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On Corporate Hedging and Firm Focus and on Bank Board Structure

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On Corporate Hedging and Firm Focus and on Bank Board Structure

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Abstract

This dissertation consists of two essays: one looks at the relation between firm focus and hedging in the REIT industry, and the other compares bank board structures in China and the US.

The first essay presented in Chapter 2 examines the relation between corporate hedging and firm focus in the REIT industry by using a sample of REITs in 2005 and in 2007. We find 46.41% utilization rate in 2005 and 43.41% in 2007. Consistent with our hypothesis, we find that, relative to diversified firms, focused firms are more likely to engage in hedging. Focused firms also tend to be involved in greater amount of hedging. We also document a negative relation between hedging and transparency, although the evidence is not overwhelming. Consistent with previous literature, there is a strong firm size effect.

The second essay presented in Chapter 3 examines the relation between bank performance and board structure by using a sample of 74 US banks and 53 Chinese banks for the period 2002 to 2006. Indeed, the empirical relation between board structure and performance is virtually non-existing in China. In particular, for the US sample, the board size is found to be significantly and negatively correlated with ROA, but a larger board also tends to be associated with lower costs. For Chinese banks, the evidence indicates that governance variables are not significantly correlated with performances with the exception of block ownership: there is strong evidence that the relation between block ownership and bank performance is negative. Additionally, we find substantial differences in board structure between the two countries; in particular the average board size and the proportion of outside directors for US banks are almost twice of those in China.

Keywords: Corporate hedging, firm focus, transparency, board structure, bank performance, ownership.

Chapter 1

Introduction

This dissertation consists of two essays: one looks at the relation between firm focus and hedging in the REIT industry, and the other compares bank board structures in China and the US.

The first essay is presented in Chapter. In this study, we examine the use of derivatives in the REIT industry. We find 46.41% utilization rate in 2005 and 43.41% in 2007. Consistent with our hypothesis, we find that, relative to diversified firms, focused firms are more likely to engage in hedging. Focused firms also tend to be involved in greater amount of hedging. However, the evidence is not strong because not all measures of firm focus are statistically significant.

Also consistent with our expectation and with DeMarzo and Duffie (1995), we document a negative relation between hedging and transparency. This result is sensible because managers in less transparent firms arguably have greater incentive to smooth incomes, thus conveying their abilities with less noise to investors. However, the evidence is also weak, since the univariate comparison between hedgers and non-hedgers does not indicate a significant difference in firm.

Our results support a firm size effect that is consistent with previous literature. Namely, larger REITs are more likely to hedge, but their hedge amounts tend to be smaller (relative to their assets) than their smaller counterparts. A possible explanation is as follows: larger firms tend to hedge due to economies of scale in entry costs or execution costs, but they hedge smaller amounts because they are less likely to be in financial distress.

The second essay presented in Chapter 3 examines the relationship between board governance and performance using a sample of 74 banks in US and 53 banks in China for the period from 2002 to 2006.

We find substantial differences in board structure between the two countries; in particular the average board size and the proportion of outside directors for US banks are almost twice of those in China. US banks also perform much better than Chinese banks during our sample period. As for the relation between performance and governance, the evidence is fairly mixed for the US sample while insignificant for the Chinese sample. In particular, in the US sample, board size is found to be significantly and negatively associated with ROA, but a larger board also tends to reduce costs. We cannot identify a satisfactory explanation to reconcile the results for ROA and costs. Regarding Chinese banks, the evidence indicates that governance variables are not significantly correlated with performances with the exception of block ownership; there is strong evidence that block ownership is negatively related to performance. In China, block ownership is often government ownership. Therefore, the overall evidence is consistent with our conjecture that the role of board governance structure is of secondary importance in Chinese banks, perhaps due to the strong role of government.

Chapter 2

Corporate Hedging and Firm Focus:

The Case of REITs

Abstract

In this study, we examine the relation between corporate hedging and firm focus in the REIT industry. The REIT industry is suitable for the investigation for various reasons, with the primary one being that the tax codes of REITs restrict their abilities to use derivatives for speculative purposes. We find 46.41% utilization rate in 2005 and 43.41% in 2007. Consistent with our hypothesis, we find that, relative to diversified firms, focused firms are more likely to engage in hedging. Focused firms also tend to be involved in greater amount of hedging. However, the evidence is not strong because not all measures of firm focus are statistically significant. We also document a negative relation between hedging and transparency, although the evidence is not overwhelming. Consistent with previous literature, we find a firm size effect. Namely, larger REITs are more likely to hedge, but their hedge amounts tend to be smaller (relative to their assets) than their smaller counterparts.

1. Introduction

Recent financial crisis points to the need to further study the role of corporate hedging. Particularly, it seems puzzling that given the widespread use of derivatives, the financial performance has remained volatile and the risk control of corporations and institutions does not appear to be ideal, to say the least. This begs the question: do firms utilize hedging in a sensible way? Therefore, it is useful to study further corporate hedging practice. However, given the complexity and variety of the derivative instruments, techniques, and markets, we choose to concentrate on just one aspect of hedging: the substitutability of hedging and diversification. Conceptually, a firm can reduce its risk either by diversification or by hedging. Conventional wisdom thus suggests that more focused firms would tend to be more active users of hedging. This point has been suggested elsewhere. For example, in his widely popular book on derivatives, Hull (2008, p. 48) states that "the arguments in favor of hedging are so obvious that they hardly need to be stated. Most companies are in the business of manufacturing, or retailing or wholesaling, or providing a service. They have no particular skills or expertise in predicting variables such as interest rates, exchange rates, and commodity prices. It makes sense for them to hedge the risks associated with these variables as they arise. The companies can then focus on their main activities – for which presumably they do have particular skills and expertise. By hedging, they avoid unpleasant surprises such as sharp rise in the price of a commodity that is being purchased." This study attempts to analyze the relation between firm hedging and firm focus.

Surprisingly to our knowledge, no study has examined the connection between the two. Therefore, this paper represents an early attempt to examine the relation between hedging and

firm focus. We hypothesize that, relative to diversified firms, focused firms are more likely to be associated with hedging, reducing the effects of factors that are beyond their control[1].

An important confounding factor in empirical research is that some evidence suggests derivatives were sometimes used for speculation. As an example in the Wharton's survey of derivatives usage, Bodnar et al (1995) find that 34% of derivatives users sometimes use them to "reduce funding costs by expressing a view". Extreme losses from some corporations and financial institutions further suggest that the speculative use of derivatives is not uncommon. Ljungqvist (1992) demonstrates that managers with private information will engage in speculation instead of hedging. Moreover, Geczy et al. (2007) find a substantial portion of firms engaged in using derivatives for speculation. Primarily for this reason, we utilize the sample of Real Estate Investment Trusts (REITs) to minimize speculation for this study. The REIT industry is suitable for this investigation because the tax codes restrict their use of derivatives for speculation, and therefore their use of derivative should be predominantly intended for hedging. The tax codes for REITs stipulate that no more than 25% of REITs' incomes may come from short-term capital gains and unrelated businesses. Moreover, a REIT must invest at least 75% of its total assets in its core business: real estate.

The investigation into this industry has other advantages. First, because REITs pay no corporate income tax, tax-motivated hedging is unlikely. Moreover, Capozza and Sequin (1998) show that REITs' expenses reflect primarily the cost of management team. This allows us to examine whether management cost is a consideration in hedging activities. The REIT industry uses derivatives quite frequently. Horng and Wei (1999) find that 41% of REITs in their sample make use of derivatives and that most of them use interest rate swaps and other interest rate

[1] The causality of hedging and focus may be two-ways. However, analyzing causality requires high frequency data, which is not available. Therefore, in this study, we concentrate on the correlation between the two.

derivatives; the use of currency derivatives is non-existing in this industry. In contrast, Mian (1996) indicates that many industries simultaneously use interest-rate derivatives, currency derivatives and commodity derivatives. To the extent motivations for employing interest rate derivatives and other types of derivatives are different; the results of the study would have clearer implications for the motivations to use interest rate derivatives. Focusing on one industry has the additional advantage of allowing us to include more detailed data and smaller firms. For the most part, data on hedging activities can only be obtained by reading annual reports. Finally, the REIT industry is relatively homogeneous; presumably a REIT can only diversify by geographic regions or by real estate subsectors such as apartments and shopping malls. Information for both types of diversification is obtainable and measureable[2].

In the following section, we review the related literature, which is followed by the third section that describes the methodology and the data. Section four discusses the empirical results, and section five concludes.

2. Literature Review

In section 2.1, we first review the theories on motivations for hedging, followed by related empirical studies in 2.2. Then some representative studies on firm focus are discussed in section 2.3. Finally, section 2.4 gives a brief background of the REIT industry.

2.1 Theories on Hedging Motivations

In a perfect market with homogeneous transaction costs, the use of derivatives should not increase firm value, since shareholders can trade derivatives with the same cost as firms. Mayers

[2] In contrast, it would be difficult to compare the focus of, say, two technology firms for which the technology products differ substantially in terms of their potential uses.

and Smith (1982) and Smith and Stulz (1985) view derivatives use as motivated by market imperfections, including progressivity of taxes, financial distress costs, and agency problems. This is so because derivatives use can reduce income volatility, thereby lowering expected taxes, financial distress costs, and conflicts of interests between shareholders and debt-holders.

Hedging can be used to resolve agency problems such as the underinvestment problem suggested by Myers (1977). Myers (1977) and Bessembinder (1991) argue that if most of the gains that accrue from positive net present value projects were distributed to debt-holders, shareholders might not be willing to take on such projects. To avoid this problem, a firm needs to make its debt-holders feel more secure about debt payments by having lower volatility in the firm's earnings. Hence, hedging is suggested by Stulz (1990) and Smith and Stulz (1985) to be able to control the underinvestment problem and increase firm value. These studies also argue that if managerial self-interests are important in the decision to hedge, managers with larger stock holdings will be more inclined to hedge. Froot, Scharfstein and Stein (1993) present a theoretical model with costly external financing. A firm having valuable growth opportunities will likely to hedge more to reduce its reliance on external financing. DeMarzo and Duffie (1995) and Breeden and Viswanathan (1998) hypothesize that managers will hedge to reduce income volatility, thus conveying their abilities with less noise to shareholders. An implication of their theory is that the greater the information asymmetry faced by a firm, the greater the benefits shareholders receive from hedging (Geczy, Minton and Schrand, 1997). Dadalt et al. (2002) exam the effect of the use of currency and interest rate derivatives on the extent of information asymmetry facing the firm, and they suggest that derivatives usage is associated with reductions in the level of information asymmetry between managers of the firm and outsiders.

There are additional theories that are relevant for interest-rate swaps only. For example, a firm might be inclined to undertake riskier projects when its debt amount increases. A firm that borrows short-term floating-rate debt and swaps into fixed-rate debt can reduce this asset substitution problem (Wall, 1989). Titman (1992) argues that a firm facing information asymmetry and expecting performance improvement also can benefit from borrowing floating-rate and swapping into fixed-rate payments. This is because the swap would allow the firm to lower its default premium in the future when performance improves while keeping the default-free interest payments fixed. Li and Mao (2003) present a theory explaining the existence of interest-rate swaps. A firm facing substantial information asymmetry would prefer private bank debt to public debt. However, since banks prefer to lend floating-rate loans, a firm that chooses a bank loan will face interest-rate risk. By swapping the floating-rate debt into fixed-rate debt, the firm can avoid interest-rate risk as well as a higher rate (due to information asymmetry) in public debt. They further argue that firms with little default risk can handle interest-rate risk better than banks, thus explaining Gortons and Rosen's (1995) finding that few banks engage in interest-rate swaps. The implications are that good firms would tend to borrow bank debt or floating-rate loans and swap the debt into fixed-rate instruments. Superior firms without default risk would take the opposite side (i.e., swap their debt from fixed-rate into floating-rate).

2.2 Empirical Testing on Hedging Motivations

Block and Gallagher (1986) survey corporate hedging via forwards, futures, options and swaps. Their main conclusion is that larger firms use interest-rate derivatives more extensively than smaller firms. In a study of interest-rate swaps, Wall and Pringler (1989) find weak evidence supporting various theories for interest-rate swaps. Nance, Smith and Smithson (1993)

investigate the hedging activities of 169 firms among the Fortune 500 and S &P 400, and find that 104 firms used hedging instruments in the fiscal year 1986. Three possible substitutes for hedging – convertible debt and preferred stock, cash reserves, and dividend yields – are also incorporated in their study. Their results indicate that firms' hedging decisions are related to the investment tax credit but are unrelated to proxies for financial-distress costs and agency costs. Howton and Perfect (1998) survey firms included in Fortune 500 and S&P 500, and find that over 61% of them use derivatives. Geczy et al. (2007) report survey findings that indicate that 61 out of 186 firms sometimes speculate and 13 frequently speculate. In contrast, a random sample of firms shows that 36% use derivatives. Their findings suggest that larger firms have a greater tendency to use derivatives. The above studies use survey data, which may have a response bias. The Statement of Financial Accounting Standard (FASB) 105 requires firms to disclose their use of derivatives in financial statement footnotes for statements ending after June 15, 1990. Several studies that use non-survey data thus followed.

Using a sample of 3,022 firms, Mian (1996) provides empirical evidence of the determinants of corporate hedging policy. He classifies firms into 771 hedgers and 2,251 non-hedges using 1992 annual financial statements (a 25.5% utilization rate). Overall evidence for the underinvestment problem and the tax-based motivation is mixed. For example, he finds the ratio of market value to book value of assets, a proxy for growth opportunities, to be negatively related to the probability of hedging, a result opposite to what the underinvestment hypothesis predicts. With a sample of 116 firms listed on the New Zealand Stock Exchange, Berkman and Bradbury (1996) provide evidence that supports most existing theories. They find that derivatives use increases with leverage, firm size, the existence of tax losses and the proportion of shares held by managers. Moreover, the use of derivatives decreases with increasing interest

coverage and liquidity. Geczy et al. (1997) investigate 372 of the Fortune 500 non-financial firms that have potential exposure to foreign-currency risk and they find a 41.4% usage rate in 1991. Their results indicate that firms with a combination of high growth opportunities and low access to both internal and external financing use currency derivatives extensively. They find little support for the explanations based on tax, asymmetry information, and managerial self-interest.

Samant (1996) examines the use of interest-rate swaps. He finds that firms with more growth opportunities, lower ratios of fixed assets to total assets, and more divergent earnings forecasts tend to use swaps. He interprets the results as evidence consistent with hedging being motivated by underinvestment, asset substitution, and information asymmetry problems.

More recent empirical studies point to a strong influence of managerial self-interest on hedging decisions. For example, Spano (2007) analyzes a sample of UK firms and finds that managerial risk aversion tends to produce a hedging scheme that deviates from the optimal one. Similarly, Hagelin, Holmen, Knopf and Pramborg (2007) conduct a survey on Swedish firms and conclude that when hedging is linked to managerial incentives, firm value decreases.

There are a few studies that investigate a single industry, and arguably they are the most relevant to this study. Tufano (1996) examines corporate risk management activity of the North American gold mining industry. The main findings are that managers who own a large number of shares of stock are likely to hedge, but those who hold more options are less likely to hedge. He suggests that this is consistent with the notion of managerial self-serving behavior. No strong relationship between hedging and other determinants of hedging is found. Haushalter (2000) examines the hedging activities of the oil and gas producers. On hundred firms responded (out of the 177 public of oil and gas producers), and approximately 50 are hedgers. The results of his

study indicate that firms facing financial constraints tend to hedge more aggressively. The differences in results between these two studies suggest that motivations to use derivatives vary across industries. This means that the results in our study may not be generalized to industries other than REITs. Nevertheless, as discussed earlier, the unique characteristics of the REIT industry might provide insightful or clearer results.

Haushalter (2000) also separates the analyses of the probability of hedging and the amount of hedging. He finds "important differences between the decision to hedge and the decision of how much to hedge." In particular, he shows that the probability of hedging is positively related to firm size, while the level of hedging is negatively related to firm size. In most of the empirical studies, firm size is used as one potential determinant of hedging decisions, yet the interpretation is not clear. Nance, Smith and Smithson (1993) argue that firm size may be a proxy for direct financial distress costs and tax effects. Smaller firms are expected to hedge more, since they generally have proportionally higher direct bankruptcy costs (Warner, 1977) and are in the progressive region of the tax schedule. Geczy, Minton and Schrand (1997) argue that smaller firms are likely to face greater information asymmetry, and hence hedge more, based on the theory of DeMarzo and Duffie (1995). On the other hand, larger firms tend to have economics of scale in information costs and transaction costs, implying that larger firms should be more inclined to hedge. Haushalter's (2000) results suggest that while economics of scale in transaction and information costs are key factors in firms' decisions to hedge, financial-distress costs, taxes, and information asymmetry are factors affecting the amount of hedging.

There are two studies that utilize the REIT sample. Horng and Wei (1999) analyze 235 REITs and find that 41% of REITs use interest rate derivatives, although the amount of derivatives on average is not high. Larger and mortgage REITs are more likely to use

derivatives. However, in terms of the amount of derivatives, smaller and more levered REITs tend to use more. They interpret that the results are evidence consistent with considerable entry costs, and consistent with financial distress costs being an important motive for hedging. Additional analysis on the relation between interest rate risk and hedging reveals an interesting pattern: mortgage REITs tend to increase their hedging when interest rates decline, while the opposite is true for equity REITs. They interpret the results as evidence consistent with prepayment risk being an important concern for mortgage REITs, while equity REITs primarily hedge to control financing costs. Ertugrul, Sezer, and Sirmans (2008) also analyze the REIT industry but look at a more recent time period: 1999 to 2001. They find results similar to those in Horng and Wei; moreover, they find evidence linking managerial compensations and hedging decisions.

2.3 Firm Focus and Firm Value

In recent years, the potential benefits of corporate focus have received widespread coverage in the academic literature. Conglomerate diversification might insulate managers from market discipline, and as a result, internal politics might induce management to misallocate resources between divisions. More diversified firms may also be hard to evaluate and are subject to a greater degree of information asymmetry. Montgomery (1994) summarizes some literature and concludes that firms that are less focused or more diversified either under-perform or perform as well as their more focused, less diversified counterparts. Berger and Ofek (1995) conclude that diversification results in a 13% to 15% firm value loss. Comment and Jarrell (1995)

examine the relation between changes in focus[3] and stock returns; they discover co-movement between focus and shareholder wealth.

A possible reason for the underperformance of diversification is that diversified firms suffer greater asymmetric information because segment reporting may be relatively uninformative. Even if valuation errors can be partially diversified away, if each segment is harder to value because segment reporting is not informative, the diversified firm will suffer greater information-based valuation problems. Nanda and Narayanan (1999) present a model suggesting the existence of increased information asymmetries in diversified firms. For empirical support, Capozza and Sequin (1999) attribute the diversification discount they observe for REITs to diversification-induced illiquidity. Moreover, Krishnaswami and Subramaniam (1999) find that spin-offs improve the liquidity of parent firms.

However, Thomas (2002) finds that diversified firms have smaller levels of information asymmetry than stand-alone firms based on analyst forecast data and returns around earnings announcements. Likewise, Hadlock, Ryngaert, and Thomas (2001) find that equity issuances by diversified firms are associated with less negative abnormal returns than those of focused firms, suggesting that diversified firms enjoy lower adverse selection risk. Finally, Clarke, Fee, and Thomas (2004) show that diversified firms have lower levels of asymmetric information, as measured by various microstructure liquidity metrics, compared to the inferred liquidity metrics of portfolios constructed from focused firms.

There are a few studies that analyze diversification effects within the real estate industry. Capozza and Seguin (1999) examine the effects of diversification within the REIT segment and find that diversification reduces firm value even though it does not reduce firm cash flow. Their explanation is that the observed diversification discount arises from investors imposing a higher

[3] Measured by year-to-year changes in asset-based Herfindahl indices.

required return on diversified REITs; in other words, they suggest that firm focus affects firm value indirectly through liquidity.

In sum, previous literature generally examines the performance effect of focus, and we are unaware of any study linking firm focus to corporate hedging behavior -- an important objective of this study.

2.4 Some Background on the REIT Industry

REITs' asset structures differ substantially between equity REITs and mortgage REITs; the former primarily invest in real estate properties such as shopping malls, apartments, and commercial buildings, while the latter invest primarily in mortgage securities. Equity REITs are expected to use derivatives mainly to hedge financing cost, since their assets lack suitable hedging instruments. For the mortgage REITs that have substantial gaps between the durations of assets and debt, hedging can be used to provide better maturity matching.

The industry has a long history, but significant growth started only after 1990s. Riding the tides in the underlying real estate market, the industry has been growing rapidly since 2000, but is facing substantial downturn during the recent housing meltdown. Also during this period, the relative importance of equity REITs has increased considerably, while mortgage REITs have declined both in terms of the number of firms and relative size. On the relationship between types of REITs and interest rate risk hedging, Horng and Wei (1999) find that the hedging activities of mortgage and equity REITs differ substantially when interest rates decrease.

3. Hypotheses, Data and Methodology

3.1 Hypotheses

As mentioned earlier, we hypothesize that, relative to diversified firms, focused firms are more likely to be associated with hedging. Put differently, focused firms are more likely to employ hedging to reduce the effects of factors that are beyond their control, such as interest rates, exchange rates, and commodity prices.

3.2 Data and Methodology

Following Horng and Wei (1999) and Haushalter (2000), we perform separate analyses on the probability of hedging and the level of hedging.

The initial sample consists of 237 REITs in 2005 and 189 REITs in 2007 included in the COMPUSTAT. The year 2005 is a relatively good year for the real estate market while 2007 is relatively poor. The data about hedging and firm focus comes from reading of annual reports (from Security Exchange Commission website (www.sec.com), which is time-consuming and is the reason for limiting the data to two years. In estimating R^2, a proxy for firm transparency, we utilize the return data in CRSP. Data for other variables (management costs, leverage ratio, market-to-book and their substitutes) come from the Compustat, and we also use the information on types of REITs from the website of National Association of Real Estate Investment Trusts (www.nareit.com). Due to missing data, the final numbers of all REITs with available data are 153 in 2005 and 127 in 2007.

To assess the probability of hedging, a logistic regression approach is used. The dependent variable is a dummy variable, with a value of one for REITs that hedge and zero otherwise. The explanatory variables are firm focus, management costs, and control variables

used in Horng and Wei (1999), including firm size, leverage ratio, and types of REITs (equity or mortgage)[4]. A detailed description of the variables will be given below; Table 1 also summaries the variables and their data sources. The regression is estimated by the maximum-likelihood method[5].

As discussed earlier, we expect a positive coefficient for more focused firms and less transparent firms. With regard to the coefficient of management costs, it should be negative if management cost is of major concern in executing hedging scheme.

Since firm focus is of major importance to the study, two alternative measures of firm focus are used: Herfindahl indices based on product lines (property types) and geographic locations. They are described next.

The first, Focus/Type, is computed as $\sum_{t=1}^{4} S_t^2$ where S_t is the proportion of a firm's assets invested in each of four real estate types: office, warehouse, retail, or apartment. Higher levels of concentration by property type lead to higher levels of the index. If the firm is highly focused along one dimension, the index is close to one; while the index approaches .25, if the firm's portfolio of properties is equally distributed across the four property types.

The second, Focus/Region $\sum_{r=1}^{8} S_r^2$ is computed the same way but S_r is the proportion of a firm's assets invested in each of eight real estate regions: New England, Middle Atlantic, Southeast, Midwest, Plains, Southwest, South Pacific, and North Pacific. As with the first focus measure, this concentration variable can vary from one for a geographically focused REIT, to 0.125 for a REIT with holdings equally divided across regions.

[4] The independent variables include no tax variable, since the tax explanation for hedging is irrelevant for REITs.
[5] The analysis is repeated using Probit regression and the results are qualitatively the same.

Table 1: Data Descriptions and Sources

Variable	Variables Descriptions	Sources
Dependent Variable		
HedgeProb	A dummy variable: 1 for REITs that hedge and 0 otherwise	www.sec.com (Financial Reports 10-K)
HedgeLevel	The notional amount of interest-rate derivatives over Market value of assets	
Independent Variable		
Firm Focus:		
Focus/Type	$\sum_{t=1}^{4} S_t^2$ where S_t is the proportion of a firm's assets invested in each of four real estate types: office, warehouse, retail, or apartment.	
Focus/Region	$\sum_{r=1}^{8} S_r^2$ where S_r is the proportion of a firm's assets invested in each of eight real estate regions: New England, Middle Atlantic, Southeast, Midwest, Plains, Southwest, South Pacific, and North Pacific.	
Agency Costs:		
R^2	Stock returns' R^2	CRSP
M/B	Market value of assets/Book value of assets	
SELF	A dummy variable: 1 for self-administered REITs	Compustat
INST	The proportion of shares held by institutions	
Control Variable:		
Firm Size:		
SZ	The log of market value of assets	
Leverage:		
DEBT	Book value of debt/market value of assets	
COV	Pre-tax income/Interest	
RATING	A dummy variable: 1 if bond rating is BBB or better	
Substitutes/Liquidity:		
CASH	Cash Balance/market value of assets	
SUBS	Value of preferred stock and convertible bonds Over Market value of assets	
REIT type:		
TYPE	A dummy variable: 1 for Equity REIT, 0 otherwise	www.nareit.com

In addition to these two variables, in the regression analysis we use a third proxy for firm focus that incorporates both types of diversification – property type and region. Specifically, we use the product of the two variables: Type * Region.

We also control for firm specific risk. DeMarzo and Duffie (1995) and Breeden and Viswanathan (1998) argue that hedging reduces noise to observing managerial abilities. They hypothesize that managers will hedge to reduce income volatility, thus conveying their abilities with less noise to shareholders. Following this argument, we expect that less transparent firms may benefit more from hedging. Firm transparency is measured by the portion of return variation explained by the market: R^2. The justification of this variable primarily comes from Barberis, Shleifer and Wurgler (2005), in which they present evidence that a stock's R^2 tends to increase following its inclusion to the S&P index. Furthermore, the increase is not easily explainable by fundamentals. This suggests that R^2 might be higher for more transparent firms.

The control variables include firm size, leverage ratio and REIT type. Firm size is commonly used in the literature and is also included here. If the costs of executing hedges are substantial, larger firms are more likely to employ hedging programs. On the other hand, if smaller firms face greater financial-distress costs and/or information asymmetry, the probability of smaller firms conducting hedges should be greater. As for the leverage ratio, we expect that the greater the leverage, the greater the probability of financial distress, thus the greater likelihood of hedging.

To analyze the determinants of the level of derivatives use, we also employ a regression approach. The dependent variable is the notional amount of interest-rate derivatives over the market value of assets, where market value of assets is estimated by adding book value of debt to market value of equity. The sample for the level of hedging is restricted to firms that hedge. Since the sample is truncated, ordinary least-squares regression estimates are biased. We therefore use the maximum-likelihood method for the estimation of regression coefficients. The

amounts of options, swaps, futures and forwards positions are aggregated to determine the total amount of derivatives use.[6]

4. Empirical Results

4.1 Descriptive Statistics

Table 2 shows that there are 71 hedgers out of 153 REITS in 2005 and 55 out of 127 REITs in 2007. That is, the utilization rate is 46.41% in 2005 and 43.41% in 2007. In 2005 these hedgers include 60 equity REITs and 11 mortgage and hybrid REITs, while in 2007, 49 equity REITs and 6 mortgage and hybrid REITs are hedgers. In both years there is a smaller proportion of equity REITs engaged in hedging, compared to mortgage and hybrid REITs. This is sensible since equity arguably REITs are less sensitive to interest rate risk. In Horng and Wei (1999), they find 76 REITs out of 186 that reported derivatives use in 1995, while we find 71 out of 153 in 2005 and 55 out of 127 in 2007, suggesting a slightly greater utilization of derivatives in recent years.[7]

Table2: Summary of REITs' hedging activities

	Equity REITs		Mortgage/Hybrid REITs		Total	
	2005	2007	2005	2007	2005	2007
Hedgers	60	49	11	6	71	55
Non-hedgers	73	66	9	6	82	72
Total	133	115	20	12	153	127

[6] Note, however, that this amount is only approximately equal to the hedge amount, since the hedge ratio between underlying assets and swaps, futures and forwards is one or very close to one, while the hedge ratios between underlying assets and options vary with terms of options, for which we do not have detailed information Another potential problem is that while the regulations for REITs restrict speculative activities, they also limit the level of hedging.

[7] Horng and Wei (1998) find 41% usage of derivatives for REITs in 1995, and we find 47% in 2005 and 43% in 2005.

Table 3 presents the choices of derivatives instruments by REITs. Interest-rate options are the most popular interest-rate derivatives that have been employed by REITs to hedge their interest-rate risk. However, swaps and combinations of swaps and options are also popular. Chen and Tzang (1988) find that REITs are sensitive to the changes of interest rates, especially to the long-term rates; since interest-rate swaps are often long-term contracts, their finding could explain why swaps are popular among REITs. Moreover, mortgage REITs might have greater needs to manage their duration gap between assets and liabilities, and swaps are efficient tools for managing gaps. The table suggests that mortgage REITs tend to use swaps or combinations of swaps and options more often than equity REITs.

Table3: REITs' choices of derivative instruments

	Equity REITs		Mortgage/Hybrid REITs		Total	
	2005	2007	2005	2007	2005	2007
Options only	26	24	5	2	31	26
Swaps only	16	12	2	2	18	14
Options/Swaps	18	13	4	2	22	15
Total	60	49	11	6	71	55

4.2 Independent Variables

Before we conduct the regression analysis, insights may be gained from some descriptive statistics for the independent variables to be used in the subsequent regression analysis.

Table 4 gives a univariate comparison of hedgers and non-hedgers. Using both the t test and the sign-rank test, the results indicate that focused firms tend to be hedgers; the means of focus in property types are 0.75 and 0.60 for hedgers and non-hedgers, and the means of geographic focus are 0.64 and 0.48 for hedgers and non-hedgers, respectively. Thus the

Table 4: A comparison of independent variables between hedgers and non-hedgers

The sample includes 153 REITs in 2005 and 127 REITs in 2007, and Table 1 describes the variables. The signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Independent Variables	All REITs	Hedgers	Non-Hedgers	t-statistic	Sign-Rank p-values
Firm Focus:					
Focus/Type	0.68	0.75	0.60	2.03*	0.08*
Focus/Region	0.59	0.64	0.48	2.43**	0.01***
Agency Costs:					
R^2	0.07	0.06	0.08	-1.68	0.29
M/B	1.75	1.81	1.38	2.35**	0.03**
SELF	0.54	0.71	0.35	7.44***	0.01***
INST	0.43	0.57	0.30	2.46**	0.01***
Control Variable:					
Firm Size ($ Mil.)	3395.88	5530.17	1539.61	77.93***	0.00***
Leverage:					
DEBT	0.44	0.47	0.42	2.02*	0.02**
COV	1.60	2.71	0.58	7.16***	0.00***
RATING	0.31	0.43	0.17	3.46***	0.03**
Substitutes/Liquidity:					
CASH	0.03	0.01	0.06	-2.78***	0.00***
SUBS	0.03	0.03	0.03	-2.03*	0.02**
REIT Type:					
TYPE	0.88	0.89	0.90	-2.06*	0.03**

univariate comparison is consistent with our expectation that hedgers tend to be more focused. However, there is no significance difference in terms of firm transparency as measured by R^2.

The table also indicates that hedgers tend to have higher market-to-book (M/B) ratio, tend to be self-administered, and tend to have greater institutional holdings, suggesting that agency problems play a role here. More specifically, higher M/B might proxy for greater growth opportunities, and hedging could produce smoother cash flow stream to support these growth opportunities; stated differently, hedging could reduce the underinvestment problem. Self-administered REITs are those not managed by outside advisors; as such, they might be lesser known to capital markets; hedging can smooth their cash flow streams and reduce their reliance on capital markets. However, the finding of hedgers having greater institutional holdings may be contrary to what agency problem might suggest. If greater institutional holdings imply lower agency problems, there should be less hedging motivated by agency problems. If, on the other hand, greater institutional holdings might reflect less control by managers; if the managers are self serving, they would have incentives to stabilize cash flows to secure their jobs.

There is also a greater tendency for larger firms to hedge, which is consistent with a substantial entry cost. Additionally, for hedgers, the debt ratio is on average higher but interest coverage is greater, the bond rating tends to be higher, and the cash holdings tend to be less—note that these also tend to be the characteristics of larger firms.[8]

Table 5 reports the correlation between independent variables. The table indicates that firm size (SZ) and market-to-book (M/B) are highly correlated with several other independent variables. To reduce the multicollinearity problem, in all following regression analyses, two

[8]We also compare the statistics between 2005 and 2007. The statistics do not seem to vary substantially between 2005 and 2007, with the exception of firm transparency and the market-to-book ratio. The R^2, a measure of firm transparency, are 0.054 in 2005 and 0.072 in 2007. The market-to-book ratios are 1.94 and 1.32 for 2005 and 2007, respectively. The higher market-to-book ratio in 2005 is consistent with the general perception that the real estate market in 2005 is relatively better than that in 2007.

Table5: Correlation among independent variables
The sample includes 153 REITs in 2005 and 127 REITs in 2007, and Table 1 describes the variables. The signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

	Focus/Region	Type* Region	R^2	M/B	SELF	INST	SZ ($ Mil.)	DB	COV	RATING	CASH	SUBS	REIT Type
Focus/Type	-0.05	-0.14*	0.04	0.04	0.03	0.00	0.14*	-0.01	0.00	0.01	-0.01	0.01	0.01
Focus/Region		-0.06	0.02	0.02	0.03	0.00	0.08*	0.01	0.01	0.00	-0.03	0.00	0.02
Type*Region			0.09*	0.07	0.01	0.01	0.16**	-0.02	0.01	0.01	0.01	0.01	0.03*
R^2				-0.09*	-0.01	-0.05	-0.12*	-0.01	0.03	-0.08	0.03	-0.02	-0.02
M/B					0.03	0.07*	0.18**	-0.03	0.07	0.09*	-0.09*	-0.02	0.01
SELF						0.04	0.08*	0.05	0.04	0.02	-0.06	0.02	0.02
INST							0.09*	0.06	-0.03	0.02	-0.02	0.03	0.02
SZ ($ Mil.)								0.10*	-0.05	0.03	-0.07*	0.08*	-0.10**
DB									-0.04	-0.09*	-0.02	0.01	-0.02
COV										-0.01	-0.02	-0.04	-0.02
RATING											-0.03	0.04	0.02
CASH												-0.04	-0.03
SUBS													0.01

regression models are employed: one includes SZ and M/B and another excludes the two variables.

4.3 Analysis of the Probability of Derivatives Use

We employ the logistic regression method to assess the determinants for the probability of derivative use. The dependent variable takes on the value of one for REITs that use derivatives, and zero otherwise. Table 6a gives the regression results with variables SZ and M/B, whereas Table 6b excludes SZ and M/B. The t statistics are shown in parentheses. The coefficients for intercepts are not shown. The sample data combines the years 2005 and 2007-- hereinafter, we refer this sample as the full sample.

In addition, to assess the robustness of results, strictly cross-sectional regressions are performed separately on the years 2005 and 2007; hereinafter, they are referred to as subsamples.

Consistent with our hypothesis, Table 6a shows a positive coefficient for all variables that measure the extent of firm focus, including property type focus (Focus/Type), geographic focus (Focus/Region) and the interaction term Type*Region. However, only Type*Region for the full sample is statistically significant at the 10% level. Therefore, the positive correlation between firm focus and hedging is fairly weak. As for the relation between firm transparency and hedging, the evidence also supports our conjecture. Specifically, the coefficient on R^2, a measure of transparency, is significantly negative for all samples. This result is consistent with the theory of DeMarzo and Duffie (1995), in which they hypothesize that managers in less transparent firms have greater incentive to hedge, so that they can convey the abilities to investors with less noise. However, recall in Table 4 univariate comparisons between hedgers and non-hedgers, the difference in their R^2 is not significant. Therefore, we conclude the overall evidence is weak for a negative relation between firm transparency and hedging.

Consistent with most previous studies, Table 6a indicates a significantly positive relationship between the log of firm size and hedging for the full sample and subsamples. The greater inclination of larger firms to employ hedging can be explained by scale economics for information costs and/or transaction costs. The significantly negative relation for REITs TYPE (=1 for equity REITs) is consistent with the notion that mortgage REITs might have more incentives to hedge interest rate risk because their portfolios are inherently more sensitive to interest rate changes. Other coefficients that are significant but only for the full sample are: a negative coefficient for M/B, a positive coefficient for institutional holdings (INST) and a negative coefficient for cash holdings (CASH).

Table 6a: Logistic regression results with variables SZ and M/B

The dependent variable is a dummy = 1 for REITs that hedge and 0 otherwise. The sample contains 153 REITs in 2005 and 127 REITs in 2007, and Table 1 describes the variables. The t statistics are in the parentheses, and the signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Variable	All(280)	2005(153)	2007(127)
Firm Focus:			
Focus/Type	1.403	1.358	2.774
	(0.568)	(0.724)	(0.376)
Focus/Region	1.558	0.658	1.949
	(0.289)	(0.385)	(0.938)
Type*Region	1.341*	0.867	1.569
	(1.766)	(0.957)	(0.776)
Agency Costs:			
R^2	-0.000***	-0.000**	-0.000***
	(2.987)	(2.036)	(3.776)
M/B	-1.021*	-0.725	-1.864
	(1.838)	(0.326)	(0.433)
SELF	-0.108	-0.019	-0.002
	(-1.069)	(0.401)	(0.706)
INST	0.039*	0.019	0.026*
	(1.977)	(1.022)	(1.899)
Control Variable:			
Firm Size: Ln (SIZE)	0.785***	0.738***	0.759***
	(7.570)	(5.387)	(7.568)
Leverage:			
DEBT	1.489	1.689	3.201
	(0.566)	(0.768)	(0.356)
COV	0.0023	0.002	0.004
	(0.443)	(0.585)	(0.325)
RATING	-0.346	-0.407	-0.206
	(0.459)	(0.559)	(0.652)
Substitutes/Liquidity:			
CASH	-7.869*	-7.994	-6.098
	(2.111)	(1.568)	(1.567)
SUBS	-1.026	-1.442	-1.880
	(0.900)	(0.768)	(0.699)
REIT Type:			
TYPE	-2.538***	-3.559***	-2.775**
	(5.633)	(7.787)	(2.569)

The regression in Table 6b excludes two variables, SZ and M/B ratio. The results also point to a weak positive relationship between focus and hedging. Nevertheless, the evidence here is somewhat stronger—property type focus is significantly positive for the full sample as well as 2007 subsample, and the interaction variable Type*Region is significantly positive for the full sample and 2005 subsample. Since the major difference between Tables 6a and 6b is the inclusion of firm size variable, the stronger evidence here for firm focus and hedging relation suggests that firm size effect is stronger than the effects associated with firm focus. The results for other variables are qualitatively similar to those in Table 6a.

Table 6b: Logistic regression results without the variables SZ and M/B

The dependent variable is a dummy = 1 for REITs that hedge and 0 otherwise. The sample contains 153 REITs in 2005 and 127 REITs in 2007, and Table 1 describes the variables. The t statistics are in the parentheses, and the signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Variable	All(280)	2005(153)	2007(127)
Firm Focus:			
Focus/Type	0.835*	0.559	1.309*
	(1.786)	(0.333)	(1.987)
Focus/Region	0.245	0.477	0.297
	(0.453)	(0.345)	(0.459)
Type*Region	1.687**	1.898*	1.266
	(2.468)	(2.045)	(0.758)
Agency Costs:			
R^2	-0.000***	-0.000***	-0.000***
	(2.599)	(2.503)	(2.955)
SELF	-0.026	-0.067	-0.025
	(0.446)	(0.103)	(0.436)
INST	0.064*	0.059	0.055*
	(2.042)	(1.758)	(1.995)
Control Variable:			
Leverage:			
DEBT	0.268	0.316	0.269
	(0.446)	(0.800)	(0.335)
COV	0.001	0.001	0.002
	(0.759)	(0.810)	(0.636)
RATING	0.010	-0.000	0.006
	(0.136)	(0.447)	(0.212)

Substitutes/Liquidity:			
CASH	-5.556	-3.866	-2.023*
	(0.518)	(0.883)	(1.869)
SUBS	-1.296	-1.454	-2.027
	(1.066)	(0.854)	(0.768)
REIT Type:			
TYPE	-0.410***	-0.307***	-0.302*
	(7.788)	(4.056)	(1.866)

Table 6c: Logistic regression results using one focus proxy

The dependent variable is a dummy = 1 for REITs that hedge and 0 otherwise. The sample contains 280 REITs (153 REITs in 2005 and 127 REITs in 2007), and Table 1 describes the variables. The focus proxy is Type (column I), Region (II) and Type*Region (III). The t statistics are in the parentheses, and the signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Variable	I	II	III
Firm Focus:			
Focus/Type	0.759**		
	(2.306)		
Focus/Region		0.553	
		(0.759)	
Type*Region			1.308**
			(2.308)
Agency Costs:			
R^2	-0.000*	-0.000	-0.000*
	(1.906)	(0.854)	(1.846)
SELF	-0.107	-0.035	-0.046
	(0.965)	(0.756)	(0.593)
INST	0.085	0.052	0.063*
	(1.302)	(1.196)	(2.042)
Control Variable:			
Leverage:			
DEBT	0.388	0.199	0.268
	(0.899)	(0.846)	(0.446)
COV	-0.013	0.000	0.001
	(0.560)	(0.308)	(0.758)
RATING	-0.000	0.000	0.009
	(0.406)	(0.637)	(0.135)
Substitutes/Liquidity:			
CASH	-3.229*	-4.064	-2.596
	(1.795)	(0.306)	(0.306)
SUBS	-1.000	-0.845	-1.335
	(0.857)	(1.252)	(0.870)
REIT Type:			
TYPE	-0.765***	-0.331***	-0.365***
	(6.330)	(3.204)	(11.034)

Summarizing the evidence to this point, we find weak evidence supportive of a positive relation between hedging and firm focus and a negative relation between hedging and firm transparency. Both are consistent with our expectations. The evidence also suggests a strong firm size effect: larger firms are more likely to be hedgers. We now turn our attention to the level or dollar amount of derivatives use.

4.4 Analysis of the Level of Derivatives Use

The results of ML estimates on the determinants of the level of hedging are shown in Table 7a and 7b; Table 7a includes SZ and M/B while Table 7b excludes them. The dependent variable is the total notional amount of derivatives over the market value of assets. The mean and the median value of this variable are 0.31 and 0.19, respectively. Stated simply, the results are similar to those in Tables 6a and 6b with one notable exception: the sign of firm size. Recall results in Table 6a, evidence indicate that larger REITs are more likely to use derivatives; here the results indicate that larger REITS hedge a less amount of derivatives relative to assets. Note that the firm size effect is consistent with the findings in Haushalter (1997) and Horng and Wei (1999). A possible interpretation is that larger firms have greater access to hedging expertise thus they tend to hedge; however larger firms tend to hedge to a smaller extent, perhaps due to their lower probability of financial distress. Table 7b that excludes SZ and M/B gives similar results.

Table 7a: The determinants of the level of hedging with the variables SZ and M/B
The dependent variable is the dollar amount of hedging. The sample contains 71 REITs in 2005 and 55 REITs that use derivatives in 2007, and Table 1 describes the variables. The t statistics are in the parentheses, and the signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Variable	All(126)	2005(71)	2007(55)
Firm Focus:			
Focus/Type	1.958	2.499	1.678
	(0.459)	(0.737)	(0.685)
Focus/Region	1.386	1.325	1.501
	(0.442)	(0.853)	(0.625)

Type*Region	0.835*	0.934	0.695**
	(1.896)	(0.942)	(2.451)
Agency Costs:			
R^2	-0.001*	-0.001	-0.001**
	(2.014)	(1.203)	(2.397)
M/B	0.296	0.279*	0.345
	(1.042)	(1.899)	(0.785)
SELF	-0.050*	-0.035	-0.065*
	(1.757)	(1.004)	(2.044)
INST	0.001	-0.000	0.001
	(0.783)	(0.623)	(0.200)
Control Variable:			
Firm Size: Ln (SIZE)	-0.075**	-0.086***	-0.001
	(2.455)	(5.117)	(0.899)
Leverage:			
DEBT	0.539	0.706*	0.428
	(0.474)	(1.996)	(0.788)
COV	0.000	0.000	0.000
	(0.452)	(0.396)	(0.752)
RATING	-0.001	-0.000	-0.002
	(0.747)	(1.028)	(0.853)
Substitutes/Liquidity:			
CASH	-1.757	-1.305	-2.024
	(1.032)	(0.376)	(0.684)
SUBS	-0.409	-1.066	-0.320
	(-0.396)	(0.776)	(0.536)
REIT Type:			
TYPE	-0.567*	-0.409*	-0.762
	(2.082)	(1.965)	(0.705)

Table 7b: The determinants of the level of hedging without the variables SZ and M/B

The dependent variable is the dollar amount of hedging. The sample contains 71 REITs in 2005 and 55 REITs that use derivatives in 2007, and Table 1 describes the variables. The t statistics are in the parentheses, and the signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Variable	All(126)	2005(71)	2007(55)
Firm Focus:			
Focus/Type	1.394	1.306	1.496
	(0.316)	(0.788)	(0.689)
Focus/Region	1.006	0.903	1.136
	(0.798)	(0.824)	(0.395)
Type*Region	0.902*	1.144*	0.840
	(2.000)	(1.845)	(0.512)
Agency Costs:			

R^2	-0.000*	-0.000*	-0.000*
	(2.122)	(2.140)	(2.100)
SELF	-0.015*	-0.013**	-0.017*
	(2.019)	(2.458)	(2.226)
INST	0.000	-0.000	0.000
	(0.850)	(0.448)	(0.265)
Control Variable:			
Leverage:			
DEBT	0.521*	0.539**	0.577*
	(1.867)	(2.354)	(2.036)
COV	0.000	0.000	0.000
	(0.109)	(0.298)	(0.332)
RATING	-0.000	-0.000	-0.000
	(0.779)	(0.645)	(0.552)
Substitutes/Liquidity:			
CASH	-0.755	-0.739*	-0.783
	(1.146)	(2.042)	(0.896)
SUBS	-0.376	-0.590	-0.201
	(0.455)	(0.519)	(0.398)
REIT Type:			
TYPE	-0.674*	-0.682*	-0.618*
	(2.002)	(1.962)	(2.231)

Table 7c: The determinants of the level of hedging using one focus proxy

The dependent variable is the dollar amount of hedging. The sample contains 126 REITs (71 REITs in 2005 and 55 REITs in 2007), and Table 1 describes the variables. The focus proxy is Type (column I), Region (II) and Type*Region (III). The t statistics are in the parentheses, and the signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Variable	I	II	III
Firm Focus:			
Focus/Type	2.306		
	(0.758)		
Focus/Region		1.205	
		(0.898)	
Type*Region			0.746*
			(1.886)
Agency Costs:			
R^2	-0.000*	-0.000	-0.000*
	(2.203)	(1.506)	(2.231)
SELF	-0.006	-0.009	-0.030*
	(1.068)	(1.753)	(2.135)
INST	0.000	0.000	0.000*
	(1.502)	(0.762)	(0.850)
Control Variable:			
Leverage:			
DEBT	0.946	0.332*	0.490*
	(1.032)	(1.996)	(2.564)
COV	-0.000	0.000	0.000
	(0.967)	(0.562)	(0.109)
RATING	-0.000	-0.000*	-0.000
	(1.552)	(1.884)	(0.906)
Substitutes/Liquidity:			
CASH	-0.493	-0.695	-0.755
	(0.394)	(1.339)	(1.146)

SUBS	-0.534	-0.409	-0.376
	(1.307)	(0.972)	(0.455)
REIT Type:			
TYPE	-0.703*	-0.697**	-0.677*
	(2.130)	(2.309)	(2.016)

4.5 Swap Users versus Non-hedgers

As mentioned earlier, previous studies suggest additional motives for interest-rate swaps. For example swaps can be used to control the asset substitution problem. Also, Titman (1992) theorizes that firms expecting improvements in operations have an incentive to borrow a floating rate loan and swap it into a fixed rate loan. The intuition is that when the operation does improve, the risk premium on the floating rate loan can be adjusted lower while the swap allows the firm to keep most of the interest payments fixed, reducing interest rate risk.

The sample here removes REIT hedgers that do not use swaps; stated differently, it excludes hedgers that utilize options only. The numbers of REITs that use only options are 31 in 2005 and 26 in 2007s; accordingly the sample sizes are 122 in 2005 and 101 in 2007, respectively.

The regression results are displayed in Table 8a (with the variables SZ and M/B) and Table 8b (without SZ and M/B). The dependent variable takes on the value of one for swap hedgers and zero for non-hedgers. In Table 8a, firm focus (represented by the product of Focus/Type and Focus/Region) and firm size (represented by the log of firm size) are both positively associated with the possibilities of using swap, while the coefficients of REIT TYPE are negative for all samples. The findings are similar to the earlier results. That is, REITs that are more concentrated in their main businesses are more likely to employee interest-rate swaps, especially for mortgage REITs. Further, the higher the level of transparency, the lower the usage of swap.

Table 8a: Logistic regression: comparisons between swap users and non-hedgers

The dependent variable is a dummy = 1 for REITs that use swaps and 0 for non-hedgers. The sample contains 122 REITs in 2005 and 101 REITs in 2007, and Table 1 describes the variables. The t statistics are in the parentheses, and the signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Variable	All(223)	2005(122)	2007(101)
Firm Focus:			
Focus/Type	1.626	1.784	1.903
	(0.456)	(0.826)	(0.778)
Focus/Region	1.639	1.806	1.566
	(0.551)	(0.697)	(0.856)
Type*Region	1.640*	1.692*	1.629*
	(1.879)	(1.993)	(2.100)
Agency Costs:			
R^2	-0.000	-0.000	-0.000*
	(1.768)	(1.235)	(1.958)
M/B	-2.930	-2.846	-3.201
	(0.747)	(0.593)	(1.067)
SELF	-0.040	-0.033	-0.008
	(1.233)	(0.865)	(0.559)
INST	0.006	0.005	0.096
	(0.632)	(1.342)	(1.455)
Control Variable:			
Firm Size: Ln (SIZE)	3.467**	3.303 *	3.796**
	(2.259)	(2.154)	(2.356)
Leverage:			
DEBT	1.343	1.694	1.526
	(0.752)	(0.824)	(1.427)
COV	-0.009	-0.009	-0.009
	(0.858)	(1.407)	(0.122)
RATING	-1.030	-1.040	-1.039*
	(1.667)	(1.424)	(2.226)
Substitutes/Liquidity:			
CASH	-16.203	-16.927	-11.338
	(0.425)	(0.876)	(1.339)
SUBS	-3.749	-3.213	-4.084
	(1.515)	(1.203)	(1.049)
REIT Type:			
TYPE	-1.879***	-1.893***	-1.609***
	(5.388)	(5.246)	(3.626)

Table 8b: Logistic regression: comparisons between swap users and non-hedgers the variables SZ and M/B

The dependent variable is a dummy = 1 for REITs that use swaps and 0 for non-hedgers. The sample contains 122 REITs in 2005 and 101 REITs in 2007, and Table 1 describes the variables. The t statistics are in the parentheses, and the signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Variable	All(223)	2005(122)	2007(101)
Firm Focus:			
Focus/Type	1.232*	1.276*	1.864*
	(1.998)	(1.979)	(1.853)
Focus/Region	1.503	1.513	1.428
	(1.396)	(1.027)	(1.285)
Type*Region	1.807*	1.695*	2.403**
	(2.024)	(1.951)	(2.449)
Agency Costs:			
R^2	-0.000*	-0.000*	-0.000
	(1.853)	(2.092)	(1.424)
SELF	-0.018	-0.019	-0.012
	(0.762)	(0.618)	(0.856)
INST	0.000	0.000	0.006
	(1.588)	(1.305)	(0.510)
Control Variable:			
Leverage:			
DEBT	1.069	0.956	1.732
	(0.645)	(0.967)	(1.256)
COV	-0.003	-0.005	0.001
	(1.200)	(1.453)	(0.762)
RATING	-0.874	-0.764	-1.000*
	(1.389)	(1.477)	(2.178)
Substitutes/Liquidity:			
CASH	-7.004	-7.037	-6.892
	(0.325)	(0.190)	(0.791)
SUBS	-2.053	-1.902	-2.225
	(0.967)	(1.406)	(0.847)
REIT Type:			
TYPE	-1.044*	-0.963*	-1.101*
	(2.149)	(1.834)	(2.200)

Table 8c: Logistic regression using one focus proxy: comparisons between swap users and non-hedgers
The dependent variable is a dummy = 1 for REITs that use swaps and 0 for non-hedgers. The sample contains 223 REITs (122 REITs in 2005 and 101 REITs in 2007), and Table 1 describes the variables. The focus proxy is Type (column I), Region (II) and Type*Region (III). The t statistics are in the parentheses, and the signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Variable	I	II	III
Firm Focus:			
Focus/Type	2.065**		
	(2.277)		
Focus/Region		1.904	
		(1.029)	

Type*Region			1.997*
			(2.106)
Agency Costs:			
R^2	-0.000*	-0.000	-0.000*
	(1.796)	(1.177)	(2.034)
SELF	-0.029*	-0.018	-0.018
	(1.826)	(0.762)	(0.762)
INST	0.001	0.000	0.000
	(1.034)	(0.825)	(1.350)
Control Variable:			
Leverage:			
DEBT	1.205	1.452	1.119
	(0.416)	(0.804)	(0.402)
COV	-0.000	-0.001	-0.003
	(0.389)	(1.037)	(0.387)
RATING	-0.796	-0.798	-0.803*
	(1.253)	(1.469)	(1.879)
Substitutes/Liquidity:			
CASH	-6.587	-7.296	-7.063
	(0.268)	(0.773)	(0.501)
SUBS	-1.677	-1.896	-1.889
	(0.705)	(0.534)	(0.563)
REIT Type:			
TYPE	-1.259**	-1.926*	-1.325*
	(2.361)	(2.068)	(2.198)

Regressions concerning the amount or level of swap usage are given in Table 9a (with SZ and M/B) and Table 9b (without SZ and M/B). The numbers of swap hedgers are 40 in 2005 and 29 in 2007. The dependent variable is the amount of interest-rate swaps over the market value of assets, and the mean and median are 0.15 and 0.10; which suggests that swaps only account for less than half of the total level of hedging on average. The conclusions are generally the same, with one exception: the signs of the firm size. Here the sign of firm size is positive whereas the corresponding coefficient in Table 7b is negative. That is, not only larger firms have a greater tendency to use swaps, they also tend to engage in greater amount of swap contracts. The latter can be explained by the following: interest rate swap is a convenient tool in managing interest

rate risk. Larger firms typically have more complex financial structure than small firms; if so, it would be sensible for them to actively use interest rate swaps.

Table 9a The determinants of the level of swap usage

The dependent variable is the dollar amount of swaps. The sample contains 71 REITs in 2005 and 55 REITs that use derivatives in 2007, and Table 1 describes the variables. The t statistics are in the parentheses, and the signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Variable	All(69)	2005(40)	2007(29)
Firm Focus:			
Focus/Type	1.203	0.942	1.329
	(0.421)	(1.253)	(0.746)
Focus/Region	1.883	2.002	1.819
	(1.338)	(1.467)	(1.002)
Type*Region	0.573*	0.523*	0.584*
	(2.259)	(1.830)	(2.056)
Agency Costs:			
R^2	-0.000*	0.000	-0.000*
	(2.022)	(1.366)	(2.233)
M/B	-0.074	-0.083	0.024
	(0.125)	(0.435)	(0.751)
SELF	-0.009	-0.012	-0.004
	(1.244)	(1.302)	(0.886)
INST	0.001	0.002	0.001
	(1.020)	(0.774)	(0.738)
Control Variable:			
Firm Size: Ln(SIZE)	0.018*	0.015*	0.028**
	(2.263)	(1.775)	(2.538)
Leverage:			
DEBT	0.002	0.001	-0.040
	(0.788)	(0.935)	(1.023)
COV	-0.001	-0.001	0.000
	(0.266)	(0.473)	(0.100)
RATING	-0.050	-0.051	-0.037
	(0.544)	(0.638)	(0.728)
Substitutes/Liquidity:			
CASH	0.122	0.093	0.189
	(1.477)	(1.023)	(0.566)
SUBS	-0.334	-0.396	-0.306
	(1.259)	(0.766)	(1.344)
REIT Type:			
TYPE	0.020	0.014	-0.028*
	(0.788)	(0.553)	(1.909)

Table 9b The determinants of the level of swap usage without the variables SZ and M/B

The dependent variable is the dollar amount of swaps. The sample contains 71 REITs in 2005 and 55 REITs that use derivatives in 2007, and Table 1 describes the variables. The t statistics are in the parentheses, and the signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Variable	All(69)	2005(40)	2007(29)
Firm Focus:			
Focus/Type	0.297	0.380	0.435
	(0.122)	(0.497)	(0.233)
Focus/Region	0.813	0.790	0.874
	(1.525)	(1.243)	(0.786)
Type*Region	1.894*	1.950*	1.427*
	(2.153)	(1.803)	(1.995)
Agency Costs:			
R^2	-0.000*	-0.000*	-0.000*
	(2.169)	(2.088)	(2.269)
SELF	-0.057*	-0.066**	-0.003
	(2.134)	(2.403)	(1.468)
INST	-0.000	-0.001	0.001
	(0.588)	(1.204)	(1.023)
Control Variable:			
Leverage:			
DEBT	-0.040	-0.051	-0.031
	(1.233)	(1.175)	(0.967)
COV	-0.000	-0.000	0.000
	(0.352)	(0.786)	(0.642)
RATING	-0.009	-0.010	-0.007
	(1.204)	(1.548)	(1.535)
Substitutes/Liquidity:			
CASH	0.127	0.114	0.151*
	(1.033)	(1.468)	(1.337)
SUBS	-0.109	-0.114	-0.096
	(1.425)	(1.732)	(1.203)
REIT Type:			
TYPE	0.020*	0.020*	-0.019*
	(2.255)	(2.176)	(2.004)

Table 9c The determinants of the level of swap usage using one focus proxy

The dependent variable is the dollar amount of swaps. The sample contains 69 REITs (71 REITs in 2005 and 55 REITs in 2007) that use derivatives, and Table 1 describes the variables. The focus proxy is Type (column I), Region (II) and Type*Region (III). The t statistics are in the parentheses, and the signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Variable	I	II	III
Firm Focus:			
Focus/Type	0.409*		
	(1.840)		
Focus/Region		0.976	
		(1.212)	
Type*Region			1.980*
			(2.203)
Agency Costs:			
R^2	-0.000*	-0.000*	-0.000*
	(1.935)	(2.117)	(2.202)
SELF	-0.259	-0.009	-0.042*
	(1.505)	(1.036)	(2.093)
INST	-0.000*	-0.000	-0.000
	(1.905)	(1.439)	(0.374)
Control Variable:			
Leverage:			
DEBT	-0.016	-0.059	-0.022
	(0.585)	(1.510)	(1.396)
COV	-0.000	-0.000	-0.000
	(0.993)	(0.744)	(0.372)
RATING	-0.002	-0.010	-0.008
	(1.069)	(1.535)	(1.652)
Substitutes/Liquidity:			
CASH	0.096	0.103	0.104
	(1.206)	(1.498)	(1.442)
SUBS	-0.068	-0.090	-0.090
	(0.892)	(1.502)	(0.934)
REIT Type:			
TYPE	0.079**	0.013*	0.021*
	(2.352)	(2.147)	(2.224)

4.6 A robustness check using lagged values of independent variables

Firm focus or transparency might be endogenous or simultaneously determined along with firms' hedging operations. To address this concern, in this section we explore the relationship between the probability of derivatives use and firm focus in prior year, as a robustness check. Specifically, the dependent variable here is hedging activity in 2007, whereas all independent variables are observations from 2005. The results are given in Table 10a and 10b. Again, we present two regression models: one includes REITs' sizes and M/B ratios as the explanatory variables and another without them. Consistent with results of contemporaneous regressions, firm size has a significant positive effect on hedging choice. This indicates that larger firms are more inclined to employ hedging programs. More important to our study, we find a positive relationship between firm focus and hedging, consistent with the notion that REITs with more focus on their main businesses are more likely to hedge. However, as in earlier analyses, the evidence for the relation is not overwhelming and the relation is only significant when the firm size variable is excluded. One major finding that is different from our prior results is that the relation between R^2 and the probability of hedging is statistically insignificant although it remains to be negative. Thus the overall evidence for a negative association between hedging and firm transparency is not strong.

Table 10a: Logistic regression results – A robustness check

The dependent variable is a dummy = 1 for REITs that hedge and 0 for non-hedgers. The sample contains 153 REITs in 2005 and 127 REITs in 2007, and Table 1 describes the variables. This regression uses the values of REITs focus and transparency in 2005 on hedging behaviors in 2007. The sample size is 127 REITs that exist for both years. There are two regressions: one with SZ and M/B as control variables and the other without SZ and M/B. The t statistics are in the parentheses, and the signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Variables	w/ SZ & M/B	w/o SZ & M/B
Firm Focus:		
Focus/Type	1.028	0.238
	(0.246)	(0.647)
Focus/Region	1.034	0.196

	(0.322)	(0.435)
Type*Region	1.129	1.104**
	(1.132)	(2.545)
Agency Costs:		
R^2	-0.000	-0.000
	(0.675)	(0.963)
M/B	-1.325*	-
	(2.156)	-
SELF	-0.076	-0.045
	(0.987)	(0.756)
INST	0.049*	0.063*
	(2.254)	(2.057)
Control Variable:		
Firm Size: Ln(SIZE)	1.163***	-
	(5.336)	-
Leverage:		
DEBT	1.036	0.640
	(0.846)	(1.755)
COV	0.004	0.002
	(0.238)	(0.623)
RATING	-0.097	-0.008
	(0.536)	(0.387)
Substitutes/Liquidity:		
CASH	-5.259*	-4.034*
	(2.114)	(1.924)
SUBS	-0.642	-0.998
	(0.900)	(0.524)
REIT Type:		
TYPE	-2.167***	-0.409***
	(3.895)	(4.953)

Table 10b: Logistic regression results using one focus proxy

The dependent variable is a dummy = 1 for REITs that hedge and 0 for non-hedgers. The sample contains 280 REITs (153 REITs in 2005 and 127 REITs in 2007), and Table 1 describes the variables (SZ and M/b are excluded). This regression uses the values of REITs focus and transparency in 2005 on hedging behaviors in 2007. The sample size is 127 REITs that exist for both years. The focus proxy is Type (column I), Region (II) and Type*Region (III). The t statistics are in the parentheses, and the signs ***, ** and * denote significance at 1%, 5%, and 10% level, respectively.

Variables	I	II	III
Firm Focus:			
Focus/Type	1.265		
	(0.925)		
Focus/Region		1.721	

		(0.322)	
Type*Region			1.339*
			(1.906)
Agency Costs:			
R^2	-0.000	-0.000	-0.000
	(0.795)	(1.265)	(1.629)
SELF	-0.049	-0.057	-0.072
	(0.306)	(0.423)	(1.395)
INST	0.026*	0.010*	0.052
	(2.039)	(2.293)	(1.729)
Control Variable:			
Leverage:			
DEBT	0.906	1.116	1.067
	(0.792)	(1.395)	(1.035)
COV	0.002	0.004	0.004
	(0.704)	(0.603)	(0.965)
RATING	-0.070	-0.089	-0.103
	(0.952)	(0.755)	(0.239)
Substitutes/Liquidity:			
CASH	-3.265	-5.323*	-5.703*
	(1.603)	(2.203)	(2.825)
SUBS	-0.706	-0.645	-0.662
	(1.356)	(1.369)	(0.638)
REIT Type:			
TYPE	-2.036***	-2.120***	-2.115***
	(2.956)	(3.201)	(3.261)

5. Conclusions

In this study, we examine the use of derivatives in the REIT industry. We find 46.41% utilization rate in 2005 and 43.41% in 2007. Consistent with our hypothesis, we find that, relative to diversified firms, focused firms are more likely to engage in hedging. Focused firms also tend to be involved in greater amount of hedging. However, the evidence is not strong because not all measures of firm focus are statistically significant.

Additional results are as follows. Consistent with our expectation and with DeMarzo and Duffie (1995), we document a negative relation between hedging and transparency. However, the evidence is also weak, since the univariate comparison between hedgers and non-hedgers does not indicate a significant difference in firm. Our results support a firm size effect that is consistent with previous literature. Namely, larger REITs are more likely to hedge, but their hedge amounts tend to be smaller (relative to their assets) than their smaller counterparts. A possible explanation is as follows: larger firms tend to hedge due to economies of scale in entry costs or execution costs, but they hedge smaller amounts because they are less likely to be in financial distress.

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Chapter 3

Bank Performance and Board Structure:

The Case of US and Chinese Banks

Abstract

In this paper, we examine the relation between bank performance and board structure by using a sample of 74 US banks and 53 Chinese banks for the period 2002 to 2006. We expect that the effectiveness of board to be less in China, due to the stronger role of government. Indeed, the empirical relation between board structure and performance is virtually non-existing in China. In particular, for the US sample, the board size is found to be significantly and negatively correlated with ROA, but a larger board also tends to be associated with lower costs. For Chinese banks, the evidence indicates that governance variables are not significantly correlated with performances with the exception of block ownership: there is strong evidence that the relation between block ownership and bank performance is negative. In China, block ownership primarily comes from government shares. Therefore, the overall evidence is consistent with our conjecture that the role of board governance structure is of secondary importance in Chinese banks, perhaps due to the strong role of government. Additionally, we find substantial differences in board structure between the two countries; in particular the average board size and the proportion of outside directors for US banks are almost twice of those in China.

1. Introduction

Much of the literature on board structure documents that the effectiveness of board affects performances, but the majority of which examine non-financial firms[9]. In this study, we examine the relation between board structure and performance in the Chinese and US banking industry.

One of our major objectives is to examine the role of government ownership. The Chinese banking industry is characterized by substantial government ownership. It is likely that substantial government ownership will reduce the effectiveness of bank board monitoring. Therefore, we expect the relation between board structure and performance to be weaker in China relative to that in the US.

Extant research on banks governance focuses on the relation between performance and ownership structure. In contrast, we concentrate on the interaction between performance and board structure, rather than ownership structure. It is conceivable, and recent turmoil suggests, that with the increased pace of securitization (especially since mid 80s), even large owners may not be able to adequately assess a bank's risk, but board members might with generally closer association with managers. To the extent this argument is correct, it is at least equally important to examine the relation between board structure and performance.

Because banks are heavily regulated, it is also conceivable that banking firm governance differs from that of unregulated firms. On the one hand, regulation might serve as an alternative form of monitoring, thus reducing the role of the board structure. On the other hand, if deposit insurance premium is not priced correctly or if securitization leads to improper risk transfer,

[9]See in particular Boone et al. (2007) and Coles et al. (2008).

some bank managers might pursue riskier customers and activities[10]; as such, the board's role might be critical.

The existing literature remains mainly concerning the U.S. and Europe (Berger et al., 2005; Iannotta et al., 2007), where the governance systems are quite different from those found in China and other transition economies (Cull et al., 2005). Therefore, we perform an empirical comparison of US and Chinese banks. The interesting points about Chinese banks are their rapid growth, their large size, and heavy government ownership. La Porta et al. (2002) find that government ownership of banks is rather prevalent around the world, so examining a representative country in that regard is potentially useful. If regulation serves as an alternative form of monitoring, corporate governance for Chinese banks is likely to be less important than that of the US banks. However, there are some potential offsetting factors: most of them are newly-listed and growing rapidly; the merger market in Chinese markets is virtually non-existing; further, they represent the dominant source of corporate financing because both the stock market and bond market are relatively small and very volatile. It is not impossible that public scrutiny on bank corporate governance might be more intense in a fast-growing industry, in an industry where outside threat is lacking, in an industry that is critical for economy growth, and in an industry where reform has recently been introduced, and competition among managers has intensified. Thus, whether the influence of board structure is stronger or weaker in the China is largely an empirical issue. To our knowledge, there is no research about bank board structure in China[11].

[10] In a theoretical model, Allen and Carletti (2006) argue that when banks with idiosyncratic liquidity risk transfer credit risk via securitization, welfare declines. They further suggest that when these banks hedge the risk through derivatives markets, it can increase the risk of crisis—a prediction that seems accurate.

[11] China has increasingly emphasized the importance of corporate governance, and the corporate governance in the Chinese economy has recently received a lot of attention in the literature (Sun and Tobin, 2005).

In sum, bank governance is unique and changes in banking environment during the 1990s and early 2000s substantially altered the governance of the world's banking organizations. What is the effect of board structure on bank performance? In order to address this issue, this paper aims to empirically analyze the relation between bank performance and board structure, in one of the developed economics -- the US bank industry, and one in developing economies -- Chinese banks. Our findings find a significant relation between the board size and bank performance in the US sample, but the evidence is mixed and varies with performance measures. For China, evidence implies that block ownership is an important determinant of Chinese bank performance. There is no other significant relationship between board governance and bank performance for either country. Therefore, the overall evidence suggests that board structure is only weakly linked to performances.

The structure of our paper is as follows. The next section presents a review of literature. Section 3 discusses the expected relation between board structure and performance. The data and methodology are given in section 4. In section 5, we examine the link between board structure and banking performance. We conclude in section 6.

2. Literature Review

In this section, we review research on the performance effects of corporate governance. We first concentrate on the broader set of studies on non-financial firms, then on financial firms. This is followed by a discussion of the Chinese banking system.

2.1 The Performance Effect of Board Structure in Non-Financial Firms

From the agency theory perspective, the objective of corporate governance is to ensure that managers resort to value maximizing strategies (Shleifer and Vishny, 1997). Most empirical studies in corporate governance focus on the linkage between corporate governance and firm performance. There are many related studies; because our main interest is in the banking industry, we only discuss a few representative papers.

Linck, Netter and Yang (2008) and Hermalin and Weisbach (1998) analyze the determinants of board structure. They indicate that the three important measures of board structure are board size, board independence, and board leadership. Boone et al. (2007) imply board structure reflects a firm's competitive environment and managerial team. Coles et al. (2007)[12] shows that the market-to-book ratio increases with the board size for complex firm and with the percentage of insiders on the board for firms in which firm-specific knowledge is important. Weisbach (1988), Byrd and Hickman (1992) and Rosenstein and Wyatt (1990) find positive relation between abnormal returns and outside board membership. Regarding CEO/Chair duality, Brickley, Coles, and Jarrell (1997) document that the duality concentrates management's power and might exacerbate potential conflicts of interest, and results in a less effective monitoring of the CEO.

The concern for corporate governance is evident from studies on markets around the world. For example, several studies show that the negative board size effects exist for publicly traded firms in other countries, for example: Conyon and Peck (1998) in a sample of publicly

[12] This paper reexamines the relation between firm value and board structure. They find that complex firms, which have greater advising requirements than simple firms, have larger boards with more outside directors. The relation between Tobin"s Q and board size is U-shaped, which suggests that either very small or very large boards are optimal. Moreover, they find some evidence that R&D-intensive firms, for which the firm-specific knowledge of insiders is relatively important, have a higher fraction of insiders on the board and that, for these firms, Q increases with the fraction of insiders on the board.

traded firms in the UK, France, the Netherlands, Denmark and Italy; and de Andres, Azofra and Lopez (2005) in a sample of firms from ten OECD countries. However, Jong et al. (2000) report insignificant board size effects in Dutch firms. These studies nevertheless investigate primarily developed countries, and our understanding of corporate governance in emerging markets is lacking.

Regarding the relationship between board structure and firm performance in China, a few studies investigate non-financial firms and find some evidence that implies board structure might affect the firm performance (Wen et al., 2002).

Li and Naughton (2007) focus on the corporate governance reform in China and they suggest that board size is positively related to short-term returns, while in the long-run, a positive relationship exists between performance and the voluntary post-listing separation of the roles of CEO and Chair of the Board.

Chen and Lin (2007) examine the relationship between corporate governance and corporate fraud, and their results reveal a lower proportion of independent members in board of directors for firms experiencing corporate fraud than for no-fraud firms; and they also imply that the firms with duality of CEO and COB are more likely to commit corporate fraud than the other firms. Moreover, Long (2008) indicates that, earnings management is positively influenced by the CEO duality and negatively affected by concentration ownership, board size and proportion of independent directors.

In sum, Su, Xu and Phan (2008) argue that ownership concentration of Chinese listed firms have a U-shaped relationship with board compensation, board size and the presence of independent directors, which provides corroborating evidence that principal–principal conflict can lead to high agency costs.

2.2 The Performance Effect of Board Structure in the Banking Industry

Banks' regulatory structure is unique; it focuses on reducing losses associated with bank failure as well as fair lending. In return for access to federal deposit insurance, banks face regulation related to such areas as safety and soundness, fair lending practices, and consumer protection. Flannery (1994) notes that because of the structure in the banking industry and the high degree of leverage with which banks operate, the impact of managerial actions on shareholder wealth is magnified. It is frequently argued that deposit insurance that is not priced to fully reflect the risk of the institution provides owners and managers with additional incentives to enhance risk-taking behavior. This suggests a greater need for the monitoring of management to insure that decisions are consistent with shareholder wealth maximization. Additionally, the lack of hostile takeovers in this market suggests that external discipline for managers is weak (Booth, Cornett, and Tehranian, 2002). Taking these factors into considerations, it can be argued that benefit of aligning the incentives of managers and shareholders may be as important in banking firms as in less regulated industrial firms.

On the other hand, during the 1990s the U.S. commercial bank regulation focuses on the prompt corrective action. Thus, managerial decisions, and their impact on the safety and soundness of the bank, are monitored closely by regulators. To the extent that monitoring by regulators limits the amount of managerial discretion (and thus its effects on shareholder wealth), board monitoring becomes less important.

Macey and O'Hara (2003) argue that a broader view of corporate governance should be adopted in the case of banking institutions, and corporate governance mechanisms for banks should take care of the interests of depositors as well as shareholders. Depositors do not know the true value of a bank's loan portfolio, as such information is incommunicable and very costly

to reveal. This information asymmetry gives bank managers an incentive to invest in riskier assets than they promised[13]. Thus the specialty of the banking firm requires public protection of depositors from opportunistic bank management. However, this specialty also affects the relationship between shareholders and managers and the existence of deposit insurance may reduce the need for banks to raise capital from large, uninsured investors who have the incentive to exert corporate control.

The competition in the product or service market may act as a substitute for corporate governance mechanisms. However, the banking industry, due to its information-intensive nature and deposit insurance, may be less competitive than other business sectors. Therefore, this lack of competitive pressure suggests that banks may need stronger corporate governance mechanisms than other firms.

Previous empirical studies analyze the relation between corporate governance and bank performance. Most of them study the relation between the ownership and bank performance[14]. However, few look at the role of board structure. To our knowledge, Adams and Mehran (2008) is the only one that examines the relation between board structure and performance for banks. They find a non-negative relationship between board size and performance[15] and suggest that the advantages of larger boards may outweigh their costs. This study is similar to ours. However, there are several differences. First, their examination period ends before 2000, while ours is post-2002 when Sarbanes-Oxley Act (SOX) is enacted. The SOX imposes stronger director liability. Moreover, this period is characterized by a huge expansion of the securitization. The importance

[13] For example, managers might choose to invest in reputation capital (Bhattacharya et al., 1998).

[14] Saunders et al. (1990) study the relationship between bank ownership structure and risk taking during the period of deregulation, and Iannotta et al. (2007) suggest that the degree of ownership concentration is positively related with the bank's loan quality and asset control but do not significantly affects its profitability.

[15] This is opposite with the negative relationship between board size and performance documented in non-banks (Hermalin and Weisbach, 1998).

of board is likely to be different from that before SOX. Second, we also examine the Chinese bank board structure, another important banking sector. In addition, we examine three important dimensions of board structure: board size, board independence, and board leadership, while they focus on the effects of board size.

2.3 What's Special about Corporate Governance in Chinese Banks?

2.3.1 Background of Chinese Banking

In China, there are four major types of banks: policy banks (3), big nationwide commercial banks with substantial state ownership (Big Four), regional commercial banks (13), and city commercial banks (117). A considerable number of city commercial banks are not publicly traded. There are also numerous, non-publicly-traded credit unions and mutual banks. In this study, we focus on big nationwide banks, regional banks, and city commercial banks for which data is available. In terms of the total asset size, the Chinese banking sector is quite large, only smaller than the US and Japan. In terms of the number of banks and credit unions, the Chinese sector is probably the largest in the world.

It should be noted that the banking sector in China is dominated by the "Big Four" state-owned banks (Industrial and Commercial Bank of China, Bank of China, Agricultural Bank of China, and China Construction Bank), which together account for about three-fifths of the market in 2005 (Standard & Poor's, 2005). The Big Four face little competitive threat and seem to be better known for their inadequate risk control than their contribution to the economy, which is due to the legacy of years of forced policy and political lending to unprofitable state-owned enterprises (SOEs). It should be noted that La Porta et al. (2002) find that government ownership of banks is rather prevalent around the world and that it is often associated with subsequent

lower productivity and development, consistent with "political" theories of government ownership.

In 1998 the government issued a special bond worth US$33 billion and injected the raised capital into the banks. In 1999–2000 the state established four asset management companies (AMCs) and transferred US$170 billion of non-performing loans to them for debt-for-equity swaps. However, bad loans continue to grow despite the efforts of the government. Overall, these facts suggest that recapitalizing banks and selling off bad loans seems unlikely to be enough without improving governance.

These problems mainly derive from the politicization and socialization of the state banking system. State-owned banks are expected to support a wide range of political and social activities, are directed by multiple principals, and operate under a number of constraints. This institutional arrangement might lead to time inconsistency problem (Kydland and Prescott, 1977) and the inconsistency across discretionary policies over time lends itself to abuse for political and social objectives. It could also lead to the absence of credible financial discipline and easy access to government funds. In such a set-up, managers might elect to take excessive risk.

2.3.2 Distinctive characteristics of corporate governance in Chinese banks

Many listed companies are still owned by various layers of governmental agencies and state enterprises. The newly listed firms face two important institutional constraints: (1) government-controlled shares and assets are prohibited to be sold to the public, and (2) government maintains the ultimate decision right on the appointment of chief executive officers (CEOs). These might lead to lower degree of board independence. Moreover, the tradable shares

are widely held by individual investors, which make it difficult for minority tradable shareholders to take an active part in corporate governance.

A second characteristic is that state shareholding incurs some principal-agency problems. Due to the non-transferability of the state owned shares and assets, the government and politicians cannot benefit from any efficiency improvement of the firm by freely selling off some of the state ownership. Because total firm value is hard to measure when most of its shares are non-transferable, the wealth of the politician depends on a set of macroeconomic and political factors rather than the firm performance, and it is important for the politician to improve the employment rate and the fiscal conditions of the region, building relationships (perhaps through trading favors with colleagues and superiors), and so on. Achieving these objectives may increase the politician's incomes and promotion opportunities, but it can reduce the efficiency and value of the enterprise (Shleifer and Vishny, 1997).

The third one is the problem of insider control, potentially more serious for Chinese banks for three reasons. First, excessive concentration of non-tradable shareholdings leads to the lack of both hostile takeover and proxy contests, which facilitates management entrenchment. Second, it is less likely for widely dispersed tradable shareholders to monitor sufficiently and this tends to increase insider discretion. Third, the appointment and evaluation of management are often determined by the controlling shareholders, which may result in rent-seeking behavior and collusion between the controlling shareholders and management. It should be noted that managerial ownership is extraordinarily low in Chinese banks. The average proportion of ownership in the hands of management, directors, and supervisors was 0.000543 percent in 2005 and 0.00174 percent in 2006. Neither long-term, equity-based programs nor performance-based

compensation programs are widely put into practice. The incentive alignment between the shareholders and management arguably is inadequate.

On the performance effect of corporate governance for Chinese banks, Wang and Kumbhakar (2007) find that joint-holding firms perform better than wholly-stated-owned banks. However, there is no corresponding research on the board structure.

Overall, the governance of Chinese banks has several problems. Therefore, we expect a generally weaker relation between board structure and performance for Chinese banks compared to the US.

3. Expected relation between board structure and performance

Linck, Netter and Yang (2008) point out three important aspects of board structure: board independence, board size, and board leadership. Consequently, these three variables are the focus of this research. The following gives a more detailed review of related studies, from which we form our expectations.

3.1 Board Independence

Fama and Jensen (1983) suggest that more outside directors increase a board's monitoring effectiveness. A number of studies on the proportion of outside directors find a positive relation between the abnormal returns associated with outside board membership (Byrd and Hickman, 1992; De Andres et al., 2005; Rosentein and Wyatt, 1997)[16].

For the case of Chinese banks, due to the dominance of the largest shareholders in Chinese listed banks, the ratio of independent directors on a board may be of particular

[16] Hermalin and Weisbach (1998), however, find no relation between the percentage of outside directors and the general level of firm performance as measured by Tobin's Q.

importance, and might help to test indirectly the level of board independence. However, because the CEO or chairman has discretion to select members of the board, many of the independent directors may be actually friends of management, that is, many "independent" directors are not really independent. The press has reported on a number of cases in which independent directors did nothing to resolve a conflict between insiders and minority shareholders.

We adopt another proxy for independence: state ownership. The degree of ownership concentration affects the nature of contracting. For example, when the ownership is diffuse in the U.S., agency problems come mainly from the conflict of interest between outside shareholders and managers. However, in Asia, the ownership is concentrated, the nature of the agency problem shifts away from manager-shareholder conflicts toward conflicts between the large shareholder and minority shareholders. As mentioned above, because of the dominant control of the non-tradable state owned shares in the Chinese banks, their management is likely affected by politicization and socialization, and the government takes a large role in Chinese bank corporate governance.

Given the above discussion, if outside directors are independent, then there should be a positive relationship between the proportion of independent members on the board of directors and bank performances. Moreover, state-owned banks or banks with CEO/COB duality tend to perform poorer than other banks.

3.2 Board Size

Board size may affect the ability of bank boards to function effectively. Resource dependence theory has been one foundation for the perspective: larger boards are associated with higher levels of firm performance (Goodstein et al., 1994). In their view, board size may be a

measure of an organization's ability to form environmental links to secure critical resources. Increased board size also gives rise to a larger pool of expertise and counsel for entity decision-making. A larger board size may be particularly beneficial for banks due to relation banking. For example, it is not uncommon for a large customer to sit on the board. Indeed, compared to other industries, banking is special for its typically larger size of board. For a typical corporation, Lipton and Lorsch (1992) propose an optimum board size of around 7 or 8 directors. Using a sample of US non-financial firms, Yermack (1996) finds that the mean of board members is about 12. In contrast for banks, Adams and Mehram (2008) document bigger boards of the US banking sample, with a mean of 17.97 during the period 1986 and 1999.

Nevertheless, researchers have far from achieving consensus on the optimal board size. Firstenberg and Malkiel (1994) argue that a board with eight or fewer members "engenders greater focus, participation, and genuine interaction and debate". Increased board size over a level, however, also carries disadvantages. Although a board's capacity for monitoring increases as more directors are added, the benefit may be outweighed by the incremental cost of poorer communication and decision-making associated with larger groups (Jensen, 1993; John and Senbet, 1998). Larger board size may also decrease the ability to control management, thereby leading to agency problems stemming from the separation of management and control (Jensen, 1993; Lipton and Lorsch, 1992).

John and Senbet (1998) survey the empirical and theoretical literature on corporate boards of directors and conclude a negative relationship between board size and firm performance. For banks, however, Adams and Mehran (2008) find no negative board size effect. Based on this study, we expect the relation to be non-negative. Also based on the above studies,

it is possible that performance and board size may be non-linearly related. Therefore, as a robustness check, we will include the square of board size in the analysis.

3.3 Leadership

CEO/Chair duality concentrates management's power and board leadership in one person's hands (Jensen, 1993) and this concentration of power might exacerbate potential conflicts of interest, and result in less effective monitoring of the CEO (Brickley et al., 1997; Miyajima et al., 2003). We expect this also applies to the banking industry; that is, we expect a negative relationship between CEO/chair duality and bank performance.

4. Methodology

4.1 Sample Selection

As a comparative study, it is desirable to have roughly equal number of comparable banks in the two countries. Since the number of traded bank stocks is smaller in China than that in the U.S., we start with the collection of Chinese bank data. The Chinese data come from BANKSCOPE and the official websites of Chinese banks. Due to the lack of data for small local banks, the sample includes 106 Chinese banks that represent more than 80% of the assets between 2002 and 2006 on average. There are three reasons to choose the post-2002 era. First, Sarbanes-Oxley Act (SOX) was enacted in 2002, and we want to keep regulatory atmosphere about the same. Second, the period before 2000 has been examined by Adams and Mehran (2008). Third, many Chinese banks were not publicly traded before this period.

The Chinese banks include three types of banks: publicly listed state-owned banks (Big Four), corporate commercial banks, and city commercial banks, the primary Chinese sample

include 53 publicly traded banks among the 106 initial largest banks (in terms of book value of assets) for each year 2002-2006. We chose a relatively small set of banks for our original sample because it is time consuming to collect detailed internal governance variables and because we need bank performance data that is unlikely to be available for small banks. However, this sample is representative since the assets of our sample banks a large fraction of total industry assets (76.3% of total Chinese banking assets in 2002 and 52.5% in 2008). The comparable US sample is obtained for the same period using the sources COMPUTSTAT, Federal Reserve at Chicago website, and RISK METRICS. The sample includes 74 banks among the 144 largest publicly traded ones; some of omitted due to the unavailability of governance data[17].

4.2 Empirical Model

We adopt a regression approach given below, followed by a description of the variables.

$$PerformanceMeasure_{it} = \alpha_0 + \alpha_1 InternalGovernance_{it} + \alpha_2 Control_{it} + \varepsilon$$

Where: the subscript i represents ith bank and t denotes time.

$PerformanceMeasure_{it}$ includes four types of bank performance variables:

Profit Measure: Return on Asset (ROA)

Valuation Measure: Tobin's Q;

Cost Measure: Cost/Asset;

Loan Measure: Loan Loss Reserve/Gross Loan.

[17] There might be some potential problems in terms of data. In particular, the financial data in China may be unreliable. In the environment of weak bank supervision in China, the financial data reported by banks to the supervisory agency are likely to be noisy. The governance data may also be problematic. For example, it is hard to identify truly independent directors.

$InternalGovernance_{it}$ is a vector of board governance variables:

Board Size (BS);

Board Independence (OUT = number of outside directors / total number of directors);

Bank Ownership (OWN = 0 if the percent of state ownership is < 5%, 0 otherwise; alternatively, the actual government ownership is used);

Leadership (LEA is a dummy variable that equals 1 if CEO is also COB).

$Control_{it}$ is a vector of control variables that include the log of size of the bank (ln(SZ)), the Growth Opportunity (GROWOPP = Capital Expenditures / total sale) and Capital Ratio (CAPRATIO = Capital / Total Assets).

As reviewed earlier, some studies suggest a non-linearity of the board size effect. Therefore, we add a square term of board size to measure the effect of the board size on banking performance. At the last section, we explore the relationship between governance and subsequent performance of banks to account for the possibility of endorgeneity of corporate governance.

5. Empirical Results

5.1. Descriptive Statistics

As mentioned earlier, we compute four performance variables, board governance variables, and additional control variables available in our data for both US and China. Their descriptions and data sources are presented in Table 1.

Table 1: Data Descriptions and Sources

Data Type	Variables Descriptions	Sources
US:		
Governance Variables:		Risk Metrics & www.sec.com (Financial Reports 10-K)
Board Size (BS)	The total number directors of the board	
Outside Director (OUT)	Number of outside directors/total number of directors	
Leadership (LEA)	A dummy variable that equals to 1 if CEO is also COB	
Block ownership (OWN)	OWN=0 if the percent of bank state ownership is < 5%, Otherwise, the actual government ownership is used.	
Performance Variables:		
ROA	Return on Assets	COMPUSTAT & CRSP
Tobin's Q	Total assets minus the book value of equity plus to the market value of equity /total assets	
Cost Measure	Cost/assets	
Loan Measure	Loan loss allowance/gross loan	
Control Variables:		
lnSize	log of total assets	
Growth Opportunity (GrowOpp)	Capital expenditures/sales	
Capital Ratio (CapRatio)	Equity/total assets	
China:		Bankscope
Share Type	A dummy variable: it equals to 1 if banks issue B or H shares, 0 otherwise. Other variables are measured same with the US's.	China Banking Regulatory Commission(www.cbrc.gov.cn) and China Security Regulatory Commission (www.csrc.gov.cn)

Table 2 reports descriptive statistics on governance measures, performance measures, and control variables for US banks (panel A) and Chinese banks (panel B). This table reports all variables for the years 2002-2006 for the sample of 74 US banks and 53 Chinese ones.

Table2: Descriptive Statistics

The table shows summary statistics for selected financial variables, board size and board composition and control variables for our sample of US and Chinese banks from 2002 -2006. Panel A is for US sample and panel B is for China. The sample includes 74 US banks and 53 Chinese banks.

Panel A: US	Obs	Mean	Median	Min	Max	Std. Dev
Independent Variables (Governance)						
Board Size	74	16.25	15	7	31	4.93
Independent Directors (in %)	74	53.66	82.15	50	94.77	12.21
Leadership	74	0.57	1	0	1	0.45
Block Ownership (in %)	74	9.34	7.52	2.33	83.45	14.89
Dependent Variables (Performance)						
ROA (in %)	74	1.23	1.27	-1.67	4.32	0.52
Tobin's Q	74	1.07	1.06	0.91	1.80	0.06
Cost Measure	74	0.27	0.16	0.07	2.41	0.56
Loan Measure	74	0.02	0.00	0.01	0.03	0.03
Control Variables						
lnSize	74	7.36	6.88	0.45	14.50	1.99
GrowOpp	74	0.12	0.07	0.00	0.85	0.44
CapRatio	74	0.09	0.10	0.05	0.23	0.03

Panel B: CHINA	Obs	Mean	Median	Min	Max	Std. Dev
Independent Variables(Governance)						
Board Size	53	8.78	10	5	17	3.68
Independent Directors (in %)	53	29.27	20.57	0	54.71	10.33
Leadership	53	0.68	1	0	1	0.31
Block Ownership (in %)	53	43.26	12.76	0	100	34.99
Dependent Variables (Performance)						
ROA (in %)	53	0.38	0.28	-0.19	0.79	0.15
Tobin's Q	53	0.85	0.97	0.54	1.44	0.08
Cost Measure	53	0.30	0.29	0.15	0.62	0.36
Loan Measure	53	0.03	0.03	0.03	0.04	0.02
Control Variables						
lnSize	53	5.37	4.31	0.24	10.78	1.58
GrowOpp	53	0.40	0.23	0.09	1.45	0.98
CapRatio	53	0.06	0.06	0.05	0.19	0.06

Governance Variables

We first focus on the governance variables. The board size is 16.25 on average in US and 8.78 in China during the period of 2002-2006. As Adams and Mehran (2008) and Hayes, Mehran, and Schaefer (2005) also document, US financial firms in the period of 1986-1999 have on average larger boards than manufacturing firms. As in with their studies, our results suggest that the board size of banking tends to be large. Although Chinese banks' average board size is about half of that in the US, the average board size of Chinese banks is still larger than that of non-financial publicly listed firms in China. Based on the data from China Security regulatory Commission[18], the average board size of all listed companies is 6.2 during the years 2002-2006. It seems safe to conclude that banks tend to have larger boards of directors than nonbanking firms both in US and in China.

Regarding the proportion of outsiders on the board, we find a 53.66% for US sample and 29.27% % for China. The 53.66% of outsiders in US is close to the 54% in Yermack (1999) but substantially lower than 69% found in Adams and Mehran (2008)[19]. Based on these results, the independence of Chinese banking boards is obviously weaker than that of US, and this might be due to the higher proportion of state ownership among Chinese banks and their relatively poorer governance. Additionally, US banks have lower leadership and block ownership than Chinese banks[20], which implies that the dual-role of CEO and CHB is more popular in Chinese bank management and the ownership distribution is more diverse in US banks.

[18] Its website is www.csrc.gov.cn.

[19] Adams and Mehran (2008) use a stricter classification of independent outsider than other studies: a director is not an outsider if he was an officer or had any business relationship with the bank-holding companies in any of the 14 years of their sample time between 1986 and 1999. The traditional classification of directors is based on current employee status or business relationships. For our samples, we employ the traditional cross-sectional studies' classification of outsiders because detailed data on lending relationships is unavailable.

[20] The average leadership (a dummy variable equals 1 if the CEO is the COB) is 0.57 in US versus 0.68 in China, and the average block ownership is 9.34% in the US vs. 43.26% in China.

Performance Variables

The performances are much higher in the US than in China during 2002-2006: the average/median ROA is 1.297%/1.274% in US and 0.375% /0.281% in China. Similarly, Tobin's Q is higher in the US (mean = 1.07) than in China (mean = 0.85). The cost measure and loan loss measure are lower in the US; the average cost measure (ratio of cost to assets) is 0.27 in the US and that in China is 0.30, and the average loan loss is 0.02 in the US and 0.03 in China. While we do not show them in the tables, there are several trends that are noteworthy, particularly trends in performance and firm size. For Chinese banks, ROA and Tobin's Q have shown an upward trend which might be induced by the Chinese banking reformation and capitalization of Chinese banking industry in 2002, while ROA and Tobin's Q of US banks fluctuate from 2002 to 2006. On the other hand, firm sizes for both countries are increasing during our sample period, reflecting the increased consolidation in the banking industry not only in US but also in China. An average US sample firm is US$101.3 billion of assets in 2002 and increases in size to US$174.9 billion of assets in 2006, whereas an average Chinese sample firm is US$21.8 billion of assets in 2002 and increases in size to US$60.4 billion of assets in 2006; the average growth rate in US is 17% versus 29% in China during the period from 2002 to 2006.

Control Variables

Bank size may be one important element of performance as banks may enjoy economics of scale in financial operations and in adoption of corporate governance norms. We measure firm size by the logarithm of total assets; on average, the US bank size is higher than that in China. We also control for growth opportunities, as banks with higher growing opportunities might achieve better performance even if their governance is not ideal. To the end, we use the ratio of

capital expenditures to sales to proxy for growth opportunities. Chinese banks have higher growth opportunities although their standard deviation is much larger than US. Another control variable is the capital ratio (equals the ratio of equity to total Assets). US banks' capital ratio is higher than Chinese banks on average (0.092 in US versus 0.061 in China), and Chinese banks' capital ratio has a greater standard deviation (0.025 in US versus 0.057 in China).

In sum, banks in China operate less efficiently than those in US based on all four measures of performance - ROA, Tobin's Q, cost, and loan management, and the variations in Chinese banks' variables tend to be greater. On average, US banks have a larger board size and higher percentage of outside directors than Chinese banks. Additionally, US banks are less likely to have a dual CEO/COB and to have a concentrated ownership.

Table 3 presents the correlations between board governance and performance variables (panel A for the US and panel B for China). In the US, ROA and Tobin's Q are significantly correlated with governance variables – board size and the percentage of outsiders, while cost measure is insignificantly but positively correlated with board size. In China, the correlations between performances and governance are insignificant except for a negative relation between

Table 3: Correlations between board governance and bank performance in the US and in China
The table presents correlations between board governance variables and bank performance for the US and Chinese samples. The sample contains 74 US banks and 53 Chinese banks between 2002 and 2006. Panel A is for US sample and panel B is for China. Table 1 describes the sample and the variables. Significance levels: (***) – 1%, (**)-5%, (*)-10%.

Panel A. Governance and Performance in US

	BS	OUT	LEA	OWN	ROA	Tobin's Q	Cost Measure	Loan Measure
BS	1.00	0.02	-0.15	0.18*	-0.12**	0.10*	0.08*	-0.07
OUT		1.00	-0.06	-0.03	0.05*	0.01	-0.01	-0.00
LEA			1.00	0.09*	-0.02	0.00	0.06	0.03
OWN				1.00	-0.08*	-0.01	0.05	0.04
ROA					1.00	-0.01	-0.04	-0.06
Tobin's Q						1.00	-0.06	-0.02
Cost Measure							1.00	0.03
Loan Measure								1.00

Panel B. Governance and Performance in China

	BS	OUT	LEA	OWN	ROA	Tobin's Q	Cost Measure	Loan Measure
BS	1.00	0.04	-0.05	0.15*	-0.11	0.09	-0.04	-0.07
OUT		1.00	-0.04	-0.09	0.09	0.13	-0.07	-0.02
LEA			1.00	0.21*	-0.11	-0.08	0.11	0.07
OWN				1.00	-0.14*	-0.15*	0.11	0.13
ROA					1.00	0.02	-0.07	-0.05
Tobin's Q						1.00	-0.04	-0.07
Cost Measure							1.00	0.06
Loan Measure								1.00

block ownership and ROA and between block ownership and Tobin's Q. Therefore, the correlation analysis suggests a general weaker association between performance and governance in China than that in the US.

5.2. Corporate Governance and Contemporaneous Performance

In this section, we discuss the regression analysis of the relation between governance and bank performance, as measured by ROA in Table 4, Tobin's Q in Table 5, cost measure in Table 6, and loan measure in Table 7. For each table, five different regressions are performed: each of the first four regressions includes just one board structure variable, specifically board size and its square term in column 1, board composition in column 2, leadership in column 3, and ownership in column 4; then in column 5, all four board structure variables are included in the same regression. The purpose of this is to assess the robustness of results.

ROA as the Measure of Bank Performance

Table 4 shows the regression results with ROA as the dependent variable. For both countries, board size is negatively related with ROA although the relation is significant for the US sample only. For US banks, the coefficient of the square of board size is significantly negative, again suggesting that larger boards are not beneficial in terms of ROA. For Chinese

Table 4: Regression Analysis - ROA as the Dependent Variable

The dependent variable is ROA, and the independent variables are board size (column I), the proportion of outside directors (II), leadership (III), block ownership proportion (IV), and all four (V). The sample contains 74 US banks and 53 Chinese banks between 2002 and 2006. Panel A is for the US sample and panel B is for China. Table 1 describes the sample and the variables. Robust t-statistics are in parentheses. Significance levels: (***) – 1%, (**) -5%, (*) -10%.

Panel A: US			ROA		
Governance Variables	I	II	III	IV	V
Board Size	-0.001*				-0.001**
	(-1.577)				(-2.374)
Board Size^2	-0.003**				-0.000**
	(2.248)				(2.957)
Independent Directors		-0.000			-0.000
		(-0.053)			(-0.834)
Leadership			0.007		0.006
			(0.038)		(0.483)
Block Ownership				0.005	0.003
				(0.382)	(0.589)
Control Variables					
lnSize	0.004*	0.007*	0.006*	0.004*	0.004*
	(-1.877)	(1.842)	(1.962)	(1.932)	(1.837)
GrowOpp	-0.031	-0.025	-0.047	-0.035	-0.033
	(0.034)	(0.032)	(0.048)	(0.028)	(0.088)
CapRatio	0.003**	0.005**	0.004**	0.006	0.004***
	(-2.857)	(-2.233)	(2.493)	(1.258)	(2.936)
Intercept	3.255***	8.496***	5.051***	5.034***	7.392***
	(-12.513)	(5.362)	(-7.473)	(4.055)	(-21.589)
R^2	0.767	0.791	0.782	0.803	0.802
F-statistic	43.803	41.553	47.638	40.452	38.349

Panel B: CHINA			ROA		
Governance Variables	I	II	III	IV	V
Board Size	-0.001				-0.001
	(-1.022)				(0.576)
Board Size^2	0.000				0.000
	(-1.217)				(-1.169)
Independent Directors		0.000			0.001
		(-0.016)			(-0.037)
Leadership			0.001		0.001**
			(2.015)		(2.493)
Block Ownership				-0.053*	-0.046*
				(-2.173)	(-2.012)
Control Variables					
lnSize	0.001	0.001*	0.002	0.001	0.001
	(0.159)	(1.938)	(0.175)	(0.094)	(0.182)
GrowOpp	-0.008	-0.003	-0.003	-0.052	-0.002
	(0.492)	(0.827)	(0.329)	(0.155)	(0.937)
CapRatio	0.000	0.002*	0.000	0.000	0.001
	(-0.983)	(-1.937)	(-0.382)	(-0.739)	(-1.392)
Intercept	4.692**	2.359***	0.934***	2.023**	5.0322**
	(4.793)	(2.948)	(3.284)	(2.945)	(3.194)
R^2	0.739	0.784	0.803	0.797	0.783
F-statistic	29.472	33.595	42.390	39.579	37.544

banks, the correlation between block ownership and ROA is negative. This result is not surprising, since the block ownership in China often is government ownership and government ownership has been shown to be associated with poor performances by some previous studies. The leadership variable is insignificant when it is the only governance variable (regression III). However, it is significantly positive when it is included with other governance variables (regression V). Note that Table 3 also indicates a positive relation between leadership and block ownership. The positive relation is contrary to our expectation: if duality of CEO/Chairman suggests entrenched managers, then performance is expected to be poor. Thus we cannot offer a satisfactory explanation for the result on the leadership variable. As for the control variables, both size and capital are positively related to performance, especially for the US sample.

Tobin's Q as the Measure of Bank Performance

The regression results using Tobin's Q as the dependent variable are displayed in Table 5. For the US sample, Tobin's Q is significantly positively related with board size, which is strikingly different from that in Table 4. Here the results imply a larger board size enhances performances while the result in the previous table suggests that a larger board lowers ROA. It is hard to reconcile the differences. However, it should be noted that our result regarding Tobin's Q is consistent with that in Admans and Mehran (2008). Also noteworthy is that the board size is significant only when it is the only governance variable, not when it is included along with other governance variables. The evidence for the square of board size is clearer, significantly positive in both cases. The relation between block ownership and performance in either the US or China is negative. As in Table 4, the coefficients of size and capital ratio are positive.

Table 5: Regression Analysis - Tobin's Q as the Dependent Variable

The dependent variable is Tobin's Q, and the independent variables are board size (column I), the proportion of outside directors (II), leadership (III), block ownership proportion (IV), and all four (V). The sample contains 74 US banks and 53 Chinese banks between 2002 and 2006. Panel A is for US sample and panel B is for China. Table 1 describes the sample and the variables. Robust t-statistics are in parentheses. Significance levels: (***) – 1%, (**) -5%, (*) -10%.

Panel A : US	Tobin's Q				
Governance Variables	I	II	III	IV	V
Board Size	0.000*				0.003
	(1.948)				(0.739)
Board Size^2	0.001**				0.001*
	(2.539)				(-1.883)
Independent Directors		0.000			0.000
		(-0.173)			(-.0184)
Leadership			0.004		0.004*
			(-0.794)		(-1.938)
Block Ownership				-0.001**	-0.001**
				(-1.947)	(-1.849)
Control Variables					
lnSize	0.003*	0.004*	0.002	0.003	0.004***
	(1.839)	(2.492)	(0.146)	(0.158)	(2.947)
GrowOpp	-0.079	-0.092	-0.104	-0.092	-0.067
	(0.215)	(0.482)	(0.322)	(0.219)	(0.189)
CapRatio	0.003**	0.003***	0.002*	0.003*	0.003***
	(3.928)	(4.958)	(3.211)	(2.947)	(2.849)
Intercept	2.391***	1.021***	1.536***	1.522***	1.294***
	(24.293)	(27.382)	(10.326)	(24.399)	(4.929)
R^2	0.828	0.792	0.823	0.821	0.793
F-statistic	35.392	40.104	37.206	26.490	36.928

Panel B: CHINA	Tobin's Q				
Governance Variables	I	II	III	IV	V
Board Size	-0.001				-0.001
	(0.292)				(-1.628)
Board Size^2	0.001				0.001
	(0.938)				(0.892)
Independent Directors		0.000			0.000
		(0.012)			(0.385)
Leadership			0.001		0.001
			(0.184)		(0.145)
Block Ownership				-0.015	-0.013*
				(1.038)	(2.248)
Control Variables					
lnSize	0.001	0.001*	0.002	0.001	0.001*
	(0.849)	(-1.789)	(-0.004)	(0.494)	(1.849)
GrowOpp	-0.021	-0.014	-0.055	-0.084	-0.037
	(0.794)	(1.023)	(0.599)	(0.729)	(0.493)
CapRatio	0.003*	0.004*	0.001	0.002*	0.003
	(2.123)	(1.894)	(0.158)	(1.923)	(1.684)
Intercept	-0.382**	0.822***	0.949***	0.692***	0.502***
	(5.925)	(-2.849)	(6.877)	(5.083)	(3.474)
R^2	0.879	0.894	0.744	0.860	0.878
F-statistic	20.329	16.930	38.039	22.493	20.583

Cost as the Measure of Bank Performance

We then turn to cost control and use cost as a proxy for bank performance. Table 6 presents the results. For the US sample, both the coefficients of board size and square of board size are significant negative. This is in agreement with the results with Tobin's Q: larger boards tend to be associated with better performances. As for the Chinese sample, there is no significant relation between performance and bank governance.

Table 6: Regression Analysis - Cost Measure as the Dependent Variable
The dependent variable is the cost measure, and the independent variables are board size (column I), the proportion of outside directors (II), leadership (III), block ownership proportion (IV), and all four (V). The sample contains 74 US banks and 53 Chinese banks between 2002 and 2006. Panel A is for US sample and panel B is for China. Table 1 describes the sample and the variables. Robust t-statistics are in parentheses. Significance levels: (***) – 1%, (**) - 5%, (*) -10%.

Panel A: US	Cost Measure				
Governance Variables	I	II	III	IV	V
Board Size	-0.001*				-0.001**
	(2.014)				(-2.439)
Board Size^2	-0.001***				-0.002*
	(2.943)				(-1.927)
Independent Directors		0.000			0.000
		(0.669)			(0.813)
Leadership			0.033		0.028
			(0.849)		(0.693)
Block Ownership				-0.001	-0.002*
				(0.492)	(1.849)
Control Variables					
lnSize	0.016*	0.153	0.019	0.017	0.023
	(1.882)	(0.394)	(0.015)	(0.097)	(1.029)
GrowOpp	-0.048	-0.063	-0.079	-0.036	-0.049
	(0.195)	(0.115)	(0.184)	(0.284)	(0.185)
CapRatio	0.004***	0.004***	0.003***	0.004*	0.004***
	(3.286)	(2.849)	(5.295)	(2.012)	(3.292)
Intercept	-0.392***	-0.843***	-0.364***	1.894***	-0.492**
	(3.494)	(5.320)	(2.849)	(3.212)	(-2.524)
R^2	0.873	0.836	0.738	0.732	0.802
F-statistic	11.480	20.739	28.533	28.930	22.495

Panel B: CHINA	Cost Measure				
Governance Variables	I	II	III	IV	V
Board Size	-0.002				-0.003
	(0.839)				(0.973)
Board Size^2	-0.011				-0.009
	(0.894)				(1.028)
Independent Directors		-0.001			-0.003
		(0.183)			(1.212)
Leadership			0.003		0.002
			(1.023)		(1.029)

Block Ownership				-0.005	-0.008
				(0.194)	(0.193)
Control Variables					
lnSize	0.002	0.002	0.003	0.004	0.002
	(0.948)	(1.029)	(0.038)	(0.391)	(0.184)
GrowOpp	-0.006	-0.005	-0.007	-0.006	-0.005
	(1.001)	(0.984)	(0.028)	(-0.739)	(-1.039)
CapRatio	0.001	0.001*	0.001	0.002	0.001
	(0.894)	(1.930)	(0.592)	(0.738)	(0.482)
Intercept	-1.090***	0.075***	0.022***	0.094***	0.713***
	(2.920)	(2.948)	(3.119)	(5.292)	(5.898)
R^2	0.792	0.842	0.585	0.589	0.729
F-statistic	40.382	32.482	14.719	14.753	43.401

Loan Loss as the Measure of Bank Performance

Table 7 reports the regression coefficients when the dependent variable is the loan loss measure. Since loan loss represents a major cost, the US results here are consistent with those in Table 6: larger boards tend to be associated with lower loan losses. For the Chinese sample, the results again indicate no significant relation between performance and governance variables.

Table 7: Regression Analysis - Loan Measure as the Dependent Variable
The dependent variable is the loan measure, and the independent variables are board size (column I), the proportion of outside directors (II), leadership (III), block ownership proportion (IV), and all four (V). The sample contains 74 US banks and 53 Chinese banks between 2002 and 2006. Panel A is for the US sample and panel B is for China. Table 1 describes the sample and the variables. Robust t-statistics are in parentheses. Significance levels: (***) – 1%, (**) -5%, (*) -10%.

Panel A: US	Loan Measure				
Governance Variables	I	II	III	IV	V
Board Size	-0.001*				-0.026
	(1.808)				(0.296)
Board Size^2	-0.001**				-0.021
	(2.355)				(0.123)
Independent Directors		0.000			0.000
		(0.119)			(0.186)
Leadership			0.029		0.018
			(0.482)		(0.381)
Block Ownership				-0.000	-0.001
				(0.014)	(0.359)
Control Variables					
lnSize	0.033*	0.000	0.023	0.045	0.069
	(1.847)	(0.849)	(0.936)	(1.039)	(0.938)
GrowOpp	-0.011	-0.032	-0.062	-0.009	-0.009
	(0.899)	(-0.724)	(-1.423)	(-1.321)	(-0.856)
CapRatio	0.002***	0.003***	0.003***	0.002**	0.002***
	(4.206)	(2.893)	(5.811)	(2.509)	(3.201)
R^2	0.803	0.821	0.793	0.784	0.794
F-statistic	28.406	27.493	30.019	31.456	30.593

Panel B: CHINA	Loan Measure				
Governance Variables	I	II	III	IV	V
Board Size	-0.001				-0.001
	(0.144)				(0.184)
Board Size^2	-0.031				-0.053
	(0.169)				(0.426)
Independent Directors		0.000			0.000
		(0.049)			(0.492)
Leadership			0.001		0.002
			(0.467)		(0.329)
Block Ownership				-0.001	-0.000
				(0.482)	(0.141)
Control Variables					
lnSize	0.007	0.009	0.005	0.006	0.007
	(0.395)	(0.944)	(0.048)	(0.983)	(1.035)
GrowOpp	-0.018	-0.006	-0.031	-0.019	-0.023
	(0.943)	(0.135)	(0.482)	(0.948)	(1.021)
CapRatio	0.000	0.002*	0.000	0.002	0.002
	(0.837)	(1.830)	(0.849)	(0.849)	(1.029)
Intercept	1.046**	0.194***	0.593***	0.948***	0.713***
	(1.948)	(2.596)	(3.011)	(2.506)	(2.995)
R^2	0.730	0.792	0.797	0.749	0.788
F-statistic	39.323	30.887	29.038	34.201	29.335

An Alternative Test and Discussion of Overall Regression Results

Because our results to this point are mixed and because some independent variables may not be exogenous, we perform an alternative test; namely, the lagged values instead of current values of independent variables are used and the results are shown in Table 8. Notably for the US sample, some previous significant results are no longer significant here. Specifically, the positive coefficient of board size in Table 5 (where Tobin's Q is the dependent variable) is no longer significant and in fact turns negative; also, the significance of board size in Table 7 (where loan loss is the dependent variable) is reduced. The governance variables that are significant in both tests are as follows. There is evidence for a negative relation between ROA and board size and a negative relation between costs and board size. The troubling point about the two results is that they have contrary implications for board size. That is, the evidence indicates that, on the one hand, larger boards tend to be associated with worse performance; on the other, larger boards

Table 8: Regression analysis with lagged independent variables

The table shows regression estimates; the dependent variables are performance variables while the independent variables and control variables are lagged values. The sample contains 74 US banks and 53 Chinese banks from 2002-2006. Significance levels: (***) – 1%, (**) -5%, (*) -10%.

Panel A: US	Performance Variables			
Governance Variables	ROA	Tobin's Q	Cost Measure	Loan Measure
Board Size	-0.001*	-0.001	-0.001**	-0.104
	(2.095)	(0.783)	(2.407)	(0.407)
Board Size^2	-0.001**	-0.000	-0.002*	-0.083
	(2.384)	(-0.978)	(-1.927)	(0.723)
Independent Directors	-0.000	0.000	-0.000	-0.000
	(-0.285)	(0.677)	(0.542)	(0.465)
Leadership	0.004	0.002	0.042	0.027
	(0.906)	(0.377)	(0.497)	(0.731)
Block Ownership	0.001	-0.001**	-0.004*	-0.001
	(1.033)	(-2.395)	(1.648)	(0.846)
Control Variables				
lnSize	0.003*	0.004***	0.019	0.052
	(2.053)	(3.846)	(0.637)	(1.046)
GrowOpp	-0.034*	-0.033*	-0.062**	-0.009*
	(-2.037)	(-2.129)	(-2.423)	(-1.821)
CapRatio	0.003***	0.003**	0.004***	0.002**
	(5.947)	(2.274)	(4.362)	(2.635)
Intercept	5.498***	1.938***	-3.512***	1.894***
	(95.765)	(80.363)	(30.466)	(30.734)
R^2	0.785	0.740	0.792	0.743
F-statistic	26.368	38.435	27.305	33.940

Panel B: CHINA	Performance Variables			
Governance Variables	ROA	Tobin's Q	Cost Measure	Loan Measure
Board Size	-0.001	-0.001	-0.004	-0.003
	(0.787)	(1.628)	(0.074)	(0.275)
Board Size^2	0.000	0.000	-0.010	-0.053
	(0.927)	(0.935)	(1.634)	(0.699)
Independent Directors	0.001	0.000	-0.003	0.001
	(0.385)	(0.007)	(1.734)	(0.262)
Leadership	0.001*	0.001	0.003	0.001
	(2.166)	(0.025)	(0.107)	(0.157)
Block Ownership	-0.037*	-0.062*	-0.006	-0.001
	(2.036)	(2.028)	(0.723)	(0.103)
Control Variables				
lnSize	0.001	0.001*	0.003	0.009
	(0.281)	(1.923)	(0.002)	(0.396)
GrowOpp	-0.0075*	-0.052	-0.008	-0.015
	(1.948)	(0.489)	(0.813)	(-1.045)
CapRatio	0.000*	0.004**	-0.000***	0.002*
	(1.934)	(1.976)	(3.019)	(1.934)
Intercept	-3.759***	0.497***	0.021**	0.644***
	(3.452)	(2.492)	(2.179)	(2.748)
R^2	0.773	0.785	0.588	0.587
F-statistic	32.491	29.306	17.403	17.267

tend to have lower costs. Therefore, there is very mixed evidence on the relation between performance and governance for the US sample. For the Chinese sample, the evidence simply suggests that governance is virtually irrelevant to performance, with the exception of block ownership. Since block ownership in China comes primarily in the form of government shares, the implication is that government ownership does not enhance performances.

As a robustness, we include an additional dummy variable that equals one if a firm is listed as H share (traded in Hong Kong) or B share (shares restricted to foreigners for our sample period), and zero otherwise. This is meant to be a control variable that represents information asymmetry. Since H and B shares are mainly held by foreigners, it is expected that firms with B or H shares are subject to a lower degree of information asymmetry. The results are shown in the appendix, with the variable denoted as share type. The variable itself is largely insignificant; however, it appears to somewhat affect other variables, suggesting a multi-collinearity problem. This is a problem we hope to address in the future.

6. Conclusions

In this paper, we present evidence on the relationship between board governance and performance using a sample of 74 banks in US and 53 banks in China for the period from 2002 to 2006.

We find substantial differences in board structure between the two countries; in particular the average board size and the proportion of outside directors for US banks are almost twice of those in China. US banks also perform much better than Chinese banks during our sample period. As for the relation between performance and governance, the evidence is fairly mixed for the US sample while insignificant for the Chinese sample. In particular, in the US sample, board size is

found to be significantly and negatively associated with ROA, but a larger board also tends to reduce costs. We cannot identify a satisfactory explanation to reconcile the results for ROA and costs. Regarding Chinese banks, the evidence indicates that governance variables are not significantly correlated with performances with the exception of block ownership; there is strong evidence that block ownership is negatively related to performance. In China, block ownership is often government ownership. Therefore, the overall evidence is consistent with our conjecture that the role of board governance structure is of secondary importance in Chinese banks, perhaps due to the strong role of government.

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Appendix:

A robustness check with a dummy variable of share type for Chinese sample: Share Type (it equals to 1 if the bank issue B share or H share, 0 otherwise.)

Table i: Regression Analysis - ROA as the Dependent Variable

The dependent variable is ROA, and the independent variables are board size (column I), the proportion of outside directors (II), leadership (III), block ownership proportion (IV), and all four (V). The sample contains 53 Chinese banks between 2002 and 2006. Table 1 describes the sample and the variables. Robust t-statistics are in parentheses. Significance levels: (***) – 1%, (**) -5%, (*) -10%.

	ROA				
Governance Variables	I	II	III	IV	V
Board Size	-0.001*				-0.001
	(-1.948)				(0.849)
Board Size^2	-0.000				-0.001
	(-1.032)				(1.634)
Independent Directors		0.001			0.001
		(0.936)			(1.087)
Leadership			0.000		0.001*
			(1.576)		(2.006)
Block Ownership				-0.027*	-0.017*
				(2.146)	(2.203)
Control Variables					
lnSize	0.001	0.001*	0.001	0.000	0.001*
	(0.603)	(2.143)	(1.605)	(0.306)	(0.936)
GrowOpp	-0.003	-0.002	-0.002	-0.004	-0.004
	(1.305)	(1.337)	(1.209)	(0.920)	(1.435)
CapRatio	0.001	0.002*	0.001	0.001	0.000
	(0.457)	(1.937)	(1.126)	(0.049)	(1.601)
Share Type	0.469*	0.152	0.227	0.118	0.789
	(1.835)	(0.485)	(9.847)	(0.795)	(1.476)
R^2	0.793	0.779	0.815	0.845	0.768
F-statistic	27.325	30.389	32.488	31.315	27.346

Table ii: Regression Analysis - Tobin's Q as the Dependent Variable

The dependent variable is Tobin's Q, and the independent variables are board size (column I), the proportion of outside directors (II), leadership (III), block ownership proportion (IV), and all four (V). The sample contains 53 Chinese banks between 2002 and 2006. Table 1 describes the sample and the variables. Robust t-statistics are in parentheses. Significance levels: (***) – 1%, (**) -5%, (*) -10%.

	Tobin's Q				
Governance Variables	I	II	III	IV	V
Board Size	-0.001				-0.001
	(1.268)				(-1.628)
Board Size^2	-0.000				-0.001
	(1.307)				(0.892)
Independent Directors		0.001			0.000
		(0.347)			(0.385)
Leadership			0.000		0.001
			(0.956)		(0.145)
Block Ownership				-0.015	-0.013*
				(1.038)	(2.248)
Control Variables					
lnSize	0.001*	0.001	0.000	0.001	0.001*
	(2.035)	(0.237)	(1.168)	(0.494)	(1.912)
GrowOpp	-0.070	-0.055	-0.032	-0.045	-0.037
	(1.286)	(1.236)	(1.448)	(1.028)	(0.495)
CapRatio	0.006	0.003	0.002	0.002	0.003
	(1.638)	(1.203)	(0.783)	(0.449)	(0.273)
Share type	0.067	0.013	0.028	0.031	0.027
	(0.483)	(0.337)	(0.581)	(1.006)	(0.325)
R^2	0.798	0.775	0.874	0.835	0.872
F-statistic	23.854	24.267	27.331	29.436	25.489

Table iii: Regression Analysis - Cost Measure as the Dependent Variable

The dependent variable is the cost measure, and the independent variables are board size (column I), the proportion of outside directors (II), leadership (III), block ownership proportion (IV), and all four (V). The sample contains 53 Chinese banks between 2002 and 2006. Table 1 describes the sample and the variables. Robust t-statistics are in parentheses. Significance levels: (***) – 1%, (**) -5%, (*) -10%.

	Cost Measure				
Governance Variables	I	II	III	IV	V
Board Size	-0.000				0.001
	(0.128)				(0.759)
Board Size^2	0.001*				0.000
	(1.794)				(1.489)
Independent Directors		-0.001			-0.001
		(0.568)			(0.679)
Leadership			0.003		0.002
			(1.564)		(1.703)
Block Ownership				0.002	0.003*
				(0.792)	(1.994)
Control Variables					
lnSize	-0.002*	-0.001	-0.000	-0.001	0.002*
	(2.025)	(1.668)	(0.159)	(0.865)	(2.104)
GrowOpp	0.004	0.003	0.003	0.002	0.002
	(1.438)	(1.486)	(0.996)	(1.469)	(1.736)
CapRatio	-0.003	-0.001	-0.001	-0.002	-0.001
	(0.214)	(0.680)	(0.989)	(0.138)	(0.237)
Share Type	-0.078*	0.028	0.017	0.032	0.016
	(1.869)	(0.385)	(0.447)	(0.178)	(0.447)
R^2	0.798	0.826	0.743	0.760	0.820
F-statistic	33.860	36.337	27.353	25.187	32.723

Table iv: Regression Analysis - Loan Measure as the Dependent Variable

The dependent variable is the loan measure, and the independent variables are board size (column I), the proportion of outside directors (II), leadership (III), block ownership proportion (IV), and all four (V). The sample contains 53 Chinese banks between 2002 and 2006. Table 1 describes the sample and the variables. Robust t-statistics are in parentheses. Significance levels: (***) – 1%, (**) -5%, (*) -10%.

	Loan Measure				
Governance Variables	I	II	III	IV	V
Board Size	0.001				0.001
	(1.132)				(0.487)
Board Size^2	0.000				0.002
	(1.031)				(0.893)
Independent Directors		-0.001			-0.000
		(0.809)			(0.699)
Leadership			0.001*		0.002
			(1.902)		(1.327)
Block Ownership				0.000	-0.000
				(1.469)	(0.141)
Control Variables					
lnSize	-0.007	-0.002	-0.002	-0.001	-0.004
	(0.992)	(1.460)	(0.799)	(1.672)	(1.327)
GrowOpp	-0.005	-0.003	-0.002	-0.003	-0.002
	(1.247)	(0.795)	(0.242)	(0.531)	(1.164)
CapRatio	0.000	0.001	0.001	0.000	0.000
	(1.269)	(1.007)	(0.425)	(1.093)	(1.248)
Share Type	-0.037	-0.021	-0.009	-0.013*	-0.021
	(0.348)	(0.469)	(0.648)	(2.206)	(1.263)
R^2	0.796	0.812	0.783	0.786	0.793
F-statistic	34.026	31.046	31.903	32.049	28.037

Table v: Regression analysis with lagged independent variables

The table shows regression estimates; the dependent variables are performance variables while the independent variables and control variables are lagged values. The sample contains 53 Chinese banks from 2002-2006. Table 1 describes the sample and the variables. Robust t-statistics are in parentheses. Significance levels: (***) – 1%, (**) - 5%, (*) -10%.

	Performance Variables			
Governance Variables	ROA	Tobin's Q	Cost Measure	Loan Measure
Board Size	-0.001	-0.001	-0.000	-0.001
	(1.158)	(1.206)	(0.993)	(1.439)
Board Size^2	-0.000*	-0.001	-0.001	-0.002
	(0.229)	(1.467)	(1.246)	(1.348)
Independent Directors	0.002	0.001	-0.002	-0.000
	(1.247)	(0.576)	(1.326)	(1.147)
Leadership	-0.001	0.001	0.002	0.001
	(1.995)	(0.884)	(0.802)	(1.953)
Block Ownership	-0.002*	-0.062	0.003	0.002
	(2.109)	(1.074)	(0.809)	(1.137)
Control Variables				
lnSize	0.001*	0.001*	0.002	0.002
	(1.935)	(1.607)	(0.894)	(1.403)
GrowOpp	-0.006	-0.003	-0.002	-0.001
	(0.738)	(0.993)	(1.476)	(1.376)
CapRatio	0.000*	0.001	-0.000	0.001
	(2.046)	(1.037)	(3.019)	(1.406)
Share Type	0.009*	0.003	0.002	0.003
	(2.016)	(1.038)	(1.476)	(0.674)
R^2	0.796	0.825	0.831	0.802
F-statistic	30.337	28.402	27.423	29.023

Vita — Bei Zeng

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