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Abstract

In light of the competitive forces in the agricultural financial service industry, increasing attention has focused on the cost effectiveness in the management of lending programs and in the delivery of agricultural credit. This study measures the accounting cost relationships at agricultural banks using Functional Cost Analysis, call report and survey information. The results suggest bank size, bank holding company affiliation, agricultural dependence and location in a metropolitan area may impact the cost structure of agricultural banks.

KEY WORDS: agricultural banks, accounting costs, bank holding company, cost structure, survey.

Measuring Agricultural Credit Delivery Costs at Commercial Banks

Profit margins of agricultural lenders have come under substantial pressures since the late 1970s due to the combined effects of greater competition in financial markets, higher and more volatile interest rates, new technologies in funds management, loan losses, costs of administering problem loans, and the restructuring and consolidation of lending institutions. These factors have hampered institutional performance and strongly influenced the cost, availability and other terms of credit for agricultural borrowers.

Financial deregulation early in the 1980s increased competition among financial institutions, lessened the insulation of farm credit from national and international markets, and, along with a shift away from interest rate targeting in monetary policy, contributed to higher and more volatile costs of funds. Removal of geographic barriers to lending, greater holding company activity, interstate banking, and expansion of financial services brought significant changes in the structure of banking. In addition, new technologies in managing funds and handling information brought new capital outlays for financial institutions, stronger personnel requirements, and a restructuring of operating costs.

In agriculture, financial stress during the 1980s was especially difficult for the specialized farm lenders--the Farm Credit System (FCS), agricultural banks, and the Farmers Home Administration. The FCS has begun a financial recovery through significant downsizing of operations, organizational restructuring, and utilization of federal financial assistance. Greater diversity and the short-term nature of bank lending allowed more rapid recovery by agricultural banks, although bank failure rates and problem loan situations reached significantly high levels.

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At the beginning of the 1990s, commercial banks and the Farm Credit System along with numerous other entrants in the agricultural lending market are actively seeking profitable agricultural loans. The FCS has implemented new pricing procedures to help restore their lost market share and to distinguish among agricultural borrowers with significantly different lending costs. Agricultural banks, on average, have relatively high liquidity positions, and, are seeking to offer a competitively priced range of short, intermediate and long term credit services to farm borrowers. Merchants and dealers are more active in agricultural lending as well, as illustrated by the efforts of farm machinery companies to enhance machinery sales through leasing and credit programs.

In light of these competitive forces, increasing attention has focused on cost effectiveness in the management of lending programs and in the delivery of agricultural credit. Potential economies of size and scope in lending programs represent a major incentive for institutional restructuring, expanded size, and pricing tailored to the cost characteristics of different types of agricultural borrowers. However, significant information gaps exist about cost relationships in agricultural lending, and the implications for competition among financial institutions and for the availability and cost of credit to agricultural borrowers.

Many studies have analyzed the size and scope efficiencies of commercial banks (for reviews see Clark; Benston; and Kolari and Zardkoohi), although Kolari and Zardkoohi is the only study to distinguish agricultural banks. A consistent finding of these studies is that economies of size only exist in small banks (i.e., below $100 million in deposits); a size category which characterizes many agricultural banks. In addition, Claggett and Stansell consider economies of size in the lending associations of the Farm Credit System. However, research on lending costs by different loan categories (e.g., agriculture loans vs. commercial and consumer loans) and the degree of scope characteristics among the various loan categories is limited. LaDue, Moss and Smith collected cost accounting data for agriculture loans from eight banks in New York State in 1975, but the banks were relatively large in size and technological changes in banking since that time have likely yielded a significantly different cost structure for agricultural credit in the 1990s.

A major reason for the lack of research on lending costs by type of loan is the limited availability of cost accounting data at financial institutions. Previous studies of commercial banks have used two principal sources of data: 1) the Federal Deposit Insurance Corporation (FDIC) Call Report of Income and Condition (call reports) and 2) the Federal Reserve Functional Cost Analysis Program (FCAP)[1]. Only aggregated operating cost data are available from the FDIC reports. In addition, no information about the numbers of loans or deposits is available. The FCAP data does contain detailed cost accounting information on a limited set of banks. However, the banks participating in the FCAP program may not be a representative sample of all commercial banks (Clark; Kolari and Zardkoohi). Furthermore, the FCAP program is voluntary, most of the participants are smaller banks (less than $200 million in deposits), and cost data on

[1] Typically, the Functional Cost Analysis program is abbreviated as FCA. In agricultural finance literature, FCA is traditionally used as an acronym for Farm Credit Administration, and therefore in this study the Functional Cost Analysis program is abbreviated as FCAP.

agricultural loans are included in the commercial, installment and real estate loan categories.

Consequently, an up-to-date cost accounting data base for agricultural lending institutions is needed to evaluate the cost of delivering agricultural credit. One objective of this study is to measure the operating costs, funding costs, and risk bearing costs of agricultural banks. In addition, survey data are used to relate the costs to the various loan management and loan review procedures of selected agricultural banks. Another objective is to compare and contrast the various agricultural loan review and monitoring procedures at commercial banks. Observing the procedures that bank managers use to evaluate and monitor agricultural loans in a competitive environment should provide insight on the manager's tradeoffs between reducing operating costs and maintaining a profitable loan portfolio.

Commercial Bank Intermediation Costs

The lending costs at financial intermediaries can be divided into three main accounting cost components -- 1) operating costs, 2) funding costs and 3) risk bearing costs. The availability of data and the expense items within each cost component are discussed in the following sections.

Operating Costs

The operating costs of credit delivery include expenses for officer and employee salaries, data services, occupancy, legal fees and other miscellaneous items. All expense items that can be attributed to the loan delivery process should be included.

The call reports include only three noninterest expense categories -- 1) salaries and employee benefits, 2) expenses of premises and fixed assets and 3) other noninterest expenses. There are no allocations of operating expense items to fund-acquisition or fund-using functions. In addition, the size of the nonbanking functions of the bank can not be adequately defined with the FDIC information. For example, all expenses for the farm management, trust and safe deposit departments are included in the above categories. Thus, obtaining operating cost information that is directly associated with credit delivery is difficult with the FDIC call and income report data.

The operating costs are allocated across all fund-using and fund-acquiring functions with the FCAP data. Each participating bank is asked to allocate labor and other operating expenses between the various bank functions. Items that are not functionally distributed by the banks are allocated based on "*experience factors*" from previous FCAP data. There are two major shortcomings with the use of FCAP data. First, only average aggregated cost data for three size categories of banks are published in the FCAP reports. The variability of cost measures across banks can not be determined. Moreover, determination of characteristics of banks that tend to have lower costs can not be estimated with FCAP data. The second major shortcoming involves the reporting of agricultural credit. Agricultural loans are not a specifically allocated loan function, rather, agricultural loans are included in the commercial and other loan function, real estate mortgage function and the installment loan function.

Funding Costs

The major source of funds for commercial banks is deposits. Thus, the major funding cost is the interest paid on deposits. Deposits include interest-bearing and noninterest bearing transaction accounts (i.e. checking, NOW, ATS, etc.) and interest bearing nontransaction accounts (i.e. CD's, savings accounts, IRA's, etc.). Other sources of funds include borrowed funds, federal funds purchased, capital notes and debentures, and other market instruments and liabilities. Funding costs also include the operating costs associated with acquiring and administering deposits.

The interest costs of acquiring funds are reported with the FCAP data. Furthermore, average interest costs for the various instruments can be readily estimated with the FDIC call and income report information. Since 1984, commercial banks are required to report interest paid and quarterly average balances for interest-bearing transaction accounts, MMDA accounts, other savings deposits, time deposits and federal funds purchased. One shortcoming of this approach is that only the average interest cost is available. To more specifically measure the cost of making new loans, the marginal interest rate paid on new funds would be more appropriate.

The noninterest funding-costs include the allocated salaries of bank officers, tellers and other personnel who collect and service deposits. In addition, FDIC insurance, data services, occupancy and other operating expenses allocated to the fund-acquisition activities should be included as funding costs. The data services expense should include the opportunity cost for balances held at correspondent banks providing various loan and deposit functions for the respondent bank. Other funding costs include the opportunity cost of holding required reserves. The amount of required reserves is based on a percentage of deposits and other liabilities.[2] The arguments regarding the applicability of FDIC and FCAP data to estimate operating costs associated with fund acquisition are the same as those for the operating costs for the lending function, i.e. no allocated expenses with the FDIC data and only aggregate information with FCAP data.

Risk Bearing Costs

The risk bearing costs of commercial banks are generally based on probability of loan loss. The probability of loan loss is commonly measured by previous loss rates. Net losses on agricultural production and other loans to farmers can be obtained directly from the FDIC call and income reports for all banks with assets greater than $300M and for all other banks that have agricultural loans and other loans to farmers exceeding 5% of total loans. Loss rates specifically for agricultural loans are not reported with the FCAP data. Losses on agricultural loans are included in losses reported for commercial and other loans, real estate

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[2] Effective December 19, 1989, the Federal Reserve's reserve requirements are 3% for all Eurocurrency liabilities, nonpersonal time deposits less than 1½ years and net transaction accounts up to $40.4 million. The reserve requirement is 12% for all net transaction balances over $40.4M. The Monetary Control Act of 1980 requires that the amount of transaction accounts against which the 3% reserve requirments applies be modified annually by 80% of the percentage change in transaction accounts held by all depository instititions as of June 30 each year.

loans and installment loans. The loss rates at agricultural banks have been well documented and thus, will not be emphasized in this study (USDA).

Data Representation

This study uses four approaches to estimate the costs to deliver agricultural credit. The first approach is to report coefficients from the FCAP data. The second approach is to use a statistical cost accounting model with call report data to estimate the allocation of operating costs across various fund using and fund acquiring activities. The third approach uses FCAP coefficients with call report data to allocate operating costs across fund using and fund acquisition activities. Average interest rates received and charged along with loss rates are also estimated. The fourth approach is to survey individual banks.

FCAP Representation and Results

The FCAP cost and returns for **Commercial and Other loans** (including agricultural production loans) from 1986 to 1988 are reported in table 1. Banks with less than $50 million in deposits (SMALL) are reported separately from banks with $50 million to $200 million in deposits (MED). Items are reported as a percentage of functional volume of commercial and other loans. For example, in 1989 the average loan income for SMALL banks was 11.79%. Loan service charges and fees were 0.15% resulting in total income for commercial and other loans of 11.94% The average agricultural income from loans and service fees was 10.78%. The average proportion of agricultural production loans to total commercial and other loans was 22.73%. After accounting for operating expenses, losses and cost of money, 2.39%, 0.57 and 6.86%, respectively, the net earnings before income taxes for SMALL banks was 2.13%.

The interest rate received by SMALL banks is 35 basis points, on average, higher than MED banks over the last three years. Labor expense allocated to loan delivery is 22 basis points higher for SMALL banks versus MED banks in 1989. Nonlabor expenses ranged between 25 and 31 points higher for SMALL banks versus MED banks from 1987 through 1989. Total operating expenses for SMALL banks are 32 to 52 basis points higher than MED banks.

Table 2 summarizes the FCAP operating costs for various fund using and fund acquiring activities for SMALL and MED banks. Operating costs for demand deposits are over 400 basis points while operating costs for time deposits are under 100. The labor expense for small banks to acquire demand deposits is 206 basis points while the average labor expense for MED banks is 219 basis points. Furthermore, the labor costs for time deposits for SMALL and MED banks are 35 and 33 basis points, respectively. Similar relationships exist for non-labor expenses.

A wide variation of costs also exists between fund using activities. Operating costs for installment loans were 384 and 316 basis points for SMALL and MED banks, respectively, while average operating costs for real estate loans were below 150 basis points, likely reflecting the larger sizes of real estate loans. Operating costs for commercial and other loans at SMALL and MED banks were 239 and 187 basis points, respectively. Operating costs for investments at SMALL and MED banks were 26 and 20 basis points respectively. For fund using activities, the proportion of operating costs allocated to labor expense ranged from 52-58% of total operating expense.

In general, then, the various FCAP cost measures for smaller banks tend to be higher than those for larger banks; this relationship is consistent with the finding of other studies, although the activities reflected in this study represent a greater degree of dissaggregation than has occurred in most other studies.

FDIC Representation and Results

Aggregate measures

The operating cost efficiency measures for agricultural banks from the 1989 FDIC call and income reports are reported in table 3. The banks are classified by size, bank holding company affiliation and location. The cost differences by size were demonstrated with the FCAP data. Furthermore, banks affiliated with a multi-bank holding company may have a different cost structure and different operating objectives than non-affiliated banks (Kolb; Ellinger and Barry). Banks in urban areas also may have to compete more heavily for deposits and thus, may have to spend more money on fund acquisition. In addition, the labor and rental markets in urban areas may be more competitive and thus, more costly than rural areas.

Average net overhead expense declines as bank size increases. In addition, net overhead expense is, on average, higher for banks located in an MSA (URBAN) than banks in rural areas (RURAL). SMALL banks not affiliated with a MBHC tend to have larger net operating expense ratios than SMALL banks affiliated with a MBHC. The ratio of average salary expense as a proportion of earning assets declines as bank size increases. Salary expense as a proportion of earning assets is also, on average, higher for SMALL banks not affiliated with a multi-bank holding company.[3]

The ratios of transaction accounts, large CDs and noninterest bearing deposit accounts to total liabilities are similar among all banks. URBAN banks not affiliated with a holding company have a statistically lower interest cost of money than their RURAL counterparts. In addition, with the exception of URBAN banks not affiliated with a multi-bank holding company, SMALL banks have a significantly lower interest cost than MED banks. The interest costs of selected accounts do not exhibit any specific trends by size, holding company affiliation or location.

The average salary and benefits of bank employees tended to be higher for SMALL banks and banks not affiliated with a multi-bank holding company.[4] The size effect is likely due to the more diverse group of employees at larger banks (Federal Reserve Bank of Dallas). Large banks tend to have more middle

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[3] The mean differences discussed are all significant at the 95% confidence level with the following three exceptions: 1) the means between URBAN and RURAL banks are not significantly different for SMALL/MULTI-BHC banks, 2) the means between SMALL and MED banks are not significantly different for URBAN/BHC banks, and 3) the mean differences between Single/NOBHC and MULTI-BHC are not significantly different for MED banks.

[4] The size effect is significant at the 95% confidence level for all pairs of bank classifications except URBAN/MULTI-BHC banks. The holding company effect is significant for all pairs with the exception of LARGE/URBAN banks.

management salaried employees than small banks, and thus the lower average costs.

These aggregate cost efficiency measures provide little information about the total cost efficiency and specific delivery costs of commercial banks. The higher net overhead expense to average earning asset ratio for small banks may simply be an indication of the predominant use of demand deposits at small banks. Results from the FCAP report suggest a higher cost of administering demand deposits than time deposits while the interest costs are lower for demand deposits. Similarly, banks that emphasize installment loans will have higher operating costs. Thus, higher bank operating expenses are not a direct indication of higher loan delivery costs. The portfolio mix of loans and deposits along with interest costs need to be taken into account with operating costs to determine overall cost efficiency.

Cost Accounting Statistical Model

One method to allocate operating costs across fund acquisition and fund using functions is the traditional statistical cost accounting model. (Kwast and Rose; Rose and Wolken). Revenue and costs are expressed as weighted sum of a firm's various assets and liabilities, where the weights are the average revenues or costs attributable to each item. Net income is represented as

$$Y = \sum_{i=1}^{M} r_i A_i + \sum_{j=1}^{N} d_j L_j \qquad (1)$$

where, A_i = ith asset, i = 1, . . . , M
L_j = jth liability (or equity), j = 1, . . . , N
Y = net income

and, the coefficients r_i and d_j are interpreted as the net average rate of return attributed to each respective balance sheet item.[5] For purposes of this study, the model is transformed into an operating cost accounting model. Net income (Y) is replaced with net operating costs.[6] The coefficients (r_i and d_j) are weights given to the average cost attributed to each balance sheet item.

In this study, three additional variables are also added to the basic model. First, an intercept dummy variable for multi-bank holding company (MBHC) affiliation is included. Second, intercept and slope dummy variables indicating

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[5] Negative coefficients are expected for d_j.

[6] Net operating costs are the sum of salaries and employee benefits, expenses of premises and fixed assets and other noninterest expenses, net of all noninterest and nonservice charge income.

bank location in a metropolitan statistical area (MSA) are added.[7] Previous studies have shown banks located in rural areas may be competing in different lending and fund acquisition environments than banks located in urban areas (Aly et al.; Hannan and Rhoades; Mikesell). Third, a variable indicating the degree of agricultural lending is also included. Banks that become more specialized in agricultural lending may benefit from some operating cost efficiencies. The resulting cost accounting model is:[8]

$$OC=\beta_1(1/TA)+\sum_{i=1}^{7} r_i A_i+\sum_{j=1}^{5} d_j L_j+\beta_2 MBHC+\beta_3 URBAN+\beta_4 AGR+\epsilon \qquad (2)$$

where,

OC = bank net operating costs

A_i = ith asset, i = 1, . . . , 7 deflated by total assets[9]

- A_1 = cash and due from depository institutions
- A_2 = federal, state and local securities
- A_3 = federal funds sold
- A_4 = real estate loans
- A_5 = installment loans and loans to individuals
- A_6 = commercial and other loans
- A_7 = all other assets

L_j = jth liability (or equity), j = 1,. . . , 5

- L_1 = transaction accounts
- L_2 = nontransaction deposit accounts
- L_3 = federal funds purchased
- L_4 = all other liabilities
- L_5 = equity capital

1/TA = intercept term deflated by total assets

MBHC = multibank holding company affiliation (1 if affiliated with a MBHC, 0 otherwise)

URBAN = MSA dummy variable (1 if located in MSA, 0 otherwise)

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[7] There is no apriori justification for assuming MBHC affiliation affects costs other than equi-proportionally across all balance sheet and thus, an intercept dummy for MBHC is included. Banks in urban areas may have to compete more heavily for deposits and thus, may have to spend more money on acquiring deposits. In addition, banks in urban areas may be located in separate labor and rental markets and have to pay different rates than rural banks. Thus, MSA intercept and slope dummies for loans and deposits were estimated in the original model. All dummy slope coefficients are insignificant at the 95% confidence level.

[8] A model separating agricultural loans was also estimated. The coefficient for agricultural loans was not significantly different than commercial loans. Thus, to maintain consistency with FCAP data the model with agricultural loans included in commercial loans is reported.

[9] To correct for heteroskedasticity the balance sheet items are deflated by total assets. Loan loss reserves unearned income on loans are added to total assets, other assets and equity capital. The individual loan categories do not include loan loss reserves or unearned income and thus, to have all the asset proportions sum to unity, these adjustments need to be made.

r_i = estimated cost coefficient for asset i
d_i = estimated cost coefficient for liability j
$ß_i$ = estimated coefficients, i = 1, . . ., 4

Due to the balance sheet identity, all assets and liabilities can not be included as independent variables. Cash and equity are normally excluded from the model (Rose and Wolken; Kwast and Rose). The common arguments are that the expected return to cash is zero while the cost of equity is not explicitly measured in costs and earnings. Rose and Wolken found a significant return to cash and suggested a transformed model that only excluded equity capital, but interpreted as model outlined above. Thus, the Rose and Wolken model is used to estimate the regression coefficients for the statistical cost accounting model. The sample includes all agricultural banks on December 30, 1989. A listing and univariate statistics of the balance sheet variables in the statistical model are reported in table 4.

Results from the statistical model are shown in table 5. Similar to the results reported with the FCAP data, installment loans exhibited the highest costs followed by commercial and other loans and real estate loans, respectively. The operating costs of acquiring transaction accounts deposits were almost three times as costly as nontransaction accounts. In addition, the MBHC, URBAN and AGR variables are significant at the 99% confidence level. The negative sign on MBHC indicates that agricultural banks affiliated with a holding company tend to have lower operating costs. The positive sign on the URBAN variable indicates banks in urban areas tend to have higher costs than banks in rural areas. Furthermore, AGR is negative indicating more specialized agricultural banks, on average, tend to have lower operating costs.

The regression coefficients indicate costs that are directly associated with a specific asset or liability account. The coefficient values for 1/TA, A_0, A_7 and L_4 are not directly associated with a fund acquisition or fund using process and thus, should be allocated. On average, this allocation would be approximately $175,000. If this entire amount were allocated as a proportion of loan volume to the three loan areas, the coefficients for r_4, r_5, r_6 would increase by 1.0%, 1.0% and 1.1%, respectively.

The confidence limits are reported to allow a comparison between FCAP results and the cost accounting allocation model. If at least 50% of the unallocated costs are allocated to the loan function, all of the confidence intervals encompass the FCAP values for SMALL and MED banks for real estate loans, installment loans, commercial and other loans, demand deposits, and time deposits.[10]

The results from the cost accounting statistical model are consistent with the FCAP reports. Transaction deposits and installment loans have, on average, higher operating costs than other deposits and loans, respectively. The statistical cost model also suggests that banks located in rural communities have lower operating costs than banks located in urban areas. Banks affiliated with multi-bank holding companies, on average, exhibited lower operating costs, while banks with a higher concentration in agricultural loans exhibited lower costs.

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[10] For purposes in this study, transaction deposit accounts are assumed to be equivalent to demand deposits.

A shortcoming with this analysis is the inability to estimate a single bank's operating costs. Only average characteristics and trends are observed with this technique.

Allocation Technique

A simple allocation technique is used to allocate operating costs among the various fund-using and fund-acquiring functions, and thus to extend the usefulness of the aggregate cost data from the FDIC call reports. The FCAP coefficients reported in table 2 are used to estimate the hypothetical cost for a specific bank. For example, the operating cost coefficient for each bank function is multiplied by the level of function activity for that bank. The costs for each function are aggregated to approximate the hypothetical cost for the bank. The hypothetical cost is then compared to the actual cost as reported on the FDIC call reports. The cost coefficients for each bank are estimated by multiplying the proportion of actual cost to hypothetical cost by each FCAP coefficient.

Average results for all agricultural banks after making the the allocations and estimations are reported in table 6. As reported with the statistical cost model, operating costs for RURAL banks tend to be lower than URBAN banks.[11] With the exception of MED/MBHC banks, the loan revenue from agricultural banks is also higher for URBAN banks, resulting in a higher net earnings before losses for URBAN banks. Losses and cost of money do not exhibit a consistent pattern by bank location. Thus, net earnings after cost of money tends to be higher for URBAN banks.

With the exception of MED/URBAN banks, results by bank holding company affiliation indicate that loan revenue was higher and labor costs were lower for banks affiliated with a multi-bank holding company. With losses and cost of money exhibiting no specific trend by holding company level, the average net earnings after cost of money is higher for banks affiliated with a multi-bank holding company.

The loan revenue for MED banks is similar to SMALL banks, while average operating costs tend to be lower for MED banks. Similar to results stated above, losses and cost of money are similar across size categories. With the exception of URBAN/MBHC banks, SMALL banks earned less after cost of money than MED banks.

Survey Approach

The fourth approach in the estimation of agricultural delivery costs is to survey individual banks. The main objective of the survey was to provide support for the measures obtained from the FCAP and FDIC data. More details regarding the explanations for the differences in delivery costs, especially in the area of labor management, was also desired. A mail survey of agricultural banks in Illinois, Iowa, Indiana, Arkansas and Missouri was conducted. The first mailing of the survey was sent to all agricultural banks on July 27th, 1990. A follow-up

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[11] Labor and salary expense was significantly different at the 90% confidence level for all pairs by size, location and holding company affiliation. Other expenses exhibited some significant differences, but not across all categories.

survey was sent one month later. An agricultural bank was defined to have agricultural loans greater than $2.5 million or a ratio of agricultural loans to total loans that exceeded 0.25 as of year end 1989. The dual criteria of a loan concentration ratio and loan volume were used in order to include larger commercial banks with a large volume of agricultural loans, but not necessarily a high concentration in agricultural lending.

The survey elicited information from each person in the bank that was involved in lending or servicing agricultural loans. The respondents were asked to allocate their time between agricultural production loans, agricultural real estate loans, other loans, deposit activities, investment activities and nonbanking activities. In addition, each respondent was asked to give their annual salary range, an annual budget of specific expense items along with the amount of days spent for various agricultural lending activities.

Information regarding the agricultural loan completion process is also collected. The agricultural loan completion process information addresses the current practices regarding lending to farm borrowers. Information gathered includes the proportion of borrowers that are required to complete various financial statements along with the average time spent with farm borrowers at various stages of the agricultural lending process. Details regarding the number, size and maturity of agricultural loans are compiled. Information on numbers and average salaries of employees and allocations of time between loan, deposit, investment, and other activities were requested. In addition, specific information regarding data services and correspondent fees and balances are also reported.

The overall response rate was 11% with only 6% being usable due to incomplete information.[12] The low response rate was expected since the survey had to be completed by at least two people in each bank. One survey reviewer comments were " . . . send out a lot, expect a low return . . .". Moreover, the motivation for banks to complete this information is demonstrated by the relatively low participation in the voluntary FCAP program. In 1989, less than 2% of commercial banks completed the FCAP survey information.

The results from the survey are reported in table 7. The efficiency measures in the first section of table 7 provide support that small banks have fewer borrowers per loan officer than larger banks, while banks affiliated with a multi-bank holding company tend to have fewer borrowers with larger loans than banks not affiliated with a bank holding company. SMALL/single-NOBHC banks have an average 137 farm borrowers and $4.5 million of agricultural loans per full time equivalent loan officer while SMALL/MULTI-BHC banks have an average 106 borrowers and $6.3 million agricultural loans. Furthermore, MED/Single-NOBHC banks have an average 148 farm borrwers and $8.8 million loans and MED/MBHC banks have 129 farm borrowers and $10.0 million of agricultural loans per full time equivalent loan officer.

The second section reports allocated cost items as a percentage of agricultural loan volume. The size and holding company affiliation effects are similar to the results reported with the FDIC data. The average loan officer salary and benefits

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[12] The incomplete information was due to only one of the two sections being returned by a bank.

expense was higher for SMALL banks than MED banks. In addition, banks affiliated with a multi-bank holding company tend to have lower labor costs than single/NOBHC. Other salaries and data services expense exhibit little variation by bank size or holding company affiliation.

The third section describes specific loan officer expenses as a proportion of agricultural loans. The cost of problem loans ranged from 21 basis points for SMALL/single-NOBHC banks to 10 basis points for MED/MBHC banks. The average labor cost of agricultural public relations and FmHA compliance was 7 and 9 basis points respectively.

The average loan size was lower for small banks and banks not affiliated with a multi-bank holding company. The average production loan size for small/single-NOBHC banks was $54,824 while the average production loan sizes for MED/single-NOBHC, small/BHC and MED/MBHC banks were $78,508, $81,980 and $106,538, respectively. The proportion of production loans less than $50,000 ranged from 62.1% for small/single-NOBHC banks to only 25.8% for MED/MBHC banks. Results for agricultural real estate loans exhibited similar characteristics as production loans. Banks affiliated with multi-bank holding companies have a slightly higher proportion of borrwers with both real estate and production loans (30%) than banks not affiliated with a multi-bank holding company (23%). This higher proportion of borrowers is one of the likely explanations for lower loan costs. The cost of obtaining borrower information should be reduced as subsequent loan requests are made.

The final section of table 7 shows the amount and distrubution of annual time spent specifically with each borrower. On average, banks spend 7.1 hours per loan customer per year. Appoximately one-fourth of that time is spent preparing financial statements and one-third is used for analyzing, verifying and approving loans. The remaining time is used for farm visits and monitoring progress of the farm borrower. Larger banks tend to allocate more time for farm visits. MED banks visit an average over 60% of farm borrowers while SMALL banks visit less than 50%. This is likely a result of the larger predominance of small loans at SMALL banks. SMALL banks are unlikely to visit borrowers with very small loans.

This study used various methods to measure the operating costs of agricultural banks. A summary of the results is shown in table 8. The results are consistent across the three samples in terms of cost/size relationships . A common conclusion is total cost of money is relatively equal across banks of different size, location and ownership structure. Another consistent result is the higher labor cost of delivering loans for smaller banks.

Conclusion

In addtion to the cost/size relationships discussed above, results also indicate that banks located in rural areas tend to have lower opearing costs than banks located in or near metropolitan areas. This is a likely consequense of reduced competition for deposits and loans from other banks in rural regions and the differing labor and rental markets faced by metropolitan banks. Furthermore, banks with a higher concentration of agricultural loans exhibited lower operating costs. The tradeoffs between operating cost efficiencies resulting from concentation and the increased susceptibility of loan loss due to lack of industry diversification is a problem many agricultural bank managers must face.

The survey results indicate the higher labor cost per dollar of loan is largely due to a higher proportion of smaller loans at smaller banks than at larger institutions. Banks affiliated with a multi-bank holding company have concentrated more heavily on larger loans and borrowers that have information currently on file for other types of loans. The time spent per borrower is not significantly different between large and small banks or by affiliation with multi-bank holding companies. It appears the amount of attention given the farm borrower does not differ by characteristic of bank, but results indicate that the size of farm borrower does differ.

The banking industry is currently undergoing a vast change in structure. Banks affiliated with holding companies currently control 93% of all bank assets. The effects of this structural change on the availability of credit for the small farmer has yet to be determined. Implications from this study indicate that larger banking organizations are concentrating more heavily on larger farm borrowers. This study also indicates that organizations that have concentrated on larger farm loans have lower operating costs per dollar of loan, and thus the likely motive to move towards larger loans. Increases in technology and expanding information services have reduced the operating costs of obtaining and processing small loan information for non-farm borrowers. The continued development of services to process borrower information for the farm sector is essential to the long-run availablity of low cost credit for smaller farms.

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Table 1. Costs and returns for **Commercial and Other loans**, Functional Cost Analysis data, 1987-89.

(SMALL)	--- Banks Less than $50M deposits ---		(MED)	---Banks $50 to $200M in deposits---		
	1989	1988	1987	1989	1988	1987
Number of banks	47	101	125	119	215	245
INCOME						
Loans	11.79 %	10.54 %	10.12 %	11.37 %	10.30 %	9.75 %
Service charges and fees	0.15	0.23	0.23	0.15	0.21	0.23
TOTAL INCOME	11.94 %	10.77 %	10.35 %	11.52 %	10.51 %	9.98 %
MEMO: Agricultural Loans Income	10.78 %	10.42 %	10.39 %	10.83 %	10.24 %	10.21 %
Proportion agr./commercial & other loans	22.73	18.11	14.95	9.55	9.01	8.97
EXPENSE						
Officer Salaries	0.84 %	0.78 %	0.79 %	0.69 %	0.69 %	0.71 %
Employee Salaries	0.23	0.21	0.21	0.20	0.21	0.22
Fringe Benefits	0.24	0.20	0.21	0.20	0.19	0.18
TOTAL LABOR & SALARY	1.31 %	1.19 %	1.21 %	1.09 %	1.09 %	1.11 %
Data Services	0.18	0.15 %	0.15 %	0.09 %	0.10 %	0.10 %
Occupancy	0.17	0.17	0.20	0.15	0.15	0.15
Fees: Legal and other	0.13	0.14	0.18	0.11	0.10	0.12
Other Operating Expenses	0.61	0.57	0.65	0.42	0.46	0.50
TOTAL NON-LABOR & SALARY EXPENSES	1.08 %	1.03 %	1.18 %	0.78 %	0.78 %	0.87 %
TOTAL OPERATING EXPENSES	2.39	2.22 %	2.39 %	1.87 %	1.90 %	1.98 %
NET EARNINGS BEFORE LOSSES	9.55	8.55 %	7.96 %	9.65 %	8.61 %	8.00 %
Net losses	0.57	1.03	1.51	0.70	0.84	1.13
Net earnings	8.98 %	7.52 %	6.45 %	8.95 %	7.77 %	6.87 %
Total cost of money	6.86	6.26	6.20	6.99	6.37	6.17
NET EARNINGS AFTER COST OF MONEY[1]	2.13	1.26 %	0.25 %	1.95 %	1.40 %	0.70 %

[1] Net earnings are on a pre-income tax basis.

Table 2. Operating costs for selected fund acquiring and fund using activities, 1989 FCAP data.

	Labor Expense	Non-Labor Expense	Total
Fund Acquiring Activities		*percentage of functional volume (%)*	
Demand deposits			
SMALL[1]	2.06	2.11	4.17
MED	2.19	2.27	4.46
Time deposits			
SMALL	0.35	0.49	0.84
MED	0.33	0.55	0.78
Fund Using Activities			
Investments			
SMALL	0.15	0.11	0.26
MED	0.11	0.09	0.20
Real Estate Loans			
SMALL	0.75	0.70	1.45
MED	0.66	0.49	1.15
Installment Loans			
SMALL	2.03	1.81	3.84
MED	1.72	1.44	3.16
Commercial and Other			
SMALL	1.31	1.08	2.39
MED	1.09	0.78	1.87

[1] SMALL banks are banks with deposits less than $50 million and MED banks are banks with deposits between $50M and $200M.

Table 3. Operating cost efficiency measures and interest cost of money for agricultural banks by bank holding company affiliation, bank size and location. 1989 FDIC quarterly Call and Income reports[1]

	Single/NOBHC[2]				MULTI-BHC[3]			
	Total Deposits				Total Deposits			
	less than $50M		greater than $50M		less than $50M		greater than $50M	
	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
Number of Banks	2,549	305	427	51	499	79	170	25
NET overhead expense/ Average earning assets (%)	2.59	2.80	2.10	2.31	2.49	2.53	2.27	2.47
Salary Expense/ Average earning assets (%)	1.73	1.88	1.40	1.58	1.55	1.61	1.42	1.58
Transaction deposit accounts / total liabilities (%)	27.2	27.0	24.4	23.9	27.5	25.3	26.0	25.1
Large Certificates of Deposit (CDs)/ total liabilities (%)	8.3	8.3	8.2	8.2	8.2	8.2	8.1	8.0
Noninterest bearing deposit accounts/ total liabilities (%)	12.2	13.7	11.1	12.2	11.5	10.9	11.8	13.1
Average interest cost of money (%)	6.01	5.86	6.19	6.03	6.01	6.10	6.12	5.99
Selected Interest Costs (%)								
Transaction accounts (all)	2.80	2.56	2.76	2.38	2.88	2.81	2.65	2.49
Transaction accounts (interest bearing)	5.03	5.02	5.07	4.89	4.98	5.03	4.87	4.85
MMDAs	5.82	5.85	5.91	5.84	5.69	5.70	5.85	6.09
Large CDs	7.82	7.81	7.75	7.81	7.90	8.10	8.10	7.91
Salary and benefits per employee ($000)	28.38	28.33	26.80	26.33	26.31	26.83	25.38	25.64
Earning assets per employee ($000)	1,767	1,673	2,057	1,800	1,799	1,781	1,892	1,764

1 *Agricultural banks are banks with an agricultural loan ratio greater than the unweighted average for all commercial banks.*

2 *Single/NOBHC are commercial banks that are either affiliated with a single bank holding company or not affiliated with a bank holding company.*

3 *MULTI-BHC are commercial banks that are affiliated with a multi-bank holding company.*

4 *URBAN banks are commercial banks located in an MSA. RURAL banks are all commercial banks not located in an MSA.*

Table 4. **Univariate statistics of variables in a cost accounting model for agricultural banks, FDIC call reports 1989.**

Variable	Description	Average Proportion of Total Assets	Std. Deviation Proportion of Total Assets
Assets			
A_1	cash and due from depository institutions	8.1	6.32
A_2	federal, state and local securities	36.6	14.29
A_3	federal funds sold	5.8	4.88
A_4	real estate loans	17.7	9.96
A_5	installment loans & loans to individuals	7.1	4.41
A_6	commercial and other loans	22.0	10.61
A_7	all other assets	3.2	3.02
Liabilities			
L_1	transaction accounts	23.8	7.39
L_2	nontransaction deposit accounts	64.6	8.46
L_3	federal funds purchased	0.4	1.43
L_4	all other liabilities	1.4	0.89

Table 5. OLS estimates of statistical cost accounting model, FDIC call reports - 1989

Coefficient	Coefficient value	P-Value[1]	95% confidence interval LOW	HIGH
r_1	0.662	0.8095	-0.472	0.605
r_2	-0.409	0.0801	-0.867	0.049
r_3	0.577	0.0478	0.006	1.150
r_4	0.427	0.1070	-0.092	0.946
r_5	2.201	0.0001	1.560	2.843
r_6	1.585	0.0001	1.050	2.120
r_7	4.269	0.0001	3.258	5.010
d_1	4.193	0.0001	3.629	4.757
d_2	1.539	0.0001	1.032	2.047
d_3	2.188	0.0014	0.843	3.533
d_4	-0.511	0.6314	-1.578	2.600
β_1	0.639	0.0001	0.598	0.678
β_2	-0.103	0.0001	-0.150	-0.056
β_3	0.158	0.0001	0.101	0.215
β_4	-0.683	0.0001	-0.824	-0.541
Adjusted R^2	0.955			

[1] One minus the p-value is the significance level of regression overfficient. For instance, a coefficient with a p-value of .050 or less is significant at the 95% confidence level.

Table 6. Estimated cost of loan delivery at agricultural banks by size and bank holding company affiliation and location. 1989 FDIC quarterly Call and Income reports.

	Single/NOBHC[2]				MULTI-BHC[3]			
	Total Deposits				Total Deposits			
	less than $50M		greater than $50M		less than $50M		greater than $50M	
	RURAL[1]	URBAN	RURAL	URBAN	RURAL	URBAN	RURAL	URBAN
Number of Banks	2,549	305	427	51	499	79	170	25
Agricultural loan ratio (%)	38	28	30	23	33	23	25	18
	percentage of functional loan volume (%)							
Agricultural loan revenue	11.46	11.85	11.48	11.79	11.71	12.1	11.84	11.57
Labor expense	1.43	1.53	1.04	1.11	1.23	1.31	0.97	1.00
Occupancy & premises exp.	0.26	0.29	0.18	0.20	0.25	0.25	0.17	0.18
Other operating expense	0.67	0.71	0.42	0.47	0.72	0.68	0.51	0.53
Total operating expenses	2.36	2.53	1.64	1.78	2.20	2.24	1.65	1.71
Net earnings before losses	9.10	9.32	9.84	10.01	9.51	9.86	10.19	9.86
Average 2 year net loss on agricultural loans	0.43	0.53	0.49	0.11	0.49	0.37	0.26	0.74
Net earnings	8.67	8.79	9.35	9.90	9.02	9.49	9.93	9.12
Cost of money								
Interest cost	6.01	5.86	6.19	6.03	6.01	6.10	6.12	5.99
FDIC insurance	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
Other operating expenses	1.69	1.83	1.49	1.61	1.62	1.59	1.59	1.70
Cost of reserve requirements	0.18	0.18	0.18	0.17	0.18	0.19	0.16	0.15
Less: Service charge income	0.37	0.46	0.31	0.37	0.37	0.40	0.35	0.38
Total cost of money	7.59	7.49	7.63	7.52	7.52	7.56	7.60	7.54
Net earnings after cost of money	1.08	1.30	1.72	2.38	1.50	1.93	2.33	1.58

[1] *Agricultural banks are banks with an agricultural loan ratio greater than the unweighted average for all commercial banks.*

[2] *Single/NOBHC are commercial banks that are either affiliated with a single bank holding company or not affiliated with a bank holding company.*

[3] *MULTI-BHC are commercial banks that are affiliated with a multi-bank holding company.*

[4] *URBAN banks are commercial banks located in an MSA. RURAL banks are all commercial banks not located in an MSA.*

Table 7. Survey results on labor and data services costs to deliver agricultural credit, by bank size.
University of Illinois Bank Survey

		Single-NOBHC total deposits		Multi-BHC total deposits	
	All banks	less than $50M	greater than $50M	less than $50M	greater than $50M
Number of responses	79	39	18	10	12
1. Efficiency measures as a proportion of full time equivalent loan officers (FTELO)					
Loan officer salary/FTELO ($)	38,530	38,825	36,991	40,261	38,429
Farm borrowers/FTELO	124	137	148	106	129
Agricultural loans/FTELO ($000)	6,574	4,555	8,817	6,301	10,019
Production loans/FTELO ($000)	5,873	5,383	6,277	5,347	7,288
2. Specific allocated cost items per $ of agricultural loan volume					
Loan officer salary and benefits (%)	0.85	1.11	0.55	0.95	0.40
Other salaries & wages (%)	0.20	0.21	0.22	0.20	0.21
Data services expense (%)	0.14	0.13	0.14	0.19	0.14
3. Estimated loan officer salary expense per $ of agricultural loan volume for the following purposes					
Problem loans (%)	0.17	0.21	0.11	0.12	0.10
Agr. public relations (%)	0.07	0.08	0.05	0.07	0.04
FmHA compliance (%)	0.09	0.14	0.05	0.07	0.03
4. Average Loan Size					
Agricultural Production ($)	71,513	54,824	78,508	81,980	106,538
Agricultural Real Estate ($)	102,205	80,171	121,485	102,160	144,933
5. Proportion of Loans less than $50,000					
Agricultural Production (%)	50.2	62.1	47.1	38.9	25.8
Agricultural Real Estate (%)	20.5	28.3	16.6	13.2	7.0
6. Proportion of borrowers with					
both Real Estate and Production loans (%)	25	22	25	31	30
7. Bank personnel time spent specifically with each borrower per year					
Average bank hours allocated to					
specific agr. loan borrower (hrs./borrower/yr.)	7.1	7.1	7.3	6.7	6.8
Proportion time					
farm visits	17.6	15.6	21.6	14.6	19.6
preparation assistance	24.9	25.8	27.8	22.6	19.5
analyzing, verify and approving loan	33.6	32.9	30.1	37.1	38.8
monitoring progress	23.9	25.6	20.4	25.7	22.1
	100.0	100.0	100.0	100.0	100.0
Borrowers that bank					
makes at least 1 farm visit per year (%)	51.9	44.2	61.7	53.0	61.3

Table 8. Agricultural Delivery Cost Comparisons of the three data sources; Functional Cost Analysis, FDIC and University of Illinois Bank Survey

	FCAP[1]		FDIC[2]		UI SURVEY[3]	
	less than $50 deposits	$50 to $200M deposits	less than $50M assets	more than $50M assets	less than $50M assets	more than $50M assets
	Percentage of functional volume					
Deposit Costs						
Interest cost	5.61	5.67	6.00	6.15	6.23	6.16
Labor cost	0.79	0.74	0.87	0.74	0.61	0.61
Data services cost	0.15	0.17	NA	NA	0.14	0.14
All other costs[4]	0.25[5]	0.35	0.70[6]	0.72	0.86[6]	0.91
Total Deposit Costs	6.80	6.93	7.57	7.61	7.84	7.82
Loan delivery costs						
Labor cost	1.31	1.09	1.41	1.03	1.32	0.68
Data services cost	0.18	0.09	NA	NA	0.14	0.15
All other costs	0.90	0.69	0.93	0.63	0.67	0.71
Total Loan Delivery Costs	2.39	1.87	2.34	1.65	2.13	1.54

[1] Federal Reserve Bank functional cost analysis data for 1989. Loan delivery coefficients are from commercial and other loans.
[2] Federal Deposit Insurance Corporation call and income quarterly report information for 1989.
[3] University of Illinois, Department of Agricultural Economics, bank survey, administered 8/90.
[4] Includes deduction for service charge income
[5] Does not include cost for reserve requirements.
[6] Includes cost for reserve requirement