The determinants of corporate board size and structure:
Evidence from Thai listed companies

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An Independent Study
Submitted in Partial Fulfillment of
the Requirement for the Degree of
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Faculty of Commerce and Accountancy
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Abstract

The purpose of this study is to examine whether firm characteristics influence board size and structure. This study employs 275 non-financial firms listed from Stock Exchange of Thailand (SET) during 2002 to 2006. The empirical results of this study are consistent with some previous literatures. I find that the board size has positively significant relationship with firm size and log of market to book ratio. Larger firm and high growth firm requires larger board to possess, supervise, and monitor the management. Whereas the board composition increases in firm age and outside director ownership and decreases in CEO tenure, and CEO ownership. It is interpreted that CEO play an important role in determining board composition. CEO who has more power would maintain his control by increasing the proportion of insider into the board by adding more insider or replacing outsider with insider in the board.

Chapter 1
Introduction

<u>Statement of problem:</u>

The costly agency conflicts between owner and managers are induced by the separation of ownership and control in modern corporations. The agency problems are the sources of large costs to shareholders. The corporate governance is the set of mechanisms – both institutional and market-based that induces the self-interested controllers of a company to make decisions that maximize the value of the company to its owners. As a result the corporate governance, with consisting of boards of directors, corporate charters, legal and regulatory rules, investor monitoring, etc, come up to lessen the agency conflicts.

As 1997 financial crisis, most of East Asia needs the reformation in financial and governance. The main weakening leading to the financial crisis caused by the lack of disclosure and unclear management practices. Limpaphayom and Connelly (2004) point that like other Asian countries affected by the 1997 financial crisis, Thailand faced corporate governance problems. Overinvestment and over borrowing are caused by the poor governance practices at firms. With the high ownership concentration the potential agency conflicts between the controllers and minority shareholders are more serious problem than the agency conflicts of the separation of ownership and control. Overinvestment and over-borrowing come at the expense of minority shareholder. Many firms encounter financial distress, bankruptcy, or financial restructuring. If high ownership concentration creates the inefficient management, it would follow that outside director monitoring would take on an increased role in preventing controlling owners from using their power for private benefit.

In recent years, many of the studies and debate over corporate governance have been interested on the size and structure of corporate board of directors. Constructing effective corporate governance that protects the company and minority shareholder is the most important at the time of an initial public offering (IPO). The Stock Exchange of Thailand (SET) has recognized the importance of

corporate governance and attempted to establish corporate governance in Thai firms. Corporate governance is a set of structures and processes of relationships among the company's management, board and shareholders to enhance its competitiveness to business wealth and long-term shareholder value by taking into consideration the interests of other stakeholders. Securities and Exchange Act B.E. 2535 (SEA) requires any company that are going into public must already have the good system of corporate governance. One mechanism to establish effective corporate governance that protects the shareholders is the board of directors. SEA requires every listed company to appoint an audit committee that comprises the independent and competent directors to regularly monitor the internal administration and the operation of the company. The board of directors can reduce the agency conflicts by using its power to monitor and control management. The board of directors has duty to hire, fire, monitor, and compensate management, in order to maximize the shareholder value. SET announced, in early 1997, that all listed companies were required to establish an audit committee by the end of 1999.The audit committee must consist of at least 3 outside independent directors. The committee's responsibilities are to:

- Review the company's financial reports to ensure that they present true and fair value, and provide sufficient information to shareholders.
- Review the adequacy and effectiveness of the company's internal controls system and internal audit functions to ensure their effectiveness and proper risk management.
- Review compliance with SET Rules and Regulations and any other relevant laws.
- Consider and propose the appointment of auditors.
- Prepare and ensure Good Corporate Governance in the audit committee report.
- Handle any other pertinent needs that may develop.

Because of the importance of the corporate board of director, in this paper I examine the determinants of corporate board size and composition in Thai listed companies. There are three hypotheses to test these - which borrows from ideas expressed by Boone A. et al. (2006). The hypotheses to corporate board size and composition are determined by firm-specific characteristics and competitive

environment. The first hypothesis is called *the scope of operations hypothesis*. This hypothesis implies that the scope and complexity of the firm determine the corporate board size and structure which follow the studies by Fama and Jensen (1983), Yermack (1996), Denis and Sarin (1998), Anderson et al. (2002), Crutchley et al. (2004), Lehn et al. (2004), and Coles et al. (2005). The second hypothesis is called *the negotiation hypothesis*. Hemalin and Weisbach (1998) present the model that CEO has an influence on corporate board of directors. They suggest that the structure of board of director depend on the balance of power between CEO and board. Kieschinick and Moussawi (2004) state that the corporate board of director's structure is related to the CEO's influence. The third hypothesis is called *the monitoring hypothesis* which implies that boards may be affected by the specific monitoring requirement of the firm's business. Demsetz and Lehn (1995), Gillan et al. (2004), Coles et al. (2005), and Linck et al.(2005) found the relation between monitoring cost or requirement and the corporate board of director size and composition.

This study makes contribution by attempts to address the determinants of corporate board size and structure which is one mechanism of the good corporate governance. The first reason that I observe the board in Thailand is Thailand faced the most severe economic fall down in the country's history which caused by the Asian financial crisis resulted by lacking of good corporate governance. The second reason is that most companies in Thailand have family-control structure and provide low level of transparency and quality disclosure to outsiders. Claessens et al. (1999) find extensive family control in more than half of East Asian corporations. Corporations in Indonesia and Thailand are mainly family controlled. Wiwattanakantang (2001) examines the ownership structure of listed Thai firm in 1996 and found the ownership structure is concentrated and more than 80 percent of the firms in the sample, the largest shareholders are controlling shareholders. The mainly families are the controlling shareholders. The main purpose of the governance is to protect the investors' wealth and provides better opportunity for companies which attempt to increase their external financing. The external financing would be more difficult for firms whose investors have no confidence in their governance. Good and standardized corporate governance would increase the confidence of internal and external

investors. The firms with good corporate governance, therefore, would have the stability, reliability, and efficiency which furnish the confidence to the internal and external investors.

Research question:
- Whether the scope and complexity of the firm determine the corporate board of director size and composition for Thai listed company.
- Whether the CEO's influence determines the corporate board of director size and composition for Thai listed company.
- Whether the monitoring requirement and the cost of monitoring of the firm determine the corporate board of director size and composition for Thai listed company.

Objective of the study:
- To determine the factors those affect the corporate board of director size and composition.

Scope of the study:
- The data of this study consists of the companies registered in Thailand during year 2002 through year 2006. The samples are cross-sectional of 275 listed companies, which provide 1,375 observations. Only firms that have complete data during the study periods are used. Companies in financial sector and companies under rehabilitation (REHABCO) sector are excluded since they have the specialized nature of operation and are subject to different set of monitoring mechanisms.
- In order to see the evolution in the board size and composition, I collect the five year periods of the data of board and information of all stated companies. I obtain the sample data from Stock Exchange of Thailand's Market Analyzing and Reporting Tools (SETSMART), listed firm's annual reports, 56-1 reports, and DATASTREAM.

This study is organized into five chapters. The first chapter is introduction. Chapter 2 expresses the literature review and theoretical framework which describe the relation between board and firm characteristics and list the variables used in this study. The methodology and variables are provided in Chapter 3. The regression results of the study are presented in Chapter 4. Finally, the conclusion for this study provided in Chapter 5.

Chapter 2 and 3

Literature review and theoretical framework

The scope of operations hypothesis

This hypothesis implies that the scope and complexity of the firm determine the corporate board size and structure. I expect positive relation between the firm size and the size of boards. Large firms engage in a more volume, a greater diversity of activities, a more merger and acquisition activity and use more sophisticated financial and marketing techniques. Larger firms have more demand for information and supervision from board than small firms. The demand for more information and supervision requires larger board. The major advantage of large boards is the collective information that the board possesses about factors that affect the value of the firms.

Turning to board composition, I expect the positive relation between the independence of boards and firm size. The reason is that the potential for agency conflicts between managers and shareholders is expected to increase in firm size. In addition, larger firms may have greater agency costs of free cash flow and less transparency with regard to the performance of its individual units. Then the independence of boards is expected to increase in firm size in to mitigate the agency problems.

Yermack (1996) and Eisenberg et al. (1998) get the same result that the board sizes and structures cause differences in the firm value and other measures of firm performance. Yermack (1996) report a negative relation between the board size and the firm profitability. Eisenberg et al. (1998) find a negative relation between the board size and the return on assets and operating margin. With consistent with Yermack (1996) and Eisenberg et al. (1998), Lehn K. et al. (2004) conclude that "the size and structure of boards of directors are determined by tradeoffs between the incremental information that directors bring to boards and the incremental costs and free rider problems engendered by their additions to the boards". They find that the board size is directly related to firm size and negatively related to growth opportunities. Moreover insider board is negatively related to firm size

and directly related to the growth opportunities because larger firms have more significant agency problem. Barclay et al. (1995) suggest that the agency conflict between manager and shareholder is expected to increase in firm size. The reason is that the percentage of equity held by top managers is expected to vary inversely with firm size. Chrutchley et al (2004) propose that outside boards increase in firm size since large firm has more significant agency problem. Cole L. et al. (2005) find that the firms with high advising requirements or more complex firms such as large, diversified and high R&D have larger boards. In addition, firms with the firm-specific knowledge of an insider is important, such as high R&D, have larger portion of insiders on the boards. Denis and Sarin (1998) find the changing in board size and composition is caused by firm growth opportunities, firm size, and leverage. They find that the board size and composition is increase in firm size. Pfeffer (1972) and Booth and Deli (1996) suggest that larger firms are likely to have more external contracting relationship, and, thus, require larger boards. And this relation will be driven by the outside directors on the board. Mak and Li (2001) propose that the board size is positively related to the firm age since as time goes on more managers are promoted to directors, and as a result boards become larger. Boone et al. (2006) suggest that older firms are larger and more complex and can require more monitoring. The demand for specialize board services are grow as the firm grows or simply survives as a public entity.

To test this hypothesis that board size and structure are determined by the scope of operation, I use two measures which are firm size and firm age as independent variables. This hypothesis predicts that all two measures have positive relation to board size and the proportion of outsider board of directors.

The negotiation hypothesis

The board size and structure can be determined by the negotiation between CEO and outside board of directors. The CEO negotiation powers come from the CEO who has more valuable than any potential replacement, better performance, or long tenure. The outside director may not act on behalf of shareholders because CEO often dominates the director nomination process. Hermalin and Weisbach (1998) suggest that the negotiation power come from CEO who has more valuable

than any potential replacement. The CEO who performs better would maintain their control over the board and add the insider to the board. Then the board loses independence and monitors less. Ryan and Wiggin (2004) suggest that in firms with more power CEOs, the directors get less incentive to monitor. Harley E. et al. (2005) also find that the percentage of insider boards increases with CEO power (CEO tenure). Kieschnick and Moussawi (2004) argue that the board size and composition are the result of number of shareholders and voting power. They find that the number of corporate board of director have positive relation with the number of shareholder. Furthermore they find that when the managements have less power, the outsider director increases more proportion of the board. Additionally, the board size and the outsider board proportion are significantly influence by the firm's corporate charter/bylaw. Weisbach (1988) suggests that outside directors represent shareholder interests better than inside directors. He finds that CEOs are more likely to be removed following poor performance if outside directors have voting control. As the SET only requires that listed company have at least three outside directors, consequently, CEO can increase the fraction of insider board by adding more insider board into the board which affected increasing in board size. Or outside director can increase the fraction of outsider board by adding more outsiders into the board.

To test this hypothesis I use two measures which are the number of years that CEO has been in the position (CEO's tenure) and the CEO's ownership as the measure of CEO's influence. This hypothesis predicts that all two measures have positive relation to board size and negative relation to the board independence. I use the outside director's stock ownership as the measure of constraints on the CEO's influence. This hypothesis predicts that this variable has positive relation to board size and board independence.

The monitoring hypothesis

The board size and composition may be affected by the specific monitoring requirement of the firm's business and monitoring cost. Many previous studies find that the board size and composition are determined by the trade off between the cost and benefit of increasing in monitoring. The net benefit of extra monitoring increases with manager opportunities to consume private benefits, but

decreases with cost of monitoring. Lehn et al. (2004) argue that the trade off between the incremental information that the director posses and the incremental cost determine the board size and structure. They find that the board size and structure have relation with the firm size and growth opportunities. Larger firm which has more activity and greater diversify than small firm needs more information than small firm. They find that the board size has positively related to the firm size. On the other hand the board size has inverse relation with firm growth opportunities because of the higher in the cost of monitoring manager in firm with high growth opportunities. With consistent with the result by Holmstrom (1979), he find that the agency cost is high in high growth firm because managers in high growth firm have higher flexibility due to future investment. In order to minimize the agency cost, the insider ownerships of equity are likely to have more insider board of directors. Moreover the firm with high growth opportunities need smart governance structure in order to assist quick decision making, then the small boards are more effective. Lipton and Lorsch (1992) and Jensen (1993) propose that the smaller boards may be more effective than the larger boards because of the coordination problem in larger boards. Coles et al. (2005) propose that firms with high R&D intensive which require specific knowledge of insiders are prefer the greater representation of insider on the board.

Raheja (2005) argue that the optimal board size and structure are determined by the tradeoff between minimizing the cost of monitoring by outsiders, maximizing the incentive to reveal the private information by insiders, and maximizing the ability to vote against the inferior project by outsiders. The CEO proposes the project to the board based on his incentive. The private benefit to firm manager may cause the CEO to choose the inferior project. The inside directors know the quality of the project and better get the information of the firm investment projects. On the other hand the outside directors can encourage insiders to reveal their superior information and help the board to improve the value of the projects. As a result the optimal board size and structure have relation with the directors and firm characteristics. At high levels of monitoring cost, it is optimal to decrease the number of outsiders as verification costs increase. Demsetz and Lehn (1985) and Himmelberg Hubbard and Palia (1999) suggest that the agency

problem that caused by a costly monitoring environment may be mitigated when the CEO hold a large ownership.

With consistent with previous studies in large shareholders and corporate control by Schleifer A. and Vishay R. (1986) and Demsetz H. and Lehn K. (1985), Jiatao L. (1994) finds that the percentage of outside directors on the boards is negative related to ownership concentration. This result follows with the predictions of agency theory. With concentrated ownership, the large shareholders can take a leadership role in monitoring management and then reduce the agency costs which caused by the conflict between shareholders and managers. In the firm with diffused ownership structure, more outside directors are needed on the board in order to monitor management. Erickson J. et al (2005) find that in Canadian listed companies the ownership concentration is negatively related with the board size and independence because the dominant shareholders avoid outside monitoring. Wiwattanakantang (2001) examines the ownership structure of listed Thai firms in 1996 and finds that the ownership structure is concentrated and more than 80 percent of the firms in the sample, the largest shareholders are controlling shareholders. The mainly families are the controlling shareholders. The controlling shareholders not only just control the votes but also involve in the firm's management as officers and directors. Claessens et al. (1999) find extensive family control in more than half of East Asian corporations. Corporations in Indonesia and Thailand are mainly family controlled.

The agency conflict between shareholders and managers may be reduced by debts since debts have the potential to discipline managers which effect to board size and composition. Firms that have high financial leverage should have higher degrees of transparency. The monitoring by debt holders or the elimination of free cashflow could substitute for board monitoring. Jensen (1986) argues that the agency cost of free cashflow may be reduced by debt. Debt serves to discipline managers by forcing them to pay out future cash flows rather than invest in low return project.

Previous studies find the relation between leverage and board size and composition. Berger, Ofek and Yermack (1997) find a negative relationship

between leverage and the size of the board. Mehran (1992) and Berger, Ofek and Yermack (1997) find a positive relationship between leverage and outside directors. However Maug (1997) suggest a negative relationship between leverage and the outside directors. And Brick and Chidambaran (2005) find that there is no relationship between the number of outside directors and leverage.

In this study, it is hypothesized that the board size and the proportion of outside boards are inversely related to the cost of monitoring and ownership concentration and positively related to manager private benefits.

To test this hypothesis, I use firm free cash flow as measurement of manager potential private benefits since free cash flow is cash flow in excess of that required to fund all projects that have positive net present values when discounted at the relevant cost of capital. Free cash flow may cause agency conflict due to manager may use it for private benefit rather to create wealth to shareholder. This hypothesis predicts that the board size and independence have positive relation to free cash flow variable.

And I use the five variables which are the log of market to book ratio, the firm's volatility of daily stock price, leverage, ownership concentration and CEO ownership, as the measurement of the cost of monitoring. The firms with high growth opportunity and high market to book ratio tend to have high monitoring cost for outsiders. The cost of monitoring is also high in the firms with high volatility in the stock return because the stock return variance represents the uncertainty of the firm performance and complicatedness to judge manager performance. The last two variables are ownership concentration and CEO ownership. Jiatao Li (1994) finds that in the firm with high ownership concentration the agency cost is low because the large shareholder can take a role in monitoring management. Jensen and Meckling (1976) and Himmelberg et al. (1999) suggest that in order to minimize the agency problem caused by the cost of monitoring, the CEO can hold a large ownership. Raheja (2005) proposes that the higher managerial ownership decreases the private benefits to insiders and increases shareholder wealth. In this study, it is hypothesized that the board size and independence have inverse relation to these five variables.

Chapter 4
Methodology

The samples used in this study include cross-section and time series panel of the companies that register in Thailand. The sample consists of 275 companies in Thailand during 2002-2006. In order to see the evolution in the board size and composition, I collect the five year periods of the data of board and information of all stated companies through year 2002 until year 2006, excluding firms in rehabilitation, banking, finance and securities and insurance sectors due to the fact that these firms have different business natures and financial reports. I also omitted samples with incomplete or missing data during year 2002-2006. I obtained data of board size, board composition from Stock Exchange of Thailand's Market Analyzing and Reporting Tools (SETSMART), listed firm's annual reports and 56-1 reports. The financial data are obtained from DATASTREAM, published by Thomson Financial. I use the panel least squares method. The balance panel data are sorted by the company and every company follows the same regular frequency with the same start and end date. I also included 21 industry dummy variables which based on SET's sectors in regression in order to analyze the industry effect. Another method, I use the simultaneous systems equations (two-staged least squares, 2SLS) that explicitly endogenize board size and board composition since the board size and board composition appear on left hand side in one equation and right hand side of each of the others.

This study is separated into 3 hypothesizes:
- The scope of operation hypothesis
- The negotiation hypothesis
- The monitoring hypothesis

4.1 The scope of operation hypothesis:

To test the hypothesis that board size and structure are determined by the scope of operation, I use two measures which are firm size, and firm age as independent

variables. This hypothesis predicts that all two measures have *positive* relation to board size and the proportion of outsider board of directors.

The regression to test the board size:

Board size $_t$ $= \alpha$

$\qquad\qquad\qquad + \beta_1 *$ Firm size $_{t-1}$

$\qquad\qquad\qquad + \beta_2 *$ Firm age $_{t-1}$

$\qquad\qquad\qquad + \beta_3 *$ Fraction of independent director $_{t-1}$

$\qquad\qquad\qquad + \beta_4 *$ ROA $_{t-1}$

$\qquad\qquad\qquad + \mu$

The variables in the model are explained below.

Dependent variable:

- Board size (B_SIZE): The board size is the total number of board members which I gather the information of number of board members from 56-1 report.

Variables used to test the scope of operation hypothesis:

- Firm size (F_SIZE): I simply measure the firm size by total assets as of each fiscal year end.
- Firm age (AGE): Age is defined by the number of years since the firm was established.

Control variables:

- The fraction of independent directors on the boards (LAGB_COM): It is the ratio of the number of independent (non-affiliated) board members who are non-employees of the firm nor firm owner over the total number of directors on the boards as of each fiscal year end.
- Return on assets (ROA): It is the operating income divided by total assets as of each fiscal year end.

The regression to test the board composition:

Fraction of independent directors on the boards $_t$ = α

$$+ \beta_1 * \text{Firm size } _{t-1}$$
$$+ \beta_2 * \text{Firm age } _{t-1}$$
$$+ \beta_3 * \text{Board size } _{t-1}$$
$$+ \beta_4 * \text{ROA } _{t-1}$$
$$+ \mu$$

The variables in the model are explained below.

Dependent variable:

- The fraction of independent directors on the boards (B_COMP): It is the ratio of the number of independent (non-affiliated) board members who are neither employees of the firm nor firm owner over the total number of directors on the boards as of each fiscal year end.

Variables used to test the scope of operation hypothesis:

- Firm size (F_SIZE): I simply measure the firm size by using total assets as of each fiscal year end.
- Firm age (AGE): Age is defined by the number of years since the firm was established.

Control variables:

- Board size (LAGB_SIZE): The board size is the total number of board members which I gather the information of number of board members from 56-1 report.
- Return on assets (ROA): It is the operating income divided by total assets as of each fiscal year end.

4.2 The negotiation hypothesis:

To test this hypothesis I use two measures which are the number of years that CEO has been in the position (CEO's tenure) and the CEO's ownership as the measure of CEO's influence. This hypothesis predicts that all two measures have

positive relation to board size and *negative* relation to the board independence. I use the outside director's stock ownership as the measure of constraints on the CEO's influence. This hypothesis predicts that this variable has *positive* relation to board size and board independence.

The regression to test board size:

Board size $_t$ = α

$+ \beta_1 *$ CEO tenure $_{t-1}$

$+ \beta_2 *$ CEO ownership $_{t-1}$

$+ \beta_3 *$ Outside director ownership $_{t-1}$

$+ \beta_4 *$ Fraction of independent director $_{t-1}$

$+ \beta_5 *$ ROA $_{t-1}$

$+ \mu$

The variables in the model are explained below.

Dependent variable:
- Board size (B_SIZE): The board size is the total number of board members which I gather the information of number of board members from 56-1 report.

Variables used to test the negotiation hypothesis:
- CEO tenure (TENURE): CEO tenure is the number of years that the CEO has been in the position with the firm.
- CEO ownership (CEO_O): It is measured by the firm's outstanding shares owned by the CEO as each of fiscal year end.
- Outside director ownership (DIR_O): It is the firm's outstanding shares owned by the outside directors as each of fiscal year end.

Control variables:
- The fraction of independent directors on the boards (LAGB_COM): It is the ratio of the number of independent (non-affiliated) board members who are non-employees of the firm nor firm owner over the total number of directors on the boards as of each fiscal year end.

- Return on assets (ROA): It is the operating income divided by total assets as of each fiscal year end.

The regression to test board composition:

Fraction of independent directors on the boards $_t$ = α

$$+ \beta_1 * \text{CEO tenure}_{t-1}$$
$$+ \beta_2 * \text{CEO ownership}_{t-1}$$
$$+ \beta_3 * \text{Outside director ownership}_{t-1}$$
$$+ \beta_4 * \text{Board size}_{t-1}$$
$$+ \beta_5 * \text{ROA}_{t-1}$$
$$+ \mu$$

The variables in the model are explained below.

Dependent variable:

- The fraction of independent directors on the boards (B_COMP): It is the ratio of the number of independent (non-affiliated) board members who are neither employees of the firm nor firm owner over the total number of directors on the boards as of each fiscal year end.

Variables used to test the negotiation hypothesis:

- CEO tenure (TENURE): CEO tenure is the number of years that the CEO has been in the position with the firm.
- CEO ownership (CEO_O): It is measured by the firm's outstanding shares owned by the CEO as each of fiscal year end.
- Outside director ownership (DIR_O): It is the firm's outstanding shares owned by the outside directors as each of fiscal year end.

Control variables:

- Board size (B_SIZE): The board size is the total number of board members which I gather the information of number of board members from 56-1 report.
- Return on assets (ROA): It is the operating income divided by total assets as of each fiscal year end.

4.3 <u>The monitoring hypothesis:</u>

To test this hypothesis, I use firm free cash flow as measurement of manager potential private benefits because free cash flow may cause agency conflict due to manager may use it for private benefit rather to create wealth to shareholder. This hypothesis predicts that the board size and independence have *positive* relation to free cash flow variable.

And I use the log of market to book ratio, the firm's volatility of daily stock price, leverage, ownership concentration, and CEO ownership as the measurement of the cost of monitoring the firm's manager. This hypothesis predicts that the board size and independence have *inverse* relation to these five variables.

The regression to test the board size:

$$
\begin{aligned}
\text{Board size }_{t} = {}& \alpha \\
& + \beta_1 * \text{Free cash flow }_{t-1} \\
& + \beta_2 * \text{Log of market to book ratio }_{t-1} \\
& + \beta_3 * \text{Stock return variance }_{t-1} \\
& + \beta_4 * \text{ownership concentration }_{t-1} \\
& + \beta_5 * \text{CEO ownership }_{t-1} \\
& + \beta_6 * \text{Leverage ratio }_{t-1} \\
& + \beta_7 * \text{Fraction of independent director }_{t-1} \\
& + \beta_8 * \text{ROA }_{t-1} \\
& + \mu
\end{aligned}
$$

The variables in the model are explained below.
Dependent variable:
- Board size (B_SIZE): The board size is the total number of board members which I gather the information of number of board members from 56-1 report.

Variables used to test the monitoring hypothesis:
- Free cash flow (FCF): Free cash flow is defined as

$$\frac{Net\ Income + Depreciation - Capital\ Expenditure}{Total\ assets}$$

- Log of market to book ratio (MTB): Log of market to book ratio is defined as

$$\ln\left(\frac{Book\ value\ of\ debt + market\ value\ of\ equity}{Total\ Assets}\right)$$

- Stock return variance (VAR): It is the variance of the firm's daily stock returns measured over the 12-month period.

- Ownership concentration (O_CON): I follow Mitton T. (2001) by specified the ownership concentration by using the total share holding of all shareholders that own 5% or more of the stock.

- CEO ownership (CEO_O): It is measured by the firm's outstanding shares owned by the CEO.

- Leverage ratio (LEV): It is defined as the sum of short term debt and long term debt divided by equity.

Control variables:

- The fraction of independent directors on the boards (LAGB_COMP): It is the ratio of the number of independent (non-affiliated) board members who are neither employees of the firm nor firm owner over the total number of directors on the boards as of each fiscal year end.

- Return on assets (ROA): It is the operating income divided by total assets as of each fiscal year end.

The regression to test the board composition:

Fraction of independent directors on the boards $_t$ = α

$+ \beta_1 *$ Free cash flow $_{t-1}$

$+ \beta_2 *$ Log of market to book ratio $_{t-1}$

$+ \beta_3 *$ Stock return variance $_{t-1}$

$+ \beta_4 *$ Ownership concentration $_{t-1}$

$+ \beta_5 *$ CEO ownership $_{t-1}$

$+ \beta_6 *$ Leverage ratio $_{t-1}$

$+ \beta_7 *$ Board size $_{t-1}$

$+ \beta_8 *$ ROA $_{t-1}$

$+ \mu$

The variables in the model are explained below.

Dependent variable:

- The fraction of independent directors on the boards (B_COMP): It is the ratio of the number of independent (non-affiliated) board members who are neither employees of the firm nor firm owner over the total number of directors on the boards as of each fiscal year end.

Variables used to test the monitoring hypothesis:

- Free cash flow (FCF): Free cash flow is defined as

$$\frac{Net\ Income + Depreciation - Capital\ Expenditure}{Total\ assets}$$

- Log of market to book ratio (MTB): Log of market to book ratio is defined as

$$\ln\left(\frac{Book\ value\ of\ debt + market\ value\ of\ equity}{Total\ Assets}\right)$$

- Stock return variance (VAR): It is the variance of the firm's daily stock returns measured over the 12-month period.

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- CEO ownership (CEO_O): It is measured by the firm's outstanding shares owned by the CEO.
- Leverage ratio (LEV): It is defined as the sum of short term debt and long term debt divided by equity.

Control variables:

- Number of directors (LAGB_SIZE): The number of board members which I gather the information of number of board members form 56-1.
- Return on assets (ROA): It is the operating income divided by total assets in the previous period.

Industry test

I also included 21 industry dummy variables in all regression models in order to eliminate the industry effect on the independent variable, for each type of industry the listed firm belongs to. The industries are based on SET's sectors. The dummy variables are shown as below.

IND1   takes value of 1 for firm in Agribusiness sector; otherwise 0
IND2   takes value of 1 for firm in Food and beverages sector; otherwise 0
IND3   takes value of 1 for firm in Fashion sector; otherwise 0
IND4   takes value of 1 for firm in Home and office product sector; otherwise 0
IND5   takes value of 1 for firm in Automotive sector; otherwise 0
IND6   takes value of 1 for firm in Industrial materials and machinery sector; otherwise 0
IND7   takes value of 1 for firm in Packaging sector; otherwise 0
IND8   takes value of 1 for firm in Paper and printing material sector; otherwise 0
IND9   takes value of 1 for firm in Petrochemical and chemical sector; otherwise 0
IND10   takes value of 1 for firm in Construction material sector; otherwise 0
IND11   takes value of 1 for firm in Property development sector; otherwise 0
IND12   takes value of 1 for firm in Energy & utilities and mining sector; otherwise 0
IND13   takes value of 1 for firm in Commerce sector; otherwise 0
IND14   takes value of 1 for firm in Health care services sector; otherwise 0
IND15   takes value of 1 for firm in Media and publishing sector; otherwise 0
IND16   takes value of 1 for firm in Professional services sector; otherwise 0

IND17   takes value of 1 for firm in Tourism and leisure sector; otherwise 0

IND18   takes value of 1 for firm in Transportation and logistics sector; otherwise 0

IND19   takes value of 1 for firm in Information and communication technology sector; otherwise 0

IND20   takes value of 1 for firm in Electronic components sector; otherwise 0

IND21   takes value of 1 for firm in Medium-sized enterprises sector; otherwise 0

Chapter 4
Empirical results

Table 1 provides descriptive statistics of firm characteristics, board, and ownership structures of 275 firms in Thailand during year 2002 through 2006. Panel A shows that on average board size in Thai listed companies is 11.76 members with a low of 3 members and high of 29 members. The board composition is 71.5% on average. The maximum of board composition is 100% while the minimum of board composition is 22.2%. On average the ownership by outside director is approximately 7.42%. The ownership concentration for Thai firms is approximately 49.8% which is quite high. The CEOs have been in their position 6.67 years on average. Panel B shows the firm characteristics and profitability measures.

Table 2 provides pairwise correlations of all the variables used in this study. Table 3 to Table 8 presents the regression results for each hypothesis. And Table 9 reports the result from simultaneous equation.

The scope of operation hypothesis

This hypothesis implies that the scope and complexity of the firm determine the corporate board size and structure. I expect positive relation between the firm size and the size of boards. Large firms engage in a more volume, a greater diversity of activities, a more merger and acquisition activity and use more sophisticated financial and marketing techniques. Larger firms have more demand for information and supervision from board than smaller firms. The demand for more information and supervision requires larger board. The major advantage of large boards is the collective information that the board possesses about factors that affect the value of the firms. Turning to board composition, I expect the positive relation between the independence of boards and firm size. The reason is that the potential for agency conflicts between managers and shareholders is expected to increase in firm size. In addition, larger firms may have greater agency costs of free cash flow and less transparency with regard to the performance of its

individual units. Then the independence of boards is expected to increase in firm size to mitigate the agency problems.

To test this hypothesis that board size and structure are determined by the scope of operation, I use two measures which are firm size and firm age as independent variables. This hypothesis predicts that all two measures have positive relation to board size and the proportion of outsider board of directors. Firm size is defined by the total assets. Firm age is the numbers of year since the firm are established. Board composition and return on assets are also included in the regression as control variables. Board composition is the fraction of independent outside director over the total directors. Return on assets is measured by the net income divided by total assets.

The results for scope of operation hypothesis are reported in Table 3 and Table 4. Table 3 presents the regression result for the scope of operation hypothesis which board size is the dependent variable and the firm size and firm age are the independent variables and lagged value of the board composition and return on assets are the control variables. The lagged value of the board composition is included as an instrumental variable in order to control for endogeneity. In Model 1-2, each of two dependent variables is input separately. In Model 3, all of dependent variables are included in the model and the results are not different from Model 1-2. The coefficient of firm size is positively and significantly related to board size at the 1% level. It is interpreted that the larger firm have the larger board. Indeed as the firm gets larger the number and complexity of its operation increases, requiring therefore more directors to rely on, to possess more information, and to supervise the management needed from larger in activity and operation. The result is consistent with previous studies by Lehn K. et al. (2004), Pfeffer (1972), Deli (1996), Cole L. et al. (2005) and Boone et al.(2006) which find that the board size increases in firm size. However the coefficient of the firm age is not statistically significant. I conclude that board size is not related to firm age. For control variable, I find the positively significant relation at 1% level between board size and board composition. Then I use the simultaneous systems equations (two-staged least square, 2SLS) that explicitly endogenize board size and board composition since the board size and board composition appear on left

hand side in one equation and right hand side of each of the others. The two-staged least square is shown in the last part of empirical result, Table 9. Another control variable, return on assets, I find that the coefficient for return on assets is not statistically significant. I conclude that the board size is not related to firm profitability.

Table 4 presents another regression result for the scope of operation hypothesis where the board composition is the dependent variable. The firm size and firm age are the independent variables and lagged value of the board size and return on assets are the control variables. The lagged value of the board size is included as an instrumental variable in order to control for endogeneity. In Model 1-2, each of two dependent variables is entered separately. In Model 3, all of dependent variables are included in the model and the results are not different from Model 1-2. The result shows that only the firm age has positively significant relation with board composition at the 1% level. Since older firms have wider scope of operation and require more monitoring. The result is consistent with the study by Boone et al. (2006) which find that the board composition increases in firm age since the specialized board services are likely to grow as firm grow or survive as a public entity. However, board composition has no significant relationship with firm. For the control variable, board composition has no significant relationship with return on assets. I conclude that the board composition is not related to firm profitability. For control variable, I find the positively significant relation at 1% level between board size and board composition. Then I use the simultaneous systems equations (two-staged least square, 2SLS) that explicitly endogenize board size and board composition since the board size and board composition appear on left hand side in one equation and right hand side of each of the others. The two-staged least square is shown in the last part of empirical result, Table 9.

Overall, I find that the firm size has an effect only on board size. It is interpreted that when the firms get larger in the number and complexity of its operation, the firms require larger board to possess more information, advise and supervise the management. However the incremental board could be both insider and outsider.

The negotiation hypothesis

The board size and structure can be determined by the negotiation between CEO and outside board of directors. The CEO negotiation powers come from the CEO who has more valuable than any potential replacement, better performance, or long tenure. CEOs who have power would maintain their control over the board and add the insider to the board. When the boards lose independence and monitor less. When the management have less power, the outsider director increases more proportion of the board.

To test this hypothesis I use two measures which are the number of years that CEO has been in the position (CEO's tenure) and the CEO's ownership as the measure of CEO's influence. This hypothesis predicts that all two measures have positive relation to board size and negative relation to the board independence. I use the outside director's stock ownership as the measure of constraints on the CEO's influence. This hypothesis predicts that this variable has positive relation to board size and board independence.

The result for negotiation hypothesis is reported in Table 5 and Table 6. Table 5 presents the regression result for the negotiation hypothesis which board size is the dependent variable and CEO tenure, CEO ownership, and outside director ownership are the independent variables and lagged value of the board composition and return on assets are the control variables. In Model 1 - 3, each of explanatory variables is included separately into the model. The result shows that there is no significant relationship between board size and CEO tenure. On the other hand, the result shows significantly relationship between board size and CEO ownership and outside director ownership at 10% level in the different predicted sign. On average the board size of Thai firm are 11 members as reported in Table 1; however, the SET only requires that listed firms to have at least three outside director, the CEOs who have more power would maintain their control by increasing the proportion of inside director, as described in the following part, by replacing some the outsider with the insider or only adding the insider into the board. Consequently, the board size is not affected by changing in board proportion. However, the result shows that the board size decreases in CEO ownership. It is consistent with the previous studies by Demsetz and Lehn (1985)

and Himmelberg Hubbard and Palia (1999) which suggest that the agency problem that caused by a costly monitoring environment may be mitigated when the CEO hold a large share. The result also show that the board size decreases in outside director ownership because the agency conflict may be mitigated when the outside director hold a large share since the CEOs that have poor performance are more likely to be remove if outside directors have voting control. In Model 4, all the explanatory variables are entered into the model and the results are not different from Model 1-3. In Model 5, I include other two independent variables used to test the scope of operation hypothesis which are firm size and firm age. All three independent variables used to test the negotiation hypothesis still have the same result as Model 4.And all two independent variables used to test the scope of operation hypothesis have the same result as Table 3.

Table 6 presents the regression result for the negotiation hypothesis which board composition is the dependent variable and CEO tenure, CEO ownership, and outside director ownership are the independent variables and lagged value of the board size and return on assets are the control variables. In Model 1 - 3, each of explanatory variables is included separately into the model. Coefficients of all independent variables are significantly related to board composition at 1% level in the predicted direction. In Model 4, all the explanatory variables are entered into the model and the results are not different from Model 1-3. The result supports the negotiation hypothesis. It is interpreted that the CEOs have the influence on the board composition. Boards are chosen through a process partially controlled by the CEO. The CEOs who have the power, longer tenure, and greater equity ownership in the company would maintain their control over the boards and add the insider to the board. This result is consistent with the previous studies by Hermalin and Weisbash (1998), Harley E. et al. (2005), and Kieschick and Moussawi (2004) which show that the outsider board decrease with CEO's influence. Turning to outside director ownership, the board composition is positively related to outside director ownership since it increases the incentive for outsiders to monitor the company. This result is consistent with Weisbach (1988) which suggests that outside directors represent shareholder interests better than inside directors. He finds that CEOs are more likely to be removed following poor performance if outside directors have voting control. In Model 5, I include other

two independent variables used to test the scope of operation hypothesis which are firm size and firm age. All three independent variables used to test the negotiation hypothesis still have the same result as Model 4 and are significantly related to board composition at the 1% level in the predicted direction. And all two independent variables used to test the scope of operation hypothesis have the same result as Table 4.

Overall, the result supports the negotiation hypothesis that when the CEOs have more power, the CEOs would maintain their control by increase the proportion of insider into the board. On average the board size of Thai firm are 11 members as reported in Table 1; however, the SET only requires that listed firms have at least three outside director, the CEOs who have more power would maintain their control by increasing the proportion of inside director by replacing some outsider with insider or adding more insider.

The monitoring hypothesis

The board size and composition may be affected by the specific monitoring requirement of the firm's business and monitoring cost. Many previous studies find that the board size and composition are determined by the trade off between the cost and benefit of increasing in monitoring. The net benefit of extra monitoring increases with manager opportunities to consume private benefits, but decreases with cost of monitoring. As described in literature review and theoretical framework part, it is hypothesized that the board size and the proportion of outside boards are inversely related to the cost of monitoring and positively related to manager private benefits.

To test this hypothesis, I use firm free cash flow as measurement of manager potential private benefits because free cash flow may cause agency conflict due to manager may use it for private benefit rather to create wealth to shareholder. Free cash flow is defined as the net income plus depreciation minus capital expenditures, all divided by total assets. This hypothesis predicts that the board size and independence have *positive* relation to free cash flow.

I use the log of market to book ratio, the firm's volatility of daily stock price, leverage, ownership concentration, and CEO ownership as the measurement of the cost of monitoring the firm's manager. The log of market to book ratio is measured as the natural log of the book value of debt plus the market value of equity, all divided by the book value of total assets. The firm's volatility of daily stock price is the variance of the firm's daily stock returns measured over the 12-month period. Leverage is defined as the short-term debt plus long-term debt, all divided by equity. Ownership concentration is the total share holding of all shareholders that own 5% or more of the outstanding shares which I follow from Mitton T. (2001). The last variable is the CEO ownership which measured as the fraction of outstanding shares hold by CEO. This hypothesis predicts that the board size and independence have *inverse* relation to these five variables.

Table 7 reported the result of the monitoring hypothesis for board size. In Model 1-6, each of the explanatory variables is included separately in the model. The result shows that only coefficient of CEO ownership is statistically significant at 1% level in the predicted direction. It is interpreted that the board size decreases when the CEOs have more ownership since the agency problem may be reduced when the CEO hold a large ownership. The result is consistent with the previous studies by Demsetz and Lehn (1985) and Himmelberg Hubbard and Palia (1999) which suggest that the agency problem caused by a costly monitoring environment may be mitigated when the CEO hold a large ownership. Turning to log of market to book ratio, it coefficient is statistically significant at 1% level in the different predicted direction. The result shows that board size increases when the log of market to book ratio increase. Since the log of market to book ratio is one of the firm measures of performance, it would expected that there should be a negative relationship between the level of board monitoring and firm performance because firm with better performance need less monitoring. On the other hand, Barclay and Smith (1995) and Titman and Wessels (1998) argue that log of market to book ratio may be interpreted as measure of future growth opportunities which implying the potentially highly agency problems. In this case it would be expected that there should be a positive relationship between the level of board monitoring and log of market to book ratio. And the result in this study shows that the board size positively relates to log of market to book ratio. For other four

explanatory variables used to test monitoring hypothesis which are free cash flow, stock return variance, ownership concentration and leverage, their coefficients are not statistically significant to board size. In Model 7, I included the entire explanatory variables used to test the monitoring hypothesis into the model and the results are not different from Model 1-6. In Model 8, I entered all of the explanatory variables used to test the scope of operation hypothesis, the negotiation, and the monitoring hypothesis into the model. The results are similar to the result of the scope of operation hypothesis as Table 3 and the negotiation hypothesis as Table 5 and the monitoring hypothesis as Table 7 in the part of Model 7. The result is consistent with the previous studies by Demsetz and Lehn (1985) and Himmelberg Hubbard and Palia (1999) which suggest that the agency problem that caused by a costly monitoring environment may be mitigated when the CEO hold a large ownership

Table 8 shows the result of the monitoring hypothesis for board composition. In Model 1-6, each of the explanatory variables is included separately in the model. The result shows that only coefficient of CEO ownership is significantly related to board composition at 1% level in the predicted direction. It is interpreted that the board composition decreases when the CEOs have more ownership since the agency problem may be reduced when the CEO hold a large ownership. The result is consistent with the previous studies by Demsetz and Lehn (1985) and Himmelberg Hubbard and Palia (1999) which suggest that the agency problem that caused by a costly monitoring environment may be mitigated when the CEO hold a large ownership. Turning to free cash flow, its coefficient is significantly related to board composition at 5% level but the sign is different from the prediction. The board composition is negatively related to free cashflow. Boone et al. (2006) also find the negative relation between board size and free cashflow. Since the coordination and free-riding cost increase with free cashflow faster than the monitoring benefits of additional board members increase. Then the board size and composition may be decreased if the firms have higher free-riding cost than the monitoring benefit. The result in Table 8 also shows that the coefficient of ownership concentration is significantly related to board composition at 10% level but the sign differs from the prediction. It shows the positive relationship between board composition and ownership concentration. Wiwattanakantang (2001) find

that Thai firms are largely family owned and controlled. The largest shareholders are the controlling shareholders. Limpaphayom and Connelly (2004m) point that like other Asian countries affected by the 1997 financial crisis, Thailand faced corporate governance problems. Overinvestment and over-borrowing come from the poor governance practices at firms. With the high ownership concentration the potential agency conflicts between the controllers and minority shareholders are more serious problem than the agency conflicts of the separation of ownership and control. Overinvestment and over-borrowing came at the expense of minority shareholder. Many firms encounter financial distress, bankruptcy, and financial restructuring. If high ownership concentration creates the inefficient management, it would follow that outside director monitoring would take on an increased role in preventing controlling owners from using their power for private benefit. This result is consistent with Andrew K. et al. (2002). On the example of New Zealand firms, they find that the firms with high ownership concentration have higher outside directors. It is implied that firms increase their use of outside directors in order to mitigate the potential negative entrenchment effect brought by high ownership concentration. For other three explanatory variables which are log of market to book ratio, stock price return variance, and leverage ratio, I do not find significant relation between these variables and board composition. In Model 7, all explanatory variables used to test the monitoring hypothesis are included into the model. The results do not differ from Model 1- Model 6. In Model 8, all explanatory variables used to test the scope of operation hypothesis, the negotiation hypothesis, and the monitoring hypothesis are entered in the model. The outcomes are consistent with the result in Table 4 and 6 except for the coefficient of ownership concentration. The result shows that there is no significant relation between board composition and ownership concentration.

Overall, I find the result does not support the monitoring hypothesis. The board size and composition are not determined by the trade off between the cost and benefit of increasing in monitoring. The board size and composition may be established in order to benefit the manager rather than the shareholder. Then the board may not minimize the net costs of agency conflicts between managers and shareholders. Agrawal and Knoeber (1996) suggest that boards may expand for

political reasons rather than monitoring reason, perhaps to include politicians, environmental activists, or consumer representatives.

Simultaneous equations estimation

To control for the endogenous relationship between board size and board composition, the appropriate methodology is a simultaneous equations approach by using a two-stage least square (2-SLS) system approach methodology. A two-equation model with Board size and board composition as dependent variables is employed, with board size appearing as a regressor in the board composition equation and vice versa. Then, the relationship between board size and board composition may be determined by estimating these two variables simultaneously.

The two-staged least squares result is shown in the Table 9. In model 1, the board size is dependent variable. The result shows that only firm size and log of market to book ratio have significant relationship with board size at 1% level. In overall, the result in model 1 is consistent with the results from scope of operation as shown in Table 3 which show that the board size has positively significant relationship with firm size. Overall, it is interpreted that the board size is determined by the scope of operation. When the firms get larger in the number and complexity of operation, the firms require larger board to possess more information, advise and supervise the management. In model 2, dependent variable is board composition. The table reports that board composition has positively significant relationship with firm age and outside director ownership at 5% and 1% level, respectively. The result also shows that board composition has negatively significant relationship with CEO tenure and CEO ownership at 1% level. The result is consistent with result from scope of operation, negotiation, and monitoring hypothesis as shown in Table 4, 6, and 8, except for free cash flow that has no significant relation with board composition. For the control variable, ROA, the result shows the positively significant relation between board composition and ROA at 10% level. It is interpreted that the more outside director serving on the board, the higher firm profitability. Overall, the board composition is only determined by the negotiation between CEO and board. When CEOs have more power, CEOs would maintain their control by increase the proportion of insider into the board.

Chapter 5
Conclusion

The empirical findings in board size and board composition of this study on 275 samples of Thailand firm during year 2002 through year 2006 are consistent with some of the implications of the agency theory literatures. I find that two variables, firm size and log of market to book ratio, explain the variation in board size. Board size increases in firm size and log of market to book ratio. This study shows that larger firms have larger board. When firms get larger, the number and complexity of its operation increases, requiring therefore more directors to rely on. Firms with high log of market to book ratio have larger board size since log of market to book ratio may be interpreted as a measure of future growth opportunities which implying the potentially highly agency problems. The boards, therefore, are required in order to mitigate the potentially highly agency problems.

Turning to board composition, I find that four variables, firm age, CEO tenure, CEO ownership, and outside director ownership, explain the variation in board composition. Board composition increases in firm age, outside director ownership and decreases in CEO tenure, CEO ownership. The result shows that older firms which more complex have higher in board composition because older firms require more monitoring. The board composition increases in firm age since the specialized board services are likely to grow as firm grow or survive as a public entity. Firms with high CEO's influence, CEO tenure and CEO ownership, have smaller in board composition. The CEOs who have the power, longer tenure, and greater equity ownership in the company would maintain their control over the boards and add the insider to the board. However firms with high constraint on CEO's influence, outside director ownership, have larger board composition since it increases the incentive for outsiders to monitor the company. CEOs are more likely to be removed following poor performance if outside directors have voting control. Board composition also has negative relation with free cash flow since the monitoring benefits of additional outside director increase slower than coordination and free-riding cost.

Collectively, these findings suggest that board size and composition in Thailand have some relation with firm's scope of operation and negotiation between CEO and board. The Board size in Thailand is determined by the size of the firm. The larger firms which have large activities and sophisticated financial require larger board in order to possess the information, supervise, and monitor the management. However, the board composition is determined by the negotiation between CEO and board. The CEOs who have the power, longer tenure, and greater equity ownership would maintain their control over the board and add the insider to the board. Moreover, the CEOs often dominate the director nomination process. The board size in Thailand is 11 members on average. But the SET only requires the listed company to have a minimum number of 3 independent directors. I do not find the significant relationship between board size and CEO power. Then it is interpreted that the CEO may increase the proportion of the insider by adding more insider or replace the outsider with insider.

Finally, the investor should be careful that the independent director may not act in the interest of shareholder since CEOs often dominate the director nomination process. And the major shareholder may highly participate in the independent director nomination process and select the independent director because of internal relationship. Therefore the independent director may not be independent as it sound.

Table 1: Descriptive Statistics of Ownership and board structure and firm characteristics

This table provides the descriptive statistics data for all 275 firms from year 2002-2006 (1,375 observations). Board size is the total number of board of director. Board composition is the fraction of the outside director who are neither employees of the firm nor firm owners divided by the total number of board of director. Outside director ownership is measured by the percentage of share owned by the outside director. Ownership concentration is calculated by using the total share holding of all shareholders that own 5% or more of the stock. CEO tenure is the number of years that the CEO has been in this position in the firm. Firm size is measured by the book value of total assets. Firm age is the number of year since the firm was established. Free cashflow is defined as (earnings + depreciation – capital expenditure)/total assets. Log market to book ratio is the log of the book value of debt plus the market value of equity divided by total assets. Leverage ratio is (short-term debt + long-term debt)/total equity. Return on assets is the earnings before interest and tax divided by total assets. Stock return variance is the variance of the firm's daily stock returns measured over the 12 month period.

Panel A: Ownership and board structure

	Mean	Median	Standard deviation	Maximum	Minimum
Board Size	11.764	11.000	3.778	29.000	3.000
Board Composition	0.715	0.733	0.149	1.000	0.222
Director Ownership (%)	7.417	1.550	11.800	63.510	0.000
Ownership Concentration (%)	49.832	53.220	22.152	97.740	0.000
CEO Tenure	6.671	7.005	3.786	13.005	0.016

Panel B: Firm characteristics

	Mean	Median	Standard deviation	Maximum	Minimum
Total Asset (x 10^6)	11,187.42	2,215.28	35,360.39	648,000.00	34.42
Firm Age	27.823	25.068	14.675	131.000	0.293
Free Cash Flow (%)	0.032	0.044	0.276	5.524	-2.210
Market to Book Ratio	6.250	6.292	1.046	12.189	1.574
Leverage Ratio	8.642	0.425	267.848	9884.523	-74.572
Return on Assets	0.042	0.054	0.276	5.481	-2.318
Stock Return Variance	0.001	0.001	0.003	0.049	0.000

Table 2: Correlation Matrix

This table shows pairwise correlations for all variables used in this study. Board size (B_SIZE) is the total number of board of director. Board composition (B_COMP) is the fraction of the outside director who are neither employees of the firm nor firm owners divided by the total number of board of director. Firm size (F_SIZE) is measured by the book value of total assets. Firm age (AGE) is the number of year since the firm was established. CEO tenure (TENURE) is the number of years that the CEO has been in this position in the firm. CEO ownership (CEO_O) is measured by the firm's outstanding shares owned by the CEO. Outside director ownership (DIR_O) is measured by the percentage of share owned by the outside director. Free cashflow (FCF) is defined as (earnings + depreciation – capital expenditure)/total assets. Log market to book ratio (MTB) is the log of the book value of debt plus the market value of equity divided by total assets. Stock return variance (VAR) is the variance of the firm's daily stock returns measured over the 12 month period. Ownership concentration (O_CON) is calculated by using the total share holding of all shareholders that own 5% or more of the stock. Leverage ratio (LEV) is (short-term debt + long-term debt)/total equity. Return on assets (ROA) is net income before interest and tax divided by total assets.

	B_SIZE	B_COMP	F_SIZE	AGE	TENURE	CEO_O	DIR_O	FCF	MTB	VAR	O_CON	LEV	ROA
B_SIZE	1.000	0.223	0.178	0.057	-0.056	-0.198	-0.113	0.002	0.070	-0.041	0.056	-0.034	0.001
B_COMP		1.000	0.122	0.056	-0.134	-0.176	0.116	0.018	0.019	-0.023	0.054	-0.018	0.034
F_SIZE			1.000	-0.004	-0.105	-0.090	-0.123	0.017	-0.001	-0.052	-0.038	-0.007	0.024
AGE				1.000	0.010	-0.040	0.050	0.026	0.030	-0.040	0.131	-0.021	0.027
TENURE					1.000	0.106	0.158	0.088	0.022	-0.123	-0.093	-0.044	0.102
CEO_O						1.000	0.403	0.015	0.036	-0.008	0.105	-0.012	0.017
DIR_O							1.000	-0.003	0.046	-0.021	0.049	0.000	0.023
FCF								1.000	0.113	-0.025	-0.046	-0.012	0.970
MTB									1.000	0.044	0.087	0.000	0.132
VAR										1.000	-0.008	-0.011	-0.040
O_CON											1.000	0.006	-0.045
LEV												1.000	-0.015
ROA													1.000

Table 3: Scope of operation hypothesis – Board size as the dependent variable

This table reports the regressions by using panel least squares method for board size on each of two variables on scope of operation hypothesis. The dependent variable is board size. Board size is the total number of board of director. The dependent variables are firm size and firm age. Firm size is measured by the book value of total assets. Firm age is the number of year since the firm was established. The control variables are board composition and return on assets (ROA). Board composition is the fraction of the outside director who are neither employees of the firm nor firm owners divided by the total number of board of director. Return on assets (ROA) is net income before interest and tax divided by total assets. T-statistics are reported in parentheses. Statistical significance at the 1, 5, and 10 percent levels are denoted by ***, **, and * respectively. N denotes the number of observation.

Table 3: Board size is the dependent variable

	Model 1	**Model 2**	**Model 3**
Variables used to test the scope of operation hypothesis:			
Firm size	0.017***		0.017***
	(6.091)		(6.123)
Firm age		-0.002	-0.005
		(-0.281)	(-0.723)
Control variables:			
Lag (board composition)	4.149***	4.369***	4.190***
	(6.441)	(6.672)	(6.472)
ROA	-0.110	-0.069	-0.101
	(-0.326)	(-0.203)	(-0.301)
Constant	7.078***	7.034***	7.154***
	(11.350)	(10.975)	(11.297)
Adjusted R^2	0.20	0.18	0.20
F-statistic	13.52 ***	11.82***	13.03***
N	1375	1375	1375

Table 4: Scope of operation hypothesis – Board composition as the dependent variable

This table reports the regressions by using panel least squares method for board composition on each of two variables on scope of operation hypothesis. The dependent variable is board composition. Board composition is the fraction of the outside directors who are neither employees of the firm nor firm owners divided by the total number of board of director. The dependent variables are firm size and firm age. Firm size is measured by the book value of total assets. Firm age is the number of year since the firm was established. The control variables are board size and return on assets (ROA). Board size is the total number of board of director. Return on assets (ROA) is net income before interest and tax divided by total assets. T-statistics are reported in parentheses. Statistical significance at the 1, 5, and 10 percent levels are denoted by ***, **, and * respectively. N denotes the number of observation.

Table 4: Board composition is the dependent variable

	Model 1	Model 2	Model 3
Variables used to test the scope of operation hypothesis:			
Firm size	0.001		0.001
	(1.211)		(0.967)
Firm age		0.001***	0.001***
		(3.455)	(3.374)
Control variables:			
Lag (board size)	0.005***	0.005***	0.005***
	(4.598)	(4.725)	(4.526)
ROA	0.020	0.020	0.020
	(1.439)	(1.427)	(1.407)
Constant	0.749***	0.727***	0.729**
	(40.892)	(37.988)	(37.965)
Adjusted R^2	0.11	0.11	0.13
F-statistic	7.16***	7.60***	7.36***
N	1375	1375	1375

Table 5: Negotiation hypothesis – Board size as the dependent variable

This table reports the regressions by using panel least squares method for board size on each of three variables on negotiation hypothesis. The dependent variable is board size. Board size is the total number of board of director. The dependent variables are CEO tenure, CEO ownership, and outside director ownership. CEO tenure is the number of years that the CEO has been in this position in the firm. CEO ownership is measured by the firm's outstanding shares owned by the CEO. Outside director ownership is measured by the percentage of share owned by the outside director. The control variables are board size and return on assets (ROA). Board composition is the fraction of the outside directors who are neither employees of the firm nor firm owners divided by the total number of board of director. Return on assets (ROA) is net income before interest and tax divided by total assets. T-statistics are reported in parentheses. Statistical significance at the 1, 5, and 10 percent levels are denoted by ***, **, and * respectively. N denotes the number of observation.

Table 5: Board size is the dependent variable

	Model 1	**Model 2**	**Model 3**	**Model 4**	**Model 5**
Variables used to test the negotiation hypothesis:					
CEO tenure	-0.017			0.000	0.011
	(-0.638)			(0.004)	(0.401)
CEO ownership		-0.059***		-0.047***	-0.049***
		(-5.795)		(-4.260)	(-4.413)
Outside director ownership			-0.039***	-0.023**	-0.019**
			(-4.642)	(-2.486)	(-2.066)
Variables used to test the scope of operation hypothesis:					
Firm size					0.001***
					(5.914)
Firm age					-0.006
					(-0.911)
Control variables:					
Lag (board composition)	4.295***	3.755***	4.801***	4.136***	3.969***
	(6.527)	(5.757)	(7.340)	(6.115)	(5.921)
ROA	-0.051	-0.041	-0.057	-0.039	-0.087
	(-0.149)	(-0.122)	(-0.170)	(-0.117)	(-0.261)
Constant	7.179***	7.823***	7.253***	7.809***	7.859***
	(10.418)	(12.222)	(11.524)	(11.283)	(11.339)
Adjusted R^2	0.19	0.21	0.19	0.20	0.23
F-statistic	11.84***	13.36***	12.81***	12.69***	13.30***
N	1375	1375	1375	1375	1375

Table 6: Negotiation hypothesis – Board composition as the dependent variable

This table reports the regressions by using panel least squares method for board composition on each of three variables on negotiation hypothesis. The dependent variable is board composition. Board composition is the fraction of the outside directors who are neither employees of the firm nor firm owners divided by the total number of board of director. The dependent variables are CEO tenure, CEO ownership, and outside director ownership. CEO tenure is the number of years that the CEO has been in this position in the firm. CEO ownership is measured by the firm's outstanding shares owned by the CEO. Outside director ownership is measured by the percentage of share owned by the outside director. The control variables are board size and return on assets (ROA). Board size is the total number of board of director. Return on assets (ROA) is net income before interest and tax divided by total assets. T-statistics are reported in parentheses. Statistical significance at the 1, 5, and 10 percent levels are denoted by ***, **, and * respectively. N denotes the number of observation.

Table 6: Board composition is the dependent variable

	Model 1	Model 2	Model 3	Model 4	Model 5
Variables used to test the negotiation hypothesis:					
CEO tenure	-0.005***			-0.005***	-0.005***
	(-4.185)			(-4.727)	(-4.601)
CEO ownership		-0.002***		-0.003***	-0.003***
		(-5.070)		(-7.820)	(-7.623)
Outside director ownership			0.002***	0.003***	0.003***
			(5.642)	(8.744)	(8.613)
Variables used to test the scope of operation hypothesis:					
Firm size					0.001
					(1.213)
Firm age					0.001***
					(2.525)
Control variables:					
Lag (board size)	0.005***	0.004***	0.0056***	0.004***	0.004***
	(4.543)	(3.973)	(5.295)	(3.923)	(3.659)
ROA	0.026**	0.021	0.019	0.026***	0.025
	(1.827)	(0.125)	(1.417)	(1.916)	(1.851)
Constant	0.786***	0.769***	0.713***	0.768***	0.753***
	(38.690)	(41.322)	(37.314)	(37.777)	(35.738)
Adjusted R^2	0.12	0.12	0.13	0.18	0.18
F-statistic	7.84***	8.18***	8.44***	11.31***	10.90***
N	1375	1375	1375	1375	1375

Table 7: Monitoring hypothesis – Board size as the dependent variable

This table reports the regressions by using panel least squares method for board size on each of six variables on monitoring hypothesis. The dependent variable is board size. Board size is the total number of board of director. The dependent variables are free cashflow, log of market to book ratio, stock price return variance, ownership concentration, CEO ownership, and leverage ratio. Free cashflow is defined as (earnings + depreciation – capital expenditure)/total assets. Log market to book ratio is the log of the book value of debt plus the market value of equity divided by total assets. Stock return variance is the variance of the firm's daily stock returns measured over the 12 month period. Ownership concentration is calculated by using the total share holding of all shareholders that own 5% or more of the stock. CEO ownership is measured by the firm's outstanding shares owned by the CEO. Leverage ratio (LEV) is (short-term debt + long-term debt)/total equity. The control variables are board composition and return on assets (ROA). Board composition is the fraction of the outside director who are neither employees of the firm nor firm owners divided by the total number of board of director. Return on assets (ROA) is net income before interest and tax divided by total assets. T-statistics are reported in parentheses. Statistical significance at the 1, 5, and 10 percent levels are denoted by ***, **, and * respectively. N denotes the number of observation.

Table 7: Board size is the dependent variable

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Variables used to test the monitoring hypothesis:								
Free cashflow	-0.484						-0.129	-0.174
	(-0.339)						(-0.092)	(-0.125)
Log (market to book ratio)		0.391***					0.409***	0.432***
		(4.103)					(4.280)	(4.585)
Stock price return variance			-38.230				-44.711	-35.707
			(-1.239)				(-1.469)	(-1.179)
Ownership concentration				-0.001			0.000	0.001
				(-0.264)			(-0.117)	(0.068)
CEO ownership					-0.059***		-0.060***	-0.050***
					(-5.795)		(-5.854)	(-4.456)

Table 7: Board size is the dependent variable (Continued)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Variables used to test the monitoring hypothesis:								
Leverage ratio						0.000	0.000	0.000
						(-0.945)	(-1.142)	(0.275)
Variables used to test the scope of operation hypothesis:								
Firm size								0.001***
								(5.924)
Firm age								-0.009
								(-1.218)
Variables used to test the negotiation hypothesis								
CEO tenure								0.002
								(0.091)
Outside director ownership								-0.02**
								(-2.212)
Control variables:								
Lag (board composition)	4.338***	4.208***	4.352***	4.361***	3.755***	4.339***	3.585***	3.791***
	(6.640)	(6.484)	(6.678)	(6.678)	(5.757)	(6.656)	(5.492)	(5.678)
ROA	0.402	-0.271	-0.087	-0.075	-0.041	-0.074	-0.144	-0.146
	(0.281)	(-0.791)	(-0.256)	(-0.220)	(-0.122)	(-0.217)	(-0.101)	(-0.104)
Constant	7.009***	4.762***	7.053***	7.059***	7.823***	7.014***	5.584***	5.556***
	(11.087)	(5.720)	(0.0)	(10.610)	(12.222)	(11.10)	(6.620)	(6.353)
Adjusted R^2	0.18	0.19	0.18	0.18	0.20	0.19	0.20	0.23
F-statistic	11.82***	12.59***	11.9***	11.82***	13.36***	11.86***	12.05***	12.26***
N	1375	1375	1375	1375	1375	1375	1375	1375

Table 8: Monitoring hypothesis – Board composition as the dependent variable

This table reports the regressions by using panel least squares method for board composition on each of six variables on monitoring hypothesis. The dependent variable is board composition. Board composition is the fraction of the outside director who are neither employees of the firm nor firm owners divided by the total number of board of director. The dependent variables are free cashflow, log of market to book ratio, stock price return variance, ownership concentration, CEO ownership, and leverage ratio. Free cashflow is defined as (earnings + depreciation – capital expenditure)/total assets. Log market to book ratio is the log of the book value of debt plus the market value of equity divided by total assets. Stock return variance is the variance of the firm's daily stock returns measured over the 12 month period. Ownership concentration is calculated by using the total share holding of all shareholders that own 5% or more of the stock. CEO ownership is measured by the firm's outstanding shares owned by the CEO. Leverage ratio (LEV) is (short-term debt + long-term debt)/total equity. The control variables are board size and return on assets (ROA). Board size is the total number of board of director. Return on assets (ROA) is net income before interest and tax divided by total assets. T-statistics are reported in parentheses. Statistical significance at the 1, 5, and 10 percent levels are denoted by ***, **, and * respectively. N denotes the number of observation.

Table 8: Board composition is the dependent variable

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Variables used to test the monitoring hypothesis:								
Free cashflow	-0.145**						-0.141**	-0.092*
	(-2.485)						(-2.430)	(-1.629)
Log (market to book ratio)		0.003					0.002	0.001
		(0.646)					(0.391)	(0.266)
Stock price return variance			-1.091				-1.015	-1.271
			(-0.860)				(-0.807)	(-1.033)
Ownership concentration				0.001*			0.001**	0.001
				(1.820)			(2.298)	(1.311)
CEO ownership					-0.002***		-0.002***	-0.003***
					(-5.070)		(-5.344)	(-7.668)

Table 8: Board composition is the dependent variable (Continued)

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
Variables used to test the monitoring hypothesis:								
Leverage ratio						-0.001	0.000	0.000
						(-0.789)	(-0.939)	(-1.069)
Variables used to test the scope of operation hypothesis:								
Firm size								0.000
								(1.119)
Firm age								0.001**
								(2.320)
Variables used to test the negotiation hypothesis								
CEO tenure								-0.005***
								(-4.509)
Outside director ownership								0.003***
								(8.324)
Control variables:								
Lag (board size)	0.005***	0.005***	0.005***	0.005***	0.004***	0.005***	0.004***	0.004***
	(4.805)	(4.706)	(4.847)	(4.802)	(3.973)	(4.812)	(3.770)	(3.531)
ROA	0.162***	0.019	0.020	0.022	0.021	0.020	0.159	0.115
	(2.762)	(1.355)	(1.429)	(1.555)	(1.535)	(1.455)	(2.721)	(2.010)
Constant	0.746***	0.734***	0.749***	0.731***	0.769***	0.748***	0.740***	0.739***
	(40.851)	(25.308)	(40.827)	(35.454)	(41.322)	(40.885)	(25.090)	(24.442)
Adjusted R^2	0.11	0.11	0.11	0.11	0.12	0.11	0.13	0.18
F-statistic	7.36***	7.11***	7.13***	7.23***	8.18***	7.12***	7.37***	9.59***
N	1375	1375	1375	1375	1375	1375	1375	1375

Table 9: Two-stage least squares regressions

To control for the endogenous relationship between board size and board composition, the appropriate methodology is a simultaneous equations approach by using a two-stage least squares (2-SLS) system approach methodology. A two-equation model with Board size and board composition as dependent variables is employed, with board size appearing as a regressor in the board composition equation and vice versa. Then, the relationship between board size and board composition may be determined by estimating these two variables simultaneously. T-statistics are reported in parentheses. Statistical significance at the 1, 5, and 10 percent levels are denoted by ***, **, and * respectively. N denotes the number of observation.

Table 9: Two-stage least square regression		
	Model 1	**Model 2**
Dependent variable	**Board size**	**Board composition**
Variables used to test the scope of operation hypothesis:		
Firm size	0.001***	0.001
	(4.376)	(1.581)
Firm age	-0.002	0.001**
	(-0.142)	(2.027)
Variables used to test the negotiation hypothesis		
CEO tenure	-0.037	-0.006***
	(-0.326)	(-4.386)
CEO ownership	-0.083	-0.005***
	(-1.326)	(-4.667)
Outside director ownership	0.008	0.003***
	(0.156)	(7.297)
Variables used to test the monitoring hypothesis:		
Free cashflow	-1.151	-0.087
	(-0.702)	(-1.403)
Log (market to book ratio)	0.399***	0.007
	(3.382)	(-0.897)
Stock price return variance	-37.593	-0.827
	(-1.154)	(-0.592)
Ownership concentration	0.003	0.000
	(0.587)	(1.146)
Leverage ratio	-0.001	-0.001
	(-1.164)	(-1.162)

Table 9: Two-stage least square regression (Continued)

Dependent variable	Model 1 **Board size**	Model 2 **Board composition**
Control variables:		
Lag (board composition)	-5.293	
	-0.324	
Lag (board size)		-0.014
		(-0.982)
ROA	0.962	0.001*
	(0.554)	(1.666)
Constant	12.769	0.908***
	(0.993)	(6.887)
Adjusted R^2	0.11	0.19
N	1375	1375

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