What makes a bank efficient? – A look at financial characteristics and bank management and ownership structure

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Efficient and effective utilization of resources are key objectives of every banker. These topics have always been important in banking, but a number of recent events are helping to bring even greater emphasis to banking efficiency. Increasing competition for financial services, technological innovation, and banking consolidation, for example, are all focusing more attention on controlling costs in banking and providing services and products efficiently.

Increasing competition from nonbank institutions and from banks expanding into new markets is putting strong pressure on banks to improve their earnings and to control costs. Efficiency is clearly a critical factor in remaining competitive, and a number of recent statistical studies have shown that the most efficient banks have substantial cost and competitive advantages over those with average or below average efficiency.[1]

Technological innovation, in the form of improvements in communications and data processing, is also bringing added emphasis to efficiency. Such improvements are giving banks and other financial institutions opportunities to dramatically raise productivity and begin delivering many services through electronic means. Even the smallest banks are automating more and more of their operations, and banks and nonbank firms of all sizes are finding cost-effective ways to introduce new products and compete more directly with each other.

Much of the consolidation movement is also being spurred by the hope of increasing efficiency. Organizations commonly view acquisitions as a way to spread the costs of backroom operations and product development over a larger base and to design more efficient branch delivery systems by eliminating overlapping offices, personnel, and other duplicative resources and services.

All of these trends suggest that cost control must be a central objective of bankers and that utilizing resources in an efficient and effective manner will be of paramount

[1] Most of these studies, in fact, suggest that the average bank may be incurring expenses that are 20 to 25 percent higher than the most efficient banks. For a review of these studies, see Allen Berger, William Hunter, and Stephen Timme, "The Efficiency of Financial Institutions: A Review and Preview of Research Past, Present, and Future," *Journal of Banking and Finance* 17 (April 1993): 221-249.

importance to banking success. This study identifies a number of characteristics of the most efficient and least efficient state-chartered banks in the Tenth Federal Reserve District.[2] By comparing financial characteristics, ownership, and management of these two sets of banks, the study will attempt to reveal factors that can contribute to efficient banking operations.

The first part of the study describes the criteria used to define one set of efficient banks and another set of inefficient banks. The following sections then discuss the financial characteristics of the banks and their ownership and management structure.

Measurement of efficiency

The banks in this study are a sample of state-chartered banks in the Tenth District that meet specified criteria on both a cost efficiency and a profitability test. These combined tests look at the ability of banks to use their resources efficiently both in producing banking products and services and in generating income from these goods and services.

In measuring bank efficiency, this study relies on a broader concept of efficiency than that which can be measured by common overhead ratios or other accounting-based measures of efficiency. First, the measure of cost efficiency is based on a statistical model of bank production costs, which controls for bank output mix, market conditions, and other important factors that would not be accounted for in the expense or efficiency ratios many bankers use. Second, a profit test is also used, because a seemingly inefficient bank might be offsetting higher expenses with higher revenues. These cost efficiency and profitability tests and the sampling procedures are described in more detail in Box 1 on pages 4 and 5. In general, banks that do well on both tests make up the most efficient bank category, while banks that fare poorly on

the two tests are in the least efficient category.

A total of 73 state banks satisfy the selection criteria for the most efficient group and 70 state banks meet the standards for the least efficient group.[3] Table 1 reports the average values for the two performance measures in the study, the cost efficiency index and the adjusted return on average assets (income before taxes, extraordinary items, and provisions for loan losses). The average bank in the least efficient group has a cost efficiency index of .71, which indicates that the bank with the highest efficiency in our sample could have produced the same amount of banking output as the least efficient banks at only 71 percent of their cost. The cost efficiency index for the average bank in the most efficient group is .94, thus indicating much less of a disparity with the "best" bank in the sample. The adjusted return on average assets for the most efficient banks is 2.31 percent, which is twice that earned by banks in the least efficient group.

According to Table 1, return on average assets and noninterest costs relative to average assets, which are two traditional performance measures, also show similar patterns. For example, the most efficient banks as a group have a much lower overhead cost ratio than the least efficient banks, 2.89 percent compared to 4.00 percent, and their return on average assets is twice that of the least efficient group. All of these performance measures therefore suggest that the most efficient and the least efficient banks have significant differences in their ability to use resources and generate earnings.

Financial characteristics of efficient and inefficient banks

An initial step in analyzing efficient and inefficient banks is to compare their major sources of income and expenses and their balance sheet components. As

shown in Table 2 on page 6, the efficient and inefficient banks have a number of interesting differences, but also are similar in several aspects.

On the earnings side, much of the advantage held by the most efficient banks is in generating interest income and controlling expenses. These banks, for instance, have a 40 basis point advantage over the inefficient banks in the interest earned on assets. The least efficient banks, on the other hand, have a higher noninterest income than the most efficient banks, suggesting that there may be some differences in the way the two groups generate income.

With regard to expenses, the most efficient and least efficient banks incur nearly identical interest expenses. If other factors are equal, this would imply that the most efficient banks have no notable advantages in funding costs—they are achieving their performance through other means. Most important, the efficient banks are very effective in controlling costs. Their salary and benefits expenses as a percent of total assets are only about 80 percent of that incurred by the least efficient banks. Other expense components are also much smaller for the most efficient banks, which indicates that these banks are making a strong effort at cost control across all of their operations. These expense differences, as well as the income differences, are all significant from a statistical standpoint.

The assets held by the most efficient banks differ from their counterparts in several ways. First, efficient banks hold fewer securities and are far more active lenders. As a percent of total assets, loans make up over eight percentage

points more of the portfolio at efficient banks than at inefficient banks. This difference results, in part, from using a profitability test to separate these banks. However, it also suggests that the lower cost structure of the efficient banks is not due to engaging in activities with lower resource requirements, such as holding securities. Instead, these banks participate more heavily in activities requiring the most resources (lending), thereby indicating that they must be better in utilizing their banking inputs. A final important portfolio trait of efficient banks is that their investment in premises and fixed assets is less than 60 percent of the level at the least efficient banks.

The efficient banks have a somewhat higher level of transaction accounts and lower levels of other types of deposits. Thus, if anything, they are probably

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Table 1

Sample bank information
(Year-end 1994)

	Most efficient banks	Least efficient banks
Number of banks	73	70
Performance measures (group averages)		
Cost efficiency index	0.94	0.71
Adjusted return on average assets	2.31%	1.11%
Noninterest cost/total assets	2.89%	4.00%
Return on average assets	1.47%	0.72%
Asset size (in millions of dollars)		
Group average	$48	$48
Group median	$35	$24
Number of banks, by asset size		
Under $25 million	22	35
$25 to $50 million	32	15
$50 to $100 million	14	12
$100 million or more	5	8

Box 1: Banks Selected for the Study

The banks in this study are a sample of state banks that meet selected criteria on both a cost efficiency and profitability test. The sample is restricted to state banks, because a broad range of ownership, management, and directorship information is available in their examination reports.

The cost efficiency test used in this study is based on a statistical model of bank production costs, and the banking data used in the model are from information banks supply in their Reports of Condition and Income.[1] This cost efficiency model looks at the cost expenditures of banks (interest plus noninterest expenses) as a function of selected variables thought to influence the cost structure of banks and a cost residual, which reflects the costs that cannot be explained by the banking variables. These unexplained costs are assumed to be a measure of a bank's excess expenditures or cost inefficiency.

The first set of variables in the model attempts to relate a bank's costs to the output it produces. These output variables include the major types of loans banks produce (amount of commercial and agricultural production loans, consumer loans, and real estate loans), transaction and liquidity services (volume of transaction deposits is used as a proxy), and fee-based activities (proxied by total fee income). A second set of explanatory variables includes the prices a bank faces for basic factors of production (average wages and benefits at the bank, cost of borrowed funds, and cost of plant and equipment). A third set of variables controls for bank risk exposure (risk-weighted assets and equity capital), added costs due to recent mergers or acquisitions (amount of bank assets acquired over the last 24 months), and market conditions and regulatory environment (proxied by a set of dummy variables indicating the state in which a bank operates).

From this information and the individual bank cost residuals, the model estimates an efficient cost frontier, which represents the expense levels that would prevail for the most efficient or "best practices" bank, given various output mixes, input prices, and other factors. A bank's actual expenses can then be compared to that of the hypothetical "best practices" bank having the same output mix and operating under the same banking conditions. The more efficient a bank is, the closer its expenses should be to this frontier. Banks on the frontier would have a cost efficiency index of "1" and this index would then decline as banks operate with higher costs and move above the frontier.

A cost function was estimated for 1,439 banks in the Tenth Federal Reserve District over the period from 1990 through 1994, and an efficiency index was created for each bank based on an average of the annual values of the bank's residuals. This five-year analysis of banking costs helps to ensure that the model is identifying long-run cost differences between banks rather than short-run anomalies. Every District bank was included in the cost function as long as it had been in existence for at least five years prior to 1990, remained in existence through 1994, offered a full range of banking services, and reported all the information needed for the cost efficiency model.

[1] For a more technical description of this model, see the appendix.

Box 1: Banks Selected for the Study (continued)

A profitability test was also applied to these same banks, using their adjusted returns on assets (adjusted ROA) in 1994. This adjusted ROA equals income before taxes and deductions for extraordinary items and loan loss reserves, divided by total bank assets. Compared to other measures of income, adjusted ROA should be less influenced by one-time events, accounting and tax adjustments, and factors beyond the control of management.

The final step in selecting banks was to choose a group of the most efficient banks and a group of the least efficient banks, using the above tests. A random, 45 percent sampling of state banks meeting the following criteria was undertaken:

- Most efficient group — banks that rank in the upper quartile of Tenth District banks on the cost efficiency test and in the upper half on adjusted ROA

- Least efficient group — banks that rank in the bottom quartile on the cost efficiency measure and the bottom half on adjusted ROA

There are several reasons these cost efficiency and profitability tests and selection procedures are used in this study. The test for cost efficiency described above, while yielding results that are somewhat comparable to common, accounting-based expense ratios, has a number of advantages over such ratios and similar efficiency measures. Most important, the cost efficiency model attempts to adjust a bank's expenses for its output mix and for the conditions the bank faces. As a result, this cost efficiency measure should provide a better means of comparing efficiency across banks, especially in the case of banks that produce more labor or resource intensive services and products, compete in high cost markets, or face other unique conditions. Such banks, for instance, could be very efficient in using their resources, but would have high expense ratios under standard accounting measures.

While the cost efficiency model has advantages over other measures of efficiency, it still should be regarded as a less than perfect measure. Because of data limitations, some of the variables in the model are only proxies or imperfect measures. Also, it is not possible to include every item or dimension of a bank's output in the model, and banks that are producing a wide range of outputs or providing specialized services could therefore be judged less efficient than they really are.

The combination of both a cost efficiency and a profitability test is incorporated into this study as a means of rating banks on both their ability to use resources effectively in producing banking products and services (cost efficiency) and their skill at generating income from these goods and services (profitability). Each of these concepts is an important aspect of a bank's overall efficiency, and the inclusion of both tests should provide the clearest picture of a bank's ability to use its resources.

Table 2

Income, expenses, and balance sheet items
(1994 Data; **Bold Face** indicates a statistically significant difference)

	Most efficient banks	Least efficient banks
	Group average as a percent of assets[1]	
Income		
Interest earned	**7.09**%	**6.69**%
Noninterest income	**0.72**	**1.04**
Expenses		
Interest paid	2.67%	2.66%
Salaries and benefits	**1.58**	**1.97**
Premises and fixed assets	**0.32**	**0.55**
Other noninterest expense	**0.99**	**1.49**
Assets		
Cash assets	5.83%	5.85%
Federal funds sold and repurchase agreements	3.15	2.77
Securities	**32.51**	**40.11**
Net loans	**55.27**	**47.03**
Premises and fixed assets	**1.07**	**1.81**
Deposits		
Total	**87.31**%	**89.56**%
Transaction	**32.00**	**28.98**
Nontransaction	**55.30**	**60.58**
Capital	**10.92**%	**8.24**%
Risk measures		
Net loan losses[2]	0.19%	0.19%
Noncurrent assets	**0.45**	**0.82**

[1] Income and expense items are percentages of average assets; assets, deposits, capital, and noncurrent assets are percentages of year-end total assets.

[2] Net loan losses are reported as a percent of total loans.

providing more transactions and payments services to their customers than their less efficient counterparts are. The most efficient banks are also holding much higher levels of capital. While higher capital is undoubtedly a result of their superior performance and stockholder support, it also shows that efficient banks are providing a high level of protection to their customers. The most efficient and least efficient bank groups have similar levels of net loan losses, but the efficient banks have significantly lower levels of noncurrent assets. These asset quality measures would seem to imply that efficient banks are devoting as much, if not more, attention and resources to loan origination, monitoring, and other credit judgment activities.

Overall, the above statistics imply that the main difference between the most efficient and least efficient banks is in the efforts by bank management and staff to control costs and generate income. Salary expenses, fixed costs, and other noninterest expenses are all significantly lower at efficient banks, suggesting that these banks are making a concerted effort to control every major component of cost. Furthermore, in achieving this record, efficient banks appear to be conducting activities that are even more resource intensive than those undertaken at inefficient banks.

Ownership and management characteristics

A review of the financial characteristics of efficient and inefficient banks suggests that bank managers, policymakers, and personnel are likely to play a large role in determining efficiency. This section of the paper will consequently take a look at the directors, managers, and owners of the most efficient and least efficient banks and the influence of this ownership/management structure on bank efficiency.[4]

Ownership and management structure and firm performance have been discussed quite extensively within financial theory. Much of this discussion has focused on the ownership structure of the firm and what constitutes an efficient form of corporate organization. Among the major issues within this topic are what is the optimal ownership/management structure and how can the interests of a firm's management be aligned with that of its stockholders when these two groups are not the same. These issues, commonly known as "agency problems," confront many banks and are potentially important factors in the efficient operation of banks.[5]

Since the banks in this study show much diversity in their management and ownership, they should provide a variety of information on agency problems and corporate organization. These banks may also provide a good look at the different incentives and forms of control used to encourage efficient operations and bring managers and stockholders closer together. This section addresses these issues by looking at the following topics: the organizational form of ownership for the sample banks, the characteristics of their boards of directors, the structure of bank ownership and management, compensation and performance incentives, and risk management considerations. Box 2 on page 10 provides a description of the information that was collected on the sample banks in order to examine these topics.

Organizational form. Individuals can hold bank stock directly or indirectly through shares in a bank holding company. In addition, holding company ownership can take the form of one-bank holding companies or multibank holding companies controlling a number of banks. Consequently, the first aspect of bank ownership to investigate is whether these differences in organizational form affect banking efficiency.

[4] A number of previous studies have looked at various aspects of bank management and ownership structure. Among these are: Linda Allen and A. Sinan Cebenoyan, "Bank Acquisitions and Ownership Structure: Theory and Evidence," *Journal of Banking and Finance* 15 (1991): 425-48; Cynthia A. Glassman and Stephen A. Rhoades, "Owner vs. Manager Control Effects on Bank Performance," *The Review of Economics and Statistics* 62 (May 1980): 263-70; Gary Gorton and Richard Rosen, "Corporate Control, Portfolio Choice, and the Decline of Banking, *NBER Working Paper*, No. 4247, National Bureau of Economic Research, Inc. (December 1992); Stephen D. Prowse, "Alternative Methods of Corporate Control in Commercial Banks," *Economic Review*, Federal Reserve Bank of Dallas, Third Quarter 1995, pp. 24-36; and Anthony Saunders, Elizabeth Strock, and Nickolaos G. Travlos, "Ownership Structure, Deregulation, and Bank Risk Taking," *Journal of Finance* 45 (June 1990): 643-54.

[5] For a discussion of this agency problem or property rights issue, see Michael C. Jensen and William H. Meckling, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership

Table 3

Organizational structure

(**Bold Face** indicates a statistically significant difference)

Organizational form	Number of sample banks	Percent of sample banks with the indicated organizational form that are in the most efficient category
Independent banks	31	51.6%
Banks in bank holding companies (BHCs)	112	50.9
Of banks in BHCs:		
In one-bank HCs	88	50.0
In multibank HCs	24	54.2
Of banks in multibank HCs:		
Lead bank	11	**27.3**
Non-lead bank	13	**76.9**

The most striking difference in the holding company statistics are when the banks in multibank holding companies are divided into lead banks (typically the largest bank in the holding company) and non-lead banks. Only 27 percent of the lead banks are in the most efficient group of banks, while nearly 77 percent of the non-lead banks are in the most efficient category. These percentages may be a reflection of the services, administrative assistance, and oversight that lead banks often provide to affiliated banks, without receiving full compensation in return. These results could also be an indication that large, lead banks are providing a much broader range of services and products to their customers than what is being captured by the output variables in the cost efficiency model. Even with these arguments, though, the very high cost structure and low profitability of many of the lead banks would seem to indicate that they have been less than efficient performers.

The figures in Table 3 thus indicate that nearly equal groups of efficient and inefficient banks exist among the independent banks in the sample and among the banks in bank holding companies. As a consequence, banks in these two different organizational forms will be examined together throughout the remainder of the paper, and primary attention will be directed towards management, directorship, and ownership at the bank level rather than within the parent organization.[6]

Bank boards of directors. A bank's board of directors has many important responsibilities, including hiring and overseeing the bank's management team, setting major policies and objectives, monitoring compliance with these policies, and participating in all significant decisions within the bank. Bank directors thus play a key role in defining the framework under which a bank operates, and their decisions should closely affect a bank's efficiency and performance.

Structure," ***Journal of Financial Economics*** *3 (October 1976): 305-60.*
[6] Since most of the sample banks are either independent banks or are in one-bank holding companies or small- to medium-sized multibank holding companies, this focus on the individual bank level should capture the most important aspects of management and ownership for these banks.

As shown in Table 3, a total of 31 banks in the sample could be characterized as independent banks operating primarily under individual ownership and control. Most of these banks are smaller banks, and just over one half of them were in the most efficient bank group. Individual ownership thus does not appear to carry any significant operating advantages or disadvantages for this group of banks. Of the banks owned by bank holding companies, nearly equal numbers are in the most efficient and least efficient bank categories. Similarly, nearly equal numbers of banks in one-bank and multibank holding companies are in the most efficient and least efficient groups, which would suggest that the holding company format has a fairly neutral effect on efficiency across the sample banks.

Table 4

Characteristics of the board of directors*
(**Bold Face** indicates a statistically significant difference)

	Most efficient banks	Least efficient banks
Number of directors	6.6	6.7
Average age	57.1	56.9
Average tenure with bank (years)	16.3	14.4
Net worth per director		
(Median value in thousands of dollars)	**$1,317**	**$835**
Share of bank owned by the entire board	**66.3**%	**55.9**%
Attendance rate	**94.2**%	**92.1**%
Percent outside directors	**25.9**%	**34.3**%
Meetings per year		
All banks	**11.6**	**10.6**
By asset size:		
Under $25 million	**11.9**	**9.8**
$25 to $50 million	11.3	11.1
$50 to $100 million	11.6	10.0
$100 million or more	12.0	13.5
Annual fees per director		
All banks	**$3,326**	**$2,257**
By asset size:		
Under $25 million	**$2,667**	**$1,277**
$25 to $50 million	2,805	2,450
$50 to $100 million	4,654	3,664
$100 million or more	5,400	3,660

* Figures in this table are group averages for the most or least efficient banks, except for the net worth of directors, which are group medians.

Table 4 explores the role that boards of directors play in fostering bank efficiency by comparing directors at the most efficient banks with those at the least efficient banks. According to this table, there are no significant differences between the most efficient and least efficient banks in the number of directors, their average age, or length of tenure.

Directors at efficient banks, though, have a higher median net worth, a greater ownership share in their bank, better attendance rate, and are less likely to be outside directors.[7] The most efficient banks typically have more frequent board meetings and pay higher director fees—a pattern which generally holds within bank size groupings. The greatest

[7] *In this study outside directors are defined as directors that have less than a five percent ownership position in their bank, are not former or current employees of the bank, and are not related to anyone with either a management position in the bank or a five percent or greater ownership position in the institution.*

Box 2: Data Collected on the Sample Banks

The information on the ownership and management of the sample banks was collected from state agency, FDIC, and Federal Reserve examination reports on state banks. These reports have a section with detailed information on bank officers and directors and any family relationships among them, as well as a listing of major stockholders and, in many cases, other stockholders. State bank examination reports also commonly contain an examiner's narrative discussion of the management of the bank and the individuals who dominate policymaking and oversee the daily operations of the bank.[1] As a result, the examination reports provide an ideal source of information on a bank's ownership and management structure, the experience and responsibilities of bank officers and directors, and the financial incentives that they are given.

For this study, the sample bank ownership and management information is based primarily on examinations commenced in 1994. In a few cases, 1993 examinations were used, because more recent examinations were not available. When necessary this information was supplemented and verified through a number of other sources, including Federal Reserve bank holding company inspection reports, the annual reports filed by banking organizations, and earlier bank examinations. Ownership and management data for 1990 were also reviewed in order to ensure that the sample banks had no significant changes in their ownership/management structure during the study period.

Basic ownership information collected on each bank included the total shares of stock outstanding, the number of these shares, if any, held by a bank holding company, and the total shares outstanding of this parent holding company. For a bank's directors, the examination reports provided data on their net worth, age and years with the bank, number of board meetings attended since the last examination, director fees and other compensation paid, occupation of many of the outside directors, and the number of bank and bank holding company shares held by each director. For major officers, the information included bank title or position, age and years with the bank, salary and bonus, number of bank and bank holding company shares owned, and full or part-time working status. In addition, all of the directors' information was available on any officer that also served as a director. Other information recorded was the identity of the daily managing officer and the major policymakers in the bank, plus the amount of stock held by major outside stockholders, trusts, and ESOPs.

The examination information on bank stockholders and family relationships was further used to aggregate stockholdings by control blocks and to calculate the largest block of stock held by any individual or group of stockholders acting together. A special notation was made for any officer or director that was part of this largest block of stockholders. Similarly, shares held by the daily managing officer were combined with those held by a parent, spouse, or child to construct a measure of this officer's family interest in the bank.

[1] The detailed information on bank officers and directors and the examiner's narrative discussion of a bank's management are contained in a confidential section of the examination report. This confidential section is for internal use by banking regulators, and it is not part of the examination report that is provided to bankers.

difference in meetings and fees would appear to be among the smallest banks, with the least efficient banks under $25 million in total assets paying far less in director fees and holding fewer meetings. These differences could thus indicate that attracting qualified, active directors may be a problem for some of the smaller banks and may also help explain why more of the smaller banks are in the least efficient category.[8]

Overall, these figures suggest that efficient banks are characterized by boards that are more actively involved in their banks—an involvement through such means as a strong ownership position, other insider ties, and regular attendance at board meetings. As a result, directors would appear to have a role in efficient bank operations that is linked to their interest and active participation in bank matters. Efficient banks have also been willing to pay higher fees for directors and, on the basis of net worth figures, seem to have succeeded in attracting a more successful group of directors. With greater personal wealth at stake, these directors are likely to have a greater incentive to closely monitor bank management.

Bank ownership and management. Within financial theory, the relationship between ownership and management is the central focus of much of the discussion about the structure of the firm and any resulting agency problems. This ownership/management relationship is also an important element in the operation of banks. The motivation and goals of bank officers and stockholders, for instance, are likely to be a major determinant of bank efficiency and performance, and such factors may differ widely from one bank to another.

In many smaller banks, large stockholders may often form much of the management team, while in other banks, management and major stockholders may be largely separate. Moreover, within small- to medium-sized banks, this ownership position can vary widely. Some banks may have a few stockholders that control most of the bank stock, but others may have many stockholders, with no one in a dominant ownership position. Consequently, the ownership and management structure of banks may pose a number of different control and agency issues.

One vital part of this ownership and management structure is the daily managing officer (DMO) of the bank. This individual is responsible for the daily operations of the bank and must make and oversee many of the decisions that come up within the normal course of business. The DMO is thus in a position that could have the most impact on bank efficiency, and his or her ability to serve the interests of stockholders will be a major factor in the performance of a bank.

In some cases, the DMO will be a major stockholder and will thus have an insight into stockholder interests and will directly benefit from any steps taken to control costs and improve bank performance. In other cases, though, the DMO may be a hired manager with little ownership interest. As a hired manager, this second type of DMO would not be rewarded in the same manner as stockholders when bank performance and efficiency improve. Consequently, stockholders and directors may have to be more careful in conveying their objectives to hired DMOs. They may also have to monitor the DMOs' performance more closely and design effective ways to reward hired DMOs for superior performance. All of these steps could help encourage a hired manager to operate a bank more efficiently, but they might be a less than adequate substitute for significant stock ownership on the part of a DMO.

To examine these aspects of management structure at the sample banks, this study divided DMOs into three categories: hired managers, minority owners,

[8] *Although Table 1 shows that the most efficient and least efficient banks are similar in asset size on average, the least efficient category has relatively more banks under $25 million in assets and more banks over $100 million.*

Table 5

Ownership dispersion and type of daily managing officer

| | Ownership Dispersion | | |
Type of manager	All banks	Widely held	Closely held
	*Percent of sample banks with the indicated type of manager and ownership attribute that are in the **most efficient category***		
Hired	44%	33%	50%
Minority owner	59	50	67
Major owner	55	60	53
All managers	51	46	54
	Number of sample banks		
Hired	61	21	40
Minority owner	22	10	12
Major owner	60	15	45
All managers	143	46	97

and major owners. Hired managers are the DMOs that have little or no ownership in their bank.[9] A minority-owner DMO has an ownership share which exceeds five percent, but someone else has a larger block of stock in the bank. A DMO that is listed as a major owner is a member of the ownership block controlling the largest share of the bank. The identification of each sample bank's DMO is based on the statements made by examiners in their examination reports.

A second vital part of bank ownership and management structure is the dispersion of ownership. A closely held bank would pose the fewest agency and monitoring problems and would be the most likely to have active, interested stockholders. In contrast, stockholders at widely held banks might not have the same singularity of purpose, and it might prove more difficult to translate their interests and ideas into clearcut objectives. For purposes of this study, bank ownership structure is divided into two basic types:

widely held banks, where the largest ownership block holds 50 percent or less of the bank's shares, and closely held banks, where an ownership block controls more than 50 percent of the shares.[10]

Table 5 looks at how management and ownership structure are related to the efficiency of the sample banks. As shown in the first column of the table, only 44 percent of the sample banks with hired DMOs are in the most efficient category, compared to 59 percent of those with minority-owner DMOs and 55 percent of those with DMOs in the largest ownership group. When widely held banks are compared to closely held banks across all types of managers (fourth row of Table 5), only 46 percent of the widely held banks are in the most efficient group, while 54 percent of the closely held banks are.

When these management types and ownership dispersion measures are examined together, the banks with hired DMOs and widely held ownership are the least efficient—only 33 percent of these banks are in the most efficient category (row 1, column 2 of Table 5), leaving 67 percent in the least efficient group. Given the substantial differences in financial performance between the most efficient and least efficient groups of banks, these results imply that widely held banks

with hired DMOs generally are poor performers. However, if just one of these ownership or management factors is changed, creating less dispersion in ownership or a stronger ownership stake by the DMO, Table 5 indicates that at least half of the banks will be in the most efficient category. Consequently, while some banks in every ownership/management category achieve efficient operations, a strong ownership group or management with a vested interest in the bank greatly improves the overall efficiency of the sample banks.

Another critical aspect in the management and ownership structure of a bank is the responsibility for setting policy. Bank policy decisions will establish the overall objectives of a bank, set the boundaries for major investment and lending initiatives, and affect many parts of a bank's cost structure. This policymaking responsibility can be vested in or assumed by one individual—such as the DMO or other top officer, a major shareholder, a board chairman, or a key director—or it can be shared by a number of individuals selected from management, the board of directors, and/or bank ownership. In cases where the DMO is not the policymaker or shares this responsibility with others, these other policymakers might play an important role in monitoring the DMO's performance and ensuring that the objectives of a bank's stockholders and board are being met in the bank's daily operations.

In 67 of the sample banks, the DMO is cited by examiners as the only major policymaker (bottom portion of column 1, Table 6). When this policymaking

DMO is a hired manager, only 27 percent of the corresponding banks are in the most efficient category (top portion of column 1, Table 6). These percentages increase to 38 percent and 50 percent, respectively, when the policymaking DMO is a minority owner or a major owner. Consequently, efficiency and performance would appear to suffer greatly when a person without a strong ownership stake is left in charge of both policymaking and a bank's daily operations and no one with a significant ownership position plays an active policymaking role. According to financial theory, it is precisely this ownership format in which the most severe agency problems should occur and where the greatest need would be for monitoring performance and establishing appropriate management incentives.

Table 6

Policymaking responsibility and type of daily managing officer

Type of manager	Daily managing officer is the only major policymaker	Daily managing officer is not a major policymaker	Daily managing officer and others are major policymakers
	*Percent of sample banks with the indicated type of manager and policymaking responsibility that are in the **most efficient category***		
Hired	27%	41%	73%
Minority owner	38	86	57
Major owner	50	75	75
All managers	45	50	69
	Number of sample banks		
Hired	11	39	11
Minority owner	8	7	7
Major owner	48	4	8
All managers	67	50	26

When someone other than the DMO is responsible for policymaking (column 2, Table 6) or when this responsibility is shared among the DMO and others (column 3, Table 6), sample bank efficiency increases substantially. In fact, the banks with the greatest likelihood of being in the most efficient category are those in which the policymaking role is shared among the DMO and others—a 69 percent likelihood across all of the management types.

Having the policymaking role vested in someone other than the DMO or shared with the DMO provides one means of monitoring the DMO's performance. Also, for DMOs that are hired managers or minority owners, this non-DMO policy-maker may be a means of ensuring that stockholder interests are considered in major decisions. This point would appear to be true for nearly all of the sample banks in these categories. Of the 64 sample banks where hired or minority-owner DMOs are not named as the sole policy-maker, 57 of these banks have a policy-making individual from the largest ownership block.

The small number of banks in several of the categories listed in Table 6 suggests caution in making detailed comparisons between these particular categories. However, the more general results seem clear with regard to policymaking responsibilities. Policymaking and efficiency are likely to suffer when too much authority is delegated to a manager without a strong financial stake in a bank's operations and when major stockholders fail to take an active interest in their banks.

Compensation and performance incentives. Compensation and performance incentives could also be used by a bank's board of directors and major stockholders to encourage a manager to run a bank efficiently. In fact, if a manager is appropriately rewarded by a bank's directors for fostering efficient operations, the manager will have a strong incentive to

pursue the objectives of stockholders and control banking costs. These internal incentives may be further enhanced by the managerial labor market, which encourages managers to perform well as a means of building their reputations and improving career opportunities.[11] To the extent that these performance incentives play an important role in banking, the managers at efficient banks should be receiving greater compensation than those at inefficient banks.

Compensation levels at banks may further be influenced by the ownership structure of a bank and by taxes. When the DMO of a bank holds much of the bank's stock, for instance, he or she may be in a position to set or strongly influence his/her own salary. In addition, because salaries are an expense item that reduces taxable income, this major owner/manager will be much better off from a tax standpoint if bank revenue is taken out in the form of a larger salary than through dividends.[12] As a result, the salaries of owner/managers may tend to be greater than that of hired managers, even when performance is comparable.

Table 7 shows the annual compensation received by the DMOs of the sample banks. This compensation includes both the annual salary and any bonuses that were paid. On average, the most efficient banks pay about $14,000 more to their DMOs than the least efficient banks (row 4, columns 1 and 2 of Table 7). For hired managers, though, this differential is just a little more than $3,300. For major-owner DMOs, the difference in salaries between the most efficient and least efficient banks rises to more than $35,000. In part, this difference may reflect the control that owner/managers have over their own compensation, but it also shows that many banks are rewarding their DMOs for efficient banking operations. The minority-owner DMO figures show higher salaries at the least efficient banks, but these figures are undoubtedly

[11] For a discussion of how these incentives might help resolve the agency problems encountered in firms where ownership and management are separate, see Eugene F. Fama, "Agency Problems and the Theory of the Firm," **Journal of Political Economy** *88 (April 1980): 288-307.*
[12] Internal Revenue Service regulations and policies attempt to limit this type of tax avoidance, but enforcement can be difficult due to the many different factors that can go into establishing "appropriate" compensation levels.

Table 7

Annual compensation of the daily managing officer and asset size

Type of manager:	Most efficient banks	Least efficient banks	Asset size (In millions of dollars, year-end 1994)			
			Less than $25	$25 to $50	$50 to $100	More than $100
Average salary and bonus of the daily managing officer						
Hired	$72,104	$68,756	$43,230	$77,325	$83,338	$127,622
Minority owner	76,403	105,322	63,222	63,125	111,455	166,384
Major owner	108,095	72,390	68,614	85,898	125,520	212,250
All managers	88,877	74,859	56,980	80,859	99,085	162,607
Number of banks						
Hired	27	34	24	17	14	6
Minority owner	13	9	10	4	5	3
Major owner	32	27	23	26	6	4
All managers	72	70	57	47	25	13

influenced by a small sample size and by the fact that some of these banks are in the larger bank size categories.

To adjust for bank size differences and provide a clearer picture of DMO compensation, Table 7 also reports average salary figures by size of bank and type of DMO. Within each size grouping, major-owner DMOs are paid more than hired DMOs, and minority-owner DMOs are generally paid somewhere in between these figures.[13]

A final set of factors that may be influencing these salary differentials is the age and experience of the managers. Hired DMOs, for example, average 49.4 years of age and have been at their banks for 11.5 years. In contrast, the average fig-ures for major-owner DMOs are 53.0 years of age and 19.3 years of tenure with the bank, and for minority-owner DMOs, 48.5 years of age and 15.3 years of tenure. As a result, major-owner DMOs appear to have been at their banks longer than other DMOs, and part of the salary differentials may reflect this experience.[14]

These salary figures provide evidence that experienced managers in the most efficient banks receive better salaries than those in the least efficient banks. Thus, compensation appears to be providing some incentive for superior performance, although such factors as a manager's ownership position and resulting influence over bank salary policies may also be important.[15]

[13] Managerial compensation was also examined by looking at the most efficient and least efficient banks separately within each bank size grouping. In general, the most efficient banks are paying higher salaries than the least efficient banks in the same size range, and owner-managers at both the efficient and inefficient banks continue to be paid more than hired managers. In some cases, though, there are too few banks in a particular category to make meaningful comparisons, and hired managers at some of the smaller, least efficient banks appear to be drawing higher salaries than their counterparts at the most efficient banks. This may be another sign of their weaknesses in controlling costs.

[14] Comparable differences in age and experience exist when DMOs are divided by their policymaking responsibilities. DMOs not involved in policymaking average 48.1 years of age and 11.9 years of experience, while the figures for policymaking DMOs are 52.2 years of age and 17.2 years of tenure with their bank.

Table 8

Ownership dispersion and bank riskiness

(Year-end 1994)

Asset size	Number of banks		Total loans Total assets		Capital Total assets		Net loan losses Total loans		Noncurrent assets Total assets	
	Widely held	Closely held	Widely held	Closely held	Widely held	Closely held	Widely held	Closely held	Widely held	Closely held
				Average value for **most efficient banks**						
Under $25 million	5	17	60.5%	54.0%	9.7%	12.4%	.35%	.10%	.97%	.29%
$25 to $50 million	7	25	59.3	56.4	8.9	11.8	.12	.26	.17	.60
$50 to $100 million	6	8	55.4	56.4	10.2	9.8	.05	.12	.50	.26
$100 million or more	3	2	52.6	61.4	8.8	8.0	.07	.79	.31	.60
All banks	21	52	57.5	55.8	9.5	11.5	.14	.21	.47	.45
				Average value for **least efficient banks**						
Under $25 million	12	23	46.9%	47.4%	8.5%	8.5%	.36%	.19%	.69%	.70%
$25 to $50 million	5	10	54.2	45.3	7.3	9.2	.05	.15	1.62	.47
$50 to $100 million	2	10	44.8	49.9	7.0	7.3	.03	.06	.23	1.24
$100 million or more	6	2	51.4	39.9	7.9	8.5	.24	.27	1.13	.32
All banks	25	45	49.3	47.2	8.0	8.4	.24	.16	.94	.75

Risk management. A final consideration in looking at bank efficiency is a bank's ability to manage and control risk. Although a bank's general performance would eventually suffer, some banks might be achieving a lower cost structure because they are devoting fewer personnel and resources to credit analysis and monitoring activities and to basic bank risk management objectives.[16] Some of these risk aspects may be difficult to examine directly, but a number of common ratios and measures should provide an insight into the risk-taking practices of the sample banks.

Table 8 presents several of these ratios for the most efficient and least efficient banks, as divided by their ownership dispersion—either widely held or closely held. The concentration of ownership in a bank could provide a clue to risk taking, because major stockholders in closely held banks may have much of their wealth tied up in the bank and may therefore be more reluctant to take risks. The most efficient banks in Table 8 have higher loan-to-asset ratios than their less efficient counterparts, but they appear to offset this more aggressive lending policy by maintaining much higher levels of capital than the least efficient banks. These relationships generally hold for both widely held and closely held banks. Two measures of credit quality, net loan loss rates and noncurrent asset ratios,

typically show the most efficient banks as a group as having somewhat fewer credit problems, although this result varies over the different size groups and ownership dispersion categories.

Perhaps the most interesting comparison in Table 8 is between widely and closely held banks. In the smaller size groups where closely held banks are more common, concentrated ownership appears to be accompanied by less aggressive lending, more capital, and fewer loan quality problems. Although these results are not uniform, they provide some indication that major stockholders may attempt to offset a lack of diversification by being more reluctant to put their banks at risk.

These results provide little evidence for the argument that efficient banks may have achieved their record by devoting fewer resources to risk management activities. Banks in the most efficient category rate as well as or better than banks in the least efficient category on several standard risk measures, and these differences are most apparent in banks with a concentrated ownership structure.

Conclusions

With increasing competition in financial markets, rapid technological advances in banking operations and services, and industry-wide consolidation, efficiency is a critical aspect in banking — one that seems destined to separate the banks that will survive and prosper from those that will have problems serving their customers and remaining competitive. This study identifies a number of financial and ownership/management characteristics that separate some of the most efficient banks in the Tenth District from the least efficient, thus providing a look at the factors behind efficient banking operations.

In terms of financial characteristics, the most efficient banks are those making a concerted effort to control all aspects of

cost, including salary expenses, fixed costs, and other noninterest expenses. At the same time, these banks remain focused on generating income and serving customers, and they appear to be conducting activities that are more resource and service intensive than those undertaken at less efficient banks. As a result, bank managers and personnel, through their ability to utilize resources effectively, would appear to play the largest role in banking efficiency.

Within a bank's ownership and management structure, a number of factors characterize efficient banks. Perhaps the most important are active involvement by major stockholders and the presence of managers and policymakers that either have a strong financial stake in the bank or have the appropriate incentives and monitoring to ensure that stockholder interests are followed. Other notable characteristics of efficient banks are active involvement by directors and a commitment to controlling bank risk exposure, particularly where ownership is concentrated and stockholders are likely to be less diversified. No single organizational structure—independent banks, one-bank holding companies, or multibank holding companies— appears to be a guarantee of efficiency, and banks from each organizational format achieved about the same level of success in the study.

These characteristics will all be important as banks continue to deal with financial competition, technological change, and consolidation. As this study shows, banks under a number of different circumstances and organizational forms can be efficient, but in each case, quality bank management and active participation by ownership will be the keys to success.

[16] Allen N. Berger and Robert DeYoung, "Problem Loans and Cost Efficiency in Commercial Banks," Office of the Comptroller of the Currency, **Working Paper 95-5**, November 1995, provide an in-depth discussion of this managerial strategy, which they refer to as "skimping" behavior.

Appendix: The Statistical Cost Model

The statistical model of bank costs that is used to determine the cost efficiency of sample banks makes bank cost (C) a function of five types of output that the bank produces (Y_i), three input prices that the bank faces in its local market (W_m), three control variables (Z_k), and a set of dummy variables that indicate the state in which the bank operates ($STATE_s$).[1] Finally, an error term (ε) is added to the model, which is assumed to capture both random error and cost inefficiencies that are unrelated to the other variables in the model. The specific mathematical form of the model is

$$
lnC = \alpha_0 + \sum_{i=1}^{5} \beta_i \, lnY_i + \frac{1}{2} \sum_{i=1}^{5} \sum_{j=1}^{5} \beta_{ij} \, lnY_i \, lnY_j + \sum_{m=1}^{3} \gamma_m \, lnW_m
$$

$$
+ \frac{1}{2} \sum_{m=1}^{3} \sum_{n=1}^{3} \gamma_{mn} \, lnW_m \, lnW_n + \sum_{k=1}^{3} \varphi_k \, lnZ_k + \frac{1}{2} \sum_{k=1}^{3} \sum_{l=1}^{3} \varphi_{kl} \, lnZ_k \, lnZ_l
$$

$$
+ \sum_{i=1}^{5} \sum_{m=1}^{3} \rho_{im} \, lnY_i \, lnW_m + \sum_{i=1}^{5} \sum_{k=1}^{3} \varphi_{ik} \, lnY_i \, lnZ_k + \sum_{m=1}^{3} \sum_{k=1}^{3} \varphi_{mk} \, lnW_m \, lnZ_k
$$

$$
+ \sum_{i=1}^{11} [\, \delta_i \cos X_i + \theta_i \sin X_i \,] + \sum_{i=1}^{11} \sum_{j=1}^{11} [\, \delta_{ij} \cos (X_i + X_j) + \theta_{ij} \sin (X_i + X_j) \,]
$$

$$
+ \sum_{i=1}^{11} \sum_{j=1}^{11} \sum_{k=1}^{11} [\, \delta_{ijk} \cos (X_i + X_j + X_k) + \theta_{ijk} \sin (X_i + X_j + X_k) \,]
$$

$$
+ \sum_{s=1}^{6} \lambda_s \, STATE_s + \varepsilon
$$

The left side of the equation is the natural log of bank costs. On the right hand side, the terms that include natural logs of Y_i, W_m, and Z_k comprise a translog cost function, which is the functional form that is used most often to estimate bank cost functions.[2] The translog functional form typically fits the cost data well for banks with values of Y_i, W_m, and Z_k close to the sample averages, but it can fit poorly for the largest and smallest banks in the sample. To adjust for this problem, the right hand side

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[1] *Definitions of output, input price, and control variables are in Box 1.*
[2] *A few of the sample banks had zero values for some of the five outputs. To eliminate the problem of calculating the natural log of zero, output variables were increased by a uniformly small amount for all banks.*

Appendix: The Statistical Cost Model (continued)

of the model has trigonometric or "Fourier" terms. The eleven X_i variables are based on the values of the natural logs of Y_i, W_m, and Z_k, but are transformations with results that fall on the interval zero to 2π. The terms *sinX_i* and *cosX_i* are unsynchronized with one another, which provides much flexibility to the cost function. This "Fourier-flexible" cost function combines the stability of the translog specification near the averages of the sample data with the flexibility of the Fourier specification for observations far from the averages.[3]

The cost equation is estimated as a pooled (time-series and cross-section data) model, using data for the five years from 1990 to 1994. Each bank enters the model five times, and five residuals (estimates of the error term, ε) are calculated for each bank. The annual values of the residuals measure both random influences on costs as well as cost inefficiencies not accounted for by other variables in the model. The average over time for the random influences should be equal to zero, and so to eliminate the random influences, the residuals are averaged over the five annual observations. What remains should then measure the cost inefficiencies not accounted for by other variables in the model. Large averaged residuals (high cost relative to comparable banks) indicate low efficiency while small averaged residuals (low cost relative to comparable banks) indicate high efficiency. The average residuals for each bank are transformed into an index that has a range from zero to one, with the index for the most efficient banks set to one.[4]

The method of averaging residuals from several annual observations is called the distribution-free approach because it does not restrict excess costs to follow any particular distribution.[5] It is designed to smooth out year-to-year fluctuations in expenses due to non-recurring events, good or bad luck, or measurement error. The conception of cost inefficiency with this method emphasizes long-run management of bank resources: a bank is considered efficient or inefficient if it consistently delivers bank services at low or high cost over many years.

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[3] *The Fourier-flexible form has been shown to be statistically superior to the translog form; see Karlyn Mitchell and Nur M. Onvural, "Economies of Scale and Scope at Large Commercial Banks: Evidence from the Fourier Flexible Functional Form," working paper, North Carolina State University, November 1992.*

[4] *In order to moderate the impact of unusually large or low average residuals, the averaged residuals are truncated at the 5% and 95% levels before the efficiency index is calculated. As a result, the top and bottom 5% of banks will have identical values of the efficiency index.*

[5] *For a detailed description and evaluation of the distribution-free approach, see Allen N. Berger, "Distribution-Free Estimates of Efficiency in the U.S. Banking Industry and Tests of the Standard Distributional Assumptions," **Journal of Productivity Analysis** 4 (September 1993): 261-92.*