

Manager wealth concentration, ownership structure, and risk in commercial banks [☆]

Richard J. Sullivan ^{a,*}, Kenneth R. Spong ^b

^a *Payments System Research, Federal Reserve Bank of Kansas City, 925 Grand Boulevard, Kansas City, MO 64198, USA*

^b *Banking Studies and Structure, Federal Reserve Bank of Kansas City, 925 Grand Boulevard, Kansas City, MO 64198, USA*

Received 25 October 2004

Available online 28 December 2006

Abstract

Of key importance in the governance structure of firms is the role of financial incentives for each major player. The main contribution of this article is an analysis of how an insider's concentration of wealth in his or her bank investment affects incentives to take risk. Major empirical findings are that, first, bank earnings variation falls when bank managers have more of their wealth concentrated in their banks; second, hired-manager banks become less risky when a person who has significant motivation to monitor bank management has his or her wealth highly concentrated in the bank; and third, stock ownership by hired managers can increase total risk of a bank. Further analysis suggests that community banks in our sample control earnings variation by manipulating idiosyncratic risk, credit risk, and leverage but not systematic risk or the loan-to-asset ratio.

© 2007 Elsevier Inc. All rights reserved.

JEL classification: G21; G34

1. Introduction

A critical issue in operating a business is the effectiveness of a company's management and ownership structure and its corporate governance systems in determining appropriate risk-return

[☆] The views expressed in this article are those of the authors, and do not necessarily reflect those of the Federal Reserve Bank of Kansas City or the Federal Reserve System.

* Corresponding author. Fax: 816 881 2425.

E-mail addresses: Rick.J.Sullivan@kc.frb.org (R.J. Sullivan), Ken.R.Spong@kc.frb.org (K.R. Spong).

trade-offs. However, recent corporate scandals and the development and implementation of the Sarbanes–Oxley Act have revealed how little sound evidence there is on what constitutes a good corporate governance system and what type of management, ownership, and board structure will lead to strong performance and effective risk management. This article addresses such issues by looking at how risk-taking behavior is shaped by a bank's management and ownership structure and the personal financial characteristics of its managers and owners. In particular, the main contribution of this article is an analysis of the extent to which a manager's or major owner's concentration of wealth in their bank investment influences risk-taking incentives.

The relationship among management and ownership structure, corporate governance systems, and risk taking is of special interest in banking. From a stockholder's perspective, assessing the overall level of performance and risk of a bank may be more difficult than in many industries.¹ The liquid nature of many bank assets and liabilities creates a potential for risk exposures to change quickly. The confidential and proprietary information inherent in a bank's operations also may keep investors from having a clear picture of the risk in a bank's operations. Moreover, there are important public policy issues and externalities associated with this industry. Because financial crises can disrupt the payments system and the general economy, risk exposures in banking are a fundamental concern of bank supervisors. This task is further complicated by the fact that deposit insurance and other aspects of the public safety net used to protect banking customers may create incentives for bank managers and owners to take excessive risks.

This article will first discuss the theoretical relationship between bank risk, ownership structure, monitoring activity, and managerial and owner wealth, with previous research on these topics providing context to the discussion. The paper then describes the sample of banks to be analyzed and details ownership and management structure and the financial characteristics of managers and other key individuals. We then present a regression analysis relating bank risk to such variables as ownership and management structure and wealth diversification by bank managers. The final section summarizes results and discusses their implications.

2. The relationship between risk taking at banks and their ownership structure, managerial wealth concentration, and monitoring activity

Among factors that are likely to influence the risk position of individual firms are a manager's ownership position in the firm, the authority exerted by directors and large outside stockholders in setting policies on bank risk–return trade-offs, and the extent to which each of these parties has their own wealth tied up in the firm.

The amount of stock a manager holds in his or her bank is important in determining whether the bank will be subject to the type of principal–agent problems identified by [Jensen and Meckling \(1976\)](#). Such principal–agent problems or agency costs arise when a manager holds little stock in the bank and thus may seek to maximize his or her own utility instead of maximizing the value of the bank and thereby serving the interests of stockholders. The manager does not benefit to the same extent as stockholders from successful outcomes, but could suffer much damage to his or her reputation and human capital investment from unsuccessful ventures. If other factors are comparable, hired managers with little or no ownership stake are likely to be more risk averse than managers with a significant ownership position.

¹ [Morgan \(2002\)](#) found bond raters disagreed more often in rating banks compared to other types of firms, which suggests that banks may be more opaque and have risk exposures that are harder to observe and evaluate.

Mechanisms to address this problem include managerial compensation, future employment prospects, and opportunities for hired managers to have a meaningful ownership stake in the firm (Fama, 1980; Cannella et al., 1995). Active monitoring of managers by directors and stockholders can also deal with agency costs. Such oversight can encourage hired managers to take appropriate risks and follow policies that closely reflect the desires of stockholders. Because monitoring is a costly and time-consuming activity, the most extensive monitoring is likely to be done by those who will benefit the most from a bank's good performance—stockholders and directors with significant ownership positions.

One other factor influencing a bank's risk position that has received little attention in previous studies on risk taking by firms is how much of a manager's or major stockholder's wealth is concentrated in the bank. Managers that have a great deal of their portfolio in the stock of their bank are likely to be more cautious compared to managers with a more diversified mix of investments (Smith and Stulz, 1985, pp. 399–403). Those individuals that monitor management and a bank's operations should be influenced in a similar fashion according to the proportion of their wealth concentrated in the bank's stock.

These wealth concentration effects are separate from principal–agent issues and the actual amount of stock a manager might hold in his or her bank. Under agency theory, two managers that hold the same amount of stock in their banks would be expected to have similar incentives in serving stockholders. However, wealth concentration effects could significantly alter these expectations by making a manager that has much of his or her wealth concentrated in the bank much more risk averse than otherwise expected. Therefore, a true picture of the factors driving decisions about risk at banks may not emerge unless manager stockholdings, monitoring, and the wealth diversification of managers and monitors are all examined at the same time.

Risk taking in banks is further complicated by deposit insurance. Insured deposits can create a moral hazard problem because insured depositors have no need to extract a price for bankers taking on higher risk, thus removing one key disciplinary influence on bankers (Merton, 1977). To the extent that deposit insurance influences risk, bank managers and stockholders may be encouraged to take on more risk than would otherwise be desirable in a market-based system.

The strength of this incentive and the ability of bankers to exploit it will depend on several factors. First, the incentive will be inversely related to the franchise value of the bank, since the cost of bank failure to owners will be directly tied to this value (Demsetz et al., 1997; Marcus, 1984; and Keeley, 1990). Second, bank regulatory and supervisory discipline will influence the ability of bankers to exploit the incentives that deposit insurance provides for taking on more risk. Even if the owners of a bank achieve a level of risk consistent with their own preferences, the resulting risk exposure may be too high from society's point of view, thereby creating a need for supervisors to substitute for lost depositor discipline.

This discussion suggests five testable hypotheses. First, increased stockholdings in a bank are likely to encourage managers to be less risk averse. Second, effective monitoring of hired managers by directors and large stockholders should encourage hired managers to increase bank risk to be more consistent with stockholder interests. Third, the more a manager's, director's, or large shareholder's wealth is tied up in a bank, the more risk averse they are likely to be. Fourth, franchise value should be negatively related to bank risk. Fifth, ownership incentives towards risk taking may be weaker in stringent regulatory regimes.

Other than the third hypothesis, all these relationships have been explored in the research literature on bank risk. Saunders et al. (1990) pioneered these investigations by studying the link between bank ownership and risk taking in a sample of 38 large, publicly held bank holding

companies.² They used stock price data to obtain several measures of the capital market risk of the bank holding companies and calculated ownership using 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. They also found that the estimated coefficient on manager ownership was significantly higher during a period of reduced regulatory scrutiny, suggesting a stronger role for ownership incentives in determining bank risk during lenient regulatory regimes.

A number of studies followed Saunders and his co-authors by using risk measures derived from stock prices (Anderson and Fraser, 2000; Brewer and Saldenberg, 1996; Chen et al., 1998; Demsetz et al., 1996; Demsetz and Strahan, 1997; and Knopf and Teall, 1996). Other studies looked at risk in banks as measured by balance sheet indicators (Cebenoyan et al., 1999; Gorton and Rosen, 1995; Knopf and Teall, 1996; and Sullivan and Spong, 1998). Results are less than conclusive regarding the relation between insider ownership and risk in banks. These studies have found that the relation between insider ownership and bank risk is sometimes positive, sometimes negative, sometimes U-shaped, and sometimes inverse U-shaped. Perhaps the most important contribution of the research is the revelation that other influences on manager behavior complicate the relation between ownership and incentives towards risk. In some of these studies, franchise value (measured by market to book equity), regulatory stringency, and economic conditions were either found or suggested as factors influencing the relationship between manager ownership and firm risk.

None of these studies account for differences in the amount of wealth that managers or other policymakers have tied up in their own banks. This shortcoming is significant because the diversification of an individual's financial wealth is likely to be an important influence on risk-taking behavior. Parrino et al. (2002), for example, developed a model of the cash flow of levered firms that incorporates agency conflicts. In simulations of the model, they found that in a manager's decision to adopt risky projects "outside wealth has a dramatic effect on investment incentives" (p. 42). Consequently, with diversified financial wealth, a person should be less concerned with the risk of any individual investment. But if the person's wealth were highly concentrated in a particular investment, then he or she should be more motivated to monitor and control the investment to reduce its risk. As a result, excluding information on wealth diversification in empirical studies may lead to inconsistent relationships between a manager's or key shareholder's stock ownership and risk by not accounting for the unique and separate effect of wealth concentration on risk.

3. Sample data

Examination reports of state chartered banks provide the primary source of data on wealth and ownership among owners, directors, and managers.³ Bank examiners 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 compensation and net worth of all the directors of the

² Many studies of non-financial firms also show a relation between ownership structure and risk (Agrawal and Mandelker, 1987; Amihud and Lev, 1981; Bagnani et al., 1994; and May, 1995).

³ DeYoung et al. (2001) examine how management and ownership structure influence the profit efficiency of banks with the same data set used in this study.

bank.⁴ 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. Financial data used to measure bank risk and other characteristics come from quarterly call reports. Market concentration data (the Herfindahl–Hirschman index) are based on the FDIC's Summary of Deposits.

The sample consists of state-chartered banks from the Tenth Federal Reserve District.⁵ Sample banks range in size from \$2.6 million to \$730 million in assets (year-end 1994), a range that encompasses much of the US bank population. In 1994, banks under \$1 billion in assets represented over 96 percent of all commercial banks and held 28 percent of the total domestic bank assets. Although this sample is primarily representative of banks in the Midwest, it may also be relevant to smaller banks in the rest of the United States.

To obtain the sample, we first identified 1421 state-chartered banks that offered loans, held insured deposits, generated non-interest income, and existed for at least the years from 1985 to 1994. These criteria led to a sample that included full-service banks, eliminated *de novo* banks (to aid comparability) and eliminated banks that failed (to ensure complete data).⁶ From these banks we randomly selected 304 banks for which detailed data on ownership and wealth were collected from 1993 or 1994 examination reports.

To match risk performance and ownership structure over this period, we included only those banks where the same major ownership group was in control from 1991 to early 1994, which resulted in the exclusion of 27 banks from the sample. Missing data on wealth or ownership reduced the sample by another ten banks, leaving 267 observations used in the statistical analysis.

Ownership share in a bank is defined as the proportion of the bank's common stock outstanding held by the individual, including any bank shares owned indirectly through a holding company. The value of the bank investment is determined by the book value of the bank stock owned.⁷ Wealth concentration in the bank is calculated as the ratio of an individual's investment in the bank to personal net worth.

A small portion of managers and monitors had bank investment to net worth ratios that were calculated to be more than 1.0. The most likely reason is that major stockholders often incur substantial debt either on a personal basis or indirectly through their interest in a bank holding company when financing the acquisition of bank stock. Ideally, we would reduce the value of this bank investment by the underlying debt behind its purchase but the information to do so is not consistently available.⁸ As a result, our calculated wealth concentration measures may overstate the true level of concentration for some managers and monitors (and, accordingly, understate the

⁴ Examiners also report the age and tenure of officers and directors, family relationships among officers and stockholders, and information on policymaking responsibility. 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. When needed we also consulted bank holding company inspection reports and annual reports filed by bank holding companies.

⁵ The Tenth Federal Reserve District includes Colorado, Kansas, western Missouri, Nebraska, northern New Mexico, Oklahoma, and Wyoming. National banks are not included in the sample because similar management and ownership data are not available in examination reports from the OCC.

⁶ The latter may cause some selection bias, which we address below in Section 6.

⁷ 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.

⁸ It would also be problematic to divide personal debt according to different purposes. Another complicating issue is that bank stock lenders often ask major stockholders to personally guarantee bank stock debt, which would suggest that other assets held by a manager or monitor could be at stake.

corresponding regression coefficients), but should still serve as a good proxy for ranking these individuals according to the general differences in their wealth concentrations.

4. Wealth, ownership and bank characteristics

Sample banks are divided into two groups, based on the ownership characteristics of the bank's top manager.⁹ In an *owner-manager* bank, the top manager is a member of the ownership group with the largest stake in the bank. There are 110 owner-manager banks (Table 1) with owner managers on average holding 37 percent of the stock in their bank. Other members of the owner-manager's family often own a significant part of the bank as well, and the combined family ownership in these banks averages 63 percent.

The 157 sample banks not in the owner-manager category are *hired-manager* banks (Table 1). With an ownership share that averages 3 percent, most hired managers have little or no stake in their bank. 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 banks have managers with an ownership of 5 percent or greater (not shown in Table 1), with a maximum of 39 percent. In all these banks, however, at least one other owner has a larger share of the bank.

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 and \$0.475 million for hired managers (Table 1). For owner managers, wealth concentration in his or her bank averages 0.86, while for hired managers, it averages 0.21 (Table 1). For the majority of

Table 1
Statistical summary of manager ownership of bank and net worth

Number of banks	Owner-manager banks 110			Hired-manager banks 157		
	Mean [*]	Minimum	Maximum	Mean [*]	Minimum	Maximum
<i>Manager characteristics</i>						
Personal ownership of bank	37%	0%	100%	3%	0%	39%
Personal plus family ownership of bank	63%	2%	100%	4%	0%	43%
Personal net worth (millions)	\$1.719	\$0.003	\$11.009	\$0.475	\$0.021	\$4.789
Investment in bank/personal net worth ^a	0.86	0	4.55	0.21	0	2.32
Correlation coefficient between personal ownership of bank and investment in bank/personal net worth		0.1641			0.6588	
<i>Monitor characteristics</i>				Mean	Minimum	Maximum
Investment in bank/personal net worth ^a				0.41	0	4.44

Notes: The sample consists of 267 state-chartered banks in the Tenth Federal Reserve District. The statistics are un-weighted averages.

^a Investment in bank = number of shares personally held in bank × book value of equity per share.

* Tests of a null hypothesis of equal population means for owner-manager and hired-manager banks reject the null at least at the 1% significance level for all variables, based on a *t*-test for a difference in means.

⁹ The top manager is the person that examiners list as responsible on a daily basis for directing the operations of the bank. In most cases this was the president or CEO. Examination information is particularly helpful in identifying the daily managing officer because a portion (perhaps 5 percent) of the sample has absentee or figurehead CEOs.

Number of banks

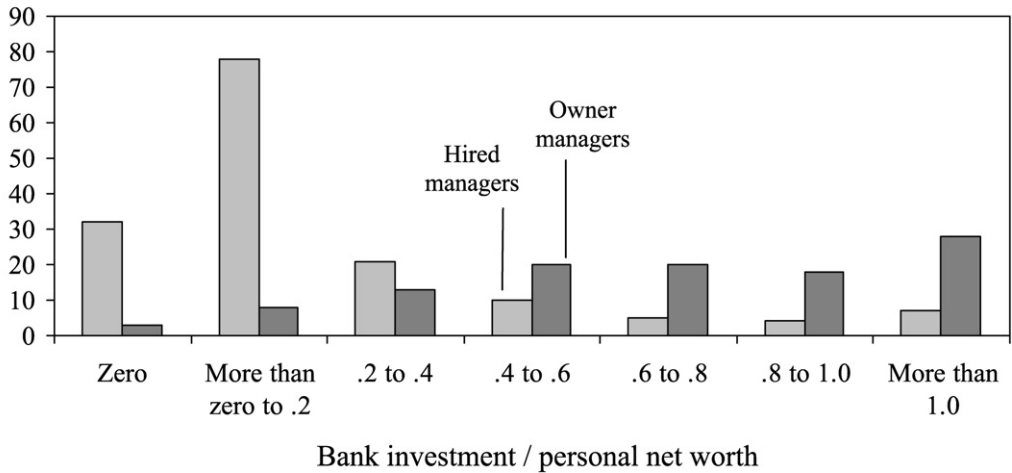


Fig. 1. Distribution of manager bank investments / personal net worth.

hired managers, the ratio is under 0.20 (Fig. 1). By contrast, Fig. 1 shows that a ratio greater than 0.20 is the rule for owner-manager banks.¹⁰

Whether a manager's bank ownership is low or high, there is a wide range in the amount of wealth managers have concentrated in their own banks. The correlation coefficients between manager ownership and wealth concentration for owner and hired managers are 0.1641 and 0.6558, respectively (Table 1). As expected, the correlations are positive, but they are far enough from a value of 1 to indicate that there is considerable spread to the relationship.

To account for a monitoring role, we identified a person most likely to take on the responsibility of monitoring the bank's manager. We assume this monitoring role would be most important in banks with hired managers because owner managers would already have an incentive to serve stockholder interests. We therefore chose as a monitor the director in a hired-manager bank who holds the most shares of any director and is also a member of the largest ownership group. This definition helps to ensure that this individual has both the ability and motivation to influence the hired manager. For this monitor, we calculate the value of his or her investment in the bank relative to personal net worth and find an average ratio of 0.41 (Table 1).

Owner-manager banks tend to be smaller, better capitalized, less urban, and somewhat less profitable than hired-manager banks in this sample (Table 2). Average assets are \$38.6 million for owner-managed banks and \$54.6 million for hired-manager banks. Owner-managed banks have an average capital-to-asset ratio of 10.18 percent, compared to 9.35 percent for hired-manager banks. Nineteen percent of owner-managed banks are in metropolitan areas, compared to 28 percent for hired-manager banks.

Statistics indicate some differences in profitability for owner- and 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 return on average assets

¹⁰ Figure 1 shows that this ratio exceeds one for some observations. As discussed in the previous section, if the manager or the holding company uses debt to finance bank stock, then the wealth concentration ratios could, in some cases, exceed one because we did not adjust the bank investment measure for any underlying debt.

Table 2

Basic characteristics of sample banks (variables with statistically different values are shown in **bold type**)

	Owner-manager banks	Hired-manager banks
<i>Basic information</i>		
Number of Banks	110	157
Assets—Average (millions), 1994**	\$38.6	\$54.6
Assets—Median (millions), 1994	\$26.3	\$30.8
Capital-to-asset ratio, 1994**	10.18%	9.35%
Location—Percent metropolitan*	19%	28%
Herfindahl–Hirschman index	0.2453	0.2341
<i>Net income</i>		
Return on Average Assets (ROAA), 1994**	1.016%	1.166%
Average ROAA, 1990–1994	1.077%	1.143%
Return on Equity (ROE), 1994**	10.46%	12.79%
Average ROE, 1990–1994*	11.47%	12.88%
<i>Operating net income^a</i>		
Operating ROAA ^a , 1994**	1.461%	1.653%
Average Operating ROAA ^a , 1990–1994	1.428%	1.533%
Operating ROE ^a , 1994**	14.93%	18.19%
Average Operating ROE ^a , 1990–1994**	15.16%	17.23%
<i>Measure of bank risk</i>		
Standard deviation of operating return on equity ^a	9.15%	10.59%

Notes: The sample consists of 267 state-chartered banks in the Tenth Federal Reserve District. Statistics are unweighted averages or median values for sample banks and cover the period from 1990 to 1994 are calculated from quarterly data.

* Significant difference between owner-manager and hired-manager banks at the 10% level. Statistical difference based on a *t*-test for a difference in means or a rank-order test for a difference in medians.

** Idem, 5%.

^a 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.

(ROAA) and return on equity (ROE) for the period from 1990 to 1994, although the difference for average ROAA is not statistically significant.

An alternative measure of profitability, operating net income (net income before taxes, securities gains or losses, and extraordinary items) should provide a better basis than ROAA or ROE for the study of risk. Operating net income, for instance, more closely reflects the variability of the demand for a bank's product and services, its interest rate volatility, and the flexibility of the bank's asset and liability management (Sinkey, 1989, p. 408). Operating net income focuses on the core business of the bank and helps to eliminate fluctuations in income from variables that can be manipulated in the short-run. As Table 2 shows, hired-manager banks have a higher average value of operating return on average assets compared to owner-manager banks.

The primary measure of bank risk we employ is the standard deviation of operating return on equity over the 20 quarters in the period from 1990 to 1994.¹¹ Hired-manager banks have greater variation in operating return on equity compared to owner-managed banks (Table 2), although the difference is not statistically significant.

¹¹ Other studies that use fluctuation in accounting earnings to measure bank risk include Emmons et al. (2004), Liang (1989), and Rivard and Thomas (1997). Market-based measures of bank risk (such as fluctuations in stock returns) are unavailable for this study because 262 sample banks do not have publicly traded common stock.

5. Regression analysis of bank risk, ownership structure, and manager wealth

5.1. Empirical model

We are interested in risk and its relationship to ownership and management structure as measured by the ownership position of managers, the concentration of their financial wealth, and the influence of monitoring activity. The following statistical model makes bank risk a function of ownership and management characteristics, three control variables, and an error term:

$$\begin{aligned}
 &\text{Standard deviation of operating return on equity}_i \\
 &= \alpha_0 \\
 &\quad + \alpha_1 (\text{manager's bank investment/personal net worth})_i \\
 &\quad + \alpha_2 (\text{monitor's bank investment/personal net worth})_i \\
 &\quad + \alpha_3 (\text{personal plus family ownership share of hired manager})_i \\
 &\quad + \alpha_4 (\text{personal plus family ownership share of owner manager})_i \\
 &\quad + \beta_1 (\text{metropolitan indicator variable})_i \\
 &\quad + \beta_2 \ln(\text{assets})_i \\
 &\quad + \beta_3 (\text{Herfindahl–Hirschman index})_i + \varepsilon_i.
 \end{aligned} \tag{1}$$

The model's dependent variable, the standard deviation of operating return on equity, represents a comprehensive measure of risk that will be highly important to bank managers and owners. For bank managers, the variation in return on equity provides a measure of how well they have done in controlling risk at their banks and how stockholders and directors are likely to judge their performance. Bank owners also view this variable as important in terms of their own financial risk exposure and potential threat to their overall wealth position.

Managers and owners alter many characteristics of the bank to control fluctuations in income. These decision variables include credit standards, makeup of the loan portfolio, the loan-to-asset ratio, liquidity, maturity levels of assets and liabilities, funding sources, operating leverage, and financial leverage. While characteristics of management and ownership structure will be correlated with these variables, they ultimately determine variation in bank income. Accordingly, our empirical analysis focuses on the standard deviation of operating return on equity.

Our primary interest is the first four explanatory variables. We expect the coefficients on the concentration of manager and monitor wealth in their bank investments, α_1 and α_2 , to be negative. This reflects increased risk aversion by managers and monitors as more of their wealth is concentrated in the bank. Note that, because we assume the owner manager has control of decision making, the monitoring variable for owner-manager banks would be equal to zero.

The model enters the ownership stake of hired and owner managers separately because the relation between ownership and risk should be different for each type of manager.¹² The coefficient for hired managers, α_3 , should be positive because added ownership provides hired managers with an incentive to be less risk averse. The ownership position of owner managers already gives them much of the incentive and authority needed to run the bank according to

¹² The variables use the personal plus family ownership of the manager because it most closely measures the voting power of the manager and represents the broad interest of the manager.

their own preferences. As a result, owner managers may have little incentive to add risk if their stockholdings increase. We therefore expect α_4 to be smaller than α_3 and much closer to zero.¹³

The model's next three terms are control variables. We include an indicator variable for whether or not the bank is in a metropolitan area. Banks in metropolitan areas face a larger market for loans and other banking products compared to other banks, which may give them more diversification in their operations. This diversification could result in a more stable earnings structure and/or a willingness and ability to take on other forms of risk. Earnings fluctuations also will depend upon economic conditions, which may vary across rural and urban markets, and these patterns may change over time.¹⁴ We therefore have no strong expectation regarding whether the effect of location on risk is positive or negative ($\beta_1 >$ or < 0).

The next term measures the size of the bank. Larger banks may have a more diversified and stable earnings stream because they have more opportunities to pursue a broader range of loans, investments and other activities. We expect that bank size should have a negative relation with risk ($\beta_2 < 0$). Total assets measure bank size, which is entered with a log transformation to allow for a possible nonlinear relation with risk. The last term measures the degree of concentration in the bank's market as a proxy for market power, based on a likely positive relation between market power and franchise value (Marcus, 1984). We expect a negative relation between market concentration and risk ($\beta_3 < 0$) as banks with higher franchise values have fewer incentives to take on greater risk and thereby exploit the moral hazard features of deposit insurance.

5.2. Estimation method and issues

We recognize that, in the long run, risk and ownership structure would be determined simultaneously. 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 (Demsetz and Lehn, 1985). In the case of banking, however, financial portfolios are relatively flexible compared to ownership structure, and a wide range of ownership structures exist among otherwise similar banks, especially in community banks. As Saunders and his co-authors note, the transaction cost of changing ownership structure would be large relative to the costs of altering a financial portfolio (Saunders et al., 1990, p. 645). This may be especially true for our study because the concentrated ownership structure of sample banks would be a significant barrier to hostile takeovers.¹⁵ We therefore assume that, for the relatively short-run period we analyze, risk adjusts to a fixed ownership and management structure.

Efforts by management to control risk likely target a number of characteristics of the bank at the same time (Pagano, 2000). We regard Eq. (1) as a reduced form with exogenous explanatory variables. The equation was estimated using ordinary least squares regression with standard errors calculated using White's (1980) heteroskedasticity-consistent method. Finally, a log transformation was necessary to obtain normally distributed error terms.

¹³ The relation between the level of manager ownership and firm risk in owner-managed banks may also depend on interactions between majority and minority owners. We did some preliminary analysis into this question using alternative definitions for monitor to include minority shareholders but did not find any statistically significant results. This sample of banks may not shed light on monitoring activity of minority owners because many of the sample banks are closely held and the degree of control generally afforded the shareholder with the largest stake in the bank may limit the ability of minority shareholders to influence firm risk.

¹⁴ Myers and Spong (2003) study earnings differences among banks across fast and slow growing local markets.

¹⁵ Other factors also make hostile takeovers in banking more costly relative to those in non-bank industries. These include geographic restrictions (now largely removed) and regulatory oversight (Prowse, 1995).

5.3. Regression analysis

5.3.1. Estimates of Eq. (1)

Column (1) of Table 3 presents estimates of Eq. (1). The overall model is statistically significant, according to an F test. Estimated coefficients have signs and significance levels that conform to our hypotheses. Estimates of α_1 and α_2 are negative and statistically significant. An increase in the concentration of wealth in the manager's or monitor's bank investment is associated with a reduction in bank risk.

The estimate of α_3 is positive and statistically significant. In this sample, hired manager ownership is positively associated with bank risk. This estimate supports our conjecture that hired managers are willing to take on more risk as their stockholdings increase. The estimate of α_4 is close to zero and statistically insignificant. The relative size of estimates of α_3 and α_4 support our argument that the effect of additional ownership on bank risk would be stronger in hired-manager banks compared to that of owner-manager banks.

Table 3
Regression analysis of manager wealth concentration, ownership, and variation in operating return to equity

Independent variable	Dependent variable: Log (standard deviation of operating return on equity)		
	(1)	(2)	(3)
Manager's bank investment / net worth	−0.1799*** (0.0590)		−0.1267** (0.0548)
Monitor's bank investment / net worth	−0.1318* (0.0672)		−0.0539 (0.0648)
Personal plus family ownership share of manager		0.0273 (0.1197)	
Personal plus family ownership share of hired manager	1.6299*** (0.6050)		1.5253** (0.5899)
Personal plus family ownership share of owner manager	0.1397 (0.1504)		0.1822 (0.1436)
Metropolitan indicator variable	0.2881** (0.1123)		0.1945* (0.1057)
Log(total assets)	−0.1679*** (0.0449)	−0.1539*** (0.0442)	−0.1719*** (0.0432)
Equity capital / total assets		−6.0080*** (1.2425)	−5.2715*** (1.2310)
Fixed assets / total assets		6.9542* (3.8753)	7.0276* (3.6934)
Herfindahl–Hirschman index	−0.0263 (0.2267)		−0.1471 (0.2392)
Constant	−0.8752* (0.4717)	−0.5017 (0.4984)	−0.4167 (0.4705)
R -squared	0.11	0.15	0.19
F	5.45	10.70	8.65
Prob > F	0.000	0.000	0.000

Notes: The sample consists of 267 state-chartered banks in the Tenth Federal Reserve District. Reported statistics are coefficient estimates, associated standard errors (in parentheses). Standard errors calculated using White's (1980) heteroskedasticity-consistent method.

* Statistically significant at a 10% significance level.

** Idem, 5%.

*** Idem, 1%.

5.3.2. Control variables

Metropolitan location and total assets are statistically significant in explaining earnings variation. Results suggest that banks in metropolitan areas are willing to tolerate more earnings variability than other banks and that bank size is negatively related to bank risk, as expected.

The coefficient on the Herfindahl–Hirschman index is statistically insignificant. Previous research that has shown that franchise value can have an effect on bank risk (Demsetz et al., 1996; Keeley, 1990). A possible explanation for this difference is that we include variables for the concentration of wealth that managers and principal owners have in their bank investment. These variables may do a better job of capturing the direct consequences of risk taking to a bank's key decision makers compared to franchise value. In addition, nearly all of the sample banks had enough capital to reduce moral hazard concerns from deposit insurance.

5.3.3. Specification and robustness checks¹⁶

Column (2) of Table 3 shows estimation results using a specification similar to that used by Saunders et al. (1990). We include it to show that, under their specification, ownership by managers would not be statistically significant in explaining bank risk. The significant results we obtain are partially due to a specification that accounts for the unique characteristics of our sample and to including wealth characteristics of owners and managers.

It is common to include other risk factors as explanatory variables in empirical studies of bank risk (Brewer and Saldenberg, 1996; Chen et al., 1998; Demsetz et al., 1997; and Saunders et al., 1990). There is little justification for including these in the present analysis because the standard deviation of operating return on equity incorporates the effects of asset risk and leverage.¹⁷ Nevertheless, for comparison with previous studies, column (3) of Table 3 adds the explanatory variables (equity capital/total assets) and (fixed assets/total assets) to Eq. (1). Signs of other estimated coefficients are the same as those in column (1) with smaller magnitudes. The statistical significance of other explanatory variables is unaffected with the exception of the monitor's bank investment/net worth.

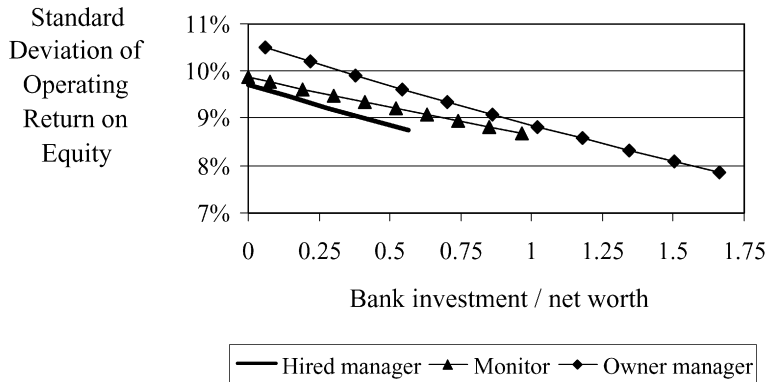
5.3.4. Economic magnitude

To illustrate the economic magnitude of these relationships, Fig. 2 shows how the predicted values of the standard deviation of operating return to equity change with variation in the concentration of owner manager, hired manager, or monitor wealth in their bank investment, based on regression (1) from Table 3.¹⁸ The horizontal range of the chart, designed to reflect common experience, is determined by the mean value for wealth concentration plus or minus one standard deviation (with a zero lower bound). For an owner manager, this change in wealth concentration is associated with a fall in predicted earnings variation from 10.5 to 7.9 percentage points, which

¹⁶ We investigated but do not report other specification and robustness checks. These included using a control variable for the proportion of various types of loans (agricultural, consumer, commercial, and real estate) in the bank's portfolio, a quadratic specification of wealth concentration for managers and monitors, a quadratic specification for the ownership of hired managers, a recode of the bank-investment-to-net-worth ratio to 2 if reported data put the value above 2 (to account for potential mismeasurement), and robust methods for calculating standard errors of coefficients. None of these experiments suggest our specification of Eq. (1) is incorrect or change the main results of the regression analysis.

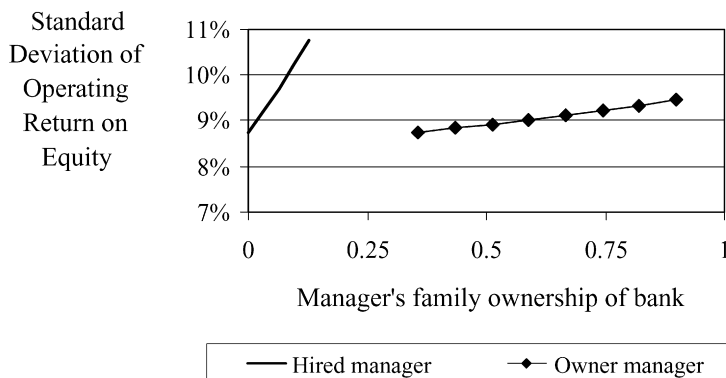
¹⁷ This is a consequence of the fact that $(\text{return on equity}) = (\text{return on assets}) * (\text{assets/equity})$.

¹⁸ Other than bank investment / net worth, the independent variables are set to the means of hired-manager banks for hired managers and monitors, and to the means of owner-manager banks for owner managers. Calculations based on regression (1) from Table 3. Predicted values are converted from logarithms to natural units using $\exp[\ln(\text{predicted value}) + 1/2 (\text{variance of } \ln(\text{predicted value}))]$; see Granger (1989, p. 132).



Notes: Calculations based on regression (1) from Table 3. Predicted values are converted from logarithms to natural units using $\exp\{\ln(\text{predicted value}) + 1/2 (\text{variance of } \ln(\text{predicted value}))\}$; see Granger (1989, p. 132). The range of bank investment / net worth for each individual (owner manager, hired manager, and monitor) is the respective mean plus and minus one standard deviation, with a zero lower bound. Other than bank investment / net worth, the independent variables are set to the means of hired-manager banks for hired managers and monitors, and to the means of owner-manager banks for owner managers.

Fig. 2. Estimated effects of concentration of wealth on variation in operating return on equity.



Notes: Calculations based on regression (1) from Table 3. Predicted values are converted from logarithms to natural units using $\exp\{\ln(\text{predicted value}) + 1/2 (\text{variance of } \ln(\text{predicted value}))\}$; see Granger (1989, p. 132). The range of manager's family ownership of bank for each individual (owner or hired manager) is the respective mean plus and minus one standard deviation, with a zero lower bound. Other than manager's family ownership of bank, the continuous independent variables are set to the means of hired-manager banks for hired managers and to the means of owner-manager banks for owner managers.

Fig. 3. Estimated effects of manager ownership on variation of operating return on equity.

is a decrease of 25 percent. Similar calculations imply a 12 percent and 10 percent decrease in the predicted earnings variation for monitors and hired managers.

By comparison, Fig. 3 shows how the predicted values of the standard deviation of operating return to equity changes with variation in the family ownership of the bank for bank managers. Across the specified range of ownership, the predicted earnings variation rises by 8 percent for owner manager banks and 23 percent for hired manager banks.

Table 4

Estimates of the elasticity of variation in operating return on equity with respect to selected independent variables

Case	Independent variable	Elasticity of earnings variation with respect to the independent variable
<i>A. Assumes profile for hired-manager bank</i>		
1	Manager's bank investment / net worth	−0.038
2	Monitor's bank investment / net worth	−0.054
3	Personal plus family ownership share of hired manager	0.066
4	Total assets	−0.159
<i>B. Assumes profile for owner-manager bank</i>		
5	Manager's bank investment / net worth	−0.153
6	Total assets	−0.159

Notes: Calculations use estimates from regressions (1) from Table 3. The base case sets the metropolitan indicator equal to 1 for both profiles. The remaining independent variables for the base case are set to their respective hired- or owner-manager bank means for the hired- or owner-manager profiles. An independent variable is then increased by one percent and elasticity coefficients are calculated from the base cases and the new predicted values.

Alternatively, we compare the effect of wealth concentration against that of bank asset size. Table 4 presents calculations of elasticity coefficients of selected independent variables for two profiles, hired-manager and owner-manager banks.¹⁹ The elasticity coefficients for asset size (cases 4 and 6) are the highest in the table. In hired-manager banks, the elasticity coefficient for ownership share of the hired managers is also larger than those for the manager's or monitor's bank investment to net worth.

Elasticity coefficients for wealth concentration are smaller than others, but not negligible. Among hired-manager banks, elasticity coefficients for the manager's or monitor's bank investment to net worth are 24 (= 0.038/0.159) or 34 (= 0.054/0.159) percent of that of asset size. Among owner-managed banks, elasticity coefficients for asset size and for the manager's bank investment to net worth (cases 5 and 6) have a similar magnitude.

Overall, we judge that wealth concentration has an economically important effect on bank risk, particularly among closely held banks. Estimates suggest that the quantitative effect of asset size is larger than that of wealth concentration, but the impact of wealth concentration is not negligible and in some scenarios the effects are similar to that of asset size.

5.4. Further analysis of selected components of ROE volatility

To allow some comparisons with previous research and to delve further into how bank owners and managers might control earnings variability, we apply the risk model in Eq. (1) to measures of idiosyncratic risk, systematic risk, asset risk, and financial leverage. Standard models allow decomposition of the variation in stock market returns into systematic and idiosyncratic components. Previous research has shown that characteristics of bank organizations are associated with these measures of risk (Demsetz et al., 1996).

¹⁹ Calculations use estimates from regression (1) in Table 3. In each profile either the means for the hired-manager or the owner-manager sub-samples are used to predict the standard deviation of operating return on equity. We then allow an independent variable to increase by one percent, form new predicted values, and calculate elasticities.

We measure idiosyncratic and systematic risk through a model that explains earnings as a function of external influences, such as industry trends tied to the business cycle and market determined interest rates.²⁰ Formally, let y_{it} denote operating return on assets for bank i in period t . The earnings model is:

$$\begin{aligned} y_{it} = & \alpha_i + \beta_i \text{ (average operating return on assets of Tenth District banks)}_t \\ & + \delta_i \text{ (change in the yield of 10-year Treasury notes)}_t \\ & + \gamma_{1i} \text{ (quarter 2 indicator variable)}_t + \gamma_{2i} \text{ (quarter 3 indicator variable)}_t \\ & + \gamma_{3i} \text{ (quarter 4 indicator variable)}_t + \eta_{it}. \end{aligned}$$

Quarterly indicator variables account for seasonal variation independent of a bank's risk due to seasonal revenue patterns (as in agricultural lending) or other factors, such as employee bonuses or provisions for loan losses that might be concentrated at year-end.²¹ The standard error of the earnings model measures idiosyncratic earnings risk. The bank's "earnings beta," represented by β_i , measures systematic earnings risk.

An alternative decomposition is based on the fact that bank managers and owners can control the level of variation in return on equity by managing asset risk and leverage (the ratio of equity capital to assets). The two measures of asset risk we analyze are the loan-to-asset ratio and the ratio of non-performing assets to total loans.

Regression results are very similar for idiosyncratic risk (column (1) of Table 5) compared to that for total earnings variation (column (1) of Table 3). By contrast, the risk model shows little ability to explain systematic risk (column (2) of Table 5). These results suggest that control of bank risk focuses on idiosyncratic rather than systematic risk, a conclusion also reached in Saunders et al. (1990, p. 648).

Regression results are particularly weak for the risk model applied to the loan-to-asset ratio (column (3) of Table 5). Results are somewhat stronger for the model applied to the ratio of non-performing assets to total loans (column (4) of Table 5), as shown by the F -test that indicates the overall model is significant at the 10 percent level and by two independent variables that are statistically significant. Estimates suggest that as a monitor's wealth becomes more concentrated in the bank, he or she will take steps to reduce non-performing assets and thereby improve the bank's credit quality. For this sample of banks, control of asset risk appears to be through policies that control credit risk rather than through changes in the loan-to-asset ratio.

Column (5) of Table 5 shows results for financial leverage. Statistically, the overall model is significant at least at a 1 percent level and estimated coefficients have expected signs. Variables reflecting manager and monitor wealth concentration are statistically significant, suggesting that the capital-to-asset ratio is an important decision variable for control of bank risk.

Table 5 shows that the asset size of the bank is statistically significant only for idiosyncratic risk. This negative relation is consistent with results by Demsetz et al. (1996) for a sample of large bank holding companies. By contrast, we find that size is not statistically significant in explaining systematic risk, asset risk, or financial leverage while Demsetz, Saldenberg and Strahan found

²⁰ Although these risk measures are based on accounting data rather than more commonly used market data, research has shown that there is a significant positive correlation between accounting- and market-based measures of systematic risk (Beaver et al., 1970; Beaver and Manegold, 1975).

²¹ Ordinary-least-squares is used to estimate the earnings model, based on quarterly data for the years from 1990 to 1994. For comparability we chose not to correct any estimates for autocorrelation because only a few banks showed autocorrelated error terms.

Table 5

Regression analysis of manager wealth concentration, ownership, and selected components of ROE volatility

Type of risk:	Idiosyncratic	Systematic	Asset		Leverage
Dependent variable:	Log (standard error from earnings model for operating return on equity)	Coefficient on mean earnings variable in earnings model for operating return on equity	Log (total loans / total assets)	Log (non-performing assets / total loans)	Log (equity capital / total assets)
Independent variable	(1)	(2)	(3)	(4)	(5)
Manager's bank investment / net worth	−0.1639*** (0.0624)	0.0583 (0.1263)	−0.0203 (0.0248)	−0.0032 (0.0020)	0.0627* (0.0356)
Monitor's bank investment / net worth	−0.1868*** (0.0700)	−0.2308 (0.1689)	−0.0259 (0.0745)	−0.0021** (0.0011)	0.1216*** (0.0443)
Personal plus family ownership share of hired manager	1.5690*** (0.6017)	2.3657* (1.3972)	0.0675 (0.2302)	0.0162 (0.0134)	−0.2945* (0.1775)
Personal plus family ownership share of owner manager	0.0482 (0.1621)	−0.0912 (0.4915)	−0.1004 (0.0676)	0.0103* (0.0060)	0.0427 (0.0624)
Metropolitan indicator variable	0.3028** (0.1181)	0.5749 (0.3645)	0.0459 (0.0440)	0.0011 (0.0024)	−0.1031** (0.0403)
Log(total assets)	−0.1609*** (0.0498)	0.0063 (0.0917)	0.0097 (0.0302)	−0.0010 (0.0013)	−0.0026 (0.0219)
Herfindahl–Hirschman index	0.0611 (0.2448)	−0.6078 (0.4658)	0.2599*** (0.0922)	0.0035 (0.0052)	−0.1565* (0.0843)
Constant	−1.1727** (0.5255)	0.1660 (0.9729)	6.1075*** (0.3175)	0.0180 (0.0141)	−2.3531*** (0.2287)
R-squared	0.10	0.05	0.04	0.05	0.09
F	4.60	0.96	1.04	2.02	2.93
Prob > F	0.000	0.455	0.397	0.064	0.009

Notes: The sample consists of 267 state-chartered banks in the Tenth Federal Reserve District. Reported statistics are coefficient estimates, associated standard errors (in parentheses). Standard errors calculated using White's (1980) heteroskedasticity-consistent method. Non-performing assets include loans at least 90 days past due and loans with non-accrual status.

* Statistically significant at a 10% significance level.

** Idem, 5%.

*** Idem, 1%.

that the holding company's total assets was positively related to systematic risk and negatively related the loan-to-asset ratio and the capital-to-asset ratio.

Different methods used to measure systematic and idiosyncratic risk and different empirical specifications contribute to the inconsistent findings. In addition, the banks in this study are community banks while Demsetz, Saidenberg and Strahan use large, publicly traded bank holding companies. Large banking organizations, facing discipline from the capital markets, are likely to place a greater weight on systematic risk and manage their organizations accordingly.²²

²² As one example of such differences, deposit insurance can enhance the potential payoff to a bank for loans that are pro-cyclical (Pennacchi, 2006). This suggests that the loan-to-asset ratio may be an important tool for large banks in managing systematic risk. Moreover, the loan-to-asset ratio may understate the relation between lending and systematic risk because capital standards provide incentives for banks to substitute loan commitments for loans on their books (Pennacchi, 2006, p. 22). Pressure to manage systematic risk may, in part, explain why larger banks are more actively involved in commitment lending (Gatev et al., 2005, p. 9).

6. Management and ownership issues in failed banks

Our sample selection process excludes some of the most risky banks—those that failed during the time of this study. From 1990 to 1994, 20 state banks failed in the Tenth Federal Reserve District. Since these banks operated with enough risk to result in failure, they may be of particular importance in giving investors and supervisors insights into the type of management and ownership structure likely to foster very high levels of risk taking.

To investigate these failed banks, we identify the management and ownership structure that was in place when a bank first encountered serious problems. From supervisory reports, we obtained management and ownership information on 13 of the 20 failed banks. At the time these 13 banks encountered serious problems, six were under the control of owner managers and seven were run by hired managers. Due to the low number of failed banks, incomplete information on several banks, and the fact that failures are often idiosyncratic in nature, the following analysis might best be regarded as an anecdotal source of information on management and ownership issues in problem institutions.

For the owner-manager banks that failed, the average ownership and wealth concentration statistics were fairly similar to that shown in [Table 1](#) for surviving banks. In three of the six banks, the owner managers had well over half of their wealth invested in their banks and might therefore have been expected to follow a more conservative approach. However, environmental and operational factors rather than ownership issues appeared to play a substantial role in these failures. Such factors included very weak local economies, several years of crop failures, banks in towns too small to support efficient banking operations and owner managers that probably thought they were operating conservatively, but greatly misjudged the risks they took.

For the seven hired-manager banks that failed, management and ownership factors suggest that these banks operated with greater incentives for risk taking than other hired-manager banks. For example, the hired managers at failed banks generally had less of their wealth tied up in their bank investment (12.6 percent at these banks compared to the 21 percent ratio shown for surviving hired-manager banks in [Table 1](#)).

A more important factor in the failure of most of the hired-manager banks may have been a lack of effective oversight by major stockholders. At least three of the hired manager banks could be described as widely held. In these banks, the largest stockholders had relatively little invested in their banks, either in terms of total shares or as a percent of their wealth. Consequently, they had less of a financial incentive for monitoring bank management and controlling risk exposures. In the other failing hired-manager banks—those that were more closely held—the principal owners were all heavily involved in other business ventures, including affiliated banks, real estate investment, and securities activities. As a result, these owners appeared to view the banks as little more than a supporting piece to their overall operations, and according to examiners, the owners often were a detrimental influence on their banks by encouraging liberal lending policies and failing to provide much oversight.

Wealth information on major stockholders/monitors was available for only four of the hired-manager banks. At these banks, the monitor, on average, had only about 23 percent of his or her wealth tied up in the bank compared to the 41 percent average shown in [Table 1](#) for monitors at surviving banks. This difference thus implies that monitors at the failing banks had less at stake and thus less of an incentive to pursue conservative banking practices.

Overall, the available statistics suggest that ownership and wealth characteristics of failed banks are largely consistent with our empirical findings, especially for hired-manager banks. In most of the failures, weaknesses in management and ownership structure appear an important

factor. In these banks, examiners commonly made such statements as “owners seldom in bank,” “principal owners largely involved in other businesses,” “influence of owners harmful to bank,” “ineffective management and board,” and “owners (or managers) want loan growth and liberal lending policies.” Thus, while economic conditions and unique factors played a role in these bank failures, management and ownership problems, coupled with weak financial incentives for controlling risk, left most of these banks in a more vulnerable position than other banks.

7. Summary and conclusions

This study looks at a sample of state banks in the Tenth Federal Reserve District to examine how bank risk taking is influenced by the ownership interests of bank managers, monitoring by large stockholders, and the degree to which managers and major owners have their wealth concentrated in their bank stockholdings. We find that when the wealth of bank managers and monitors is more heavily concentrated in their own banks, earnings variation is smaller. In addition, stock ownership by hired managers has a positive relationship with bank risk, presumably meaning that hired managers—as their own stockholdings increase—can overcome an aversion to risk taking and operate their banks more in line with stockholder interests. Further analysis suggests that community banks in our sample control earnings variation by manipulating idiosyncratic risk, credit risk, and leverage but not systematic risk or the loan-to-asset ratio.

These results have a number of implications for bank investors, supervisors, and public policymakers. Managers and monitors with a strong financial commitment to their bank appear to play an important role in controlling bank risk exposure. This result should give investors insights into why some banks continue to perform well and maintain effective risk management practices. Also, stock held by hired managers can be a useful tool in addressing agency problems, especially when combined with monitoring to ensure that goals of major stockholders are met.

From an investor and a supervisory perspective, our analysis illustrates that a range of factors should be considered when evaluating corporate governance in a bank, and much of the focus should be directed to the financial incentives that influence managers, directors, and major stockholders. In particular, banks where the key players have a substantial portion of their wealth at risk are the most likely to be operated in a safe and sound manner.

While our sample banks are somewhat unique in terms of their prudential regulation and limited discipline from public markets, we believe the financial incentives we analyze may also play a role in explaining risk in other banks and businesses. Other banks and businesses are likely to face many of the same management, ownership and governance issues, such as selecting managers, designing appropriate incentives to direct manager behavior, finding investors, and developing a board of directors with a strong motivation to oversee management. All of these issues are likely to play a crucial role in the operation and governance of any business.

Acknowledgments

This paper has benefited from the many useful comments of participants at presentations at the Federal Reserve Bank of Saint Louis and at the meetings of the Western Economics Association and the Financial Management Association, especially John Jordan, Bill Lang, Mark Vaughan and Ken Jones. We are indebted to the Federal Deposit Insurance Corporation and the state banking departments in the Tenth Federal Reserve District for their help in collecting the data used in this paper. We thank Nathan Halmarst for research assistance, and greatly appreciate guidance offered by referees and the editor of this journal.

References

- Agrawal, A., Mandelker, G., 1987. Managerial incentives and corporate investment and financing decisions. *J. Finance* 42 (September), 823–837.
- Anderson, R.C., Fraser, D.R., 2000. Corporate control, bank risk taking, and the health of the banking industry. *J. Banking Finance* 24, 1383–1398.
- Amihud, Y., Lev, B., 1981. Risk reduction as a managerial motive for conglomerate mergers. *Bell J. Econ.* 12 (Autumn), 605–617.
- Bagnani, E.S., Milonas, N., Saunders, A., Travlos, N., 1994. Managers, owners, and the pricing of risky debt: An empirical analysis. *J. Finance* 49 (June), 453–477.
- Beaver, W., Manegold, J., 1975. The association between market determined and accounting determined risk measures of systematic risk: Some further evidence. *J. Finan. Quant. Anal.* (June), 231–284.
- Beaver, W., Kettler, P., Scholes, M., 1970. The association between market determined and accounting determined risk measures. *Acc. Rev.* (October), 654–682.
- Brewer III, E., Saidenberg, M., 1996. Franchise value, ownership structure, and risk at savings institutions. Research paper No. 9632. Federal Reserve Bank of New York.
- Cannella Jr., A.A., Fraser, D.R., Lee, D.S., 1995. Firm Failure and Managerial Labor Markets: Evidence from Texas Banking. *J. Finan. Econ.* 38, 185–210.
- Cebenoyan, A.S., Cooperman, E.S., Register, C.A., 1999. Ownership structure, charter value, and risk-taking behavior for thrifts. *Finan. Manage.* 28 (Spring), 43–60.
- Chen, C., Steiner, T., Whyte, A.M., 1998. Risk-taking behavior and management ownership in depository institutions. *J. Finan. Res.* 21 (Spring), 1–16.
- Demsetz, H., Lehn, K., 1985. The structure of corporate ownership: Causes and consequences. *J. Polit. Economy* 93, 1155–1177.
- Demsetz, R.S., Strahan, P.E., 1997. Diversification, size, and risk at bank holding companies. *J. Money, Credit, Banking* 29 (August), 300–313.
- Demsetz, R., Saidenberg, M., Strahan, P., 1996. Banks with something to lose: The disciplinary role of franchise value. *Fed. Reserve Bank New York Econ. Pol. Rev.* (October), 1–14.
- Demsetz, R., Saidenberg, M., Strahan, P., 1997. Agency problems and risk taking at banks. Staff report No. 29. Federal Reserve Bank of New York. September.
- DeYoung, R., Spong, K., Sullivan, R.J., 2001. Who's minding the store? Motivating and monitoring hired managers at small, closely held commercial banks. *J. Banking Finance* 25 (7), 1209–1242.
- Emmons, W.R., Gilbert, R.A., Yeager, T.J., 2004. Reducing the risk at small community banks: Is it size or geographic diversification that matters? *J. Finan. Services Res.* 25 (April/June), 259–281.
- Fama, E., 1980. Agency problems and the theory of the firm. *J. Polit. Economy* 88 (April), 288–307.
- Gatev, E., Schuerman, T., Strahan, P.E., 2005. Managing bank liquidity risk: How deposit–loan synergies vary with market conditions. Working paper 2006-03. FDIC Center for Financial Research.
- Gorton, G., Rosen, R., 1995. Corporate control, portfolio choice, and the decline of banking. *J. Finance* 50 (December), 1377–1420.
- Granger, C.W.J., 1989. *Forecasting in Business and Economics*. Academic Press, San Diego.
- Jensen, M., Meckling, W., 1976. Theory of the firm: Managerial behavior and agency costs, and ownership structure. *J. Finan. Econ.* 3 (October), 305–360.
- Keeley, M.C., 1990. Deposit insurance, risk and market power in banking. *Amer. Econ. Rev.* 80 (December), 1183–1200.
- Knopf, J., Teall, J., 1996. Risk-taking behavior in the US thrift industry: Ownership structure and regulatory changes. *J. Banking Finance* 20 (September), 1329–1350.
- Liang, N., 1989. Bank profits, risk, and local market concentration. *J. Econ. Bus.* 41, 297–305.
- Marcus, A.J., 1984. Deregulation and bank financial policy. *J. Banking Finance* 8 (March), 557–565.
- May, D.O., 1995. Do managerial motives influence firm risk reduction strategies? *J. Finance* 50 (September), 1291–1308.
- Merton, R.C., 1977. An analytic derivation of the cost of deposit insurance loan guarantees. *J. Banking Finance* 1 (June), 3–11.
- Morgan, D.P., 2002. Rating banks: Risk and uncertainty in an opaque industry. *Amer. Econ. Rev.* 92 (September), 874–888.
- Myers, F., Spong, K., 2003. Community bank performance in slower growing markets: Finding sound strategies for success. *Fed. Reserve Bank Kansas City Finan. Ind. Perspect.* (October), 15–30.
- Pagano, M.S., 2000. An empirical investigation of the rationales for integrated risk-management behavior. Working paper. Villanova University. May.

- Parrino, R., Potoshman, A.M., Weisbach, M.S., 2002. Measuring investment distortions when risk-averse managers decide whether to undertake risky projects. *Finan. Manage.* 34 (Spring), 21–60.
- Pennacchi, G., 2006. Deposit insurance, bank regulation, and financial system risks. *J. Monet. Econ.* 53, 1–30.
- Prowse, S.D., 1995. Alternate methods of corporate control in commercial banks. *Fed. Reserve Bank Dallas Econ. Rev.* (Third Quarter), 24–36.
- Rivard, R.J., Thomas, C.R., 1997. The effect of interstate banking on large bank holding company profitability and risk. *J. Econ. Bus.* 49, 61–76.
- Saunders, A., Strock, E., Travlos, N., 1990. Ownership structure, deregulation, and bank risk taking. *J. Finance* 45 (June), 643–654.
- Sinkey Jr., J.F., 1989. *Commercial Bank Financial Management*. MacMillan, New York, p. 408.
- Smith, C.W., Stulz, R.M., 1985. The determinants of firm's hedging policies. *J. Finan. Quant. Anal.* 20 (December), 391–404.
- Sullivan, R.J., Spong, K.R., 1998. How does ownership structure and manager wealth influence risk?—A look at ownership structure, manager wealth, and risk in commercial banks. *Fed. Reserve Bank Kansas City Finan. Ind. Perspect.* (December), 15–40.
- White, H., 1980. A heteroskedasticity-consistent covariance matrix estimator and a direct test for heteroskedasticity. *Econometrica* 48, 817–838.