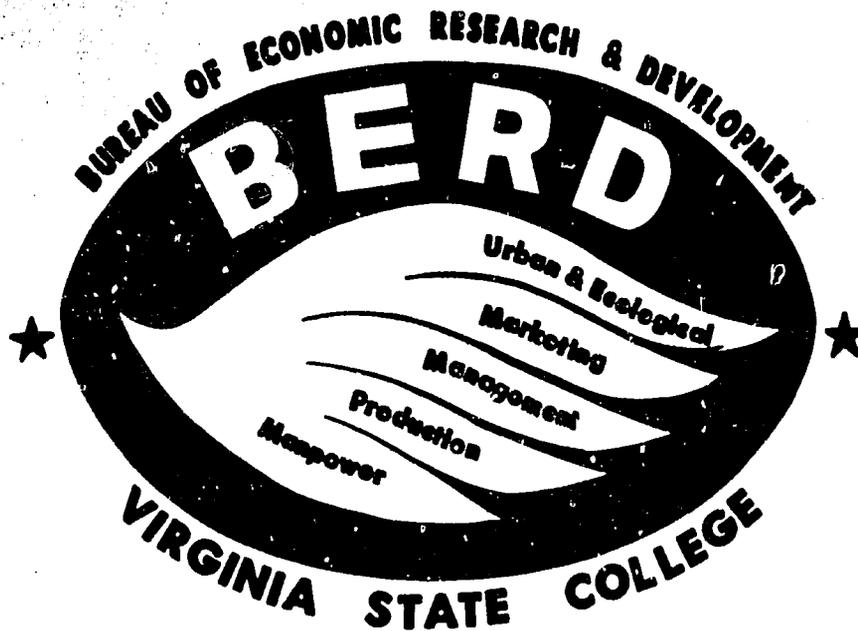


AGENCY FOR INTERNATIONAL DEVELOPMENT WASHINGTON, D. C. 20523 <b>BIBLIOGRAPHIC INPUT SHEET</b>		<b>FOR AID USE ONLY</b> BATCH 42	
1. SUBJECT CLASSIFICATION	A. PRIMARY Food production and nutrition		AE10-0000-G430
	B. SECONDARY Agricultural economics--USA		
2. TITLE AND SUBTITLE An analysis of commercial bank credit to farmers in Pittsylvania County, Virginia			
3. AUTHOR(S) Motley, W.H.; Joshua, M.S.; Whyte, C.D.			
4. DOCUMENT DATE 1976	5. NUMBER OF PAGES 42p.	6. ARC NUMBER ARC	
7. REFERENCE ORGANIZATION NAME AND ADDRESS Va. State			
8. SUPPLEMENTARY NOTES (Sponsoring Organization, Publishers, Availability) (In BERD pub., v.4, no.4)			
9. ABSTRACT			
10. CONTROL NUMBER PN-AAC-824		11. PRICE OF DOCUMENT	
12. DESCRIPTORS Banks Credit Economic analysis Models Virginia, USA? USA		13. PROJECT NUMBER	
		14. CONTRACT NUMBER CSD-3415 211(d)	
		15. TYPE OF DOCUMENT	

CSD-3415 211(d)  
DN-AAC-824

VOLUME IV

NUMBER 4



**AN ANALYSIS OF  
COMMERCIAL BANK CREDIT TO FARMERS  
IN PITTSYLVANIA COUNTY, VIRGINIA**

BY

**WESLEY H. MOTLEY**

Research Assistant

**MICHAEL S. JOSHUA**

Research Associate

AND

**CHARLES D. WHYTE**

Professor, Economics and Assistant Director

**BUREAU OF ECONOMIC RESEARCH AND DEVELOPMENT  
VIRGINIA STATE COLLEGE**

**PETERSBURG, VIRGINIA**



**AN ANALYSIS OF COMMERCIAL BANK CREDIT  
TO FARMERS IN PITTSYLVANIA COUNTY, VIRGINIA**

**AGENCY FOR INTERNATIONAL DEVELOPMENT  
BUREAU OF ECONOMIC RESEARCH AND DEVELOPMENT**

**PRINCIPAL INVESTIGATORS**

**Wesley H. Motley**

**Michael S. Joshua**

**and**

**Charles D. Whyte**

**VIRGINIA STATE COLLEGE**

**PETERSBURG, VIRGINIA**

The material in this report was prepared under U. S. Agency for International Development Contract No. AID/csd 3415, authorized under Section 211 (d), Title II of the Foreign Assistance Act of 1966. Researchers undertaking such projects under government sponsorship are encouraged to express freely their professional judgement. Therefore, points of view or opinions stated in this document do not necessarily represent the official position or policy of the U. S. Agency for International Development. The researchers are solely responsible for the factual accuracy of all material developed in the report.

## **FOREWORD**

One of the primary functions of the Bureau of Economic Research and Development is to focus on problems that tend to impede growth and development in the rural sector of South Central Virginia. Credit availability to farmers as provided by commercial banks is viewed as an important factor affecting managerial and production operations of farmers.

This monograph is designed to investigate the credit and lending practices of commercial banks in Pittsylvania County, one of the counties in the Laboratory of the Bureau of Economic Research and Development. The monograph also attempts to identify relationships between bank structures and credit availability to farmers in the county. Realizing the limited scope of this study, recommendations as to alternative courses of action were not intended to emerge from it. The study is expected to provide a frame of reference for a

more comprehensive study to be made including all seventeen counties and the five independent cities in South Central Virginia.

The authors are commended for the procedure used in gathering the empirical data and their treatment of that data. It certainly adds to the understanding of the role of commercial banks in providing credit to farmers in the area studied. It provides a format for the comprehensive study to follow.

Huey J. Battle, Director

Bureau of Economic Research  
and Development—Professor  
of Economics.

Virginia State College

Petersburg, Virginia 23803

March, 1976

## ACKNOWLEDGMENT

Research support is gratefully acknowledged from the United States Agency for International Development 211(d) Institutional Grant to the Bureau of Economic Research and Development.

The authors wish to express thanks to their colleagues at the Bureau of Economic Research and Development for their helpful suggestions and comments on the early drafts of the manuscript; and to Dr. Huey J. Battle of BERD and Dr. Irene Moszer of the Department of Economics at Virginia State College for their helpful comments on the thesis from which this monograph was devel-

oped. Special thanks are also extended to Ms. Betty M. Glass for typing the manuscript.

Errors of fact and opinion that may exist in this manuscript are, of course, the sole responsibility of the authors; and should not be attributed to the individuals or institutions mentioned above.

W. H. Motley,  
M. S. Joshua and  
C. D. Whyte

March 1976

**AN ANALYSIS OF COMMERCIAL BANK CREDIT  
TO FARMERS IN PITTSYLVANIA COUNTY, VIRGINIA**

**TABLE OF CONTENTS**

Section	Page No.
List of Tables .....	V
List of Appendices .....	VI
Introduction .....	1
<b>Review of Farm Finance and Sources of Farm Credit</b>	
Trends in Farm Finance .....	4
Sources of Farm Credit .....	6
Structure of Farm Credit Extension by Commercial Bank .....	8
Proposed Changes in Farm Credit Flows Through Banks .....	9
<b>Theoretical Framework</b>	
Theory of Market Structure and Performance .....	10
Bank Size, Economies of Scale and Performance .....	11
Bank Ownership and Performance in Virginia .....	13
Bank Markets and Performance .....	14
Expected Influence of Structure on Agricultural Lending Performance .....	18
<b>Framework For the Analysis of Data</b> .....	19
Data .....	22
Methodology .....	22
<b>An Analysis of The Survey Data</b>	
Model I .....	22
Model II .....	23
Model III.....	26
<b>Summary Conclusion and Implications</b> .....	27
<b>Bibliography</b> .....	33

## **LIST OF TABLES**

	<b>Page. No.</b>
<b>Table 1: Size of Banks as Measured by Deposits in the City of Danville and Pittsylvania County Virginia, December 1974 .....</b>	<b>3</b>
<b>Table 2: Farm Debt Outstanding and Percentage by Principal Source of Credit, United States Select Years 1960 and 1974 .....</b>	<b>7</b>
<b>Table 3: Definition of Economic Variables Relevant to the General Hypothesis .....</b>	<b>20</b>
<b>Table 4: Average Interest Rate, Loan Size and Maturity by Loan Purpose and Deposit Size of Bank. Selected Banks in the City of Danville and Pittsylvania County Virginia, December 1974 .....</b>	<b>21</b>

## LIST OF APPENDICES

	Page No.
Appendix A: Coefficients of Bank Structural Variables ..... (Operating Capital)	29
Appendix B: Coefficients of Bank Structural Variables ..... (Machinery and Equipment)	30
Appendix C: Coefficients of Bank Structure Variables ..... (Real Estate)	31
Appendix D: Coefficients of Bank Structure Variables ..... (Consumer Goods)	32

# **AN ANALYSIS OF COMMERCIAL BANK CREDIT TO FARMERS IN PITTSYLVANIA COUNTY, VIRGINIA**

**BY**

**Wesley Motley, Michael Joshua and Charles Whyte\***

## **INTRODUCTION**

One of the issues involved in the current reappraisal of the commercial banking system is its role as a source of farm credit. Historically, commercial banks have been a primary source of such credit with a large proportion of the credit channeled through the small independent rural banks. For a variety of reasons, the economic function of these smaller banks is being critically examined and the survival in a rapidly changing economy is being questioned.

While the future of the small rural bank is uncertain, there is little question that a shifting of resources in the commercial banking system will have an impact on the farm credit flows. However, because agricultural lending is only one of the functions of a bank, and a relatively minor one when considering all commercial bank activities, the nature of the relationship between the economic structure of the commercial banking system and the extension of farm credit has been given little analytical attention in the past. Thus, judgments concerning the effect of changes in institutional banking on the flows of farm credit tend to be confused and ambiguous.

A primary motivation for this study comes from recent attempts to extend branch banking systems into rural areas

through changes in the State of Virginia's banking legislation. In general, proponents of these changes argue that the dominance of the small unit bank and the restricted resources available to these banks have hampered rural economic development and impeded the flow of credit to farmers. Support for this position is found in recent studies of banking operations, by Benston, Bell, Alhadeff and others (discussed in Section II). These studies provide fairly clear evidence that economies of scale exist within the industry and the economic performance is affected by bank size and control. To conclude from these studies that a structural change will have a beneficial effect on farm credit, however, requires an assumption that the advantages of scale and banking organization extend to all banking operations, or, more to the point of this study, to the farm lending activities of the bank. So far, there is little empirical evidence to support this assumption.

The notion that advantages of scale might have little positive influence on farm credit extension is expressed to some extent in a series of proposals (discussed in Section II), designed to improve the flow of credit into agriculture through the commercial banking system without necessitating a change in structure. The rationale behind these

---

\*The authors are Research Assistant, Research Associate and Assistant Director of The Bureau of Economic Research and Development at Virginia State College, Petersburg, Virginia.

proposals is that restrictions on farm credit flows are due more to external forces and money market imperfections than to problems associated with banking structure. These forces would include legal limitations on bank lending activities, the types of lending arrangements that are associated with agricultural credit, and a separation of the farm sector from the major money markets.

While this view generally recognizes the structural problems involved where small unit banks are the dominant supplier of agricultural credit, they tend to place much more emphasis on the external limitations on the flow of credit into agriculture. Arguments supporting this view are weakened, however, to the extent that these external limitations have not been overcome through some institutional arrangement in the past, and to the extent that no evaluation has been made in the possibility that small banks may be inefficient in the use of additional resources or would continue to be economically inferior as a source of credit to the individual borrower. This problem is of considerable importance in rural areas where small unit banks dominate the banking structure and agriculture is a primary source of economic activity.

While the debate over branch banking involves several major issues of which the flow of farm credit is only one, and while decisions to change banking structure might be made regardless of any impact on farm credit, it is important that this vital link in the farm production process be considered. It is obviously the hope of the branch proponents that gains in overall banking efficiency will produce beneficial results for agriculture. This may be the case, but there is little solid empirical evidence to demonstrate its actuality. At the same time, attempts at improving financial flows through the banking

system might be a wasted effort if the small unit banks are unable to use it effectively. The possibility also exists that the banking system itself is an adequate institutional arrangement to handle farm credit flows and that a different institutional "setup" will have to be implemented to supplant banks. These are just a few of the ramifications that the policy maker will need to consider in determining the structure of banking.

The problem in this study is to determine the performance of selected banks in the city of Danville and Pittsylvania County, Virginia, with respect to the specific bank function of extending credit to farm borrowers in selected credit areas.

The objective of this study is to analyze the relationship between the structural economic characteristics and the performance variables of the commercial banking system. In particular, the influence of structural characteristics such as bank size, loan to deposit ratios, etc. on performance variables such as interest rates charged, amount of loan and maturity of loans are isolated and measured in order to determine the impact of banking on the farm borrower.

The primary hypothesis to be tested is that structural variables of banks are directly and significantly related to bank lending performance in an attempt to answer questions such as: do smaller banks tend to restrict loan extension to farmers and charge higher interest rates? is there a variation in maturity and other credit terms as a result of bank size and other bank characteristics?

The empirical analysis will be limited to commercial banks in the city of Danville and the county of Pittsylvania, Virginia. The analysis of this study will focus on the farm credit activities of all

but two of the eleven commercial banks located in the study area. The banking system in this area is dominated by relatively small independent unit banks although holding companies and, to a limited extent, the branch bank system accounts for a small proportion of all bank resources. (Table 1).

The city of Danville and the County of Pittsylvania, Virginia was selected for this study for three reasons. First, the County of Pittsylvania is the largest agricultural county in the state of Virginia, with a land area of 651,520 acres of which 424,345, or 65 percent were in farms in 1969. Among the other counties of Virginia, Pittsylvania ranks first in the production of tobacco and wheat. In 1969, this county was first in the value of sales from crops and third in the value of sales from all farm products.

Second, the commercial banking structure serving the City of Danville and the County of Pittsylvania is quite diverse, being characterized by three National Banks: American National Bank, an independent bank; First National Bank, a member of First and Merchants Corporation (a holding company); and Virginia National Bank, a branch office of VNB, Norfolk, Virginia. There are eight state commercial banks, four of which are located in Danville. They are: Bank of Virginia, a member of Bank of Virginia Company (a holding company); First State Bank, an independent bank; Schoolfield Bank and Trust Company, a member of First Virginia Bankshares, Inc. (a holding company); Virginia Bank and Trust (an independent bank). The others located in Pittsylvania county are: Planters Bank and Trust Company, a member of Fidelity

**TABLE 1**  
**Size of Banks as Measured By Deposits**  
**in the city of Danville and Pittsylvania County,**  
**Virginia, 1974**

Banks	December 1974 (mil. \$)	Percent of Virginia Total
<u>Virginia</u>	<u>13,089.3</u>	<u>100.0000</u>
First National Bank (HC)	71.7	.5478
First State Bank (Unit)	9.0	.0688
Virginia Bank and Trust Company (Unit)	19.0	.1452
American National Bank (Unit)	58.0	.4431
Schoolfield Bank and Trust Company (HC)	29.0	.2216
Bank of Chatham (Unit)	15.8	.1207
Bank of Virginia (HC)	43.2	.3300
Planters Bank of Gretna (HC)	14.2	.1085
Peoples Bank of Chatham (HC)	18.6	.1421
First Guaranty Bank, Hurt (HC)	1.2	.0092
Virginia National Bank (Branch)	N/A	N/A
<b>Totals</b>	<u><b>297.7</b></u>	<u><b>2.1370</b></u>

Source: 1974 Annual Report of the Bureau of Banking State Corporation Commission Commonwealth of Virginia. Economic Survey conducted by the Bureau of Economic Research and Development.

American Bankshares, Inc. (a holding company); Bank of Chatham, an independent bank, (all located in Chatham, Virginia); Peoples Bank of Gretna, a member of United Virginia Bank (a holding company) located in Gretna, Virginia; First Guaranty Bank, a member of First Virginia Bankshares, Inc., (a holding company) located in Hurt, Virginia.

Third, the Bureau of Economic Research and Development (BERD) under a 211(d) US-AID grant carries our research work in rural economic development in the city of Danville and the county of Pittsylvania, both of which are part of its laboratory area.

This monograph is presented in four sections. The first, Section I, reviews the trends in agricultural finance and the relationship of commercial banking to the extension of agricultural credit. Some of the current proposals for chang-

ing the bank structure or otherwise increase the flow of funds into agriculture are examined. Section II, presents a theoretical framework from which the analysis of the relationship between banking structure and performance is based. The purpose of this section is to determine the relevant structural variables and to analyze the economic consequences of changes in these variables. This part of the study draws heavily on the literature, particularly on the recent research investigations in bank structure and competition. The methodology for empirical testing proceeds from the theoretical framework in Section III. Quantitative analyses, employing multiple regression techniques, is used to analyze the relationship between structural characteristics and selected performance variables of bank farm lending. Finally, Section IV contains the empirical analysis of the hypothesis and conclusions and implications of the analyses.

## I. REVIEW OF FARM FINANCE AND SOURCES OF FARM CREDIT

The need for an evaluation of the commercial banking systems as a source of farm credit arises out of the increasing financial requirements of the agricultural sector. Since World War II the agricultural sector has experienced a rapid transformation in terms of size of farm, applied technology and increased productivity<sup>1</sup>. These transformations have led to significant shifts in the financial structure of banking institutions serving agriculture and toward an increasing use of funds supplied by institutions not previously serving agriculture<sup>2</sup>.

### Trends in Farm Finance

The increase in the financial flows to agriculture is the result of various forces. Perhaps the most visible and undoubtedly the most important is the extent to which the agricultural transformation has involved the substitution of capital for labor. The impact of the substitution process is reflected in the more than 100 percent increase in the value of production assets employed in agriculture between 1960-1974<sup>3</sup>.

A relating cause for greater financial improvement is the trend toward spe-

<sup>1</sup>Financing Virginia's Agriculture, Virginia Industry of Agriculture Credit Committee, Richmond, Virginia, February 1975.

<sup>2</sup>Ibid.

<sup>3</sup>The Balance Sheet of the Farming Sector, 1975, Agriculture Information Bulletin No. 389, Economic Research Service, U. S. Department of Agriculture, (September 1975) p. 33.

cialization in farm production with the attendant reliance on purchased non-farm inputs. In all, farm operating expenses have risen from \$204 billion in 1960 to \$475 billion in 1974, a gain of almost 133 percent<sup>4</sup>.

The decline in farm numbers and increasing size of farm associated with the adjustment process adds a further dimension to the financial picture. On the average, production assets employed per farm increased four fold between 1960 and 1974, while production expenses per farm have roughly doubled during that same period.<sup>5</sup> Not only have the industry demands for capital and credit increased to a considerable extent but there has been a concentration of these funds into fewer hands and a significant change in the financial requirements of individual farm operators.<sup>6</sup>

The future promises to exhibit a continuation if not acceleration of these trends. The growth in farm capital has been analyzed and projected to the year 1980 in several recent studies.<sup>7</sup> While the projections varied to a considerable extent depending on basic assumptions, a general conclusion is that capital accumulation will continue at a fairly rapid pace. The projections indicate annual average growth rates during the 1970's that range from 2 to about 5 percent. This would lead to capital assets of values measured in current dollars of

from \$359 billion to \$490 billion by 1980 as compared to \$281 billion in 1969.

The trend in farm incomes has been much weaker than that of assets. Aggregate gross farm income has advanced by only 38 percent between 1960 and 1974, while aggregate net incomes have advanced by 36 percent.<sup>8</sup> Future gains in farm incomes will likely be at or near the current rates which means that the capital accumulation process will out-run increases in income and, when the rising production expense figures are added, the total financial flows into agriculture from nonagricultural sources will be significantly larger than they are now.

The rise in financial flows was estimated in a recent study by Emanuel Melichar<sup>9</sup> in which he translated capital stock projections into capital flows that will be required for capital expenditures on an annual average to the end of the 1970's. Melichar's method accounts for the financial requirements for: capital accumulation, capital replacement, inventory changes, working capital and the transfer of land assets through sales. This results in an estimate of capital flows rather than stocks and provides a representation of the total capital requirements of agriculture. The results found in the Melichar study are quite impressive. Annual capital flows increased from an average of \$7.5

---

<sup>4</sup>Ibid.

<sup>5</sup>Ibid.

<sup>6</sup>John R. Brake, "Impact of Structural Changes on Capital and Credit Needs," *Journal of Farm Economics*, Vol. 48, No. 5, (December 1966), p. 1536.

<sup>7</sup>John R. Brake, op. cit.; Earl O. Heady and Luther G. Tweeten, *Resources Demand and Structure of the Agricultural Industry*, Iowa State University Press, Ames, Iowa, 1963; Earl O. Heady and Leo V. Myer, "Food Needs and U. S. Agriculture in 1980," Technical papers-Vol. I, National Advisory Commission on Food and Fiber, August 1967; Emanuel Melichar and Raymond Doll, "Capital and Credit Requirements of Agriculture and Proposals to Increase the Availability of Bank Credit," Project #24, Board of Governors of the Federal Reserve System, Washington, D. C., November 1969; "Fundamental Reappraisal of the Discount Mechanism," Report of a System Committee, Board of Governors of the Federal Reserve System, Washington, D. C., July 1968.

<sup>8</sup>Ibid.

<sup>9</sup>Emanuel Melichar and Raymond Doll, "Farm Capital and Credit Projections to 1980," *American Journal of Agricultural Economics*, Vol. 51, No. 5, December 1969, p. 11-72.

billion in the 1950-54 period to \$10.8 billion in the latter half of the 1960's. Estimates of capital flows for the 1970's vary depending on capital stock projections. The Melichar estimates indicate that farm capital flows could range from a low of about \$13 billion to almost \$19 billion per year during the 1975 to 1979 period.

One of the critical questions facing agriculture involves the sources of funds for these capital flows. In the past, capital flows were primarily financed through farm generated cash flows, that is, net income, depreciation allowances and, to a limited extent, nonfarm earnings of the farm operators. Borrowing has been of lesser importance although there has been a pronounced trend toward the use of debt as a means of financing capital flow as is evidenced in a fourfold increase in total farmer liabilities between 1960 and 1974.<sup>10</sup> The shift toward debt financing reflects both the rapid increase use of capital assets and the liability to increase farm generated cash flows because of slowly rising farm incomes.

In the Melichar study the contribution of farm generated cash flows to total capital flows increased from \$6.5 billion to \$6.9 billion in the 1964-1969 period, while the increasing debt rose from \$0.9 billion to \$4.0 billion.<sup>11</sup> Projecting these figures through the 1970's Melichar estimates that the annual average increase in debt would range from \$3.4 billion to \$8.9 billion, depending upon the basic capital stock projection. In terms of outstanding debt, an increase from \$56 billion in 1969 to over \$100 billion by 1980 is expected. These figures are, of course, based on a variety of assumptions and should not be taken too literally. Moreover, the distribution of capital flows between debt and farm generated cash

flows is based on past patterns which will not necessarily hold in the future. To the extent other sources of equity funds can be developed, the burden of debt would be reduced. Nevertheless, the basic assumptions underlying the projections appear reasonable and these figures can be taken as an indication of the increased agricultural burden that will be on the current sources of funds.

#### Sources of Farm Credit

The foregoing trends in farm finance requirements have a direct impact on the commercial banking system. Over the years, banks have been a major and leading institutional source of farm credit. Commercial banks in recent years supplied about 20 percent of the total amount of farm debts outstanding and 42 percent of that supplied through institutional lenders. (Table 2). The amount of farm debt held by banks has grown more than fourfold since 1960, a rate just slightly under the growth rate of total farm debt. For the most part, bank lending to farmers has been concentrated in the short term and in the non real estate category. Much of the long term lending by banks represents a shifting of short term borrowing to long term loans secured for home real estate rather than for the purchase of land. The main lending function of banks, then, is the extension of short term operating and intermediate term production loans.

While banks hold a dominant position as a source of institutional funds for agriculture there has been some weakening in their relative position over time. The cooperative credit system, including the production Credit Associations and the Federal Land Bank Association, has shown marked increases in

<sup>10</sup>Balance Sheet of Agricultural, 1975, op. cit., p. 4.

<sup>11</sup>Emanuel Melichar and Raymond Doll, op. cit., p. 11-72.

funds for agricultural credit. Growth in funds for agricultural credit for these institutions has been in excess of that of the banks. (Table 2).

There has also been some shifting in loans made among other farm lenders in terms of their relative share of outstanding farm loans. The estimated credit extended by Commodity Credit Corporation lenders has dropped from about 20 percent of the total in 1960 to just under 8 percent in 1974.<sup>12</sup> Insurance companies, a major source of farm real estate loans, have shown a decrease in relative share, having about 8 per-

cent of total outstanding farm real estate loans in 1974 as compared to 12 percent in 1960. The share held by banks during this period gained from about 6.4 percent to 7.3 percent. The Farmers Home Administration, never a major source of credit, accounted for only 3.9 percent of outstanding farm real estate loans in 1974 compared to 2.9 percent in 1960. (Table 2). All of these declines in shares were picked up by the Production Credit Associations and Federal Land Bank Associations. The Production Credit Association's share has increased from 6 percent to 12 percent of the total outstanding farm real estate

TABLE 2  
**FARM DEBT OUTSTANDING AND PERCENTAGES  
 BY PRINCIPAL SOURCE OF CREDIT  
 UNITED STATES SELECT YEARS 1960 AND 1974**

(mil)

	1960		1974	
	\$	%	\$	%
<b>Non Real Estate Debt</b>				
All Commercial Banks	4,819	20.3	18,238	22.4
Production Credit Assoc.	1,451	6.1	9,893	12.1
Farmers Home Adm.	398	1.7	1,044	1.3
Merchants, Dealers, others	4,860	20.5	6,050	7.4
<b>Total Non Real Estate Debt</b>	<b>11,528</b>	<b>48.6</b>	<b>35,225</b>	<b>43.2</b>
<b>Farm Mortgage Debt</b>				
All Commercial Banks	1,523	6.4	5,996	7.3
Federal Land Banks	2,335	9.8	13,402	16.4
Life Ins. Companies	2,820	11.9	6,317	7.8
Farmers Home Adm.	676	2.9	3,121	3.9
Individuals and others	4,828	20.4	17,408	21.3
<b>Total Mortgage Debt</b>	<b>12,182</b>	<b>51.4</b>	<b>46,305</b>	<b>56.8</b>
<b>Total Farm Debt Outstanding</b>	<b>23,710</b>	<b>100.0</b>	<b>81,530</b>	<b>100.0</b>

Source: Balance Sheet of the Farming Sector, 1975, Agricultural Information Bulletin No. 389, Economic Research Service, U. S. Department of Agriculture, Washington, D. C. 1975.

<sup>12</sup>Balance Sheet of Agricultural, 1975, op. cit.; p. 15.

loans while the Federal Land Banks share has increased from 9.8 percent to 16.4 percent. (Table 2).

The changes in the relative position of banks as a source of farm credit along with the slower growth rate provide some of the basis for the concern over future bank participation in the agricultural credit market. To a large extent, the reasons for the decline can be found in the economic structure of the banking sector.

#### **Structure of Farm Credit Extension by Commercial Banks**

In terms of total lending, farm loans typically account for about 5 percent.<sup>13</sup> Farm lending activity by banks, however, is concentrated in a large number of relatively small banks located in rural areas and it is not unusual to find banks in such areas with farm loans representing one half or more of their total loan portfolios. Thus, while farm loans are a small part of all bank loans, a large number of banks are engaged in the extension of farm credit to a significant degree.

The small county bank, which is the dominant source of farm credit is most directly affected by the changes in the structure of agriculture. This means that the potentially large expansion of credit requirements in agriculture will primarily involve that part of the commercial banking system representing the fewest resources.

The basic trends in farm finance that were reviewed suggest that these small banks will have a less than favorable position for future participation in the

farm credit market.<sup>14</sup> The primary source of loanable funds for these banks has been deposits. However, the amount of deposit growth is closely related to the growth in aggregate income in their market area and for many rural banks this means aggregate farm income. But, farm income has been increasing at a fairly slow rate, certainly much slower than the demand for credit. Loanable funds available to these banks then are coming under increasing pressure as loan demand grows. In recent years this gap was filled by the sales of government securities and other bank investments, a process that has obvious limitations. It appears from this that those banks which are the major farm lenders will be unable to meet the increases in farm loan demands through deposit inflows. Deposit inflows, of course, are only one among several primary sources of loanable funds available to a bank, and if many of these banks are to actively compete for farm loans they will be unable to operate on the basis of deposit growth.

Another general problem faced by the small county bank is the rapid rising credit requirements of the individual farm unit. As noted earlier, the average farm debt has risen rapidly in recent years, and the requirements for operating credit during a year can far exceed the year-end outstanding balances. Banks on the other hand are limited in the amount that can be extended to an individual borrower either because of legal restrictions relative to bank capital or to management decisions relative to risk or liquidity considerations. Because of these limitations the smaller banks are in an unfavorable position in competition for the accounts of the larger, more prosperous farm borrowers.

<sup>13</sup>Balance Sheet of Agricultural, 1975, op. cit.

<sup>14</sup>Andrew F. Brimmer, "Central Banking and the Availability of Agricultural Credit," *Journal of Agricultural Economics*, Vol. 50, No. 2, (May 1968), p. 357.

Together, these trends suggest that the capacity of many country banks is being outrun by the growth taking place in farm credit requirements and that these banks will not be able to effectively serve agriculture in the future. The problem, however, appears to be largely a question of bank participation in this market and, of lesser importance, to the overall flow of funds into agriculture. This observation is made on the basis of alternative sources of credit available to farmers and the largely untapped sources of equity capital that could be drawn in through changes in farm corporation and other organizational laws.

Historically there is little evidence of prolonged capital shortages in agriculture. Various credit arrangements have been developed when restrictions set in the form of new institutions, subsidized credit or through the always large merchant dealer and "other" credit category.<sup>15</sup> It is assumed here that as farmers grow in financial strength in the future, adequate credit flows will be developed. Certainly, if present farm finance trends continue, and the banking system fails to solve the dilemma facing small country banks, there will be a shifting about of farm credit sources and some frictions in credit flows will develop.<sup>16</sup> There is little logic, however, in arguing that the solving of the dilemma is essential to the flow of credit in the growth of agriculture.

#### **Proposed Changes in Farm Credit Flows Through Banks**

From the point of view of the bank-

ing system, the problems facing the rural banks are serious and several proposals have been advanced which are designed to enhance the flow of funds through the banking system into agriculture. These proposals range from schemes that would strengthen the position of the rural bank by creating greater access to non-deposit sources of funds to proposals that would cause fundamental changes in the economic organization of the banking system.<sup>17</sup> These proposals have in common the goal of maintaining or increasing the participation of banks in the farm credit market, and all would involve some degree of change in the legal and institutional arrangements now prevailing in the system. The proposals, however, approach the problem of the rural bank with significant differences in basic assumptions about the problem. These differences raise important questions due to the public policy implications of the proposals.

In general, the difference in assumption can be classified into broad groups.<sup>18</sup> One is that the flow of credit into agriculture through banks is restricted due to the inadequacy of the institutional arrangements which tie the rural bank to the money markets. It is argued that the rural bank suffers in its ability to acquire money market funds because of the size and type of transactions carried by these banks, their relatively isolated location and the size of the institution itself. Perhaps the best statement of this position is that of Raymond Doll of the Kansas City Federal Reserve Bank.<sup>19</sup> Doll proposes, among other things, the development of a sec-

---

<sup>15</sup>Willellyn Morelle, Leon Hesser and Emanuel Melichar, "Merchant and Dealer Credit in Agriculture," Board of Governors of the Federal Reserve System, Washington, D. C. 1966.

<sup>16</sup>Ibid.

<sup>17</sup>See: Raymond J. Doll, "Unified Markets for Rural Banks," *Banking*, Vol. 61, No. 7, (January 1969), p. 63.

<sup>18</sup>Ibid. p. 63.

<sup>19</sup>Ibid.

oundary market for rural bank portfolio items. Through this kind of mechanism, the rural banks would gain access to non-deposit funds and would then be in a position to extend more credit to farmers.

The second broad view of the rural bank problem is that too many of these small banks are economically inefficient in terms of costs of operation and their ability to service loan customers. The proposal to correct this is to liberalize banking legislation to allow bank users access to economically larger banks.<sup>20</sup> The current drive for branch bank legislation rests to a considerable extent upon this argument. This point of view sees the small rural bank itself as a restrictive influence on the flow of credit

into rural areas rather than finding the restrictions in money market channels.

A complete evaluation of these proposals is complex and there are many important questions brought out by the proposals that have not been satisfactorily answered. Since the focus of this study is limited to an analysis of the performance of rural banks, as measured by terms of credit extended to farm borrowers, and is influenced by bank structure, we will not pursue these proposals any further.

In the next chapter a theoretical framework is developed to serve as a basis for the analysis of the relationship between banking structure and farm lending performance of the bank.

## II. THEORETICAL FRAMEWORK

The term "rural bank," which figures prominently in the current examination of banking structure and is largely undefined, suggests a composite of structural characteristics including economic size, form of organization or ownership, and the market environment within which the bank operates. These characteristics, by implication, are thought to influence the competitive behavior and performance of the bank. Bank size and ownership are also the characteristics that are most likely to be directly affected by new legislation.

### Theory of Market Structure and Performance

The influence of market structure on market performance is well established in economic theory. Conventional price theory seeks to explain the economic be-

havior of a firm or set of firms through a series of assumptions concerning cost-production relationships, consumer behavior, producer motivation and the structure of the market in which the firm sells.<sup>21</sup> All of these elements act as controls on the firm's behavior with the latter typically accounted for in the degree of competition that exists within a market.

Market structure for practical purposes means those characteristics of the organization of a market which seem to influence strategically the nature of competition and pricing within the market.<sup>22</sup> Firms adapt to the market structure in a variety of ways. Given a market structure a firm establishes a pattern of behavior or conduct that involves pricing policies, the determination of

<sup>20</sup>William B. Camp, "Branching, Often Best Way to Meet Financial Demands of New Market," *American Banker*, (March 25, 1968).

<sup>21</sup>See: Joe S. Bain, *Industrial Organization*, John S. Wiley and Sons, Inc., 1959.

<sup>22</sup>Joe S. Bain, *Ibid.* p. 7.

output levels and varieties of output, the forms and extent of non-price competition, and the method of reaction to the policies of competitors. The end result of the market structure and the pattern of conduct is market performance.

Market performance reflects the impact of market structure on the allocation of resources, price levels, and growth of the economy. For individual firms or industries, market performance is more frequently measured in terms of price and profitability variation, productive efficiency, innovation, product characteristics such as quality and variety, and the use of non-price methods of competition.

This study is limited to specific performance measures, such as interest rates charged, amount of loan and maturity of the loan, and their relationship to the market structure of the banking system. Attempts are not made to measure directly such performance variables as profits or operational efficiency; and judgemental criteria are not based on an intra-firm (bank) comparison of selected performance variables with respect to their impact on the farm borrower.

The theory of market structure has been applied to the commercial banking system in several studies in recent years. While little of this has been directed toward the agricultural lending function of banks, the results of the research and the methods used to characterize the market structure of the banking system present influences that can be extended to the analysis that is to be undertaken in this study.

### **Bank Size, Economies of Scale and Performance**

The economic significance of bank size has been a major topic of interest given the goals of public policy. Among the most important of these are: a desire to maintain competition within the banking sector, to achieve an efficient allocation of resources, and to insure the solvency of the system. Given the possibility of economies of scale within the industry and the nature of bank markets, these goals are not necessarily compatible. Attempts to resolve this issue have led to several studies of bank costs and economies of scale.

The existence of economies of scale in banking has been a generally accepted attribute of the industry. Such acceptance is based on arguments with considerable intuitive appeal: unit costs of output ought to decline due to greater efficiencies in transactions; greater expertise and specialization in various bank functions should develop as banks expand the scope of their operations; and similar arguments tend to support this presumption. A major problem in empirically testing this hypothesis, however, is in the determination of appropriate bank output measures.

The early studies of bank costs typically used earning assets (loan plus investment) or deposits as a bank output measure. Alhadeff's bank cost study of 1954<sup>23</sup> is perhaps the classical example of this approach. In his study, he derived cost curves by relating operating expenses to total earnings assets and, in turn, to total deposits. The results of his study indicated that costs declined

---

<sup>23</sup>D. A. Alhadeff, *Monopoly and Competition in Banking*, Berkeley University of California Press, 1954. Similar results were found by: Paul M. Horvitz, *Economies of Scales in Banking, Private Financial Institutions, Commission on Money and Credit*, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1953; I. Schweiger and J. McGee, *Chicago Banking, Journal of Business*, XXXIV, July 1961; Lyle E. Gramley, "A Study of Scale Economies in Banking," Federal Reserve Bank of Kansas City, Kansas City, Missouri (1962).

sharply for bank sizes up to \$5 million deposit size, and then exhibited another decline.

Balance sheet items as measures of bank output have also been used, but this approach has several shortcomings. Stuart Greenbaum<sup>24</sup> points out that such measures, particularly earning assets, limit banking functions to lending as its primary productive activity and that all forms of bank credit are perfect substitutes to bank borrowers. He goes on to argue that the use of a single value output measure obscures the economic functioning of a bank. These and other questions about the validity of balance sheet measures led to a second approach in the analysis of economies of scale in banking.<sup>25</sup>

Using the evidence presented in these studies we can formulate criteria about the meaning of the term "small bank." In terms of economies of scale it seems reasonably clear from the literature that banks with less than \$5 million in assets are in the range of diminishing costs, perhaps sharply declining costs. Further economies are probably significant as their size increases to the \$10 million level. From that point, generalization becomes more risky. For the range of banks that are considered in this study, however, it is probably best to assume near constant returns up to the \$10 million level and economies of scales near \$15 million. From that point generalization becomes more risky.

Given these criteria and the size dis-

tribution of banks, the study area banks hold a large proportion of fairly efficient units. In 1974, the study area banks had over 90 percent of the commercial bank deposits with more than \$10 million in total deposits, 56 percent were in the \$10 to \$25 million, and only 11 percent in the \$10 million and less category.<sup>26</sup>

To some extent, the current interest in the extension of branch banking into rural areas arises because of the results of the research summarized here. Given the generalized cost curve, it is apparent that some savings in real costs and improved bank performance would be possible through the consolidation of banking facilities and the elimination of the relatively small banks. The weight of the evidence suggests that banks in the range of less than the \$10 million deposit operate at higher costs than those above, and that the bulk of savings from consolidation would occur in this range.

The question we are asking, though, is how does this cost disadvantage affect the extension of credit to farmers? Other things being equal, it would seem reasonable to expect some differences in the terms of such credit among banks due to the cost differences. In other words is it reasonable to expect the cost and terms of a specific farm loan to vary because of the size bank? Unfortunately the answers to these questions cannot be found in cost analysis alone. Potential gains in efficiency may or may not be passed on to the customer depending to

<sup>24</sup>S. I. Greenbaum, "Competition and Efficiency in the Banking System, Empirical Research and Its Policy Implications," *Journal of Political Economy*, August 1967.

<sup>25</sup>Other studies with similar results are: George Benston, "Economies of Scale and Marginal Costs in Banking Studies in Banking Competition and the Banking Structure," *Administrator of National Banks*, U. S. Treasury, Washington, D. C., 1969; Frederick W. Bell and Neil B. Murphy, "Economies of Scale in Commercial Banking," Federal Reserve Bank of Boston, 1967; Donald D. Hester, "Comment," *Journal of Political Economy*, August 1967; Donald Hester and John F. Zoellner, "The Relations Between Bank Portfolios and Earnings," *An Economic Analysis Review of Economic and Statistics*, XLVIII, November 1966.

<sup>26</sup>Bureau of Economic Research and Development, Survey of Banks in Danville - Pittsylvania County, Virginia 1975, Virginia State College, Petersburg, Va., Summer 1975.

a large extent on the competitive nature of the market.

The major weakness in the traditional cost analysis as applied to banks is that the analytical method is derived from the study of single product manufacturing firms.<sup>27</sup> Viewing banks as multi-product firms thus makes the previous procedure of comparing large and small banks in terms of deposit on any undimensional measure questionable. Some light is shed on this by the multi-product analysis of banking costs.<sup>28</sup>

As many of the smaller banks tend to have a relatively high proportion of agricultural loans to total loans, the disadvantages of small transactions and small number of such loans might well be offset through economies of scales or specialization. A more important offset to the cost disadvantage, however, lies in the extent to which small banks use the correspondent banking system discussed below.

#### **Bank Ownership and Performance in Virginia**

The "dual banking system" of the United States is unique in that both state and national government are involved with bank formation and expansion. Under the current Virginia code, the State Corporation Commission must approve for state chartered banks the initial incorporation, the opening for business, and the opening of branches, mergers, and consolidation.<sup>29</sup>

All national banks are chartered

through the Office of the Comptroller of the Currency. Expansion of all existing banks in Virginia is subject to approval of the Federal Government. All Virginia banks are insured by the Federal Deposit Insurance Corporation. Therefore, they are subject to the Bank Merger Act of 1960, as amended in 1966, which requires approval from one of three federal bank supervising agencies: Comptroller of the Currency, if it is to be a national bank; Board of Governors, if it is to be a state chartered member of the Federal Reserve System; and the Federal Deposit Insurance Corporation, if it is to be an insured, non-member state chartered bank. The Bank Merger Act provides that the responsible Federal Agency shall not approve of any proposed merger which would result in monopoly or would lessen competition unless public interest in meeting the needs and convenience of community is better served.<sup>30</sup>

Historically, small rural banks have obtained numerous banking services from their large city correspondents. The smaller banks have traditionally paid for these services by keeping demand deposit accounts at the large city banks and maintaining in correspondent banks deposit balances over and above those needed for clearing purposes.<sup>31</sup> This, however, tends to siphon off rural banking resources. Rural banks that reduce their correspondent balances, on the other hand, can free up funds which they themselves can put to work in local loans and investments.

Some rural banks have been success-

<sup>27</sup>Bernard Shull and Paul M. Horvitz, "Branch Banking and the Structure of Competition," *Studies in Banking Competition and the Banking Structure, Administrator of National Banks*, U. S. Treasury, Washington, D. C., 1966, p. 99.

<sup>28</sup>Frederick W. Bell and Neil B. Murphy, "Economies of Scale in Commercial Banking," Federal Reserve Bank of Boston, 1967.

<sup>29</sup>Harmon H. Haynes, "A Study of Banking in Virginia," Rural Affairs Study Commission, Richmond, Virginia, 1969, p. 8.

<sup>30</sup>Ibid., p. 15.

<sup>31</sup>Haynes, Ibid., p. 20.

ful in working out participation in agricultural lending with their city correspondents, but many correspondent banks reportedly have not been interested in participating in farm loans. Now, however, when a correspondent bank accepts the overline part of a big city loan originated by a rural bank, the overline portion can be written as a banker's acceptance. Since such an instrument can be sold wherever the need for funds arises, participation in rural lending could become a more attractive service for correspondents.

Originally, most banks were unit banks with no laws concerning branch banks. Gradually, as so many banks opened branches, the state legislature responded by passing laws to limit this development. The trend continued until most states prohibited branch banking entirely or strongly restricted it. Recently, the pendulum has begun to swing the other way and state banking codes have liberalized branch banking.

The trend today is toward statewide or limited branch banking for several reasons: (1) need for large banks to take care of needs of enlarged numbers of customers; (2) top management personnel is hard to find, and harder to keep a number two man of sufficient training and quality to take over when top man has to be replaced; (3) good bank cites are scarce; and (4) scarcity of capital, a sound reason in any business.

Virginia has been far more fortunate than many of the rest of the states in the nation in the availability of banking services to rural areas. The population distribution of the state has led to the development of a number of relatively large banks in urban centers, and those banks have established or acquired

branches in many smaller communities. In addition, there are many smaller unit banks throughout the state, most of which are old, well established organizations with highly competent management. No where in the United States has the banking system been adapted to changing conditions more rapidly than in Virginia.<sup>32</sup>

Several generalizations on rural banking service can be made about the effect of increased concentration in Virginia banking since 1926. First, the statewide branch banking was necessary if Virginia was to compete successfully with large banks in neighboring states. A branch can only become large if it has access to a large number of possible customers and, in the absence of any very large city, branch banking was the answer. Secondly, no large bank in Virginia has attempted to build a monopolistic empire. Instead, more recent mergers have taken place at the initiation of small banks on account of management succession problem, capital shortage problem, impending failure, etc. Finally, Virginia has a well balanced banking system with adequate and large banks scattered throughout the state and smaller banks for smaller needs of smaller customers.

#### **Bank Markets and Performance**

One of the goals of bank legislation is to promote competition within the industry. The success in achieving this is questionable, especially in the case of the small bank. A review of the literature, gives little evidence to support arguments on either side of the issue. This lack of competition reflects, to some extent, the problems of defining relevant bank output as was found in the case of the cost studies mentioned above,

---

<sup>32</sup>Harmon H. Haynes and Charles F. Phillips, Jr., "The Banking Structure of Virginia," *The Washington and Lee Review*, Vol. 25, No. 1, Spring 1968.

that is, the multi-product nature of the bank and, particularly, the influence of public policy.

Even when considering the two major categories of bank outputs, deposit services and credit services, a much different line of analysis is necessarily induced due to the different characteristics of clientele and service. Limiting the analysis to only one service as in this study, the extension of credit, there appears to be no strong consensus about the degree of competition.

Several attempts have been made to apply the traditional economic criteria to the existence of monopoly or competitiveness in banking with only limited success. There is a general tendency to find a likelihood of monopoly strongest among the smaller banks. A conclusion that the existence of a monopoly power in small banks can be drawn from the theory of market structure. The theory holds in brief that a competitive environment requires a large number of buyers and sellers, with none dominant products that are close substitutes, and relatively free entry into the industry. The absence of these characteristics leads to less than competitive markets. Certainly, the review of bank market structure shows many departure from the competitive model. However, if we are concerned with a specific bank product, such as farm credit, the market must be defined in terms of the buyers and sellers of that product and not the entire range of bank output. We shall follow this approach in determining the influence of structure on performance.

The market for many of the functions performed by banks, particularly rural

banks, is largely a function of location and convenience. Several studies<sup>33</sup> have found that customers tend to select banks on the basis of accessibility with respect to their home, place of business or place of employment. These conditions would hold especially in rural areas where distance and alternative banking facilities become more important than in urban places. In a study of selected banking services, Weintraub and Jessup<sup>34</sup> observed that "...unit bank, smaller banks and banks in rural areas and smaller cities tend to serve 'neighborhoods' and that amount of services extended increase with the size and, presumably in turn, market area of the bank. In their conclusions they also noted that the data indicate that, "... banking services generally are supplied where a demand exists." This implies that performance is, to some extent, a function of demand as is predicted by price theory.

Weintraub and Jessup<sup>35</sup> also found that a bank's commercial and industrial loan market is highly localized. Banks, regardless of size tended to make 70 percent or more of all business loans to firms located in the bank's home city although smaller banks (less than \$10 million in deposits) tended to make a relatively larger proportion of such loans to firms within a 40 mile radius of the bank. The larger banks hold a greater proportion of business loans to firms located more than 50 miles from the bank office. This pattern is not too surprising inasmuch as the larger banks have access to national markets as compared to small banks. The greater activity of the smaller banks in the 50 mile range probably reflects trade area considerations, particularly by agricul-

---

<sup>33</sup>For example, Robert Weintraub and Paul Jessup, "A Study of Selected Banking Services by Bank Size," Structure and Location, House of Representatives, 88th Congress, Second Session, November 17, 1964.

<sup>34</sup>Ibid.

<sup>35</sup>Weintraub and Jessup, Ibid.

ture sector, and the lack of banking alternatives for businessmen in some rural areas.

The localized nature of a bank's market has several implications for our analysis of bank performance as a source of farm credit. Among the more important of these is the degree of competition that exists in the market for banking services. We find in the literature an indication that the greatest overall departure from competition is among the smaller banks in more or less isolated market areas, more specifically in rural communities. It is in these cases where only one or at most a very few alternative banks are available and the number of substitute products are likely to be limited. The entry of new banking firms is also likely to be severely restricted because of the size of the market and more importantly because of the bias of the bank regulators toward limiting the number of banks in order to improve and insure the safety and viability of the existing bank.

The effect of banking concentration on bank performance is still a matter of controversy. Edwards,<sup>36</sup> in his study of bank performance in metropolitan areas, found a significant relationship between concentration and performance, with high concentration associated with high loan rates and savings deposits. Other studies tend to support this finding although much of the evidence suggests that concentration, per se, is of little influence and that other structural elements are more important to bank performance.

The potential for bank monopoly power in a rural isolated community, however, would appear to be limited. Certainly some bank functions are likely

to be more monopolistic than others. The lack of convenient alternatives for depositors' services is perhaps the most significant of these. On the bank credit side, the small business loans and, perhaps, mortgage and consumer loans are probably the most likely to have few available alternatives and are more affected by monopolistic tendencies. The potential for monopoly power with respect to farm loans would appear much more limited in view of the alternative sources of credit available to farmers especially from merchants and dealers and the cooperative credit system. Given these alternatives it is difficult to argue that even isolated banks hold monopoly positions in the farm credit market. Thus, it seems reasonable to assume that the performance of banks with respect to the cost and terms of farm loans will be highly influenced by competing institutions.

The problem associated with bank cost analysis become more complex when market considerations are introduced. Assuming deposit size and market are positively related, then we would expect the large banks to not only have greater opportunity to reduce transaction costs through larger transactions but to be able to significantly diversify their portfolios as compared to smaller banks with more restricted markets. This would tend to give the larger bank a much different product mix and obscure the basis for comparison among banks that can be drawn from the application of the cost studies. Thus, one explanation for the apparent existence of economies of scale among banks is the difference in product mix and the lower average cost would not necessarily be due to differences in efficiency, per se. This view suggests that cost among banks of different size might not show

---

<sup>36</sup>Franklin R. Edwards, "The Banking Competitions Controversy," *Studies in Banking Competition and Banking Structure*, Comptroller of the Currency, Washington, D. C., (1966).

up in individual transactions and that some differences in performance are due to market condition.

The effect of a localized market on bank performance is probably of great significance than the effect of economies of scale or bank concentration. As Carson and Cootner<sup>37</sup> point out, "there is little doubt that on *a priori* grounds alone, small banks give greater risks than large ones." Given the localization of both loans and deposits, a greater proportion of each is more likely to depend on the economic health of a single town or limited group of firms. The risk problem would appear to be accentuated for small banks in predominantly agricultural areas. A concentration of loans in a limited rural market exposes the bank to the vagaries in local weather conditions and, to the extent that farming is specialized in the market area, to the particular economic conditions facing their customers. Larger size banks could disperse this risk over a broader geographic area and, perhaps, a more diversified group of customers.

A further market area factor is the likelihood that many small banks located in communities with small populations and mainly small businesses, which exist to serve agriculture, are dependent upon the farm economy. Banks so located are not only faced with risk conditions inherent in agriculture but lack the opportunity to diversify their loan portfolios through direct loans to non-agricultural business firms and consumers. Carson and Cootner<sup>38</sup> found evidence of this risk factor in a comparison of loan losses among banks. Actual losses for the smallest banks amounted to 0.22 percent of loans while only 0.05

percent of the largest banks. While the differences between the groups is large, such losses account for only a small percentage of total loans. In their analysis, Carson and Cootner found that smaller banks charge higher rates on loans although they could not separate the premium due to risk from the premium associated with the higher cost of handling small loans. Along with the possibility of charging a risk premium, the bank may also avoid risk through customer selection, restrictions on the amount of individual and total loans, and the terms of the loan.

While a larger bank, given a larger market area, faces a smaller risk exposure, the fact that it has a larger market also has implications to total agricultural credit. If it is assumed that larger banks are located in communities with more diversified local economies, then these banks have a greater opportunity for a broad loan mix in their portfolios. This would allow a reduction in market area risk due to concentration of a specific type of loan and should, presumably, result in lower loan charges and more appropriate credit terms, other things being equal. Such banks, however, having many alternative outlets for their loans and holding the resources necessary for large transactions, may also be highly selective in accepting farm customers and, given the specialized nature of farm loans, likely to concentrate their efforts in other areas such as commercial and consumer credit. If this is the result of large size, then it is possible that total credit to agriculture is diminished as banks grow in size.

The deposit resources of a bank, which are tied to economic conditions

<sup>37</sup>Deane Carson and Paul H. Cootner. *The Structure of Competition in Commercial Banking in the United States, Research Study 2, Private Financial Institutions, Commission on Money and Credit*, Prentice-Hall, Inc., Englewood Cliffs, N. J. (1963).

<sup>38</sup>Carson and Cootner, *Ibid.*

in its market area, obviously limit the amount of credit that can be extended to an individual borrower. Loan size is restricted, in one sense, by the amount of risk a bank can afford to carry. This is recognized in the legal limitations that are imposed on banks with respect to outstandings held by the individual borrowers. Because of growth in credit demands of many farm firms, this limitation is of considerable importance to the small rural bank. In a study of bank credit to farmers Melichar<sup>39</sup> found that one bank in seven had farm loan requests that exceeded their legal limits and that over 25 percent of these banks held less than \$300,000 in capital and surplus. Furthermore, few banks of over \$500,000 in capital and surplus indicated such requests. Melichar also reported that the number of overline requests was relatively small, although the dollar amounts were more significant. This suggests that smaller banks are having difficulty servicing their customers.

Banks can avoid this limitation by sharing the loan with another bank through a participation agreement. In general, such arrangements are not common relative to the total amount of agricultural credit extended by banks.<sup>40</sup> Various reasons exist for this, such as the difficulty of exchanging the necessary loan information between banks and possible reluctance on the part of the banker or borrower in working with split credit transactions. The pressure on a bank's total resources may act to further reduce the scope of the bank's market by eliminating the larger and presumably more profitable farm firms. This would lead to an increase in the risk exposure of the bank due to a concentration of small farm loans in the portfolio and reduce the bank's ability to lower costs through larger transactions.

#### **Expected Influence of Structure on Agricultural Lending Performance**

The literature suggests that structural variables will have an effect on performance. The problems associated with the economic analysis of banking and the interrelationship that exists among the structural variables, however, result in a somewhat confused picture that cannot be easily interpreted. In general, it would appear from the evidence that some hypotheses are possible. A rural bank, operating in a limited rural market is likely to have agricultural lending performance characterized by restricted lending to individual farmers and higher interest charges. To some extent, higher costs and the problems of risk and loan limits can be offset through loan specialization and through participation in correspondent banking system. Increased bank size and form of organization, in terms of non-deposit resource availability, suggest improvements in agricultural lending performance are possible. Whether these are changes that occur, however, depends on competition and other market factors.

While there is some indication of differences in performance as related to structure, a further question involves their significance with respect to overall costs and terms extended to the farmer. Differences in performance due to the structural variables may well be insignificant when compared to differences in performance related to the demand for the bank service such as the nature of the loan and characteristics of the borrower. For example, the credit characteristics of a specific borrower, or loan may dictate cost and terms where structural characteristics would be of little consequence. This would imply that, from the view of the individual, the banking system is homo-

<sup>39</sup>Emanuel Melichar, "Bank Finance of Agriculture," *Federal Reserve Bulletin*, June 1967.

<sup>40</sup>Ibid.

geneous as a source of credit and that changes in structure would have no effect.

In the next section, the framework for

the analysis of the data is developed. The performance variables and independent or structural variables are defined; and three models for the analysis are specified.

### III. FRAMEWORK FOR THE ANALYSIS OF DATA

In the analysis, each dependent or performance variable, Interest Rates charged (Model I), Amount of the Loan (Model II), and Maturity of the Loan (Model III), is regressed on the independent or structural variables in order to explain variations in the performance variables. The general hypothesis for all three models is that the structural variables are positively related to the dependent variables.

The independent or structural variables<sup>41</sup> are those related directly to the bank and its operations. The variables are: Total Deposits ( $X_1$ ) Net Worth or Capital Accounts ( $X_2$ ); Total Farm Loans ( $X_3$ ); Percent of Farm Loans to Total Loans ( $X_4$ ); Banks Under \$25 Million ( $X_5$ ); Unit Banks ( $X_6$ ); and Loan to Deposit Ratios ( $X_7$ ). Both performance and structural variables are described in Table 3.

In Model I, the average interest rate charged to farmers ( $R_i$ )

where  $i$  represents equations 1-4 is expressed as  $R_i=f(X_i)$

where  $X_i$  represents the independent variables.

In Model II, the average amount of loan ( $L_i$ )

where  $i$  represents equations 5-8 is expressed as  $L_i=f(X_i)$

where  $X_i$  represents the independent variables.

In Model III, the average amount of maturity ( $M_i$ )

where  $i$  represents equation 9-12 is expressed as  $M_i=f(X_i)$

where  $X_i$  represents the independent variables.

Three equation forms of each of the regression models relating structural and performance variables for each of four loan purpose groups can be stated as follows:

$$\text{Equation 1: } Y = a_0 + b_1X_1 + \dots + b_3X_3 + \dots + b_7X_7$$

$$\text{Equation 2: } Y = a_0 + \dots + b_2X_2 + \dots + b_7X_7$$

$$\text{Equation 3: } Y = a_0 + b_1X_1 + \dots + b_7X_7$$

Equation 1 includes all the independent variables except  $X_2$  which was omitted to determine the effect of  $X_1$  without the influence of  $X_2$ , since both variables are suspected to be highly correlated. Equation 2 includes all the independent variables except  $X_1$  which was omitted for the same reason  $X_2$  was omitted in equation 1. Equation 3 includes all the independent variables to determine what the joint effect of  $X_1$  and  $X_2$  would be on the dependent variables ( $Y_i$ ).

<sup>41</sup>Both quantitative and dummy (zero-one) variables are employed as independent variables. The use of dummy variables permits the quantification of information and sub-classification of variables such as: unit banks and types of bank size.

---

TABLE 3

**Definition of Economic Variables  
Relevant to the General Hypothesis**

Identification of Variables	Description of Variables*
R <sub>1</sub>	Average interest on loans for operating capital. (.000)
R <sub>2</sub>	Average interest on loans for machinery & equipment. (.000)
R <sub>3</sub>	Average interest on loans for consumer goods. (.000)
R <sub>4</sub>	Average interest on loans for real estate. (.000)
L <sub>1</sub>	Average amount of loan for real estate. (\$thousands)
L <sub>2</sub>	Average amount of loan for operating capital. (\$thousands)
L <sub>3</sub>	Average amount of loan for machinery & equipment. (\$thousands)
L <sub>4</sub>	Average amount of loan for consumer goods. (\$thousands)
M <sub>1</sub>	Average maturity of loans for operating capital. (days)
M <sub>2</sub>	Average maturity of loans for machinery & equipment. (days)
M <sub>3</sub>	Average maturity of loans for consumer goods. (days)
M <sub>4</sub>	Average maturity of loans for real estate. (days)
X <sub>1</sub>	Bank size measured by total deposits. (\$millions)
X <sub>2</sub>	Bank size measured by capital accounts (net worth) (\$millions)
X <sub>3</sub>	Total farm loans outstanding. (\$millions)
X <sub>4</sub>	Percent of farm loans to total loans. (.00)
X <sub>5</sub>	Banks with under \$25 million in total deposits, dummy variable used.
X <sub>6</sub>	Units banks, measured by a dummy variable, list banks not affiliated with holding companies.
X <sub>7</sub>	Loan to deposits ratios for all loans. (00.00)

---

\*All X<sub>i</sub>'s are structural variables used as independent variables.

---

The purpose of farm borrowing can be classified into four broad categories: (1) operating or production loans, frequently classified as loans for seeds, fertilizer and credit for current expenses; (2) machinery and equipment, classified as credit for capital acquisition such as tractors; (3) real estate, classified as credit to acquire farm real estate or long term loans secured by a farm mortgage; and (4) consumer goods, classified as credit to purchase personal goods such

as televisions and home appliances. Each of these four broad categories represent distinct credit functions with distinct terms of credit. For example, loans to purchase farm real estate would involve large amounts of credit and longer maturities than loans to finance operation or production.

The difference in loan terms by loan purpose, as reported in the average shown for all banks (Table 4) indicates

TABLE 4

**Average Interest Rate, Loan Size and Maturity  
by Loan Purpose and Deposit. Size of Bank.  
Selected Banks in the City of Danville and  
Pittsylvania County, Virginia December 1974.**

Purpose of Loan	BANK SIZE (\$ mil)			All Banks
	1-12.9	13-24.9	25-over	
<b>OPERATING EXPENSE</b>				
Av. Interest Rate	8.5	8.4	11.1	9.78
Average amount of loan	1,750	2,050	1,750	1,825
Average Maturity	328	428	475	425
<b>REAL ESTATE</b>				
Av. Interest Rate	8.5	8.7	11.2	9.90
Average amount of loan	20,000	14,500	22,500	19,875
Average Maturity	4330	4782	5330	4793
<b>MACHINERY &amp; EQUIPT.</b>				
Av. Interest Rate	8.5	9.0	11.5	10.13
Average amount of loan	3,000	5,125	4,375	4,218
Average Maturity	1355	1411	1471	1427
<b>CONSUMER GOODS</b>				
Av. Interest Rate	8.5	8.4	11.1	9.78
Average amount of loan	1,450	2,375	1,250	1,581
Average Maturity	493	460	430	459
<b>ALL LOANS</b>				
Av. Interest Rate	8.5	8.6	11.2	9.90
Average amount of loan	6,550	6,012	7,468	6,874
Average Maturity	1628	1769	2047	1776

Source: Bureau of Economic Research and Development Survey of Banks in Danville-Pittsylvania County, Virginia 1975, Virginia State College, Petersburg, Virginia, Summer 1975.

the general nature of the different terms among loan purposes. For example, the average rate of interest on all loans to cover operating expense is 9.78 percent charged on an average size credit of \$1,825, with an average maturity of 425 days. For real estate loans the figures are 9.90 percent charged on an average size credit of \$19,875 to mature in a little over 13 years. For machinery and equipment the average terms on all loans were 10.13 interest for \$4,218 for about 4 years. The average loan rate on consumer goods was 9.78 on an average credit of \$1,581 with an average maturity of 1¼ years.

More important to this study than differences in rates among loan purpose groups are the differences due to bank characteristics within a specific loan category. In most instances, the average amount of credit tended to rise with bank size. About the same variation appears to exist in the average maturities of specific loans among the banks, although an examination of Table 4 would seem to indicate a slight tendency for larger banks to extend credit with longer maturities.

#### IV: AN ANALYSIS OF SURVEY DATA

The results of the least squares regression analysis are presented in Appendixes A-D for each of the three models, I-III, in the four broad loan categories as follows: loans for operating capital in Appendix A; loans for machinery and equipment in Appendix B; loans for real estate in Appendix C; and loans for consumer goods in Appendix D.

##### Model I

The twelve equations (three for each

##### Data

The primary data used in this study were gathered through a survey of the study area banks conducted by the "BERD."<sup>42</sup> The survey took place during the summer of 1975.

The data used in the analyses were cross-sectional rather than time-series. The danger of multicollinearity and other problems associated with time-series data are, therefore, avoided.

The sample size of this study was nine of eleven commercial banks in the survey area. While this represents a high percent (over 80%) of the banks in the area, it is relatively small for analysis to explain economic phenomenon.

##### Methodology

The general statistical model,  $Y_i = f(X_i)$ , was developed to conform to economic criteria within the constraints of data availability and *a priori* assumptions. The least squares regression technique was employed, using a "stepwise" program with set tolerance levels for independent variables, in estimating the impact of structural variable on performance.

loan group), Appendixes A-D, estimating the relationship between interest rates and the selected independent variables were fitted to cross-sectional survey data. The empirical results showed that none of the independent variables ( $X_i$ ) was significant at the 05 percent level. The  $R^2$ 's for each of the twelve equations in Model I showed a fairly good fit, ranging from .689 in the operating capital category (Eq. I-2) to .806 in machinery and equipment category (Eq. II-3). The actual signs for some vari-

<sup>42</sup>Michael S. Joshua, Bank Survey, Bureau of Economic Research and Development, Virginia State College, Petersburg, Virginia, Summer 1975.

ables in the equations were different from those expected. Using (Eq. II-3) as an example we have:

$$\begin{aligned}
 R_2 = & .026932 + .00268X_1 - .02237X_2 \\
 & \quad (.014) \quad (.246) \\
 & -.00601X_3 + .08899X_4 + .01986X_5 \\
 & \quad (.020) \quad (.292) \quad (.640) \\
 & + .00459X_6 + .03695X_7 \\
 & \quad (.079) \quad (.134)
 \end{aligned}$$

$$R^2 = .806; \text{ F-Ratio} = 0.5940$$

$$\text{Standard Error of Estimate} = 0.01966$$

Whereas the fit of the equation in terms of  $R^2$  and standard errors (in parenthesis) is fairly good, the actual signs for  $X_2$  and  $X_3$ , in (Eq. II-3) are different from those hypothesized. It was expected that an increase in net worth ( $X_2$ ) would have a positive influence on interest rate ( $R_2$ ); and that an increase in total farm loans ( $X_3$ ) would be at higher interest rates. The actual signs indicate, on the contrary, that interest rate would decrease as both net worth and total farm loans increase.

Though the decrease in interest rates ( $R_2$ ) is quite small, at .002 percent for every million dollar increase in net worth ( $X_2$ ), and .006 for every million dollar increase in total farm loan ( $X_3$ ), the results support findings by Alhadeff, Horvitz, Schweiger and McGee that there exists economies of scales for banks with under \$50 million in total deposits, and refutes the contention that interest rates are determined externally of bank structure and its individual market.

A close inspection of the signs in (Eqs. I-1 and I-2), Appendixes A-D, for each loan category, shows that the independent variables ( $X_i$ ) reacted as expected, that is, having a positive influence on interest rates ( $R_i$  where  $i=1..4$ ). However, total farm loans showed a fairly consistent negative sign. This indicates

that, for all loan groups, an increase in total farm loans would produce a slight decrease in interest rates. This suggests that the study area banks are sensitive to the needs of agriculture and are willing to meet the increased credit needs with a lower interest rate. Interestingly enough, this is true in all loan groups.

The results produced by Model I suggest that, other things being equal, bank structural characteristics have only a modest influence on interest rates ( $R_i$ ) for certain types of loans. Moreover, there is no clear pattern of that influence. On the one hand, it appears that larger deposits exert an upward pressure on interest rates, while increases in net worth have the opposite effect; and specialization in farm lending leads to lower interest rates. On the other hand, bank deposits and aggressive lending policies, as measured by the loan to deposit ratio, appear to be associated with higher interest rates.

#### Model II

As in Model I, twelve equations (three for each loan category) were used in Model II to estimate the relationship between the amount of loan ( $L_i$ , where  $i=1..4$ ) and the selected independent variables ( $X_i$ ). There were four equations in Model II that have independent variables which significantly affect the dependent variable at the 05 percent level. These variables are: total deposits ( $X_1$ ), percent of farm loans to total loans ( $X_4$ ), banks under \$25 million ( $X_5$ ), and loan to deposit ratio ( $X_7$ ). (Eq. II-1). Total deposit ( $X_1$ ), percent of farm loan to total loan ( $X_4$ ) and loan to deposit ration ( $X_7$ ) are significant at the 05 percent level. Significantly affecting the dependent variable at the 01 percent level were: net worth ( $X_3$ ), and unit banks ( $X_6$ ) in (Eq. II-1); total farm loans ( $X_3$ ), banks under \$25 million ( $X_5$ ) and unit banks ( $X_6$ ) in (Eq. II-2). The empirical results are given as follows:

$$L_2 = 4.56756 - .02956X_1^\circ + .59239X_3^{\circ\circ}$$

(Eq. II-1)                      (.004)                      (.049)

$$-5.19157X_4^\circ - 1.96437X_5^\circ$$

(.791)                      (.117)

$$-.34053X_6^{\circ\circ} - 1.18527X_7^\circ$$

(.049)                      (.201)

$$R_2 = .999; \text{ F-Ratio} = 170.51086^{\circ\circ}$$

$$\text{Standard Error of Estimate} = .06207$$

$$L_2 = 6.14058 - .51852X_2^\circ + .56934X_3^{\circ\circ}$$

(Eq. II-2)                      (.054)                      (.033)

$$-5.53281X_4^\circ - 3.31364X_5^{\circ\circ}$$

(.042)                      (.133)

$$R^2 = .998; \text{ F-Ratio} = 328.58909^{\circ\circ}$$

$$\text{Standard Error of Estimate} = .04423$$

From the two equations, we find that total farm loans ( $X_3$ ) is the only independent variable with the expected hypothesized sign. This indicates that as total farm loans ( $X_3$ ) increase, we can expect an increase in the amount of loan ( $L_2$ ).

In (Eq. II-1), total deposits ( $X_1$ ) was used as the measure of bank size, whereas in (Eq. II-2) net worth ( $X_2$ ) was used as the measure of bank size. The signs for both of these variables are different from those hypothesized. Unexpected negative signs are also present in both equations for: percent of farm loan to total loan ( $X_4$ ); banks under \$25 million ( $X_5$ ); unit banks ( $X_6$ ); and loan to deposit ratio ( $X_7$ ). It was expected that increases in the value of each of these independent variables would cause an increase in the amount of loan for operating capital. The actual signs indicate that the amount of loan for operating capital would decrease as the value of these variables increase. These negative signs are difficult to explain, especially with the excellent fit as shown by the high  $R^2$ 's and the small standard errors.

However, a possible explanation can be found in the data which represents a multiplicity of bank functions rather than the specific function of agricultural loans; and possible degree of freedom problem.

Unlike (Eqs. II-1 and II-2), both total deposits ( $X_1$ ) and net worth ( $X_2$ ), were included in (Eq. II-3). This resulted not only in a better fit of the equation as is evidenced by the high  $R^2$  but a positive sign for total deposits ( $X_1$ ) as was expected.

In the loan category for farm real estate, when the measures of bank size, total deposits, ( $X_1$ ) and net worth ( $X_2$ ), are included in the same equations, all the structural variables prove to be significant in explaining the amount of loan at the 05 percent level. The results are as follows:

$$L_1 = 242.36795 + 3.22696X_1$$

(Eq. II-3)                      (.154)

$$-62.60078X_2 + 3.87881X_3$$

(2.672)                      (.212)

$$-164.21630X_4$$

(3.165)

$$-162.21630X_5^\circ - 23.2514X_6^\circ$$

(6.948)                      (.862)

$$-5.73163X_7^\circ$$

(1.452)

$$R^2 = .999; \text{ F-Ratio} = 959.7548^\circ$$

$$\text{Standard Error of Estimate} = .20340$$

The actual signs of several variables ( $X_2$ ,  $X_4$ ,  $X_6$ , and  $X_7$ ) were different from expected.

In the consumer goods category, with ( $L_1$ ) as the dependent variable, the independent variables: total farm loans ( $X_3$ ), and unit banks ( $X_6$ ) were significant at the 05 percent level and have positive

signs as expected. (Eq. II-1). The variables ( $X_2$ ) and ( $X_3$ ) were also significant at the 05 percent level but the signs differed from those hypothesized. (Eq. II-2). The results of both (Eq. II-1) and (Eq. II-2) are as follows:

$$\begin{aligned} L_4 = & 2.68624 - .08488X_1 - .68370X_3 \\ \text{(Eq. II-1)} & \quad (.020) \quad (.232) \\ & -12.09870X_4 - 2.23589X_5 \\ & \quad (3.726) \quad (.551) \\ & +1.16461X_6 + 4.46576X_7 \\ & \quad (.321) \quad (.948) \end{aligned}$$

$$R^2 = .989; \text{ F-Ratio} = 15.47498$$

$$\text{Standard Error of Estimate} = .24431$$

$$\begin{aligned} L_4 = & 7.27290 - 1.49926X_7 + .62320X_3 \\ \text{(Eq. II-2)} & \quad (.296) \quad (.186) \\ & -13.17430X_4 - 6.14949X_5 \\ & \quad (3.263) \quad (1.158) \\ & +.68845X_6 + 4.4657X_7 \\ & \quad (.1158) \quad (.948) \end{aligned}$$

$$R^2 = .987; \text{ F-Ratio} = 17.67070^*$$

$$\text{Standard Error of Estimate} = .29250$$

In the categories of operating capital, real estate, and consumer goods, the bank size variables: total deposits ( $X_1$ ), and net worth ( $X_2$ ) were negatively related to the amount of loan ( $L_1$ ). (Eq. II-1 and II-2). However, when taken together, as in (Eq. II-3), total deposits ( $X_1$ ) is positive and net worth ( $X_2$ ) is negative. This reversal of sign for total deposit ( $X_1$ ) is difficult to explain.

An explanation of the coefficients of ( $X_1$ ) and ( $X_2$ ) in (Eq. II-3) shows that  $X_2$ , as a measure of bank size, has a greater influence than  $X_1$  on the amount of loan. The larger coefficient with the unexpected negative sign has to be interpreted with care. In fact, it is un-

realistic to expect such a large negative change in the amount of loan as net worth ( $X_2$ ) increases. Though total deposits ( $X_1$ ) has lesser influence on the amount of loan, its impact is more realistic.

The most consistent and significant variable is banks under \$25 million ( $X_5$ ), which shows a negative relationship with the amount of loan. This indicates that smaller banks would have problems meeting the increased demand for farm credit. While banks under \$25 million at present do make substantial number of loans to farm borrowers, the empirical results show that the projected increased needs for larger amounts of loans may not be met by banks under \$25 million. This observation is further supported by the relationship of the positive significant effect of total farm loans ( $X_3$ ) on the amount of loan ( $L_1$ ). This independent variable was significant at the 01 percent level in (Eqs. II-1 and II-2) above. The indication here is that as farm loans increase, the amount of the loan will increase also; and, if Melichar and others are correct in their projections of increased credit needs to 1980, then from the above results, a portion of this need will possibly have to be met by larger banks.

The Equations in each of the four loan categories: *operating capital, machinery and equipment, real estate, and consumer goods*, showed irregularity in signs, many of which are unexpected and difficult to explain. The results in the equations, however, confirm the expectation that the independent structural variables do significantly influence the dependent variable, the amount of the loan ( $L_1$ ). Because of the irregularities of signs in the coefficients of the various regression runs it is difficult to make further generalizations with regard to the influence of the structural variables on the amount of loan.

### Model III

As in the previous two models, twelve equations (three for each loan group), Appendixes A-D, were used to estimate the relationship between loan maturity and selected independent variables. For the most part, the regression equations 1, 2, and 3, in Model III indicate that the bank structural variables ( $X_1$  to  $X_7$ ) had little influence on the maturity of loans in the four categories of loans. Except for loan maturity in the consumer goods category, Model III produced poorer results than either Model I or II.

The results of (Eq. III-2) in which several of the structural variables were significant in explaining maturity are presented as follows:

$$M_3 = 3597.497 + 57.2177X_1^{\circ} \quad (\text{Eq. III-2}) \quad (2.876)$$

$$-1033.80X_2^{\circ} - 47.4131X_3 \quad (49.923) \quad (3.959)$$

$$-937.9357X_4^{\circ} \quad (59.114)$$

$$-2732.26X_5^{\circ} - 271.575X_6^{\circ} \quad (129.798) \quad (16.095)$$

$$+ 658.594X_7 \quad (27.116)$$

$$R^2 = .999; \text{ F-Ratio} = 170.906198^{\circ}$$

$$\text{Standard Error of Estimate} = 3.98641$$

The positive relationship between total deposits ( $X_1$ ) with loan maturity ( $M_3$ ) and loan to deposit ratio ( $X_7$ ) with loan maturity ( $M_3$ ) are as expected. However, the sign for ( $X_2$  to  $X_6$ ) are different from those hypothesized. It was expected that an increase in net worth ( $X_2$ ), total farm loans ( $X_3$ ), percent of farm loans to total loans ( $X_4$ ), banks under \$25 million ( $X_5$ ) and unit banks ( $X_6$ )

would have a positive influence on loan maturity ( $M_3$ ). The actual signs indicate, on the contrary, that loan maturity ( $M_3$ ) would decrease as the values of these independent variables increased.

The loan maturity ( $M_3$ ) is measured in days and, from the above results, it is unreasonable to expect such a large decrease in the number of days that loans might be made for as evident by the coefficients. Considering the fact that average consumer loans are made for 459 days, the results indicate that the consumer loans are quite sensitive to changes in the structural variables.

The positive relationship of loan maturity ( $M_3$ ) and total deposits ( $X_1$ ), indicates that as total deposits ( $X_1$ ) increase by \$1 million dollars, as many as 57 days of additional loan maturity could be expected. Also, as a 1 percent increase in the loan to deposit ratio ( $X_7$ ) is experienced as many as 658 days of additional loan maturity could be expected.

The overall results of the regression analysis yielded little firm evidence that the structural characteristics of banks have significant and/or consistent influence on the terms of credit extended to farmers. The positive relationship of the total deposits and negative relationship of net worth to the performance variables, in particular, indicate that what influence does exist between bank structure and performance is complex. For example, one generalization that could be made on the basis of the evidence is that given equal net worth, the bank with larger deposits tends to make a smaller loan at a higher interest rate and with a shorter maturity. The explanation for this probably lies in the relationship between the amount of credit a bank can extend to a borrower and the size of its net worth.

## V. SUMMARY CONCLUSION AND IMPLICATIONS

Economic theory holds that the major structural characteristics that influence performance are the number and size distribution of firms, the existence of close substitute products and the conditions of entry. The manner in which these structural characteristics are combined in industry, in turn, affects the performance of the industry through pricing policies and output decisions; and the economic desirability of the performance is judged on the degree to which it approximates the competitive norm. Past studies of the commercial banking system have provided evidence that structure departs in many respects from that which would lead to the desired competitive results. In particular, there is general agreement that economies of scale exist in the industry and that the limitations on entry imposed by public regulation have perpetuated many inefficient units. The impact of structure on certain phases of performance, such as interest charged, is less clear according to the literature. One reason for this is that the banking system is highly complex, being made up of a wide range of multi-product firms that face several distinct markets for their products. Moreover, when performance with respect to a specific product is analyzed, as it has been in this study, consideration must be given to market factors beyond those generally associated with the internal organizational banking system. In many respects, the evaluation of bank performance with respect to a specific product is not amenable to the broad application of traditional market structural theory and the analysis must be made in recognition of the unique characteristics associated with the product and the market conditions.

The factors that were analyzed in this study as having influence on bank performance were: total deposits, net

worth, total farm loans, percent of farm loan to total loan, banks under \$25 million, unit banks, and loan to deposit ratio. It was expected that the above independent variables would have a positive effect in relation with the dependent performance variables.

The primary hypothesis tested were that total deposits, net worth, total farm loans, percent of farm loan to total loan, banks under \$25 million, unit banks, and loan to deposit ratio of the banks have a significant influence on the terms of credit extended to a farmer as measured by interest rates charged, amount of loan and maturity of loan.

The results of the analysis indicate that while, in general, the structural characteristics of the bank have some influence on the terms of credit extended to a farm borrower, the influence is complex and frequently is associated with the type of loan under consideration. Furthermore, there was no distinct pattern of influence on the terms of credit or performance that could lead to the unqualified acceptance of the primary hypotheses.

While the analysis does not lead to an unqualified conclusion, some of the findings are of considerable interest and add some insight into the particular relationship between structure and performance studied. For example, the study indicates that bank ownership, whether it is a holding company affiliate or an independent unit bank, is of virtually no significance with respect to terms of farm credit. There was an indication, however, that specialization in agricultural lending, as measured by the amount of farm credit extended by the bank and by the bank's portion of farm loans to total loans, leads to more favorable credit terms or in other words improved performance.

The results with respect to the influence of bank size measured in millions of dollars present, perhaps, the most interesting findings. On the basis of this analysis, it would appear that the net worth of a bank acts as a strong influence on performance and that up to a point the terms of credit improve as net worth increases. (See (L<sub>4</sub>) Appendix D). However, when used in the same equation with total deposits, the actual sign differs from the expected sign. It appears, therefore, that net worth does provide a strong influence on the amount of loan up to a point. This conclusion, while theoretically consistent with an expanded bank market, is only suggested and is not fully supported by the results.

It is not clear from this study that a change in policy that would relax the restrictions on branch banking and bank size would lead to an improved credit situation for the farm borrowers or the banking system. This, of course, does not mean that policy changes will not have effects on other aspects of farm credit.

While the analysis does not shed much light on the problem of the total flow of credit into agriculture it does raise some disturbing questions. The indication of an adverse relationship between performance and deposit size implies that the relationship between increasing deposit size and the allocation of loanable funds may be away from agriculture and toward the other options open to a larger bank. This could mean that specialization in farm lending may be of greater importance to agriculture credit flows than the deposit resources available to the bank. This question needs further analysis in order to fully evaluate the effects of a change in bank structure on agricultural credit.

It must be emphasized that the findings were not uniform for all loan categories but are only indications of some general influence. The lack of consistent structural influence suggests that the terms of credit are influenced by a variety of factors and that the internal structural characteristics of the banking system are, at best, of only partial significance from the viewpoint of the farm borrower. This implies that the existence of economies of scale in the banking system and other economic advantages attributable to bank size and organization will not necessarily lead to improved credit terms for the farm borrower.

The limited question analyzed in this study precludes further broad generalization about the role of commercial banks as a source of farm credit and the analysis in many respects raises more questions than can be answered. Further study should be given to the degree to which the terms of credit are adopted to the individual borrower and the possibility that terms are inflexible. The interaction between terms of farm credit, particularly interest rates, and broad market rates also needs to be pursued. In future studies it is recommended that interest rates charged be used as an independent rather than dependent variable. Finally, it is hoped that the approach used in this study and the analysis of bank performance with respect to a specific bank function, will lead to a more intensive study of the banking system in South Central Virginia as part of a broader network of farm credit suppliers; and to greater precision in the debate over policy in the field of banking.

**APPENDIX A.**

**Coefficients of Bank Structural Variables  
(Operating Capital)**

Model	CONSTANT a <sub>0</sub>	TOTAL DEPOSITS X <sub>1</sub>	NET WORTH X <sub>2</sub>	TOTAL FARM LOAN X <sub>3</sub>	% FARM LOAN TOTAL LOAN X <sub>4</sub>	UNDER \$25 MIL X <sub>5</sub>	UNIT BANKS X <sub>6</sub>	LOAN/ DEPOSIT X <sub>7</sub>	R <sup>2</sup>
<b>I Interest Rate (R<sub>1</sub>)</b>									
1	.01367	.00137 (.001)		-.00812 (.112)	.12141 (1.87)	.03302 (.028)	-.00326 (.011)	.02083 (.048)	.700
2	-.05438		.02332 (.018)	-.00666 (.011)	.12986 (.200)	.09284 (.071)	.00405 (.014)	.00883 (.040)	.689
3	.06832	.00368 (.015)	-.04029 (.257)	-.01005 (.020)	.09698 (.304)	-.07156 (.668)	-.01599 (.083)	.04007 (.140)	.707
<b>II Amount of Loan (L<sub>2</sub>)</b>									
1	4.56756	-.02956° (.004)		.59239°° (.049)	-5.19157° (.791)	-1.96437° (.117)	-.34053°° (.049)	1.18527° (.201)	.998°
2	6.14058		-.51852° (.054)	.56934°° (.033)	-5.53281° (.597)	-3.31364°° (.212)	-.50479° (.042)	-.94177° (.133)	.998°
3	7.03865	.01745 (.042)	.82006 (.732)	.55326 (.058)	-5.68868 (.867)	-4.09294 (1.903)	-.59979 (.236)	-.79364 (.398)	.999
<b>III Maturity (M<sub>1</sub>)</b>									
1	-204.6153	7.39430 (10.819)		-47.26748 (122.811)	147.374 (1972.436)	365.230 (29.501)	-47.58417 (122.443)	289.220 (501.778)	.652
2	-484.78221		112.819 (192.767)	-23.30959 (117.246)	63.34913 (2122.377)	212.024 (753.501)	-13.80321 (149.129)	212.024 (407.899)	.633
3	4600.26021	98.80923 (128.501)	1594.56 (2231.097)	-123.350 (176.914)	-819.231 (2641.861)	-3782.65 (5800.775)	-551.698 (719.282)	1050.71 (1211.839)	.769

**APPENDIX B**

**Coefficients of Bank Structural Variables  
(Machinery and Equipment)**

Model	CONSTANT $a_0$	TOTAL DEPOSITS $X_1$	NET WORTH $X_2$	TOTAL FARM LOAN $X_3$	% FARM LOAN TOTAL LOAN $X_4$	UNDER \$25 MIL $X_5$	UNIT BANKS $X_6$	LOAN/DEPOSIT $X_7$	R <sup>2</sup>
<b>I Interest Rate (<math>R_z</math>)</b>									
1	.00092	.00140 (.001)		-.00495 (.011)	.10255 (.178)	.03820 (.026)	.00248 (.011)	.02626 (.045)	.804
2	-.06984		.02402 (.017)	-.00354 (.010)	.11297 (.189)	.10002 (.067)	.01003 (.031)	.01416 (.042)	.799
3	.06932	.00268 (.014)	-.02237 (.246)	-.00601 (.020)	.08899 (.292)	.01986 (.640)	.00459 (.079)	.03695 (.134)	.806
<b>II Amount of Loan (<math>L_z</math>)</b>									
1	-1.58867	.02311 (.085)		.01474 (.963)	-9.75994 (15.466)	2.02158 (.960)	.61986 (2.285)	4.80068 (3.934)	.837
2	-1.95899		.27726 (1.487)	.10246 (.904)	-10.77762 (16.373)	2.59226 (5.812)	.69284 (1.150)	4.48686 (3.633)	.844
3	37.60139	.76871 (.986)	-13.00577 (17.124)	-.60582 (1.358)	-17.64359 (20.277)	-31.73642 (44.523)	-3.49185 (5.521)	11.01170 (9.301)	.897
<b>III Maturity (<math>M_z</math>)</b>									
1	1803.439	-15.46531 (10.986)		247.796 (124.904)	-2668.986 (2002.840)	-58.4353 (295.994)	467.629 (124.330)	268.348 (509.513)	.946
	2766.214		-292.103 (172.514)	247.845 (104.928)	-3056.581 (1899.390)	-843.074 (647.335)	-526.582 (133.461)	375.635 (421.424)	.956
3	9789.993	136.481 (49.185)	-2650.45 (853.917)	121.333 (67.771)	-4275.650 (1011.130)	-6937.99 (220.155)	-1305.56 (275.294)	1534.09 (468.812)	.995

**APPENDIX C**

**Coefficients of Bank Structural Variables  
(Real Estate)**

Model	CONSTANT $a_0$	TOTAL DEPOSITS $X_1$	NET WORTH $X_2$	TOTAL FARM LOAN $X_3$	% FARM LOAN TOTAL LOAN $X_4$	UNDER \$25 MIL $X_5$	UNIT BANKS $X_6$	LOAN/DEPOSIT $X_7$	$R^2$
<b>I Interest Rate (<math>R_4</math>)</b>									
1	-.00718	.00153 (.001)		-.00916 (.011)	.16018 (.820)	.03672 (.027)	-.00091 (.011)	.03556 (.046)	.745
2	-.08408		.02616 (.018)	-.00760 (.011)	.17110 (.194)	.10401 (.069)	.00370 (.014)	.02230 (.043)	.736
3	.08100	.00321 (.014)	.02926 (.251)	-.01056 (.020)	.14244 (.297)	-.03924 (.652)	-.01016 (.081)	.04953 (.136)	.749
<b>II Amount of Loan (<math>L_1</math>)</b>									
1	53.73416	-.25186 (.247)		6.86572 (2.806)	-126.26847 (45.067)	.13600 (6.600)	-3.46049 (2.798)	-35.62174 (11.465)	.918
2	70.63741		-4.93949 (3.972)	6.95340 (2.416)	-134.41004 (43.736)	-13.33171 (15.527)	-5.08597 (3.073)	-34.62174 (9.704)	.929
3	242.36795	3.33696* (.154)	-62.60078* (2.672)	3.87881* (.212)	-164.21630* (3.165)	-162.35159* (6.948)	-23.2514* (.862)	-5.73163* (1.452)	.999*
<b>III Maturity (<math>M_4</math>)</b>									
1	-5152.683	167.390 (105.039)		-2131.16 (1192.311)	26596.75 (19149.450)	2845.79 (2830.047)	395.532 (1188.739)	4857.58 (4871.536)	.661
2	-12410.881		2690.330 (1982.461)	-1866.91 (1205.66)	26064.53 (21824.726)	9557.098 (7748.367)	1219.297 (1533.521)	3241.86 (4871.536)	.599
3	59755.490	1402.380 (901.287)	-21540.69 (15647.461)	-3153.95 (1240.761)	13539.04 (18523.290)	-6414.540 (40682.860)	-53065.56 (5044.575)	15144.51 (8499.050)	.883

**APPENDIX D**

**Coefficients of Bank Structural Variables  
(Consumer Goods)**

Model	CONSTANT a <sub>0</sub>	TOTAL DEPOSITS X <sub>1</sub>	NET WORTH X <sub>2</sub>	TOTAL FARM LOAN X <sub>3</sub>	% FARM LOAN TOTAL LOAN X <sub>4</sub>	UNDER \$25 MIL X <sub>5</sub>	UNIT BANKS X <sub>6</sub>	LOAN/ DEPOSIT X <sub>7</sub>	R <sup>2</sup>
<b>I Interest Rate (R<sub>3</sub>)</b>									
1	-.00920	.00156 (.001)		-.01022 (.011)	.17459 (.183)	.03535 (.227)	-.00176 (.011)	.03788 (.046)	.733
2	-.08764		.02670 (.018)	.00862 (.011)	.18563 (.195)	.10501 (.069)	.00062 (.014)	.02434 (.043)	.723
3	.08417	.00334 (.015)	-.03099 (.252)	.00169 (.020)	.15581 (.298)	-.04408 (.655)	.01155 (.081)	.05268 (.137)	.737
<b>II Amount of Loan (L<sub>4</sub>)</b>									
1	2.68624	-.08488 (.020)		.68370° (.232)	12.08970 (3.726)	-2.23589 (.551)	1.16461° (.231)	4.46576 (.948)	.981°
2	7.27290		-1.49926° (.296)	.62320 (.186)	13.17430 (3.263)	-6.14949° (1.158)	.68845 (.229)	5.15485° (.724)	.987°
3	13.13699	.11395 (.222)	-3.46823 (3.848)	.51821 (.305)	-14.19210 (4.557)	-11.23808 (10.005)	.06815 (1.241)	6.12204 (2.090)	.989
<b>III Maturity (M<sub>3</sub>)</b>									
1	464.360	-2.13878 (4.083)		1.91341 (46.351)	-311.257 (744.431)	-48.90831 (110.017)	55.25589 (46.212)	164.8937 (189.380)	.641
2	639.520		46.65737 (68.019)	5.22303 (41.371)	-427.661 (748.896)	-181.0843 (265.878)	39.41478 (52.621)	173.693 (166.160)	.699
3	3579.497	57.2177° (2.876)	-1033.80° (49.923)	-47.4131 (3.959)	-937.9357° (59.114)	-2732.26° (129.798)	-271.575° (16.095)	658.594° (27.116)	.999°

## BIBLIOGRAPHY

- Alhadeff, David A., *Monopoly and Competition in Banking*, University of California Press, Berkeley, California, 1954.
- Bain, Joe S., *Industrial Organization*, John Wiley and Sons, Inc., New York, 1959.
- Balsley, Howard L. *Quantitative Research Methods for Business and Economics*, Random House, Inc., New York 1970.
- Bell, Frederick W. and Neil B. Murphy, *Economies of Scale in Commercial Banking*, Federal Reserve Bank of Boston, 1967.
- Benston, George J., *The Cost of Banking Operations: A Statistical Study*, University of Chicago, Illinois, June 1963.
- Brake, John R., "Impact of Structural Changes on Capital and Credit Needs," *Journal of Farm Economics*, Vol. 48, No. 5, December 1966.
- Brimmer, Andrew R., "Central Banking and the Availability of Agricultural Credit," *American Journal of Agricultural Economics*, Vol. 50, No. 2, May 1968.
- Camp, William B., "Branching, Often Best Way to Meet Financial Demands of New Market," *American Banker*, March 25, 1968.
- Carson, Deane and Paul H. Cootner, "The Structure of Competition in Commercial Banking in the United States," *Private Financial Institutions*, The Commission on Money and Credit, Research Study 2, Prentice-Hall, Inc., Englewood Cliffs, N.J., 1963.
- Clarke, Sada L., *The Changing Face of Fifth District Agriculture*, Research Department, Federal Reserve Bank of Richmond, Richmond, Virginia, 1973.
- The Commercial Banking Industry*, American Banking Association, The Commission on Money and Credit, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1962.
- The Commission on Money and Credit, *Private Financial Institutions*, Prentice-Hall, Englewood Cliffs, N. J., 1963.
- Comptroller of the Currency, *Studies in Banking Competition and Banking Structure*, Office of the Comptroller of the Currency, U. S. Treasury Department, Washington, D. C., 1966.
- Doll, Raymond J., "Unified Markets for Rural Banks," *Banking*, Vol. 61, No. 7, January 1969.
- Federal Reserve Bank of Kansas City, "Correspondent Banking," *Monthly Review*, March-April 1965.
- Federal Reserve Board, "Research into Banking Structure and Competition," *Federal Reserve Bulletin*, Board of Governors of the Federal Reserve System, Washington, D. C., November 1964.
- Federal Reserve System, *Reappraisal of the Federal Reserve Discount Mechanism — Report of a System Committee*, Board of Governors of the Federal Reserve System, Washington, D. C., July 1968.
- Gramley, Lyle E., *A Study of Scale Economies in Banking*, Federal Reserve Bank of Kansas City, November 1969.

- Greenbaum, Stuart I., "Competition and Efficiency in the Banking System — Empirical Research and Its Policy Implications," *Journal of Political Economy*, August 1967.
- Haynes, Harmon H., "A Study of Banking in Virginia," *Rural Affairs Study Commission*, Richmond, Virginia, 1969.
- Haynes, Harmon H. and Charles F. Phillips, Jr., "The Banking Structure of Virginia," *The Washington and Lee Review*, Vol. 25, No. 1, Spring 1968.
- Hester, Donald D., "Comment," *Journal of Political Economy*, August 1967.
- Hester, Donald and John F. Zoellner, "The Relation Between Bank Portfolios and Earnings" — An Economic Analysis, *Review of Economic and Statistics*, XLVIII, November 1966.
- Hopkins, John A., Peter J. Barry, and C. B. Baker, *Financial Management in Agriculture*, Danville: The Interstate Printers and Publishers, 1973.
- Horvitz, Paul M., "Economies of Scale in Banking," Private Financial Institutions, The Commission on Money and Credit, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1963.
- Hu, Teh-wei, *Econometrics, An Introductory Analysis*, University Park Press, 1973.
- Jessup, Paul, "Changes in Bank Ownership: The Impact on Operating Performance," *Staff Economic Studies*, Federal Reserve Board, Washington, D. C., April 1969.
- Johnson, J. *Econometric Methods*, McGraw-Hill, New York 1972.
- Lindow, Wesley, *Inside the Money Market*, Random House, New York, 1972.
- Melichar, Emanuel, "Bank Financing of Agriculture," *Federal Reserve Bulletin*, June 1967.
- Melichar, Emanuel and Raymond J. Doll, *Capital and Credit Requirements of Agriculture and Proposals to Increase Availability of Bank Credit*, Project No. 24, Fundamental Reappraisal of the Discount Mechanism, Board of Governors of the Federal Reserve System, Washington, D. C., November 1969.
- Melichar, Emanuel, "Aggregate Farm Capital and Credit Flows Since 1950, and Projections to 1980," *Agricultural Finance Review*, Vol. 33, USDA, Economic Research Service, Washington, D. C., July 1972.
- Morelle, Wilellyn, Leon Hesser and Emanuel Melichar, *Merchant and Dealer Credit in Agriculture*, Board of Governors of the Federal Reserve System, Washington, D. C., 1966.
- Murry, William G. and Aaron G. Nelson, *Agricultural Finance*, Fourth Edition, Iowa State University Press, Ames, Iowa, 1953.
- Polakoff, Murry E. and others, *Financial Institutions and Markets*, Houghton Mifflin Co., New York, 1970.
- Ritter, Lawrence S. and William L. Silber, *Principles of Money, Banking and Financial Markets*, Basic Books, Inc., New York, 1974.
- Schweiger, I. and J. McGee, "Chicago Banking," *Journal of Business*, Vol. 34, July 1961.

- Swackhamer, Gene L. and Raymond J. Doll, *Financing Modern Agriculture: Banks Problems and Challenges*, Research Department, Federal Reserve Bank of Kansas City, May 1969.
- U. S. Department of Agriculture, *The Balance Sheet of the Farming Sector — 1974*, Agriculture Information Bulletin, No. 340, Economic Research Service, U. S. D. A., Washington, D. C., January 1975.
- Virginia Department of Agriculture, Board of Agriculture and Commerce, 1973, *Agriculture the Cornerstone of Tomorrow*. Virginia Department of Agriculture and Commerce, Richmond Virginia, 1973.
- State Capital and Credit Report, *Opportunities for Virginia's Agriculture*, Vol. 1, Commission of the Industry of Agriculture, Richmond, Virginia, 1974.
- Virginia Industry of Agriculture Credit Committee, Richmond, *Financing Virginia's Agriculture*, Virginia Department of Agriculture and Commerce, Richmond, Virginia, February 1975.
- 1974 Annual Report of the Bureau of Banking, State Corporation Commission, Commonwealth of Virginia, Richmond, Virginia.
- Weintrab, Robert and Paul Jessup, *A Study of Selected Banking Services By Bank Size, Structure and Location*, Committee on Banking and Currency, House of Representatives, 88th Congress, Second Session, November 17, 1964.
- Whyte, Charles D. "An Economic Analysis of the Factors Determining the Price of Processing Tomatoes in Ohio." Unpublished Thesis, Ohio State University, 1965.
- Wilcox, Walter W., Willare W. Cochrane, and Robert W. Herdt, *Economics of American Agriculture*, Prentice-Hall, Inc., Englewood Cliffs, N. J., 1974.
- Wonnacott, Thomas H. and Ronald J. Wonnacott, *Introductory Statistics for Business and Economics*, John Wiley & Sons, Inc., New York 1972.

## PAMPHLETS

- State Board of Agriculture and Commerce, 1973, *Agriculture the Cornerstone of Tomorrow*. Virginia Department of Agriculture and Commerce, Richmond, Virginia, 1973.
- Clarke, Sada L., *The Changing Face of Fifth District Agriculture*, Research Department, Federal Reserve Bank of Richmond, Richmond, Virginia, 1973.
- Virginia Industry of Agriculture Credit Committee, Richmond, *Financing Virginia's Agriculture*, Virginia Department of Agriculture and Commerce, Richmond, Virginia, 1975.
- Balsley, Howard L., *Quantitative Research Methods for Business and Economics*, Random House, Inc., New York 1970.
- Wonnascott, Thomas H. and Ronald J. Wonnascott, *Introductory Statistics for Business and Economics*, John Wiley & Sons, Inc., New York, 1972.
- Capital and Credit Report, *Opportunities for Virginia's Agriculture*, Vol. 1, Commission of the Industry of Agriculture, Richmond, Virginia, 1974.
- 1974 Annual Report of the Bureau of Banking*, State Corporation Commission, Commonwealth of Virginia, Richmond, Virginia.
- Hu, Teh-wei, *Econometrics*, An Introductory Analysis, University Park Press, 1973.
- Whyte, Charles D., "An Economic Analysis of the Factors Determining the Price of Processing Tomatoes in Ohio." Unpublished Thesis, Ohio State University, 1965.
- Johnson, J., *Econometric Methods*, McGraw-Hill, New York 1972.