

AN EXAMINATION OF BOARD AND FIRM PERFORMANCE: EVIDENCE FROM TAIWAN

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ABSTRACT

This article discusses the impact of duality and board structure in corporate governance on corporate performance. The results showed that, regarding Tobin's Q, outside independent directors have a positive impact while other variables have no impact on corporate performance. Similar results were achieved using ROA and ROE for analysis. Duality, board size, and family-controlled directors had a negative impact on ROA and ROE. Supervisory directors, outside independent directors and inside directors had a positive impact on ROA and ROE. The analysis of large companies showed duality, board size, and family-controlled directors yielded a negative impact on ROA and ROE. Both supervisory directors and inside directors had positive impacts on ROA and ROE. Outside independent directors had positive impacts on ROE but no impact on ROA. No variable had an impact on Tobins' Q. The results from small and medium-sized companies indicate that supervisory directors, outside independent and inside directors had positive impacts on ROA and ROE. Other variables did not yield impacts on ROA and ROE. Finally, most of the variables had no impact on Tobins' Q.

JEL: G34, L25

KEYWORDS: corporate governance, board structure, duality, corporate performance

INTRODUCTION

Corporate governance concerns the effects of board structure on a firm's performance. Since shareholders elect board members, major shareholders have more influence when electing directors and supervisory directors. They account for the majority of share rights, which means they can choose and appoint persons as directors and supervisory directors. Therefore, those individuals holding the majority of share rights can control the company thus influencing the operations of the company. Further, the effectiveness of corporate governance will influence business performance. In recent years, the Taiwanese government has given more attention to corporate governance. In October 2002, the Taiwan Stock Exchange Corporation (TSEC) announced Corporate Governance Best-Practice Principles for TSEC/GTSM (GreTai Securities Market) listed companies, which stipulates that TSEC/GTSM listed companies must establish effective corporate governance structures, formulate their own corporate governance codes to enhance the function of their board of directors, perform supervisory director functions, and ensure shareholder equity.

These tasks are an effort to strengthen corporate governance effectiveness. In order to promote these goals, the Taiwanese government amended *Article 14, Securities and Exchange Act* in January 2007, to require listed companies have at least two and no less than one-fifth of directors to be independent. In Taiwan, board organizations differ from those in the U.S. because they maintain a two-tier board system composed of directors and supervisory directors. Specifically, directors are persons who determine and execute company policies while supervisory directors are those who supervise the decisions and implementation of activities made by the directors, thus serving functions similar to executive and non-executive directors in European companies. The principal role of non-executive directors is to protect shareholders' interests when the company makes decisions (Fernandes, 2008). Additionally, the role of supervisory directors in Taiwanese companies is similar to that of non-executive directors in European companies.

Many studies have investigated the relationship between corporate governance and a firm's performance. Finegold, Benson, and Hecht (2007) reviewed 105 studies conducted in major public companies between

1989 and 2005 that explored board structure, board equity, directors' remuneration, shareholder activism, degree of corporate governance, and firm performance. Additionally, Sanchez-Ballesta and Garcia-Meca (2007) analyzed 33 periodicals published between 1994 and 2006 that discuss the effects of share structure on a firm's performance. Wagner, Stimpert, and Fubara (1998) studied 30 articles that explored the relationship between board organization and firm performance. For some years, the effect of board and share structure on a firm's performance has been the subject of studies in the field of corporate governance. Major theories of corporate governance include agency theory, stewardship theory, and resource dependence theory (Nicholson & Kiel 2007). Agency theory argues that the board of directors manages a firm on behalf of shareholders; therefore, the board of directors must protect shareholders' interests and supervise the managers to prevent them from merely pursuing their own benefit when conflicts appear between the interests of themselves and those of shareholders. Further, shareholders must protect their interests because when managers pursue their own benefits, they gain advantages at the cost of shareholders (Nicholson & Kiel 2007). Therefore, shareholders elect board members and these individuals must manage the firm on behalf of its shareholders. Such a task of agency produces a dilemma (Nicholson & Kiel 2007) because it is difficult to give attention to the interests of both the board of directors and shareholders, simultaneously.

In Taiwan, many studies have explored the issue of corporate governance, focusing mainly on (1) corporate governance and performance (Chiang & Lin 2007; Her & Mahajan 2005; Huang, 2010; Li, Hu, & Chiu, 2004; Luan & Tang 2007); (2) corporate governance, leadership relations, and remuneration (Lin, 2005); (3) establishment of corporate governance indicators (Chen, Kao, Tsao, & Wu, 2007); and (4) corporate governance and financial crisis (Lee & Yeh 2004). Leadership structure includes duality with one individual serving as chair of the board and another individual serving as CEO. Additionally, board organization consists of both directors and supervisory directors, including inside directors, grey directors, and outside directors, because Taiwan has adopted the two-tier board system (Yammeesri & Herath, 2010). The implementation of corporate governance in practice also deserves exploration. As such, the following article investigates the influence of leadership structure and board organization on a firm's performance. Specifically, Taiwan's electronics industry plays an important role in the global electronics industry supply chain. Considering this, the current study reviewed three years of data from listed companies in Taiwan's electronics industry to explore corporate governance of Taiwanese electronics companies. Companies of various sizes were reviewed for the purpose of understanding the influence of board structure on a firm's performance in corporate governance and practice.

The remainder of this study is organized as follows. The next section offers a literature review, followed by an introduction to the study's methodology and description of the current sample and variable measures. The empirical results are that presented with a discussion and conclusions and implications are provided in the final section.

LITERATURE REVIEW

Three major theories explain corporate governance, (1) agency theory, (2) stewardship theory, and (3) resource dependence theory. Agency theory has two major facets, the effect of board organization on a firm's performance and the effect of board leadership structure (i.e., duality) on a firm's performance (Nicholson & Kiel 2007). The board of directors supervises primary corporate operations. Additional outside directors can also supervise corporate managers to prevent them from pursuing their own interests. Stewardship theory considers managers as reliable, high-level executives who will not exhibit behaviors that would be unfavorable to shareholders; therefore, inside directors can achieve better firm performance and create more profit for shareholders. Resource dependence theory suggests that board members have connections to important external resources and can maximize a firm's performance (Nicholson & Kiel, 2007). In corporate governance, the board of directors plays a vital role. For example, Johnson, Daily and Ellstrand (1996) pointed out three major duties of directors. First, control involves directors' supervising managers to manage the firm's interests by an agency mechanism. Independent directors (outside directors) can supervise managers in managing a firm's interests more effectively than can non-independent directors (inside directors). Second, director service involves providing the CEO with

expert suggestions and opinions related to operations and management. Directors may be retired CEOs who can provide professional suggestions to newer CEOs. Third, a resource dependence role requires directors to provide resources that the firm needs to help them succeed. The directors' duty is to provide resources, supplying a certain percentage to the board of directors, a certain percentage to outside directors, and connections to different economic fields. If directors have good connections with financial institutions, the firm can locate funds easily.

The board of directors is the most important component of corporate governance; therefore, we need to understand the board structure. Finegold et al. (2007) pointed out that a component of board structure is duality, which consists of inside and outside directors, board size, board ownership share, and director remuneration. Therefore, the board's structure will influence firm performance. Many studies on corporate governance and firm performance have studied the influence of the board of directors on a firm's performance. Bonn (2004), Bonn, Yoshikawa and Phan (2004), and Jackling and Johl (2009) analyzed firm performance and board structure, while Luan and Tang (2007) analyzed independent directors and firm performance. The above studies used a board structure, or a certain property of this structure, to target different firm performance variables assessed using Tobin's Q, ROA, or ROE as measures of firm performance. Many proxy variables have been used to evaluate firm performance; however, Tobin's Q, ROA, and ROE are the most frequently used proxy variables (Bonn, 2004; Huang, 2010; Kiel & Nicholson 2003; Kota & Tomar 2010; Lam & Lee 2008; Luan & Tang 2007; Yammeesri & Herath 2010).

Two major subjects of agency theory focus on the effect of duality and the effect of board organization on firm performance (Nicholson & Kiel 2007). First, duality concerns leadership structure in terms of duality or service by separate persons; duality reduces the supervising effectiveness of a board of directors (Yammeesri & Herath 2010). Because Taiwan has a two-tiered board system, a board of directors is composed of directors and supervisory directors. Supervisory directors' major responsibilities are to audit, control, and prevent fraudulent behaviors of directors while directors' major duties are to supervise CEOs' management of the firm (Huang, 2010). The composition of directors may include inside directors, grey directors, and outside directors. Additionally, internal staff, or employees of the company (e.g., the CEO) serve inside directors who take part in the daily routines of the firm. Grey directors are persons who have relations with the firm but do not participate in daily routines. Outside directors, also called independent directors, are individuals with no relationship to the inside personnel of company (Yammeesri & Herath, 2010). Agency theory stresses that outside directors can supervise CEOs and their colleagues more effectively than inside directors (Daily, Johnson & Dalton 1999).

Finegold et al. (2007) analyzed 105 periodicals and found that, in terms of board structure, duality has a vague influence on a firm's performance. However, no consistent results have been reported concerning the proportion between inside and outside directors. Regarding board size, some studies have indicated a positive correlation, while others have indicated a negative correlation. Further, these studies indicate the need to clarify many areas of influence of board and share structure on firm performance. These different results might result from different conditions in various countries (Bonn et al. 2004). Therefore, the influence of board structure on firm performance remains a subject under investigation. As such, this article will discuss the influence of each aspect of board structure on firm performance.

Hypotheses

The effect of duality is indistinct with some studies showing positive results and others showing negative results (Finegold et al., 2007). For example, Jermias (2007) and Yammeesri and Herath (2010) found that duality has a negative effect on firm performance. According to agency theory, when the chair of the board also serves as CEO, the effectiveness of the board of directors' supervision of CEOs is reduced and the chair of the board might have more control over fulfilling private interests (Finkelstein & D'Aveni, 1994). Therefore, duality is not beneficial for a firm's operation, suggesting the concept of duality will have a negative influence on firm performance. Therefore, this study proposed the following hypothesis:

H1a. Duality relates negatively to a firm's performance.

However, Kota and Tomar (2010) pointed out that duality significantly influences firm performance. According to stewardship theory, inside directors create more profit for shareholders and achieve better performance (Nicholson & Kiel, 2007). Chiang and Lin (2007) mentioned that better performance is achieved when the chair of the board also serves as CEO due to effective and explicit leadership with unity of command. Further, Boyd (1995) believed that duality is better for corporate operations when the external environment is complicated and dynamic and lacks resources. The above findings indicate that duality is good for firm operations and positively influences firm performance; therefore, the following hypothesis was proposed:

H1b. Duality relates positively to firm performance.

The number of board members will influence the efficiency of board operations. Jensen (1993) noted that when the number of board members exceeds seven or eight, board function weakens and allows the CEO to control the board easily. Conversely, when the number of board members is small, the board's communication improves and board members are more likely to reach consensus. Bonn et al. (2004) discovered that board size of Japanese companies negatively influenced firm performance because larger boards of directors experience difficulty when communicating, coordinating, and taking part in corporate decision-making. Chiang and Lin (2007) also considered that, in Taiwan, smaller boards of directors could reduce the problem of bureaucracy and thus enable increased functioning. Based on these studies, smaller boards of directors will have better communication and will reach consensus faster. Therefore, this study proposed the following hypothesis:

H2. Board size relates negatively to firm performance.

Boards of directors in Taiwan are composed of directors and supervisory directors. In this two-tier board system, the primary duties of supervisory directors are to supervise how directors conduct their work while supervising the performance of the firm and reviewing the firm's business and financial status. Therefore, the major functions of supervisory directors in Taiwan are to audit, control, and prevent directors' disloyal behaviors (Huang, 2010). Dahya, Karbhari, Xiao and Yang (2003) suggested that the effectiveness of supervision for the majority of supervisory directors is unsatisfactory. Huang (2010) reported that the number of supervisory directors correlates negatively with firm performance, thus suggesting that firm performance decreases with increasing numbers of supervisory directors. Based on this information, the following hypothesis was proposed:

H3. The number of supervisory directors relates negatively to firm performance.

Among listed companies in Taiwan, major shareholders of families that control companies may nominate directors (Yeh, Lee & Woidtke 2001) while affiliated companies of the controlling family may nominate others. The more control a family exerts over the directors, the easier it becomes for these families to request that CEOs pursue the maximum interests of the controlling family. According to this study results indicate that family businesses hold an average share ownership of 23.52%, not reaching 50%; therefore, the controlling family's interests would not be the same for all shareholders. Additionally, the more a family controls the directors, the larger the chance of a negative influence on firm performance. Filatotchev, Lien and Piesse (2005) indicated that family-controlled directors correlated negatively with firm performance. Therefore, the following hypothesis was proposed:

H4. The percentage of family-controlled directors that serve on the board of directors relates negatively to firm performance.

Agency theory suggests that outside directors can supervise high-level executives and control whether they seek their own interests, consequently reducing the agency costs (Fama, 1980). Bonn (2004) pointed out that outside independent directors in Australian companies were effective indicators of

Australian boards and correlated positively with the company's ROE. Huang (2010) found that outside directors in Taiwanese banks correlated positively with the banks' financial performance. Luan and Tang (2007) reported that outside independent directors of listed electronic companies in Taiwan correlated positively with firm performance. These studies all suggest that increasing the number of outside independent directors serving on a board is necessary to ensure the board's functioning. From the above discussion, the number of outside independent directors relates positively to firm performance. Therefore, this study proposed the following hypothesis:

H5. The number of outside independent directors relates positively to firm performance.

Inside directors: Finegold et al. (2007) found that the ratio between inside and outside directors affects firm performance. However, there are no consistent findings to conclude that increasing outside director participation would increase firm performance. For example, Wagner et al. (1998) reviewed 29 articles in a meta-analysis and discovered that increasing the number of both inside and outside directors had a positive influence on firm performance. In listed Taiwanese companies, many directors also served as vice general managers, assistant general managers, or managers; therefore, so they were inside directors. Inside directors take positions of high-level executives concurrently and participate in the companies' daily business operations (Johnson et al., 1996; Yammeesri & Herath 2010). Agency theory suggests that boards of directors need inside directors who can provide important internal supervision; without them, CEOs receive asymmetrical information. Additionally, inside directors can help the board pay careful attention to CEOs' actions and overall performance (Johnson et al., 1996). Finally, stewardship theory proposes that inside directors can achieve better firm performance and create more profit for shareholders (Nicholson & Kiel 2007). Therefore, the following hypothesis was proposed:

H6. The number of inside directors relates positively to firm performance.

DATA AND METHODOLOGY

Since Taiwan's electronic industry plays a vital role in the supply chain of global electronic industries, this study used Taiwan's electronic industry as the research sample. We obtained three year's (2007-2009) data for (TSEC/GTSM) listed companies from the Taiwan Economic Journal (TEJ) data bank and selected large firms with annual sales in the first half as research samples. Complete data were available for 662 listed electronics companies in 2007, 686 companies in 2008, and 719 companies in 2009, totaling 2,067 electronics companies for the three consecutive years. The number of companies with annual sales in the first 50% was 331 in 2007, 343 in 2008, and 359 in 2009, for the sum of 1,033 companies. Table 1 summarizes the descriptive statistical data for independent, dependent, and control variables. Table 2 shows the correlation coefficients for all variables.

In Table 1, the chair of the board also served as CEO (duality) in 307 companies, the average is 29.72%. Regarding board size, the smallest board consisted of six directors while the largest board consisted of 19 directors, with an average number of directors of 9.46. Overall, 984 companies employed supervisory directors with a maximum of five supervisory directors and an average number of 2.62. Regarding the percentage of family-controlled directors, the highest was 100% and the average was 51.61%. Among outside independent directors, 646 companies had independent directors; with a maximum having six and an average of 1.63. Regarding inside directors, 938 companies had inside directors, with a maximum of seven and an average of 1.91. Among all 1,033 companies, the lowest annual sales was NTD 1.67 billion (USD 57 million) while the highest was NTD 1,473.03 billion (USD 50 billion), with an average of NTD 27.42 billion (USD 935 million).

As seen in Table 2, independent directors correlated significantly with Tobins' Q. The variables duality, supervisory directors, family-controlled directors, and outside independent directors correlated significantly with ROA and ROE. Finally, the above analyses suggest that board structure variables do affect firm performance.

Table 1: Descriptive Statistics

	Minimum	Maximum	Median	Mean	S.D.
Duality	0	1	0	0.2972	0.4572
B-size	6	19	9	9.4569	1.9028
Sup-dire	0	5	3	2.6196	0.7872
FC-dire	0.0909	1	0.5	0.5161	0.1866
Outs-dire	0	6	2	1.6292	1.4228
Ins-dire	0	7	2	1.9148	1.3113
Sales (NTD million)	1669	1473026	5760	27418	102031
F-size	7.4197	14.2028	8.6587	8.9810	1.2053
Tobins'Q	-0.2884	12.0537	0.7168	0.9915	1.0303
ROA	-0.6239	0.5310	0.0675	0.0647	0.1033
ROE	-1.7976	0.7405	0.1083	0.0867	0.1888

Note: $n=1033$; Duality: is a dummy variable that is set to 1 when there is CEO duality and 0 otherwise. B-size: the number of board members. Sup-dire: the number of supervisory directors on the board of directors. FC-dire: The number of directors controlled by the controlling families and relatives/friends of controlling families. Outs-dire: the number of outside independent directors on the board of directors. Ins-dire: the number of inside directors on the board of directors. Sales(NTD million) : the annual sales of the company. F-size: the natural logarithm value of the annual sales of the company. Tobins'Q = $(MVCS + MVPS + STL - STA + LTD) / TA$. ROA: net income/ average total asset. ROE: net income/average net worth.

This study applied regression analysis, taking corporate performance, Tobins' Q, ROA, and ROE as dependent variables and duality, board size, supervisor directors, family-controlled directors, independent directors, and inside directors as independent variables. Firm size was used as the control variable. The regression equation was as follows:

$$Y_i = \alpha + \beta_1(Duality) + \beta_2(B - size) + \beta_3(Sup - dire) + \beta_4(FC - dire) + \beta_5(Outs - dire) + \beta_6(Ins - dire) + \beta_7(F - size) + \varepsilon \quad (1)$$

Y_i =Firm performance, Y_1 =Tobins'Q, Y_2 =ROA, Y_3 =ROE

Ordinary Least Squares (OLS) was used to analyze regression equation (1).

Board Variables

Duality: Duality refers to the event in which one individual takes the position of both the chair of the board and CEO. Duality was coded as a dummy variable in this study. When the chair of the board also served as a CEO, the variable was coded as 1, otherwise it was coded 0.

Board size (B-size): Board size reflected the total number of directors and supervisory directors serving on the board of directors.

Supervisory directors (Sup-dire): It is the total number of supervisory directors serving on the board of directors.

Table 2: Pearson Correlation Coefficients between Variables

	Duality	B-size	Sup- director	FC- director	Outs- director	Ins- director	F-size	Tobins'Q	ROA	ROE
Duality	1.000									
B-size	-0.119***	1.000								
Sup-dire	-0.079*	0.327***	1.000							
FC-dire	-0.083**	0.083**	-0.088**	1.000						
Outs-dire	-0.128***	0.286***	0.021	-0.323***	1.000					
Ins-dire	0.225***	0.270***	0.046	0.324***	-0.169***	1.000				
F-size	-0.098**	0.212***	-0.093**	0.292***	0.064*	0.187***	1.000			
Tobins'Q	-0.050	0.038	0.011	-0.061	0.115***	-0.013	-0.038	1.000		
ROA	-0.073*	0.015	0.105***	-0.090**	0.183***	0.041	0.024	0.525***	1.000	
ROE	-0.092**	0.013	0.110***	-0.093**	0.167***	0.027	0.055	0.402***	0.928***	1.000

Note: n=1033; Duality: is a dummy variable that is set to 1 when there is CEO duality and 0 otherwise. B-size: the number of board members. Sup-dire: the number of supervisory directors on the board of directors. FC-dire: The number of directors controlled by the controlling families and relatives/friends of controlling families. Outs-dire: the number of outside independent directors on the board of directors. Ins-dire: the number of inside directors on the board of directors.. F-size: the natural logarithm value of the annual sales of the company. Tobins' Q = (MVCS + MVPS + STL - STA + LTD)/TA. ROA: net income/ average total asset. ROE: net income/average net worth. *** Correlation is significant at the 0.01 level (two-tailed); ** Correlation is significant at the 0.05 level (two-tailed); * Correlation is significant at the 0.1 level (two-tailed);

Family-controlled directors (FC-dire): Directors or supervisory directors are nominated and appointed by the major shareholder of families controlling the company (Yeh et al., 2001), by affiliated companies of the controlling families, or by relatives or friends of the controlling families. All of the above are family-controlled directors who made decisions concerning the company's operations according to controlling families' interests.

Outside Independent directors (Outs-dire): These include directors or supervisory directors not served by internal personnel, members of families controlling the company, or relatives or friends of families controlling the company, but by external persons who have no relationship to the company.

Inside directors (Ins-dire): A director who serves concurrently as deputy vice general manager, assistant general manager, or manager. Inside directors take the position of a high-level executive concurrently and participate in the companies' daily business operations (Johnson et al., 1996; Yammeesri & Herath 2010)

Performance Variables

This study adopted three performance variables that most researchers use to evaluate firm performance: Market-based Tobins' Q (Kiel & Nicholson 2003; Kota & Tomar 2010; Yammeesri & Herath 2010), accounting-based ROA (Bonn et al., 2004; Huang 2010; Kiel & Nicholson 2003; Lam & Lee 2008), and ROE (Huang, 2010; Lam & Lee 2008).

Tobins' Q: Tobins' Q as proposed by Brainard and Tobin (1968) is the ratio between market value and replacement cost of corporate assets. When Tobins' Q > 1, the company has better business performance; when Tobins' Q < 1, the company has poor business performance. This study adopted the proximate

calculation formula of Tobins' Q as proposed by Chung and Pruitt (1994):

$$\text{Approximate } q = (MVE + PS + DEBT) / TA \quad (2)$$

In which MVE is the product of a firm's share price and the number of common stock shares outstanding. PS is the liquidating value of the firm's outstanding preferred stock, DEBT is the value of the firm's short-term liabilities net of its short-term assets, plus the book value of the firm's long-term debt, and TA is the book value of the total assets of the firm. (Chung & Pruitt 1994)

$$\text{Tobins' } Q = (MVCS + MVPS + STL - STA + LTD) / TA \quad (3)$$

MVCS= market value of common stock, MVPS= market value of preferred stock
STL= short-term liabilities, STA= short-term assets
LTD= long-term debt, TA= total assets

ROA: Return on assets (net income / average total asset).

ROE: Return on equity (net income / average net worth).

Control Variable

Firm size (F-size): Majamdar (1997) suggested that firm size positively correlates with firm performance. There are three kinds of proxy variables: Book value of total firm assets, market capitalization of firm, and total net annual sales (Lam & Lee, 2008). This article used a natural logarithm of total net annual sales as the control variable.

RESULTS

Tobins' Q for firm performance is the ratio between market value and replacement cost of firm assets. This ratio shows the achievement of business performance accumulated after years of operation and the present market value used to evaluate the firm. ROA is the return rate of firm assets; business performance is evaluated by return of total assets for the current year. ROE is the return of equity; business performance is evaluated by the return of shareholders' equity for the current year. Therefore, three business performance variables represented different applications of business performance evaluation. Tobins' Q, ROA, and ROE were used as dependent variables in the regression equation analysis to verify the six research hypotheses (see Table 3). VIF values of the independent variables in the three regression models ranged from 1.148 and 1.474; therefore, there was no collinear problem.

The first regression model used Tobins' Q as a dependent variable producing an adjusted $R^2 = 0.011$. The control variable, firm size, correlated negatively with no significant influence on the outcome variable. Outside independent directors correlated positively with, and significantly influenced firm performance in terms of Tobins' Q supporting hypothesis H5. This result is similar to Yammeesri and Herath's (2010) findings that indicated a positive correlation between independent director and firm performance in terms of Tobins' Q; however, there was no significant influence on firm performance. Duality, supervisory directors, and family-controlled directors all negatively correlated with firm performance in terms of Tobins' Q; however, no significant effects were present. Board size and inside directors correlated positively with firm performance in terms of Tobins' Q, with no significant effects. Therefore, hypotheses H1a, H1b, H2, H3, H4, and H6 were not supported.

The second regression model used ROA as the dependent variable producing an adjusted $R^2 = 0.062$. The control variable, firm size, correlated negatively with firm performance in terms of ROA, with no significant influence. Duality correlated negatively with and had significant influence on ROA for firm performance, thus supported hypothesis H1a but not H1b. Lam and Lee (2008) suggested that the influence of duality on ROA for firm performance is negative in family businesses but positive in non-family businesses, thus offering support to the notion those companies with different shareholder

Table 3: All Samples Regression Model Analysis

	Model(1)		Model(2)		Model(3)	
	B-value	t-value	B-value	t-value	B-value	t-value
Intercept	1.296	4.411 ***	0.041	1.440	0.005	0.099
Duality	-0.114	-1.523	-0.020	-2.673 ***	-0.042	-3.143 ***
B-size	0.004	0.217	-0.007	-3.772 ***	-0.014	-3.766 ***
Sup-dire	-0.009	-0.193	0.017	3.968 ***	0.033	4.179 ***
FC-dire	-0.153	-0.757	-0.035	-1.762 *	-0.082	-2.279 **
Outs-dire	0.077	2.960 ***	0.015	6.000 ***	0.024	5.146 ***
Ins-dire	0.026	0.910	0.011	4.017 ***	0.018	3.490 ***
F-size	-0.043	-1.493	0.003	1.071	0.012	2.309 **
R ²	0.018		0.069		0.068	
Adjusted R ²	0.011		0.062		0.061	
F-value	2.710 **		10.792 ***		10.631 ***	
N	1033		1033		1033	

Note: Duality: is a dummy variable that is set to 1 when there is CEO duality and 0 otherwise. B-size: the number of board members. Sup-dire: the number of supervisory directors on the board of directors. FC-dire: The number of directors controlled by the controlling families and relatives/friends of controlling families. Outs-dire: the number of outside independent directors on the board of directors. Ins-dire: the number of inside directors on the board of directors. F-size: the natural logarithm value of the annual sales of the company. Tobins'Q = (MVCS + MVPS + STL - STA + LTD) / TA ROA: net income/ average total asset. ROE: net income/average net worth. This table shows the regression estimates of the equation: $Y_i = \alpha + \beta_1(\text{Duality}) + \beta_2(\text{B-size}) + \beta_3(\text{Sup-dire}) + \beta_4(\text{FC-dire}) + \beta_5(\text{Outs-dire}) + \beta_6(\text{Ins-dire}) + \beta_7(\text{F-size}) + \varepsilon$. $i=1,2,3$, $Y1=\text{Tobins'Q}$, $Y2=\text{ROA}$, $Y3=\text{ROE}$. The first figure in each cell is the regression coefficient. The second figure in each cell is the t-statistic. ***, ** and * indicate significance at the 1, 5 and 10 percent level respectively.

types have different effects. Board size correlated negatively with and had significant influence on ROA for firm performance, thus supporting hypothesis H2. Huang's (2010) study on Taiwan's banking industry reported that board size affected ROA for firm performance positively. This finding is different from the finding of the current study. Specifically, the current study explored the electronics industry; therefore, the reason for the different findings may be due to different competitive environments of these industries. Supervisory directors correlated positively with and had significant influence on ROA for firm performance, and thus did not support hypothesis H3. Such a result is different from Huang's (2010) finding that supervisory directors affect firm performance negatively. The variable family-controlled directors correlated negatively with ROA for firm performance and had significant influence; this finding support hypothesis H4. The variable outside independent directors correlated positively with ROA for firm performance and had significant influence, supporting hypothesis H5. This finding is similar to Huang (2010) and Bonn et al.'s (2004) findings on Australian companies. The variable inside directors correlated positively with and had significant influence on ROA for firm performance, supporting hypothesis H6. This result is different from Huang's (2010) finding that inside directors did not influence firm performance.

The third regression model used ROE as a dependent variable produced an adjusted R² = 0.061. The control variable, firm size, correlated positively with and had significant influence on firm performance. In addition, duality correlated negatively with and had significant influence on ROE for firm performance, thus supporting hypothesis H1a, but not H1b. Lam and Lee (2008) found the effect of duality on ROE for firm performance was negative in family businesses but positive in non-family businesses. Companies

with different shareholder types seem to influence firm performance differently.

In addition, board size correlated negatively with and had significant influence on ROE for firm performance, supporting hypothesis H2. Supervisory directors correlated positively with and had significant influence with ROE for firm performance, rejecting hypothesis H3. This result is different from Huang's (2010) finding that indicated supervisory directors in Taiwan's banking industry have a negative influence on ROE for firm performance. Family-controlled directors correlated negatively with and had significant influence on ROE for firm performance, supporting hypothesis H4.

Filatotchev et al. (2005) found similar results. Outside independent directors correlated positively with and had significant effect on ROE for firm performance, supporting hypothesis H5. This supports the findings of Bonn (2004), Luan and Tang (2007), and Huang (2010), who found that outside independent directors have a positive influence on ROE for firm performance. Finally, inside directors correlated positively with and had significant influence on ROE for firm performance, supporting hypothesis H6.

Among the 1,033 samples collected in this study, the minimum annual revenue was NTD 1.669 billion (USD 57 million) and the maximum was NTD 1,473 billion (USD 50 billion). The company sizes also differed greatly. In order to learn about the different impacts of board structure of different sized companies on business performance, the companies were divided into three groups according to company size. Considering that a sample number of each group should be more than 300, the companies were divided as follows according to annual revenue.

Large-sized companies ($N = 347$) with an annual revenue of more than NTD 10 billion (USD 341 million); the total sample was 347. Medium-sized companies ($N = 320$) had an annual revenue from NTD 4 billion (USD 137 million) to NTD 10 billion. Small-sized companies ($N = 366$) had an annual revenue from NTD 1.669 billion (USD 57 million) to NTD 4 billion. The regression analysis of the company samples were conducted with the corporate performance variable Tobins' Q, ROA, and ROE against the board structure variable and control variable. The VIF value of every independent variable in the nine regression models was between 1.018 and 1.581. Thus there was no problem of collinearity within the nine regression models (see Tables 4, 5, and 6).

The F value of Tobins' Q regression model (model 4) was 0.617 for the large-sized companies (see Table 4); therefore, the regression analysis of Tobins' Q was not useful. The adjusted R^2 of the ROA regression analysis model (model 5) was 0.060. The variables that yielded a negative impact on ROA included duality, board size, and family-controlled directors. The variables that yielded a positive impact on ROA included supervisory directors, inside directors, and firm size.

The variable outside independent directors had no impact. The adjusted R^2 of the ROE regression analysis model (model 6) was 0.080. The variables that yielded a negative impact on ROE included duality, board size, and family-controlled directors. Finally, the variables that yielded a positive impact on ROE included supervisory directors, outside independent directors, inside directors, and firm size.

The adjusted R^2 of Tobins' Q regression analysis model (model 7) for medium-sized companies was 0.022 (see Table 5). The variables yielding a positive impact on Tobins' Q included board size and outside independent directors. Other variables had no impact. The adjusted R^2 of the ROA regression analysis model (model 8) was 0.084. The variables that yielded a positive impact on ROA included supervisory directors, outside independent directors, and inside directors. Other variables had no impact on this analysis. The adjusted R^2 of the ROE regression analysis model (model 9) was 0.071. The variables that yielded a positive impact on ROE included supervisory directors, outside independent directors, and inside directors; other variables had no impact.

Table 4: Big-size Companies' Regression Model Analysis

	Model(4) Tobins'Q		Model(5) ROA		Model(6) ROE	
	B-value	t-value	B-value	t-value	B-value	t-value
Intercept	0.815	1.752 *	0.037	0.633	-0.014	-0.127
Duality	-0.148	-1.467	-0.035	-2.777 ***	-0.067	-2.761 ***
B-size	-0.012	-0.530	-0.009	-3.298 ***	-0.020	-3.760 ***
Sup-dire	-0.044	-0.932	0.010	1.666 *	0.024	2.115 **
FC-dire	-0.116	-0.449	-0.083	-2.591 ***	-0.176	-2.797 ***
Outs-dire	0.019	0.580	0.006	1.538	0.013	1.675 *
Ins-dire	0.020	0.632	0.008	2.002 **	0.014	1.812 *
F-size	0.035	0.842	0.012	2.269 **	0.030	2.958 ***
R ²	0.016		0.079		0.099	
Adjusted R ²	-0.005		0.060		0.080	
F-value	0.617		0.000		0.000	
N	347		347		347	

Note: Duality: is a dummy variable that is set to 1 when there is CEO duality and 0 otherwise. B-size: the number of board members. Sup-dire: the number of supervisory directors on the board of directors. FC-dire: The number of directors controlled by the controlling families and relatives/friends of controlling families. Outs-dire: the number of outside independent directors on the board of directors. Ins-dire: the number of inside directors on the board of directors. F-size: the natural logarithm value of the annual sales of the company. Tobins'Q = (MVCS + MVPS + STL - STA + LTD)/TA ROA: net income/ average total asset. ROE: net income/average net worth. This table shows the regression estimates of the equation: $Y_i = \alpha + \beta_1(Duality) + \beta_2(B - size) + \beta_3(Sup - dire) + \beta_4(FC - dire) + \beta_5(Outs - dire) + \beta_6(Ins - dire) + \beta_7(F - size) + \varepsilon$. $i=1,2,3$, $Y1=Tobins'Q$, $Y2=ROA$, $Y3=ROE$. The first figure in each cell is the regression coefficient. The second figure in each cell is the t-statistic. ***, ** and * indicate significance at the 1,5 and 10 percent level respectively.

Table 5: Medium-size Companies' Regression Model Analysis

	Model(7) Tobins'Q		Model(8) ROA		Model(9) ROE	
	B-value	t-value	B-value	t-value	B-value	t-value
Intercept	1.422	0.658	-0.048	-0.244	-0.151	-0.390
Duality	0.054	0.361	-0.001	-0.098	-0.030	-1.110
B-size	0.085	1.792 *	-0.007	-1.527	-0.011	-1.320
Sup-dire	-0.046	-0.474	0.032	3.688 ***	0.061	3.548 ***
FC-dire	0.162	0.393	-0.033	-0.893	-0.073	-0.995
Outs-dire	0.108	2.114 **	0.019	4.095 ***	0.030	3.300 ***
Ins-dire	0.001	0.009	0.016	2.846 ***	0.027	2.408 **
F-size	-0.158	-0.649	0.005	0.223	0.014	0.325
R ²	0.043		0.104		0.091	
Adjusted R ²	0.022		0.084		0.071	
F-value	0.054		0.000		0.000	
N	320		320		320	

Note: Duality: is a dummy variable that is set to 1 when there is CEO duality and 0 otherwise. B-size: the number of board members. Sup-dire: the number of supervisory directors on the board of directors. FC-dire: The number of directors controlled by the controlling families and relatives/friends of controlling families. Outs-dire: the number of outside independent directors on the board of directors. Ins-dire: the number of inside directors on the board of directors. F-size: the natural logarithm value of the annual sales of the company. Tobins'Q = (MVCS + MVPS + STL - STA + LTD)/TA ROA: net income/ average total asset. ROE: net income/average net worth. This table shows the regression estimates of the equation: $Y_i = \alpha + \beta_1(Duality) + \beta_2(B - size) + \beta_3(Sup - dire) + \beta_4(FC - dire) + \beta_5(Outs - dire) + \beta_6(Ins - dire) + \beta_7(F - size) + \varepsilon$. $i=1,2,3$, $Y1=Tobins'Q$, $Y2=ROA$, $Y3=ROE$. The first figure in each cell is the regression coefficient. The second figure in each cell is the t-statistic. ***, ** and * indicate significance at the 1,5 and 10 percent level respectively.

The F value of Tobins' Q regression model (model 10) for small-sized companies was 0.142 (see Table 6); therefore, the regression analysis of Tobins' Q did not exist. The adjusted R² for the ROA regression analysis model (model 11) was 0.075. The variables that yielded a positive impact on ROA include supervisory directors, outside independent directors, and inside directors; other variables had no impact. The adjusted R² for the ROE regression analysis model (model 12) was 0.065. The variable that yielded a positive on ROE was outside independent directors; other variables have no impact.

Table 6: Small-size Companies' Regression Model Analysis

	Model(10) Tobins'Q		Model(11) ROA		Model(12) ROE	
	B-value	t-value	B-value	t-value	B-value	t-value
Intercept	3.455	1.562	-0.189	-0.959	-0.382	-1.228
Duality	-0.179	-1.241	-0.018	-1.378	-0.029	-1.414
B-size	-0.006	-0.141	-0.002	-0.523	0.001	0.145
Sup-dire	0.069	0.670	0.016	1.713 *	0.023	1.619
FC-dire	-0.507	-1.316	-0.003	-0.090	-0.015	-0.271
Outs-dire	0.076	1.457	0.020	4.261 ***	0.026	3.613 ***
Ins-dire	0.049	0.824	0.010	1.985 **	0.013	1.605
F-size	-0.305	-1.109	0.024	0.993	0.044	1.143
R ²	0.030		0.093		0.083	
Adjusted R ²	0.011		0.075		0.065	
F-value	0.142		0.000		0.000	
N	366		366		366	

Note: Duality: is a dummy variable that is set to 1 when there is CEO duality and 0 otherwise. B-size: the number of board members. Sup-dire: the number of supervisory directors on the board of directors. FC-dire: The number of directors controlled by the controlling families and relatives/friends of controlling families. Outs-dire: the number of outside independent directors on the board of directors. Ins-dire: the number of inside directors on the board of directors. F-size: the natural logarithm value of the annual sales of the company. Tobins' Q = (MVCS + MVPS + STL - STA + LTD) / TA ROA: net income/ average total asset. ROE: net income/average net worth. This table shows the regression estimates of the equation: $Y_i = \alpha + \beta_1(\text{Duality}) + \beta_2(\text{B-size}) + \beta_3(\text{Sup-dire}) + \beta_4(\text{FC-dire}) + \beta_5(\text{Outs-dire}) + \beta_6(\text{Ins-dire}) + \beta_7(\text{F-size}) + \varepsilon$. $i=1,2,3$, $Y_1=\text{Tobins'Q}$, $Y_2=\text{ROA}$, $Y_3=\text{ROE}$. The first figure in each cell is the regression coefficient. The second figure in each cell is the t-statistic. ***, ** and * indicate significance at the 1,5 and 10 percent level respectively.

DISCUSSION

This study focused on the effects of board structure in corporate governance on firm performance. A board of directors plays a critical role in corporate governance. Further, the leadership structure and organization of a board of directors also appears to affect the effectiveness of corporate governance. Therefore, this study analyzed the impact of board structure on firm performance to learn about the influence of leadership structure and board of directors on firm performance.

Regarding board leadership structure, the outcomes from this study indicate that duality has a negative influence on both the ROA and ROE. When the chair of the board also serves as CEO, firm performance worsens. This conclusion is similar to the findings of Yammeesri and Herath (2010) and indicates that a board of directors can effectively supervise the CEO to make decisions to benefit the company and promote firm performance only when the chair of the board does not serve as CEO. If the chair of the board also serves as CEO, the board of directors cannot effectively supervise the CEO to make decisions to benefit the company, thus leading to the reduction of firm performance. This conclusion is one that complies with agency theory.

Board size had a negative influence on ROA and ROE for firm performance. This conclusion mirrored that of Bonn et al. (2004) and Chiang and Lin (2007). Further, these findings suggest that it becomes difficult to coordinate, exert directors' expertise, and establish interpersonal relationships when there are

too many members of a board of directors. (Forbes & Milliken, 1999). Additionally, it is difficult for a large board of directors to arrive at consensus when these obstacles to communication exist; therefore, the supervisory function of a board of directors is reduced. Jensen (1993) pointed out that a board's function would be weakened and easily controlled by a CEO when the number of board members exceeds seven or eight. When a board has few members, they can communicate and reach consensus more easily. A small board of directors can also reduce the problem of bureaucracy and enable better functioning (Chiang & Lin, 2007). Therefore, when the number of a board of directors is eight or less, the effectiveness of the board of directors and firm performance will improve.

This study found that the number of supervisory directors has a positive influence on ROA and ROE for firm performance, which indicates that a greater number of supervisory directors is linked to stronger supervisory abilities of a board of directors and improved firm performance. Dahya et al. (2003) suggested that if a supervisory director is just an honored guest, a friendly advisor, or a censored watchdog, his report will be of no use. Conversely, if a supervisory director is independent, his report will be valuable. Therefore, companies should employ more independent supervisory directors to promote firm performance.

This study also found that family-controlled directors have a negative influence on ROE for firm performance, which replicates Filatotchev et al. (2005) findings. During the three years data period of the current research, listed family businesses held share ownerships of 23.52%, on average. Overall, 85 family businesses held more than 50% of share ownership, accounting for 8.23% of the 1,033 businesses examined. Family-controlled directors, appointed in 606 firms, accounted for more than 50% of the board of directors. Concerning these larger shareholder family-controlled boards of directors, their interests will often not be the same as non-family shareholders. It is evident that, when considering ROE, major shareholders will consider their own interests when participating in the company's operational decisions, in spite of the interests of other shareholders. Thus, family-controlled directors have a negative effect on ROE for firm performance. Therefore, companies should reduce family-controlled directors to promote firm performance.

Outside independent directors had a positive influence on Tobins' Q, ROA, and ROE for firm performance. This result is consistent with the findings of Luan and Tang (2007) and Bonn (2004) who found that outside directors have a positive influence on ROE. This finding is also consistent with that of Huang (2010) who found that outside directors have positive effect on ROA and ROE. Moreover, this result supports the findings of Bonn et al. (2004) who reported outside directors have a positive influence on ROA. In addition, inside directors have a positive influence on ROA and ROE for firm performance, which is consistent with the findings of Yammeesri and Herath (2010) that inside directors have positive influence on Tobins' Q. Wagner et al. (1998) evaluated 30 articles and discovered that both outside independent directors and inside directors have a positive effect on firm performance, a finding supported by the current study.

Although there are grey directors on a board of directors, this study did not analyze this variable. Since Yammeesri and Herath (2010) found that grey directors have no effect on firm performance, companies should increase the number of outside and inside directors to reduce grey directors and promote firm performance. Finally, appropriate proportions between outside directors and inside directors needs further examination.

By analyzing different sized companies, it was found from the Tobins' Q of corporate performance that large and small-sized companies are not be affected by board structure. However, medium-sized companies are positively affected by board size and the numbers of outside independent directors. This means, among medium-sized companies, the larger the board size, the more outside resources might be available to promote performance of corporate Tobins' Q. When there are many independent outside directors, performance of corporate Tobins' Q improves. In terms of ROA and ROE, duality, board size, and family-controlled directors yielded a negative impact on large-sized companies, indicating when the chairperson of the board in large-sized companies also serves as the CEO, he might negatively effects

business operations by pushing a private benefit agenda. Larger boards result in a malfunction of board operations, thus causing a decline in performance of the company's ROA and ROE. Likewise, family-controlled directors may also cause the performance of the company's ROA and ROE to decline by pushing an agenda in favor of the family's private benefits.

The positive impact of both supervisory directors and inside directors means, in large-sized companies, effective supervision by a board of supervisory directors can enhance the performance of the company's ROA and ROE. Inside directors will be devoted to their duties and better communication between the board of directors and managers can improve the performance of the company's ROA and ROE. Outside independent directors have a positive impact on ROE but have no impact on ROA. This indicates when there are many outside independent directors in a large-sized company, the company's ROE performance will be promoted under the outside independent directors' supervision.

In medium-sized companies, supervisory directors, outside independent directors, and inside directors have a positive impact on ROA and ROE, indicating that the effective supervision of managers by supervisory directors in medium-sized companies can promote the performance of the company's ROA and ROE. This is because, in these companies, inside directors will be more devoted to their duties and increased communication between the board of directors and managers will improve the performance of the company's ROA and ROE.

In small-sized companies, outside independent directors have a positive impact on ROA and ROE, indicating supervision by outside independent directors in small-sized companies can promote the performance of the company's ROA and ROE. In terms of ROA, supervisory directors and inside directors have a positive impact, indicating the effective supervision by supervisory directors overseeing managers in small-sized companies can promote the performance of the company's ROA. As with large and medium-sized companies, these inside directors will be more devoted to their duties and allow better communication between the board of directors and managers, which will improve the company's ROA. Finally, duality, board size, and family-controlled directors have no impact on ROA and ROE in small and medium-sized companies as well as for companies with annual revenue of less than NTD 10 billion.

The two major subjects of agency theory include the effect of the board of directors and the effect of duality on firm performance (Nicholson & Kiel, 2007). The results of this study indicate that duality has a negative impact on firm performance in terms of accounting-based ROA and ROE, which complies with agency theory. This indicates that, when the chair of a board also serves as CEO, the supervisory functions of the board of directors will be reduced, consequently weakening firm performance. Among the five variables of board organization, board size has a negative influence on firm performance, which supports Jensen (1993) who claimed that firm performance would improve when the board of directors maintained a smaller size. This result does not support resource theory.

Both the number of supervisory directors and outside independent directors has a positive impact on firm performance; family-controlled directors have a negative influence on firm performance. Both of the above results complies with agency theory; however, the positive effect of inside directors on firm performance does not comply with agency theory. Rather it complies with stewardship theory (i.e., inside directors will work hard to create maximal profit for shareholders) (Nicholson & Kiel, 2007). As evident from accounting-based firm performance in the conclusion of this study, the board functions in corporate governance of Taiwan's electronic companies largely complies with agency theory. Most functions of a board of directors in large-sized companies conform to agency theory. Finally, only some of the functions of a board of directors in small and medium-sized companies conform to agency theory.

CONCLUSION

This study explored the impact of board structure in corporate governance on corporate performance. Our analysis was conducted by dividing the companies into three size groups based on annual revenue (more than NTD 10 billion (USD 341 million), NTD 4-10 billion (USD 137-341 million), and NTD

1.669-4 billion (USD 57-137 million). Analytical samples included 1,033 TSEC/GTSM listed companies during 2007-2009. OLS regression model was applied to the analysis. According to the results, only outside independent directors have a positive impact on firm performance for Tobins' Q, while the other variables have no impact. In terms of ROA and ROE, duality, board size and family-controlled directors have a negative impact while supervisors, outside independent directors and inside directors have a positive impact.

Based on the results, this study determined that in companies with annual revenue of more than NTD 10 billion (USD 341 million), duality, board size, and family-controlled directors have a negative impact on ROA and ROE for firm performance. Both supervisory directors and inside directors have a positive impact on ROA and ROE for firm performance and outside independent directors have a positive impact on ROE for firm performance. None of the variables of board structure had any impact on corporate performance considering Tobins' Q. In companies with annual revenues of less than NTD 10 billion, supervisory directors, outside independent directors, and inside directors have a positive impact on ROA and ROE. Thus, in practice, large-sized companies exercise caution when forming the board of directors to ensure an effective operation and to promote the performance of ROA and ROE. Likewise, small and medium-sized companies should increase the number of supervisory directors, outside independent directors, and inside directors when forming the board of directors to promote performance of ROA and ROE.

This study analyzed only companies from Taiwan's electronic industry. Additionally, only large companies whose performance rankings were among the first 50% and annual revenues were more than NTD 1.669 billion were analyzed. The corporate governance of companies whose annual revenues were below NTD 1.669 billion (USD 57 million) and whose achievements were small were not considered. The above conditions are restrictions of this study. Additionally, major family shareholders, who might then control the firm, might hold the majority of firm shares and such a family business would unavoidably have certain impacts on the implementation of corporate governance. This was also a condition that this study failed to consider and will cause certain limitations to the application of the current findings.

Bonn et al. (2004) revealed different results concerning corporate governance conditions of Australian and Japanese companies. In Japanese companies, board size correlated negatively with firm performance, while in Australian companies, board size did not influence firm performance. Further, in Australian companies, outside directors influenced firm performance positively, while in Japanese companies, outside directors did not influence firm performance. Huang (2010) found that among Taiwanese banks, board size correlated positively with firm performance. This finding is different from the result of the current study, which indicated that board size of Taiwanese electronics companies correlates negatively with firm performance. Among previous studies on the influence of duality on firm performance, Kota and Tomar (2010) reported a positive effect of duality in Indian companies on firm performance. Coles, McWilliams and Sen (2001) found that duality in American companies also positively influenced firm performance, which is different from the result of this study that found duality in Taiwanese electronics companies correlates negatively with firm performance. The differences between previous research findings and the findings of this study may be due to different environments or different characteristics of industry competitiveness. Therefore, corporate governance in different countries and different industries deserves further study. This study did not conduct analyses for family businesses or for companies whose annual revenues were less than NTD 1.669 billion, both of which should be considered for further study.

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