire range of new savings was divided into four quartiles it was found that both federals and stocks were mostly evenly distributed per quartile. In 1968, for instance, there were eight federals and six stocks in the first quartile, five and seven in the second, two and one in the third and one each
in the fourth. The same kind of distribution was noted almost every other year. Secondly, both these types of firms had similar asset sizes in all years. In 1969 and 1970, for example, an average federal firm had assets of $99.4 million and $107.5 million respectively compared to $101.3 million and $110.7 million for stock firms. Thirdly, the differences in new savings obtained and savings withdrawn were not large. The per capita expenses on compensation and advertising between both types of S.& L.'s for many years was very close. An average federal or stock firm spent about the same dollar amount as operating expenses (e.g., $1.28 million and $1.37 million for a federal in 1969 and in 1970 compared to $1.27 million and $1.35 million for a stock firm respectively). Finally, since the number of associations were about equal (16 federals compared with 15 stock firms) and since competition among these associations was evenly matched both in number and in financial characteristics, neither one would have been impervious to the behavioral influences of the other. The results, therefore, showed inconsequential cost differences.

Columbus SMSA

Average and marginal costs for federal and stock associations with and without branches

The number of state mutuals in the Columbus SMSA and in Cleveland SMSA were so few that a statistically valid cost comparison was made possible only between federals and stock associations. The cost differences between these two types of savings associations were found to be statistically significant in all years except for 1970.
The average costs for federals were much lower than stock associations in all the three years. But the marginal costs for a given increase in new savings were substantially higher for federals compared to stocks. The years 1968 and 1969 witnessed declining marginal costs for stocks and increasing costs for federals. Figure -6 shows these costs trends as well as the new savings intersection points for 1968 and 1969. Note that the slopes of the cost curves of stocks in both years slope downward and those of federals move upward. Also note that not much difference is noticeable in intersection points for the two years.

An average stock association was smaller in asset size relative to a federal ($21.3 million for stocks compared to $54.6 million in 1969), received lower per capita new savings than a federal ($7.0 million for stocks compared to $14.5 million for federals in 1968, and $10.6 million compared to $19.3 million in 1969), had more proportion of deposited savings withdrawn compared with a federal (98.2% and 94.1% in 1968 and 1969 respectively for stocks compared to 91.4% and 89.0% for federals) and paid less in compensation and advertising costs as percent of new savings. In 1968, for example, compensation and advertising costs amounted to about 1.38% and 0.285% of savings received for a stock firm and the percentages were 1.96% and 0.333% respectively for a federal. Similar differences between stocks and federals were found in 1969 as well.

All these favorable factors outweighed the disadvantages stocks faced in the form of higher average rates of interest they
FIGURE - 6


New savings (millions of dollars)
paid on savings and larger annual increases in salary and advertising costs they experienced during the period.

The factors working against federals were lower loan repayments, increased FHLB and other advances (an annual increase of about 211% compared to stock firm's 137%) and higher annual growth in advertising costs (41% to 31% for stocks). The federals decreased their refinancing activities at an average annual rate of 59% to stock firm's 22%. Refinancing of a loan is relatively less costlier than originating a new loan. Both federals and stocks reduced their cash holdings during the period but the reduction was much smaller for federals (annual rate of decline of about 13.8% for federals and 19.3% for stocks).

Thus, despite of being small in size the stocks were able to reap the benefit of smaller increases in costs due to various factors stated above.

**Dayton SMSA**

Average and marginal costs for federals and state mutuals with and without branches

The data for ten federals and ten state mutuals were analysed and a cost comparison was made between them. Since data for only one stock association were available no other costs comparisons could be made. The marginal costs for federals rose slowly but those of state mutuals increased at a faster rate (Figure - 7). A problem in the analysis was that both new savings and new loans which were highly correlated were dropped out from the equations
Figure 7

Average and Marginal Costs, Dayton SMSA: Federal and State Mutual: 1967 and 1969

- Costs ($000)
- New Savings (millions of dollars)

1967 Federal
1967 State Mutual
1969 State Mutual
1969 Federal
for many years leaving the variable, 'number of employes' in the model. Since the results obtained were statistically significant only for 1967 and 1969, the following analysis applies to those years only.

Nine out of ten associations of each category of federals and state mutuals fall into the first quartile of new savings, the $600,000 to $18.56 million range. The remaining one of federal appears in the third quartile (the $36.5 to $54.5 million range) while the remaining one state mutual shows up in the fourth quartile (the $54.5 to $72.4 million range).

A state mutual in Dayton SMSA area received, on an average, higher net savings than a federal each year ($9.4 million compared to $8.5 million in 1967 and $11.8 million to $10.7 million in 1969) paid more compensation as a percent of assets than a federal (0.46% compared to 0.45% in 1967 and 0.48% to 0.47% in 1969) and paid on average higher interest rates on savings than a federal in 1969 (4.75% paid by state mutual compared to federal firm's 4.725%).

A look at the growth rates of certain of these variables also confirms these differences. For example, the new savings of federals grew at an annual rate of 12.1% compared to 14.8% of state mutuals and FHLB and other advances at 266% for federals compared to a phenomenal rate of 1573% for state mutuals. Moreover, the federals increased their cash holdings by about 7.6% every year and the mutuals by 17.4%. 
Thus, the marginal costs for federals in Dayton area increased at a slower rate than that of state mutual associations for the years 1967 and 1969. The factors that operated against state mutuals included higher cost of funds, more borrowings, increased compensation expenses and larger additions to cash holdings.

Total Assets and Types of Associations

Table-13 presents the results of modified cost equation with operating costs as the dependent variable and total assets as the main independent variable for all years, 1967 through 1970. The regression results showed that 'total assets,' is an important explanatory variable. The high t-values accompanying the coefficients of the total assets variable confirm this. Since 85% to 88% of the total assets come from withdrawable savings, which requires incurring interest costs, the total assets variable shows consistent, positive and significant coefficients for all years. Another variable of considerable importance, which affects the associations' costs is the 'number of employes.' This variable also shows high t-values in all years. The other two explanatory variables, 'percentage of withdrawals to savings capital,' and 'real estate items' were not statistically significant in most of the years.

The type dummy and interaction variables behaved in a similar manner to the earlier cost model. The positive and significant coefficients of branch variable in all years affirm the earlier finding that it is expensive to have branches. The R-Sq. values are higher, indicating that the included variables explained most
### TABLE - 13

REGRESSION RESULTS: COST MODEL: TOTAL ASSETS INTERACTION WITH TYPE DUMMIES (T-VALUES IN PARENTHESES)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>TA (TOTAL ASSETS)</td>
<td>0.008</td>
<td>0.008</td>
<td>0.009</td>
<td>0.010</td>
</tr>
<tr>
<td></td>
<td>(22.504)</td>
<td>(20.455)</td>
<td>(27.209)</td>
<td>(31.966)</td>
</tr>
<tr>
<td>AREF</td>
<td>0.036</td>
<td>0.022</td>
<td>0.008</td>
<td>0.032</td>
</tr>
<tr>
<td></td>
<td>(2.338)</td>
<td>(1.227)</td>
<td>(0.423)</td>
<td>(1.063)</td>
</tr>
<tr>
<td>EMPLE</td>
<td>4.782</td>
<td>4.916</td>
<td>3.437</td>
<td>2.681</td>
</tr>
<tr>
<td></td>
<td>(9.824)</td>
<td>(8.698)</td>
<td>(6.685)</td>
<td>(5.380)</td>
</tr>
<tr>
<td>WSVGRW</td>
<td>0.384</td>
<td>0.451</td>
<td>0.549</td>
<td>0.722</td>
</tr>
<tr>
<td></td>
<td>(0.740)</td>
<td>(0.824)</td>
<td>(1.117)</td>
<td>(2.134)</td>
</tr>
<tr>
<td>GLONSG</td>
<td>-0.282</td>
<td>0.708</td>
<td>-2.073</td>
<td>-1.652</td>
</tr>
<tr>
<td></td>
<td>(0.210)</td>
<td>(0.510)</td>
<td>(1.632)</td>
<td>(1.199)</td>
</tr>
<tr>
<td>FEDDY</td>
<td>2.858</td>
<td>-0.558</td>
<td>-19.341</td>
<td>-13.629</td>
</tr>
<tr>
<td></td>
<td>(0.183)</td>
<td>(0.034)</td>
<td>(1.129)</td>
<td>(0.720)</td>
</tr>
<tr>
<td>SMUDY</td>
<td>-18.139</td>
<td>-19.550</td>
<td>-32.028</td>
<td>-38.566</td>
</tr>
<tr>
<td></td>
<td>(1.165)</td>
<td>(1.195)</td>
<td>(1.899)</td>
<td>(2.030)</td>
</tr>
<tr>
<td>BRNHDY</td>
<td>45.597</td>
<td>61.939</td>
<td>62.257</td>
<td>69.312</td>
</tr>
<tr>
<td></td>
<td>(3.585)</td>
<td>(4.636)</td>
<td>(4.813)</td>
<td>(4.874)</td>
</tr>
<tr>
<td>TAINTFED</td>
<td>-0.000</td>
<td>-0.000</td>
<td>0.001</td>
<td>0.000</td>
</tr>
<tr>
<td></td>
<td>(1.104)</td>
<td>(0.076)</td>
<td>(2.366)</td>
<td>(1.288)</td>
</tr>
<tr>
<td>TAINTSMU</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
<td>0.001</td>
</tr>
<tr>
<td></td>
<td>(1.644)</td>
<td>(2.838)</td>
<td>(3.625)</td>
<td>(3.473)</td>
</tr>
<tr>
<td>INTERCEPT</td>
<td>-9.056</td>
<td>-9.973</td>
<td>2.742</td>
<td>2.183</td>
</tr>
<tr>
<td></td>
<td>(0.428)</td>
<td>(0.466)</td>
<td>(0.119)</td>
<td>(0.314)</td>
</tr>
<tr>
<td>R-SQ ADJUSTED</td>
<td>97.16%</td>
<td>97.40%</td>
<td>97.77%</td>
<td>97.65%</td>
</tr>
<tr>
<td>NO. OF ASSOCIATIONS</td>
<td>324</td>
<td>322</td>
<td>321</td>
<td>323</td>
</tr>
</tbody>
</table>
of the variations in the average costs of an association.

Average and marginal costs for federals and state mutuals with and without branches

Except for 1969, the results showed significant differences in costs between federals and state mutuals. The average costs of state mutuals were much lower than that of federals but their marginal costs were higher. The differences in marginal costs as defined by the coefficients of the variable 'new savings,' however, was only 0.001 in all the significant years. The reasons given in a previous section for the cost differences between these two types of associations apply equally well here. An additional observation is that most of state mutuals are found in the lowest $0-10 million assets size category. The federal firms, on the other hand, were rather evenly distributed in all the size categories. For example, thirty three federals and sixty mutuals were in the $0-10 million group and thirty federals and five state mutuals were in the largest size categories ($50 million and above assets size). The higher concentration of state mutuals in the low end of the assets size category certainly impeded the mutuals from obtaining larger economies of scale.

Average and marginal costs for federals and state stock associations with and without branches

No significant cost differences showed when these two types of associations were compared except for 1969. In that year, the average costs of federals were found to be lower than stocks but their marginal costs were not. The increase in FHLB and
other advances by federals from $0.495 million in 1968 to $1.14 million in 1969, undoubtedly increased their costs. Compensation and advertising expenses also increased and these costs together with the rise in interest rates on savings capital forced federals to incur higher expenses.

Average and marginal costs for state mutuals and state stock associations with and without branches

Stock associations appeared to be more cost efficient than mutuals in all years except for 1967, when no significant differences were found. Although the average costs of state mutuals were generally lower compared with stocks, the marginal costs for the former rose at a higher rate. As stated earlier, an average stock association was larger in asset size, received more savings, paid less average interest rate charges on savings capital, received higher loan repayments, had substantially large dollar amount per mortgage account and paid less in compensation and advertising costs as percent of total assets than a state mutual. For these and for other reasons given earlier, the stock firms, better than state mutuals, proved to be cost efficient.

**ANALYSIS OF PROFIT REGRESSION RESULTS**

The dependent variable in the profit model is return on equity or net worth (ROE) and the main explanatory variables, in addition to type and branch dummies and interaction variables are net profit margin (NPM: ratio of net income after taxes to operating revenue), equity multiplier (EM: ratio of average assets
to average equity) and asset utilization (AU: ratio of operating revenue to average assets). Thus, the profit model adopted here to determine differences in profit performance between various types of associations is essentially a different one. The usefulness of this model relies on two important purposes: (i) to check whether the results obtained from the cost model are confirmed and (ii) to permit the use of popular industry measures in a regression context.

GENERAL RESULTS

Table - 14 presents the profit regression results for the years 1967 through 1970. The important explanatory variables were net profit margin, equity multiplier and asset utilization in that order. The high t-values might be taken as indicative of their relative importance in their contribution to explanation of profit ratio variations (the dependent variable). The positive signs of coefficients for all the variables in all years mean that they add to return on net worth of an association. The type-dummy variables were generally found to be statistically significant. All of them, except state mutuals in 1967, show positive coefficients.

The interaction of net profit margin with type-dummies produce a negative although very small contribution to return on equity to both federals and state mutuals.

The R-Sq. values are very high. Since these three explanatory variables are highly correlated the presence of multicollinearity could have influenced the results to a certain degree.
TABLE - 14

REGRESSION RESULTS: PROFIT MODEL: NET PROFIT MARGIN INTERACTION WITH TYPE DUMMIES (T-VALUES IN PARENTHESES)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NPM (NET PROFIT MARGIN)</td>
<td>0.662</td>
<td>0.881</td>
<td>1.048</td>
<td>1.217</td>
</tr>
<tr>
<td></td>
<td>(67.390)</td>
<td>(32.793)</td>
<td>(33.144)</td>
<td>(32.414)</td>
</tr>
<tr>
<td>AU (ASSET UTILISATION)</td>
<td>109.262</td>
<td>138.920</td>
<td>63.140</td>
<td>187.179</td>
</tr>
<tr>
<td></td>
<td>(7.728)</td>
<td>(6.851)</td>
<td>(2.459)</td>
<td>(7.607)</td>
</tr>
<tr>
<td>EM (EQUITY MULTIPLIER)</td>
<td>0.496</td>
<td>0.607</td>
<td>0.585</td>
<td>0.658</td>
</tr>
<tr>
<td></td>
<td>(63.478)</td>
<td>(29.882)</td>
<td>(23.424)</td>
<td>(19.785)</td>
</tr>
<tr>
<td>FEDDY</td>
<td>0.008</td>
<td>1.771</td>
<td>2.801</td>
<td>2.364</td>
</tr>
<tr>
<td></td>
<td>(5.345)</td>
<td>(3.008)</td>
<td>(4.595)</td>
<td>(3.678)</td>
</tr>
<tr>
<td>SMUDY</td>
<td>-0.136</td>
<td>1.495</td>
<td>2.084</td>
<td>4.327</td>
</tr>
<tr>
<td></td>
<td>(0.674)</td>
<td>(2.497)</td>
<td>(5.087)</td>
<td>(6.230)</td>
</tr>
<tr>
<td>BRNHDY</td>
<td>-0.072</td>
<td>0.002</td>
<td>0.002</td>
<td>-0.558</td>
</tr>
<tr>
<td></td>
<td>(0.922)</td>
<td>(0.011)</td>
<td>(0.010)</td>
<td>(2.088)</td>
</tr>
<tr>
<td>NPMINTFED</td>
<td>-0.001</td>
<td>-0.155</td>
<td>-0.250</td>
<td>-0.196</td>
</tr>
<tr>
<td></td>
<td>(5.997)</td>
<td>(3.255)</td>
<td>(4.910)</td>
<td>(3.247)</td>
</tr>
<tr>
<td>NPMINTSMU</td>
<td>0.004</td>
<td>-0.122</td>
<td>-0.265</td>
<td>-0.420</td>
</tr>
<tr>
<td></td>
<td>(0.191)</td>
<td>(2.388)</td>
<td>(5.525)</td>
<td>(6.142)</td>
</tr>
<tr>
<td></td>
<td>(15.319)</td>
<td>(14.301)</td>
<td>(9.039)</td>
<td>(14.869)</td>
</tr>
<tr>
<td>R-SQ ADJUSTED</td>
<td>96.79%</td>
<td>89.30%</td>
<td>88.33%</td>
<td>86.98%</td>
</tr>
<tr>
<td>NO. OF ASSOCIATIONS</td>
<td>324</td>
<td>322</td>
<td>321</td>
<td>323</td>
</tr>
</tbody>
</table>
SPECIFIC RESULTS

**Federal and state mutual associations with and without branches**

There appears to be no distinct profit performance by any type of association in this category for three years 1967 through 1969. Only in 1970, federals showed evidence of higher rate of contribution to return on equity than state mutuals. In that year, the mortgage loans of federals increased at about 8% over 1969 values. The state mutuals increased the same by 7.9%, not much of a difference. The largest increase for federals was found in loans purchased, 36% compared to 31% for state mutuals. Federal associations increased their refinancing activities by 221% in 1970 over 1969, while the state mutuals increased it by only 10%. In construction loan activities it was again federals which scored high percentage of growth (88% increase in 1970 compared to 52% for state mutuals). While compensation expenses for federals increased at an average annual rate of 8.8% the state mutuals' increases were about 9.2%. The income from lending activities was relatively proportionately higher for federals. For example, in 1970, the rate of interest income from mortgages and from other sources were 6.1% and 0.703% respectively for federals and the same for state mutuals were 5.86% and 0.74% respectively. Federals received more fees and discounts in 1970, 2.66% of gross operating income compared to mutual firms' 2.05%. For every savings dollar received by federals there was more gross operating revenue compared with state mutuals. Further,
the state mutuals paid more in interest rate charges on its savings funds in all years. State mutuals also had maintained higher cash balances (as a per cent of total assets) than federals (2.58% for state mutuals compared to 2.10% in 1970). Thus, these distinct operating characteristics of federals enabled them to be more profitable than state mutuals.

Federals and stock associations with and without branches

It is seen above that between federals and state mutuals the federals' profit performance was higher. But when the profitability between federals and the stock associations was compared the latter showed a statistically significant superior performance in all years.

An average stock association had larger asset size than a federal ($39.4 million compared to $34.7 million for a federal in 1967 and $52.1 million to $42.2 million in 1970), had a lower ratio of savings withdrawn to savings deposited (87.3% for a stock company to 89.3% for a federal in 1967 and 91.6% to 99.5% in 1970), received higher average rate of interest on mortgages and other investments (6.04% for a stock compared to 5.9% for a federal in 1967 and 7.15% to 6.77% in 1970), had more mortgage loans outstanding ($33.45 million for a stock firm compared to $28.89 million for a federal in 1967 and $44.33 million to $35.7 million in 1970), and had a smaller per cent of assets kept in cash (2.19% for a stock association compared to 2.32% for a federal firm in 1967 and 1.6% to 2.10% in 1970).
When stock associations, which received more operating revenue per dollar of assets, paid less than a federal in compensation expenses as a per cent of gross operating revenue (8.68% compared to 8.75% in 1967 and 8.18% to 8.32% in 1970) the result was higher profits for stocks. To a certain extent, the large differences in profits between those two associations were reduced by stock associations' spending more advertising and interest charges on FHLB and other borrowings. One can not but notice the flexibility with which the stock firms seemed to have changed their investment strategies. When market conditions were uncertain and yields on marketable securities were high the stock associations resorted to invest their uncommitted funds in these securities rather than putting them in long term mortgages whose yields might stagnate. For example, after a negligible rise in their investments in cash balances, U.S. governments and other securities in 1969, the stock associations increased their investments in these securities by 18% in 1970. When new savings inflows were drying up, as had happened in 1969, stocks increased their advertising budget by about 29% (federals: 18%) and reduced their cash balances by about 15% (federals increased by 10%) from the previous year. Thus, flexibility in decision making, aggressiveness in seeking savings capital, and risk taking in borrowing funds appear to have paid higher dividends in the form of higher ROE for stock associations.
Stocks and state mutuals with and without branches

The regression results and the analysis of other data showed that the stock associations achieved a higher return on net worth performance than state mutuals in all years except in 1967. Thus, under profit model as with the previous cost models, the stock associations showed better results both in cost efficiency, by a slower increase in marginal costs, and in return on net worth, by a larger increase in net profit margin. The interaction regression technique supported by valid statistical tests showed these cost and profit differences that existed between the three types of associations in the four years, 1967 through 1970. The analyses of other data also confirmed these observations.

STATISTICAL PROPERTIES OF THE MODEL

The validity of the regression model and the statistical results reported in this chapter rely on how well the various regression assumptions hold during the performance regression runs. Depending upon how severe the violations are, corrective measures must be taken to make the interpretation of the regression results meaningful. The results of tests performed indicate that the model and the statistical findings can be taken as valid and relevant. The details of various tests and their outcomes are given below.

The test to check for normality is based on the 'unit normal deviate form' and was carried out for one group of fifty-one savings

---

and loan associations. The results are given in appendix-B and they clearly show that normality in the observations is present. The test results of non-transformed observations indicated that approximately 95 per cent of the residuals are found to fall within the accepted limits, (-2, 2). As a further test, a transformation to first differences of all values of dependent and explanatory variables of 137 savings and loan associations was done (appendix-C) to determine whether there were any changes both in the number of significant variables and in the level of their significance. All variables that were statistically significant at 99 per cent level in the prior transformation runs maintained their significance even after the transformation. Also, no new variables entered the list of significant variables once the transformation was carried out.

Two tests, the Bartlett's test\(^3\) and Cochran's test\(^4,5\) for the equality of variances were carried out on systematic samples on the lines suggested by Benston (every third observation).\(^6\) Using Bartlett's test formula, the equality of


\(^4\)Ibid., pp.177-181.


\(^6\)The selection of systematic samples was based on Benston's method. Benston, loc.cit., pp.701-702.
variances among these groups was tested (appendices- D and E) and found to be present in the samples. Another test statistic was calculated and compared with Cochran's test statistic and it also indicated that heteroskedastic problem is not severe in the samples.

Autocorrelation problem arises due to the nature of time series observations. It is generally absent in cross-sectional data unless there exists a non-linear relationship between an independent variable and the dependent variable.\(^7\) Since the data used here were cross-sectional the danger of autocorrelation affecting the results was negligible.\(^8\) Nevertheless, a first difference test on the lines suggested by Cochran and Orcutt was done and the test results indicated that serial correlation problem was minor.\(^9\) A further test, based on the Dixie and Massey method, was performed and this required the calculation of 'z' statistics on the basis of mean-square successive differences for the residuals of the annual data, 1967 through 1970. It was determined from the results (appendix-F) that all z-values were not too large and the hypothesis of randomness of residuals was accepted. The same conclusions were made when the Durbin-Watson 'd' statistics for three samples of S.& L.'s


of 26, 73, and 66 observations were calculated and tested at 95 per cent significance level (appendix- F). None of the hypotheses of auto-correlation being equal to zero is rejected.10

The test results of the degree of multicollinearity in the sample observations are shown in the appendices G and H. Although many independent variables were found to have high correlations among themselves, the results of regressing each of the independent variables against the remaining explanatory variables for the 1970 data showed that none of the R-square values is close to unity. It implies that the degree of multicollinearity is not very high.11

The same test was repeated for a small sample of 74 FSLIC insured state mutuals in the SMSA-148 for the year 1970. The previous conclusion was confirmed again. When the R-square deletes test was performed for the above small sample, the change in R-square values due to dropping of one explanatory variable at a time was found to be not very large (appendix- H). But the generally high t-values which are obtained for the significant variables indicate that the effects of multicollinearity on the coefficients are much less.12

Many of the coefficients were proven different from zero at 99 per cent level. It is therefore, reasonable to conclude that although multicollinearity is present, especially in very small samples, it

10Dixie, W.J. and Massey, Jr., loc.cit., pp.298-299.
has not affected the statistical results effectively. Benston and Nicols did not report any specific measures used to find out the presence of high degree of multicollinearity in their samples.

In view of the above, the statistics reported may be read as representing unbiased and efficient estimates.
CHAPTER V

SUMMARY

The primary objective of this study is to compare the cost efficiency and profit performance of Ohio's insured associations for the period, 1967 through 1970.

Methodology

The yearly data of savings associations were analysed through interaction regression models. The total annual operating costs and the return on net worth were measures of cost efficiency and profit performance respectively. The independent variables in the cost model were 'new savings,' 'new loans,' 'real estate items,' 'number of employes,' 'growth,' and 'percentage of savings withdrawn to savings capital.' Further, two type-dummy variables to classify the S.& L.'s by charter, a branch dummy to distinguish between firms having branches and home office only and two interaction variables to determine marginal cost differences between associations were included in the cost model.

The profit model used 'net profit margin,' 'asset utilization,' 'equity multiplier,' and type, branch and interaction dummies as independent variables. Four separate analyses were used to evaluate the associations' comparative performance. The details of the results of testing the cost and profit hypotheses and conclusions regarding their acceptance or rejection are given in the next section.
Hypothesis One

The type of charter of Ohio savings and loan associations produced no difference in cost efficiency for the years, 1967 through 1970. This hypothesis was not supported.

The results of the cost model generally indicated that the state stock firms were far more cost efficient than the other two types of associations over the period studied.

Federals versus state mutuals. Federals were bigger in asset size, paid a lower rate of interest on savings funds and had higher loan repayments than state mutuals. The factors working against the state mutuals were a sharp rise in the use of borrowed funds, increased compensation and advertising costs and large savings inflows that were subject to higher rate of interest charges. The result was that the marginal costs of state mutuals rose sharply compared with federals.

Federals versus stocks. The stock firms were larger in asset size, paid lower average rates of interest on savings, maintained smaller percentage of assets in idle cash balances and spent fewer dollars of savings capital on compensation and advertising. The higher growth in annual advertising budget seems to have enabled the stock firms not only to add more savers but increased the average size of savings accounts as well. This combination of factors resulted in stock firms showing smaller increases in their marginal costs compared to federals.

State mutuals versus state stocks. Comparing state mutuals and stocks, the stock firms showed a better cost performance than state
mutuals since the latter had higher marginal costs. The cost determining factors applicable to both these types of firms were stated earlier.

In summary, the state stock firms had lower marginal costs than the other types of firms and therefore, the hypothesis of no cost differences between these associations was unsupported.

**Hypothesis Two**

The type of charter of Ohio savings and loan firms resulted in no cost differences among associations differentiated by SMSA locations. This hypothesis was generally not supported.

Cost comparisons between all types of firms were made only for the Cincinnati SMSA data. The small number of observations in Cleveland, Columbus and Dayton SMSA's permitted comparisons between state stocks and federals and between state mutuals and federals only.

**Cincinnati SMSA.** In the Cincinnati area a state mutual received smaller savings inflows, made less use of borrowed funds and paid proportionately less on advertising and compensation expenses than a federal. These factors resulted in state mutuals showing lower marginal costs compared to federals.

The comparison between stocks and federals showed that the stock firms were by far the largest in asset size, paid much less in compensation and advertising expenses for every dollar of new savings obtained, and their loan repayments were always higher. Consequently, they were able to show a lower rate of increase in their marginal costs.

The regression analysis showed no statistically significant cost differences between stocks and state mutuals and, therefore, no further analysis was carried out.
Cleveland SMSA. No significant cost differences were found between federals and stock associations in the Cleveland area because the operating characteristics for both of these associations were very similar. Only the analysis of Cleveland SMSA data supports the hypothesis of no cost difference.

Columbus SMSA. The comparison between federals and stock firms in the Columbus SMSA yielded a result favorable to stocks in three out of four years (the difference was statistically insignificant in 1970).

The results showed that while the marginal costs of federals were increasing, those of the stock firms were declining over a wide range of new savings. The factors that made the stock firms experience decreasing marginal costs were reduced inflows of savings, larger loan repayments, and smaller compensation and advertising expenses as a percent of total assets. Federal associations, on the other hand, increased their FHLB and other borrowings substantially, as well as their advertising costs.

Dayton SMSA. The results of cost comparison between federal firms and state mutual savings and loan associations indicated significant differences only for one year (1969).

The state mutual firms incurred higher marginal costs because they received more savings capital, paid more in compensation expenses and incurred a higher rate of interest charges on savings capital than federals.
In summary, although the analysis of the data of four SMSA's did not produce uniform results, the relevant points in the analysis tend not to support the contention of no cost differences among associations by SMSA locations.

**Hypothesis Three**

There were no cost differences among the Ohio S.& L.'s differentiated by charter and by asset size. This hypothesis was not generally supported.

**Federals versus state mutuals.** Comparison between federal and state mutual associations revealed that in three out of four years the state mutuals had marginal costs significantly higher than that of federally-chartered associations. The factors such as small size, higher interest rates on savings, smaller loan repayments, increased expenditures on advertising and compensation etc., were unfavorable to state mutuals pushing their marginal costs higher.

An important additional observation is that most of the state mutuals (about 81%) were in the $0-20 million asset group, 60% were in the $0-10 million group, and 21% were in the $10-20 million group. Only about 55% of the federal firms were in the $0-20 million category. About 28% of the federal associations were in the $0-10 million category and 27% were in the $10-20 million group. The federal firms in general, were spread out evenly in all size categories. The higher average size of their assets permitted the federal associations to achieve greater economies of scale.
Federals versus state stocks

The results of cost comparison between federals and stocks failed to show any significant cost differences between these two types of associations for most of the years. The percentage distribution of federal and stock firms across the four size categories were almost the same, (56% each in the $0-20 million group in 1967; 51% and 54% respectively in the same group for federals and stocks in 1968, 49% and 51% each in 1969 and in 1970) an indication that total asset size plays a significant part in determining cost differences between associations.

State mutuals versus state stocks

The comparison between state mutuals and state stocks produced significant cost differences in favor of the stock firms. The stock associations were the largest in asset size (about two and one half times as large as a state mutual), paid lower rates of interest on savings capital and, as per cent of total assets, spent less on compensation and advertising expenses compared to state mutuals. The outcome of these and other favorable factors was lower marginal costs for stocks.

Hypothesis Four

No difference in return on net worth should exist among the associations differentiated by charter for the years, 1967 through 1970. This hypothesis was not supported.
**Federals versus state mutuals**

The federals and state mutuals had no significant differences in return on net worth in all years except in 1969, when federals had a clear profit edge over state mutuals. Substantial increases in lending activities such as loan refinancing, purchase loans, construction loans etc., enabled federals to obtain more gross operating revenue than state mutuals. However, lack of any statistical significant differences in their profit performance for other years does not support the claim of overall superiority for federals.

**Federals versus stocks**

A distinct and significant difference in return on net worth between federals and stock firms occurred in each of the four years, with stock associations showing superior profit performance over federal firms. The stock companies were clearly larger in size and efficient enough to retain a higher portion of savings deposited with them in every year. In addition, an average stock firm had obtained a rate of interest higher than federals on its mortgages which, when combined with larger dollar volume of mortgages, boosted its per dollar investment income. As a per cent of gross operating income, stock associations paid fewer dollars in advertising, although the stock companies increased advertising costs more than the federal associations.
State mutuals versus state stock firms

The comparison between state mutuals and state stock firms showed that stock companies were distinctive winners in profit performance in all years except in 1967, when results were statistically insignificant. The factors that were favorable to stock associations are stated above.

COMPARISON OF FINDINGS WITH OTHER STUDIES

In view of their importance in mortgage credit markets the savings and loan associations' operating efficiency and profit performance have been subjects of critical research in the past. The studies of Brigham and Pettit, Benston, and Nicols were the most significant in this area and produced interesting results. This section compares the important aspects of the Ohio study with those of the studies mentioned above.
### COMPARISON OF STUDIES

<table>
<thead>
<tr>
<th>Ohio study</th>
<th>Brigham and Pettit study</th>
<th>Benston study</th>
<th>Nicols study</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Methodology and data</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>b. Types of interaction</td>
<td>b. No interaction</td>
<td>b. No interaction</td>
<td>b. Types interaction with new loans variable (new loans found to be important)</td>
</tr>
<tr>
<td>c. Branch and types as dummy variables (three type dummies: federal, state mutual and state stock)</td>
<td>c. Branches and types as dummy variables (two type dummies: federal and state stock)</td>
<td>c. Branches and types as dummy variables (mostly three type dummies: federal, state mutual and state stock)</td>
<td>c. No branch variable separately; only two type dummies: federal and state stock</td>
</tr>
<tr>
<td>d. Dependent variables:</td>
<td>d. Dependent variables:</td>
<td>d. Dependent variables:</td>
<td>d. Dependent variables:</td>
</tr>
<tr>
<td>i. Operating expenses (dollars)</td>
<td>i. Operating costs to assets (ratio)</td>
<td>i. Separate itemized expenses less advertising costs (dollars)</td>
<td>i. Operating expenses (dollars)</td>
</tr>
<tr>
<td>ii. Return on equity (ratio)</td>
<td>ii. Before tax return on deposits and equity (ratio)</td>
<td>ii. No profit regression</td>
<td>ii. Operating profits (dollars)</td>
</tr>
<tr>
<td>Ohio study</td>
<td>Brigham and Pettit study</td>
<td>Benston study</td>
<td>Nicols study</td>
</tr>
<tr>
<td>------------</td>
<td>--------------------------</td>
<td>--------------</td>
<td>--------------</td>
</tr>
<tr>
<td><strong>B. Results</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>a. Between federal and state mutual, marginal costs of federal were lower; between federals and stocks, stocks' marginal costs were lower and between state mutuals and stocks, the latter incurred lower marginal costs</td>
<td>a. Results of two types only: a. Stocks in California incurred lower costs; but elsewhere higher costs. Between federals and state mutuals, federals had higher costs. No significant cost differences between types were noticed</td>
<td>a. Stocks incurred lower costs in Los Angeles. No breakdown between state mutuals and federal firms</td>
<td></td>
</tr>
<tr>
<td>b. Growth: an important cost affecting variable with negative coefficients</td>
<td>b. Significant and positive for L.A. S.&amp; L.'s but negative and insignificant for other S.&amp; L.'s</td>
<td>b. Coefficients were generally significant and negative</td>
<td>b. No separate growth variable was included</td>
</tr>
<tr>
<td>c. Branch dummy: positive and significant-branches are expensive</td>
<td>c. Same results-positive and significant</td>
<td>c. Same results-branches are expensive</td>
<td>c. No separate branch variable</td>
</tr>
<tr>
<td>d. Profit performance: Between state mutuals and federals no significant differences (except for 1970); between federals and stocks, generally stock showed higher marginal profits and between stock and state mutuals, stock performed better</td>
<td>d. Generally mixed results. Stock firms and mutuals were about equally profitable but stocks may have slight edge over mutuals in certain years. No separate analysis for state mutuals and federals</td>
<td>d. No profit regression</td>
<td>d. Stocks are generally found to be more profitable. No separate analysis between state mutuals and federals</td>
</tr>
</tbody>
</table>
APPENDIX A

Details of Balance Sheet and Income Statement Data Items Obtained From FHLBB for the Years 1967 Through 1971

Description of Data

Docket Number
Type of Association
SMSA Number
County Number
Year-Month-Day Incorporated
Code (1) Merged (2) Deleted (0) Active (7) Tent. Mgr.
Year and Month of Data
Number of Branches (No Data)
Savings Capital Deposited During Year
Savings Capital Withdrawn During Year
Savings Capital Excess Regular Rate
Savings Capital Regular Rate or Below
Mortgage Loans Outstanding
Other Loans
Real Estate Owned and in Judgment
Other Real Estate Owned
Foreclosed Real Estate
Loans to Facilitate Sale of Foreclosed Real Estate
Cash on Hand and in Banks (Combined 1971-1972)
U.S. Government Obligations In This Field
Other Investment Securities
Fixed Assets (Less Depreciation Office)
Fixed Assets (Less Depreciation Furniture)
Total Fixed Assets (Net of Depreciation and Amort.)
Other Assets
Total Assets
Withdrawable Savings Accounts and Certificates
Advances From Federal Home Loan Bank
Other Borrowed Money
Loans In Process
Specific Reserves
Total Liabilities
Permanent, Reserve or Guarantee Stock
Paid-In Surplus
General Reserves
Other Reserves
Earned Surplus and Undivided Profits
Total Net Worth

109
"Gross Operating Income"
Interest - Mortgage Loans (a)
Interest - b - c - d - e (total)
Fees and Discounts
Other Charges and Fees
Gross Income From Office Building
Total Gross Operating Income
"Operating Expense"
Salaries, Wages and Fees
Number of Officers and Employees**
Expense Accounts of Officers - Directors and Empl.
Office Occupancy
Furniture Fixtures and Equipment Expense
Advertising
Other Operating Expenses
Total Operating Expense
Net Operating Income Before Charges
Interest Charges on Advances FHLB
Interest Charges on Other Borrowed Money
Net Operating Income Before Income Taxes
Net Income Before Income Taxes
Federal Income Tax
Other Income Tax
Total Income Tax
Net Income After Taxes
"Distribution of Net Income"
Transfer to General Reserves
Transfer to Other Reserves
% - Div. and Int. on Sav. Dep., Inv., Certs, ETS**
$ - Div. and Int. on Sav. Dep., Inv., Certs, ETS
% - Div. on Perm., Reserve or Guaranty Stock**
$ - Div. on Perm., Reserve or Guaranty Stock
Transfers to Undivided Profits or Earned Surplus
Provisions for Bonus Accounts**
"Profit and Loss Section"
% - Dividends on Savings*
$ - Dividends on Savings*
% - Interest on Deposits, Investment Certs.*
$ - Interest on Deposits, Investment Certs.*
% - Dividends on Perm., Reserve or Guar. Stock*
$ - Dividends on Perm., Reserve or Guar. Stock*
"Mortgage Loans"
VA - Total # Mortgage Loans**
VA - Total $ Mortgage Loans
VA - Loans # Serviced for Others**
VA - Loans $ Serviced for Others**
FHA - Total # Mortgage Loans**
FHA - Total $ Mortgage Loans
FHA - Loans # Serviced for Others**
FHA - Loans $ Serviced for Others**
Conv. - Total # Mortgage Loans**
Conv. - Total $ Mortgage Loans
Conv. - Loans # Serviced for Others**
Conv. - Loans $ Serviced for Others**
Total - # Mortgage Loans
Total - $ Mortgage Loans
Total - # Loans Serviced for Others
Total - $ Loans Serviced for Others
"Mortgage Loan Activity"
Construction - Total #
Construction - Total $
Purchase - Total #
Purchase - Total $
Refinancing - #
Refinancing - $
All Other Purposes - #
All Other Purposes - $
Total Loans Closed - #
Total Loans Closed - $
Loans Purchased From Other Lenders - #
Loans Purchased From Other Lenders - $
Participations Purchased From Other Lenders - #
Participations Purchased From Other Lenders - $
Total Loans Acquired - #
Total Loans Acquired - $
Loans Sold to Other Lenders - #
Loans Sold to Other Lenders - $
Participations Sold to Other Lenders - #
Participations Sold to Other Lenders - $
Loan Repayments
Net Change In Loan Portfolio
"Other Loans"
Conv. College or University Education
Total Conv. College or University Education
Conv. Other Loans
Total Conv. Other Loans
Total VA Other Loans
Total FHA Other Loans
Total Conv. Other Loans
Total - Total All Loans
"Scheduled Items"
Total Scheduled Items - Book Value
Total Scheduled Items - Specific Reserve
Total Scheduled Items - Net Value
"Specified Assets"
Specified Assets
"Accounts"
# $15,000 or Less
$ $15,000 or Less
# Over $15,000
$ Over $15,000
Total # Holders
Total $ Holders
State # (62 - Ohio)

* Not Available for all years
** Not Available for 1971
APPENDIX B

Test For Normality: Unit Normal Deviate Method

1. State FSLIC insured mutuals, 1970 (non-transformed, 51 observations)

The $e_i/s, i = 1, 2, \ldots, n$ are calculated for the residuals.

The $e_i$s are residuals and $s = 42.88$

Since 95 percent of an $N(0,1)$ distribution lies between the limits $(-1.96, 1.96)$, we can expect that roughly 95 percent of the $e_i$s fall between the limits $(-2, 2)$. In the above sample, only three out of 51 residuals are out of these limits. Their actual values are:

1. -3.36
2. -2.39
3. -2.74

2. Data as above: (After transformation to First Differences)

The number and values of deviates of residuals of the transformed 50 observations are as follows:

1. -2.06
2. -2.50
3. -2.41

---

### APPENDIX C

**REGRESSION RESULTS: OPERATING EXPENSES (DEPENDENT VARIABLE): FIRST DIFFERENCE TRANSFORMATION, NORMALITY TESTS**

<table>
<thead>
<tr>
<th>Explanatory Variables</th>
<th>Value of Coefficients from First Difference Transformation and Standard Deviation</th>
<th>Significance Value of Coefficients without Transformation and (Standard Deviation)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEDERAL MUTUALS, 1970.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRANDHY</td>
<td>63.129 (37.911)</td>
<td>44.189 (27.525)</td>
</tr>
<tr>
<td>NSVGSN</td>
<td>0.009 (0.002) 99%</td>
<td>0.009 (0.002) 99%</td>
</tr>
<tr>
<td>WSVGRW</td>
<td>-0.179 (0.847)</td>
<td>-0.473 (0.836)</td>
</tr>
<tr>
<td>AREF</td>
<td>0.133 (0.100)</td>
<td>0.950 (0.096)</td>
</tr>
<tr>
<td>NLONSL</td>
<td>0.021 (0.005) 99%</td>
<td>0.021 (0.005) 99%</td>
</tr>
<tr>
<td>EMPLE</td>
<td>9.321 (0.892) 99%</td>
<td>9.213 (0.873) 99%</td>
</tr>
<tr>
<td>GLONSG</td>
<td>-11.173 (3.338) 99%</td>
<td>-10.689 (3.179) 99%</td>
</tr>
<tr>
<td>Constant</td>
<td>-28.230 (22.672) 99%</td>
<td>-25.370 (76.099) 99%</td>
</tr>
<tr>
<td>R-Sq Adj.</td>
<td>95.24%</td>
<td></td>
</tr>
</tbody>
</table>
Statistical Tests: Equality of Variances In Systematic Samples
(Every Third Observation) S & L's: 1970, Operating Expenses (Dependent Variable)

Bartlett's Test

$H_0$: All sample variances are equal
$H_1$: Not all variances are equal
Significance Level: 95%, for $F(2,388) = 2.42$

The observed sample variances are $S_1^2 = 6637.84$, $S_2^2 = 5036.41$, and $S_3^2 = 6881.40$ from $n_1 = 131$, $n_2 = 130$ and $n_3 = 130$ samples, respectively, and $N = n_1 + n_2 + n_3$.

Let $S_p^2 = \frac{(131-1) \cdot 6637.84 + (130-1) \cdot 5036.41 + (130-1) \cdot 6881.4}{391-3} = 6186.38$

and $A = \frac{1}{3(3-1)} \left[ \frac{1}{130} + \frac{1}{129} + \frac{1}{129} - \frac{1}{388} \right] = 0.0034$

$A^2 = .00001156; V_1 = (3-1) = 2; V_2 = (3+1)/.00001156; b = 347199.15$ and $M = 4.40587$. We obtain that the test $F$ statistic = 2.2. Thus, the observed $F$ statistic is less than $F(2,388) = 2.42$. We accept the hypothesis that variances are equal.

---

APPENDIX E

Statistical Test: Equality of Variances - Systematic Samples
       (Every third observation) 391 S & L's, 1970,
       Operating Expenses (Dependent Variable)

Cochran's Test

H₀: All sample variances against H₁: Not all variances
    are equal.

Significance Level: 99%, Cochran's Test

Statistic Value for n = 131, and r = 3, is .436.

The observed sample variances are as given in Appendix D. The test
statistic is

\[ R_{n,r} = \frac{6881.4}{18555.65} = 0.37 \]

The Cochran's test statistic value for n = 131 and r = 3, is 0.436.
Therefore, we accept the hypothesis that variances are equal.

---

1Dixon, W. J. and F. J. Massey, Jr., loc. cit., pp. 180-181 and
APPENDIX F


Explanation:

If observations are chosen such that $e_1, e_2, \ldots, e_N$'s mean square successive difference

$$n = \frac{\sum (e_{i+1} - e_i)^2}{\sum (e_i - \bar{e})^2}$$

can be used to test for randomness. If $N$ is large and the population is normal, then

$$z = \frac{(1 - \frac{n}{2})}{\sqrt{\frac{N-2}{(N-1)(N+1)}}}$$

is approximately normally distributed with zero mean and unit standard deviation. Long trends are associated with high positive values of $z$ and short oscillations with high negative values.\(^1\) The test results for all the years data and for a small sample size are given below:

(i) S & L's Ordered by Years:

<table>
<thead>
<tr>
<th>Year</th>
<th>$n$</th>
<th>$N$</th>
<th>$z$</th>
</tr>
</thead>
<tbody>
<tr>
<td>1967</td>
<td>1.9012</td>
<td>324</td>
<td>1.00</td>
</tr>
<tr>
<td>1968</td>
<td>2.1738</td>
<td>322</td>
<td>-1.738</td>
</tr>
<tr>
<td>1969</td>
<td>2.1245</td>
<td>321</td>
<td>-1.24</td>
</tr>
<tr>
<td>1970</td>
<td>1.9307</td>
<td>323</td>
<td>0.69</td>
</tr>
</tbody>
</table>

\(^1\) Dixon, W. J. and F. J. Massey, Jr., loc. cit., pp. 298-299.
(ii) S & L's By Size Category, 1968

\[ n = 2.4226 \quad N = 26 \quad z = -1.11 \]

This above sample residuals were also used to test for Durbin-Watson test statistic at 5% level of significance.²

(a) \[ H_0: P = 0, \quad H_1: P > 0 \]

level of significance: 5\%, \( K = 10, N = 26 \).

\[ d_L = 0.42 \quad d_u = 3.00 \]

The obtained 'd' statistic = 2.42, therefore accept \( H_0 \).

(b) S & L's By Type: FSLIC Insured State Stock Associations, 1963

\[ H_0: P = 0, \quad H_1: P \neq 0 \]

level of significance: 5\%, \( K = 10, N = 73 \).

\[ d_L = 1.36, \quad d_u = 1.91 \]

The obtained 'd' statistic = 2.10

Since 1.91 is less than 2.10 which is almost equal to 4-1.91, \( H_0 \) is not rejected.

(c) S & L's By Type: Non-FSLIC Insured State Mutuals, 1969

\[ H_0: P = 0, \quad H_1: P \neq 0 \]

level of significance: 5\%, \( K = 8, N = 66 \)

\[ d_L = 1.34 \quad d_u = 1.87 \]

The obtained 'd' statistic = 1.882

Since 1.87 is less than 1.882 which is less than 4-1.87, \( H_0 \) is accepted.

## APPENDIX G

### MULTICOLLINEARITY TESTS

#### RESULTS OF REGRESSION ON REGRESSORS

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>R-sq.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>(i) 323 FSLIC insured S.&amp; L.'s: Cost Model, 1970</strong></td>
<td></td>
</tr>
<tr>
<td>OPEXP</td>
<td>96.29%</td>
</tr>
<tr>
<td>NSVGSN</td>
<td>91.59</td>
</tr>
<tr>
<td>WSVGRW</td>
<td>24.84</td>
</tr>
<tr>
<td>AREF</td>
<td>36.23</td>
</tr>
<tr>
<td>EMPLE</td>
<td>82.18</td>
</tr>
<tr>
<td>GLONSG</td>
<td>29.58</td>
</tr>
<tr>
<td>NLONSL</td>
<td>90.29</td>
</tr>
<tr>
<td>NSVINFED</td>
<td>68.72</td>
</tr>
<tr>
<td>NSVINSMU</td>
<td>45.12</td>
</tr>
</tbody>
</table>

| OPEXP               | 97.40% |
| NSVGSN              | 96.35  |
| EMPLE               | 89.24  |
| NLONSL              | 94.86  |
| NSVINFED            | 51.75  |
| NSVINSMU            | 50.10  |
### APPENDIX H

MULTICOLLINEARITY TESTS (CONTINUED)

(i) Results of 'R-sq' deletes for regression of 323 FSLIC insured S.& L.'s: Profit Model, 1970

<table>
<thead>
<tr>
<th>R-sq. Values</th>
<th>Independent Variables in the Regression</th>
<th>Variable not in the Regression</th>
</tr>
</thead>
<tbody>
<tr>
<td>87.31%</td>
<td>AU, BRNDHY, EM, NPM, FEDDY,</td>
<td>AU</td>
</tr>
<tr>
<td>84.97</td>
<td>STMUTDY, NPMINFED, NPMINSMU</td>
<td>EM</td>
</tr>
<tr>
<td>71.48</td>
<td></td>
<td>NPM.</td>
</tr>
<tr>
<td>44.84</td>
<td></td>
<td>NPMINFED</td>
</tr>
<tr>
<td>86.88</td>
<td></td>
<td>NPMINSMU</td>
</tr>
<tr>
<td>85.78</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*All the variables are in the regression runs except the eliminated variable.*

(ii) Results of Regression on Regressors for Regression on 323 FSLIC Insured S.& L.'s: Profit Model, 1970

<table>
<thead>
<tr>
<th>Dependent variable</th>
<th>R-sq.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ROE</td>
<td>87.31%</td>
</tr>
<tr>
<td>AU</td>
<td>88.73</td>
</tr>
<tr>
<td>EM</td>
<td>8.13</td>
</tr>
<tr>
<td>NPM</td>
<td>53.26</td>
</tr>
<tr>
<td>NPMINFED</td>
<td>82.69</td>
</tr>
<tr>
<td>NPMINSMU</td>
<td>83.23</td>
</tr>
</tbody>
</table>
BIBLIOGRAPHY

Books


Articles and Periodicals


_________. "Savings Banking and the Public Interest." *Journal of Money, Credit and Banking* (Feb., 1972), Part II.


Reports


Unpublished Materials


