DIRECTORSHIP, COLLATERALIZED SHARES, RISK, AND PERFORMANCE OF TAIWAN BANKING INDUSTRY

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Abstract

In recent years, considerable concerns have arisen over the issue of corporate governance in banks' supervision. One of the major issues has been investigated whether the sound mechanism of corporate governance benefits bank risk management and performance. The collateralized shares, serving stocks as collaterals, are one of financial leverage approaches and it is likely to be an incentive for block shareholders to misapply assets due to the deviation between the controlship and the ownership. The objective of this study is to examine whether the attitude of the board of directors toward risk will affect the bank risk and performance. Quarterly data of commercial banks listed either on the Taiwan Stock Exchange or GreTai Securities Market from 1999 to 2007 are examined in this study. The results show that the collateralized shares may have contributed to a lower return due to a higher risk and they are in line with previous studies our results are in line with previous researches. In conclusion, the monitoring mechanism should enforce relatively regulations more strictly to avoid the agency problems. Especially to the insiders of influence such as board of directors or block shareholders, more strictly regulations and the disclosure of relatively information should be necessary. The result will be expected to lead to better understanding of the nature of the collateralized shares and laying the groundwork for realizing that is the collateralized shares worth monitoring. It may provide policy implication for the regulators in the later monitoring requirement.

Keyword: Collateralized Shares, Commercial Bank, Bank Performance, Bank Risk

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1. Introduction

It is essential to develop a sound monitoring mechanism to the financial institutions after several financial crises in the 1990s. The government plays an important role on making the market safe and sound. The Financial Supervisory Commission (FSC), founded in July 2004, is the main authority of all financial institutions in Taiwan. The major objective of the FSC is to maintain financial stability, which enhances the participation and success of not only domestic but foreign financial institution and individual investors.

In 2001, FSC implemented the "First Financial Reform" which used the tax payers' money to rescue the insolvent banks and to raise the average ratio of the non-performing loans to total assets. It took almost five years to improve the soundness of the domestic commercial banks by the First Financial Reform. However, in November 2006, the congress discovered that some members, especial the chairman, of the board of directors of the financial institutions collateralized their shares with extreme high ratio. In general, it is the personal leverage behavior of those members of the board of directors. Yet, if a director collateralize shares and borrow money to buy more shares, the controlship of the firm can be obtained with little money.

In recent years, considerable concerns have arisen over corporate governance issues in corporate' supervision since Jensen and Meckling (1976) introduced the agency theory. Firm performance and risk management can be benefited from the well corporate governance. It is regarded as agency cost reduction effect. La Porta et al. (1999) and Claessens et al. (1999) show evidences that well corporate governance mechanism is contributive to performance and risk-reduction. However, the banking industry is a highly regulated industry. A bank can be regarded as a corporate with special regulation. In general, the financial institutions are excluded in the empirical study. Therefore, little evidence supports the direct

relationship between corporate governance and performance of banks.

A bank is viewed as a corporate with special regulation. Banks are highly regulated because they receive deposits and lend loans with high leverage. One of the more intriguing issues prevailing throughout the last few decades of empirical researches is the question of why banks' owners/block shareholders misapply assets outrageously. To this question, the deviation between the controlship and the ownership is applicable to elaborate it. Reviewing those failed commercial banks in Taiwan, block shareholders use little money to own shares and obtain the controlship of the bank. Yet, block shareholders can make use of assets totally even if they own little proportion of the total assets. In other words, this kind of the block shareholders can have not only management power but also less cost. Such a curious situation that the deviation between the controlship and the ownership would be dangerous because it could give block shareholders an incentive to misapply assets due to the self-interest mindset and arising other financial distress.

The collateralized shares, served owing share as collateral for the loan, is regarded as one of personal financial leverage approaches to shareholders. Chiou et al. (2002) indicate that "collateralized shares" is referred to shareholders' personal financing behavior and it is irrelevant to the corporation. However, it could be a factor for block shareholders to abuse assets due to self-interest motive. Bebchuk and Cohen (2005) show that staggered boards bring about a reduced firm value. Boards with block shares might have the incentive to abuse the power of the decision. If this is the case, collateralizing shares might affect the decision of the boards and might no longer be the merely personal financing behavior. It is regarded as the entrenched effect.

The share collateralized is also an important issue to the banking industry in recent years due to the cases of some banks with extremely high percentage of collateralized shares to holding shares. Those cases with extremely high collateralized ratio did attract the attention of the authority of the banking industry, FSC. FSC was concerned about this issue because it believes that the relationship between collateralized shares and the credit risk on banks' loan might exist.[1]

Although FSC was concerned about the problems of collateralized shares in recent years, there are few literatures discussed in this issue in the academia (Chiou et al., 2002; Kao and Chiou, 2002; Hsiung, 2000). In fact, the relationship of collateralized shares and bank risk has not been examined before. The banking industry is a special case in opposition to corporations due to the lower equity capital. Banks will go bankruptcy easily then other enterprises if they suffer financial crises. Under the situation that the deviation between the controlship and the ownership, could the collateralized shares be a factor for the board of directors and block shareholders to misapply bank's assets? When the block shareholders own the controlship of the bank and employ collateralized shares as their leverage approach, will their personal leverage behavior affect bank credit risk? It is a critical problem for the monitoring mechanism and it intrigues us to put emphasis on this issue.

In light of these concerns, the objective of this study is to examine whether the attitude of the board of directors toward risk will affect the bank risk and performance. Return on assets (ROA) and return on equity (ROE) are generally used to evaluate performance. Barber and Lyon (1996) and Core *et al.* (2006) argue that ROA is a preferred measure of operating performance because it is not affected by leverage, extraordinary items and other discretionary items. However, in this study we followed two ratios created based on the market-derived Shape Ratio to evaluate the risk-adjusted performance. Rose (2002) argues that credit risk plays the major role of all kind of risk because the largest asset item in the banking industry is loans. Gompers *et al.* (2003) also noted that weak governance might encourage managers to behave in a less risk-averse manner. For bank managers, what criteria and volume about a loan reveal managers' attitude. Therefore, in our study we also examine the relationship between the shares collateralized and credit risk. Empirical results in this study are in line with previous researches (Chiou et al., 2002; Kao and Chiou, 2002) that the financial leverage approaches such as collateralized shares affect the attitude toward credit risk of the management and performance, higher proportion of shares collateralized is significant positively related to credit risk and negatively related to risk-adjusted return. Since the objectives of the monitoring mechanism are to consolidate the supervision and ensure the safety of the banking industry, the findings in our study may disclose some information of bank risk and performance. Overall, the focus of analyses presented in this paper is to provide empirical evidences related to our main issue and attempt to address this issue of concern by shedding light on the nature of the problems.

To achieve these objectives, this study is structured as follows. The first section deals with the research background, objectives and incentives in this study. Literature review offers theoretical foundations for the development of the research and our expectations will be shown in the second section. After which research methodology is presented with full details of procedures for the collation of data, results are then presented with a thorough description of the relationship among the collateralized shares, credit risk management and performance in the domestic banking industry. Finally, results are discussed and conclusions are drawn.

[1] On November 2006, FSC announced that the board of directors and block shareholders of all banks need to show up the information that how many stocks they collateralize if the proportion of collateralized shares is as half as their own stocks.

2. Literature Review

2.1 Corporate Governance and the Collateralized Shares

The relevant issue of corporate governance has been discussed since Jensen and Meckling (1976) introduce the agency theory and investigate the nature of the agency costs generated by the debt and equity. They show that ownership of equity is positively related to firm performance. It is viewed as agency cost reduction effect.

Over the past few decades, the researches on agency problems, whether more delegation to agent (manager) is benefit to shareholder, remain controversial. La Porta *et al.* (1999) and Claessens *et al.* (1999, 2000) suggest that block shareholders cause equity agency problem due to the deviation between the controlship and the ownership, especially to family-control firms. They indicate that ownership concentration will reduce corporate value. It is entrenched effect.

Several studies have supported that a high performing corporate is characterized by good governance system. The existing literatures can be classified into following dimension: inside control efficiency, inside financial control efficiency and outside control efficiency (Klapper & Love, 2003; Gompers *et al.*, 2003; Khiari et al., 2007). This viewpoint is similar to the banking industry theoretically since a bank can be regarded as a corporate with special regulation. Frolov (2007) review the theoretical and empirical research on disclosure and explores the problem of public disclosure in banking. Mandated disclosure rules for banks are consequences of the government policy of financial safety net. Singh (2006) and Hacimahmutoglu (2007) have similar conclusions. However, their viewpoint has not been sufficiently supported by direct evidence to prove that it is helpful for the improvement of bank performance.

The collateralized shares become an issue in corporate governance. The relationship of collateralized shares and bank risk has not been examined. There are few researches exploring collateralized shares in corporate finance. Since banks are regarded as corporate with enforced regulations, the relationship between collateralized shares and bank risk is necessary to be examined.

Chiou *et al*. (2002) point out that the term "collateralized shares" referred to shareholders' personal behavior because the separation of control right and ownership. In general, collateralized shares seem irrelevant to the corporation, but the corporation value could be reduced and other shareholders' right might be deprived if some directors of the board gain more shares by collateralized their shares to maintain the controlship of the firm. Some directors of the board can maintain the management power with little money. Hsiung (2000) and Chiou *et al*. (2002) separate their samples into failed and non-failed corporations and investigate the relationship of collateralized shares to the financial distress in Taiwan during the Asian Financial Crisis. They find that the higher the proportion of collateralized shares, the poorer the operating performance and thus the higher the possibility of financial crises. They show that the directors of the board could exercise their power to invest in riskier investment or resort to illegal conduct during the period of recession. Kao and Chiou (2002) examine how directors and supervisors do to achieve their self-interest goal when they collateralize their shares subsequently. They show that directors and supervisors would reveal message to outside shareholders in order to window dressing self-interest motivation through accounting earning management.[2] Moreover, the higher the proportion of collateralized shares, the lower the prediction power of current earnings on future earnings. Earning management would diminish the credibility of accounting data and mitigate the relation between accounting earnings and stock returns. Those literatures support the argument that collateralized shares is an incentive for directors and supervisors to abuse assets and affect the attitude toward credit risk management. Therefore, in term of the incentive of collateralizing shares, the relationship between personal attitude toward risk of bank directors and risk management of the bank is an interesting issue to discuss.

2.2 Estimations of Bank Risk and Performance?

There are comprehensive literatures related to bank credit risk. Rose (2002) points out that credit risk plays the major role of all kind of risks because bank loans are one of the bank major assets.[3] Gompers *et al.* (2003) note that weak governance might encourage managers to behave in a less risk-averse manner. If the board members prefer high-risk behavior by collateralizing shares for personal financing purpose, it might affect the behavior of the managerial attitude toward loan risk. The criteria of the loan credit scoring might be influenced. If it is the case, board's risky attitude might have direct and indirect impact on the bank's risk level. Therefore, in our study we examine the relationship between credit risk and the collateralized shares of board members. The objective of this study is to investigate whether personal leverage behavior affects bank credit risk when the board members of the bank employ collateralized shares as their leverage approach.

[2] Schipper (1989) suggested that the earning management is a self-interest behavior, the directors and supervisors reach their goal on the strength of influencing the financial statements.

[3] Rose (2002) suggested that bankers are concerned about six types of risks. These are credit risk, liquidity risk, market risk, interest rate risk, earnings risk and solvency risk. These risks are grouped as credit risk, market risk and operational risk.

Gruening and Bratanovic (2000) and Rose (2002) indicate that the ratio of nonperforming loans to total loans is a common used indicator to evaluate credit risk.[4] This ratio can observe the credit scoring policy to the loans. If this ratio is high, it means that banks might tend to lend risky loans. Furthermore, nonperforming loans is an item which was happened and the monitoring mechanism can realize if banks operation is well-regulated or not in accordance with this item.

The objective of the banker is to maximize the shareholders' wealth. In general, the profitability of a bank is an indicator for the performance of a bank. Return on assets (ROA) and return on equity (ROE) are two most common ratios for the profitability indicator. Yet, maximization of profitability might cause higher risk. It does not maximize shareholders' wealth. To consider both risk and profit of the bank, risk-adjust rate of return is considered as the measure of performance. Risk-adjusted rates of return are defined as bank's average returns divided by the volatility of returns (measured as the standard deviation) This method was introduced by William F. Sharpe in 1966 and so-called the "Sharpe Ratio". Stiroh (2004) developed alternative Sharpe ratio in terms of the original idea.[5] Stiroh (2004) defined risk-adjusted return on equity, RAR_{ROE}, and on assets, RAR_{ROA}, as follows:

$$RAR_{ROE} = \frac{\overline{ROE}}{\sigma_{ROE}} \quad (1)$$

$$RAR_{ROA} = \frac{\overline{ROA}}{\sigma_{ROA}} \quad (2)$$

where $\overline{ROE}$ is the mean return on equity, σ_{ROE} is the standard deviation of three-year ROE, $\overline{ROA}$ is the mean return on assets, and σ_{ROA} is the standard deviation of three-year ROA.

Prior studies implied that ROA is a better measure of performance than ROE. Barber and Lyon (1996) and Core *et al.* (2006) argued that ROA is a preferred measure of operating performance because it is not affected by leverage, extraordinary items and other discretionary items. However, in this study we followed two ratios created based on the market-derived Shape Ratio to evaluate the risk-adjusted performance. To estimate a comprehensive result, we adopt both measures in our study. Furthermore, we following Barber and Lyon (1996) advocated operating incomes before depreciation because this measure is not affected by managerial discretion in depreciation policy. Therefore, we prefer operating incomes before depreciation as a measure of performance in our study.

2.3 Other Related Issues in the Banking Industry

In the banking industry, the capital adequacy ratio, the percentage of bank's capital to its risk-weighted assets, attracts increased attention. Sharpe (1978) defines the capital as the difference between assets and deposits, the deposits will be safe when the ratio of capital to assets is large enough, and it means that capital would be "adequate". Lackman (1986) employs three different capital adequacy constraints to examine the relationship between capital adequacy and bank portfolio and finds that the higher capital adequacy ratio reduces the variance of return on equity and causes a shift of bank portfolios towards less risky assets. Karels *et al.* (1989) examine the relationship between bank capital adequacy and market measures of risk and find that higher levels of capital adequacy correspond with lower risk measures. Although there are some literatures which provide evidence to show the relationship between capital adequacy and risk, Daesik and Anthony (1988) challenge the effectiveness of the traditional capital ratio regulation. They suggest that it ignores the individual banks' different preference structures and allows "risky" banks to circumvent the restrictions. However, the capital adequacy ratio is still a convictive criterion to evaluate whether banks operate safety. According to Basel II, there is a new and significantly accurate framework to calculate this ratio.

Bank size is another factor which is essential to performance. Berger et al. (1987) find very little scale economies at very small sizes, typically under $1 billion in assets. Berger and Mester (1997) suggest that there may be more extensive cost scale economies in the 1990s, with average costs declining up to asset sizes of $25 billion or more. Akhavein *et al.* (1997) and Hughes *et al.* (1999) find that mergers and acquisitions (M&As) increased profits and revenues through improved risk-expected return frontiers. Berger and Mester (2003) suggest that U.S. banks involved in M&As improve the quality of their outputs in the 1990s in ways that increased costs, but still improve profit productivity by increasing revenues more than costs. However, some evidence suggests that large banks may not be equivalent to better performance. Hubris hypothesis, introduced by Roll (1986), suggested that mangers might overestimate M&As synergy and recognize higher

[4] The ratio of loan loss provision to total loans is another ratio to evaluate credit risk. Nonperforming loan ratio is used because the loan loss provision depends on the setup of the bank and is related to subjective judgment and the conservativeness toward the credit risk. Thus, we adopt the ratio of nonperforming loans to total loans to evaluate credit risk.

[5] The original Sharpe ratio is a market-derived ratio, which defines risk-adjusted returns as market returns divided by the standard deviation of returns and needs to take account of the risk-free rate of return. But we can' t get market returns because of market data are not available for all banks, so we adopt the Sharpe Ratio developed by Stiroh (2004). By the way, the risk-free rate of return would not affect the results if it is constant across all banks.

goodwill in the financial statement in order to take first-moving advantage, then result in huge lost and bankruptcy. Summarizing these arguments, there is obviously no single solution to the problem that how large a bank is suitable. In our research, we served the capital adequacy ratio and bank size as control variables. Theoretically, the capital adequacy ratio is negatively related to risk. Furthermore, because research on the relationship between performance, size and the capital adequacy ratio remain controversial, we attempt to detect their trend and provide explanations in our study.

2.4 The Expectations of the Study

As noted by Jensen and Meckling (1976), the nature of the agency costs can be generated by the debt and equity. Jensen and Meckling (1976) argue that the agency problem would be diminished by higher proportion of director shareholders' holding. Kangis and Kareklis (2001) argue that managers in private banks showed greater interests and more mobile in their jobs because of more compensation. However, more existing literatures support the argument that more delegation to manger will deepen agency problem. Shleifer and Vishny (1989) advance the entrenched effect and argue that managers would entrench themselves by making manager-specific investments that make it costly for shareholders to replace them. For this reason, managers can reduce the probability of being replaced higher wages and larger perquisites from shareholders, and obtain more latitude in determining corporate strategy. La Porta *et al.* (1999) and Claessens *et al.* (1999, 2000) suggest that block shareholders cause equity agency problem and ownership concentration will reduce corporate value. The hypotheses are formed as follows:

H1a: Director shareholders' holding is positively associated with risk

H1b: Director shareholders' holding is negatively associated with risk-adjusted performance

The family block shareholder might use little money to own shares with management controlship through personal leverage approach such as the collateralizing shares. It causes equity agency problem because of the deviation between the controlship and the ownership. Hsiung (2000) and Chiou *et al*. (2002) find that the higher the proportion of collateralized shares, the poorer the operating performance and the higher the possibility of financial crises. Kao and Chiou (2002) also suggest that the higher the proportion of collateralized shares, the lower the prediction power of current earnings on future earnings because managers might mitigate the relation between accounting earnings and stock returns through earning management. However, there are few researches to explore collateralized shares in corporate finance. Since banks are regarded as corporate with enforced regulations, the relationship between directors' collateralized shares and commercial banks is examined in our study. The hypotheses related to collateralized shares are formed as follows:

H2a: Collateralized shares are positively associated with bank credit risk

H2b: Collateralized shares are negatively associated with risk-adjusted performance

2.5 The Contribution of the Study

The purpose of this paper is to examine the relationship among the directors' collateralized shares, credit risk and performance in the Taiwan banking industry. It might be critically important in laying the groundwork for realizing whether the directors' collateralized shares is worth monitoring. The results may provide policy implications for the regulators in the later monitoring requirement.

3. Data and Methodologies

3.1 Dataset

The population of our research is domestic listed commercial banks in Taiwan.[6] The examination periods are from the 4th quarter of 1999 to the 4th quarter of 2007. At the end of September 2007, there are 40 domestic banks. However, there are only 26 banks listed in the Taiwan Stock Exchange and GreTai Securities Market during our examination periods. Furthermore, the criteria of the sampling we adopt are (a) whether equity is negative and (b) whether the bank is taken over by FSC. The samples are eliminated if they fit the conditions of (a) and (b). Since the population of this study is the domestic commercial banks, investment banks are also eliminated. Table 10 indicates the list of financial institutions and which is listed in the Taiwan Stock Exchange and the GreTai Securities Market during our examination periods. The information on directors' collateralized shares and relevant financial data are collected from the Taiwan Economic Journal (TEJ) database.

3.2 Panel Data Model

Since OLS estimators could be inconsistent and meaningless if there were heterogeneity across individuals, to control for individual heterogeneity, the quantitative analysis of the panel data regression model is conducted. It consists of two models: the fixed-effects model and the random-effects model. They can take into account the heterogeneity across firms by allowing variable intercepts. The fixed-effects model is equivalent to introduce dummy variables to specify individual cross-sectional effects. If the regression model is specified as

$$y_{it} = \alpha_i + \underset{\sim}{\beta}' \underset{\sim}{\chi}_{it} + \varepsilon_{it}$$

[6] Sample banks are listed in either Taiwan Stock Exchange (TSE) or the GreTai Securities Market.

$i=1,...,N,\ t=1,...,T.$ (3)

where β is constant, α_i is the individual effects. The fixed-effects model allows us to specify individual cross-sectional effects by conducting dummy variables as

$$y_{it} = \sum_{j=1}^{N} \alpha_i D_{ij} + \beta \chi_{it} + \varepsilon_{it}$$

$i = 1,\ldots,N,\ t = 1,...,T.$ (4)

where D_{ij} =1 if $i = j$;0 otherwise, then the fixed-effects model can sweep the individual effect α_i by summarizing t periods, getting mean response over t periods and finally subtracting to each other as

$$(y_{it} - \bar{y}_i) = \beta (x_{it} - \bar{x}_i) + (\varepsilon_{it} - \bar{\varepsilon}_i)$$ (5)

where $\bar{y}_i = \frac{1}{T}\sum_{t=1}^{T} y_{it}$ and $\bar{x}_i = \frac{1}{T}\sum_{t=1}^{T} x_{it}$, then the slope estimators are BLUE (Best Linear Unbiased Estimator) when $N \to \infty$ or $T \to \infty$ or both. However, $\hat{\alpha}_i$ (intercept) will be unbiased but consistent only when $T \to \infty$.

As opposed to the fixed-effects model treating the effects of omitted individual-specific variables constant over time, the random-effects model views them as random variables and irrelevant to the error terms and the covariance structure of $y_{it} = \alpha_i + \beta \chi_{it} + \varepsilon_{it}$, $i = 1,\ldots,N,\ t = 1,...,T.$ is

$$\operatorname{cov}(y_{it}, y_{js}) = \begin{cases} 0 & for \quad i \neq j \\ \sigma_\alpha^2 & for \quad i = j, t \neq s \\ \sigma_\alpha^2 + \sigma_\varepsilon^2 & for \quad i = j, t = s \end{cases}$$ (6)

The random-effects model applies the generalized least squares (GLS) method to estimate slopes and other parameters. However, contrast with the fixed-effects model, both $\hat{\beta}$ and $\hat{\alpha}_i$ are BLUE when $N \to \infty$ or $T \to \infty$ or both.

There are three criteria used to discriminate which model is better. First, F test can be applied to test whether OLS or the fixed-effects model is fit. The null hypothesis, the alternative hypothesis and the test statistic is shown as

$$H_0 : \alpha_1 = \alpha_2 = ... = \alpha_N = \alpha(OLS)$$
$$H_1 : Not \quad H_0 (Fixed)$$
$$Test \quad Statistic \ : F = \frac{(SSE_R - SSE_U)/(N-1)}{SSE_U/[NT-(N+K)]} \sim F_{(N-1),(NT-N-K)}$$ (7)

where K is the number of explanatory variables, not including the intercept, SSE_R and SSE_U are error sum of square when H_0 and H_1 is true, respectively. It represents that individual effects do not exist when H_0 is true. However, oppositely, it shows that not all intercepts are equal and individual effects exist.

The second criterion is LM (Lagrange Multiplier) test; it can be applied to test whether OLS or the random-effects model is fit. The null hypothesis, the alternative hypothesis and the test statistic is shown as following equation, where $\hat{\varepsilon}_{nt}$ means residuals derived by OLS method. It represents that the intercept is constant when H_0 is true and individual effect exists when H_1 is true.

$$H_0 : \sigma_\alpha^2 = 0(OLS)$$
$$H_1 : \sigma_\alpha^2 > 0(Random)$$
$$Test \quad Statistic \ : LM = \frac{NT}{2(T-1)} \left[\frac{\sum_{n=1}^{N} \left[\sum_{t=1}^{T} \hat{\varepsilon}_{nt} \right]^2}{\sum_{n=1}^{N} \sum_{t=1}^{T} \hat{\varepsilon}_{nt}^2} - 1 \right]^2 \sim \chi^2_{(1)}$$ (8)

If individuals does not exist heterogeneity, OLS method is preferred to estimate unknown parameters. However, the fixed-effects model and the random-effects model can estimate parameters more precisely if heterogeneity exists. Hausman test provides a criterion to determine whether the fixed- or random-effects model is preferred. It discriminates if α_i and explanatory variables were uncorrelated or not by Wald test. The null hypothesis, the alternative hypothesis and the test statistic is shown as

$$H_0 : E(\beta_{0n} | X_{1nt},...,X_{knt}) = \alpha_0 (Random)$$
$$H_1 : E(\beta_{0n} | X_{1nt},...,X_{knt}) \neq \alpha_0 (Fixed)$$
$$Test \quad Statistic \ : W = (\hat{\beta}_{CV} - \hat{\beta}_{GLS})^T \left[Var(\hat{\beta}_{CV}) - Var(\hat{\beta}_{GLS}) \right]^{-1} (\hat{\beta}_{CV} - \hat{\beta}_{GLS}) \sim \chi^2_{(K)}$$ (9)

where K in the number of explanatory variables, if α_i and explanatory variables are uncorrelated and slope parameters derived by the fixed-effects method and by the random-effects method are both consistent, while the latter is more efficient. However, slope parameters derived by the fixed-effects method are still consistent but not by he random-effects method.

4. Empirical Results

4.1 Variables and Descriptive Statistics

a. Dependent variable

Return on Assets (ROA) and Return on Equity (ROE) are generally used to evaluate performance. Barber

and Lyon (1996) and Core *et al*. (2006) argued that ROA is a preferred measure of operating performance because it is not affected by leverage, extraordinary items and other discretionary items. However, in this study we followed two ratios created based on the market-derived Shape Ratio to evaluate the Risk-adjusted performance: risk-adjusted return on equity (RAR_{ROE}) and risk-adjusted return on asset (RAR_{ROA}) (Stiroh, 2004). To compare with difference between ratios adjusted in terms of the risk before and after and make a comprehensive result, both measures are used in our study. Furthermore, to prevent results from disturbing by taxes and interests, operating incomes was served as the numerator when ROA and ROE were computed in empirical research. Barber and Lyon (1996) advocate operating incomes before depreciation is preferred because this measure is not affected by managerial discretion in depreciation policy. Therefore, operating incomes before depreciation is used as a measure of performance.

The ratio of nonperforming loans to total loans (NPLR) was introduced to evaluate credit risk based on existed literatures (Gruening and Bratanovic, 2000; Rose, 2002). Moreover, σ_{ROE} and σ_{ROA} (Stiroh, 2004), served as the volatility of ROE and ROA respectively, were also adopted to evaluate risk.

b. Independent variables

The ratio of shares collateralized to director shareholdings (CLR) and the ratio of director shareholdings to total shares (HDR) are conducted in empirical literature and served as the main effect in this paper (Chiou *et al*., 2002; Kao and Chiou, 2002; Hsiung, 2000). The capital adequacy ratio is a convictive criterion to evaluate whether banks operate safety and there are several researches to explore the concept and importance of capital adequacy (Sharpe, 1978; Lackman, 1986; Daesik and Anthony, 1988; Karels *et al.*, 1989).[7] Since bank capital adequacy ratio is not available through examination periods, equity to assets ratio (EA) is used as the proxy of the bank capital adequacy. The literature is full of discussions surrounding the size effect. Berger and Mester (1997), Akhavein *et al.* (1997), Hughes *et al.* (1999), Chiou *et al.* (2002), and Kao and Chiou (2002) indicated that the size effect is another important factor to affect the performances. Variable definitions are summarized in Table 2 in detail.

c. Correlations and descriptive statistics

To indicate the direction and relationship between variables, descriptive statistics and variance inflation factor (VIF) as a measure of collinearity were computed. The results, shown in Table 3, reveal that independent variables are chiefly showed not to be significantly related (VIF< 10) except for variable HDR (director shareholdings divided by total shares). Although the VIF values of HDR and HDR^2 are moderate, directors' shareholding is an important issue. These two variables are still in the equation. The Pearson correlation matrix is shown in Table 4 and the results are shown not to be significant related among independent variables. The results of descriptive statistics are shown in Table 5. The result of HDR indicates that approximately 45% of the stocks were held by the board of directors. It shows that the extent of ownership concentration is high on average. Based on La Porta *et al.* (1999) and Claessens *et al.*, (1999, 2000), it may reinforce the agency problem due to the deviation between the controlship and the ownership, which block shareholders can make use of assets totally even if they own little proportion of the total assets. Assuming HDR to be the cardinal variable to dependent variables, CLR (shares collateralized divided by director shareholdings) is a critical factor if it were the factor for block shareholders to abuse assets due to self-interest motive. The average of CLR is 10.90%, which is not a high average. However, the maximum number of CLR is 98.26% during the examination period. It means that some banks have very high percentage of directors' collateralized shares. In our study, we show relationships between variables by two stages and empirical results are following presented.

4.2 Models and Empirical Results

To test H1a and H1b hypotheses, the model formed as follow is used to test the relationship between directors' shareholding and bank risk or performance. Based on the existing studies, directors' shareholding might exist optimal size. Therefore, the squared of HDR is added in the model.

$$Y_{it} = \alpha_i + \beta_1 HDR_{it} + \beta_2 HDR^2_{it} + \beta_3 EA_{it} + \beta_4 SIZE_{it} + \varepsilon_{it} \quad i=1\ldots N,\ t=1\ldots T, \tag{10}$$

where HDR represents the ratio of director shareholdings to total shares, EA represents the equity to total assets ratio, SIZE represents the total assets of the bank. The empirical results reflected in Table 6 indicate that variable HDR plays significant role on bank risk and performance. The nonlinearity of HDR to bank risk and performance does exist. HDR is positively significant on bank performance and negatively significant on bank risk. It is consistent with the agency cost reduction hypothesis by Jensen and Meckling (1976). However, the square of HDR is negatively significant on bank performance and positively significant on bank risk. When the directors' shareholding exceeds certain level, bank risk will increase and risk-adjusted performance and raw performance deteriorate. The results imply that entrenched effect does exist. It is consistent with the finding of La Porta *et al.* (1999) and Claessens *et al.* (1999, 2000) that ownership concentration will reduce

[7] Because of the lack of observations on capital adequacy ratio in this study, we follow Stiroh (2004) that adopted equity to total assets ratio to evaluate the capital adequacy.

corporate value. Based on Shleifer and Vishny (1989) advanced the entrenched effect, managers would entrench themselves by making manager-specific investments that make it costly for shareholders to replace them. For this reason, bank manager would make more risky loans and let nonperforming ratio rise. However, the more important issue in our study is that if holding were a consequential factor in banking industry. Obviously, the empirical results support the argument that it should be.

To test H2a and H2b hypotheses and discriminate the influence of the collateralized shares, variable CLR was added. The interaction between HDR and CLR is also added to test whether there is interaction effect between these two variables. The model is formed as follow:

$$Y_{it} = \alpha_i + \beta_1 HDR_{it} + \beta_2 HDR^2_{it} + \beta_3 CLR_{it} + \beta_4 HDR_{it}*CLR_{it} + \beta_5 HDR^2_{it}*CLR_{it} + \beta_6 EA_{it} + \beta_7 SIZE_{it} + \varepsilon_{it} \quad i=1\ldots N,\ t=1\ldots T \qquad (11)$$

where HDR represents the ratio of director shareholdings to total shares, CLR represents The ratio of shares collateralized to director shareholdings. EA represents the equity to total assets ratio, SIZE represents the total assets of the bank. A more detailed understanding of the relationship between the collateralized shares and dependent variables can be gained from Table 7. The results support the claim that the higher the proportion of collateralized shares, the poorer the operating performance. The proportion of collateralized shares is negatively related to ROA at 1% significant level, but significant positively related to ROE at 1% significant level. However, the proportion of collateralized shares is negatively related to all risk-adjusted performance measures at 1% significant level. We follow Stiroh (2004) that served performance volatility as performance risk. The empirical results may suggest that bank manager take highly risk (performance volatility) to make profit. Furthermore, the results indicate that the proportion of collateralized shares is significant positively related to nonperforming loans at 1% significant level. When the proportion of director holding is low, the effect of collateralized shares is not significant and consistent to performance. However, as the proportion of director holding increasing, the proportion of collateralized shares is negatively related to all risk-adjusted performance measures at 1% significant level. Compared to empirical results revealed in Table 6, those results are more consistent to our expectation that bank manager will misapply assets and make risky loans due to self-interest incentives. Those results are in line with Chiou *et al.* (2002) and Kao and Chiou (2002) that the financial leverage approaches such as collateralized shares significantly affect the attitude toward risk of the management and performance. More proportion of collateralized shares is observably not good to banks.

Based on the descriptive statistics of CLR in Table 5, CLR is not normally distributed. To clarify the effect of CLR on bank risk and performance, we redefine the variable CLR as a dummy variable D_{it} to observe the variation in the relationship between the collateralized shares and bank return and risk. The threshold of CLR affect bank risk and return can be found in this way. The model we use for the test is:

$$Y_{it} = \alpha_i + \beta_1 HDR_{it} + \beta_2 HDR^2_{it} + \beta_3 D_{it} + \beta_4 HDR_{it}*D_{it} + \beta_5 HDR^2_{it}*D_{it} + \beta_6 EA_{it} + \beta_7 SIZE_{it} + \varepsilon_{it} \quad i=1\ldots N,\ t=1\ldots T \qquad (12)$$

where HDR represents the ratio of director shareholdings to total shares, D represents dummy variables of CLR. EA represents the equity to total assets ratio, SIZE represents the total assets of the bank. We separate the row data into two groups: (a) CLR = 0 to median (.1758), (b) CLR = median to maximum (.9826).[8] The experimental arrangement for finding the threshold of variable CLR and the results are shown in Table 8. The results suggested that the group (b) is more significant related to performance and risk measures in opposite to the group (a). It supports the claim that highly proportion of stocks collateralized could be an incentive for mangers to misapply assets and make risky loans. Although the results of ROA and ROE are conflicted, it is consistent after risk-adjusted when CLR is increasing. Furthermore, NPLR is higher when CLR is increasing. In conclusion, empirical results suggest that bank manager may make more risky investment due to highly proportion of directors' shares collateralized, it make performance decreasing and risk risking. The results imply that the attitude toward risk of the management is affected by the director personal risk preference. Although directors' share collateralized is regarded as personal financing behavior, the higher the shares collateralized, the more risk is tolerated by the directors. When the risk tolerance of the board of directors is higher, our results support that it might affect the risk attitude toward risk of the management. Relatively, bank risk will be affected. Those results are in line with Chiou *et al.* (2002) and Kao and Chiou (2002).

4.3 Robustness of Performance and Risk Results - Seasonal Effect

Because we adopt quarterly data in our study, another important issue is that if performance on different month is anomaly. To mitigate this concern, we examine performance measures and risk measures by rerunning the equation (11) with subsample groups which are grouped by quarter. Empirical results are shown in Table 9. Although significant level is lower then prior results due to fewer observations, the direction is almost consistent. We also introduce dummy variables to determine whether seasonal anomaly exists. The model we adopt is:

[8] Kao and Chiou (2002) separated their samples into two groups. The criterion they adopted was .5 proportion of stocks collateralized. Since 50% is an ad hoc number, the median of the CLR is used as the cutoff of the testing.

$$Y_{it} = \alpha_i + \beta_1 HDR_{it} + \beta_2 HDR^2_{it} + \beta_3 D_{it} + \beta_4 HDR_{it} * D_{it} + \beta_5 HDR^2_{it} * D_{it} + \beta_6 EA_{it} + \beta_7 SIZE_{it} + \beta_8 Q_{2it} + \beta_9 Q_{3it} + \beta_{10} Q_{4it} + \varepsilon_{it} \quad (13)$$

where HDR represents the ratio of director shareholdings to total shares, CLR represents The ratio of shares collateralized to director shareholdings. EA represents the equity to total assets ratio, SIZE represents the total assets of the bank. Q_2, Q_3 and Q_4 are the quarter dummy variables. We consider the first quarter to be the reference group and detect if significant difference exist among them. When the sample is the data of the second quarter, Q_2 is equal to 1 and Q_3 and Q_4 are equal to 0.

The results are reported in Table 10. The results suggest that there are not significant differences among individual quarter. In conclusion, this analysis indicates that performance and risk measures engaging in the seasonal effect results similar to the full samples, and suggests that our inference is not biased by the seasonal anomaly.

4.4 Discussions

This study enhances the existing studies by providing a more detailed examination of the importance of holding and the influence of the collateralized shares in the banking industry. The results of this study are concluded as the follow. (a) The directors' shares holding and the shares collateralized are positively significant on bank performance and negatively significant on bank risk. (b) The higher proportion of the holding shares and the collateralized shares may not be a good message to banks. All of our empirical results have shown the pattern that the higher the holding shares and the collateralized shares, the higher the risk and the lower the performance. This finding is also in accord with the results of the previous studies (Chiou *et al.*, 2002; Kao and Chiou, 2002). Recalling the main issue of this study: Could the collateralized shares be a factor for the board of directors to misapply bank's assets? When the block shareholders own the control of the bank and employ collateralized shares as their leverage approach, will their personal leverage behavior affect bank risk? Since deviation between the controlship and the ownership, the personal financial leverage approach such as the collateralized shares may reinforce the agency problem and this study supports this standpoint.

In conclusion, this study has indicated that it might be a fruitful line of continued inquiry. In spite of different industries in comparison to previous studies, our findings also support the claim that the collateralized shares may have contributed to a lower return due to a higher risk. The monitoring mechanism should be enforced more restricted to prevent banks from the agency problems. Especially to the insiders of influence such as board of directors, more related regulations and the disclosure of relative shares holding and collateralized information might be necessary.

5. Conclusions

The fundamental question addressed in this study is whether the attitude of the board of directors toward risk will affect the bank risk and performance. The population of our research is domestic commercial banks. The examination period is from 4th quarter 1999 to 4th quarter 2007. Since OLS estimators could be inconsistent and meaningless if there were heterogeneity across individuals. To control for individual heterogeneity, the quantitative analysis of the panel data regression model was conducted. The empirical results support the claim that the collateralized shares may have contributed to a lower return due to a higher risk. Furthermore, the samples are categorized into two groups using the median of the CLR (17.88%) as the cutoff. The evidence shows that the performance and risk of the samples with higher CLR will deteriorate when CLR becomes higher. Those results are also in line with previous researches (Chiou et al., 2002; Kao and Chiou, 2002). Because we adopt quarterly data in our study, another important issue is that if performance on different quarters is anomaly. We reexamine performance measures and risk measures for each quarter. This analysis indicates that performance and risk measures engaging in the seasonal effect results similar to the full samples, and suggests that our inference in not biased by the seasonal anomaly. Such findings underscore the importance of enforcing relatively regulations and may provide policy implication for the regulators in the later monitoring requirement.

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Appendices

Table 1. List of financial institutions (end of September 2007)

The first column indicates bank name. The second and the third column indicate that if banks were listed in the Taiwan Stock Exchange or the GreTai Securities Market (OTC) during our examination periods, respectively. The forth column shows firm ticker if banks were listed in the Taiwan Stock Exchange or the GreTai Securities Market during our examination periods.

Bank Name	SE	OTC	Code	period
Bank of Taiwan				×
Land Bank of Taiwan				×
Taiwan Cooperative Bank	○		5854	1th 2000 to 4th 2007
First Commercial Bank	○		2802	4th 1999 to 4th 2007
Hua Nan Commercial Bank	○		2803	4th 1999 to 4th 2007
Chang Hwa Commercial Bank	○		2801	4th 1999 to 4th 2007
Bank of Overseas Chinese				×
The Shanghai Commercial and Savings Bank				×
Taipei Fubon Commercial Bank Co., Ltd.	○		2830	4th 1999 to 4th 2007
Cathay United Bank	○		2826	4th 1999 to 4th 2007
The Export-Import Bank of ROC				×
Bank of Kaohsiung	○		2836	4th 1999 to 4th 2007
Mega International Commercial Bank	○		2806	4th 1999 to 4th 2007
Agricultural Bank of Taiwan				×
China Development Industrial Bank Inc.	○		2804	×
Industrial Bank of Taiwan				×
Standard Chartered Bank (Taiwan) Limited	○		2807	4th 1999 to 4th 2007
Taichung Commercial Bank	○		2812	4th 1999 to 4th 2007
King's Town Bank	○		2809	4th 1999 to 4th 2007
First Capital Commercial Bank				×
Hwatai Bank				×
Shin Kong Commercial Bank	○		2893	3th 2005 to 4th 2007
Sunny Bank				×
Bank of Pan Shin				×
Cota Commercial Bank				×
Union Bank of Taiwan	○		2838	4th 1999 to 4th 2007
The Chinese Bank	○		2831	4th 1999 to 4th 2005
Far Eastern International Bank	○		2845	4th 1999 to 4th 2007
Yuanta Commercial Bank	○		2843	4th 1999 to 4th 2007
Bank SinoPac Company Limited	○		2839	4th 1999 to 4th 2007
E. Sun Commercial Bank	○		2840	4th 1999 to 4th 2007
Cosmos Bank, Taiwan	○		2837	4th 1999 to 4th 2007
Bowa Bank	○		5810	4th 1999 to 4th 2005
Taishin International Bank	○		2844	4th 1999 to 4th 2007
Ta Chong Bank Ltd.	○		2847	4th 1999 to 4th 2007
Jih Sun International Bank		○	5817	4th 1999 to 4th 2007
EnTie Commercial Bank	○		2849	4th 1999 to 4th 2007
Chinatrust Commercial Bank	○		2815	4th 1999 to 4th 2007
Chinfon Commercial Bank				×
Taiwan Business Bank	○		2834	4th 1999 to 4th 2007
Total: 40	26	1	27	

Source: Central Bank of the Republic of China (Taiwan)

Table 2. Variable definitions

Variable	Definition
ROA (before depreciation)	operating income (before depreciation) divided by total assets
ROE (before depreciation)	operating income (before depreciation) divided by equity
RARROA	risk adjusted return on assets (moving average of three-year ROA divided by three-year standard deviation of ROA)
RARROE	risk adjusted return on equity (moving average of three-year ROE divided by three-year standard deviation of ROE)
NPLR	nonperforming loan ratio (nonperforming loans divided by total loans)
ROASTV	three years standard deviation of ROA
ROESTV	three years standard deviation of ROE
HDR	director shareholdings divided by total shares
CLR	shares collateralized divided by director shareholdings
EA	equity to assets ratio
SIZE	logarithm of total assets (unit: thousand)

Table 3. Variance inflation factor

Variance inflation factor (VIF) is a measure of collinearity. The result of the VIF revealed that independent variables are chiefly showed not to be significantly related (VIF< 10) except for variable HDR. However, this relationship, while significant, is moderate in strength.

$Y_{it}=\alpha_i+\beta_1 HDR_{it}+\beta_2 HDR^2_{it}+\beta_3 EA_{it}+\beta_4 SIZE_{it}+\varepsilon_{it}$		
Variable	VIF	1/VIF
HDR	44.98	.0222
HDR^2	40.34	.0247
EA	1.10	.9092
SIZE	1.89	.5288
Mean VIF: 22.08		
$Y_{it}=\alpha i+\beta_1 HDR_{it}+\beta_2 HDR^2_{it}+\beta_3 CLR_{it}+\beta_4 HDR_{it}*CLR_{it}+\beta_5 HDR^2_{it}*CLR_{it}+\beta_6 EA_{it}+\beta_7 SIZE_{it}+\varepsilon_{it}$		
Variable	VIF	1/VIF
HDR	49.53	.0202
HDR^2	43.64	.0229
CLR	4.59	.2120
HDR*CLR	19.67	.0508
HDR^2*CLR	14.04	.0712
EA	1.14	.8737
SIZE	1.92	.5196
Mean VIF: 19.24		

Variable definitions

HDR	=director shareholdings divided by total shares
CLR	=shares collateralized divided by director shareholdings
EA	=equity to assets ratio
SIZE	=logarithm of total assets (unit: thousand)

Table 4. Pearson correlation

	HDR	CLR	EA	SIZE
HDR	1			
CLR	-.4561	1		
EA	-.1963	.2870	1	
SIZE	.5789	-.4382	-.3127	1

Variable definitions

HDR	=director shareholdings divided by total shares
CLR	=shares collateralized divided by director shareholdings
EA	=equity to assets ratio
SIZE	=logarithm of total assets (unit: thousand)

Table 5. Descriptive statistics

Variable	Mean	Std.Dev.	Skewness	Kurtosis	Min	Max	Observations
ROA	.0024	.0057	-2.2396	10.9226	-.0311	.0124	840
ROE	.0007	.1742	-6.0592	46.1036	-1.5866	.1417	840
RARROA	1.0255	1.0198	-.1109	1.8216	-1.3613	3.3491	821
RARROE	.9214	1.0557	.0891	1.6848	-1.3193	3.0558	831
NPLR	.0454	.0437	2.6360	11.7697	.0000	.3025	836
ROASTV	.0057	.0050	2.5716	13.1811	.0005	.0382	822
ROESTV	.1493	.4191	6.8361	53.3077	.0080	3.6987	832
HDR	.4526	.3894	.5129	1.5153	.0007	1.0000	828
CLR	.1090	.2026	2.2048	7.7776	.0000	.9826	825
EA	.0651	.0193	.6093	6.0001	.0068	.1739	839
SIZE	8.6197	.3883	.0627	2.2161	7.6111	9.3937	839

Variable definitions

ROA (before depreciation)	=operating income (before depreciation) divided by total assets
ROE (before depreciation)	=operating income (before depreciation) divided by equity
RARROA	=risk adjusted return on assets
RARROE	=risk adjusted return on equity
NPLR	=nonperforming loan ratio
ROASTV	=three years standard deviation of ROA
ROESTV	=three years standard deviation of ROE
HDR	=director shareholdings divided by total shares
CLR	=shares collateralized divided by director shareholdings
EA	=equity to assets ratio
SIZE	=logarithm of total assets (unit: thousand)

Table 6. The relationship between holding, the proxy of return and risk

To distinguish if shares holding is a consequential factor in banking industry, he relationship between shares holding and bank risk and performance has been examined at the first stage. The model we use for the test is:
$Y_{it} = \alpha_i + \beta_1 HDR_{it} + \beta_2 HDR^2_{it} + \beta_3 EA_{it} + \beta_4 SIZE_{it} + \varepsilon_{it}$.

Variable	ROA (FIX)	ROE (FIX)	RARROA (FIX)	RARROE (FIX)	NPLR (FIX)	ROASTV (FIX)	ROESTV (FIX)
HDR	.0118***	.2966***	2.9605***	2.4820***	.1202***	-.0119***	-.4707*
HDR^2	-.0121***	-.2498***	-3.1080***	-2.5611***	-.0972***	.0121***	.3401*
EA	.0789***	5.7391***	15.7801***	17.2370***	-.0938*	-.0948***	-14.0092***
SIZE	.0086***	.3466***	-.0089	-.6479**	-.0903***	-.0027***	-.5346***
AD-R^2	83.38%	73.35%	60.11%	64.15%	69.07%	68.11%	63.77%
F-test	99.33	51.08	23.37	25.41	45.24	52.78	35.88
(p-value)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)
LM-test	4155.98	2455.70	1290.54	1312.94	2086.82	3134.53	1615.07
(p-value)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)
H-test	16.08	17.78	21.00	34.39	15.04	14.22	9.76
(p-value)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0003)	(.0446)
Cases	828	828	819	819	825	820	820

*Significant at .1 level;**Significant at .05 level;***Significant at .01 level

Variable definitions

ROA (before depreciation)	=operating income (before depreciation) divided by total assets
ROE (before depreciation)	=operating income (before depreciation) divided by equity
RARROA	=risk adjusted return on assets
RARROE	=risk adjusted return on equity
NPLR	=nonperforming loan ratio
ROASTV	=three years standard deviation of ROA
ROESTV	=three years standard deviation of ROE
HDR	=director shareholdings divided by total shares
CLR	=shares collateralized divided by director shareholdings
EA	=equity to assets ratio
SIZE	=logarithm of total assets (unit: thousand)

Table 7. The relationship between the collateralized shares, the proxy of return and risk

To investigate the influence of the collateralized shares, variable CLR was added. The model is:

$$Y_{it} = \alpha_i + \beta_1 HDR_{it} + \beta_2 HDR^2_{it} + \beta_3 CLR_{it} + \beta_4 HDR_{it}*CLR_{it} + \beta_5 HDR^2_{it}*CLR_{it} + \beta_6 EA_{it} + \beta_7 SIZE_{it} + \varepsilon_{it}.$$

The results support the claim that the higher the proportion of collateralized shares, the poorer the operating performance. Furthermore, the results indicate that the proportion of collateralized shares is not statistically significant related to nonperforming loans.

Variable	ROA (FIX)	ROE (FIX)	RARROA (FIX)	RARROE (FIX)	NPLR (FIX)	ROASTV (FIX)	ROESTV (FIX)
HDR	.0074***	.7261***	1.5498**	.8752*	.1756***	-.0159***	-1.8406***
HDR^2	-.0091***	-.5830***	-2.0658***	-1.4108**	-.1431***	.0154***	1.3949***
CLR	-.0055***	.6460***	-1.9543***	-2.1403***	.1088***	.0066***	2.0250***
HDR*CLR	.0087	-4.9673***	11.8227***	9.8525***	-1.1092***	-.0564***	-14.8719***
HDR^2*CLR	-.0027	4.2968***	-9.9802**	-7.7752**	.9737***	.0482***	12.7383***
EA	.0952***	4.8935***	19.1426***	21.7558***	-.0056	-.0874***	-11.1599***
SIZE	.0093***	.3464***	.0603	-.5140*	-.0876***	-.0028**	-0.5195***
AD-R^2	84.42%	80.04%	61.97%	66.76%	71.52%	68.81%	75.54%
F-test	79.21	72.76	23.97	28.04	31.94	51.33	65.34
(p-value)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)
LM-test	2988.30	1688.48	1248.58	1469.85	1227.22	2679.69	1442.15
(p-value)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)	(.0000)
H-test	25.90	45.32	25.81	33.39	31.42	17.21	43.79
(p-value)	(.0005)	(.0000)	(.0000)	(.0000)	(.0000)	(.0161)	(.0000)
Cases	825	825	816	816	822	817	817

*Significant at .1 level;**Significant at .05 level;***Significant at .01 level

Variable definitions

ROA (before depreciation)	=operating income (before depreciation) divided by total assets
ROE (before depreciation)	=operating income (before depreciation) divided by equity
RARROA	=risk adjusted return on assets
RARROE	=risk adjusted return on equity
NPLR	=nonperforming loan ratio
ROASTV	=three years standard deviation of ROA
ROESTV	=three years standard deviation of ROE
HDR	=director shareholdings divided by total shares
CLR	=shares collateralized divided by director shareholdings
EA	=equity to assets ratio
SIZE	=logarithm of total assets (unit: thousand)

Table 8. The variation in the relationship between the collateralized shares and bank performance and risk

To contribute to the nature and influence of the collateralized shares, CLR is defined as a dummy variable D_{it} to observe the variation in the relationship between the collateralized shares and bank performance and risk. The model we use for the test is:

$$Y_{it} = \alpha_i + \beta_1 HDR_{it} + \beta_2 HDR^2_{it} + \beta_3 D_{it} + \beta_4 HDR_{it}* D_{it} + \beta_5 HDR^2_{it}* D_{it} + \beta_6 EA_{it} + \beta_7 SIZE_{it} + \varepsilon_{it}.$$

CLR	Variable	ROA	ROE	RARROA	RORROE	NPLR
	HDR	.0382	.8428	28.1177	2.6741	.2559
	HDR^2	-.0584	-1.2470	-36.4098	3.3946	.1150
	CLR	-.1542	2.0866	-6.9578	-5.7676	.4246
0 - Median	HDR*CLR	1.5873	-19.7424	9.9659	4.8299	-4.3389**
(median=.1788)	HDR^2*CLR	-1.9471	29.9646	-11.4514	-2.8148	3.5921*
	EA	.1872***	3.2874***	18.8571*	20.4902***	.0409
	SIZE	.0280***	.4534***	3.8079*	3.3959**	-.2166***
	AD-R^2	83.86%	72.32%	86.72%	85.92%	90.57%
	Cases	620	620	611	611	618
	HDR	.2729	1.0529	13.8220	14.3460*	-5.7184
	HDR^2	-.6240	-1.4549	-16.1380	-22.1350	17.1306*
	CLR	-.0188	-.3716*	-9.8046*	-1.2737	.2192**
Median -	HDR*CLR	.5451**	32.7348***	1.8948**	2.3538**	-12.6439**
Maximum						
(median=.1788)	HDR^2*CLR	-1.2831*	-.33.9152**	-5.8498**	-2.9136*	45.6029***
(max=.9826)	EA	.0874***	1.4385**	12.4166***	11.2047***	-1.3441***
	SIZE	.0181***	0.0595	5.9850***	5.3974***	-.2829***
	AD-R^2	85.67%	75.70%	88.67%	89.37%	91.68%
	Cases	205	205	205	205	204

*Significant at .1 level;**Significant at .05 level;***Significant at .01 level

** The model we adopted is the fixed effect model, we have detected all criteria

Variable definitions

ROA (before depreciation)	=operating income (before depreciation) divided by total assets
ROE (before depreciation)	=operating income (before depreciation) divided by equity
RARROA	=risk adjusted return on assets
RARROE	=risk adjusted return on equity
NPLR	=nonperforming loan ratio
CLR	=shares collateralized divided by director shareholdings

Table 9. Robustness of performance and risk results - seasonal effect

Because we adopt quarterly data in our study, another important issue is that if performance on different quarter is anomaly. We examine performance and risk measures by quarters. We then rerun the model (11):

$$Y_{it} = \alpha_i + \beta_1 HDR_{it} + \beta_2 HDR^2_{it} + \beta_3 CLR_{it} + \beta_4 HDR_{it} * CLR_{it} + \beta_5 HDR^2_{it} * CLR_{it} + \beta_6 EA_{it} + \beta_7 SIZE_{it} + \varepsilon_{it}$$

	Q1				Q2		
Variable	RARROA	RARROE	NPLR	Variable	RARROA	RARROE	NPLR
HDR	1.0864	.5688	.1864***	HDR	.4968	.2368	.2144***
HDR^2	-1.9451*	-1.4392	-.1526***	HDR^2	-1.1211	-.8336	-.1712***
CLR	-.7623	-1.1436	.0754	CLR	-.2048	-.0633	.0817
HDR*CLR	18.8554	20.3447	-.6730	HDR*CLR	48.9881*	-49.6781*	-.1827
HDR^2*CLR	-136.6860	-151.7740	.8709	HDR^2*CLR	-291.723***	283.1600**	-3.5661
EA	18.8763***	23.0759***	-.1764	EA	18.7877***	22.0985***	-.0037
SIZE	.8767	.4089	-.0922***	SIZE	.0471	-.4965	-.0962***
Cases	196	196	198	Cases	198	198	199
	Q3				Q4		
Variable	RARROA	RARROE	NPLR	Variable	RARROA	RARROE	NPLR
HDR	.7235	.0503	.2068***	HDR	2.1602	1.0032	.1536***
HDR^2	-1.3084	-.6098	-.1646***	HDR^2	-2.6142**	-1.4680*	-.1282***
CLR	-1.9796***	-2.1416***	.1052***	CLR	-1.5318**	-1.5487**	.1342***
HDR*CLR	10.5699*	8.9210*	-1.0598***	HDR*CLR	5.5857	2.8880	-1.2526***
HDR^2*CLR	-9.5258	-7.9517	.8982**	HDR^2*CLR	-4.2130	-1.3313	1.0966***
EA	18.2821***	20.5296***	-.3089**	EA	21.4149***	21.9154***	-.1393
SIZE	-.3398	-.7488	-.0749***	SIZE	-.1028	-1.0226**	-.0867***
Cases	198	198	199	Cases	224	224	226

*Significant at .1 level;**Significant at .05 level;***Significant at .01 level

Variable definitions

RARROA	=risk adjusted return on assets
RARROE	=risk adjusted return on equity
NPLR	=nonperforming loan ratio
HDR	=director shareholdings divided by total shares
CLR	=shares collateralized divided by director shareholdings
EA	=equity to assets ratio
SIZE	=logarithm of total assets (unit: thousand)

Table 10. Robustness of performance and risk results - seasonal effect

To mitigate the concern of the seasonal effect, we add quarter dummy variables to investigate if it exists. The model we adopt is:

$$Y_{it} = \alpha_i + \beta_1 HDR_{it} + \beta_2 HDR^2_{it} + \beta_3 D_{it} + \beta_4 HDR_{it} * D_{it} + \beta_5 HDR^2_{it} * D_{it} + \beta_6 EA_{it} + \beta_7 SIZE_{it} + \beta_8 Q_{2it} + \beta_9 Q_{3it} + \beta_{10} Q_{4it} + \varepsilon_{it},$$

which Q_2, Q_3 and Q_4 are dummy variables. We consider the first quarter to be the reference group and detect if significant difference exist among them. Q_2 is equal to 1 and Q_3 and Q_4 are equal to 0 when the sample is at the second quarter.

Variable	Q_2	Q_3	Q_4
RARROA	-.0041	.1013	.0499
(p-value)	(.9358)	(.8269)	(.3144)
RARROE	-.0341	-.0551	-.0515
(p-value)	(.4962)	(.1973)	(.2828)
NPLR	-.0020	-.0012	-.0037
(p-value)	(.2891)	(.4329)	(.4332)

Variable definitions

Q_2	=Q_2 is 1 if data were belong to the second quarter and 0 for otherwise
Q_3	=Q_3 is 1 if data were belong to the third quarter and 0 for otherwise
Q_4	=Q_4 is 1 if data were belong to the forth quarter and 0 for otherwise
RARROA	=risk adjusted return on assets
RARROE	=risk adjusted return on equity
NPLR	=nonperforming loan ratio