How does ownership structure and manager wealth influence risk? A look at ownership structure, manager wealth, and risk in commercial banks

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Bankers are often characterized as being in the business of managing risk. To be successful, bank managers, stockholders, and directors must work closely together in deciding what risks their bank will assume and how they will control the bank's overall risk exposure. Each of these participants, though, is likely to have different preferences and opinions regarding risk. In fact, the development of bank risk-management policies and procedures typically involves bank owners, directors, and managers in a process of give and take. Throughout this process, differences in opinion may arise because of differences in ownership positions, responsibilities for managing the bank, and management oversight functions. Consequently, if mutually acceptable decisions are to be made, each decision maker will have to understand the preferences of the others and develop policies that reflect all of their concerns.

Bank risk is also important from the perspective of public policy because of the corresponding risks to the payments system and financial stability. Moreover, deposit insurance and the federal safety net may provide incentives for banks to take on additional risk. Bank supervisors therefore focus on how well banks manage risk. In many cases, weaknesses in a bank's risk management practices can be traced to weaknesses in its management and ownership structure. Thus, if a bank examiner is to suggest corrective steps for a problem institution, the examiner should also understand the basic components of a sound management and ownership structure.

This study examines the relationship between ownership and management structure and a bank's risk exposure. Previous research has addressed this topic as well. This study, though, is able to take a more comprehensive look at the factors influencing bank risk taking by examining the portion of an owner's or manager's wealth that is concentrated in bank stockholdings. This variable provides new insights into bank risk taking and helps clarify the contribution of other factors.

In earlier work, we found ownership and management structure to be an important factor in the cost and profit efficiency of a sample of Tenth Federal Reserve District banks.[1] The same sample is used in this study to relate ownership and management structure to bank risk. The data reveal that ownership and wealth diversification of bank owners and managers do influence bank risk. These effects extend not only to the overall risk of the bank, but are also reflected uniquely in asset quality measures, bank leverage, and other parts of a bank's risk exposure.

The article first discusses how wealth, ownership structure, and management position might affect bank risk. It then briefly reviews other studies of this topic, describes the data used in this study, and presents characteristics of manager wealth and ownership at the sample banks. We next present a simple analysis of credit risk, other balance

[1] *Kenneth Spong, Richard J. Sullivan, and Robert DeYoung, "What Makes a Bank Efficient?—A Look at Financial Characteristics and Management and Ownership Structure," Federal Reserve Bank of Kansas City* ***Financial Industry Perspectives*** *(December 1995): 1-20. Robert DeYoung, Kenneth Spong, and Richard J. Sullivan, "Ownership, Control, and Performance at Small Closely Held Firms: The Case of Commercial Banks", working paper, Federal Reserve Bank of Kansas City, 1998.*

sheet risks, and overall risk of hired-manager banks compared to owner-manager banks. The core of the article is then presented, which is a regression analysis of risk and ownership structure.

The relationship between wealth, ownership structure, and risk

Attitudes towards risk and the extent that a person will accept risk will be determined by a number of personal characteristics. One important influence on risk taking is the extent to which an individual's financial wealth is diversified. Diversification can reduce exposure to risk because an investment with poor returns can be offset by an investment with good returns. As long as financial wealth is diversified, an investor can be less concerned with the riskiness of any individual investment. But if the investor's wealth is highly concentrated in a particular investment, then he or she would be more motivated to monitor and control the investment to reduce its risk.

Owners and managers face different opportunities as well as personal limitations that will influence the amount of risk that they might accept. Stockholders face a positive relationship between risk and return to investment projects, and must balance their desire for added returns with the desire to avoid risk. Stockholders wishing to obtain higher returns may want a business to operate with higher levels of risk, while others are willing to accept lower returns in exchange for lower risk.

Managers must also grapple with the level of risk and return appropriate to the business they run. But managers often have little ownership stake in the business and therefore may not have a direct claim on any added profit earned by accepting added risk. Without an assurance that they would gain from accepting higher risk, the managers may tend to avoid risky investments. Moreover, much of the background and training necessary to do their jobs is specific to the business for which they work, the value of which would disappear if the manager were employed elsewhere. As a result, managers may be reluctant to take additional risks, since they may tarnish their reputation and be out of a job if their gambles fail.

These differences in risk behavior may cause a conflict between business owners and hired managers.[2] Managers may operate the business in a less risky manner than that desired by owners. Thus, owners must devise methods of encouraging managers to take reasonable risks. One method is to reward managers based on the profitability of the business. As long as profitability rises as the level of risk rises, this would encourage managers to take on added risk. However, such incentive schemes are difficult to design properly, and in some cases, may cause managers to take on more risk than owners desire. An alternative is to give managers stock or stock options, thus aligning their interests with that of other owners and encouraging them to take more risks.

Another alternative is to monitor the activities of managers. As representatives of stockholders, the board of directors performs the role of monitoring and controlling the performance of management. The board must design policies, procedures, and compensation schemes that ensure managers will act in the interest of stockholders while operating the bank in a safe and sound manner. Board involvement may thus induce managers to take appropriate risks while avoiding highly risky ventures. However, this mechanism may not always be

*[2] Financial theory has labeled this conflict a "principal-agent" problem. See Michael Jensen and William Meckling, "Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure," **Journal of Financial Economics** 3 (October 1976): 305-60, and Eugene Fama, "Agency Problems and the Theory of the Firm," **Journal of Political Economy** 88 (April 1980): 288-307.*

effective because careful monitoring requires time and effort, and some board members may not have sufficient motivation to bear these costs.[3]

Thus, the extent to which directors engage in monitoring and controlling risk may be tied to their ownership characteristics. Owners with a significant share of ownership will be more motivated to monitor the firm because they largely benefit from the firm's good performance. However, the risk preference of these owners will depend on their wealth diversification, and as their wealth becomes more concentrated in the bank's stock, the bank should have less risk.

Finally, there are unique aspects of the banking industry that must also be considered regarding owner and manager attitudes towards risk. First, banks are subject to supervision, and a major objective of this supervision is to ensure that banks are operated in a safe and sound manner. Supervisory agencies place this responsibility on the bank's management and board of directors, so that bank managers and directors need to be particularly concerned with risk. Second, deposit insurance and other elements of the federal safety net may encourage bank owners to take additional risk, because a risky bank can attract deposits from insured depositors who would be unconcerned about the level of risk in the bank.

To summarize, this study focuses on three hypotheses regarding risk, wealth, and ownership structure:

- As the manager's or owner's wealth becomes more concentrated in the bank's stock, the bank should have less risk.

- Because owners and non-owner managers have differing risk preferences, owner-managed and hired-manager banks are likely to have different levels of risk. Furthermore, because non-owner managers are likely to be more risk averse, an increase in hired-manager ownership of the bank should increase bank risk.

- Monitoring the performance of a manager can assure appropriate risk taking, but monitoring is a costly activity and will depend on a monitor's motivation. Effective monitors would likely have a significant share of ownership. These monitors' risk preferences will depend on their wealth diversification, and as their wealth becomes more concentrated in a bank's stock, the bank should have less risk.

Research on bank risk and ownership structure

A number of studies examine the relation between bank risk and ownership, and their findings have varied considerably. According to different studies, the relation between insider ownership and the risk of banks is sometimes positive, sometimes negative, sometimes U-shaped, and sometimes inverse U-shaped (more information on these studies are in Box 1, page 18). These inconsistent results are due to a number of factors, such as different measures of risk, different time periods for study, and different methods for analyzing the relation between ownership and risk. Another possible reason for the inconsistent results may be that none of the studies had information on the wealth of owners or managers.

The sample used in this study contains information on the wealth of owners and managers. The sample consists of 270 banks randomly selected from state-chartered banks in the Tenth Federal Reserve District.[4] Bank

[3] One study found that businesses with boards of directors that have poor attendance at board meetings and low ownership of the business tend to be less efficient. See Spong, Sullivan, and DeYoung (1995), pp. 8-11.

[4] The Tenth Federal Reserve District includes Colorado, Kansas, western Missouri, Nebraska, northern New Mexico Oklahoma, and Wyoming.

Box 1: Research on Bank Risk and Ownership Structure

Most studies that have related bank risk to ownership structure have used measures of risk obtained from stock prices.[1] In the earliest of these studies, Saunders, et. al. (1990) examine the link between bank ownership structure and risk taking in a sample of 38 large, publicly held bank holding companies. They use the stock prices of the banks to obtain several measures of the capital market risk of the bank holding companies. Their measure of ownership structure was the combined share of outstanding stock and stock options held by all of the managers and directors at a bank. They found a higher level of risk in banks that had higher levels of ownership by managers and directors.

A number of similar studies followed that of Saunders and his coauthors by using risk measures derived from stock prices, but results have been inconsistent. In a sample of 100 savings institutions, Brewer and Saidenberg (1996) find a U-shaped relation between risk and insider ownership, so that a positive relation may occur only at higher levels of insider ownership. Knopf and Teall (1996) investigate a sample of 300 savings institutions over the period from 1987 to 1992. They find that the relation between risk and insider ownership changed over time and argue that the relationship may depend on the level of regulatory stringency imposed on financial institutions. For the post-FIRREA period (after 1989), they find a negative relation between insider ownership and stock price risk. Demsetz, Saidenberg, and Strahan (1997) study a sample of 350 bank holding companies and find a positive relation between risk and insider ownership, but only for bank holding companies with a low franchise value. Chen, Steiner, and Whyte (1998) find a negative relation between insider ownership and risk in a sample of 302 banks and savings institutions.

Two studies look at risk in banks as measured by balance sheet indicators. Gorton and Rosen (1995) use the mix of loans in a sample of 456 bank holding companies to measure risk, and find an inverse U-shaped relation between the proportion of risky loans in the bank's loan portfolio and insider ownership. Knopf

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[1] Many studies of non-financial firms also show a relation between ownership structure and risk. For examples, see Amihud and Lev (1981), Agrawal and Mandelker (1987), Bagnani, et. al. (1994), and May (1995).

Box 1: Research on Bank Risk and Ownership Structure (continued)

and Teall (1996) use such risk measures as real estate loans as a proportion of total assets, the equity-to-asset ratio, and brokered CDs as a proportion of total assets and find an inconsistent relation between insider ownership and risk.

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Table 1

Manager ownership and net worth

(Variables with statistically different values are shown in **bold type**.)

	Owner-Manager Banks	Hired-Manager Banks
Number of Banks	110	160
Manager Characteristics		
Personal Ownership of Bank***	**37%**	**3%**
Personal plus Family Ownership of Bank***	**63%**	**4%**
Personal Net Worth (millions)***	**$1.719**	**$0.472**
Investment in Bank / Personal Net Worth+,***	**86%**	**21%**

Notes: The sample consists of 270 state-chartered banks in the Tenth Federal Reserve District. The statistics are unweighted averages.
+ Investment in bank = number of shares personally held in bank × book value of equity per share.
*, **, *** indicate significant difference between owner-manager and hired-manager banks at the 10%, 5%, or 1% significance level. Statistical difference based on a t-test for a difference in means.

examination reports are our primary source of data on wealth and ownership among owners, directors, and managers. Bank examiners collect and report information on the number of shares held by officers, directors, and all major owners of the bank, the responsibilities and compensation of managers, and the net worth of all the directors of the bank.[5] Because a bank's chief executive officer or top manager is typically on the board of directors, the data set also contains information on his or her net worth. Ownership for the bank is identified for the year 1994, and the same major ownership group must have controlled the bank from 1991 to 1994.[6] Financial data come from quarterly call reports for 1990 to 1994. More detail on the data can be found in Box 2 on the facing page.

Wealth and ownership characteristics of managers

Sample banks can be in one of two groups, based on the ownership characteristics of the bank's top manager.[7] In an *owner-manager bank*, the manager is a member of the ownership group with the largest stake in the bank. In the sample, there are 110 owner-manager banks (Table 1), and owner managers on average held 37 percent of the stock in their bank. Other members of the owner manager's family often owned a significant part of the bank as well, and the combined family ownership in these banks averaged 63 percent. The owner-manager banks are a useful reference group because there should be no conflict between their roles as owners and managers.

A *hired-manager bank* is any bank not in the owner-manager category, and there are 160 hired-manager banks in our sample (Table 1). For most of the hired-manager banks, the manager has little or no ownership stake: this ownership share averages only 3 percent.[8] Moreover, including the manager's family raises the average share to only 4 percent. In a portion of the hired-manager banks, the manager's ownership is more substantial—32 of the banks have managers with an ownership of 5 percent or greater, with a maximum of 39 percent (not shown in Table 1). In all of these banks, however, at least one other owner has a larger share of the bank. The hired-manager banks are an important focus of this study because of the hired manager's potential for risk averse behavior and the impact on bank risk

5 Details on compensation, net worth, and other sensitive information are contained in a confidential section of the examination report. The confidential section is for internal use by bank supervisors and is not part of the examination report that is provided to bankers.
6 For independent banks, ownership was determined by the individual's proportion of bank common stock. For banks owned by a bank holding company, individual ownership was calculated using bank shares owned indirectly through ownership of shares in the holding company plus any additional bank shares that might be owned directly.
7 We identify the manager as the person that examiners list as responsible on a daily basis for directing the operations of the bank. In most, but not all, cases this was the president or CEO.
8 Often the ownership was in shares necessary for the manager to qualify as a member of the board of directors.

Box 2: Details on Sample Data

Ownership data come from a unique data set that was compiled from bank examination reports, and the financial variables are taken from call report information. The sample of banks is from the Tenth Federal Reserve District. To be considered for this sample, a bank had to be in existence for at least five years prior to 1990 and remained in existence through 1994. A bank also had to be a full-service bank, offering loans, holding insured deposits, and generating noninterest income. All of the banks had to have a complete set of financial data. A total of 1,421 banks met these criteria.

As the second step of the data selection process, we randomly chose 304 state-chartered banks from the group of banks identified in the first step. The data set on management and ownership was constructed by transcribing data from state agency, FDIC, and Federal Reserve examination reports of state-chartered banks. The sample size was limited to 304 banks because of the labor required to collect this examination data. Since data on ownership structure and wealth of directors were readily available for state-chartered banks, the sample only included this charter class. Exam reports have information on responsibilities, age, tenure and compensation of bank officers; ownership, net worth, responsibilities, age, tenure and compensation of members of the boards of directors; ownership information on all major owners of the bank; family relationships among officers and stockholders; and information on policymaking responsibilities in the bank. On occasion we supplemented and verified this data through a number of other sources, including Federal Reserve bank holding company inspection reports and annual reports to the Federal Reserve filed by bank holding companies.

In general, the ownership information comes from 1994 examination reports, although some 1993 reports were used when the 1994 report was unavailable. Our measures of the overall risk of the banks (the standard deviation of adjusted net income and the survival likelihood index) use quarterly data from the five-year period from 1990 to 1994. In order to match risk performance and ownership structure over this period, we excluded any bank that underwent a significant ownership change in 1991, 1992, or 1993.[1]

A few banks had to be excluded because of information problems. Twenty-seven banks were excluded because they experienced a significant ownership change (that is, the majority ownership of the bank changed hands). Missing data and other problems reduced the initial sample by another seven banks, so that the final sample included 270 banks. Finally, the data used in the regressions reported below used 267 observations because financial data were missing from some sample banks.

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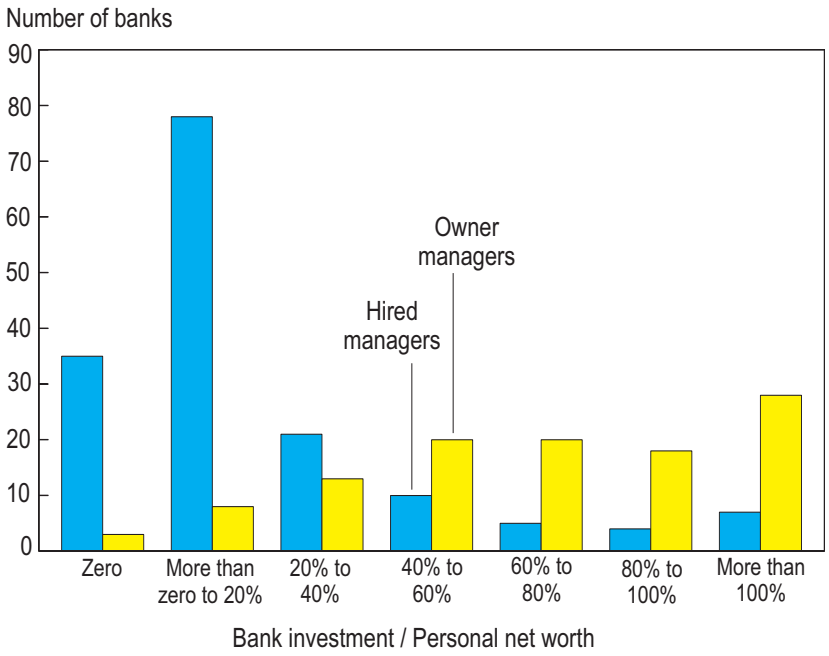
[1] *If a bank had an ownership change in 1994, data on the 1993 ownership structure was used.*

Chart 1

Distribution of manager bank investment / personal net worth



if they act in their own interest rather than that of owners.

Information on net worth and bank investment relative to net worth shows that, compared to hired managers, the average owner manager is wealthier and has more wealth concentrated in the bank. The average net worth of owner managers is $1.719 million, compared to $0.472 million for hired managers (Table 1). Wealth concentration in the bank is calculated as the ratio of one's investment in the bank to personal net worth, with investment in the bank equal to the number of shares of common stock held times the book value of bank capital per share.[9] For owner managers, this wealth concentration averages 86 percent, while for hired managers, it averages 21 percent (Table 1)[10] For the majority of hired-managers, the ratio is under 20 percent (Chart 1). By contrast, Chart 1 shows that a ratio greater than 20 percent is the rule for owner-manager banks.[11]

These ratios and their distribution across individual managers have a number of implications for bank risk taking. When an owner-manager's wealth is well diversified, we expect owner-managed banks to be run in a riskier fashion than hired-manager banks. In a number of the sample banks, owner managers are well diversified, as Chart 1 shows. But Chart 1 also shows that owner-manager wealth is often highly concentrated in their banks, which could lead them to run

9 Few of the banks had stock that was actively traded, so book value was used as a simple proxy for the value of stock in the sample banks. Control shares are typically worth more than minority shares, but book value gave a consistent measure across all stockholders and sample banks.

10 This ratio may be subject to measurement error, since a great deal of time may not be spent in preparing or verifying the accuracy of some of the director net worth statements. Also, book value is only a proxy for the actual value of investment in the bank. Overall, though, these ratios should provide a good general guide to the wealth concentration of the major players in a bank's operations.

11 If the manager or the holding company used debt financing in purchasing the bank, then our wealth concentration ratios could be overstated and even exceed one because we did not adjust the bank investment measure for any underlying debt. On the other hand, lenders often ask major stockholders to personally guarantee their bank stock debt, which would suggest that more of their wealth could be at stake than just their investment in the bank. Underreporting of net worth could also lead to wealth concentration ratios above one.

their banks conservatively. Moreover, many hired managers have diversified wealth, which could lead them to accept higher levels of risk. These differences suggest that we need to account for both ownership of bank stock and wealth diversification to get a complete picture of how the characteristics of managers influence risk at a bank.[12]

Table 2

Basic characteristics of sample banks

(Variables with statistically different values are shown in **bold type**.)

	Owner-Manager Banks	Hired-Manager Banks
Basic information		
Number of Banks	110	160
Assets—Average (millions), 1994**	**$38.6**	**$56.7**
Assets—Median (millions), 1994	$26.3	$30.8
Location—Percent nonmetropolitan*	**81%**	**72%**
Net income		
Return on Average Assets (ROAA), 1994*	**1.016%**	**1.138%**
Average ROAA, 1990-1994	1.077%	1.132%
Return on Equity (ROE), 1994**	**10.46%**	**12.33%**
Average ROE, 1990-1994*	**11.47%**	**12.47%**
Operating net income+		
Operating ROAA+, 1994*	**1.461%**	**1.619%**
Average Operating ROAA+, 1990-1994	1.428%	1.519%
Operating ROE+, 1994**	**14.93%**	**17.63%**
Average Operating ROE+, 1990-1994*	**15.16%**	**17.05%**

Notes: The sample consists of 270 state-chartered banks in the Tenth Federal Reserve District.
The statistics are unweighted averages or median values for sample banks. Statistics covering the period from 1990 to 1994 are calculated from quarterly data.
*, **, *** indicate significant difference between owner-manager and hired-manager banks at the 10%, 5%, or 1% significance level. Statistical difference based on a t-test for a difference in means or a rank-order test for a difference in medians.
+Operating net income measures profitability of banking operations, and is defined as net income + taxes + extraordinary Items – securities gains or losses. Operating ROAA = operating net income / average assets, and operating ROE = operating net income/ equity capital.

Owner-manager banks tend to be smaller, more rural, and somewhat less profitable than hired-manager banks in this sample (Table 2). Average assets are $38.6 million for owner-managed banks and $56.7 million for hired-manager banks. Eighty-one percent of owner-managed banks are in nonmetropolitan areas, compared to 72 percent for hired-manager banks. Both return on average assets and return on equity in 1994 were higher for hired-manager banks than for owner-manager banks. This is also true when we calculate average ROAA and ROE for the period from 1990 to 1994, although the difference for average ROAA is not statistically significant.

An alternative measure of profitability, and one more relevant for the study of risk, is operating net income. Operating net income is net income before taxes, securities gains or losses, and extraordinary items. Operating net income is a better reflection of a bank's business risk because business risk is determined by the variability of the demand for the bank's product and services, interest rate volatility, and the flexibility of the bank's asset and liability management.[13] Operating net income focuses on the core business of the bank and eliminates fluctuations in income from variables that can be manipulated on a short-run basis. As Table 2 shows, hired-manager banks have a higher average value of operating return on average assets compared to owner-manager banks.

[12] There is a positive correlation between ownership and the ratio of bank investment to personal net worth. The correlation is .944 for hired-manager banks, although if you only consider hired managers with an ownership stake over 1 percent, the correlation drops to .531. For owner-manager banks, the correlation is only .441. The relatively low correlation implies that there can be considerable error in assuming that a higher percentage of ownership also implies less diversification of wealth.

*[13] Joseph F. Sinkey, Jr., **Commercial Bank***

Table 3

Manager ownership and credit risk

(Variables with statistically different values are shown in **bold type**.)
Year-end 1994

	Owner-Manager Banks	Hired-Manager Banks
Total Loans / Total Assets	51.90%	54.80%
Net Loan Losses / Total Loans*	**0.227%**	**0.157%**
Nonperforming Assets / Total Loans**	**1.360%**	**0.807%**
Past Due Loans / Total Loans*	**2.818%**	**2.093%**
Noncurrent Assets / Total Assets*	**0.929%**	**0.616%**
Allowance for Loan Losses / Total Loans	1.866%	1.899%
Provision for Loan Losses / Total Loans	0.193%	0.216%
Other Real Estate Owned / Total Assets	0.236%	0.162%
Noncurrent Assets / Allowance for Loan Losses *	**114%**	**65%**

Notes: The sample consists of 270 state-chartered banks in the Tenth Federal Reserve District. Statistics are unweighted averages. Nonperforming assets = loans that do not accrue interest plus loans that are past due by 90 days or longer. Past due loans = loans that do not accrue interest plus loans that are past due by 30 days or longer. Noncurrent assets = nonperforming assets plus other real estate owned.
*, ** indicate significant difference between owner-manager and hired-manager banks at a 10% or 5% significance level. Statistical difference based on a t-test for a difference in means.

Risk characteristics of owner- and hired-manager banks

To gain insight into the range of risks that a bank must control, we studied a number of measures of bank risk, and this section of the article introduces these risk measures. This section also compares the values of the risk measures at owner-managed banks with those for hired-manager banks to analyze the effect of management structure on risk. This comparison yields some interesting features of risk-taking and management structure, but is incomplete and sometimes contradictory. These contradictions occur because underlying characteristics of hired- and owner-manager banks, such as wealth diversification, asset size, and location, each have their own effect on bank risk. Tables 1 and 2 show that these underlying characteristics can be very different across banks. The next section will present a more complete analysis of ownership structure, diversification of the manager's wealth, and other factors that affect bank risk, and will reconcile any contradictions uncovered in this section.

Credit risk. The first set of risk measures examines a bank's exposure to risk through its lending activities. The loan portfolio is a major source of risk that the board of directors and management control by establishing policies regarding lending limits for loan officers, limiting the loan-to-asset ratio, and limiting credit concentrations among industries, loan categories, or geographic locations. Senior management and the board of directors may also approve major loans as an added level of control.

Compared to hired-manager banks, owner-managed banks have a higher level of risk in their loan portfolios, as reflected in higher rates of loan losses, higher levels of past due loans, and higher ratios of noncurrent assets to the loan loss reserve (see Table 3). These differences are due to a number of different factors. Owner managers may be willing to set less conservative standards for acceptable loans because they can benefit from the higher expected return associated with riskier loans. Hired managers may set more conservative standards because bad loans are highly visible, and hired managers may want to avoid reporting losses to the board of directors. On the

Financial Management *(New York: MacMillan Publishing Company, 1989), p. 408.*

other hand, this result may be somewhat surprising, because many owner managers have much of their personal wealth at stake in their bank and might be expected to control credit risk more carefully than hired managers. This latter effect is important, as will be seen in the next section. However, considering this risk in isolation, the net effect of all the determinants of credit risk is to leave owner-manager banks in our sample with more credit risk, on average, compared to hired-manager banks.

Table 4

Manager ownership and other balance sheet risk

(Variables with statistically different values are shown in **bold type**.)
Year-end 1994

	Owner-Manager Banks	Hired-Manager Banks
Capitalization—leverage risk		
Equity / Total Assets**	**10.18%**	**9.36%**
Operating leverage—fixed asset risk		
Premises and Fixed Assets / Total Assets**	**1.133%**	**1.419%**
Non-core funding risk		
Non-core Liabilities / Total Deposits[1]	10.24%	10.83%
Market risk—interest rate risk		
Absolute value (Asset-Liability Mismatch / Total Assets)**,[2]	**13.48%**	**16.47%**

Notes: The sample consists of 270 state-chartered banks in the Tenth Federal Reserve District. Statistics are unweighted averages for sample banks.
*, ** indicate significant difference between owner-manager and hired-manager banks at a 10% or 5% significance level. Statistical difference based on a t-test for a difference in means.
[1] Non-core liabilities include time deposits or certificates of deposits over $100,000, federal funds purchased, repurchase agreements, and foreign deposits.
[2] The asset-liability mismatch measures the gap between short-term (under one year) assets and liabilities. We calculate gap by subtracting fixed and floating rate short-term deposits (both time and certificates of deposits) from fixed and floating rate short-term earning assets (loans and securities). Risk rises as the absolute value of the gap rises, because the bank's earnings are then subject to greater fluctuations due to changes in interest rates.

Other balance sheet risk. Banks must also control risk associated with other balance sheet items. The bank is exposed to risk associated with access to funds, commitments to the cost of fixed assets, and interest rate fluctuations. Bank managers and owners must also make a fundamental decision about how much equity to hold in the bank. This decision is important because equity provides a cushion to absorb loan losses or unexpected drops in net income.

We find that owner-manager banks have lower levels of other balance sheet risk compared to hired-manager banks. Sample data show that owner-manager banks have higher levels of capitalization and lower levels of operating leverage and market (interest rate) risk compared to hired-manager banks (see Table 4). This result, which is somewhat at variance with measures of credit risk, may reflect the concentration of wealth that owner managers have in their bank and the interest this will give them in the long-run stability of their banks. Additional determinants of other balance sheet risk also play a role, as we will see in the next section of the article.

Overall risk. Because higher risk in the loan portfolio is offset to some extent by lower risk in other balance sheet accounts for owner-manager banks (and vice-versa for hired-manager banks), it is useful to examine measures of the overall risk of the bank. The commonly used market-based measures of bank risk (such as fluctuations in stock returns) are unavailable for this study because most of the sample banks do not have publicly traded common stock.[14]

[14] Only five of the banks in the study are in banking organizations that have stock traded on major exchanges.

Table 5

Manager ownership and measures of overall bank risk

(Variables with statistically different values are shown in **bold type**.)

	Owner-Manager Banks	Hired-Manager Banks
Income variation		
Standard Deviation of Total Revenue / Average Assets	.286%	.340%
Standard Deviation of Operating Return on Average Assets	.787%	.842%
Survival likelihood index[+]		
(Equity/Assets + Average operating ROAA[++]) / Standard Deviation of operating ROAA	20.58	18.96

Notes: The sample consists of 270 state-chartered banks in the Tenth Federal Reserve District.
Statistics are calculated from quarterly data for the period from 1990 to 1994, and are unweighted averages for sample banks.
*, **, *** indicate significant difference between owner-manager and hired-manager banks at least at a 10%, 5%, or 1% significance level. Statistical difference based on the Wilcoxon test for a difference rank order of the data.
[+] The survival likelihood index measures the number of standards deviations that ROAA or operating ROAA would need to fall in order to exhaust equity and force a bank failure. A large value of the survival likelihood index implies low risk, that is, the larger the value of the index the lower the probability of bank failure.
[++] Operating net income measures profitability of banking operations, and is defined as net income + taxes + extraordinary items – Securities Gains or Losses. Operating ROAA = (operating net income) / (average assets).

Instead, accounting-based measures of risk will serve as a substitute.[15]

The first measure we consider is variation in income.[16] A bank with risky loans and investments will be more likely to experience large gains and losses, which will be reflected in extensive income variability. Table 5 shows information on the variation of income, as measured by the variation in total revenue or the variation in operating return on assets. Hired-manager banks have greater variation in income compared to owner-managed banks, although the difference is not statistically significant.

A second measure of overall risk is a bank's survival likelihood index. While income fluctuations are important indicators of the riskiness of a bank, their ability to measure risk is incomplete. A bank may have a stable income stream, but it could be more risky than some other banks due to lower levels of average profitability or less capital protection.

Income fluctuation, capitalization, and average profitability combine in a number of different ways to produce a unique level of risk. In the results presented above, the average owner-manager bank was less profitable compared to hired-manager banks, which implies more risk, but had a higher capital-to-asset ratio and lower fluctuations in income, both of which imply less risk. An advantage to the survival likelihood index as a measure of risk is that it incorporates all three of these factors together.[17]

The survival likelihood index is defined as

$$\frac{\text{capital-to-asset ratio} + \text{average value of operating return on assets}}{\text{standard deviation of operating return on assets.}}$$

The higher the value of the survival likelihood index, the lower the risk of the bank. An increase in the capital-

*15 Research has shown that there is a positive and significant correlation between accounting- and market-based measures of risk; see William Beaver, Paul Kettler, and Myron Scholes, "The Association Between Market Determined and Accounting Determined Risk Measures," **The Accounting Review** (October 1970): 654-82 and William Beaver and James Manegold, "The Association Between Market Determined and Accounting Determined Risk Measures of Systematic Risk: Some Further Evidence," **Journal of Financial and Quantitative Analysis** (June 1975): 231-84.*

16 Variation in income is measured using the standard deviation of income over the 20 quarters in the period from 1990 to 1994.

*17 The index is based on the Z score in John H. Boyd and Stanley L. Graham, "Bank Holding Company Risk," chapter 10 in Benton Gup, editor, **Bank Mergers: Current Issues and Perspectives**. (Boston: Kluwer Academic Publishers, 1989), pp. 200-1. This represents the number of standard deviations below the mean that operating return on assets would have to fall in order to eliminate capital.*

to-asset ratio would raise the index, as would an increase in the mean value of operating return on assets, both of which imply less risk. A rise in the standard deviation of operating return on assets would lower the index, which implies more risk.

A second advantage is that the survival likelihood index can be viewed as a measure of the likelihood of failure. The smaller the value of the survival likelihood index, the more likely a bank will fail. This is of particular importance to stockholders and regulators since bank failure will wipe out a stockholder's investment, while exposing the bank insurance fund to loss.[18] Table 5 shows that the survival likelihood index is higher for owner-manager banks, although the difference is not statistically significant. Thus the differences in profitability, capitalization, and income fluctuations combine into a slightly higher survival likelihood index for owner-managed banks.

A regression analysis of bank risk, ownership structure, and manager wealth

Dividing banks into owner-manager and hired-manager categories captures a notable difference in the manager's ownership status but is a crude method for understanding the many variables that can influence bank risk. The differences in risk revealed in Tables 3, 4, and 5 reflect not only the manager's ownership status, but also other underlying characteristics, such as the manager's wealth diversification, the amount of ownership of the hired manager, the wealth diversification of the major owners of hired-manager banks, and the size and location of the bank. A clear understanding of how bank risk responds to differences in ownership structure, wealth diversification, and other characteristics requires that their effects be accounted for simultaneously.

Multiple regression provides the appropriate statistical tool for this type of analysis. We specify an equation that makes risk a mathematical function of several explanatory variables: the manager's ratio of bank investment to personal net worth, the ownership share of the hired manager (when the bank has a hired manager), and a "monitor's" ratio of bank investment to personal net worth (for hired-manager banks only). In this equation, the "monitor" is defined as the director who holds the most shares of any director and is also a member of the largest ownership group. The equation also includes variables to indicate the asset size of the bank and whether the bank is in a nonmetropolitan location.

The regression technique allows us to estimate the function and see how risk responds to an individual explanatory variable after accounting for the other explanatory variables. For example, we can estimate the change in risk associated with a change in the ownership of a hired manager, while holding the other explanatory variables at certain, specified values. As a result, we will have a cleaner measure of how changes in hired manager ownership might affect risk or how changes in any of the other variables might affect risk separately.

We estimate the regression equation using all of the measures described above for credit risk, other balance sheet risk, and overall bank risk. In order to focus the following discussion on essential results, technical details of the analysis are in an appendix. To illustrate the results, we present graphs for various risk measures plotted against various explanatory variables.[19]

[18] Boyd and Graham (1989), pp. 221-2, consider the question of whether the survival likelihood index computed using accounting data or stock market data is a better measure of bankruptcy risk. They conclude that the accounting-based survival likelihood index conveys "much of the same information that is in commercial paper ratings. The market [survival likelihood indices] do not. To the extent, therefore, that commercial paper ratings are useful measures of bankruptcy risk, these findings favor the use of [a survival likelihood index]computed with accounting data."

[19] The graphs use estimated regression equations and assumed values for variables as specified in each figure.

Wealth concentration. Under our first hypothesis, managers and owners are assumed to become more conservative as more of their wealth becomes tied up in the bank. For both hired and owner managers, this relationship appears to be true across a wide range of risk measures. The manager's ratio of bank investment to personal net worth is statistically significant in explaining asset quality (as measured by the ratios of net loan losses to total loans, nonperforming assets to total loans, past due loans to total loans, and noncurrent assets to total assets; see Table A1.1).[20] Estimates show that as a manager has more of his or her wealth concentrated in the bank, asset quality improves, suggesting that the manager is reducing the risk in the loan portfolio.

Owner managers typically have a much higher concentration of wealth in their bank investment compared to hired managers, and by itself, this would imply a lower average credit risk in owner-managed banks. Table 3, however, shows that the average hired-manager bank had lower levels of credit risk. The apparent contradiction is because other factors that influence credit risk are not equal across owner- and hired-manager banks, and the differences are sufficient to cause average credit risk to be higher at owner-managed banks.

The manager's ratio of bank investment to personal net worth is also statistically significant in explaining the equity-to-asset ratio (Table A2) and the survival likelihood index (Table A3). As the manager's concentration of wealth in the bank rises, the equity-to-asset ratio rises and the survival likelihood ratio rises, thus indicating a decline in risk.

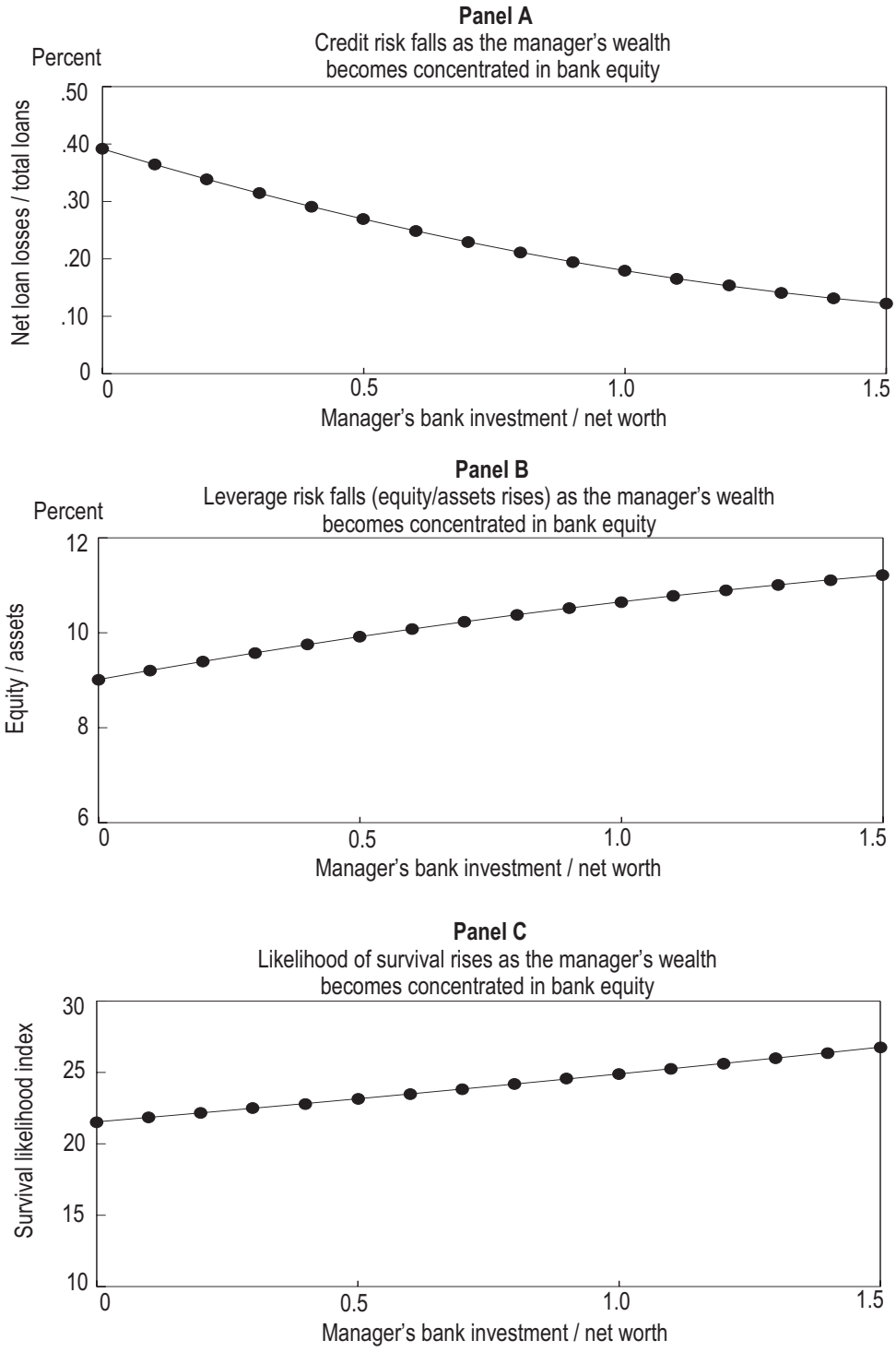
Chart 2 illustrates how the rate of loan losses, the equity-to-asset ratio, and the survival likelihood index each responds to changes in wealth concentration.[21] Other factors held constant, risk declines as the manager's wealth becomes more concentrated in the bank's stock for all three measures of risk.

Hired managers and their ownership. In our second hypothesis, hired managers are assumed to be more risk averse than otherwise comparable owner managers. Our regression results show that banks with hired managers have lower credit risk as reflected in lower rates of loan losses, nonperforming assets, past due loans, and noncurrent assets (see the hired manager indicator variable, Table A1.1). One reason hired managers may be avoiding risky loans is because reporting bad loans to the bank's board of directors is a highly visible blemish on the performance record of the manager. Moreover, a hired-manager could also be concerned about a reputation for making bad loans because it might have implications for the manager's future job prospects. In contrast to owner managers, who are committed to their own bank, a hired manager may have aspirations to move to other banks as professional opportunities arise.

A lower level of credit risk at hired-manager banks may further indicate conflict between the risk preferences of hired managers and bank owners. As we argued above, stock ownership on the part of a hired-manager may overcome the tendency for the manager to avoid risk. The regression results suggest that this is true with regard to net loan losses, noncurrent assets, bank equity, variation of operating earnings, and the survival likelihood index.[22] In each of these cases, an increase in a hired manager's ownership is associated with greater

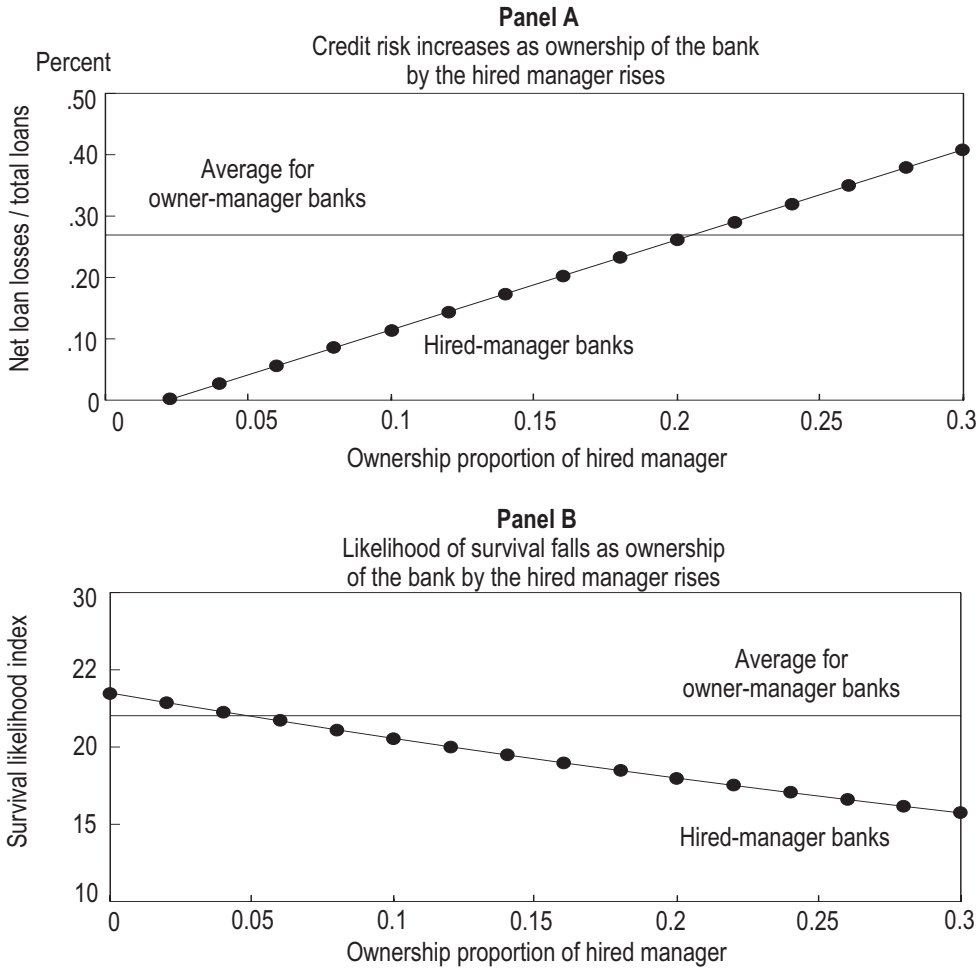
[20] The manager's ratio of bank investment to personal net worth was not statistically significant in explaining allowance or provision for loan losses.
[21] Panels A, B, and C of Chart 2 are based on regression equations (2), (10), and (16) from Appendix Tables A1.1, A2, and A3.
[22] See the variable for ownership share of hired manager in regressions (2), (5), (10), (15) and (16) in Tables A1.1, A2, and A3.

Chart 2



Note: Calculations assume the monitor's investment relative to net worth is 50%, the bank has $50 million in assets,, and is in a nonmetropolitan area. In Panels A, B, and C, calculations assume that the hired manager owns, respectively, 20.5%, 6.7%, or 4.8% of the bank. The survival likelihood index is defined as (equity / assets + average operating ROAA) / standard deviation of operating ROAA.

Chart 3



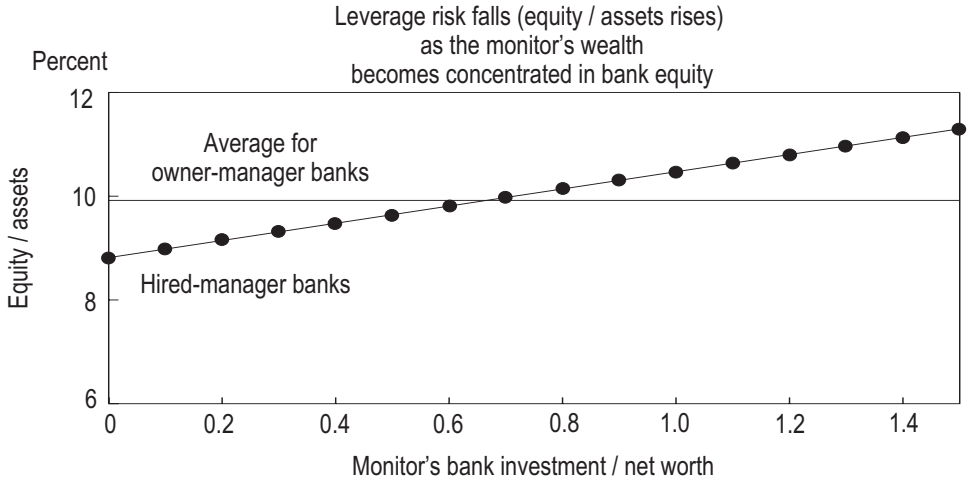
Note: Calculations assume the monitor's investment relative to net worth is 50%, the bank has $50 million in assets, is in a nonmetropolitan area, and bank investment/personal net worth for the manager is .5. The survival likelihood index is defined as (equity / assets + average operating ROAA) / standard deviation of operating ROAA.

risk. Chart 3 illustrates this effect: holding other variables constant, credit risk rises (as reflected in the rate of net loan losses) and the survival likelihood index falls, as the hired manager's ownership in the bank increases.[23]

Monitor's wealth concentration. Under our third hypothesis, individuals in a position to monitor hired managers should influence bank risk in accordance with their investment concentration in the bank. Results show that the monitor's ratio of bank investment to personal net worth is positively related to the equity-to-asset ratio and to the survival likelihood index, and negatively related to variation in total revenue.[24] Thus as bank monitors have more of their wealth tied up in the bank, they become more careful about the risks

[23] Panels A and B of Chart 3 are based on regressions (2) and (16) of Table A1.1 and A3.
[24] See the variable for monitor's bank investment/net worth in regressions (10), (14), and (16) of Tables A2 and A3.

Chart 4



Note: The "monitor" is defined as the director who holds the most shares of any director and is also a member of the largest ownership group. Calculations assume that the hired manager owns 10% of the bank, bank investment / net worth for the hired manager is .2, the bank has $50 million in assets, and is in a nonmetropolitan area.

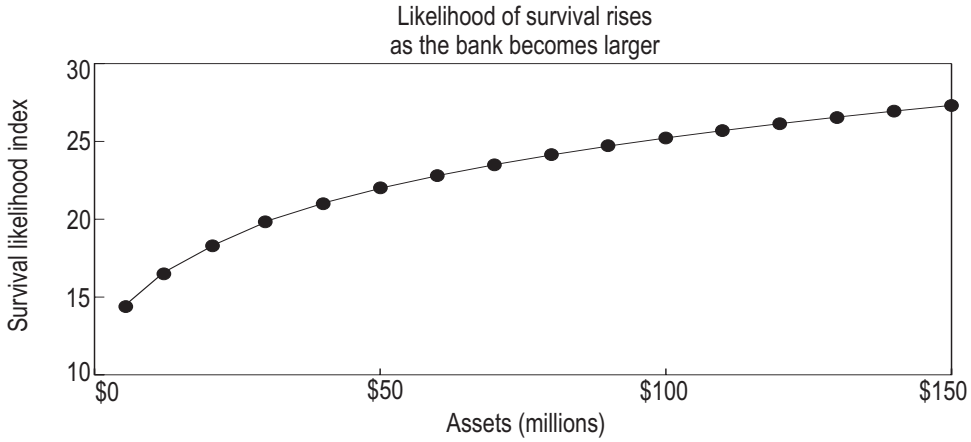
that managers and the bank are allowed to assume. Chart 4 illustrates this effect.[25] When the ratio of the monitor's bank investment to personal net worth is .10, the equity-to-asset ratio would be roughly one percentage point below comparable owner-managed banks. If the ratio of the monitor's bank investment to net worth rises to .60, the equity-to-asset ratio would be at a higher level, implying not only less risk, but also an equity-to-asset ratio close to that of comparable owner-managed banks.

The effect of the monitor's wealth concentration on the equity-to-asset ratio helps to explain why hired-manager banks, on average, have a lower equity-to-asset ratio compared to owner-manager banks (see Table 4). Among hired-manager banks, the monitor's investment in the bank relative to personal net worth averages 51 percent, while Table 1 shows that the figure for owner managers is 86 percent. Thus, the wealth of the major owners of hired-manager banks is more diversified than that of owner managers. As a result, the lower ratio of equity to assets among hired-manager banks seen in Table 4 is not due solely to the manager's ownership status, but also due to the wealth diversification of the major owner of the bank (and to other underlying characteristics).

Since the monitor is a major owner and is also on the board of directors, he or she has the power to influence the financial position of the bank. Our results show that much of this influence is reflected in the equity-to-asset ratio, fluctuations in total income, and the bank's survival likelihood index. The results did not show that this monitoring individual had as strong of an influence over credit risk in the bank, which may indicate a lesser involvement in daily credit decisions.

[25] Chart 4 is based on regression (10) of Table A2.

Chart 5



Note: Calculations assume the bank investment/personal net worth for the manager is .5, the hired-manager owns 0% of the bank, the monitor's bank investment/personal net worth is .88, and the bank is in a nonmetropolitan area. The survival likelihood index is defined as (equity/assets + average operating ROAA) / standard deviation of operating ROAA.

Location and bank size. Our results suggest that banks in nonmetropolitan areas are less risky compared to those in metropolitan areas. Banks in nonmetropolitan areas had lower loan loss rates, lower rates of noncurrent assets, lower holdings of other real estate owned, higher equity-to-asset ratios, lower ratios of premises and fixed assets to total assets, and a higher survival likelihood index, all of which suggest less risk for nonmetropolitan banks.[26]

Our results show that bank size was either insignificant or had conflicting influences on bank risk. Results did not show that there was a relationship between asset size and credit risk (Tables A1.1 and A1.2). Other risk measures were sometimes positively and sometimes negatively related to bank size (Tables A2 and A3), and so it may be best to turn to an overall measure of bank risk to summarize these conflicting results.

A good summary measure is provided by the survival likelihood index. Our results show that the survival likelihood index increases with asset size, as illustrated in Chart 5.[27] The figure also shows that the relationship is not linear, with the curve becoming flatter at higher asset sizes. Thus, banks that grow from $10 million to $15 million in assets will have a larger increase in the survival likelihood index than banks that grow from $95 million to $100 million in assets.

Summary and conclusions

Controlling risk in banks is a challenging responsibility, but the task can be made easier through an understanding of how ownership structure and the diversification of wealth influences the risk preferences and risk-taking behavior of bank managers and owners. This study looks at a sample of Tenth Federal Reserve District banks to examine the relationship between bank risk, ownership of the bank by managers,

[26] See regressions (2), (5), (9), (10), (11), and (16) of the Appendix tables. Counter to these results is a higher ratio of volatile deposits to total deposits for nonmetropolitan banks (regression (12), Table A2).

[27] Chart 5 is based on regression (16) of Table A3.

and the degree to which managers and owners have their wealth concentrated in their bank stockholdings. The major results are that:

- Concentration of financial wealth in the bank has a clear role in determining bank risk: banks are less risky when bank managers (whether he or she is a hired or an owner manager) have a higher concentration of wealth in their bank. This effect is multifaceted, through impacts on credit risk, the equity-to-asset ratio, variation in earnings, and average profitability (as reflected in the survival likelihood index).

- Hired managers typically operate their banks with lower credit risk than banks with owner managers, reflecting the different incentives that these managers face. Stock ownership by hired managers can provide an incentive to bring the level of credit risk in their bank closer to that of owner-manager banks.

- Active monitoring by an owner or director can guide hired-manager banks towards a level of risk desired by bank owners.

Because of these combined effects, there is no simple way to characterize whether a hired-manager bank is likely to be more or less risky compared to an owner-managed bank. Credit risk may be higher at owner-manager banks, but owner managers often take steps to offset this risk, such as holding more capital in the bank. Results of this study do, however, allow some generalizations:

- owner-manager banks tend to be more risky when the owner's wealth is well-diversified; and

- hired-manager banks tend to be more risky when the hired manager has a significant ownership stake in the bank but has wealth that is well-diversified, and where any major owners that are likely to fulfill a monitoring role have wealth that is highly diversified.

These results have implications for trends in the banking industry and for the risk-focused examination process. Consolidation will have a profound effect on the ownership structure of the banking industry by reducing the proportion of owner-managed banks relative to hired-manager banks and by creating larger banks with more diversified investors. According to the results of this study, more hired managers could cause the level of risk in bank loan portfolios to fall, but this lower credit risk may be offset by higher risks in other aspects of a bank's operations. Diversified investors with smaller blocks of stock in larger banks could mean that other risk control mechanisms will become more important, such as managerial compensation schemes, boards of directors, and equity markets. Bank examiners and supervisors need to be aware of management and ownership structures that could lead to excessive risk taking—such as a bank where major owners have diversified wealth and where other control mechanisms are weak.

For individual banks, results of this study show that ownership structure and concentration of wealth in bank equity have significant influence on bank risk. Understanding how risk preferences depend on ownership and wealth diversification can be valuable information to managers and owners as they grapple with the level and type of risk to take in their banks.

Appendix: Regression Analysis of Risk, Ownership Structure, and Manager and Ownership Wealth

Specification

The statistical model is designed to test hypotheses related to the effect of ownership structure and diversification of wealth on bank risk. The basic statistical model makes bank risk a function of characteristics of ownership and management and two control variables:

Risk Measure = f (manager's bank investment/personal net worth,
hired manager indicator variable,
ownership share of hired manager,
monitor's bank investment/net worth ×
hired manager indicator variable,
nonmetropolitan indicator variable,
assets, assets squared)

The first and second hypotheses discussed above (p. 17) suggests that the relation between risk and a manager's bank investment/personal net worth should be negative, while the relation between risk and the ownership share of hired managers should be positive.

Because of the differences in the preferences towards risk between owners and hired-managers, monitoring of hired-managers can be an important influence on bank risk taking. To account for this aspect of hired-manager banks, we had to identify a person who would most likely take on the responsibility of monitoring the bank's manager. We chose the director who holds the most shares of any director and is also a member of the largest ownership group.[1] For this monitor, we calculate the value of his or her investment in the bank relative to personal net worth. Among hired-manager banks, the average value of the monitor's bank investment relative to personal net worth was 51 percent. As this variable rises, and the monitor's wealth becomes less diversified, we would expect to see the monitor become more risk averse and more interested in limiting bank risk taking.

The regression equation also includes variables for the bank's location and size. Location is measured by whether or not the bank is in a nonmetropolitan area. Banks in metropolitan areas face a different market for loans compared to banks in nonmetropolitan areas. Market characteristics can influence the mix of loans that a bank can

[1] *We also considered two other definitions of monitor: the director who holds the most shares of any director regardless of belonging to the largest ownership group and the chair of the board of directors. The results using these individuals as potential monitors are not statistically significant in the regression equations and are not presented here.*

Appendix: Regression Analysis of Risk, Ownership Structure, and Manager and Ownership Wealth (continued)

make, and since different types of loans have different risks, location can influence the amount of risk at a bank. Bank size may also influence risk, since larger banks often have more opportunities to diversify their loans and investments and thus lower portfolio risk. While banks can have some control over their loan mix and asset size, for many of the banks in our sample the degree of control is limited. Location and asset size are included in the regression equation in order to account for some factors influencing risk that are beyond the control of bank management.

Tests revealed that the error terms for regressions with raw values of the standard deviation of earnings or the survival likelihood index were not normally distributed. A log transformation of these dependent variables corrected this problem (Table A3 has the results). In these equations we used the log of assets (rather than assets and assets-squared) to allow for a potential nonlinear relation between the dependent variables and asset size.

We experimented with the variable "manager's bank investment/net worth" for appropriate functional forms. First, we looked for a nonlinear relationship by entering the variable as a set of dummy variables. Results did not suggest that this specification was superior to entering "manager's bank investment/net worth" as a continuous variable. We also looked for a nonlinear relation by making the risk measure a quadratic function of "manager's bank investment/net worth" (by entered the variable itself and the variable squared). We did find instances where the squared term was statistically significant, and these are presented in the results. Finally, the variable "manager's bank investment/net worth" was interacted with the hired-manager indicator variable to see if risk responded to this variable differently for hired managers compared to owner managers. In no instance, however, were these additional terms significant (results are available upon request).

Estimation method and issues

The model equation was estimated using ordinary least squares regression. Tests for heteroscedasticity revealed a problem only when the ratio of volatile liabilities to total deposits was the dependent variable. To correct, we used White's heteroscedastic-consistent standard error in regression (12) of Table A2.[2]

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[2] *Hal White, "A Heteroscedasticity-Consistent Covariance Matrix Estimator and a Direct Test for Heteroscedasticity,"* ***Econometrica*** *48 (1980): 817-38.*

Appendix: Regression Analysis of Risk, Ownership Structure, and Manager and Ownership Wealth (continued)

In this formulation, a measure of risk is the dependent variable, which implies that risk adjusts to ownership characteristics. Others have argued that ownership structure adjusts to the risk of a firm or industry, where closer ownership control may be expected in riskier environments.[3] In the case of banking, however, financial portfolios are relatively flexible compared to ownership structure. As Saunders and his coauthors note, the transaction cost of changing ownership structure would be large relative to the costs of altering a financial portfolio.[4] For example, regulatory oversight and geographic restrictions have raised the cost of hostile takeovers in banking, and have made them rare relative to nonbank industries.[5] We recognize that, in the long run, risk and ownership structure would be determined simultaneously but assume that, for the relatively short-run period we analyze, risk adjusts to a fixed ownership and management structure.

Results

Regression results show that our measures of overall bank risk are influenced in varying degrees by ownership structure and the diversification of wealth. Credit risk as measured by loan losses and nonperforming assets was clearly tied to ownership structure and diversification of wealth (Table A1.1), but measures of bank preparation for bad loans such as allowances and provisions for loans losses were not (Table A1.2). Of other balance sheet risks, only the equity-to-asset ratio was significantly related to ownership structure and diversification of wealth (Table A2). Finally, variation in total income was not statistically related to either manager's bank investment/net worth or the ownership share of the hired manager, but was negatively related to the monitor's bank investment/net worth (regression (14), Table A3). On the other hand, the survival likelihood index was significantly related to all three of these variables. Variation in operating earnings was statistically related to the ownership share of the hired manager, but not to the manager's or monitor's bank investment/net worth (regression (15), Table A3).

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*[3] Harold Demsetz and Kenneth Lehn, " The Structure of Corporate Ownership: Causes and Consequences," **Journal of Political Economy** 93 (1985): 1155-77.*
[4] Saunders et. al., (1990): 645.
*[5] Stephen D. Prowse, "Alternate Methods of Corporate Control in Commercial Banks," Federal Reserve Bank of Dallas **Economic Review** (Third Quarter 1995): 24-36.*

Table A1.1

Regression analysis of manager wealth, ownership, and credit risk

	Dependent Variable				
	Total Loans / Total Assets	Net Loan Losses / Total Loans	Nonperforming Assets / Total Loans	Past Due Loans / Total Loans	Noncurrent Assets / Total Assets
Independent Variable	(1)	(2)	(3)	(4)	(5)
Constant term	0.526618***	0.003915***	0.017888***	0.033843***	0.011236***
	(.02126)	(.00091)	(.00109)	(.00417)	(.00168)
Manager's bank investment/net worth	-0.016548	-0.002771**	-0.004556**	-0.006201*	-0.002681**
	(.01619)	(.00131)	(.00206)	(.00318)	(.00128)
Manager's (bank investment/net worth)^2	not entered†	0.000651**	not entered†	not entered†	not entered†
		(.00033)			
Hired manager indicator variable	0.016365	-0.003151***	-0.008709***	-0.010435**	-0.005182***
	(.02440)	(.00094)	(.00311)	(.00479)	(.00193)
Ownership share of hired manager	0.082268	0.014681**	0.036378	0.039030	0.029017*
	(.19132)	(.00696)	(.02438)	(.03756)	(.01514)
Monitor's bank investment / net worth ×hired manager indicator variable	-0.000695	0.000278	-0.002377	-0.005366	-0.002046
	(.02152)	(.00071)	(.00274)	(.00422)	(.00170)
Nonmetropolitan indicator variable	-0.035599*	-0.001309*	-0.001377	-0.003792	-0.003389*
	(.02224)	(.00074)	(.00283)	(.00437)	(.00176)
Assets	0.000034	0.000003	-0.000018	-0.000028	-0.000008
	(.00029)	(.00001)	(.00004)	(.00005)	(.00002)
Assets^2	-0.000000	-0.000000	0.000000	0.000000	0.000000
	(.00000)	(.00000)	(.00000)	(.00000)	(.00000)
R^2	.0301	.0570	.0301	.0507	.0555

Notes: The sample consists of 267 state-chartered banks in the Tenth Federal Reserve District. Reported statistics are coefficient estimates and associated standard errors.

***, **, and * indicate statistically different from zero at a 1%, 5%, or 10% significance level.

† Tests indicated that the coefficient on this variable was not statistically different from zero, and so the variable was not entered for this regression.

Table A1.2

Regression analysis of manager wealth, ownership, and credit risk

	Dependent Variable			
	Allowance for Loan Losses / Total Loans	Provision for Loan Losses / Total Loans	Other Real Estate Owned / Total Assets	Noncurrent Assets / Allowance for Loan Losses
Independent Variable	(6)	(7)	(8)	(9)
Constant term	0.019792***	0.000607	0.002082***	1.367990***
	(.00154)	(.00153)	(.00078)	(.26572)
Manager's bank investment/net worth	0.000714	0.000687	-0.000211	-0.294672
	(.00117)	(.00116)	(.00059)	(.20232)
Manager's (bank investment/net worth)^2	not entered†	not entered†	not entered†	not entered†
Hired manager indicator variable	0.001360	0.000187	-0.001159	-0.678058**
	(.00177)	(.00175)	(.00089)	(.30498)
Ownership share of hired manager	0.004233	0.002097	-0.012224*	2.203199
	(.01384)	(.01375)	(.00700)	(2.3909)
Monitor's bank investment/net worth	-0.001192	-0.000022	-0.000755	-0.226297
×hired manager indicator variable	(.00156)	(.00155)	(.00079)	(.26901)
Nonmetropolitan indicator variable	0.003668**	-0.001143	-0.001928**	-0.269063
	(.00161)	(.00160)	(.00081)	(.27793)
Assets	0.000033	0.000016	0.000002	-0.000542
	(.00002)	(.00002)	(.00001)	(.00348)
Assets^2	-0.000000*	-0.000000	-0.000000	0.000001
	(.00000)	(.00000)	(.00000)	(.00001)
R^2	.0437	.0079	.0407	.0317

Notes: The sample consists of 267 state-chartered banks in the Tenth Federal Reserve District. Reported statistics are coefficient estimates and associated standard errors.
***, **, and * indicate statistically different from zero at a 1%, 5%, or 10% significance level.
†Tests indicated that the coefficient on this variable was not statistically different from zero, and so the variable was not entered for this regression.

Table A2

Regression analysis of manager wealth, ownership, and other balance sheet risk

	Dependent Variable			
	Equity / Total assets	Premises and fixed assets / Total assets	Volatile liabilities / Total deposits†	Absolute value (asset-liability mismatch) / Total assets
Independent Variable	(10)	(11)	(12)	(13)
Constant term	0.094192***	0.010778***	0.090889***	0.128589***
	(.00576)	(.01455)	(.01432)	(.01661)
Manager's bank investment/net worth	0.019801**	-0.000888	-0.003513	-0.006256
	(.01015)	(.00111)	(.00842)	(.01265)
Manager's (bank investment/net worth)^2	-0.003413*	not entered‡	not entered‡	not entered‡
	(.00243)			
Hired manager indicator variable	0.002584	0.002804*	-0.011572	0.015255
	(.00592)	(.00167)	(.01138)	(.01907)
Ownership share of hired manager	-0.084461*	-0.020826	-0.017577	0.018623
	(.04387)	(.01309)	(.08065)	(.14948)
Monitor's bank investment/net worth	0.016560***	-0.000880	0.028009***	0.014589
× hired manager indicator variable	(.00451)	(.00147)	(.01005)	(.01682)
Nonmetropolitan indicator variable	0.010073**	-0.005330***	0.022827**	0.009995
	(.00466)	(.00908)	(.00908)	(.01738)
Assets	-0.000093	0.000008	-0.000501*	0.000370*
	(.00006)	(.00002)	(.00028)	(.00022)
Assets^2	-0.0000002**	-0.000000	0.000000	-0.000000
	(.000001)	(.00000)	(.00000)	(.00000)
R^2	.1239	.1018	.1092	.0418

Notes: The sample consists of 267 state-chartered banks in the Tenth Federal Reserve District. Reported statistics are coefficient estimates and associated standard errors.
***, **, and * indicate statistically different from zero at a 1%, 5%, or 10% significance level.
† Tests indicated that the error terms for this regression were heteroscedastic. We corrected for this by using White's (1980) heteroscedastic-consistent standard errors.
‡ Tests indicated that the coefficient on this variable was not statistically different from zero, and so the variable was not entered for this regression.

Table A3

Regression analysis of manager wealth, ownership, and measures of overall bank risk

	Dependent Variable		
Independent Variable	Total Revenue Variation: Log (Standard Deviation of Total Revenue / Average Assets) (14)	Net Earnings Variation: Log (Standard Deviation of Operating Return on Average Assets) (15)	Survival Index: Log [(Equity + Average Operating Return on Assets) / (Standard Deviation of Operating Return on Average Assets)] (16)
Constant term	-5.791945***	-3.180676***	0.752156
	(.23610)	(.41888)	(.46112)
Manager's bank investment/net worth	-0.003614	-0.100298	0.145045**
	(.03563)	(.06321)	(.06958)
Manager's (bank investment/net worth)^2	not entered†	not entered†	not entered†
Hired manager indicator variable	0.139355**	-0.049743	-0.013011
	(.05399)	(.09578)	(.10544)
Ownership share of hired manager	-0.000582	1.083792*	-1.337034**
	(.31749)	(.56328)	(.62007)
Monitor's bank investment/net worth	-0.179664***	-0.016636	0.155403*
×hired manager indicator variable	(.04745)	(.08417)	(.09266)
Nonmetropolitan indicator variable	-0.038601	-0.124302	0.247042***
	(.04864)	(.08630)	(.09500)
Log (Assets)	-0.010791	-0.174922***	0.195719***
	(.02320)	(.04115)	(.04531)
R^2	.0667	.0875	.1125

Notes: The sample consists of 267 state-chartered banks in the Tenth Federal Reserve District. Reported statistics are coefficient estimates and associated standard errors.

***, **, and * indicate statistically different from zero at a 1%, 5%, or 10% significance level.

† Tests indicated that the coefficient on this variable was not statistically different from zero, and so the variable was not entered for this regression.