

Bank Return Volatility and Management Structure

Xiaolou Yang¹ and Gang Peng²

Abstract

This study investigates the dynamic relationship between bank management structure, payment contract and bank return volatility. We find that increasing the sensitivity of executives pay to equity risk will increase bank return volatility. When CEOs are also the chairs of board directors, bank risk is higher. As banks expand more risky investments, the risk level of the banks is higher. These results hold not only for commercial banks but also for savings and loan institutions.

JEL classification number: G20, G21

Keywords: Bank governance, Return volatility, Payment structure

1 Introduction

The aim of the management structure is to align executives' self-interest and investors' wealth maximization, therefore executive compensation structure is viewed as an important device for bank management. In the current literature, very little attention has been paid to the management structure in banking industry and how the bank management structure affects bank return volatilities.

To date, the empirical evidence of how certain management structures affect banks' performance is mixed and provides litter coherent evidence for the shape of an optimal management structure. For example, Lambert et al. (1993) and Boyd (1994) document a positive relationship between CEO compensation and the percentage of the board composed of outside directors, whereas Finkelstein and Hambrick (1989) find that compensation is unrelated to the percentage of outside directors on the board. Other characteristics of the board have also been explored. Hallock (1997) finds that CEO compensation is higher for firms with interlocked outside directors. Lambert et al. (1993) find that CEOs receive higher pay when they have appointed a greater proportion of the board. Crystal (1991) argues that boards of directors are ineffective in setting appropriate

¹Xiaolou Yang, Corresponding author. Associate Professor at the Department of Accounting and Finance at Youngstown State University.

²Gang Peng, Associate Professor at Department of Management at Youngstown State University.

levels of compensation because outside directors are essentially hired by the CEOs and can be removed by the CEOs. As such, board members may be unwilling to take positions adversarial to the CEOs, especially concerning the CEOs' compensation. Moreover, boards usually rely on the compensation consultants hired by the CEOs, and this may lead to compensation contracts that have been optimized not for the firms, but for the CEOs. Jensen (1990) argues that boards of directors are ineffective because board culture discourages conflicts, the CEO determines the agenda and information given the board, and there is little equity ownership by managers and non-managers on the typical board. The CEOs and the board chairs are frequently the same individuals. Other empirical research examines whether certain board structures are associated with better firm value and performance. For example, Rosenstein and Wyatt (1990) provide evidence that shareholder wealth is affected by the proportion of outside directors by documenting a positive stock price reaction at the announcement of the appointment of an additional outside director. Byrd and Hickman (1992) find that bidding firms on which independent outside directors hold at least 50% of the seats have higher announcement-date abnormal returns than other bidders, except when the independent directors hold a very high proportion of board seats. In contrast, Yermack (1996) finds no association between the percentage of outside directors and firm performance. Thus, the evidence for the importance of outside directors is mixed. Yermack (1996) also provides evidence that firm value and performance is a decreasing function of board size, while Baysinger and Butler (1985), Hermalin and Weisbach (1991), and Bhagat and Black (1997) find no meaningful relationship between various characteristics of board composition and firm performance. Lambert et al. (1993) find that CEO compensation is lower when the CEO's ownership is higher and when there is an internal member on the board other than the CEO who owns at least 5% of the shares. Using a sample of Canadian companies (30% of which have multiple classes of voting stock), Core et al. (2002a) finds that CEO compensation is increasing in insider control of share votes and decreasing in insider ownership of share value. Holderness and Sheehan (1988) provide evidence that managers who are majority shareholders (defined as individuals owning at least half but not all of the common stock) in publicly held corporations receive marginally higher salaries than other officers. However, Allen (1981) finds that the level of CEO compensation is a decreasing function of the equity held by the CEO (and his family), as well as the extent of equity holdings by board members not related to the CEO. However, despite the general focus on corporate management, little attention has been paid to the management on banks. As financial institutions are very different from firms in unregulated industries, such as manufacturing firms, thus banks should be treated differently in the matter of management. It is important to understand current management practices as well as how management practices differ between banking and non-financial institutions.

The purpose of this paper is to investigate the causal relationships between bank management structure, executive pay and bank risk. We use vega and delta as measures of compensation structure. In order to assess the relationship between board and ownership structure, vega and bank risk, we apply a three-simultaneous-equation using a 3 Stage Least Squares (3SLS) method in which vega, delta and bank risk are all treated as endogenous variables and are jointly determined. The 3SLS estimate could avoid spurious inferences in OLS estimate and provide asymptotically consistent estimates of the standard errors (Sawa, 1969). The empirical results show that the more shares CEOs hold, the more they are exposed to banks' specific risk, which increase their incentives to

implement risk-increasing investments. Therefore, increasing the sensitivity of executives pay to equity risk will increase bank risk. Based on this argument, CEOs with high stock ownership in their banks will have a high sensitivity of their compensation to equity risk. Moreover, when CEOs are also the chairs of board directors, vega is higher. In terms of CEO tenure, we found that CEO tenure is negatively associated with the sensitivity of CEO compensation to equity risk. The entrenched CEOs will prefer compensation schemes with low incentives to take on high risks. Banks with more outside blockholders have a higher percentage of their executive compensation in equity-based form; banks with a higher percentage of the shares held by outside blockholders use less equity-based compensation. Further, as a bank expands more risky investments, the risk level of the bank is expected to be higher. In order to test the cross-sectional effect, we partition the full sample into commercial banks and savings and loan institutions, and examine CEO incentives and bank risk level for each group respectively. In general the results for commercial banks also hold for savings and loan institutions, which indicate that managerial incentive, as reflected in vega, induces higher level of risk for both commercial banks and savings and loan institutions.

The remainder of this paper is organized as follows. Section 2 describes the prior literature and background. Section 3 introduces measures and methodology. Data sample is described in section 4. Section 5 and 6 report the empirical results followed by conclusion remarks.

2 Measures and Methodology

We use vega and delta as measures of compensation structure. Vega is defined as the change in the dollar value of the executive's wealth for a one percentage point change in the annualized standard deviation of stock returns. Delta is defined as the change in the dollar value of the executive's wealth for a one percentage point change in stock price. Guay (1999) shows that option vega is many times higher than stock vega. Therefore, in this study, we measure CEO's incentives to increase risk by the vega of stock options rather than by the vega of the stock and option portfolio. Rajgopal and Shevlin (2002), Rogers (2002) and Coles et al. (2006) adopt the same approach.

Most prior studies use the ratio of stock option based compensation to total compensation as a measure of compensation structure or the value of accumulated stock options as a measure of option based wealth. Such compensation measure, however, cannot precisely capture risk-taking incentives of managers induced by their compensation schemes. Core and Guay (2002a) argue such measures are noisy proxies for vega and delta. For instance, a positive relationship between the ratio of stock option compensation to total compensation and stock return volatilities could result from a certain factor having a positive effect on the volatility of stock returns. In such a case, the positive relationship is not the result of greater incentives for risk-taking by managers due to the structure of their compensation. By estimating vega and delta for managers' option portfolio, we obtain a more precise measure of the incentives faced by managers rather than the potentially noisy proxies. Moreover, we include both vega and delta into empirical models, which allow us to isolate the effect of vega and delta. With the exception of Rogers (2002) and Coles et al. (2006), prior studies tend to focus on one dimension of compensation structure, such as delta or vega, without controlling for the other. The mix of vega and delta is likely to have substantially cross-sectional difference and both affect risk-taking

behavior (Guay, 1999). Therefore, any attempt to isolate the relationship between risk-taking investment and financial strategies and vega should also control for delta. In order to avoid spurious inferences and to isolate causation, we apply various model and econometric remedies, including simultaneous equations, instrument variables, etc.

3 Data Sample

The data on salary, bonus, and total compensation for the top five executives (ranked annually by salary and bonus) for banks during the period of 1992 to 2006 are from the Standard & Poor's Execucomp database for data on CEO compensation. The ExecuComp database contains variables such as the Black-Scholes value of annual stock options granted, total annual compensation, and Black-Scholes value of in-the-money options held to date. Data for the control variables are also obtained from the ExecuComp database. The pooled sample contains 96 banks involving 305 CEOs over the time period from 1992 to 2006. Data on daily returns used to calculate the risk measures are collected from the CRSP database. Bank characteristic data are obtained from the Compustat database. The variables of management include: (1) Percentage shares held by the CEO. (2) Age of the CEO. (3) CEO tenure. (4) Percentage held by outside blockholders. (5) Number of outside holders. (6) CEO is also the chair of the board of director. The investment and financial policy variables we consider are: (1) Book leverage, defined as total book debt scaled by book value of assets. (2) Bank risk, which is defined as the logarithm of the variance of daily stock returns.

Table 1: Summary Statistics

	Mean	Standard Deviation	Minimum	Maximum
<i>Characteristics of CEO</i>				
Vega (\$000s)	20.495	29.366	0.194	207.220
Delta (\$000s)	19.820	28.682	0.289	257.928
Cash Compensation (\$000s)	882.674	784.101	134.231	5000
<i>Bank Characteristics</i>				
Bank size (\$000s)	9,945	140.8	6,125	14,072
Bank risk	1.769	1.832	0.328	8.526
Book leverage	0.195	0.088	0.007	0.481
<i>Bank Management Variables</i>				
Ownership	0.352	2.526	0	45.466
CEO age	60.412	6.79	36	80
Tenure	9.913	5.883	0.485	25.233
Percentage held by outside blockholders	6.63	11.448	0	73.12
Number of outside blockholders	0.781	1.151	0	5

We used as control variables the determinants of the policy measures and incentives based on existing literature. Specially, we use: (1) Logarithm of assets to proxy for firm size. (2) Stock price. (3) CEO cash compensation, defined as salary plus bonus, to proxy for the CEO's level of risk aversion. For instance, Berger et al. (1997) argue that CEOs with higher cash compensation are more likely to be entrenched and will seek to avoid risk. Guay (1999) argues that CEOs with higher total cash compensation are better diversified, as they have more money to invest outside the firm and, therefore, are less risk averse.

The summary statistics of the top five executives including the CEO characteristics and bank characteristics are reported in Table 1. Consistent with prior literature (Guay, 1999; Core and Guay, 1999), we winsorize vega, delta, and cash compensation at the 1st and 99th percentiles. Mean vega and delta are \$20,495 and \$19,820 respectively. Mean cash compensation is \$882,674. Mean CEO ownership is 0.352%. Percentage held by outside block holders is 6.63%, CEO tenure is 9.913 years on average. The number of outside block holders is 0.781 on average. Finally, the mean value of bank size is 9.945 million.

4 CEO Compensation, Board Structure and Bank Risk

In order to assess the relationship between board and ownership structure, vega and bank risk, we apply a three-simultaneous-equation using a 3 Stage Least Squares (3SLS) method in which vega, delta and bank risk are all treated as endogenous variables and are jointly determined. The 3SLS estimate could avoid spurious inferences in OLS estimate and provide asymptotically consistent estimate of the standard errors (Sawa, 1969). While we focus on vega as the primary explanatory variable, here and in subsequent sections all model specifications include both delta and control variables based on evidence elsewhere in the literature. Accordingly, we control for bank size, cash compensation, and stock price. (Servaes, 1994; Bhagat and Welch, 1995; and Opler et al., 1999). An important reason to include these control variables is to represent forces that drive both vega and delta together with investment or financial strategies. To address the possibility that there are other omitted variables, all specifications throughout include both industry (two-digit SIC) fixed and year effects. We include all of the endogenous variables on the right-hand side.

Table 2 reports the empirical results. The jointly determined variables are vega, delta, and bank risk. Since the results on determinants of vega and delta are similar across all the specifications, rather than discuss the results in each subsection separately, we provide a consolidated discussion in this section. From the equation of vega, we can see that the coefficient on ownership is positive and significant. It implies that the more shares CEOs hold, the more they are exposed to banks' specific risk, which increases their incentives to implement risk-increasing investments. Therefore, increasing the sensitivity of executives pay to equity risk will increase bank risk. Based on this argument, CEOs with high stock ownership in their banks will have a high sensitivity of their compensation to equity risk. When CEOs are also the chairs of board directors, vega is higher. In terms of CEO tenure, as the number of years the CEOs have been in office increases, the likelihood that their control over internal management mechanisms becomes higher. Numerous prior studies have used the length of CEO tenure as a measure of CEO entrenchment (e.g., Berger et al., 1997). For instance, Berger et al. (1997) report a negative association between the length of CEO tenure and the leverage ratio, and suggest that this may be interpreted as evidence that entrenched CEOs – who have a long tenure – prefer low debt ratios to avoid performance pressures that accompany high debt. Therefore entrenched CEOs will prefer compensation schemes with low incentives to take on high risks. The reason is that a high risk level increases the likelihood of default and thus the threat for the CEO's job. Entrenched CEOs are likely to extract more private benefits from their firms than CEOs who are controlled appropriately by the internal and external management mechanisms. Hence, entrenched CEOs will be more risk-averse as their loss in case of default is high. Assuming that a longer tenure is an indicator of CEO entrenchment, CEO tenure will be

negatively associated with the sensitivity of CEO compensation to equity risk. From table 2, the coefficient on CEO tenure is negative and significant, which confirms this prediction. Moreover, based on the empirical results, we can also observe that banks with more outside blockholders have a higher percentage of their executive compensation in equity-based form; and Banks with a higher percentage of the shares held by outside blockholders use less equity-based compensation.

As banks expand more risky investments, the risk level of the bank is expected to be higher. Therefore, banks risk should be positively related to vega and negatively related to delta. The regression results in Table 2 are consistent with these predictions. The estimated coefficient on vega is positive and is significant at 5% level. It suggests that higher vega induces higher risk level of the bank. On the other hand, higher delta implements lower risk level. The coefficient on delta is negative and significant. It implies that bank risk level is negatively associated with delta.

This table reports simultaneous regression of bank risk, vega, and delta. Vega is the dollar change in the executive's wealth for a 1% change in stock standard deviation of returns. Delta is the dollar change in the executive's wealth for a 1% change in stock price. Cash compensation is the sum of salary and bonus. Robust standard errors are reported in the parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 2: Commercial Banks
Simultaneous Equations (3SLS): Bank Risk and CEO Incentives

Independent Variables	Bank Risk	Vega	Delta
Vega	0.135 (0.005)***		1.288 (0.019)***
Delta	-0.069 (0.004)**	0.670 (0.026)***	
Ownership		2.695 (0.002)***	
Chair		4.661 (0.003)***	
CEO tenure		-0.098 (0.006)**	
Percentage held by outside blockholders		-1.028 (0.025)**	
Number of outside blockholders		6.956 (0.008)**	
Cash compensation		0.036 (0.006)***	
Log (assets)	0.329 (0.002)**	4.028 (0.063)***	-5.369 (0.097)*
Stock prices			0.355 (0.097)***
Year dummy	YES	YES	YES
R-squared	0.3918	0.7663	0.7512

The empirical results on savings and loan institutions are reported in Table 3. In general

the results for commercial banks also hold for savings and loan institutions. In particular, the estimated coefficient on vega is positive and is significant at 5% level for both commercial banks and savings and loan institutions. It suggests that higher vega induces higher risk level. On the other hand, the coefficient on delta is negative and significant, which implies that higher delta implements lower risk level. Therefore the risk level is negatively associated with delta. These empirical results indicate that managerial incentive, as reflected in vega, induces higher level of risk for both commercial banks and savings and loan institutions.

This table reports simultaneous regression of bank risk, vega, and delta. Vega is the dollar change in the executive's wealth for a 1% change in stock standard deviation of returns. Delta is the dollar change in the executive's wealth for a 1% change in stock price. Cash compensation is the sum of salary and bonus. Robust standard errors are reported in the parentheses. ***, **, and * indicate statistical significance at the 1%, 5% and 10% levels, respectively.

Table 3: Savings and Loans Institutions
Simultaneous Equations (3SLS): Bank Risk and CEO Incentives

Independent Variables	Bank Risk	Vega	Delta
Vega	0.142 (0.001)*		1.275 (0.108)***
Delta	-0.014 (0.003)**	0.674 (0.114)***	
Ownership		1.658 (0.002)***	
Chair		4.356 (0.003)***	
CEO tenure		-0.086 (0.003)**	
Percentage held by outside blockholders		-1.198 (0.012)**	
Number of outside blockholders		4.132 (0.006)**	
Cash compensation		0.043 (0.025)***	
Log (assets)	0.323 (0.012)***	3.638 (0.103)***	-4.121 (0.022)*
Stock prices			0.368 (0.075)***
Year dummy	YES	YES	YES
R-square	0.4209	0.7845	0.7691

Additionally, we check the robustness for the empirical results. We include year dummy variables, and use logarithmic values of vega and delta rather than the raw values. The results on vega are robust to all these alternative specifications.

5 Conclusions

This study investigates the causal relationships between bank management structure, executive pay and bank risk. We use vega and delta as measures of compensation structure and found that the more shares CEOs hold, the more they are exposed to banks' specific risk, which increases their incentives to implement risk-increasing investments. Therefore, increasing the sensitivity of executives pay to equity risk will increase bank risk. When CEOs are also the chairs of board directors, vega is higher. In terms of CEO tenure, we found that the entrenched CEOs will prefer compensation schemes with low incentives to take on high risks. Banks with more outside blockholders have a higher percentage of their executive compensation in equity-based form, and banks with a higher percentage of the shares held by outside blockholders use less equity-based compensation. As banks expand more risky investments, the risk level of the bank is expected to be higher. In general these results hold for both commercial banks as well as for savings and loan institutions, which indicates that managerial incentive, as reflected in vega, induces higher level of risk for both commercial banks and savings and loan institutions.

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