

Derivative activities and managerial incentives in the banking industry

David A. Whidbee^{a,*}, Mark Wohar^{b,1}

^a *Department of Finance, Insurance and Real Estate, Washington State University, Pullman, WA
99164-4746, USA*

^b *Department of Economics, University of Nebraska-Omaha, Omaha, NE 68182, USA*

Received 1 July 1996; accepted 1 April 1999

Abstract

Using a sample of 175 publicly traded bank holding companies (BHCs), we find that managerial incentives and external monitoring affect the decision to use derivatives in the banking industry. Managers with incentives that are more closely aligned with the interests of shareholders, as reflected in a high percentage of CEO shareholdings, are less likely to use derivatives when insider holdings exceed 10%. Similarly, when outside directors own substantial equity, the firm is less likely to use derivatives. These results suggest that managers with large equity stakes take advantage of the risk-shifting opportunities of deposit insurance by not hedging. For BHCs with insider holdings below 10%, however, monitoring by outside directors is associated with a greater likelihood of derivative usage. This suggests that monitoring by outside directors may lead to more risk-averse behavior on the part of managers with small equity stakes. © 1999 Elsevier Science B.V. All rights reserved.

JEL classification: G21; G30

Keywords: Derivatives; Hedging; Inside ownership; Outside directors

* Corresponding author. Tel.: +1-509-335-3098; fax: +1-509-335-3857; e-mail: whidbee@wsu.edu

¹ Tel.: +1-402-554-3712; fax: +1-402-554-3747; e-mail: wohar@unomaha.edu.

1. Introduction

According to modern finance theory, value-maximizing firms hedge risk exposures in an effort to reduce the costs associated with taxes, financial distress, and agency problems between stockholders and bondholders (Smith and Stulz, 1985; Shapiro and Titman, 1986; Froot et al., 1993; Smith, 1993). Empirical evidence on the use of derivatives by both banks and nonfinancial firms provides mixed results concerning these arguments.²

Several recent studies focus on the effects of managerial incentives on the hedging decision. Smith and Stulz (1985) argue that when managers own a substantial share of a firm's equity and are poorly diversified, they are more likely to hedge risk exposures. Tufano (1996) finds results consistent with this argument for firms in the gold-mining industry. However, Géczy et al. (1997) find no relation between managerial incentives and currency-risk hedging for a sample of nonfinancial firms in the *Fortune 500*.

Absent from these studies is an analysis of whether managerial incentives affect hedging decisions in the banking industry. As in other industries, managers in the banking industry may hedge even when the marginal benefit to shareholders is less than the marginal cost. Managers benefit from hedging by reducing the uncertainty associated with the level of their wealth (as a function of firm value) and by reducing the likelihood that they are disciplined for poor firm performance. Unlike managers in other industries, however, managers in the banking industry that have high equity stakes may avoid hedging in an effort to capitalize on the risk-shifting opportunities provided by deposit insurance. Although a number of studies find a negative relationship between managerial shareholdings and firm risk-taking in nonfinancial firms (e.g., Amihud and Lev, 1981; Agrawal and Mandelker, 1987), studies of the banking industry tend to find a positive relationship between managerial shareholdings and risk-taking (Saunders et al., 1990).³

This paper examines the influence of managerial incentives and external monitoring on the decision to use derivatives in the banking industry. The results of the study also help explain the conflicting results of other studies. An underlying assumption of this study is that the banks in our sample that use derivatives do so primarily for the purpose of hedging the risk exposures that arise as a result of the asset-transformation functions they perform. Although there have

² For example, Géczy et al. (1997) find results consistent with nonfinancial firms hedging to reduce the costs of financial distress. Mian (1996) and Tufano (1996), however, find no evidence that the potential costs of financial distress affect hedging decisions. In the banking industry, Sinkey and Carter (1997) find evidence that poorly capitalized banks are more likely to hedge, consistent with banks hedging in an effort to reduce the likelihood of financial distress. However, Sinkey and Carter also find that banks with greater on-balance-sheet risk exposures are less likely to hedge.

³ A related stream of research finds that stock-owned savings institutions engage in more risk-taking than mutually owned institutions (Cordell et al., 1993; Esty, 1997).

been several cases of firms using derivatives for speculative purposes, most firms in the banking industry argue that the primary reason for using derivatives is to reduce their risk exposures. Those banks that act as derivative dealers, as evidenced by their primary member status in the International Swaps and Derivatives Association (ISDA), are excluded from the analysis.⁴

Using corporate-governance, ownership-structure, and financial characteristics for a sample of 175 publicly traded bank holding companies (BHCs), we find that large BHCs are more likely to use derivatives. When insider holdings exceed 10%, we find that hedging decisions are strongly influenced by insiders' equity holdings.⁵ Unlike nonfinancial firms, BHCs are less likely to use derivatives as CEO shareholdings increase. This result suggests that when the CEO owns a substantial equity share, they act more like owners rather than the agent of owners. As bank owners, they have an incentive to take on additional risk (and avoid hedging) because of the limited liability of equity and the risk-shifting opportunities provided by deposit insurance.

Similarly, as shareholdings by outside directors increase, BHCs are less likely to use derivatives when insider holdings exceed 10%. Although the primary role of outside directors is to ensure that the officers of the bank make decisions that are in the best interests of shareholders, bank directors are also responsible for ensuring that officer decisions are governed by the principles of safety and soundness.⁶ In other words, outside directors face a trade-off between maximizing shareholder wealth and ensuring safe-and-sound practices. As these directors acquire more equity, the results of this study suggest that these directors favor maximizing shareholder wealth (by not hedging) at the expense of safety and soundness.

For BHCs with low insider holdings, we find no significant relation between insiders' equity holdings and the decision to use derivatives. However, managers of these BHCs are more likely to hedge risk exposures when they are being monitored by a board that consists of a high percentage of outsiders. This result suggests that when outside directors hold a large percentage of board seats and are effectively monitoring senior managers, managers hedge risk exposures in an effort to reduce the likelihood of poor firm performance. Even if hedging is not in the best interests of shareholders, outside directors that own little of a BHC's equity may allow, or even encourage, managers to hedge because it is consistent with the principles of safety and soundness.

⁴ While we are confident that the majority of banks in our sample are using derivatives primarily for the purpose of reducing their risk exposures, we cannot rule out speculation or dealing by some of the banks in the sample.

⁵ For the purposes of this study, we define insiders as all officers and directors. Outside directors are those directors that have no significant relationship with the firm other than their service on the board.

⁶ See Fischer (1992), Schipani (1993), and Schooner (1995) for a discussion of the additional responsibilities placed on bank directors by Congress and bank regulators.

Overall, the results suggest that outside directors affect managers' hedging decisions. Increases in shareholdings by outside directors are associated with a reduced likelihood that the BHC hedges while increases in the percentage of board seats held by these directors is associated with a greater likelihood that the BHC hedges. However, whether it is the level of ownership by these directors or the percentage of board seats held by these directors that affects managers' decisions depends on the level of insider holdings. Shareholdings by outside directors affects managers' decisions at high levels of insider holdings, while the percentage of board seats held by these directors affects managers' decisions at low levels of insider holdings.

We also find that managers with low equity stakes are more likely to use derivatives when the BHC has a low capital-to-asset ratio and has many unused commitments outstanding. These results are consistent with derivatives being used to minimize the costs of financial distress. A related finding is that managers are more likely to use derivatives when the firm has performed relatively well in the preceding year. This is consistent with managers hedging in an effort to ensure continued good performance.

The remainder of the paper is organized as follows. Section 2 reviews the literature on hedging theory and derivative activities in the banking industry. Section 3 describes the data. Section 4 presents empirical evidence on whether corporate-governance and ownership-structure characteristics influence the decision to use derivatives. Section 5 summarizes and concludes the paper.

2. Literature review

Several recent studies attempt to explain differences in firms that hedge risk exposures and those that do not hedge. In this section, we review this literature and discuss the potential influence of managerial incentives and external monitoring mechanisms on the hedging decision.

2.1. *Value-maximizing reasons to hedge*

According to modern finance theory, value-maximizing managers will hedge only when it increases firm value. One of the potential ways hedging increases firm value is by reducing expected taxes. According to Smith and Stulz (1985) and Nance et al. (1993), if a firm's effective tax rate is a convex function of pretax profit, hedging can reduce the present value of expected tax liabilities. Hedging can also reduce expected tax liabilities by smoothing the profit stream and reducing the likelihood that the firm will pay high taxes in one period while having to forgo the benefits of tax shields in another period.

Hedging can also increase firm value by reducing cash flow uncertainty. Cash flow uncertainty can cause a firm to pursue a value-reducing investment strategy

(Froot et al., 1993). For example, some firms may forgo good investments when the cash flow generated by the firm is low. By hedging, the firm can reduce the chances of experiencing low cash flow and avoid this potential underinvestment problem.

A third way hedging can increase firm value is by reducing the likelihood of financial distress. By reducing the likelihood of financial distress, the firm can reduce the direct costs of financial distress (Smith and Stulz, 1985) as well as many of the contracting costs involving relationships with creditors, suppliers, and employees (Shapiro and Titman, 1986). In addition, hedging may increase revenue for firms that sell products with warranties or service contracts (Shapiro and Titman, 1986).

As noted by Sinkey and Carter (1997), however, the notion that risk management reduces the costs of financial distress may not apply to banking institutions. Because of federal deposit guarantees, banks are not subject to the same market discipline as other firms, and as such, they may not benefit from hedging to the same extent as nonfinancial firms. For example, customers of a commercial bank are not likely to be concerned about the probability of financial distress at that bank. In other words, deposit insurance may mitigate some of the costs of financial distress because the FDIC bears most of these costs.

2.2. Banks and derivatives

Sinkey and Carter (1997) examine cross-sectional differences in the use of derivatives by banks in an effort to identify the factors that cause banks to use derivatives. The results of their study suggest that many of banks' derivative activities can be explained by the arguments of contemporary finance theory. Consistent with avoidance of the costs of financial distress, they find that banks with greater leverage (and lower capital-to-asset ratios) are more likely to use derivatives. Inconsistent with this argument, however, they find that banks with greater on-balance-sheet sources of risk exposure, as reflected in large maturity gaps, are less likely to use derivatives.

A number of explanations have been offered to explain these conflicting results. One possible explanation is that banks use derivatives for speculative purposes rather than hedging risk exposures. However, inconsistent with this argument, Ahmed et al. (1997) find lower risk exposures for banks using derivatives. Similarly, Hassan et al. (1994) find that most of the off-balance-sheet activities of commercial banks, including their derivative activities, are associated with lower risk. Likewise, Hentschel and Kothari (1995) find no notable differences in the characteristics of firms that use derivatives and those that do not, suggesting that firms use derivatives to hedge risk exposures rather than for speculative purposes. Finally, Gorton and Rosen (1995a) find that banks' off-balance-sheet risk exposures, as reflected in their swap portfolios, appear to be offset by their on-balance-sheet risk exposures. Overall, the majority of the studies examining the

use of derivatives by banks are consistent with the argument that banks are using derivative securities primarily to reduce risk exposures.⁷

2.3. Firm size and derivative activities

Several studies document that large firms are more likely to use derivatives (e.g., Carter and Sinkey, 1998). Booth et al. (1984) argue that large firms are more likely to develop the expertise necessary for the use of derivatives. In addition, large firms may be able to take advantage of economies of scale in using derivatives.

2.4. Managerial incentives and hedging

Although there are several reasons why a value-maximizing manager might hedge, managers may hedge even if it does not increase firm value. Smith and Stulz (1985) argue that a manager's hedging incentives depend on the relation between the manager's wealth and firm value. If the manager's wealth is a concave function of firm value, the manager will tend to hedge as much as possible because his wealth will be higher when firm value is hedged relative to his expected wealth for the unhedged firm value. However, if the manager's wealth is a convex function of firm value, the manager faces a trade-off between expected wealth and the risk of that wealth. The manager's expected wealth for the unhedged firm value is higher than when firm value is hedged. The higher expected wealth is also accompanied by greater risk. Therefore, the risk-averse manager must balance the higher expected wealth of not hedging against the risk-reduction benefits of hedging. The more convex the manager's wealth function, the less incentive he has to hedge.

The determinants of whether a manager's wealth is a concave or convex function of firm value are his investment in the firm's equity, the structure of his compensation, and the extent that managers are disciplined if the firm performs poorly. As a manager's investment in the firm increases, his wealth function will increasingly resemble equity holders' payoff function. For most nonfinancial corporations, the payoff to equity holders is a linear function of firm value over the range of possible outcomes. Therefore, in most types of businesses, as a manager's investment in the firm increases, his wealth becomes an increasingly linear function of firm value. Poorly diversified managers with linear wealth functions have incentives to engage in more hedging activities. The more options

⁷ Hirtle (1997) provides one notable exception. Using a two-factor market model to estimate interest-rate betas for a sample of publicly traded BHCs, she finds that interest rate swap usage is associated with greater interest-rate betas. However, these results are concentrated in large dealer banks which are excluded from our analysis.

the manager owns, however, the more convex the relationship between his wealth and firm value (because of the convex payoff structure of options). Based on these arguments, Smith and Stulz (1985) predict that increases in shareholdings by managers should be associated with greater hedging while increases in option holdings should be associated with less hedging. Tufano (1996) provides empirical support for these predictions using a sample of firms from the gold-mining industry.

In the banking industry, however, the payoff to equity holders is more convex than in other industries. Because of the very high leverage of banks and the risk-shifting opportunities provided by deposit insurance, equity holders in banks face a convex payoff. This is especially true when banks are poorly capitalized. Equity in any firm can be viewed as a call option on the assets of the firm (Black and Scholes, 1973; Galai and Masulis, 1976) and deposit insurance provides a subsidy to bank owners in the form of a put option (Merton, 1977; Marcus and Shaked, 1984; Ronn and Verma, 1986). Risk taking by the firm increases the value of both options. Empirical evidence indicates that as managers acquire more equity in a bank, the bank takes on more risk (Saunders et al., 1990). Therefore, in the banking industry, we predict that increases in shareholdings by managers should be associated with less hedging.

2.5. Outside directors and hedging

Monitoring and discipline of a manager will also affect the relation between the manager's wealth and firm value. If a manager is subject to dismissal in the event the firm performs poorly, his wealth will tend to be a concave function of firm value. At low levels of firm value, the manager faces an increased likelihood of being dismissed by the firm, thereby suffering a loss in earnings, reputation, and firm-specific human capital. Based on these arguments, closely monitored managers should be more likely to hedge because their wealth is a more concave function of firm value.

The primary role of outside directors is to represent the interests of shareholders by monitoring the performance of the officers of the firm, especially the CEO.⁸ Unlike directors of nonfinancial firms, however, bank directors are also under pressure from regulators to ensure that bank managers are engaging in safe and sound banking practices (Fischer, 1992; Schipani, 1993; Schooner, 1995). Therefore, outside directors face a trade-off between ensuring that managers are maximizing shareholder wealth and ensuring that managers are engaged in safe

⁸ Brickley and James (1987) find that managers in the banking industry exhibit less expense preference behavior when the board of directors is dominated by outsiders. Rosenstein and Wyatt (1990) document a positive share price response to the appointment of an outside director. Byrd and Hickman (1992) report that the share price response for bidding firms in takeover attempts is positively related to the proportion of the board of directors that consists of outsiders.

and sound banking practices. When outside directors own a substantial share of the firm's equity, they effectively are the owners of the firm and have a convex payoff function. As such, we expect to find that BHCs are less likely to hedge when outside directors own a substantial share of firm equity.

When outside directors own little of the firm's equity, however, their payoff function is less convex. These directors have less to gain from taking advantage of the risk-shifting opportunities of deposit insurance. Moreover, as outside directors hold a larger percentage of board seats, they are more likely to discipline poorly performing managers (Weisbach, 1988). Therefore, we expect to find that BHCs are more likely to hedge (in an effort to avoid poor performance) as outside board membership increases.

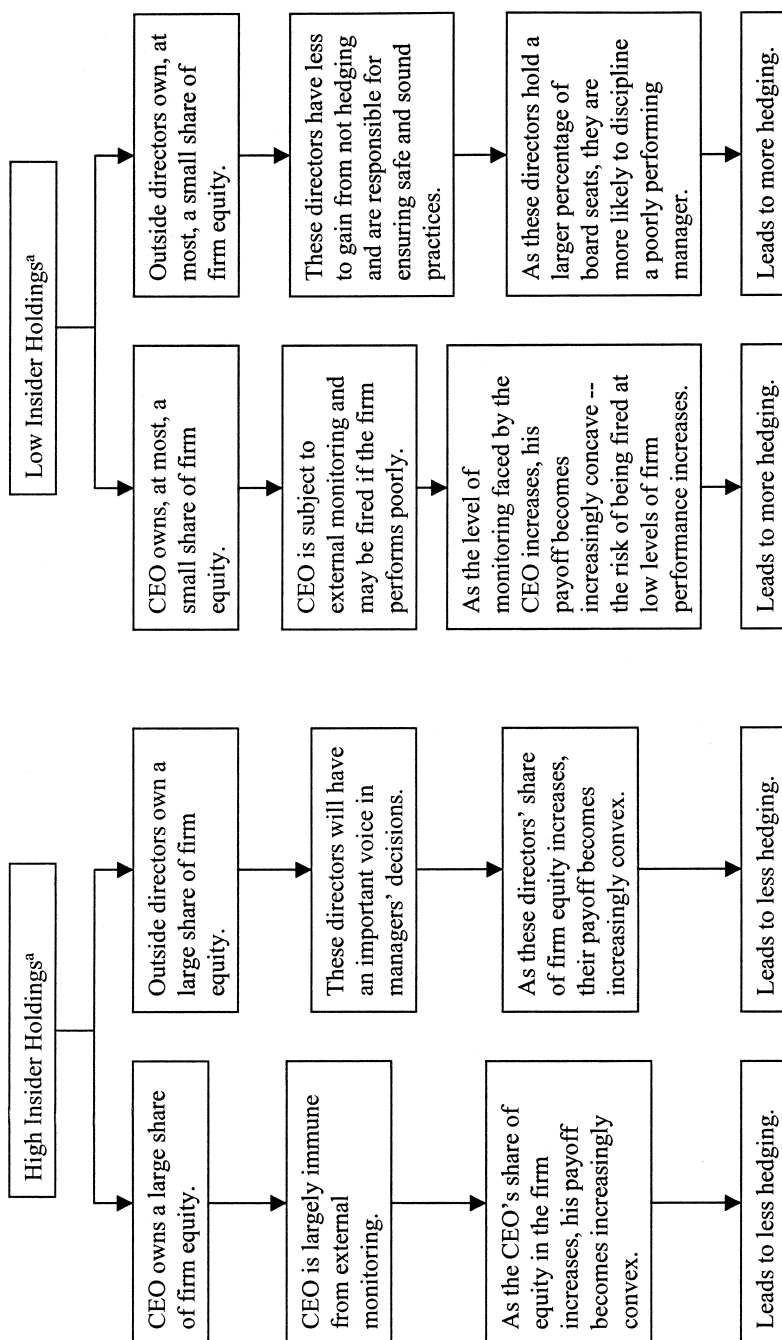
2.6. External monitoring and hedging

Outside block holders have an incentive to monitor the actions of senior managers since they have a larger stake in the firm (Grossman and Hart, 1980; Shleifer and Vishny, 1986). Similarly, institutional investors are expected to more actively monitor senior manager's decisions (Brickley et al., 1988; Black, 1992; Gordon and Pound, 1993). As outsiders, however, these investors may have only limited information about whether an individual firm's derivatives activities are value-maximizing. Because individual firms' derivatives activities are opaque, these investors are more likely to be concerned about the bottomline performance of the firm and will discipline managers only when the firm performs poorly. Therefore, the likelihood that managers hedge should increase as shareholdings by outside block holders and institutional investors increases.

2.7. Managerial incentives vs. monitoring mechanisms

Although aligning the interests of managers with those of shareholders and monitoring managers are two ways of influencing a manager's wealth function and the likelihood that the manager hedges, evidence suggests that corporate-governance and ownership-structure characteristics have varying effects on manager decisions depending on the percentage of equity held by insiders. For example, Gorton and Rosen (1995b) find evidence that the relationship between insider

Fig. 1. Summary of managerial incentives to hedge. This figure summarizes the expected influence of CEO shareholdings, outside director shareholdings, and external monitoring on managers' wealth functions and hedging decisions. As indicated these influences are expected to differ depending on the level of the insider holdings.



^aHigh insider holdings firms are those in which the board of directors, as a group, owns more than 10 percent of the equity of the firm. Low insider holdings firms are those in which the board owns less than 10 percent of the equity of the firm.

holdings and the composition of bank asset portfolios differs depending on the level of insider holdings.⁹

At low levels of insider holdings, neither the CEO nor outside directors own a large percentage of firm equity. If the CEO owns a relatively small percentage of firm equity, it is less costly for directors and other investors to remove the CEO. At low levels of insider holdings, we expect to find that outside board membership, outside block holders, and institutional investors have a positive influence on the decision to use derivatives and for shareholdings by the CEO and outside directors to have little influence on the decision to use derivatives.

At relatively high levels of insider holdings, however, a large percentage of the benefits of share ownership accrue to insiders. If these high insider holdings are due to the CEO owning a large percentage of firm equity, then outside directors, outside block holders, and institutional investors may be ineffective as monitoring mechanisms. If, on the other hand, high insider holdings are due to outside directors owning a large percentage of firm equity, then other monitoring mechanisms may be unnecessary or redundant. Therefore, at relatively high levels of insider holdings, we expect shareholdings by the CEO and shareholdings by outside directors to have a negative influence on the decision to use derivatives and for external monitoring mechanisms to have little or no influence on the decision to use derivatives.

Fig. 1 summarizes the expected effects of ownership and monitoring on managers' wealth functions and hedging decisions. Ownership by board members should affect hedging decisions at relatively high levels of insider holdings. At low levels of insider holdings, however, hedging decisions are more likely to be motivated by monitoring mechanisms like outside board membership, outside block holders, and institutional investors.

3. Data collection and sample characteristics

To be included in the sample, the firm must have appeared on the Compustat Bank tapes for 1991, had financial statement data available on the Federal Reserve *Call Report* tapes, and had a proxy statement available. BHCs that are primary members of the ISDA are excluded from the analysis because their derivative positions are more likely to reflect dealer activities rather than end-user positions.¹⁰

⁹ Gorton and Rosen (1995b) estimate the relation between managerial ownership and lending decisions made during the 1980s, a time when the banking industry was "unhealthy". Their results suggest that the relationship between managerial ownership and risk-taking is inversely U shaped, with more risky lending taking place at moderate levels of ownership. Therefore, they find that risk-taking is increasing in managerial ownership at low levels of ownership and decreasing in managerial ownership at high levels of ownership.

¹⁰ Similar results are found when the sample is restricted to BHCs that have derivatives activities less than 50% of assets and when the sample was limited to BHCs with less than US\$10 billion in assets.

A list of these firms is provided by Sinkey and Carter (1997). For the remaining firms, bank *Call Report* data were used to compile the financial variables.¹¹

3.1. Data collection

Director affiliation data and whether the CEO and chairperson positions are held by the same person are from 1991 proxy statements. As discussed in Section 2, outside directors that are unaffiliated with senior management are treated differently from those that, by their profession or some business arrangement with senior management, may have incentives that are not consistent with shareholder wealth maximization. These affiliated or ‘grey directors’ are not treated as outside directors.¹²

Data on the ownership structure of the BHCs in the sample are taken primarily from 1991 proxy statements, with the exception of institutional holdings which is from Spectrum.¹³ In contrast to most other studies, we distinguish between shareholdings by the CEO and shareholdings by other officers because the CEO is the chief decision maker in most firms and benefits from share ownership only to the extent that he or she owns shares of the firm. We distinguish between shareholdings by outside directors and other directors because outside directors play an important role in monitoring and disciplining senior managers in the modern corporation. Data were also collected on several variables related to the characteristics of individual CEOs. CEO age, tenure, and cash compensation are gathered from 1991 proxy statements.

3.2. Differences in derivative users and nonusers

Nonparametric tests for differences in the corporate-governance and ownership-structure characteristics of sample BHCs that use derivatives and those that do not are shown in Table 1. The 84 BHCs that use derivatives differ substantially from the 91 BHCs that do not. This is reflected in the Wilcoxon rank

¹¹ The bank *Call Report* tapes include data on individual banks, not BHCs. Therefore, similar to Saunders et al. (1990), financial statement data for the BHCs reflect the aggregated data from individual bank subsidiaries.

¹² Affiliated directors are any directors that are former employees of the firm, related to an employee of the firm, an officer of a company that has a significant business relationship with the firm, an officer of another firm in the financial services industry, a consultant, an attorney, or an accountant. Outside directors are directors that have no business relationship with the firm other than their service on the board. This definition of an outside director is consistent with studies by Weisbach (1988), Rosenstein and Wyatt (1990), Hermalin and Weisbach (1991), Byrd and Hickman (1992), Shivdasani (1993), Mayers et al. (1997), and Whidbee (1997).

¹³ For the purposes of this study, shares that can be acquired by exercising options and, where possible, unvested restricted stock and unvested shares in stock ownership plans are excluded from the shareholdings measure for individual directors.

Table 1

Means and nonparametric tests for differences in the corporate governance and ownership structure characteristics of publicly traded BHCs that use derivatives and those that do not use derivatives, 1991. This table provides means and nonparametric tests for differences in the corporate governance and ownership structure characteristics of those firms in the sample that have derivative contracts outstanding and those that do not have derivative contracts outstanding. Primary members of the ISDA are excluded from the analysis.

Variable ^a	Means for BHCs with derivatives (84 firms)	Means for BHCs without derivatives (91 firms)	Wilcoxon rank sum test for differences in the two groups (Z) ^b
<i>Board composition</i>			
Total number of directors	15.0	13.1	2.75***
All nonofficer directors (as a percentage of all directors)	79.92%	80.02%	−0.15
Outside directors	60.42%	55.42%	2.48**
Affiliated directors	19.49%	24.60%	−3.14***
Separate CEO and chairperson dummy	0.06	0.23	−3.17***
<i>Shareholdings (as a percentage of all shares outstanding)</i>			
All board members	10.68%	18.26%	−4.67***
CEO	2.14%	3.57%	−3.24***
Other officers	3.31%	1.91%	0.83
Affiliated directors	2.31%	4.24%	−4.61***
Outside directors	2.92%	8.47%	−5.40***
Affiliated block holders	6.19%	5.66%	1.08
Outside block holders	5.48%	3.25%	1.76*
Institutional investors	27.04%	10.43%	6.83***
<i>CEO Characteristics</i>			
Age (in years)	54.9	55.3	−0.57
Tenure (in years)	8.9	9.6	−1.26
Cash compensation (US\$ in thousands)	518.9	286.4	7.19***
Option holdings (as a percentage of all shares outstanding)	0.48%	1.09%	−0.40

^a Financial-statement data are from 1991 bank *Call Reports*. Ownership-structure, board-composition, and CEO data are from 1991 proxy statements. Institutional investor shareholdings are from Spectrum. Market value data are from the Bank Compustat tapes.

^b The Wilcoxon rank sum test is a nonparametric test of the null hypothesis that the medians of the two samples are the same. *** Indicates statistical significance at the 1% level. ** Indicates significance at the 5% level. * Indicates significance at the 10% level.

sum test statistics in the fourth column. Many of the differences found in Table 1, however, can be attributed to size differences — the BHCs that use derivatives are much larger, on average, than those that do not. Although it is not indicated in the table, derivative users are almost eight times larger than nonusers, based on total assets. In addition to the size differences, there are other differences worth noting.

For example, the CEOs of BHCs that use derivatives are much more likely to also be the chairperson than are the CEOs of BHCs that do not use derivatives.

In addition to the differences between users and nonusers, it is interesting that there are no significant differences in the age and tenure of the CEOs of firms that use derivatives and the CEOs of firms that do not use derivatives. Some have suggested that younger CEOs may be more willing to use derivatives. The univariate results shown in Table 1 suggest that there is no relationship between a CEO's age and tenure and whether the BHC uses derivatives. Nonparametric tests for differences in the financial characteristics of BHCs that use derivatives and those that do not among the sample of BHCs with high insider holdings and those with low insider holdings are shown in Table 2. We define high insider holdings as being above 10%. Low insider holdings are those below 10%.¹⁴ The majority of BHCs with low insider holdings use derivatives (59.1%) while only 35.4% of BHCs with high insider holdings use derivatives. As expected, there are substantial differences between those BHCs that use derivatives and those that do not in the two groups of BHCs. Many of the differences can be attributed to differences in size. For both the low insider holdings group and the high insider holdings group, the average firm value is much higher for those BHCs that use derivatives.

In addition to differences in size, derivatives users with low insider holdings have more unused commitments and standby letters of credit outstanding than nonusers with low insider holdings. Derivatives users with low insider holdings also exhibit balance sheet characteristics that differ substantially from nonusers with low insider holdings. There are fewer differences between derivatives users with high insider holdings and nonusers with high insider holdings.

Table 3 shows the differences in corporate-governance and ownership-structure characteristics of derivative users and nonusers. Sample BHCs with insider holdings above 10% and those with insider holdings below 10% are shown separately. Derivative users with low insider holdings have a greater proportion of outside directors on the board than nonusers with low insider holdings. For BHCs with high insider holdings, there are no significant differences between the board composition of derivative users and nonusers. For both the high and low insider holdings groups, derivatives users have lower share ownership by the board than nonusers.

Although Tables 2 and 3 indicate significant differences in the financial and corporate governance characteristics of those BHCs that use derivatives and those that do not, this does not control for other factors, especially size. Therefore, in Section 4, we use multivariate logit analysis to examine these relations.

¹⁴ Ten percent was chosen as the level of insider holdings to use for the purpose of distinguishing between high insider holdings and low insider holdings. Gorton and Rosen (1995b) use firms with insider holdings between 10 and 80% in the parametric specification of their model. We investigated other possible break points, but none yielded stronger results.

Table 2

Means and nonparametric tests for differences in the financial characteristics of derivatives users and nonusers among publicly traded BHCs with insider holdings above 10% and below 10%, 1991

This table provides means and nonparametric tests for differences in the financial characteristics of those firms in the sample that use derivatives and those that do not use derivatives. Separate analyses are performed for firms in which the board of directors as a group owns more than 10% of all equity and those firms in which the board of directors as a group owns less than 10% of all equity. Primary members of the ISDA are excluded from the analysis. (All dollar figures are in millions).

Variable ^a	BHCs with insider holdings < 10% (93 firms)			BHCs with insider holdings > 10% (82 firms)		
	Means for BHCs with derivatives (55 firms)	Means for BHCs without derivatives (38 firms)	Wilcoxon rank sum test for differences in the two groups (Z) ^b	Means for BHCs with derivatives (29 firms)	Means for BHCs without derivatives (53 firms)	Wilcoxon rank sum test for differences in the two groups (Z) ^b
<i>Other off-balance-sheet activities (as a percentage of assets)</i>						
Unused commitments	24.61%	11.64%	5.47***	16.84%	11.56%	1.30
Standby letters of credit	3.10%	1.02%	5.62***	1.98%	1.37%	2.59***
<i>Firm size and growth</i>						
Total assets (US\$)	12,337.0	1807.2	6.26***	3711.1	833.1	5.05***
Market value of equity (US\$)	667.4	119.1	5.17***	185.5	53.5	4.72***
Firm value (MV of equity plus BV of debt) (US\$)	12,230.0	1780.3	6.29***	3653.2	826.7	5.06***
Growth in assets	3.84%	3.79%	1.50	7.41%	9.54%	−0.50
<i>Balance sheet characteristics (as a percentage of assets)</i>						
12-month GAP	18.01%	12.06%	1.87*	20.99%	17.67%	0.96
Liquid assets	10.92%	8.18%	2.07**	12.65%	9.85%	1.33
Total loans	62.85%	59.72%	2.05**	58.01%	63.14%	−2.27**

Commercial and industrial loans	14.80%	10.93%	3.51***	15.12%	14.51%	0.39
90 + days past due loans (as a percentage of total loans)	0.48%	0.68%	− 0.14	0.48%	0.66%	− 1.10
Deposits	81.66%	86.27%	− 3.23***	82.18%	87.88%	− 3.11***
Notes and debentures	0.53%	0.14%	4.80***	0.45%	0.26%	1.15
Preferred stock	0.21%	0.04%	3.54***	0.05%	0.08%	− 0.76
Shareholders equity	6.75%	8.26%	− 4.30***	7.04%	7.45%	− 1.44
Risk-based capital (as a percentage of risk-based assets)	11.35%	14.27%	− 3.92***	12.50%	12.61%	− 0.10
<i>Performance measures</i>						
Return on average assets	0.55%	0.53%	0.82	0.62%	0.56%	0.45
Return on average equity	6.86%	4.15%	1.93*	8.70%	6.15%	1.61
Net interest margin	4.20%	4.28%	− 0.27	4.43%	4.73%	− 1.70*
Dividends as a percentage of assets	0.03%	0.03%	1.66	0.02%	0.02%	0.16

^a Financial-statement data are from 1991 bank *Call Reports*. Ownership-structure, board-composition, and CEO data are from 1991 proxy statements. Institutional investor shareholdings are from Spectrum. Market value data are from the Bank Compustat tapes.

^b The Wilcoxon rank sum test is a nonparametric test of the null hypothesis that the medians of the two samples are the same. *** Indicates statistical significance at the 1% level. ** Indicates significance at the 5% level. * Indicates significance at the 10% level.

Table 3

Means and nonparametric tests for differences in the corporate governance and ownership structure characteristics of derivatives users and nonusers among publicly traded BHCs with insider holdings above 10% and below 10%, 1991

This table provides means and nonparametric tests for differences in the corporate governance and ownership structure characteristics of those firms in the sample that use derivatives and those that do not use derivatives. Separate analyses are performed for firms in which the board of directors as a group owns more than 10% of all equity and those firms in which the board of directors as a group owns less than 10% of all equity. Primary members of the ISDA are excluded from the analysis. (All dollar figures are in millions).

Variable ^a	BHCs with insider holdings < 10% (93 firms)			BHCs with insider holdings > 10% (82 firms)		
	Means for BHCs with derivatives (55 firms)	Means for BHCs without derivatives (38 firms)	Wilcoxon rank sum test for differences in the two groups (Z) ^b	Means for BHCs with derivatives (29 firms)	Means for BHCs without derivatives (53 firms)	Wilcoxon rank sum test for differences in the two groups (Z) ^b
<i>Board composition</i>						
Total number of directors	15.8	14.0	1.89*	13.4	12.6	0.90
All nonofficer directors (as a percentage of all directors)	83.09%	82.94%	0.04	73.88%	77.92%	−0.96
Outside directors	65.39%	57.29%	3.09***	51.01%	54.08%	−0.44
Affiliated directors	17.71%	25.64%	−3.62***	22.87%	23.85%	−0.55
Separate CEO and chairperson dummy	0.00	0.21	−3.53***	0.17	0.25	−0.75

Shareholdings (as a percentage of all shares outstanding)

All board members	3.54%	5.57%	− 3.54***	24.21%	27.36%	− 1.98**
CEO	0.56%	0.71%	− 1.85*	5.13%	5.62%	− 0.67
Other officers	0.38%	0.41%	− 0.84	8.88%	2.99%	2.31**
Affiliated directors	0.60%	1.83%	− 4.46***	5.55%	5.98%	− 0.73
Outside directors	2.00%	2.62%	− 2.46**	4.66%	12.67%	− 3.95***
Affiliated block holders	6.18%	8.58%	− 0.86	6.22%	3.57%	1.48
Outside block holders	5.87%	3.22%	1.73*	4.74%	3.27%	0.14
Institutional investors	32.86%	14.01%	5.29***	16.00%	7.87%	3.49***
<i>CEO characteristics</i>						
Age (in years)	54.6	55.8	− 1.10	55.4	54.9	0.02
Tenure (in years)	7.9	8.9	− 1.15	10.7	10.1	0.23
Cash compensation (US\$ in thousands)	569.9	279.1	5.52***	422.1	291.7	3.90***
Option holdings (as a percentage of all shares outstanding)	0.34%	0.53%	− 1.08	0.76%	1.49%	− 0.17

^a Financial-statement data are from 1991 bank *Call Reports*. Ownership-structure, board-composition, and CEO data are from 1991 proxy statements. Institutional investor shareholdings are from Spectrum. Market value data are from the Bank Compustat tapes.

^b The Wilcoxon rank sum test is a nonparametric test of the null hypothesis that the medians of the two samples are the same. *** Indicates statistical significance at the 1% level. ** Indicates significance at the 5% level. * Indicates significance at the 10% level.

4. Corporate governance, ownership structure, and derivative activities

To examine whether agency relationships within the firm influence the decision to use derivatives, we estimate two logit models: one for firms with low insider holdings and one for firms with high insider holdings. The dependent variable is a dichotomous variable indicating whether a firm uses derivatives.¹⁵ The independent variables include ownership-structure and board-composition variables that are expected to capture the effects of corporate governance and managerial incentives on the decision to use derivatives.¹⁶ Section 2 discussed how these variables are expected to influence derivative activities.

We measure firm value as the sum of the market value of equity and the book value of debt.¹⁷ The log of firm value is included as a regressor in an effort to control for differences in size.¹⁸ Small firms, it is argued, may lack the technology and expertise to effectively use derivatives to manage their risk exposure. The absolute value of the 12-month GAP as a percentage of firm value and commercial and industrial loans as a percentage of firm value are included to control for differences in the on-balance-sheet risk of the firm. Separate GAP variables for firms with positive and negative GAPs were included to control for possible differences in the hedging incentives of these firms.¹⁹ Shareholders' equity as a percentage of firm value is included because expected costs of financial distress are a function of the probability of failure and the probability of failure is directly related to shareholders' equity. Unused commitments as a percentage of firm value are included because it represents additional risk exposure that is not included on the balance sheet. Return on average assets during 1991 is included to control for differences in the recent performance of firms. Dividends as a percentage of firm

¹⁵ If the sum of interest rate derivatives plus foreign exchange derivatives is greater than zero, the variable takes on a value of 1, 0 otherwise. Similar results are found when only interest rate derivatives are used to identify users and nonusers.

¹⁶ In addition to these variables, several other variables were introduced into the specification of the empirical model. These additional variables included outside block holder shareholdings, CEO age, CEO tenure, CEO option holdings, CEO shareholdings squared, and outside director shareholdings squared. None of the coefficients associated with these variables were statistically significant.

¹⁷ Ideally, firm value would be measured as the market value of equity plus the market value of debt. However, because market value numbers for debt are not available, we are forced to use the book value of debt in its place.

¹⁸ The log of total assets was also used in place of the log of firm value with similar results. Derivative securities and other off-balance-sheet activities are not included in total assets but their value will be reflected in the market value of equity. As such, firm value is a better measure of firm size. We include the log of firm value as a regressor because size effects should be nonlinear.

¹⁹ If expected changes in interest rates affect hedging decisions, then whether a BHC's GAP is positive or negative may influence the BHC's decision to use derivatives. To control for this possibility, two GAP measures are included in the analysis. The first is the absolute value of the 12-month GAP for firms with a positive GAP, zero otherwise. The other is the absolute value of the 12-month GAP for firms with a negative GAP, zero otherwise.

value are included because firms that pay a relatively low dividend may have fewer agency problems between shareholders and debt holders. With fewer agency problems, these firms may be less likely to use derivatives.

We focus on the decision to use derivatives rather than the extent of their use for two reasons. First, as noted by several authors, information about individual BHC's derivative activities is limited to the face amount of outstanding contracts. Measuring the extent of derivative activities is, therefore, problematic. The total notional principal amount of derivative contracts is a poor measure of the extent of usage because it aggregates long and short positions, thereby ignoring the potential netting of long and short positions. In addition, the total notional principal amount ignores differences in the types of derivative contracts. Second, to examine whether ownership-structure and corporate-control characteristics affect derivative activities, our dependent variable must be transparent to directors and investors. Because of the limited information available about banks' derivative activities, directors and investors should be able to interpret the decision to use derivatives but it is unlikely they will have enough information to interpret the extent of usage.²⁰

4.1. Results for BHCs with insider holdings below 10%

The results of estimating the logit model for BHCs with low insider holdings are shown in the second column of Table 4. Within this sample of BHCs, derivative usage is associated with firms that have a relatively low ratio of shareholders' equity to firm value, a high return on average assets, and a high ratio of unused commitments to firm value. All of these results are consistent with derivatives being used to hedge risk exposures.

However, we are not able to reject the hypothesis that firm value has no impact on whether a firm uses derivatives for the sample of BHCs with low insider holdings. One possible reason for this result is that BHCs with low insider holdings also tend to be the largest BHCs. Effectively using derivatives requires a level of expertise that many smaller firms may not have, but once a firm reaches a certain size any additional increase in size may not, by itself, affect the likelihood that the firm uses derivatives. It may be that the majority of firms in the low insider holdings group have the expertise necessary to effectively use derivatives.

²⁰ For example, a notional principal amount of US\$100 million dollars could include a long position in interest rates of US\$50 million and a short position in interest rates of US\$50 million, giving the firm a net position of zero. However, the information released by the BHC would indicate a total notional principal amount of US\$100 million. The only reliable information that can be drawn from this type of data is that the firm uses derivatives.

Table 4

Parameter estimates of the likelihood of derivatives usage by 93 publicly traded BHCs with low insider holdings and 82 publicly traded BHCs with high insider holdings

This table provides the results of estimating a logit model for the likelihood that a publicly traded BHC uses derivatives. The dependent variable in the logit model is a dummy variable indicating whether a firm uses either interest rate or foreign exchange derivatives. The variable takes on a value of 1 if the firm uses either type of derivatives, 0 if the firm does not have any derivatives in its portfolio. Primary members of the ISDA are excluded from the analysis. (Asymptotic *t*-statistics are shown in parentheses).

Independent variables ^a	BHCs with insider holdings < 10% (93 firms) ^b	BHCs with insider holdings > 10% (82 firms) ^b
Constant	22.572 (1.240)	−40.922 (−3.291)***
Natural log of firm value (market value of equity plus book value of debt)	−0.659 (−0.855)	1.947 (3.311)***
Absolute value of 12-month GAP as a percentage of firm value for firms with a positive GAP, 0 otherwise	−3.863 (−0.953)	2.959 (1.015)
Absolute value of 12-month GAP as a percentage of firm value for firms with a negative GAP, 0 otherwise	−7.475 (−0.966)	−7.774 (−0.688)
Shareholder's equity as a percentage of firm value	−253.400 (−3.357)***	30.740 (0.945)
Return on average assets	2.323 (2.664)***	−0.569 (−0.816)
Unused commitments as a percentage of firm value	26.113 (2.243)**	3.658 (0.887)
Commercial and industrial loans as a percentage of firm value	−5.206 (−0.608)	−5.038 (−0.828)
Dividends as a percentage of firm value	1.125 (0.266)	−0.708 (−0.342)
CEO shareholdings ^c	25.192 (0.458)	−13.263 (−1.995)**
Outside directors' shareholdings ^c	−22.680 (−0.741)	−28.811 (−2.578)***
Outside directors as a percentage of all directors	9.721 (2.004)**	0.870 (0.395)
Institutional investors shareholdings ^c	9.225 (1.592)	1.035 (0.275)
Number of sample firms using derivatives	55	29
Number of sample firms not using derivatives	38	53

^a Financial-statement data are from 1991 bank *Call Reports*. Ownership-structure, board-composition, and CEO data are from 1991 proxy statements. Institutional investor shareholdings are from Spectrum. Market value data are from the Bank Compustat tapes.

^b *** Indicates statistical significance at the 1% level. ** Indicates significance at the 5% level. * Indicates significance at the 10% level.

^c Shareholdings are as a percentage of all shares outstanding.

The lack of a statistically significant coefficient for the log of firm value in the results for the low insider holdings group does not suggest that size does not matter. Rather, it implies that for the subsample of firms in this group, firm value is not an important determinant of whether a BHC uses derivatives. In fact, since the average firm value of the BHCs in this group is almost US\$8 billion, it is not surprising that the coefficient on firm value is not statistically significant.²¹

Consistent with our expectations, the decision to use derivatives seems unrelated to CEO shareholdings and shareholdings by outside directors for BHCs with insider holdings below 10%. Also consistent with our expectations, the use of derivatives seems related to outside directors as a percentage of all directors.²² The coefficient on this variable is positive and statistically significant. These results are consistent with the argument that, at low levels of insider holdings, manager decisions are more likely to be influenced by the degree of monitoring they face rather than their shareholdings. Derivative usage is associated with BHCs in which outside directors constitute a large percentage of the board. We interpret these results to be evidence that when insiders own a relatively small percentage of firm equity, managers seek to minimize variation in profitability when their performance is being closely monitored.

4.2. Results for firms with insider holdings above 10%

The results of estimating the logit model for BHCs with insider holdings above 10% are shown in the third column of Table 4. Within this sample of BHCs, large firms make greater use of derivatives. Many of the BHCs with high insider holdings are small when compared to other publicly traded bank holdings companies and may not have the expertise necessary to effectively use derivatives.

The results for BHCs with insider holdings above 10% are largely consistent with our expectations regarding the influence of corporate governance and ownership structure. The likelihood that a firm uses derivatives is decreasing in CEO shareholdings and outside director shareholdings but has no relationship to outside board membership or institutional-investor shareholdings. The negative coefficient on CEO shareholdings suggests that CEOs with incentives which are closely aligned with the interests of shareholders, as reflected in a high percentage of

²¹ One additional explanation for the lack of a significant coefficient on size is the relatively high correlation between the log of firm size and both unused commitments and institutional investor shareholdings. In both cases, the correlation coefficient is greater than 0.6. However, only by excluding both unused commitments and institutional investor shareholdings is the coefficient on the log of firm size statistically significant. When only one of these variables is excluded, the coefficient on the log of firm size is still not statistically significant.

²² When insider holdings and insider holdings squared were substituted for CEO share ownership and outside director share ownership, neither was statistically significant in the logit regressions for firms with low insider holdings.

shareholdings, are less likely to use derivatives.²³ Unlike managers of nonfinancial firms, managers of BHCs with relatively high equity stakes are less likely to hedge. By not hedging, these managers exploit the risk-shifting opportunities provided by deposit insurance.

The coefficient for outside director shareholdings is also negative and statistically significant, suggesting that BHCs with a high proportion of equity held by outside directors are less likely to use derivatives. This finding is consistent with several recent studies, most notably Shivdasani (1993) and Subrahmanyam et al. (1997), that find that shareholdings by outside directors have an important influence on the decisions made by a firm.²⁴ The results found here suggest, however, that shareholdings by outside directors affects manager's decision only when insiders own a relatively large percentage of firm equity. As shown in the second column of Table 4, we find little evidence that outside director shareholdings affect the decision to use derivatives when insider holdings are less than 10%.

4.3. Comparison to other studies

The results of this study provide support for the argument that managers' wealth functions affect hedging decisions. Monitoring mechanisms encourage hedging by managers at low levels of insider holdings. Monitoring mechanisms tend to make a manager's wealth function concave at low levels of firm value due to the increased likelihood of the manager being dismissed when the firm suffers a loss in value. As argued by Smith and Stulz (1985), managers with concave wealth functions are likely to hedge as much as possible.

At high levels of insider holdings, BHC managers' wealth functions become increasingly convex as their equity holdings increase. This is due to the convexity in BHC equity holders' wealth functions. Note that in nonfinancial firms, equity holders' wealth functions are more linear because nonfinancial firms tend to be better capitalized than banks. For example, Tufano (1996) argues that managers in the gold-mining industry tend to hedge more as their equity holdings increase because the payoff to equity holders in the gold-mining industry is linear and managers are risk averse. Géczy et al. (1997) find no evidence that insider holdings affect hedging decisions. However, their study includes firms from many different industries. The payoff to equity holders may vary substantially within

²³ When insider holdings and insider holdings squared were substituted for CEO share ownership and outside director share ownership, the coefficient on insider holdings was negative and statistically significant and the coefficient on insider holdings squared was positive and statistically significant for the sample of firms with high insider holdings. However, neither CEO share ownership squared nor outside director share ownership squared was ever statistically significant.

²⁴ Alternatively, these results could be interpreted as suggesting that outside directors with high equity stakes pressure management to avoid derivatives because they (the directors) lack sufficient expertise to understand the advantages of using derivatives to manage risks.

their sample, thereby leading to an inconsistent relation between insider holdings and hedging.²⁵

One of the most important findings of this study is that, in addition to firm value, share ownership by the CEO and outside directors influences hedging decisions for firms with high insider holdings. None of the other variables we tested are statistically significant for this group of BHCs. This is important because many banks, especially small banks, have high insider holdings. This may help to explain some of the inconsistent results found by cross-sectional studies of derivative activities in the banking industry. Gunther and Siems (1995) and Sinkey and Carter (1997) examine the determinants of derivative usage for banks. However, both studies fail to include insider share ownership in the analysis. By failing to account for insider holdings, these studies may suffer from an omitted-variables problem.

One noteworthy aspect of the time period under examination here is that 1991 was a year in which the banking industry experienced historically poor performance. This was due in large part to loans backed by commercial real estate that went bad. It is reasonable, therefore, to ask whether our results are affected by this period of low profitability. For example, this low profitability might have caused some banks to speculate using derivatives. If this were the case, we would expect to observe a greater incidence of derivatives usage among the worst-performing banks. In fact, our results indicate a greater likelihood of derivatives usage among banks that were performing well relative to their peers during the previous year. The coefficient on return on average assets is positive and statistically significant for banks with low insider holdings.

5. Summary and conclusions

This paper examines whether corporate-control and ownership-structure characteristics influence the hedging decision in the banking industry. As in other studies, we argue that bank managers' hedging decisions are influenced by the relation between their wealth and firm value. Bank managers are more likely to hedge when their wealth is a concave function of firm value. They are less likely to hedge when their wealth is a convex function of firm value. Unlike studies of nonfinancial firms, however, we argue that managers in the banking industry are less likely to hedge as their equity share increases. This is due to the high leverage of banks and the risk-shifting opportunities provided by deposit insurance.

²⁵ Géczy et al. (1997) use the dollar value of managers' shareholdings as a proxy for managers' investment in the firm. Tufano (1996) uses the log of the dollar value of managers' shareholdings. When we substitute the log of the dollar value of CEO shareholdings and outside director shareholdings for the percentage of equity held by the CEO and outside directors, we get results that are very similar to the results shown in Table 4.

The findings of this study are consistent with this argument and suggest that corporate governance and ownership-structure characteristics appear to affect the likelihood that a bank uses derivatives even after controlling for size and risk exposures. According to finance theory, risk-averse managers have an incentive to minimize the risk exposures of the firm. According to the results found here, CEOs that have incentives which are closely aligned with the interests of shareholders, as indicated by a high percentage of equity holdings, are less likely to use derivatives when insider holdings exceed 10%.

For BHCs with insider holdings below 10%, the presence of outsiders on the board of directors is associated with a greater likelihood of derivative use. These results suggest that monitoring by outside directors may lead to even greater risk-averse behavior on the part of managers when insiders own a small percentage of firm equity. This can be attributed, at least in part, to the additional burden placed on bank directors to ensure that the officers of the firm are engaged in safe and sound banking practices. Our results also suggest that when insiders own a relatively small percentage of firm equity and managers are being closely monitored, they seek to minimize variation in profitability.

The results of this analysis have several implications for bank shareholders and bank regulators. First, this study suggests that aligning the interests of managers with those of shareholders using equity ownership influences the risk-management strategy of the firm. Second, when insiders own only a small percentage of firm equity, monitoring by outside directors may lead to greater derivative use. Third, consistent with other studies, the results suggest that banks use derivatives in an effort to minimize the costs associated with financial distress. Finally, unlike managers of nonfinancial firms, managers in the banking industry are less likely to hedge as their share of a firm's equity increases due to the high leverage of banks and the risk-shifting opportunities provided by deposit insurance.

Acknowledgements

The authors wish to thank Rick Sias, an anonymous referee, and seminar participants at Washington State University and the 1998 Financial Management Association meetings for useful comments and suggestions. Financial support from the CSUS Research, Scholarship, and Creative Activities Award Program and the University Committee for Research of the University of Nebraska-Omaha are gratefully acknowledged.

References

- Agrawal, A., Mandelker, G., 1987. Managerial incentives and corporate investment and financing decisions. *Journal of Finance* 42, 823–837.
- Ahmed, A.S., Beatty, A., Takeda, C., 1997. Evidence on interest rate risk management and derivatives usage by commercial banks, Working Paper, University of Rochester, Rochester, NY.

- Amihud, Y., Lev, B., 1981. Risk reduction as a managerial motive for conglomerate mergers. *Bell Journal of Economics* 12, 605–617.
- Black, B.S., 1992. Institutional investors and corporate governance: The case for institutional voice. *Journal of Applied Corporate Finance* 5, 19–32.
- Black, F., Scholes, M., 1973. The pricing of options and corporate liabilities. *Journal of Political Economy* 81, 637–654.
- Booth, J.R., Smith, R.L., Stolz, R.W., 1984. Use of interest rate futures by financial institutions. *Journal of Bank Research* 15, 15–20.
- Brickley, J.A., James, C.M., 1987. The takeover market, corporate board composition, and ownership structure: The case of banking. *The Journal of Law and Economics* 30, 161–180.
- Brickley, J.A., Lease, R.C., Smith, C.W., 1988. Ownership structure and voting on antitakeover amendments. *Journal of Financial Economics* 20, 267–291.
- Byrd, J.W., Hickman, K.A., 1992. Do outside directors monitor managers? Evidence from tender offer bids. *Journal of Financial Economics* 32, 195–221.
- Carter, D.A., Sinkey, J.F. Jr., 1998. The use of interest-rate derivatives by end-users: The case of large community banks. *Journal of Financial Services Research* 14, 17–34.
- Cordell, L.R., MacDonald, G.D., Wohar, M.E., 1993. Corporate ownership and the thrift crisis. *Journal of Law and Economics* 36, 719–756.
- Esty, B.C., 1997. Organizational form and risk taking in the savings and loan industry. *Journal of Financial Economics* 44, 25–55.
- Fischer, D.B., 1992. Comment, bank director liability under FIRREA: A new defense for directors and officer of insolvent depository institutions — or a tighter noose? *UCLA Law Review* 39, 1703–1790.
- Froot, K.A., Scharfstein, D.S., Stein, J.C., 1993. Risk management: Coordinating corporate investment and financing policies. *Journal of Finance* 48, 1629–1658.
- Galai, D., Masulis, R.W., 1976. The option pricing model and the risk factor of stock. *Journal of Financial Economics* 3, 53–81.
- Géczy, C., Minton, B.A., Schrand, C., 1997. Why firms use currency derivatives. *Journal of Finance* 52, 1323–1354.
- Gordon, L.A., Pound, J., 1993. Information, ownership structure, and shareholder voting: Evidence from shareholder-sponsored corporate governance proposals. *Journal of Finance* 48, 697–718.
- Gorton, G., Rosen, R., 1995a. Banks and derivatives, Working Paper No. 5100, National Bureau of Economic Research, Cambridge, MA.
- Gorton, G., Rosen, R., 1995b. Corporate control, portfolio choice, and the decline of banking. *Journal of Finance* 50, 1377–1420.
- Grossman, S.J., Hart, O.D., 1980. Takeover bids, the free-rider problem, and the theory of the corporation. *Bell Journal of Economics* 11, 42–64.
- Gunther, J.W., Siems, T.F., 1995. The likelihood and extent of bank participation in derivatives activities, *Financial Industry Studies*, Federal Reserve Bank of Dallas, Dallas, TX.
- Hassan, M.K., Karels, G.V., Peterson, M.O., 1994. Deposit insurance, market discipline, and off-balance-sheet banking risk of large U.S. commercial banks. *Journal of Banking and Finance* 18, 575–593.
- Hentschel, L., Kothari, S.P., 1995. Life insurance or lottery: Are corporations managing or taking risks with derivatives? Working Paper, University of Rochester, Rochester, NY.
- Hermalin, B.E., Weisbach, M.S., 1991. The effects of board composition and direct incentives on firm performance. *Financial Management* 20, 101–112.
- Hirtle, B.J., 1997. Derivatives, portfolio composition, and bank holding company interest rate risk exposure. *Journal of Financial Services Research* 12, 243–266.
- Marcus, A.J., Shaked, I., 1984. The valuation of FDIC deposit insurance using option price estimates. *Journal of Money, Credit and Banking* 16, 446–460.
- Mayers, D., Shivdasani, A., Smith, C.W. Jr., 1997. Board composition and corporate control: Evidence from the insurance industry. *Journal of Business* 70, 33–62.

- Merton, R.C., 1977. An analytic derivation of the cost of deposit insurance and loan guarantees: An application of modern option pricing theory. *Journal of Banking and Finance* 1, 3–11.
- Mian, S.L., 1996. Evidence on corporate hedging policy. *Journal of Financial and Quantitative Analysis* 31, 419–439.
- Nance, D.R., Smith, C.W. Jr., Smithson, C.W., 1993. On the determinants of corporate hedging. *Journal of Finance* 48, 267–284.
- Ronn, E.I., Verma, A.K., 1986. Pricing risk adjusted deposit insurance: An option based model. *Journal of Finance* 41, 871–896.
- Rosenstein, S., Wyatt, J.G., 1990. Outside directors, board independence, and shareholder wealth. *Journal of Financial Economics* 26, 175–191.
- Saunders, A., Strock, E., Travlos, N.G., 1990. Ownership structure, deregulation, and bank risk taking. *Journal of Finance* 45, 643–654.
- Schipani, C.A., 1993. Should bank directors fear FIRREA: The FDIC's enforcement of the financial institutions reform, recovery, and enforcement act. *Journal of Corporate Law* 17, 739–743.
- Schooner, H.M., 1995. Fiduciary duties' demanding cousin: Bank director liability for unsafe or unsound banking practices. *George Washington Law Review* 63, 175–220.
- Shapiro, A.C., Titman, S., 1986. An integrated approach to corporate risk management. In: Stern, J., Chew, D. (Eds.), *The Revolution in Corporate Finance*. Basil Blackwell, Oxford, England.
- Shivdasani, A., 1993. Board composition, ownership structure, and hostile takeovers. *Journal of Accounting and Economics* 16, 167–198.
- Shleifer, A., Vishny, R.W., 1986. Large shareholders and corporate control. *Journal of Political Economy* 94, 461–488.
- Sinkey Jr., J.F., Carter, D.A., 1997. Evidence on the financial characteristics of banks that do and do not use derivatives, Working Paper, University of Georgia, Athens, GA.
- Smith Jr., C.W., 1993. Risk management in banking. In: Schwartz, R.J., Smith Jr., C.W. (Eds.), *Advanced Strategies in Financial Risk Management*. New York Institute of Finance, Englewood Cliffs, NJ, pp. 147–162.
- Smith, C.W., Stulz, R., 1985. The determinants of firms' hedging policies. *Journal of Financial and Quantitative Analysis* 20, 391–405.
- Subrahmanyam, V., Rangan, N., Rosenstein, S., 1997. The role of outside directors in bank acquisitions. *Financial Management* 26, 23–36.
- Tufano, P., 1996. Who manages risk? An empirical examination of risk management practices in the gold mining industry. *Journal of Finance* 51, 1097–1137.
- Weisbach, M.S., 1988. Outside directors and CEO turnover. *Journal of Financial Economics* 20, 431–460.
- Whidbee, D.A., 1997. Board composition and control of shareholder voting rights in the banking industry. *Financial Management* 26, 27–41.