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The determinants of board size and composition: Evidence from Taiwan banks

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Using panel data on banks publicly listed in Taiwan over 1997 to 2008, this paper examines the determinants of board size and composition in an environment where most banks have concentrated ownership and investor protection is weak. The result shows that board size and composition reflect the bank-specific and ownership characteristics. First, bank size and bank age are the key determinants of banks' board size. Besides, board independence increase with the controlling shareholders' ownership, but decrease with the ownership of outside directors. However, board size and structure are both not sensitive to the benefits and costs of monitoring and advising. Thus, contrary to the finding of US unregulated firms with disperse ownership, our results are not supportive of the view that banks structure boards in an efficient response to their operating environment.

Key words: Board size, board composition, ownership.

INTRODUCTION

In the wake of the recent corporate scandals, corporate governance practices have received heightened attention. Among several governance mechanisms, board size and board composition are especially the focus of many attempts to increase corporate governance because they are important characteristics that influence the effectiveness of the board in solving the agency problem between shareholders and managers. Are boards of directors effective at monitoring managers? The results of existing literature do not provide a satisfied answer to the question. Several empirical analyses find that board composition is not related to firm performance (Hermalin and Weisbach, 1991; Mehran, 1995; Klein, 1998; Bhagat and Black, 2002). However, other studies show significant positive relationships between the proportion of outside directors and firm performance (Rosenstein and Wyatt, 1990; Daily and Dalton, 1993). Another line of research that examines the association between board size and firm performance also has mixed results. Some studies report negative effect of board size on firm performance (Yermack, 1996; Eisenberg et al., 1998; Bhagat and Black, 2002). But, Belkhir (2009b) find positive relationship between board size and banks' performance. These studies on the relation between governance mechanisms and firm performance impliedly assume there

are common optimal board sizes and board compositions for all firms, and the firms which diverge from the optimal characteristics will have lower firm performance.

The alternative view is that corporate governance mechanisms are endogenously determined according to the cost and benefit of each governance mechanism and the optimal corporate governance mechanisms vary across firms. If every firm structures its board in an efficient response to its operating environment, there will likely be no empirical relationship between board size or board composition and firm performance (Mak and Li, 2001; Hermalin and Weisbach, 2003; Belkhir, 2009a). Belkhir (2009a) suggests that the empirical results of how board structure affects firm's performance will be misleading if ignoring the fact that the optimal corporate governance mechanisms vary across firms. Thus, in order to understand the effect of the board on firm performance, one must understand how a board is structured. The literature on the determinants of board structure is fast growing recently. One line of research build theoretical model to explore the determinants of board structure (Hermalin and Weisbach, 1998; Raheja, 2005; Adams and Ferreira, 2007; Harris and Raviv, 2006). Hermalin and Weisbach (1998) model board structure as the outcome of a negotiation between the CEO and outside

directors and propose the board independence will decrease with CEO's influence. Raheja (2005) and Harris and Raviv (2006) argue that board size and the proportion of outside directors optimally increase with the level of private benefits available to managers, but decline with the cost of monitoring. Adams and Ferreira (2007) also show that a management-friendly board can be optimal if the importance of the information that CEO can provide is high. Another line of research empirically examines the determinants of board structure. Lehn et al. (2009) find that both board size and the proportion of outside directors are positively related to firm size and negatively related to growth opportunities by using 81 US firms from 1935 to 2000. Coles et al. (2008) show that complex firms, have larger boards, and more outsider directors, but high R and D firms have a higher proportion of insiders on the board. Boone et al. (2007) find that board size increases with the level of private benefits available to managers and decline with the cost of monitoring managers. However, there is no evidence that the fraction of outsider directors is related to the cost and benefits of monitoring.

The focus of most studies on the determinants of board structure has been primarily on large unregulated firms (Shivdasani and Yermack, 1999; Boone et al., 2007; Linck et al., 2008). Board of directors in banks has received only limited attention. However, banking firm governance differs from the governance of unregulated firms. Adams and Mehran (2003) find that the boards of bank holding companies are larger than those of manufacturing firms. Besides, more board directors of BHC are from outsiders. Contrary to the evidence found for non-financial firms, Belkhir (2009b) also indicate that banking firms with larger board do not underperform their peers. Since the health of the overall economy depends on banks performance (Adams and Mehran, 2003) and the board of directors plays a crucial role on monitoring banks' performance, understanding the determinants of banks' board structures is more important than ever before at the time when the banking industry becomes increasingly deregulated. Thus, this paper examines the determinants of board composition using a sample of banking firms in Taiwan.

Moreover, Caprio et al. (2007) argue that most banks are not widely held but rather controlled by families or the State, except the few in countries with very strong shareholder protection laws. In such condition, the controlling owner may play important role in selecting the board composition and expand their control power through pyramid structures of firms and cross-holdings among firms. Whether the results from existing researches can be generalized to banks with concentrated ownership is worth exploring. Taiwan offers an ideal laboratory that let us address the issue about the determinants of banks' board composition with concentrated ownership. As Yeh and Woidtke (2005) point out, Taiwan features relatively weak protection of minority shareholders, high ownership

concentration, a predominance of family control, and an abundance of pyramidal groups and cross-holdings – characteristics common to many countries (La Porta et al., 1999; Claessens et al., 2000; Faccio and Lang, 2002). Using panel data on banks publicly listed in Taiwan over 1998 to 2007, the results from the study can enhance the understanding as to how a bank's board is structured in an environment where most banks have concentrated ownership and investor protection is weak.

Our empirical results indicate that larger and more mature banks tend to have larger boards. Moreover, a bank's board structure is the outcome of a negotiation between the controlling shareholders and outside directors in Taiwan where most banks have concentrated ownership and investor protection is weak. Banks, in which controlling shareholders have substantial influence and in which the constraints to controlling shareholders' influence are weak, have more affiliated directors. However, contrasting to the finding of US unregulated firms with disperse ownership, we find no evidence that board size is related to the costs and benefits of monitoring.

LITERATURE REVIEW AND DEVELOPMENT OF HYPOTHESIS

Related literature

Hermalin and Weisbach (1998) are the first to develop a model to explore how a board is structured. In their model, board structure is the outcome of a negotiation between the CEO and outside directors. Because CEO prefer a less dependent board, the proportion of outside directors decreases with the CEO's bargaining power. Boone et al. (2007) refer to this argument as the "negotiation hypothesis".

Raheja (2005), Adams and Ferreira (2007) and Harris and Raviv (2006) formulate their theoretical model by considering the monitoring or advising function of board. In their model, boards are made of insiders and outsiders. Boards monitor managers' deed to prevent them from expropriating shareholders, and provide their expertise to advise management on the firm's decision that affects firm profits. Insiders have firm-specific information relevant to the decision. However, due to private benefits and lack of independence from the CEO, insiders also have distorted objectives that lead them to select a decision that does not maximize shareholders' wealth. If the CEO or insiders have stronger incentive to extract private benefit by expropriating shareholders, the benefit of monitoring will increase. Contrary to insiders, outsiders can provide better monitoring and advice because they are more independent and have a variety of expertise. But, outsiders have less information about the firm's constraints and opportunities, and may obtain private, decision-relevant information at a cost. If the firms face greater information asymmetry, the cost of

monitoring will increase. The larger board will also increase the monitoring cost because of the free-riding problems and higher co-ordination cost. All of the theoretical models proposed by Raheja (2005), Adams and Ferreira (2007) and Harris and Raviv (2006), point out an optimal board structure of firm is a function of the cost and benefit of monitoring and advising. The board size and the proportion of outside directors increase with the benefit of monitoring and advising, but decrease with the cost of monitoring.

Hypothesis

The study uses board size and the proportion of outside directors as two measures of board structure, and examines the determinants of board structure. Based on the previous theoretical models, the optimal board structure depends on the CEO's bargaining power and the cost and benefit of monitoring and advising. Further, we develop our primary hypothesis according to those above attributes.

Board structure and benefits of monitoring and advising

The benefit of monitoring and advising functions are related to firm complexity and managers' opportunities to extract private benefits. Fama and Jensen (1983) suggest firms with larger operation scope and complex production process have larger and more hierarchical organizations. Thus, in order to monitor managers' decision, the firms need larger board. The view is consistent with Bhagat and Black (1999), Agrawal and Knoeber (2001), Coles et al. (2008) and Lehn et al. (2009). They also suggest that a firm will look for new directors to supervise managers' performance when it grows into a new business area.

The scope and complexity of a firm's operations also has an impact on the board's composition except on board size. Because agency problems become more significant with firm size, larger firms demand more outside directors (Boone et al., 2007; Linck et al., 2008; Lehn et al., 2009). Moreover, Anderson et al. (2000) and Coles et al. (2008) show that diversified firms need more independent outsiders to monitor their complex operations. In summary, firms with larger operation scope and complex production process need larger and independent boards because of their stronger and more urgent need of monitoring function. Boone et al. (2007) refer to such an argument as the "scope of operation hypothesis".

Following Boone et al. (2007) and Linck et al. (2008), we use bank size and bank age to proxy for bank complexity. Besides, in most countries, separated banks and universal banks coexist (Vennet, 2002; Shen, 2005). The separated banks focus on traditional intermediation activities, but the universal banks also conduct the

services of credit cards, derivative designs, underwriting and brokerage except traditional intermediation activities. In other words, the operations of universal banks are diversified and more complex. Chen (2004) and Shen (2005) use the fee revenue ratio to divide banks into two technology types-separated banks and universal banks. Thus, we also use the fee revenue ratio to proxy for bank complexity.

The fee revenue ratio will increase with banks' complexity.

On the other hand, Raheja (2005), Adams and Ferreira (2007) and Harris and Raviv (2006) proposed that the higher level of private benefits available to managers will increase the benefit of monitoring, and result in a larger and more independent board. We use free cash flow to measure managers' potential private benefits (Jensen, 1986; Boone et al., 2007; Linck et al., 2008) and argue free cash flow can influence board size and board composition.

Board structure and cost of monitoring

Many studies argue that high growth firms may increase the cost of monitoring to outside directors because firm-specific information is more important in such firms (Raheja, 2005; Coles et al., 2008; Lehn et al., 2009). Demsetz and Lehn (1985) contend that the monitoring cost will increase with the noisiness of a firm's operating environment.

Furthermore, Maug (1997) and Linck et al. (2008) suggest that, in the firms with high information asymmetry, it is costly to transfer firm-specific information to outside directors, and the monitoring cost increases.

The prevailing literature usually uses the market-to-book ratio to proxy for the firm growth opportunities (Smith and Watts, 1992; Gaver and Gaver, 1993; Boone et al., 2007). The standard deviation of stock returns can be proxy for information asymmetry (Fama and Jensen, 1983) and reflect uncertainty of a firm's operating environment about the firm's prospects (Demsetz and Lehn, 1985). Finally, Chen (2004) argues that the outside directors are ineffective in monitoring separated banks because managers of separated banks have specific knowledge about traditional intermediation activities. Since the monitoring cost of separated banks is higher than those of the universal banks, we also use the fee revenue ratio to measure the cost of monitoring. Because the board size and the proportion of outside directors decrease with the cost of monitoring and advising, we predict that these variables are negatively related to board size and the proportion of outside directors.

Board composition and control shareholders' influence

Hermalin and Weisbach (1998) argue that board

composition is the outcome of a negotiation between the CEO and outside directors. In their model, CEOs wield their influence to place insiders in board, and the proportion of outside directors is negatively related to CEOs' bargaining power. Kieschnick and Moussawi (2004) also show that the proportion of outside directors decreases with CEOs' influence and increases with constraints on CEOs' influence.

Hermalin and Weisbach (1998) suggest that CEO's influence is increasing in firm performance. Boone et al. (2007) use CEO ownership to measure CEO's influence. When ownership is more concentrated and investor protection is weaker, the controlling shareholders have enough control over the operations of the firm and strong incentives to put pressure on managers (Claessens et al., 2002; Shleifer and Vishny, 1997). So, it is possible that the controlling shareholders will replace managers to exercise power over the selection of board composition. Since most banks are not widely held but rather controlled by control shareholders (Caprio et al., 2007), the study examines the role the controlling shareholders play in selecting board composition and uses three measures of control shareholders' influence: banks' past performance and control shareholders' ownership. Besides, outsider directors' ownership is used to proxy for constraint on control shareholders' influence because higher outsider directors' ownership can limit control shareholders' influence (Boone et al., 2007).

Board composition and ownership incentive

The theoretical model proposed by Raheja (2005) show that the board size and the proportion of outside directors optimally grow with the level of private benefits available to managers, but decline with the cost of monitoring. He contents that higher ownership will align the interests of CEO with shareholders, thus CEO with higher ownership is less likely to seek private benefits. On the other hand, the outside directors have stronger incentive to exercise monitoring function when they have higher ownership. Therefore, the cost of monitoring is negatively related to outside directors' ownership. In summary, the board size and the proportion of outside directors will decrease with CEO's ownership but increase with outside directors' ownership. Because of the similarity between CEOs and the controlling shareholders in banks with concentrated ownership, the ownership of the controlling shareholders will be used to replace the ownership of CEOs.

Moreover, the controlling shareholders are often able to control a firm's operations with only limited ownership – cash flow right, through pyramid structures and cross-holdings among firms (La Porta et al., 1999). Claessens et al. (2002) find that when there is a greater divergence between control right and cash flow ownership, the controlling shareholders have more power to expropriate wealth from minority shareholders but just bear less cost

of their actions. So, the controlling shareholders are more inclined to seek private benefits. Thus, the divergence between control right and cash flow is also used to proxy for the controlling shareholders' potential private benefits. The board size and the proportion of outside directors are predicted to be positively related to the divergence between control right and cash flow.

Our hypotheses are based on the assumption that the firm chooses the board composition as an efficient response to the firm characteristics. Alternatively, board composition may be a result of agency problem and regulatory mandates about board composition may be beneficial to investors (Linck et al., 2008). For example, Yeh and Woitke (2005) find that negative entrenchment effects will induce the controlling shareholders to select an inefficient board "when that shareholder: (1) has a greater divergence in control and cash flow rights, (2) is a member of the controlling family, and (3) is the firm's CEO and chairman". If the alternative argument is true, we will find that the board size and the proportion of outside directors decrease with the level of private benefits available to managers.

RESEARCH DESIGN

Sample

Our data includes banks publicly listed in Taiwan during the period from 1998 to 2007. In the sample, we found that sixteen banks are acquired by bank-holding companies from 2002 to 2007 and the bank-holding companies almost have 100% ownership. Because all the acquired banks' board directors are representatives elected by the bank-holding companies, we omit the sixteen banks observations after they are included in the bank-holding companies to avoid bias in the empirical results. As a result, our final sample contains 233 bank-year observations.

We collect the board composition, control rights, cash flow ownership and other company information data from the Taiwan Economics Journal (TEJ) database, company prospectuses and "Business Groups in Taiwan," a book published annually by the China Credit Information Services Limited.

Variable definition

The paper examines how a bank's board is structured in an environment where most banks have concentrated ownership and investor protection is weak. Following Boone et al. (2007) and Linck et al. (2008), we focus on two important characteristics of board-board size and board independence. Board size is measured by the number of directors on the board. Board independence is measured with the proportion of outside directors and outside directors are directors that are not affiliated to the controlling owner. Following Lin and Hsu (2008), the controlling owners are defined as the shareholders, family group or government institution that have ultimate influence over major decisions regarding the operation, management, and allocation of company resources. Board directors and supervisors, are defined as affiliated when they are held either by the firm's controlling owner, by the controlling owner's identifiable relatives, or by legal representatives from other companies or entities controlled by the controlling owner (Yeh and Woitke, 2005). The proportion of outside directors is calculated based on

the number of outside directors divided by the total number of directors. Board size is measured with the total number of directors. The rationales for each of the independent variables and the details of the measures are explained further.

Bank size

The study measures bank size as the natural log of total assets as of each fiscal year-end. Based on the “scope of operation hypothesis”, bank size can measure bank complexity and is positively related to board size and the proportion of outside directors.

Bank age

The “scope of operation hypothesis” proposes that bank complexity increases with bank age. Thus, bank age is also predicted to be positively related to board size and the proportion of outside directors.

Fee revenue ratio

Following Chen (2004) and Shen (2005), we use the fee revenue ratio to divide banks into two technology types-separated banks and universal banks. If the fee revenue ratio increases, the bank is more toward universal banks. The scope of operation hypothesis states that firms with more complicated production process need larger and independent boards.

Because the operations of universal banks are diversified and more complex, fee revenue ratio is expected to be positively related to board size and the proportion of outside directors based on the scope of operation hypothesis.

On the other hand, the monitoring cost of separated banks is higher since Chen (2004) argues that managers of separated banks have specific knowledge about traditional intermediation activities. Because the board size and the proportion of outside directors decrease with the cost of monitoring and advising, we can also predict that fee revenue ratio is negatively related to board size and the proportion of outside directors.

The fee revenue ratio is calculated based on fee revenues divided by total revenues.

Market-to-book ratio

Raheja (2005), Coles et al. (2008) and Lehn et al. (2009) argue that a small and less independent board is optimal for a high growth firm because high growth firms may have more firm-specific information and will increase the cost of monitoring to outside directors.

The market-to-book ratio can be proxy for the firm growth opportunities (Boone et al., 2007; Linck et al., 2008), and is predicted to be negatively related to board size and the proportion of outside directors. The market-to-book ratio is measured as the book value of debt plus the market value of equity, divided by the book value of assets.

Standard deviation of stock returns

Demsetz and Lehn (1985) suggest that the standard deviation of stock returns can measure a firm's operation risk and can be proxy for uncertainty of a firm's operating environment about the firm's prospects. The monitoring hypothesis shows that the noisiness of a firm's operating environment will increase the monitoring cost and

result in a small and less independent board. Thus, the study predicts that the standard deviation of stock returns is negatively related to board size and the proportion of outside directors. The standard deviation of stock returns is the standard deviation of the daily logarithmic stock return measured over the prior 12-month period.

Free cash flow

Jensen (1986) show higher free cash flow will increase the level of private benefits available to managers. Thus, it is better to increase the board size and board independent based on the monitoring hypothesis. If the monitoring hypothesis is true, free cash flow will be positively related to board size and the proportion of outside directors. Free cash flow is defined as the firm's earnings plus depreciation minus capital expenditures, all divided by assets.

Bank prior performance

We use return on asset in the previous year to measure bank prior performance. Hermalin and Weisbach (1998) show that CEO's influence increases with firm performance. Therefore, bank prior performance is negatively related to the proportion of outside directors.

Controlling shareholders' ownership

Boone et al. (2007) propose that CEO with higher ownership is more likely to wield his influence over board selection process. Since CEO prefers inside directors, CEOs' ownership is negatively related to the proportion of outside directors. Raheja (2005) also argues that higher ownership will align the interests of CEO with shareholders, and decrease CEOs' incentive of seeking private benefits. In such scenario, there is less need for outside monitors and a smaller and less independent board is optimal. Therefore, based on the monitoring hypothesis, CEOs' ownership is also negatively related to the proportion of outside directors and board size. Because of the similarity between CEOs and the controlling shareholders in banks with concentrated ownership, the study use the ownership of the controlling shareholders to replace the ownership of CEOs, and expects the controlling shareholders' ownership is also negatively related to the proportion of outside directors and board size.

As in Claessens et al. (2000), ownership is defined as cash flow rights. The cash flow rights data are collected from the Taiwan Economics Journal (TEJ) database. The cash flow right is the right of the controlling owner to get the distributed earning of the bank. Following La Porta et al. (2002), TEJ database defined cash flow right as direct voting right based on the proportion of shares registered to the ultimate owner plus the multiple of indirect voting right in the chain of shares held by entities that in turn is controlled by the ultimate owner.

Controlling shareholders' excess control right

Excess control right is defined as control right less ownership. Because the controlling shareholders have stronger incentive to seek private benefits when the divergence between control right and cash flow right increase, a larger and more independent is optimal for banks with the higher excess control right. Thus, the board size and the proportion of outside directors are predicted to be positively related to the divergence between control right and cash flow right. Control right is also collected from TEJ database. Based on La Porta et al. (2002), they define control right as direct

Table 1. Descriptive statistics.

Statistic	Mean	Standard deviation	Minimum	Maximum
Panel A. Board composition				
Proportion of outside directors (%)	41.89	24.55	0.00	100
Board size(Number of directors)	15.08	5.27	6.00	30.00
Panel B. Ownership				
Controlling shareholders' Ownership (%)	19.83	18.39	0.02	100
Excess control (%)	4.41	12.50	0.00	99.89
Outside directors' ownership (%)	6.35	10.28	0.00	93
Panel C. Bank characteristics				
Bank size (billion)	412.04	400.76	41.76	2,422.54
Bank age	29.64	20.68	5.00	73.00
Fee revenue ratio (%)	17.90	10.80	2.06	89.11
Free cash flow ratio (%)	1.14	2.45	-5.68	12.59
Market-to-book ratio	1.01	0.11	0.88	2.39
Standard deviation of stock returns (%)	2.51	0.71	0.16	4.83
Prior performance (%)	-0.05	1.77	-12.13	9.53

voting right plus indirect voting right. When calculating indirect voting right, they take the last link in the control chain.

Outside directors' ownership

Raheja (2005) shows that the monitoring cost will decline with outside directors' ownership and the less monitoring cost results in a large and independent board. In the other hand, Kieschnick and Moussawi (2004) argue that the proportion of outside directors increases with constraints on CEOs' influence. The higher outside directors' ownership will constrain CEOs' influence, and thus increase the proportion of outside directors. In summary, outside directors' ownership should be positively related to board size and the proportion of outside directors.

EMPIRICAL RESULTS

Descriptive statistics

Table 1 shows the descriptive statistics for our sample of Taiwan banks on key bank, board composition and ownership variables. The average board size is 15.08. This is much higher than that for US banks (Belkhir, 2009b) and for non-financial companies in Taiwan (Yeh and Woidtke, 2005). The average value for the proportion of outside directors is 41.89%. Contrary to the finding of the prevailing literature (Booth et al., 2002, Adams and Mehran, 2003), the banks tend to have more affiliated directors and supervisors than non-financial companies in Taiwan. Panel B is the ownership data. Average controlling shareholders' ownership in the sample is 19.83%, and excess control right is 4.41%. Caprio et al. (2007)

define the banks as with concentrated ownership if they have a shareholder that owns at least 10% of the voting rights. Thus, most banks in Taiwan have concentrated ownership. However, contrasting to Taiwan non-financial companies, the ownership of banks in Taiwan is less concentrated. The average outside directors' ownership is 6.35%.

Panel C of Table 1 is the measures of bank characteristics for the sample. The mean value of total assets is \$ 412.04 billion. The mean fee revenue ratio is 17.9%, however, the maximum fee revenue ratio is 89.11% and the standard deviation of fee revenue ratio is 10.8%. The result shows that there exist large differences between banks' technology types. Mean free cash flow (FCF) is 1.14% of total assets, and mean MTB ratio is 1.01. The sample has an average return on asset of -0.05%.

The determinants of board composition

To test our hypotheses and examine the determinants of board size in Taiwan, we estimate multivariate regressions. All regression equations include year dummy variables to solve the possible problem that the contemporaneous residuals are correlated across banks in panel data set (Coles et al., 2008). The results are presented in model (a) of Table 2. We use bank size and bank age to proxy for bank complexity and find both variables are positively related to board size. This is consistent with the scope of operation hypothesis, which predict that complex banks need larger board to monitor managers' decision.

Table 2. The determinants of board size.

Model	a	b
Bank size	0.0783 *(0.0339)	0.0741 **(0.0345)
Bank age	0.1514 ***(0.0000)	0.1262***(0.0001)
Fee revenue ratio	0.0937(0.7799)	-0.0695(0.8281)
Free cash flow ratio	-0.0969(0.9276)	0.5396(0.5966)
Market-to-book ratio	0.0619(0.8442)	-0.0204(0.9456)
Standard deviation of stock returns	-12.4604**(0.0141)	-11.8916**(0.0136)
Outside directors' ownership	0.4174 *(0.0673)	0.2510(0.2505)
Controlling shareholders' ownership	-0.6676 *** (0.0000)	-0.2253(0.1644)
Excess control	-0.1422(0.4779)	-0.0452(0.8131)
Lag (Proportion of outside directors)		0.5756 *** (0.0000)
Adjusted R-squared	0.1934	0.2777
F-statistic	4.0910***	5.6737***

The results of a multiple regression analysis of the determinants of board composition are presented where the dependent variable is board size measured by the number of directors on the board. Bank size is the natural log of total assets as of each fiscal year-end. Bank age is the data year less the year a firm was founded. The fee revenue ratio is calculated based on fee revenues divided by total revenues. Free cash flow is defined as the firm's earnings plus depreciation minus capital expenditures, all divided by assets. The market-to-book ratio is measured as the book value of debt plus the market value of equity, divided by the book value of assets. The standard deviation of stock returns is the standard deviation of the daily logarithmic stock return measured over the prior 12-month period. Outside directors' ownership is the proportion of shares or cash flow rights owned by the outside directors. Controlling shareholders' ownership is the proportion of shares or cash flow rights owned by the largest shareholder group. Excess control is control rights less cash flow rights and control right is the proportion of shares or votes controlled by the largest shareholder group. Lag (the proportion of outside directors) is the proportion of outside directors on the board in the previous year and outside directors are directors that are not affiliated to the controlling owner. Data are obtained from the Taiwan Economics Journal database. p-values are given in parentheses, ***, **, * represent significance at the 1, 5, and 10% level, respectively.

Except standard deviation of stock returns, the coefficients for fee revenue ratio, market-to-book ratio and free cash flow all are insignificant. It is inconsistent with our hypothesis. Market-to-book ratio and standard deviation of stock returns are used to proxy for information asymmetry, and thus the results provide some, albeit not uniform support for the hypothesis that board size decreases for banks with high information asymmetry. Fee revenue ratio flow is used to divide the banks into different technology type. So, the results imply that the board size is not related with bank operating type. Free cash flow measure private benefits available to managers, and is not the important determinant of board size. In other words, the bank does not increase board member to monitor managers that have more free cash flow to use.

The coefficient on outside directors' ownership is significantly positive, and the coefficient on controlling shareholders' ownership is significantly negative, consistent with the monitoring hypothesis. But the coefficient on excess cash flow is insignificant. We also include instrument variable for board independence to control for the fact that board size and board composition are endogenous to the firm's environment. Following Boone et al. (2007), we use the previous year's proportion of outside directors as the instrument variable for board

independence, and the results are showed on model (b) of Table 2. We find that the significant coefficients on bank age and banks size remain significant, but the coefficients on outside directors' ownership and controlling shareholders' ownership become insignificant. Contrary to the finding of Boone et al. (2007) and Linck et al. (2008), the results don't support the monitoring hypothesis. Thus, we find that the scope of operation is the key determinants of banks' board size.

In order to understand how a bank's board is structured, we also estimate multivariate regressions by using the proportion of outside directors as dependent variable. In model (a) of Table 3, the coefficients are not significant on all bank's characteristic variables except bank size. However, consistent with our predictions, banks size is positively related to the proportion of outside directors. The results provide little support for the hypothesis that board independent is a function of banks' operating environment, but indeed show that the bank selects more outside directors as the bank size increases.

The coefficient on bank prior performance is significant negative, consistent with the negotiation hypothesis proposed by Hermalin and Weisbach (1998). The negotiation hypothesis argues that the controlling shareholders' influence is increasing in firm performance and the controlling shareholders incline to select more inside

Table 3. The determinants of board composition.

Model	a	b
Bank size	0.0370*(0.0544)	0.0316*(0.0640)
Bank age	0.0203(0.2497)	-0.0167(0.3128)
Fee revenue ratio	0.2757(0.1405)	0.3551**(0.0336)
Free cash flow ratio	0.3460(0.5341)	0.6243(0.2081)
Market-to-book ratio	0.2042(0.2187)	0.1208(0.4130)
Standard deviation of stock returns	-3.7026(0.2165)	-2.2391(0.4011)
Prior performance	-2.2496 ** (0.0401)	-2.8045 *** (0.0042)
Outside directors' ownership	0.3467 *** (0.0034)	0.2508** (0.0175)
Controlling shareholders' ownership	-0.8772*** (0.0000)	-0.7187*** (0.0000)
Excess control	-0.1500(0.1479)	-0.1281(0.1641)
Lag (board size)		0.2588 *** (0.0000)
Adjusted R-squared	0.4567	0.5701
F-statistic	11.2629***	16.3182***

The results of a multiple regression analysis of the determinants of board composition are presented where the dependent variable is board composition measured by the proportion of outside directors. Outside directors are directors that are not affiliated to the controlling owner. Bank size is the natural log of total assets as of each fiscal year-end. Bank age is the data year less the year a firm was founded. The fee revenue ratio is calculated based on fee revenues divided by total revenues. Free cash flow is defined as the firm's earnings plus depreciation minus capital expenditures, all divided by assets. The market-to-book ratio is measured as the book value of debt plus the market value of equity, divided by the book value of assets. The standard deviation of stock returns is the standard deviation of the daily logarithmic stock return measured over the prior 12-month period. Bank prior performance is return on asset, measured as the operation income over total assets in the previous year. Outside directors' ownership is the proportion of shares or cash flow rights owned by the outside directors. Controlling shareholders' ownership is the proportion of shares or cash flow rights owned by the largest shareholder group. Excess control is control rights less cash flow rights and control right is the proportion of shares or votes controlled by the largest shareholder group. Lag (the proportion of outside directors) is the proportion of outside directors on the board in the previous year. Data are obtained from the Taiwan Economics Journal database. p-values are given in parentheses, ***, **, * represent significance at the 1, 5, and 10% level, respectively.

directors, thus bank prior performance is negatively related to the proportion of outside directors.

The controlling shareholders' ownership is both negatively and significantly related to board independent, but the coefficient on outside directors' ownership is significantly positive. The results can be explained by two views. The negotiation hypothesis shows that the proportion of outside directors decreases with CEOs' influence and increases with constraints on CEOs' influence. Because the controlling shareholders' ownership can measure their influence, and outsider directors' ownership is used to proxy for constraint on control shareholders' influence, and thus our results are consistent with the negotiation hypothesis. Another view is based on the monitoring hypothesis. The monitoring hypothesis proposes that the proportion of outside directors optimally grows with benefit of monitoring, but decline with the cost of monitoring. The higher controlling shareholders' ownership aligns the controlling shareholders' incentive with stockholder, thus the benefit of monitoring will decrease. Moreover, the higher outside directors' ownership will increase the outside directors' incentive of exercising monitoring function, and decrease the cost of monitoring. Thus, based on the monitoring

hypothesis, the proportion of outside directors is negatively related to the controlling shareholders' ownership, but positively related to the outside directors' ownership. However, the coefficient on controlling shareholders' excess control right is insignificant, which is inconsistent with the monitoring hypothesis. In summary, the negotiation hypothesis can provide better explanations for the determinants of board independent than the monitoring hypothesis.

Including the lagged board size as the instrument variable for board size, the results are showed on model (b) of Table 3. We find that the significant coefficients on bank age, bank prior performance, controlling shareholders' ownership and outside directors' ownership also remain significant, the same with the results of model (a) in Table 3. The results provide stronger support for the negotiation hypothesis. In Taiwan, most banks' ownership is high concentrated and the mechanism of investor protection is weak. Shleifer and Vishny (1997) point out that "Large investors may represent their own interests, which need not coincide with the interests of other investors in the firm, or with the interests of employees and managers." Because the controlling owner has enough power to control the operations of a bank and the controlling owner

may structure board just for his own interests, banks do not structure boards in an efficient response to their operating environment. Thus, the empirical results show that the proxies for the costs and benefits of monitoring and advising, for example fee revenue ratio, market-to-book ratio and free cash flow, all are insignificant determinants of board size and structure. The results are consistent with Yeh and Woidtke (2005) and Ting and Liao (2010), they also find the controlling owner select a board for his own interests.

Conclusion

Using data on banks of Taiwan, this paper examines the determinants of board size and composition in an environment where most banks have concentrated ownership and investor protection is weak. The results show that bank size and bank age are the key determinants of banks' board size. This is consistent with the scope of operation hypothesis, which predict that complex banks need larger board to monitor managers' decision. However, contrary to the finding of US unregulated firms with disperse ownership, we find little evidence that board size is related to the costs and benefits of monitoring.

Moreover, the proportion of outside directors is negatively related to measures of the controlling shareholders' influence – including bank past performance and the controlling shareholders' ownership, and positively related to constraints on such influence, including the ownership of outside directors. The results provide some support for the negotiation hypothesis, consistent with the finding of US unregulated firms with disperse ownership. The negotiation hypothesis proposes that corporate boards reflect the outcome of a negotiation between the CEO and outside board members. Our empirical results show that board composition is also the outcome of a negotiation between the controlling shareholders and outside directors in an environment where most banks have concentrated ownership and investor protection is weak. When the controlling shareholders can exercise more influence, they select more affiliated directors, but board independence will increase if constraints on the controlling shareholders' influence. Nevertheless, our empirical results are not consistent with the monitoring hypothesis that firms choose board composition based on the costs and benefits of monitoring and advising.

Overall, these results indicate that board size and composition reflect the bank-specific and ownership characteristics, but are not sensitive to the benefits and costs of monitoring and advising. Thus, contrary to the finding of US unregulated firms with disperse ownership, our results are not supportive of the view that banks select board size and composition in an efficient response to the bank's operating environment. Because most banks have controlling owners in Taiwan and the controlling owners may structure board just in ways that are advantageous to themselves, banks do not change

board size and composition to respond to the benefits and costs of monitoring and advising. Moreover, the board structure is just the outcome of a negotiation between the controlling owner and outside board members, and the bargaining power depends on the ownership of the controlling shareholders and outside directors. However, for firms with disperse ownership, maximizing shareholder wealth is their main objective. Hence, the empirical results of US unregulated firms with disperse ownership show that firms' boards are indeed efficient responses to the firms' operating environment. The empirical implication is that regulatory mandates for bank may be beneficial to investors in an environment where most banks have concentrated ownership and investor protection is weak. However, the mandates must vary with bank operating characteristics and uniform requirements could be not appropriate.

One of the limitations of this study is the possible imperfect proxies for the costs and benefits of monitoring and advising. For example, market-to-book ratio and standard deviation of stock returns may not be good proxies for information asymmetry. Therefore, by using imperfect proxies, the conclusions from the empirical results may be misleading. Unfortunately, existing theory and empirical research on the determinants of board structure are not sufficiently complete to help taking into account the proper proxies. The findings of the study suggest possible avenues for future research. For example, we can replicate the present study on unregulated firms from Taiwan. It may aid us to understand whether the conclusions which differ from US are caused by the ownership structure difference between US and Taiwan, or, the industry difference induces the different conclusions. A multi-country study that incorporates a larger sample of firms from across different countries also can provide more powerful tests of the determinants of board structure.

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