Incentive Features in CEO Compensation: The Role of Regulation and Monitored Debt[1]

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October 2006

[1] We appreciate helpful comments from Rajesh K. Aggarwal, Matthew Billett, Arturo Estrella, Jon Garfinkel, Jim Mahoney, Don Morgan, Lemma Senbet, Philip Strahan, Anjan Thakor, James Vickery, Larry Wall, and seminar participants at the Federal Reserve Bank of New York, System Committee Conference on Financial Structure and Regulation, the Journal of Financial Services Research and the FDIC joint conference on Finance and Banking, the Association of the Financial Economists meetings, and the Financial Intermediation Research Society (FIRS) conference on Banking, Insurance and Intermediation.

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Abstract

We study CEO compensation in the banking industry by taking into account banks' unique claim structure in the presence of two types of agency problems: the standard managerial agency problem as well as the risk-shifting problem between shareholders and debtholders. We empirically test two hypotheses derived from this framework: (1) the pay-for-performance sensitivity of bank CEO compensation decreases with the total leverage ratio; and (2) the pay-for-performance sensitivity of bank CEO compensation increases with the intensity of monitoring provided by regulators and nondepository (subordinated) debtholders. We construct an index of the intensity of outsider monitoring based on four variables: subordinated debt ratio, subordinated debt rating, non performing loan ratio and BOPEC rating assigned by regulators. We find supporting evidence for both hypotheses. Our results hold after controlling for the endogeneity among compensation, leverage and monitoring. They are robust to various regression specifications and sample criteria.

JEL classification: G21, G34, J33

Keywords: CEO compensation, pay-for-performance sensitivity, risk-shifting, agency problems, banking, regulation, subordinated debt

1. INTRODUCTION

The topic of corporate governance in general, and top management compensation in particular, has received enormous attention in recent years. In this paper, we examine CEO compensation in banking firms. Our study attempts to obtain new insights by taking into account two factors. First, we take into account the unique claim structure in banks, and consequently, the incentives of their claimholders to monitor management. Second, we consider the interaction of two types of agency problems and its impact on CEO compensation: the standard agency problem between shareholders and management, and the conflict of interest between shareholders and debtholders.

An important mechanism to mitigate the shareholder-management agency problem is through incentive compensation, i.e., by tying managerial compensation to shareholder wealth. Aligning managerial incentives with shareholders' interest, however, will exacerbate the shareholder-debtholder conflicts in levered firms. In particular, managers who are aligned with shareholders will have risk-shifting incentive, i.e., the incentive to undertake excess risk at the expense of debtholders.

Although both types of agency problems have been extensively researched, there is little work examining the interaction of the two. One notable exception is John and John (1993) who take the perspective that CEO compensation plays the role of a commitment mechanism to mitigate risk-shifting incentive in addition to its conventional role of aligning managerial incentives with shareholder interest. Their model shows that as leverage increases, the optimal pay-for-performance sensitivity of CEO compensation should decrease to offset the increased risk-shifting incentive.

Although not explicitly modeled, John and John (1993) point out that alternative mechanisms other than incentive compensation may play a role in controlling agency costs due to different contracting relationships, and by doing so, they may affect the optimal compensation design. In this paper, we consider such a mechanism for controlling agency problems in banks.

We argue that due to the bank's unique claim structure, two parties will provide outsider monitoring of the bank's risk choice: the subordinated debtholders and the regulators of the bank.

Banks differ from manufacturing firms in the structure of their claims. This, in turn, gives rise to monitoring mechanisms that are very different from those in manufacturing firms. A lion's share of a bank's cash flow claims is in the form of debt held by dispersed depositors. Moreover, the Federal Deposit Insurance Corporation (FDIC) insures a large fraction of this type of debt. Consequently, unlike the case in manufacturing firms, the primary debtholders of a bank do not have sufficient incentives to monitor the bank. Instead, a bank's nondepository (subordinated) debtholders, as claimants on junior and uninsured debt, have incentives to monitor the bank's risk choice. Moreover, regulators will also monitor a bank's risk choice because they have the responsibility to maintain a stable financial system and because the deposit insurance is equivalent to a put option given to the depositors by the FDIC (see Merton, 1977). We discuss in detail the two parties' incentives and abilities to monitor a bank's risk choice in Section 2.

While subordinated debtholders and regulators are primarily concerned with the risk of the bank and that of its securities, they may lack the incentives and the capabilities to monitor the agency problems between shareholders and managers. John and John (1993) model one standard shareholder-management agency problem: the CEO's desire to enjoy benefits of control in solvent states. Such incentives will result in managers being too conservative in making investment decisions. There is no obvious method for any outsider or even an informed board of directors to directly redress such distorted incentive other than trying to align the CEO's interest with that of shareholders'. It is similarly difficult, if not infeasible, to monitor shirking (effort aversion), which is another standard shareholder-management agency problem.

In John and John's framework, aligning the CEO with shareholders with increased ownership decreases shareholder-management agency problem but aggravates the risk-shifting problem. The optimal CEO compensation structure depends on the tradeoff between managerial agency problems and risk-shifting problems. The presence of outsider monitoring disciplines a

bank's risk appetite, thus reducing the costs of increased alignment of the CEO with shareholders. Hence outside monitoring allows for higher pay-for-performance sensitivity in the optimal CEO compensation structure.

The above arguments yield two testable hypotheses: (1) the pay-for-performance sensitivity of bank CEO compensation decreases with total leverage; (2) the pay-for-performance sensitivity of bank CEO compensation increases with the intensity of the outsider monitoring by regulators and subordinated debtholders. We empirically test these two hypotheses.

We construct an index of the intensity of outsider monitoring based on four variables: a bank's subordinated debt ratio, its subordinated debt rating, its non performing loan ratio, and its BOPEC rating assigned by regulators that measures its overall financial health. The first three variables measure the intensity of monitoring provided by subordinated debtholders on the assumptions that the monitoring intensity will increase with the amount of the subordinated debt (the stake in question), the riskiness of the subordinated debt and the riskiness of the assets. The fourth variable, the BOPEC rating, measures the intensity of regulatory monitoring.

With our index of outsider monitoring, we find supporting evidence for both hypotheses. In particular, the pay-for-performance sensitivity of bank CEO compensation is negatively related to the bank's total leverage ratio and positively related to the monitoring intensity. Both effects are statistically and economically significant.

Our results are robust to the use of multiple indices of monitoring intensity, different measures of leverage, and various regression methods. They are also robust to various sample selection criteria. We acknowledge the possibility that leverage, monitoring and CEO compensation might be endogenously determined. We address this issue using a few methods including estimating a simultaneous equation system. Our main results hold.

A few papers have documented evidence that suggests a negative relationship between leverage and pay-for-performance sensitivity. For example, Houston and James (1995) find that CEOs in banking firms (with high leverage ratio) receive less cash compensation, and that they

receive a smaller percentage of their total compensation in the form of options and stocks than do CEOs in other industries. Gilson and Vetsuypens (1993) find that the pay-for-performance sensitivity of CEO compensation declines dramatically while a firm becomes financially distressed (therefore with high leverage) but increases after financial distress. This paper provides a direct test of John and John's prediction (our first hypothesis) with recent data and a comprehensive measure of the pay-for-performance sensitivity. We find supporting evidence.

Moreover, our study is the first paper to analyze the interaction between monitoring by subordinated debt or regulation, and bank CEO compensation. Understanding how incentive features in CEO compensation are affected by outsider monitoring in banks will provide insights useful in the larger context of firms in general.

The remainder of the paper is organized as follows: Section 2 discusses the institutional setting and the monitoring role performed by regulators and subordinated debtholders. Section 3 lays out the arguments of our hypotheses. Section 4 presents the empirical tests. In particular, we describe in this section the data and methods, report the empirical results and robustness tests. We also discuss the potential endogeneity issue in the tests and use two methods to address the issue. Section 5 concludes.

2. OUTSIDER MONITORING OF RISK CHOICE

Since the payoffs to levered equity represent a call option on a firm's assets, shareholders have risk-shifting incentives, i.e., the incentive to take excessive risk at the expense of debtholders. This problem is particularly severe in the banking industry because of these firms' high leverage ratios (see Esty, 1997, 1998). Debtholders are generally concerned about a firm's risk choice. An important difference between banks and manufacturing firms lies with the incentives of debtholders to monitor the firms' risk choice. In manufacturing firms, the bank, as the senior debtholder, may perform most of the monitoring role. The bank has the incentive, expertise and

informational advantage to monitor a borrower firm.[2] However, the primary debtholders for a bank are its depositors. Under the current FDIC insurance system, a large proportion of deposits are fully insured. Therefore, the depositors do not have the incentive to monitor the banks vigorously. Instead, the subordinated debtholders of a bank have incentives to monitor.

As claimants on junior and uninsured debt, subordinated debtholders stand to suffer heavy losses in the case of bank insolvency. They, therefore, have the incentive to monitor the bank closely and on an on-going basis. Moreover, there is evidence that these subordinated debtholders have the ability to monitor. A staff study at the Board of Governors (1999) shows that the investors of bank subordinated debt are mostly institutional investors. They often conduct their own analysis of the bank and demand disclosure from the bank. A minimum level of subordinated debt holding was the centerpiece of a proposal for reforming bank regulation from the U.S. Shadow Financial Regulatory Committee (SFRC, 2000).[3]

It is argued that subordinated debt can discipline a bank's risk appetite through two channels. Subordinated debtholders can impose direct discipline on the bank by charging high funding costs once excessive risk-taking activities are detected. It can also impose derived discipline by providing risk signals to other market participants and to regulators who can then discipline the bank. See Estrella (2000) and Evanoff and Wall (2001). Empirical studies also find evidence that subordinated debtholders are able to distinguish banks with different risk profiles and take those differences into account in pricing the debt. See DeYoung et al. (2001) and Morgan and Stiroh (2001).

Another party that has high incentives to monitor banks' risk choice is the regulators. First of all, the regulators are concerned about the welfare of the public and try to maintain a safe and sound financial system. Second, as a guarantor of the depository debt, the regulators will not want the banks to take on excessive risk, and to lead to a loss for the Federal Deposit Insurance

[2] There is a large body of literature on banks' specialness in monitoring, see James (1987).
[3] Comprehensive surveys of recent subordinated debt proposals are available in Evanoff and Wall (2000), and Lang and Robertson (2002).

Corporation. Capital requirements and mandatory restrictions on asset choice have been central features of recent US bank regulations. For example, the FDIC Improvement Act (FDICIA), passed in 1991, is a system based on capital requirements and prompt corrective action (PCA). As a bank's risk-adjusted capital adequacy ratio declines – moving from well capitalized to under capitalized – regulators are likely to consider a number of mandatory and discretionary actions restricting the asset and liability activities of weakly capitalized banks, as well as imposing constraints on their payment of fees, dividends and management compensation.

In the next section, we discuss how monitoring of risk choice will affect the design of the optimal bank CEO compensation.

3. THE HYPOTHESES

The hypotheses we test in the paper are based on the model of John and John (1993). In their model, a firm's CEO makes the investment choice between a risky project and a safe project. Both projects require an investment of I. The safe project yields a return of I for certain. The risky project yields high return H with a probability q and a low return L with probability $(1-q)$, where q is private information to the CEO. Since debt is rationally priced, the optimally-designed CEO compensation should induce the first-best investment policy that maximizes the firm value.

John and John (1993) consider a CEO compensation structure $\{S, \phi, \alpha\}$, where S is a fixed salary, ϕ is a penalty in insolvent states (i.e., a compensation $S - \phi$), and α is the CEO's share of equity payoff (i.e. the pay-for-performance sensitivity). The firm has a debt obligation of F ($F>L$ for risky debt). In this setup, the penalty ϕ can be interpreted as CEO's loss of control rights in insolvent states. The CEO's desire to keep her control rights is a standard shareholder-management problem. Without incentive compensation (if $\alpha=0$), the CEO will be too conservative to undertake any risky project. On the other hand, if the CEO is perfectly aligned with shareholders, they will overinvest in the risky project, i.e., they have risk-shifting incentive.

The optimal pay-for-performance sensitivity of the CEO compensation contract is characterized as: $\alpha = \frac{\phi}{F - L}$. This implies that the optimal pay-for-performance sensitivity increases with the severity of the control rights agency problem (α increases with ϕ). Moreover, to offset the risk-shifting incentive induced by debt, the optimal pay-for-performance sensitivity decreases with the debt level (α increases with F). This is the first hypothesis we will directly test in this paper.

Although not explicitly modeled, John and John (1993) point out that alternative mechanisms other than incentive compensation may play a role in controlling agency costs, and by doing so, they may affect the optimal compensation design. In this paper, we consider such a mechanism.

We augment John and John's (1993) model by assuming that an outside third party will provide monitoring of the firm's risk choice. As discussed in the previous section, in the banking industry, both the subordinated debtholders and the regulators have the incentives and capabilities to monitor a bank's risk choice. Specifically, we assume that the outsider monitors with an intensity of λ. λ is also the probability of detecting the presence of the risky project, given that the risky project has been chosen by the bank's CEO. Once the presence of the risky project is detected, a penalty C will be imposed on the CEO.[4] Therefore, the CEO incurs an expected penalty of λC when she chooses the risky project.

It can be shown that under this augmented setup with the presence of outside monitoring, the optimal pay-for-performance sensitivity increases with the outsider monitoring intensity, λ.[5] The intuition is straightforward. Since the outsider monitoring reduces the risk-shifting problem

[4] The penalty on the CEO may be indirectly imposed. The monitor can impose a direct penalty on the bank in the form of higher funding costs or additional regulatory scrutiny. When the bank is subjected to a penalty, it can impose pecuniary and nonpecuniary costs on the CEO.

[5] The optimal pay-for-performance sensitivity can be characterized as: $\alpha = \frac{\lambda C(H - L) + \phi(H - I)}{(H - I)(F - L)}$. This level of pay-for-performance sensitivity will induce the CEO to exercise the first-best investment policy.

of debt, it reduces the cost of managerial alignment. Now the optimal compensation structure can use a higher level of pay-for-performance sensitivity to address more of the shareholder-management agency problem. The original John and John (1993) result also holds in this setup: the optimal pay-for-performance sensitivity decreases with the debt level.

These results can be summarized in the following hypotheses:

Hypothesis 1*: All else equal, the pay-for-performance sensitivity of a bank CEO's compensation decreases with the bank's leverage.*

Hypothesis 2*: All else equal, the pay-for-performance sensitivity of a bank CEO's compensation increases with the intensity of outsider monitoring.*

In the next section, we empirically test these hypotheses.

4. EMPIRICAL TESTS

4.1 Methods

To test the two hypotheses laid out in the previous section, we estimate the following regression:

$$\textbf{(CEO compensation)}_{it} = [b_1 + b_2 * \textbf{leverage ratio}_{it-1} + b_3 * \textbf{outsider monitoring}_{it-1} + b_4 * \textbf{control variables}_{it-1}] * \textbf{(return to shareholders)}_{it} + b_5 * \textbf{leverage ratio}_{it-1} + b_6 * \textbf{monitoring index}_{it-1} + b_7 * \textbf{control variables}_{it-1} + \varepsilon_{it}$$

In the above regression, the pay-for-performance sensitivity (PPS) of CEO compensation is equal to the sum in the square brackets. It implies that the pay-for-performance sensitivity is a function of a constant term, the leverage ratio, the outsider monitoring intensity, and the control variables. Hypothesis 1 predicts that higher leverage leads to lower PPS, i.e., $b_2 < 0$. Hypothesis 2 predicts that higher monitoring intensity leads to higher PPS, i.e., $b_3 > 0$. We do not have a theoretical prediction on the impact of leverage or monitoring on compensation level, i.e., we do not have a prediction on the sign of b_5 (or b_6). By including leverage ratio and monitoring in the regression, we ensure that any relationship between leverage ratio (monitoring) and the level of CEO compensation will not affect our estimates of b_2 (b_3).

The timing of the regression variables merits a note here. We use lagged values for all the PPS determinants (i.e. all variables in the square brackets). Although the compensation is observed at the end of the year, the compensation structure is determined at the beginning of the year. The factors that are taken into account in determining the CEO compensation will be variables measured by the beginning of the year. Results are robust when using contemporaneous variables.

We also include CEO-firm (i.e. a unique combination of CEO and firm) and year fixed effects in the regression. Murphy (1985) argues that the fixed-effect model is the optimal estimation methodology because "absent a theory indicating the relevant variables, and data on these variables, these cross-sectional models are inherently subject to serious omitted variables problem" (p.12). The fixed-effect model has the advantage of being able to capture any unobservable manager and year-level differences.

4.2 Data and variables

We obtain a sample of 787 CEO-years during 1993-2003 for 126 bank-holding companies (firms with SIC codes 6021–6029) from Standard and Poor's ExecuComp, which provides compensation data.[6] We obtain accounting data such as assets and debt values from Compustat. We obtain stock returns and market values of common equity from CRSP. We obtain the examination ratings data for banking holding companies (BHCs) from the Board of Governors of the Federal Reserve System. We obtain data on the BHC's non performing loans from the Federal Reserve Banks' Y-9C reports, which is available on the web site of the Federal Reserve Bank of Chicago. We also obtain the BHC's subordinated debt rating from Moody's Default Risk Service. All the data sources are matched on a fiscal-year basis. To remove the effect of inflation, we

[6] ExecuComp data start from year 1992 because consistent disclosure of option portfolios began at that time. Our definition of total compensation, CEO's firm-related wealth change, requires using lagged values of some component variables. Therefore observations with nonmissing total compensation values start from year 1993. Six problematic data points are taken out of the sample since ExecuComp indicates that the executive became CEO after that year.

convert all dollar values to constant year-2003 dollars. The consumer price index used for this purpose is obtained from the Bureau of Labor Statistics.

We use a comprehensive measure for CEO compensation. We define the CEO's total compensation as the sum of salary, bonus, long-term incentive plan, other annual compensation, value change of option holdings,[7] value change of restricted stocks, profits from exercising options, and value change of direct equity holdings. This measure includes all components of changes in the CEO's wealth related to the firm. Therefore, we call this measure of compensation "CEO's firm-related wealth change". In 1990s, grants of stock options and restricted stocks constitute an important proportion of the CEO compensation. Moreover, Hall and Liebman (1998) show that most of the pay-for-performance sensitivity in the compensation structure is associated with the value change of existing option holdings other than direct equity holdings. Hence, it is important to use this comprehensive measure of compensation when it comes to estimating pay-for-performance sensitivity.

The leverage ratio used in the analysis is defined as one minus the ratio of equity over assets. Depending on whether the book value or market value of equity (and assets) is used, we obtain two measures for the leverage ratio: the book and market values of leverage ratio.

We use two control variables as additional determinants for pay-for-performance sensitivity: firm size and firm risk. Schaefer (1998) models the relationship between firm size and pay-for-performance sensitivity and documents evidence that pay-for-performance sensitivity declines with firm size. Holmstrom and Milgrom (1987) argue that the optimal performance-related compensation component (the pay-for-performance sensitivity) for risk-averse managers should be inversely related to firm risk. Aggarwal and Samwick (1997) document evidence supporting this hypothesis. We measure size as natural logarithm of the bank's book value of

[7] In ExecuComp, the value of the existing options is only reported for in-the-money options. Therefore we use the value change of in-the-money options to approximate the value change of total option holdings. The direction and magnitude of the bias resulting from this reporting convention has been discussed in Aggarwal and Samwick (1999). They conclude that the direction of the bias is indeterminate and the net effect may not be severe.

assets. Results are similar if we measure size as the market value of equity. Consistent with the literature, we measure return to shareholders and firm risk in dollar terms. Dollar return to shareholders is equal to the firm's beginning-of-year market value of equity times its annual stock return. Volatility of dollar return is equal to stock return volatility times the average of a firm's beginning-of-year and end-of-year market values of equity. Results are robust when return to shareholder is measured as percentage return and firm risk measured as stock volatility.

Panel A of Table 1 reports the summary statistics of BHC characteristics. The bank holding companies in the sample are large firms with a median market capitalization of 3.0 billion (constant 2003) dollars and the largest one has a market capitalization of 114.9 billion dollars. As expected, these bank holding companies are highly levered. The mean (median) book value of leverage is 92.1% (92.2%). The mean (median) market value of leverage is 83.5% (84.7%). They perform well during the sample period with a median annual stock return of 16.6%.

Panel B of Table 1 shows the summary statistics of CEO compensation variables. The median values of salary, bonus, new grants of options, and value change of option holdings are of the same order of magnitude, at hundreds of thousand dollars. The mean values of option grants and value change of option holdings are much bigger. They are $2.0 million and $1.8 million, respectively. It can be seen that the value change of direct equity holdings constitutes an important part of CEO's wealth change, with a mean value of $8.1 million and a median value of $1.1 million. The following three variables can take on negative values and their ranges are quite wide: value change of option holdings, value change of restricted stock holdings and direct equity holdings. This means that CEO's firm-related wealth changes can be negative.

4.3 Measuring outsider monitoring

As discussed before, two parties are likely to provide outsider monitoring of a bank's asset allocation and risk choice: subordinated debtholders and regulators.

We argue that the intensity of monitoring by subordinated debtholders will depend on the following factors. First, it will depend on the amount of the subordinated debt. The higher stake the subordinated debtholders have in the bank, the higher the incentive that the debtholders have to monitor the bank.[8] Second, the monitoring intensity will depend on the quality of the subordinated debt. The riskier the debt, the higher the incentive that the debtholders have to monitor the bank. We use debt ratings to measure the riskiness of the debt. Last, the monitoring intensity will depend on the quality of the bank's assets. The riskier the assets, the higher the incentive that the debtholders have to monitor the bank. We use the amount of non performing loans to measure the riskiness of the bank's assets.

In terms of the regulatory monitoring, the primary responsibility for monitoring bank holding companies falls to the Federal Reserve Banks. Full-scope on-site inspections of BHCs are a key element of the supervisory process. They are generally conducted once a year. At the conclusion of an inspection, the supervisors assign the BHC a composite rating summarizing their assessment of the BHC's overall health and financial condition. This rating is called BOPEC, and it stands for the five key areas of supervisory concern: the condition of the BHC's Bank subsidiaries, Other nonbank subsidiaries, Parent company, Earnings, and Capital adequacy. BOPEC ratings range from one (best) to five (worst). The poorer the BOPEC rating, the BHC is more of a regulatory concern and will be subjected to more scrutiny such as restrictions on asset choice and payout policies. In the following analysis, we use BOPEC rating as the measure for the intensity of regulatory monitoring.[9]

[8] When the subordinated debt is held by multiple investors, there might be a free-rider problem in monitoring. If data were available, we would also like to use the stake of the largest subordinated debt investor to measure the monitoring intensity. But such data is not available.

[9] In our sample, 660 observations (out of 787) have non-missing BOPEC values. To preserve as many observations as possible, we use the CAMELS rating (examination rating at the bank level) for the lead bank in the bank holding company instead, where the BOPEC rating is unavailable. CAMELS ratings are assigned by various bank supervisory agencies: the OCC (Office of the Comptroller of the Currency) for national banks, the FDIC for state banks that are not members of the Federal Reserve System, and the Federal Reserve Banks for state member banks. As with BOPEC ratings, CAMELS ratings are assigned after bank examinations. The acronym CAMELS refers to the six key areas of concern: Capital adequacy, Asset quality, Management, Earnings, Liquidity, and Sensitivity to risk. The composite CAMELS rating

Taken as a whole, we use four variables to measure outsider monitoring intensity: (1) subordinated debt ratio, measured as a BHCs' long-term non-depository debt relative to assets; (2) subordinated debt rating, whose value ranges from 1 (Aaa rating) to 21 (C rating); (3) non performing loan ratio, measured as loans past due 90 or more days and still accruing plus nonaccrual loans, relative to total loans; and (4) BOPEC rating. For each of these variables, a higher value indicates higher monitoring intensity.

Each of these variables measures the monitoring intensity to some degree but not completely. To measure the overall outsider monitoring intensity in a comprehensive way, we construct a monitoring index as follows: we first calculate the percentile ranking for each monitoring variable; we then average the percentile ranks across the four variables to get the index value. The higher the index value, the higher the monitoring intensity.

Table 2 reports the summary statistics for the four monitoring variables and the monitoring index. Panel A presents the mean and median of these variables by year. The average use of subordinated debt steadily increases during our sample period, with the mean value rising from 3.1% in 1993 to 8.9% in 2003. This trend of increased use of subordinated debt can possibly be attributed to two reasons. First, a bank uses more subordinated nondepository debt when their risk level is lower (See Billett et al., 1998). Our sample corresponds to a long period of bull market in which the sample firms enjoyed high returns and low volatilities. The average stock volatility is highest in Year 2000 (2.9% compared to 1.8% for the rest of the sample), which seems to result in the only decrease in average subordinated debt ratio during our sample period (from 8.1% at the beginning of year 2000 to 7.1% at the beginning of year 2001). Second, banks may have increased their use of subordinated debt to prepare for the possible mandatory requirement of subordinated debt use.

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also have values ranging from one (best) to five (worst). The lead bank's CAMELS rating is highly correlated with the BHC's BOPEC rating. The correlation in our sample is 0.88. Results are similar when we use BOPEC rating only.

Despite the fact that subordinated debt increases during our sample period, the debt rating improves on average. The median value of the debt ratings changes from 8 (Baa1) in 1993 to 6 (A2) in 2003. This is probably due to the BHCs' good performance during the period. Similarly, the average non performing loan ratio decreases and the average BOPEC rating improves steadily through 1998, and both measures deteriorate a little bit after that. The aggregate monitoring index reflects the same pattern. That is, the monitoring intensity decreases steadily through 1998, but increases slightly after that.

Panel B of Table 2 presents the correlations among the four monitoring variables and between the four variables and the monitoring index. The monitoring index has a highest correlation with BOPEC rating at 70% and a lowest correlation with subordinated debt ratio at 51%. Among the four component variables, the correlations are not very high with their absolute values ranging from insignificant numbers to a correlation of 46% between BOPEC and non performing loans. It suggests that these component variables complement each other and do not measure exactly the same thing. It is therefore useful to use the aggregate index.

Panel C of Table 2 presents the correlations between the monitoring index and other firm characteristics. The correlation results suggest that large BHCs, BHCs with higher leverage and BHCs with higher stock volatilities are likely to receive more intensive monitoring.

In Table 3, we divide the sample into quartiles based on the monitoring index and examine BHC characteristics and CEO compensation in each quartile. Panel A presents the mean and median for the four monitoring variables and the monitoring index. All variables indicate a higher monitoring intensity from quartile 1 to quartile 4.

Panel B of Table 3 presents the mean and median for firm characteristics. The changing pattern in firm characteristics as the monitoring index changes is consistent with the correlation results in Panel C of Table 2. In general, the average firm size increases, the average leverage ratio increases and the average stock volatility increases when moving from monitoring quartile 1 to quartile 4, although none of the changing patterns is monotonic except for leverage ratios.

Panel C of Table 3 presents the mean and median for CEO compensation variables. Considering that firms in higher monitoring quartiles tend to be larger firms, it is not surprising to find that these firms also have a higher level of compensation in terms of salary, bonus, option grants and restricted stock grants. However, larger firms usually have smaller CEO ownership due to CEO wealth constraint and risk aversion (see Schaefer, 1998 and Murphy, 1999). In our sample, we also find that BHCs with above-median size have significantly lower CEO ownership than those with below-median size (not reported in tables). When size is measured by book value of assets, the larger BHCs have a mean CEO ownership of 0.6% while the smaller BHCs have a CEO ownership of 2.0%. Similar results hold when size is measured by market capitalization. Given the generally negative relationship between size and CEO ownership and the observation that BHCs subject to higher monitoring intensity tend to be larger BHCs, it is interesting to find that the CEO ownership increases with monitoring quartiles from 0.9% in quartile 1 to 2.3% in quartile 4. With the caveat that CEO ownership is only one component of pay-for-performance sensitivity, this evidence is consistent with our second hypothesis: higher intensity of outsider monitoring leads to higher pay-for-performance sensitivity.

4.4 Regression results

Table 4 reports the estimates of our main regression model. Panel A of Table 4 presents regression estimates when the total leverage ratio and the subordinated debt ratio in the monitoring index are measured in market value, i.e., the debt ratios are standardized by market value of assets measured as book value of assets minus book value of equity plus market value of equity. The first (second) column shows the impact of leverage ratio (monitoring) on pay-for-performance sensitivity without controlling for size and risk. As predicted, the coefficient on the interaction-term between leverage ratio and return to shareholders is negative and significant at 1% level; the coefficient on the interaction-term between monitoring and return to shareholders is positive and significant at 1% level. Column (3) estimates the effects of leverage ratio and

monitoring after controlling for risk. The coefficients on the interaction terms of leverage*returns to shareholders and monitoring*returns to shareholders do not change much. The coefficient on the interaction-term between risk and return to shareholders is significantly negative, which is consistent with Aggawal and Samwick (1997).

Column (4) estimates the full regression model that controls for size and risk. The main results are robust and consistent with our predictions: the coefficient on the interaction term leverage*return to shareholders, b_2, is significantly negative; and the coefficient on monitoring*return to shareholders, b_3, is significantly positive. The coefficient on size*return to shareholders is significantly negative, consistent with the literature. The coefficient on risk*return to shareholders, however, becomes insignificantly positive. This could be due to the higher correlation between size and risk, which is at 63%.

CEO compensation in our data is in thousands of dollars; return to shareholders is in millions of dollars. Therefore, the regression coefficient b_2 (b_3) can be interpreted as the dollar increase in CEO compensation for every $1000 increase in shareholder value, per percentage point increase in leverage ratio (per unit increase in monitoring index). The coefficient b_2 in column (4) shows that for each one percentage point increase in leverage ratio, the pay-for-performance sensitivity of CEO compensation will be $0.67 less per $1000 increase in shareholder value, all else equal. The coefficient b_3 implies that for each unit increase in the monitoring index, the pay-for-performance sensitivity will increase by $0.49 per $1000, all else equal.

Panel B of Table 4 presents regression estimates when the total leverage ratio and the subordinated debt ratio in the monitoring index are measured in book value, i.e., the debt ratios are standardized by book value of assets. Strictly speaking, market value of debt ratios makes more economic sense because market value reflects the current fair value while book value is often a stale number. We show that our main results are robust with book value of debt ratios. For brevity, further analysis is only presented for market value of debt ratios.

Table 5 reports the economic significance of these coefficients. We calculate the change in pay-for-performance sensitivity as each sensitivity-determinant increases by one standard deviation. When debt ratios are measured in market value, one standard deviation increase in leverage ratio (7.3%) decreases the pay-for-performance sensitivity by $4.9 per thousand dollar increase in shareholder value. One standard deviation increase in monitoring index (18.3) increases the pay-for-performance sensitivity by $8.9 per thousand dollars. In comparison, one standard deviation increase in size decreases the pay-for-performance sensitivity by $4.0 per thousand dollars. One standard deviation increase in risk decreases the pay-for-performance sensitivity by $0.03 per thousand dollars and the corresponding regression coefficient is statistically insignificant. The average pay-for-performance sensitivity for the sample is $7.1 per thousand dollars.[10] The effects of leverage and monitoring on pay-for-performance sensitivity are, therefore, economically significant. Results are similar when debt ratios are measured in book value.

4.5 Robustness checks

Table 6 reports the results of several robustness checks. In Column (1), we re-estimate our regression model using the median regression method. Estimates of median regressions are possibly less subject to influences of outliers. The median regression results also show that leverage has a negative impact on PPS (b_2 is significantly negative) and monitoring has a positive impact on PPS (b_3 is significantly positive).

In Column (2), we re-estimate our regression model measuring return to shareholders in percentage stock returns. Correspondingly, risk is measured as the daily stock return volatility. Under this specification, the pay-for-performance sensitivity is thousands of dollars increase in

[10] Hall and Liebman (1998) find an average PPS of $25.11 per thousand dollars for firms in general. Our results are consistent with the observation made by Houston and James (1995) that banks exhibit lower PPS for their CEO compensation.

CEO compensation for each percentage point increase in shareholder return. Results support our hypotheses.

In Column (3), we re-estimate our regression model using contemporaneous measures for PPS determinants. That is, leverage, monitoring and size are measured at the end of the year, and risk is the current year's risk. Results are robust when we use contemporaneous variables.

We also conduct the following robustness checks but do not report them in tables for the sake of space. First, we use option-related pay as the dependent variable in our regressions instead of the comprehensive compensation measure. Other than direct equity holding, most of the pay-for-performance sensitivity in CEO compensation comes from option-related pay (see Hall and Liebman, 1998). We measure option-related pay as the sum of change in value of option holdings and profits from exercising options. Regression results are robust with this compensation measure.

Second, we run cross-sectional regressions year by year in a similar fashion as Fama and MacBeth (1977) to ensure our results are not driven by spurious time-series correlation between PPS and outsider monitoring. Out of the 11 yearly regressions, nine of the coefficient b_2, the coefficient on (leverage*return to shareholders), are negative; and all 11 of the coefficient b_3, the coefficient on (monitoring index*return to shareholders), are positive. The mean b_2 is -1.91 with a t-statistic of -2.87. The mean b_3 is 0.60 with a t-statistic of 3.69.

Third, we examine whether mergers and acquisitions affect our results. The banking industry witnessed many mergers and acquisitions during our sample period. Bliss and Rosen (2001) show that the CEO compensation increases after bank mergers despite the bad performance on average. Harford and Li (2005) document evidence that the pay-for-performance sensitivity of CEO compensation decreases following mergers. By matching our sample with SDC data, we find 306 BHC-years in which the BHCs acquired other firms (122 BHC-years in which the deal value is at least 10% of the acquiring BHC's market capitalization). Regression results are robust when we exclude these BHC-years. Alternatively, we include in our

regressions an M&A dummy which is equal to one if the BHC has acquired a firm in the year, and an interaction-term of the dummy and return to shareholders. We find an insignificant coefficient on the M&A dummy. We find, however, a significantly negative coefficient on the interaction term suggesting lower PPS following bank mergers, which is consistent with Rosen and Bliss (2001) and Harford and Li (2005). More importantly, our main results hold in that the PPS decreases with leverage and increases with monitoring intensity.

Finally, we try to control the effect of the economic environment on PPS. We measure the economic environment using two variables: a nation-wide business cycle dummy which is equal to 1 if NBER labels all months in the year as in expansion, and a measure of the regional economic environment a BHC is exposed to. To measure the regional economic environment, we calculate the weighted average of the growth rates of the Gross State Product (or state personal income) for all states a BHC has branches in, using the number of branches (or amount of deposits) to calculate weights.[11] When we include the business cycle dummy and its interaction term with return to shareholders in our regressions, our main results hold in that PPS decreases with leverage and increases with monitoring intensity. The coefficient on (business cycle dummy*return to shareholders) is insignificant. When we include the regional economic variable and its interaction term with return to shareholders in our regressions, our main results again hold. The coefficient on (regional economic environment*return to shareholders) is significantly positive, suggesting better economic environment (proxied by higher regional growth rate) leads to high PPS.

4.6 Discussion of endogeneity

The main objective of this paper is to study the influences of a bank's leverage ratio and outsider monitoring on its CEO compensation structure. In doing so, we treat leverage ratio and outsider

[11] The data on Gross State Product and state personal income are from the Bureau of Economic Analysis. The data on a BHC's number of branches and amount of deposits in each state are from FDIC's Summary of Deposits dataset.

monitoring as exogenously given. It is possible that debt, compensation and outsider monitoring are jointly determined. We argue that endogeneity (although pervasive in corporate finance) might not be a serious problem for our study. Managerial discretion in banks in the choice of leverage is less than their counterparts in manufacturing firms due to bank regulation. The business model of banking determines that most of its debt comes from depositors, whose decisions are not at the bank CEO's discretion. Banks can choose not to issue subordinated debt to avoid market monitoring, but most banks in our sample (741 out of 787 observations) have subordinated debt. Regulatory monitoring is not at the discretion of the bank CEO either.

Nevertheless, we take measures to control for the potential endogeneity problem. First, we use lagged values for PPS-determining variables in our main regressions. Lagged variables by definition are not jointly determined with the contemporaneous dependent variable, with the caveat that leverage ratios and monitoring variables are often autocorrelated.

In this section, we further use two methods to mitigate or control for endogeneity: (1) to use sub indices of monitoring that are less likely to suffer endogeneity, and use deposit ratio as an exogenous proxy for total leverage; and (2) to estimate a system of simultaneous equations treating compensation, leverage and monitoring as jointly determined.

Our measure of outsider monitoring is based on four variables: subordinated debt ratio, subordinated debt rating, non performing loans and BOPEC rating. Among the four, it is most reasonable to argue that subordinated debt is at the bank CEO's discretion and hence subject to the endogeneity problem. This variable, however, has low correlations with other component variables (-13% with debt rating, 2% with non performing debt which is statistically insignificant, and 5% with BOPEC rating which is also statistically insignificant, as shown in Panel B of Table 2). It suggests that the other component variables may not suffer too much from the endogeneity problem.

We therefore construct a sub index of monitoring based on three variables: subordinated debt rating, non performing loans and BOPEC rating. In addition, we use deposits as a proxy for

the BHC's total leverage. As discussed earlier, a lion's share of a bank's debt comes from its deposits. This form of debt to a large extent is not at the bank CEO's discretion and therefore can be viewed as exogenously given in considering corporate policies. In our sample, deposits is 81% of total debt for an average BHC and it has a high correlation with total leverage at 0.99.

We then re-estimate our regression model using the sub index of monitoring and deposits as a proxy for leverage. Results are presented in Panel A of Table 7. Our main results hold in that the coefficient on the interaction-term of leverage and return to shareholders is significantly negative and the coefficient on the interaction-term of monitoring and return to shareholders is significantly positive in various specifications.

Next, we construct another sub index of monitoring by excluding one more variable, subordinated debt rating. This is to take into account the argument that subordinated debt rating depends on the amount of subordinated debt and therefore can be influenced by the bank CEO's decisions. We believe that debt rating is affected by the amount of subordinated debt, but more importantly, it depends on the financial health of the bank. During our sample period, the average use of subordinated debt increases but the average debt rating actually improves. Nevertheless, we construct a sub index of monitoring excluding both subordinated debt ratio and subordinated debt rating. Regression results using this sub index of monitoring and deposit ratio as a proxy for leverage are reported in Panel B of Table 7. These results are similar to those in Table 4. In addition, we also use BOPEC rating alone to measure the monitoring intensity and our main results hold (not reported in tables for the sake of space).

Finally, we explicitly address the potential endogeneity problem by estimating a system of simultaneous equations, viewing CEO compensation, bank leverage and outsider monitoring as jointly determined. Specifically, we estimate the following regression system:[12]

[12] Notice that the compensation equation in the system differs from our main regression model in that it omits the non interaction terms of leverage, monitoring and control variables. As discussed before, we do not have theoretical predictions on theses variables. Omitting them from our main regression models does not change our main results, i.e., results on b_2 and b_3. Including the non interaction terms makes the

$$(\text{CEO compensation})_{it} = [b_1 + b_2 * \text{leverage ratio}_{it} + b_3 * \text{monitoring index}_{it} + b_4 * \text{instrument}_{it} + b_5 * \text{control variables}_{it}] * (\text{return to shareholders})_{it} + \varepsilon_{it}$$

$$(\text{Leverage ratio})_{it} = c_1 + c_2 * \text{compensation}_{it}/\$ \text{ shareholder return}_{it} + c_3 * \text{monitoring index}_{it} + c_4 * \text{instruments}_{it} + c_5 * \text{control variables}_{it} + u_{it}$$

$$(\text{Monitoring index})_{it} = d_1 + d_2 * \text{compensation}_{it}/\$ \text{ shareholder return}_{it} + d_3 * \text{leverage ratio}_{it} + d_4 * \text{instrument}_{it} + d_5 * \text{control variables}_{it} + v_{it}$$

A valid instrument is required to be exogenous to the structural equation, and is to be correlated with the endogenous variables. Following Palia (2001), we use CEO tenure as the instrument for PPS in the compensation equation. Murphy (1986) argues that the board learns more about the CEO's ability over her tenure and therefore do not need a high PPS for a seasoned CEO. Consistent with this argument, he finds that CEO tenure is negatively related to CEO's PPS. It is also possible that a CEO's PPS increases with tenure to offset any effect of managerial entrenchment.

Following Brick, Palia and Wang (2005), we use three instruments for leverage: MacKie-Mason's (1990) modified Altman's Z-score (Altman 1968), Tobin's q and firm's profitability.[13] Z-score is an inverse measure for the probability of financial distress and is therefore predicted to be positively correlated with leverage. Tobin's q measures the investment opportunity of the firm. Myers (1977) argues that firms with higher investment opportunity should use less debt. For firm's profitability, the static tradeoff theory of capital structure predicts it should be positively correlated with leverage. But the pecking-order theory of capital structure predicts that it should be negatively correlated with leverage.

We use the bank's stock return as the instrument for monitoring. It is reasonable to think that the better the stock performs the less scrutiny the BHC will receive from the market as well as from the regulators. We run a simple regression of monitoring index on stock return to verify this intuition. The coefficient is negative and significant at 5% level.

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simultaneous equation system under identified.

[13] Including deposit ratio as an instrument for leverage does not change main results.

We use the same control variables for all three equations: firm size and firm risk. The coefficients on these control variables are not reported for brevity. In our previous single-equation regression estimates, we use lagged values for explanatory variables to avoid the potential endogeneity problem. The current simultaneous framework explicitly addresses this possibility that contemporaneous compensation, leverage and monitoring can be jointly determined. Therefore we use contemporaneous variables for this regression system. Due to the data requirements on the additional regressors, the sample size drops to 612 observations.

Table 8 reports the estimates of the simultaneous regressions. Our main interest is on the compensation equation. Consistent with our hypotheses, we find a coefficient of -1.22 for the interaction-term of leverage and return to shareholders, and a coefficient of 1.35 for the interaction-term of monitoring and return to shareholders, both significant at 5% level. For the leverage equation, we find the coefficient on monitoring and that on compensation are both insignificant, consistent with our intuition that a banking firm's leverage ratio is to a large degree not at the CEO's discretion. The monitoring index, on the other hand, does seem to depend on both the leverage ratio and compensation. In particular, the higher the leverage ratio, the higher the monitoring intensity. The higher the CEO's PPS, the higher the monitoring intensity.

In summary, even after controlling for endogeneity, we find supporting evidence for our hypotheses: higher leverage leads to lower PPS in CEO compensation and higher outsider monitoring intensity leads to higher PPS.

5. CONCLUDING REMARKS

We study CEO compensation in the banking industry in a framework where the optimal bank CEO compensation is designed to minimize costs of two types of agency problems: the standard shareholder-management problem and the risk-shifting problem between shareholders and debtholders. Given banks' claim structure, subordinated debtholders and regulators have incentives to monitor banks' risk choice. Such outsider monitoring allows for high pay-for-

performance sensitivity in the optimal CEO compensation. We empirically test two hypotheses: (1) the pay-for-performance sensitivity of bank CEO compensation decreases with the total leverage ratio; and (2) the pay-for-performance sensitivity of bank CEO compensation increases with the intensity of monitoring provided by subordinated debtholders and regulators. Using our index for the intensity of outsider monitoring, we find supporting evidence for both hypotheses.

This paper adds to our understanding of the interaction of different governance mechanisms in banks, which is useful in formulating both regulatory and compensation policies. Our results in the context of banks would also be useful in understanding the design of corporate governance in a broader setting. For example, a manufacturing firm that uses a high degree of monitored debt (bank debt) may also optimally use high-powered compensation structure. Our results also provide insights on the design of the optimal ways to provide incentives to managers taking into account the effects of alternative regulatory and monitoring mechanisms. In future research, it would be interesting to explore the impact of additional mechanisms of corporate governance such as takeovers and board monitoring on bank management compensation. It has been argued that the effectiveness of takeovers in the United States has declined in the 1990s. It would be interesting to study the effect of such decreased market discipline on the incentive features of CEO compensation. Similarly, innovations in the design of corporate boards have led to an increase in the effectiveness of boards in banks. It would be interesting to explore concurrent changes in the pay-for-performance sensitivity of CEO compensation.

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Table 1: Firm characteristics and CEO compensation

This table presents summary statistics for firm characteristics and various components of CEO compensation. The sample consists of 787 BHC CEO-years during 1993-2003. Dollar values in Panel A are in millions of constant year 2003 dollars, and compensation numbers in Panel B are in thousands of constant year 2003 dollars. Book value of leverage ratio is equal to one minus the ratio of book value of common equity relative to book value of assets. Market value of leverage ratio is equal to one minus the ratio of market value of common equity relative to market value of assets, which is in turn defined as book value of assets minus book value of common equity plus market value of common equity. Volatility of dollar return is equal to stock return volatility times the average of a firm's beginning-of-year and end-of-year market values of equity. Book value of assets, market value of equity, leverage ratios are measured at the beginning of the year. Stock volatility and volatility of dollar return are measured in the previous year. Dollar return to shareholders is equal to the firm's beginning-of-year market value of equity times its annual stock return. CEO's firm-related wealth change is defined as the sum of salary, bonus, long-term incentive plan, other annual compensation, value change of option holdings, value change of restricted stocks, profits from exercising options, and value change of direct equity holdings.

	Mean	Median	Std	Minimum	Maximum
Panel A: Firm Characteristics					
Book value of assets	49689.79	17851.87	91809.13	626.63	764367.20
Market value of equity	7976.46	3010.80	13840.67	106.21	114923.32
Book value of leverage ratio	92.08%	92.21%	1.72%	82.78%	96.40%
Market value of leverage ratio	83.49%	84.69%	7.34%	37.70%	96.20%
Stock volatility	1.89%	1.77%	0.67%	0.74%	7.36%
Volatility of dollar return	152.37	46.64	305.87	2.77	2597.39
Annual stock return	20.79%	16.56%	33.00%	-93.81%	274.56%
Dollar return to shareholders	1042.49	321.24	4189.17	-28932.87	33455.44
Panel B: Compensation components					
Salary	692.92	660.00	294.64	0	3000.00
Bonus	1088.84	562.53	1512.15	0	12908.78
Long-term incentive plan	224.58	0	734.19	0	8959.61
Other annual compensation	49.95	0	260.57	0	5770.03
Option grants	2018.30	757.32	4113.95	0	51050.03
Grants of restricted stocks	705.54	0	2718.08	0	49368.55
Value change of option holdings	1819.31	324.27	16493.90	-279377.35	100973.75
Value change of restricted stocks	299.50	0	5242.59	-104032.80	33076.60
Profits from exercising options	1593.32	112.75	7112.81	0	172765.63
Equity holding	1.28%	0.30%	3.72%	0	35.05%
Value change of equity holding	8140.86	1113.30	63854.30	-619894.65	1001488.63
CEO's firm-related wealth change	13721.82	4422.41	73374.06	-743399.32	1141813.09

Table 2: Measures of monitoring

This table presents summary statistics for measures of outsider monitoring intensity. The sample consists of 787 BHC CEO-years during 1993-2003. Panel A shows by year the mean and median of four measures of monitoring intensity and their aggregate index. Subordinated debt ratio is measured as a BHC's long-term non-depository debt divided by market value of assets, which is in turn defined as book value of assets minus book value of common equity plus market value of common equity. Subordinated debt rating is based on Moody's ratings and its value ranges from 1 (Aaa rating) to 21 (C rating). Non performing loan ratio is loans past due 90 or more days and still accruing plus nonaccrual loans, relative to total loans. BOPEC rating is the rating assigned by Federal Reserve Banks to a BHC for its overall financial condition and has a range between 1 (the best) and 5 (the poorest). Monitoring index is the average percentile ranking of the four monitoring variables. The higher the index value, the higher the monitoring intensity. All monitoring variables are measured at the beginning of the year. Panel B presents the correlations between monitoring variables and the index. Panel C presents the correlations between the monitoring index and other firm characteristics. Leverage ratio is equal to one minus the ratio of market value of common equity relative to the market value of assets. Volatility of dollar return is equal to stock return volatility times the average of a firm's beginning-of-year and end-of-year market values of equity. Book value of assets and leverage ratio are measured at the beginning of the year. Stock volatility and volatility of dollar return are measured in the previous year.

Panel A: Monitoring variables by year

	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003
Subordinated debt ratio (%)	3.13 (2.01)	4.03 (3.10)	4.69 (3.55)	4.88 (3.68)	5.23 (4.14)	5.40 (4.53)	6.69 (6.20)	8.06 (7.10)	7.09 (5.87)	8.09 (7.44)	8.90 (9.15)
Subordinated debt rating	7.71 (8.00)	7.73 (8.00)	6.95 (7.00)	6.53 (6.00)	6.29 (6.00)	6.50 (6.00)	6.56 (6.00)	6.67 (6.00)	6.16 (6.00)	6.52 (6.00)	6.52 (6.00)
Non performing loan ratio (%)	2.42 (1.76)	1.66 (1.21)	1.04 (0.84)	0.94 (0.83)	0.94 (0.80)	0.79 (0.71)	0.83 (0.67)	0.82 (0.68)	0.88 (0.80)	0.98 (0.86)	0.93 (0.81)
BOPEC rating	1.98 (2.00)	1.68 (2.00)	1.57 (2.00)	1.49 (1.00)	1.47 (1.00)	1.36 (1.00)	1.40 (1.00)	1.58 (2.00)	1.64 (2.00)	1.71 (2.00)	1.72 (2.00)
Monitoring index	58.44 (58.21)	53.56 (53.67)	46.84 (44.83)	44.42 (42.71)	44.94 (44.83)	41.75 (40.13)	43.71 (44.13)	46.85 (48.75)	47.95 (49.67)	51.70 (55.00)	51.33 (53.25)
Observations	62	77	70	72	74	78	74	73	69	73	65

Panel B: Correlation between monitoring variables

	Monitoring index	Subordinated debt ratio	Subordinated debt rating	Non performing loan ratio	BOPEC rating
Monitoring index	1.00				
Subordinated debt ratio	0.51 (0.00)	1.00			
Subordinated debt rating	0.62 (0.00)	-0.13 (0.01)	1.00		
Non performing loan ratio	0.58 (0.00)	0.02 (0.53)	0.28 (0.00)	1.00	
BOPEC rating	0.70 (0.00)	0.05 (0.20)	0.45 (0.00)	0.46 (0.00)	1.00

Panel C: Correlation between monitoring index and firm characteristics

	Monitoring index	Log(book value of assets)	Leverage ratio	Stock volatility	Volatility of dollar return
Monitoring index	1.00				
Log(book value of assets)	0.24 (0.00)	1.00			
Leverage ratio	0.32 (0.00)	0.13 (0.00)	1.00		
Stock volatility	0.15 (0.00)	-0.11 (0.00)	-0.27 (0.00)	1.00	
Volatility of dollar return	0.08 (0.03)	0.63 (0.00)	-0.18 (0.00)	0.27 (0.00)	1.00

Table 3: Firm characteristics and CEO compensation by monitoring intensity

This table presents the mean and median of firm characteristics and CEO compensation by quartiles of the monitoring index. The sample consists of 787 BHC CEO-years during 1993-2003. Panel A shows the mean and median of four measures of monitoring intensity and their aggregate index. Subordinated debt ratio is measured as a BHC's long-term non-depository debt divided by market value of assets, which is in turn defined as book value of assets minus book value of common equity plus market value of common equity. Subordinated debt rating is based on Moody's ratings and its value ranges from 1 (Aaa rating) to 21 (C rating). BOPEC rating is the rating assigned by Federal Reserve Banks to a BHC for its overall financial condition and has a range between 1 (the best) and 5 (the poorest). Non performing loan ratio is loans past due 90 or more days and still accruing plus nonaccrual loans, relative to total loans. Monitoring index is the average percentile ranking of the four monitoring variables. The higher the index value, the higher the monitoring intensity. All monitoring variables are measured at the beginning of the year.

Panel B shows the mean and median of firm characteristics. Book value of leverage ratio is equal to one minus the ratio of book value of common equity relative to book value of assets. Market value of leverage ratio is equal to one minus the ratio of market value of common equity relative to market value of assets. Volatility of dollar return is equal to stock return volatility times the average of a firm's beginning-of-year and end-of-year market values of equity. Book value of assets, market value of equity, leverage ratios are measured at the beginning of the year. Stock volatility and volatility of dollar return are measured in the previous year. Dollar return to shareholders is equal to the firm's beginning-of-year market value of equity times its annual stock return.

Panel C shows the mean and median of various components of CEO compensation. CEO's firm-related wealth change is defined as the sum of salary, bonus, long-term incentive plan, other annual compensation, value change of option holdings, value change of restricted stocks, profits from exercising options, and value change of direct equity holdings.

	Monitoring index Quartile 1	Quartile 2	Quartile 3	Monitoring index Quartile 4
Panel A: Monitoring variables				
Monitoring index	24.62 (25.67)	41.99 (41.71)	55.02 (55.00)	71.27 (68.88)
Subordinated debt ratio	2.21% (1.39%)	5.90% (4.60%)	6.77% (5.40%)	9.24% (7.54%)
Subordinated debt rating	5.30 (5.00)	5.94 (6.00)	6.53 (7.00)	8.40 (8.00)
BOPEC rating	1.11 (1.00)	1.35 (1.00)	1.80 (2.00)	2.13 (2.00)
Non performing loan ratio	0.54% (0.51%)	0.78% (0.73%)	1.15% (0.96%)	1.99% (1.59%)
Panel B: Firm characteristics				
Book value of assets	27141.15 (10124.40)	50637.67 (19655.80)	68112.67 (22434.88)	52848.01 (28152.49)
Market value of equity	5080.89 (2266.40)	9155.83 (3636.50)	10924.99 (3179.53)	6715.69 (3679.20)
Book value of leverage ratio	91.65%	91.96%	92.16%	92.54%

	(91.76%)	(92.01%)	(92.34%)	(92.75%)
Market value of leverage ratio	80.33% (81.43%)	82.11% (82.90%)	85.02% (85.72%)	86.56% (88.25%)
Stock volatility	1.78% (1.68%)	1.83% (1.67%)	1.91% (1.80%)	2.04% (1.90%)
Volatility of dollar return	85.01 (31.62)	180.72 (53.23)	205.82 (49.53)	137.65 (56.72)
Annual stock return	24.31% (22.58%)	18.36% (13.75%)	20.77% (16.56%)	19.68% (14.48%)
Dollar return to shareholders	989.05 (273.24)	582.28 (295.36)	1597.73 (374.76)	992.45 (343.74)
Panel C: Compensation components				
Salary	633.23 (617.50)	665.35 (649.45)	715.05 (685.03)	759.01 (719.58)
Bonus	747.79 (466.72)	1120.42 (573.07)	1202.39 (590.10)	1288.53 (691.02)
Long-term incentive plan	227.78 (0)	257.14 (0)	201.57 (0)	212.02 (0)
Other annual compensation	28.57 (0)	31.58 (0)	68.41 (0)	71.39 (0)
Option grants	1442.02 (538.16)	2350.08 (787.28)	1873.53 (759.85)	2413.80 (961.80)
Grants of restricted stocks	422.40 (0)	753.71 (0)	774.02 (0)	875.60 (0)
Value change of option holdings	2686.86 (826.79)	1267.67 (165.13)	2028.36 (143.23)	1268.53 (151.65)
Value change of restricted stocks	300.19 (0)	570.33 (0)	412.92 (0)	-89.60 (0)
Profits from exercising options	930.71 (123.89)	1565.77 (224.27)	1998.96 (84.50)	1881.33 (19.97)
Equity holding	0.85 (0.35)	0.72 (0.27)	1.34 (0.29)	2.26 (0.32)
Value change of equity holding	4913.33 (1106.83)	3506.74 (1112.59)	6732.61 (1268.31)	17817.08 (1022.46)
CEO's firm-related wealth change	10373.59 (4599.19)	8920.23 (3855.40)	13178.84 (5559.02)	22547.17 (4469.32)

Table 4: Effects of leverage and monitoring on pay-for-performance sensitivity

The sample consists of 787 BHC CEO-years during 1993-2003. The dependent variable, CEO's firm-related wealth change, is defined as the sum of salary, bonus, long-term incentive plan, other annual compensation, value change of option holdings, value change of restricted stocks, profits from exercising options, and value change of direct equity holdings. Return to shareholders is equal to the firm's beginning-of-year market value of equity times its annual stock return. Monitoring index is the average percentile ranking of the four monitoring variables (subordinated debt ratio, subordinated debt rating, non performing loan ratio and BOPEC rating). Volatility of dollar return is equal to stock return volatility times the average of a firm's beginning-of-year and end-of-year market values of equity. Book value of assets, leverage ratio, and monitoring index are measured at the beginning of the year. Volatility of dollar return is measured in the previous year. In panel A, leverage ratio is equal to one minus the ratio of market value of common equity relative to market value of assets, which is in turn defined as book value of assets minus book value of common equity plus market value of common equity. Subordinated debt ratio is also measured in market value, i.e. long-term non-depository debt divided by market value of assets. In Panel B, leverage ratio is equal to one minus the ratio of book value of common equity relative to book value of assets. Subordinated debt ratio is long-term non-depository debt divided by book value of assets. Each regression includes CEO-firm (for each unique combination of CEO and firm) and year fixed effects. However, R^2 is calculated without taking into account the variations of these dummies, i.e., regressions are estimated with all non-dummies variables demeaned. *t*-statistics are in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

4A: Debt ratios measured in market value

Independent Variables	CEO's firm-related wealth change			
	(1)	(2)	(3)	(4)
Return to shareholders	75.87 ***	-20.34 ***	50.49 ***	70.00 ***
	(12.64)	(-6.50)	(7.93)	(5.81)
Leverage ratio* Return to shareholders	-0.90 ***		-0.85 ***	-0.67 ***
	(-11.84)		(-12.03)	(-5.66)
Monitoring index * Return to shareholders		0.49 ***	0.47 ***	0.49 ***
		(8.25)	(8.97)	(9.13)
log (book value of assets) * Return to shareholders				-3.06 *
				(-1.91)
Volatility of dollar return * Return to shareholders			-0.003 **	0.0001
			(-2.58)	(0.05)
Leverage ratio	1124.31		1488.86 *	1054.05
	(1.27)		(1.72)	(1.17)
Monitoring index		-224.81	-262.47	-268.09
		(-0.76)	(-0.98)	(-0.99)
Size: log (book value of assets)				-373.40
				(-0.03)
Risk: Volatility of dollar return			18.21	-16.83
			(-1.17)	(-1.02)
R^2	0.29	0.21	0.39	0.39
Observations	787	787	787	787

4B: Debt ratios measured in book value

Independent Variables	CEO's firm-related wealth change			
	(1)	(2)	(3)	(4)
Return to shareholders	460.47 ***	-22.15 ***	399.43 ***	348.18 ***
	(13.42)	(-7.25)	(10.53)	(8.89)
Leverage ratio* Return to shareholders	-4.96 ***		-4.38 ***	-3.28 ***
	(-13.28)		(-11.00)	(-7.02)
Monitoring index * Return to shareholders		0.52 ***	0.25 ***	0.30 ***
		(9.07)	(4.53)	(5.44)
log (book value of assets)* Return to shareholders				-4.79 **
				(-4.38)
Volatility of dollar return * Return to shareholders			-0.004 ***	0.0004
			(-4.55)	(0.33)
Leverage ratio	22979.89 ***		20735.21 ***	18671.65 ***
	(8.09)		(7.39)	(6.66)
Monitoring index		-265.81	-130.34	-205.31
		(-0.91)	(-0.51)	(-0.80)
Size: log (book value of assets)				1536.74
				(0.12)
Risk: Volatility of dollar return			-17.16	-12.56
			(-1.11)	(-0.78)
R^2	0.37	0.23	0.42	0.43
Observations	787	787	787	787

Table 5: Economic significance of the estimates

This table displays the change in the pay-for-performance sensitivity (dollar increase in CEO compensation per $1000 increase in shareholder value) as each of the listed explanatory variable increases by one standard deviation. It is calculated as the regression coefficient of the interaction-term of a listed variable times dollar return to shareholders, times the standard deviation of the variable. Column (1) corresponds to regression coefficients from Table 4 Panel A Column (4). Column (2) corresponds to regression coefficients from Table 4 Panel B Column (4). ***, **, and * denote significance at the 1, 5, and 10 percent levels for the corresponding regression coefficients. The average PPS is calculated as the sum of regression coefficient of the interaction-term of a variable (including constant 1) and return to shareholders, times the mean value of the variable, i.e. the mean value of $(b_1 + b_2 *$ leverage ratio $+ b_3 *$ monitoring index $+ b_4 * X)$ in our regression model, X being a vector of size and risk.

	(1) Debt ratio in market value	(2) Debt ratio in book value
Panel A: Economic significance		
Leverage ratio	-4.92***	-5.63***
Monitoring index	8.86***	5.48***
Size: log (book value of assets)	-4.00*	-6.26**
Risk: volatility of dollar return	0.03	-0.15
Panel B: Average PPS		
Average PPS	7.09	13.47

Table 6: Effects of leverage and monitoring on pay-for-performance sensitivity: Robustness checks

The sample consists of 787 BHC CEO-years during 1993-2003. Column (1) presents results of a median regression. The dependent variable, CEO's firm-related wealth change, is defined as the sum of salary, bonus, long-term incentive plan, other annual compensation, value change of option holdings, value change of restricted stocks, profits from exercising options, and value change of direct equity holdings. Return to shareholders is equal to the firm's beginning-of-year market value of equity times its annual stock return. Leverage ratio is equal to one minus the ratio of market value of common equity relative to market value of assets, which is in turn defined as book value of assets minus book value of common equity plus market value of common equity. Monitoring index is the average percentile ranking of the four monitoring variables (subordinated debt ratio, subordinated debt rating, non performing loan ratio and BOPEC rating). Risk is measured as volatility of dollar return which is equal to stock return volatility times the average of a firm's beginning-of-year and end-of-year market values of equity. R^2 for the median regression is the pseudo R^2. Column (2) presents fixed-effect regression results where return to shareholders is measured in percentage return, and risk is measured as stock volatility. In both column (1) and column (2), book value of assets, leverage, and monitoring are measured at the beginning of the year and risk is measured for the previous year. Column (3) presents fixed-effect regression results where book value of assets, leverage and monitoring are measured at the end of the year and risk is measured for the current year. Return to shareholders and risk are measured in dollar terms. *t*-statistics are in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

Independent Variables	CEO's firm-related wealth change		
	(1) Median regression	(2) Percentage return to shareholders	(3) Contemporaneous Variables
Return to shareholders	34.65 ***	9225.80 ***	98.57 ***
	(48.69)	(7.68)	(8.71)
Leverage ratio * Return to shareholders	-0.05 ***	-132.09 ***	-1.08 ***
	(-6.83)	(-11.52)	(-11.29)
Monitoring index * Return to shareholders	0.04 ***	26.86 ***	0.62 ***
	(11.94)	(6.35)	(12.69)
log (book value of assets) * Return to shareholders	-2.49 *	103.54 *	-3.40 ***
	(-26.80)	(1.69)	(-2.99)
Risk* Return to shareholders	0.0006 ***	27.50	0.0007
	(7.75)	(0.25)	(0.53)
Leverage ratio	-7.76	418.55	-533.93
	(-0.28)	(0.42)	(-0.60)
Monitoring index	6.38	-329.21	-307.35
	(0.64)	(-1.06)	(-1.21)
Size: log (book value of assets)	175.95	5584.75	4678.10
	(0.95)	(0.42)	(0.35)
Risk	3.84 ***	8778.03	-54.51 ***
	(6.23)	(0.97)	(-3.72)
R^2	0.27	0.30	0.47
Observations	787	787	787

Table 7: Effects of leverage and monitoring: Using deposit ratio and sub-indices of monitoring

The sample consists of BHC CEO-years during 1993-2003. The dependent variable, CEO's firm-related wealth change, is defined as the sum of salary, bonus, long-term incentive plan, other annual compensation, value change of option holdings, value change of restricted stocks, profits from exercising options, and value change of direct equity holdings. Return to shareholders is equal to the firm's beginning-of-year market value of equity times its annual stock return. Deposit ratio is equal to deposits relative to market value of assets, which is in turn defined as book value of assets minus book value of common equity plus market value of common equity. Volatility of dollar return is equal to stock return volatility times the average of a firm's beginning-of-year and end-of-year market values of equity. Book value of assets, deposits, and monitoring are measured at the beginning of the year and risk is measured for the previous year. In Panel A, monitoring index is the average percentile ranking of three variables: subordinated debt rating, non performing loan ratio and BOPEC rating. In Panel B, monitoring index is the average percentile ranking of two variables: BOPEC rating and non performing loan ratio. Each regression includes CEO-firm (for each unique combination of CEO and firm) and year fixed effects. However, R^2 is calculated without taking into account the variations of these dummies, i.e., regressions are estimated with all non-dummies variables demeaned. *t*-statistics are in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

Panel A: Monitoring index based on subordinated debt rating, non performing loan ratio and BOPEC rating

Independent Variables	CEO's firm-related wealth change			
	(1)	(2)	(3)	(4)
Return to shareholders	65.93 ***	-12.52 ***	56.27 ***	91.78 ***
	(11.04)	(-5.83)	(9.31)	(8.31)
Deposit ratio* Return to shareholders	-1.02 ***		-1.07 ***	-0.84 ***
	(-10.32)		(-11.65)	(-7.67)
Monitoring index * Return to shareholders		0.39 ***	0.38 ***	0.36 ***
		(8.57)	(9.22)	(8.92)
log (book value of assets) * Return to shareholders				-4.40 ***
				(-3.83)
Volatility of dollar return * Return to shareholders			-0.004 ***	0.0003
			(-4.20)	(0.18)
Deposit ratio	676.53		907.66	629.45
	(1.00)		(1.44)	(0.99)
Monitoring index		-165.27	-199.62	-185.04
		(-0.70)	(-0.92)	(-0.85)
Size: log (book value of assets)				2904.55
				(0.21)
Risk: Volatility of dollar return			-9.08	-9.24
			(-0.57)	(-0.55)
R^2	0.26	0.22	0.38	0.39
Observations	778	778	778	778

Panel B: Monitoring index based on non performing loan ratio and BOPEC rating

Independent Variables	CEO's firm-related wealth change			
	(1)	(2)	(3)	(4)
Return to shareholders	66.02 ***	-1.95	69.80 ***	115.12 ***
	(11.02)	(-0.79)	(11.75)	(10.51)
Deposit ratio* Return to shareholders	-1.02 ***		-1.21 ***	-0.92 ***
	(-10.30)		(-12.56)	(-8.12)
Monitoring index * Return to shareholders		0.12 ***	0.27 ***	0.27 ***
		(2.86)	(7.04)	(7.33)
log (book value of assets) * Return to shareholders				-5.73 ***
				(-4.88)
Volatility of dollar return * Return to shareholders			-0.007 ***	-0.001
			(-6.70)	(-0.84)
Deposit ratio	667.57		883.26	498.76
	(0.97)		(1.35)	(0.76)
Monitoring index		-49.31	-122.16	-80.31
		(-0.20)	(-0.56)	(-0.37)
Size: log (book value of assets)				919.94
				(0.07)
Risk: Volatility of dollar return			-13.25	-13.86
			(-0.79)	(-0.80)
R^2	0.26	0.13	0.34	0.37
Observations	774	774	774	774

Table 8: Simultaneous equations

This table presents estimates of the simultaneous equation system. The sample consists of 612 BHC CEO-years during 1993-2003. CEO's firm-related wealth change is defined as the sum of salary, bonus, long-term incentive plan, other annual compensation, value change of option holdings, value change of restricted stocks, profits from exercising options, and value change of direct equity holdings. Leverage ratio is equal to one minus the ratio of market value of common equity relative to market value of assets, which is in turn defined as book value of assets minus book value of common equity plus market value of common equity. Monitoring index is the average percentile ranking of the four monitoring variables (subordinated debt ratio, subordinated debt rating, non performing loan ratio and BOPEC rating). CEO tenure is the number of years since the executive has become CEO, plus one. Z-score is the modified Altman's Z score = [3.3*(operating income after depreciation) + sales + 1.4*(retained earnings) +1.2*(current assets-current liability)]/total assets. Tobin's q is market value of assets divided by book value of assets. Profitability is operating income before depreciation divided by assets. All variables are contemporaneous: size, leverage ratio, and monitoring index are measured at the end of the year and risk is the current year's risk. *t*-statistics are in parentheses. ***, **, and * denote significance at the 1, 5, and 10 percent levels, respectively.

Independent Variables	CEO's firm-related wealth change	Leverage ratio	Monitoring index
Intercept	9883.70 ***	174.03 ***	-76.63 ***
	(3.64)	(9.20)	(-4.48)
Leverage ratio*return to shareholders	-1.22 **		
	(-2.56)		
Monitoring index*return to shareholders	1.35 **		
	(2.37)		
Leverage ratio			0.86 ***
			(4.16)
Monitoring index		-0.15	
		(-0.81)	
CEO's firm-related wealth change/return to shareholders		0.01	0.24 ***
		(0.84)	(3.07)
Log(CEO tenure)* return to shareholders	1.94		
	(0.68)		
Z-score		-18.41	
		(-1.48)	
Tobin's Q		-84.48 ***	
		(-5.02)	
Profitability		1.02	
		(0.50)	
Stock return			-0.01
			(-0.38)
R^2	0.34	0.76	0.20