

Park, Jeong hwan

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The Effect of Multiple Directorships on Investment Efficiency

Jeong hwan Park[†]

Assistant Professor, Department of Business Administration, Busan University of Foreign Studies, Republic of Korea

A B S T R A C T

In this article, I investigate the effect of multiple directorships on investment efficiency. Through the study of Korean firms, this article confirms that the existence and proportion of multiple directorships were negatively related to investment efficiency. The study also found that multiple directorships were strongly related to underinvestment. Accordingly, it concludes that multiple directorships are an obstacle to directors' fulfillment as it impedes effective investment opportunities and prevents them from playing leading roles in managerial decision-making. This, in turn, affects investment efficiency negatively.

Keywords: Board Culture, Board of Directors, Governance, Investment Efficiency, Multiple Directorships

I . Introduction

People living in modern society perform various roles at the same time. Some lead all of their roles successfully while some succeed only in certain roles and still others fail in all their roles. Although it is different for different individuals, with an increase in the number of roles we take up, our memory and concentration becomes all the more dispersed and distracted, leading us to experience more failures. This is because our energy and time are not infinite.

Charron and Koechlin (2010) measured the brain activity of 16 volunteers through fMRIs to find out how many tasks people can do simultaneously. They found that memory and concentration were significantly reduced when more than three tasks were performed

at a time. They concluded that the human brain could handle no more than two tasks at one time. The greater the number of tasks, the lesser memory and concentration is offered to each. This has been proven by scientific experiments. The question of multiple directorships and their impacts relate to a similar point. Therefore, many studies have focused on the effect of multiple directorships on board function. However, they have not arrived at consistent conclusions and are divided between two hypotheses, busyness and reputation. According to the busyness hypothesis, on the lines of the findings in Charron and Koechlin (2010), there is a limit to the number of directorships that a director can hold onto at the same time. Multiple directorships affect the companies involved negatively (Carpenter and Westphal, 2001; Loderer and Peyer, 2002; Fich and Shivdasani, 2006; Jiraporn et al., 2008; Jiraporn et al., 2009). As reported by these researchers, the resultant insufficiency in the management insight of directors aggravates their agency conflicts, as directors

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[†] Jeong hwan Park

E-mail: prof.hwan@gmail.com

in various companies cannot spend enough time on the board activities of all the companies that they are directors of. Further, those who work as board members in various companies are less able to understand the key issues challenging each company because they spread their time and attention over several companies. This prevents them from preparing sufficiently for all their board meetings.

On the other hand, reputation hypothesis, some argue that the network of multiple directorships has a positive effect on the company in that it acts as a conduit for the connection of several companies through the same directors. They also argue that executive surveillance would be better because of the sharing of efficient and effective means to monitor the executive activities in each company through a network of multiple directors (Conyon and Read, 2006; Fahlenbrach et al., 2010; Dass et al., 2013 ; Field et al., 2013). Discussions on multiple directorships are eventually a question of whether the existing board functions of a company are threatened by the existence of directors or the percentage of directors who serve on several other boards at the same time. Johnson et al. (1996) classified the role of the board of directors into three roles: control, resource dependence, and service. Previous research (Williamson, 1984; Singh et al., 1986; Zahra and Pearce, 1989; Boeker and Goodstein, 1991; Hambrick, 1994; Daily and Schwenk, 1996), that evaluated these roles found that the scope of control of the board reduces the cost of agency and improves the performance of the company. The study found that another likely outcome is that it increases the possibility of survival of the enterprise by coping with uncertainty by linking with the external environment. Further, the study also reported that multiple directorships had beneficial effects on both strategic and general management decisions. If multiple directorships threaten the functioning of the board, it may lead to various complicated problems. Therefore, the number of directorships should be controlled at an appropriate level. Where multiple directorships do not have much of a negative impact, or have clearly positive impacts on the functioning of the board, it they need not be addressed.

In this study, I analyze the effect of multiple directorships on the functioning of the board by verifying the relationship between multiple directorship and investment efficiency. Biddle and Hilary (2006) and Biddle et al. (2009) reported that information asymmetry between firms and investors is alleviated by multiple directorships as internal control, monitoring, and supervision functions are enhanced and reliable accounting information is provided. Also, as the director concentrates on one directorship rather than doing multiple directorships, the board has higher independence and activity. As a result, investment proposals are reviewed in an objective and rigorous manner, and effective monitoring activities. Therefore, the investment efficiency of a corporation is enhanced by suppressing both excessive and frugal investment-related activities of managers. If corporate directors do not play their roles as members of the board because of multiple directorships, they will affect the investment efficiency of the company.

For the purpose of this study, I defined the person appointed as a director in two or more companies as “directors with multiple directorships” and divided the category into three, namely total, inside, and outside directors. The remainder, generated after regressing the capital expenditure of the corporation to various variables including the previous year's Tobin's Q, is used as a proxy variable for investment efficiency. It was found that the existence and proportion of multiple directors belonging to the total and inside categories were found to have a significant negative (-) relationship with investment efficiency. However, there were no significant results for outside directors.

II. Literature Reviews and Hypothesis

A. Multiple directorships and Board function

Many studies have focused on the effect of multiple directorships on board function. Many studies have especially focused on the relationship between “multiple directorships and corporate value.” However, they have not arrived at consistent conclusions and are divided

between two hypotheses.

1. The Reputation Hypothesis

According to the reputation hypothesis, multiple directorships contribute to the director's experience and enhance board functions by helping the director provide better advice and monitoring the situation in each company. Rosenstein and Wyatt (1994) found that multiple directorships of outside directors is positively related to the excess returns of financial firms as shown by the results of their empirical study on the "wealth effect" for both the "home" and "receiver" firms. They interpreted this as a result of the efficiency and networking effects of collecting information according to the roles of a director with multiple directorships.

Dass et al. (2013) defined "directors from related industries (DRI)" as the case where corporate directors belong to several companies within the same industry at the same time. They analyzed the impact of DRI on corporate value and return on total assets, and verified whether DRI could resolve information asymmetry. As a result, Dass et al. (2013) reported that there is a positive relationship among DRI, corporate value, and the return on assets, thereby suggesting that companies can improve their ability to cope with demand and supply shocks through DRI and predict trends in related industries. In addition, the DRI concluded that it would strengthen the capacity of the board to monitor the management performance by reducing the information gap between the board and management.

Field et al. (2013) found that in the case of start-ups, the value of an experienced "busy" director would be evident, as it could create links with multiple companies. They analyzed the effects of "busy" directors who were in directorial positions in three or more companies on the Initial Public Offering (IPO). They found that multiple directorship was common across several companies at the IPO stage, and that the value of corporations increased with the increase in the number of multiple directorships.

Lei and Deng (2014) conducted a survey of companies in Hong Kong. They argued that there is a difference in the number of directorships to reach the "busyness"

level, because each company has different conditions such as being family-owned or government-owned, or may involve large geographical distances for some directors to attend board meeting. They found that an increase in legal liability due to the posting of directorships would warn directors against multiple directorships. Thus, multiple directorships will enhance the board function (where directors pay greater attention to monitoring the firm because they have big legal responsibility owing to multiple directorships).

2. The Busyness Hypothesis

According to the busyness hypothesis, the director holding multiple directorships fails to make effective use of his time for benefit of the activities of all the boards that he is a member of. His management insight and ability deteriorates. He does not play a leading role in decision making concerning general and strategic decisions. Thus, the function of the board of directors at large is undermined.

Carpenter and Westphal (2001) showed that those who were directors in a number of companies tended to scatter their time and attention, lacked an understanding of the major issues challenging each company, and did not prepare enough for the board meetings. Loderer and Peyer (2002) found that the accumulation of directorships was negatively (-) related to firm value in their study of listed companies in Switzerland. They explained the reason for this as the presence of conflicting interests and temporal constraints of the directors.

Fich and Shivdasani (2006) found that the addition of directorships could weaken the functioning of several boards. They found that when outside directors had more than three directorships it resulted in poor corporate governance structure, book value ratio, profitability, and corporate performance.

Jiraporn et al. (2008) analyzed the effects of multiple directorships on corporate diversification to illustrate the process by which multiple directorships affect corporate value. They found that firms that had a larger number of directors with multiple directorships were more closely related to the diversification discount phenomenon, and that the negative influence of the

directors who had excessive roles was more evident in firms that had high agency costs. In a subsequent study by Jiraporn et al. (2009), they examined changes in the monitoring ability of directors as a result of holding multiple directorships of other companies.

B. Board function and investment efficiency

Recent studies (Biddle and Hilary, 2006; Verdi, 2006; Biddle et al., 2009; Chen et al., 2011; Cheng et al., 2013) have shown that the higher the quality of accounting information, the greater the investment efficiency of firms. In particular, Biddle et al. (2009) found that the quality of financial reporting information reduces overinvestment and underinvestment in companies facing financial constraints in investment, in firms with large cash holdings, and in firms with high free cash flow. A study by Cheng et al. (2013) reported that firms have significantly improved their investment efficiency levels after disclosing their Internal Control Weakness (ICW). These studies argued that the higher the quality of financial reporting, the lesser the information asymmetry between the investor and the manager, and thus, the investor can monitor the manager well. Therefore, if the quality of financial reporting can be improved through the normalization of board functions, investment efficiency can be affected positively. In some studies analyzing the relationship between investment efficiency and corporate governance or board function, it has been reported that investment efficiency improves with improvements in corporate governance and board functions.

Park and Kwon (2014) argue that foreign shareholders increase investment efficiency because foreign investors increase their investment efficiency by monitoring managerial investment decisions. Yim et al. (2014) found that the investment efficiency of firms with superior internal governance is higher than those with weak internal governance.

Jeon et al. (2018) analyzed the relationship between foreign directors and firms' investment efficiency as foreign directors would affect corporate performance

positively as members of the board. As a result, they found that there is a positive relationship between foreign directors and investment efficiency, and argued that foreign directors did not only function as a board of directors, but also functioned appropriately to provide advice to assist in executive decision-making.

In contrast to research that reported increased investment efficiency with improvements in corporate governance and board function, some studies reported the opposite. Park and Bae (2011) predicted that corporate governance variables, such as the audit committee, large shareholders' stakes, and foreign ownership will affect overinvestment and underinvestment. However, only the "audit committee" showed significant results with investment efficiency and did not provide consistent evidence on corporate governance variables.

Choi et al. (2013) identified that while the characteristics of the board were not significant in the overinvestment by corporate establishments, the higher the ratio of outside directors in the corporate establishment with underinvestment, the less efficient the investment itself is.

Kim et al. (2014) also confirmed that the proportion of outside directors who hold multiple directorships is not significantly related to investment efficiency in the KOSPI market. However, it was confirmed that the higher the proportion of outside directors who hold multiple directorships, the more likely that appropriate investments will be made in the KOSDAQ market.

The corporate governance variables used in these studies are expected to alleviate agency problems or reduce information asymmetry. However, their relationship with investment efficiency is mixed depending on the nature of the variables.

C. Hypothesis

Preceding studies conducted abroad on multiple directorships held by directors of companies show mixed results. They are largely divided between the Reputation Hypothesis and the Busyness Hypothesis. Both hypotheses provide sufficient rationale for the

effect of multiple directorships, but in the case of the reputation hypothesis, it is presupposed that the experience and information accumulated by a director with multiple directorships will be sufficiently reflected in the board of directors in order for the experience of the multiple director to be linked to the strengthening of the board function. Therefore, there may be a large difference depending on the business environment and internal conditions of the board of directors.

In the case of the Busyness Hypothesis, there may be different opinions as to whether the combined number of directorships can be managed according to the capabilities of the directors, thereby undermining the functions of the board of directors. However, in the US National Association of Corporate Directors Guidelines and the corporate governance policy of the Council for Institutional Investors, directors should not be active in more than three boards. In practice, it seems that the effort recognizes that there is a clear limit and considers the negative effects caused by multiple directorships.

Dechow et al.(1996) and Klein(2002) argue that when the board of directors is functioning properly, it performs an effective monitoring function to suppress earnings management. On the other hand, Vafeas(1999) also confirm that the higher the activity of the board of directors was found to be related to future operating performance, with lower discretionary accruals, less likely to be accounting fraud. In summing up the findings of these prior study, if the independence and activity of the board of directors are high, it is likely that investment efficiency will be high by examining the investment proposals in an objective and rigorous manner and conducting effective monitoring activities(Yim et al., 2014)

Therefore, in this study, it is expected that the insufficient management insight ability of directors holding multiple directorships will exacerbate agency conflicts because multiple directors do not have enough time to spend on board activities for all the boards they are members of. In addition, it is believed that the failure to play a leading role in strategic decision-making as well as general management decisions will undermine the board function. The

quality of accounting information will deteriorate because the functions of the board are impaired and both control and advisory roles are not performed properly due to the multiple directorships. Eventually, I expect that the role of directors holding multiple directorships will have a negative impact on investment efficiency. The hypothesis is framed as follows.

Hypothesis: The role of directors holding multiple directorships will have a negative impact on investment efficiency.

III. Study design and sample selection

A. Definition of variables

1. *Multiple directorships*

In order to determine whether a director holds multiple directorships, I checked the list of directors for each company. I considered all those whose names appeared more than twice on all the list of directors as directors holding multiple directorships.

The Director with Multiple Directorships Dummy (DMDD) is a representation of the existence of directors with multiple directorships within a firm. Director with Multiple Directorships Ratio (DMDR), the primary interest variable in the model in this study, is a representation of the proportion of directors with multiple directorships within a firm. These variables were measured separately using the number of directorships of total, inside, and outside directors. Prior studies conducted abroad have used the average number of directorships per director that was obtained by dividing the total number of directorships by the total number of directors (Ferris et al., 2003). However, this method is flawed. Although each director is independent, the number arrived at by using this method can be interpreted as sharing the increase in workload due to multiple directorships of the directors. Accordingly, the subsequent study defines the directors as “busy” if they hold more than one additional directorial position. This is because the average additional number of directorships is close

to 2. Previous studies conducted abroad have relied on the existence and the proportion of “busy” directors to the board of directors (Fich and Shivdasani 2006). In this study, the data were collected from all directors to confirm that the average additional number of directorships was 1.36. Accordingly, there were no benefits in defining “busy” as defined in previous studies. Therefore, in this study, to demonstrate and analyze the influence of a director with multiple directorships, the ratio of directors with multiple directorships to the total number directors was used.

2. Investment Efficiency

Tobin (1969) argued that investment opportunities could be measured at marginal Q. This is because the firm's capital investment can be explained through Q values. In other words, the Q value is measured as the ratio of the market value of the firm's asset (the sum of the market value of the shares and liabilities) to its replacement cost (the amount used to purchase the assets)(Park and Noh, 2017), meaning that the larger the Q value, the more successful the capital investment was. Fazzari et al. (1988) explained that in a complete capital market, a firm's investment decision is independent of its financial position because external capital completely replaces internal capital. However, in practice, because both internal and external capital are not completely replaced, investment depends on the financial factors of the firm, such as the availability of internal resources and financing by the issue of shares. They also demonstrated that the current operating cash flows relate to capital investments. Hayashi (1982) argued that by calculating marginal Q through average Q based on the US tax system related to income tax and depreciation costs, an average Q could be used in determining investment decisions instead of marginal Q. Accordingly, a number of studies related to the decision on investment have used the following model.

$$INV_{i,t} = \alpha + \beta_1 Q_{i,t-1} + \beta_2 CF_{i,t} + \epsilon_{i,t} \quad (1)$$

where $INV_{i,t}$ is the investment level for firm i in year t, $Q_{i,t-1}$ is the beginning of year t market value of

assets divided by book value of assets, and $CF_{i,t}$ is a measure of firm-level cash flows.

However, as noted earlier, it is hard to measure the exact Q because there are many factors that should be reflected depending on the characteristics of each asset and the calculation is difficult. Consequently, McNichols and Stubben (2008) expanded the model to compensate for the problem of the measurement error of Q being reflected in the coefficient values. Based on a study by McNichols and Stubben (2008), this study used the following model.

$$INV_{i,t} = \alpha + \beta_0 Q_{i,t-1} + \beta_1 Q_{i,t-1} \times Quartile2_{i,t-1} + \beta_2 Q_{i,t-1} \times Quartile3_{i,t-1} + \beta_3 Q_{i,t-1} \times Quartile4_{i,t-1} + \beta_4 CF_{i,t} + \beta_5 GROWTH_{i,t-1} + \beta_6 INV_{i,t-1} + \epsilon_{i,t} \quad (2)$$

Equation (2) controls for asset growth, past investment, and allows for variations in the relationship between investment and Tobin's Q. Where $GROWTH_{i,t-1}$ equals the natural log of total assets at the end of year t-1 divided by total assets at the end of year t-2. $Q_{i,t-1} \times Quartile2_{i,t-1}$, $Q_{i,t-1} \times Quartile3_{i,t-1}$, $Q_{i,t-1} \times Quartile4_{i,t-1}$ equals $Q_{i,t-1}$ times an indicator variable that equals 1 if $Q_{i,t-1}$ is in the second (third, fourth) quartile of its industry-year distribution. They also allow the intercept, α , to vary across the quartiles of $Q_{i,t-1}$ (McNichols and Stubben, 2008; Yu, 2018). When the time series data is involved, there may be an autocorrelation. To confirm this, I conducted the Durbin-Watson test and got a value of 1.72, indicating that there is no autocorrelation.

In equation (2), the capital investment of “year t” is explained by the inputs in the model, so the residual of the model represents an inefficient investment beyond the appropriate investment. A positive value means a case of overinvestment, and a negative value implies underinvestment. This indicates that investment efficiency is lower, and manifests as a value that is further away from zero, whether it represents overinvestment or under-investment. Therefore, this study measures the inefficiency of investments by using the absolute value of the residual. A larger absolute value of the residual indicates an inefficient investment

beyond the appropriate level of investment. The absolute value of the residual was multiplied by -1 for the convenience of interpretation.

A regression model that uses the estimated investment efficiency measures according to equation (2) as a dependent variable was established.

$$\begin{aligned}
 INV_Ef_{i,t} = & \beta_0 + \beta_1 DMDR(Total, Inside, Outside)_{i,t} \\
 & + \beta_2 SIZE_{i,t} + \beta_3 LEV_{i,t} + \beta_4 Loss_{i,t} + \beta_5 CFO_{i,t} \\
 & + \beta_6 FAR_{i,t} + \beta_7 GRW_{i,t} + \beta_8 Acc_{i,t} + \beta_9 OWN_{i,t} \\
 & + \beta_{10} FOR_{i,t} + \beta_{11} BOARDSIZE_{i,t} + \beta_{12} BIG4_{i,t} \\
 & + \beta_{13} OPINION_{i,t} + Year + industry + \epsilon_{i,t}
 \end{aligned}
 \tag{3}$$

In equation (3), the dependent variable represents investment efficiency and the DMDR(Total, Inside, Outside) represents the proportion of multiple directors within the firm. In this study, the following variables, which have been proven to affect investment efficiency, were used as control variables. We anticipate that larger firms (SIZE) will have reduced volatility and higher investment efficiency. The debt ratio (LEV) and loss for the term (Loss) were added to the model, according to Myers (1977), who found that firms with high debt ratios tend to under-invest because of pressures to reduce debt (Biddle and Hilary, 2006; Biddle et al., 2009). The higher the amount of cash held in a firm, the more likely the firm is to overinvest in the face of agency problems (Jensen, 1986; Blanchard et al., 1996; Opler et al., 1999). Therefore, the model includes operating cash flows (CFO) (Biddle et al., 2009). A firm with a high level of investment in the past is expected to have a high level of investment in the future. Thus, the model included a fixed asset ratio (FAR) for the firm's investment performance (Richardson, 2006). Growth rates (GRW) were added to the model according to Jensen (1986), who found that growth opportunities and cash flows can act as factors that determine overinvestment and underinvestment. Based on the preceding study which argued that the quality of the accruals (Acc) could affect investment, the quality of

the accruals was also included in the model (McNichols and Stubben, 2008; Biddle et al., 2009). In addition, corporate governance variables such as the largest shareholder ratio (OWN), the share of foreign shareholders (FOR), the size of the board of directors (BOARDSIZE), the big 4 auditors (BIG4), and the opinion of auditors (OPINION) were included.

B. Sample Selection

This study analyzed the effects of multiple directorship on investment efficiency of companies listed on the Korean Exchange (KOSPI) from 2011 to 2016. For this purpose, the data required to measure multiple directorship and other necessary data were collected through TS-2000 and DataGuide. For an accurate measurement of some of the data, we referred to each company's business reports as provided by the Data Analysis Retrieval and Transfer (DART) System and excluded companies meeting the following conditions.

- 1) Companies belonging to the financial industry or those whose settlement date is not in late December.
- 2) Companies that cannot obtain multiple directorship data and other materials necessary for empirical analysis.

The reason why companies in the financial sector are excluded from the sample is that the characteristics of the financial statements of the companies in the financial sector may affect the consistency in the measurement of variables. The board and financial data were extracted using TS-2000 and DataGuide. Business reports provided by the DART were utilized as well, but reports with missing or defective data were excluded. Finally, from 2011 to 2016, 2,394 samples were used for analysis. In addition, the major explanatory variables in the study model were adjusted by winsorizing the firms in the upper and lower 1% ranges, respectively, in order to prevent the error of the analysis resulting from being distorted due to the extreme value of the sample.

Table 1 shows the distribution of the sample by

Table 1. Sample distribution by year

Year	2011	2012	2013	2014	2015	2016
N	404	396	416	432	387	359

year. Although there is a slight difference in the number of samples by year, it is determined that there is no major problem in performing the statistical analysis.

Although it has not been listed in the table, the largest number of samples (300 firm-years) belonged to the chemical and chemical products manufacturing industry, and the smallest sample came from the textile products manufacturing industry (38 firm-years).

IV. Results of the empirical analysis

A. Descriptive statistics and correlation analysis

Table 2 shows the descriptive statistics of the variables used to analyze the relationship between multiple directorship and investment efficiency. For the *abs_INV_Ef* used as a dependent variable in this study, the mean was -0.21 and the median was -0.14. The average value of *DMDR_Total*, which indicates the number of multiple directors in comparison with the total number of directors in the company, is 0.12,

indicating that about 12% of the directors in each company also have additional directorships in other companies. The average value of *DMDR_Inside* is 0.15, and the average value of *DMDR_Outside* is 0.09, indicating that inside directors are more likely to have additional directorships than outside directors.

Table 3 shows both the Pearson correlation (bottom) coefficient and the Spearman correlation coefficient (top), as the variables of multiple directorship and investment efficiency are asymmetric. First, the Pearson correlation analysis shows that *DMDR_Total* is a negative correlation with *abs_INV_Ef* at the 5% level. In the case of *DMDR_Inside*, there is a significant negative correlation with *abs_INV_Ef* at the 1% level. However, *DMDR_Outside* has a positive correlation with *abs_INV_Ef* with coefficient value 0.03, but it is not significant. If I interpret the correlation analysis alone, it can be concluded that the multiple directorship of an inside director is related to the investment efficiency and is negative (-), but not the outside director. Therefore, in the following segment, a regression analysis is performed by including variables that affect investment efficiency based on the results of correlation analysis. The results of the Spearman correlation analysis to consider the asymmetry of the

Table 2. Descriptive statistics

stats	mean	sd	p1	p25	p50	p75	p99
<i>abs_INV_Ef</i>	-0.21	0.21	-0.90	-0.30	-0.14	-0.06	-0.00
<i>DMDR_Total</i>	0.12	0.16	0	0	0	0.20	0.6
<i>DMDR_Inside</i>	0.15	0.23	0	0	0	0.33	0.75
<i>DMDR_Outside</i>	0.09	0.17	0	0	0	0	0.67
SIZE	20.14	1.55	17.30	19.06	19.96	20.89	25.09
LEV	0.48	0.20	0.09	0.32	0.49	0.62	0.95
Loss	0.23	0.42	0	0	0	0	1
CFO	0.05	0.06	-1.13	0.02	0.04	0.08	0.22
FAR	0.37	0.17	0.01	0.26	0.37	0.48	0.75
GRW	0.05	0.16	-0.37	-0.02	0.04	0.10	0.78
Acc	-0.03	0.07	-0.36	-0.06	-0.02	0.01	0.15
OWN	0.45	0.16	0.10	0.33	0.45	0.56	0.83
FOR	0.09	0.12	0	0.01	0.04	0.13	0.58
BOARDSIZE	1.81	0.31	1.10	1.61	1.79	2.08	2.56
BIG4	0.70	0.46	0	0	1	1	1
OPINION	1	0.05	1	1	1	1	1

abs_INV_Ef represents investment efficiency, which is obtained by equation (3). *DMDR_Total*, *Inside*, *Outside* is a proportion of directors with multiple directorships within a firm. *SIZE* is the natural log of total asset. *LEV* is debt ratio and *Loss* represents loss for the term. *CFO* is the operating cash flow. *FAR* is fixed asset ratio and *GRW* is the growth rate of assets. *Acc* represents quality of accruals which calculated by dividing net profit minus operating cash flow by total asset. *OWN* is the largest shareholder ratio. *FOR* is the share of foreign shareholders. *BOARDSIZE* is the size of the board of directors and *BIG4* indicates whether or not a firm is audited by the 4 largest audit corporation. *OPINION* is audit result.

Table 3. Correlation

	Abs_ INV_Ef	DMDR (T)	DMDR (I)	DMDR (O)	SIZE	LEV	Loss	CFO	FAR	GRW	Acc	OWN	FOR	BOARD SIZE	BIG4	OPINION
Abs_ INV_Ef	1	-0.05 **	-0.06 ***	0.00	0.04 *	0.06 ***	-0.01	0.02	0.20 ***	-0.06 ***	-0.03	0.06 ***	-0.05 ***	0.04 **	0.00	0.03
DMDR(T)	-0.05 **	1	0.82 ***	0.61 ***	0.35 ***	0.08 ***	-0.07 ***	0.08 ***	0.06 ***	0.06 **	-0.01	0.11 ***	0.15 ***	0.20 ***	0.21 ***	0.03
DMDR(I)	-0.07 ***	0.83 ***	1	0.14 ***	0.24 ***	0.03 *	-0.06 ***	0.05 **	0.05 **	0.05 **	0.02	0.13 ***	0.09 ***	0.16 **	0.13 ***	0.02
DMDR(O)	0.03	0.63 ***	0.13 ***	1	0.32 ***	0.10 ***	-0.04 **	0.08 ***	0.07 ***	0.05 ***	-0.04 *	-0.01	0.19 ***	0.21 ***	0.19 ***	0.01
SIZE	0.02	0.30 ***	0.20 ***	0.29 ***	1	0.20 ***	-0.15 ***	0.11 ***	0.11 ***	0.14 ***	0.03	0.02	0.55 ***	0.39 ***	0.43 ***	0.02
LEV	0.04 **	0.06 ***	0.01	0.09 ***	0.19 ***	1	0.34 ***	-0.22 ***	0.21 ***	-0.06 ***	-0.18 ***	-0.16 ***	-0.19 ***	0.05 **	0.05 **	-0.08 ***
Loss	-0.02	-0.07 ***	-0.07 ***	-0.03 *	-0.15 ***	0.36 ***	1	-0.36 ***	0.06 ***	-0.32 ***	-0.33 ***	-0.18 ***	-0.24 ***	-0.03	-0.09 ***	-0.09 ***
CFO	0.05 **	0.08 ***	0.05 ***	0.07 ***	0.13 ***	-0.20 ***	-0.36 ***	1	0.11 ***	0.04 **	-0.52 ***	0.11 ***	0.25 ***	0.02	0.10 ***	0.05 **
FAR	0.19 ***	0.07 ***	0.05 ***	0.07 **	0.10 ***	0.22 ***	0.06 ***	-0.12 ***	1	-0.08 ***	-0.21 ***	-0.00	-0.07 **	0.11 ***	0.03	0.01
GRW	-0.06 ***	0.04 **	0.03	0.05 **	0.11 ***	-0.04 **	-0.25 ***	-0.01	-0.07 ***	1	0.35 ***	0.07 ***	0.12 ***	0.01	0.03	0.04 *
Acc	-0.01	-0.01	0.01	-0.02	0.06 ***	-0.22 ***	-0.39 ***	-0.42 ***	-0.15 ***	0.36 ***	1	0.07 ***	0.01	0.02	-0.01	0.04 *
OWN	0.07 ***	0.12 ***	0.14 ***	0.01	-0.02	-0.15 ***	-0.17 ***	0.12 ***	0.00	0.06 ***	0.09 ***	1	-0.15 ***	-0.08 ***	0.07 ***	0.08 ***
FOR	-0.01	0.10 ***	0.04 **	0.14 ***	0.48 ***	-0.16 ***	-0.17 ***	0.22 ***	-0.04 **	0.05 **	0.02	-0.14 ***	1	0.28 ***	0.30 ***	0.03 *
BOARD SIZE	0.04 *	0.15 ***	0.12 ***	0.15 ***	0.41 ***	0.06 ***	-0.02	0.01	0.12 ***	-0.00	0.03	-0.07 ***	0.28 ***	1	0.17 ***	-0.01
BIG4	0.00	0.16 ***	0.11 ***	0.16 ***	0.41 ***	0.05 ***	-0.09 ***	0.10 ***	0.02	0.01	-0.00	0.08 ***	0.25 ***	0.17 ***	1	0.03
OPINION	0.04 *	0.02	0.02	0.01	0.03	-0.10 ***	-0.09 ***	0.06 ***	-0.00	0.05 **	0.08 ***	0.09 ***	0.03	-0.01	0.00	1

Note. Variable definition is the same as Table 2. ***, **, * denote statistical significance at the 1, 5, 10% level, respectively.

variables were not different from those derived by the Pearson correlation analysis.

B. Main analysis

In Table 4, before examining the changes in investment efficiency according to the proportion of multiple directorships in the firm, I sought to confirm whether investment efficiency varied depending on the existence of multiple directorships. The results of the regression analysis are as follows.

The analysis indicates that the DMDD_Total and the DMDD_Inside are in a significant negative relationship with investment efficiency. However, DMDD_Outside was not significantly related to investment efficiency. From the results of this analysis, it can be concluded

that multiple directorships undermine the functioning of the board by inducing a lack of management insight capability instead of strengthening the function of the board through network effects. However, there is a problem in that the dummy variable that utilizes the existence of a multiple director is either overestimated or underestimated because it has the same value, regardless of the number of multiple directorships. Therefore, for a more sophisticated analysis, the ratio variable should be used.

Table 5 shows the results of the OLS regression analysis of the relationship between the proportion of multiple directors and investment efficiency. DMDR_Total variable has a significant negative coefficient value. This indicates that the higher the percentage of multiple directors, the lower the investment efficiency. In the case of DMDR_Inside, it is also confirmed that investment

efficiency is significantly related to the negative (-) at the 5% significance level. This implies that multiple directorship weakens the functioning of the board and thus, risks failure of both managerial control and strategic decision-making. However, for the DMDR_Outside variable, although negative coefficient values were present, no significant results were shown. Given the

results of many preceding studies analyzing the impact of outside directors on enhancing the functions of the board of directors, significant results were not obtained even though the combined effect of outside directors on investment efficiency was expected. The reasons for this are as follows.

Table 4. Existence of directors with multiple directorships and investment efficiency - OLS

abs_INV_Ef	(1)	(2)	(3)
DMDD_Total	-0.015* (-1.66)		
DMDD_Inside		-0.017** (-1.92)	
DMDD_Outside			-0.000 (-0.04)
SIZE	0.008** (2.15)	0.008** (2.05)	0.007** (1.75)
LEV	0.046* (1.83)	0.045* (1.81)	0.045* (1.78)
Loss	-0.001 (-0.06)	-0.001 (-0.09)	-0.001 (-0.07)
CFO	0.119 (1.22)	0.116 (1.19)	0.113 (1.16)
FAR	0.136*** (5.11)	0.136*** (5.14)	0.135*** (5.07)
GRW	-0.087*** (-3.09)	-0.088*** (-3.11)	-0.087*** (-3.08)
Acc	0.167** (1.95)	0.166** (1.94)	0.168** (1.95)
OWN	0.102*** (3.89)	0.104*** (3.94)	0.098*** (3.75)
FOR	0.009 (0.21)	0.009 (0.23)	0.013 (0.31)
BOARDSIZE	-0.008 (-0.52)	-0.008 (-0.51)	-0.012 (-0.78)
BIG4	0.003 (0.34)	0.003 (0.28)	0.002 (0.23)
OPINION	0.139* (1.71)	0.137* (1.68)	0.137* (1.68)
Year dummy	YES	YES	YES
Industry dummy	YES	YES	YES
N	2394	2394	2394
Adj R ²	0.13	0.13	0.13
F-Statistics	17.00***	17.04***	16.86***

Note. Variable definition is the same as Table 2. ***, **, * denote statistical significance at the 1, 5, 10% level, respectively.

Table 5. Ratio of director with multiple directorships and investment efficiency - OLS

abs_INV_Ef	(4)	(5)	(6)
DMDR_Total	-0.055** (-2.01)		
DMDR_Inside		-0.042** (-2.25)	
DMDR_Outside			-0.010 (-0.40)
SIZE	0.008** (2.15)	0.008** (2.07)	0.007* (1.84)
LEV	0.045* (1.80)	0.044* (1.75)	0.045* (1.80)
Loss	-0.002 (-0.13)	-0.002 (-0.13)	-0.001 (-0.07)
CFO	0.114 (1.17)	0.113 (1.16)	0.113 (1.17)
FAR	0.138*** (5.20)	0.139*** (5.22)	0.135*** (5.08)
GRW	-0.086*** (-3.05)	-0.087*** (-3.09)	-0.086*** (-3.07)
Acc	0.161* (1.88)	0.164** (1.91)	0.167** (1.94)
OWN	0.104*** (3.96)	0.106*** (4.01)	0.098*** (3.75)
FOR	0.010 (0.25)	0.009 (0.22)	0.013 (0.32)
BOARDSIZE	-0.010 (-0.67)	-0.010 (-0.64)	-0.012 (-0.78)
BIG4	0.003 (0.28)	0.002 (0.25)	0.002 (0.24)
OPINION	0.138* (1.69)	0.137* (1.68)	0.137* (1.68)
Year dummy	YES	YES	YES
Industry dummy	YES	YES	YES
N	2394	2394	2394
Adj R ²	0.13	0.13	0.13
F-Statistics	17.06***	17.11***	16.86***
Durbin-Watson	1.07	1.07	1.07

Note. Variable definition is the same as Table 2. ***, **, * denote statistical significance at the 1, 5, 10% level, respectively.

Studies such as Mace (1971), Nader et al. (1976), and Eisenberg (1976) argued that many outside directors in companies do not actively disclose their positions. This is because they are dominated by inside directors. Some prior studies have reported that the board of directors and other internal corporate governance devices were not successful in protecting the interests of shareholders because of what is called the “Board Culture” (Jensen, 1993). In addition, in the case of Korea, the approval rate for the 30 largest companies and their respective boards of directors is 99 percent or more a year, and opposition to the proposed agenda is very rare. Given the benefits, the above results are expected to reflect the specificity of the domestic directorship environment where the opinions of outside directors are not actively reflected.

Table 5 confirms that the proportion of multiple directorships is significantly related to investment efficiency. However, the Durbin-Watson statistic is only 1.07. In order to solve the autocorrelation problem in the model, we used Prais-Winsten regression, according to Prais and Winsten (1954). The Prais-Winsten estimate is applicable when the error term follows a one-phase autocorrelation($e_t = \rho e_{t-1} + \vartheta_t$), that is, AR(1) process.

The results according to the Prais-Winsten estimation method are shown in Table 6. The results suggest that DMDR_Total and DMDR_Inside are related to investment efficiency. The Durbin-Watson statistic also rises from 1.07 to 1.70 indicating that it solved the autocorrelation problem. However, no significant results were obtained for DMDR_Outside.

Based on the results in Table 6 the same analysis was performed by dividing the investment efficiency variables into over-investment and under-investment to obtain more specific results. These results are presented in Table 7. Studies show that the DMDR_Total and the DMDR_Inside have significant negative(-) relationships with underinvestment. This means that the higher the proportion of multiple directors within a firm, the more the underinvestment is likely. After all, multiple directorship is an obstacle to directors' fulfillment as it impedes effective investment opportunities and prevents them from playing leading roles in management decisions. This, in turn, affects

investment efficiency negatively.

Table 6. Ratio of director with multiple directorships and investment efficiency – Prais and Winsten Regression

abs_INV_Ef	(7)	(8)	(9)
DMDR_Total	-0.062* (-1.80)		
DMDR_Inside		-0.045** (-1.93)	
DMDR_Outside			-0.015 (-0.52)
SIZE	0.009* (1.71)	0.008* (1.63)	0.008 (1.48)
LEV	0.013 (0.36)	0.011 (0.31)	0.012 (0.36)
Loss	0.007 (0.53)	0.007 (0.55)	0.008 (0.56)
CFO	0.126 (1.24)	0.127 (1.25)	0.122 (1.20)
FAR	0.104*** (2.79)	0.105*** (2.83)	0.099*** (2.67)
GRW	-0.071*** (-2.62)	-0.072*** (-2.68)	-0.070*** (-2.57)
Acc	0.121 (1.39)	0.125 (1.44)	0.122 (1.41)
OWN	0.086** (2.46)	0.087** (2.38)	0.080** (2.20)
FOR	0.011 (0.19)	0.010 (0.18)	0.013 (0.23)
BOARDSIZE	-0.017 (-0.89)	-0.016 (-0.88)	-0.018 (-0.95)
BIG4	0.002 (0.13)	0.001 (0.11)	0.002 (0.15)
OPINION	0.160** (2.03)	0.160** (2.03)	0.160** (2.03)
Year dummy	YES	YES	YES
Industry dummy	YES	YES	YES
N	2394	2394	2394
Adj R ²	0.13	0.13	0.13
F-Statistics	16.08***	16.11***	15.93***
Durbin-Watson	1.70	1.70	1.70

Note. Variable definition is the same as Table 2. ***, **, * denote statistical significance at the 1, 5, 10% level, respectively.

Table 7. Ratio of director with multiple directorships and negative investment – Prais and Winsten Regression

	Ne_INV			Po_INV		
	(10)	(11)	(12)	(13)	(14)	(15)
DMDR_Total	-0.103*** (-2.47)			-0.039 (-0.66)		
DMDR_Inside		-0.063** (-2.25)			0.038 (0.94)	
DMDR_Outside			-0.029 (-0.81)			-0.064 (-1.40)
SIZE	0.015*** (2.44)	0.014** (2.27)	0.014** (2.19)	0.005 (0.60)	0.003 (0.37)	0.006 (0.69)
LEV	-0.025 (-0.59)	-0.026 (-0.62)	-0.025 (-0.57)	-0.114** (-2.01)	-0.117** (-2.06)	-0.112** (-1.96)
Loss	0.002 (0.15)	0.004 (0.23)	0.004 (0.24)	-0.026 (-1.10)	-0.025 (-1.08)	-0.026 (-1.11)
CFO	-0.134 (-1.04)	-0.134 (-1.04)	-0.143 (-1.10)	-0.632*** (-3.71)	-0.633*** (-3.71)	-0.638*** (-3.74)
FAR	0.122*** (2.60)	0.123*** (2.62)	0.115*** (2.45)	-0.097 (-1.60)	-0.102* (-1.70)	-0.096 (-1.59)
GRW	0.016 (0.45)	0.017 (0.47)	0.019 (0.52)	0.115*** (2.63)	0.116*** (2.67)	0.118*** (2.69)
Acc	-0.081 (-0.73)	-0.073 (-0.65)	-0.078 (-0.70)	-0.477*** (-3.18)	-0.472*** (-3.15)	-0.483*** (-3.21)
OWN	0.082* (1.77)	0.080* (1.73)	0.069 (1.50)	-0.091 (-1.63)	-0.099* (-1.78)	-0.093* (-1.66)
FOR	-0.030 (-0.41)	-0.026 (-0.36)	-0.024 (-0.33)	-0.057 (-0.67)	-0.052 (-0.62)	-0.053 (-0.62)
BOARDSIZE	-0.051** (-2.16)	-0.051** (-2.16)	-0.053** (-2.27)	-0.022 (-0.73)	-0.023 (-0.77)	-0.022 (-0.73)
BIG4	0.014 (0.81)	0.014 (0.79)	0.014 (0.80)	0.006 (0.28)	0.005 (0.26)	0.007 (0.32)
OPINION	0.251*** (3.27)	0.250*** (3.26)	0.246*** (3.20)	0.141 (1.03)	0.151 (1.11)	0.139 (2.02)
Year dummy	YES	YES	YES	YES	YES	YES
Industry dummy	YES	YES	YES	YES	YES	YES
N	1287	1287	1287	1107	1107	1107
Adj R ²	0.15	0.15	0.15	0.10	0.10	0.10
F-Statistics	11.15***	11.09***	10.86***	6.16***	6.19***	6.23***

Note. Variable definition is the same as Table 2. ***, **, * denote statistical significance at the 1, 5, 10% level, respectively.

V. Conclusions

This study conducted a regression analysis on the change in investment efficiency according to the

proportion of directors with multiple directorships to verify whether the multiple directors threatened the functions of the board. It was found that the existence and proportion of multiple directors belonging to the total and inside categories were found to have a

significant negative (-) relationship with investment efficiency. However, there were no significant results for outside directors. Thus, the ratio of multiple directors is negatively related to investment efficiency because they either do not have the information necessary for investment or are not actively involved in the decision-making process.

This study suggests the possibility that multiple directorship held by directors may be used as an indicator of the functional efficiency of the board. To do so, a more sophisticated analysis has been attempted as shown, by expanding or modifying the scope and model of the previous study using the multiple directorship variables. Currently, the “Assessment of the Governance” of the Korea Corporate Governance Service includes the composition and operation, evaluation, and compensation of the board of directors, including the status of outside directors. However, given the mixed results from prior studies on the effects of these variables on firm value, these factors are considered by users of accounting information as ineffective means for the evaluation of governance.

Therefore, it is expected that users of accounting information will be more intuitive in judging the soundness of the governance structure if it becomes mandatory to include information on multiple directorships held by directors within the firm. This study shows that the inflow of positive effects from a reputation hypothesis is difficult to expect, and as the busyness hypothesis suggests, since the failure of the directors to spend sufficient time on board activities would not have a positive effect on investment efficiency, the information on multiple directorships can be used as a meaningful indicator for future improvements in corporate governance.

Notwithstanding the above implications, this study has a few limitations. Most previous studies conducted abroad have measured the degree of “busy-ness” based on the number of multiple directorships. However, in this study, I did not conduct a sophisticated analysis using the number of directorships because of difficulties encountered in applying the appropriate method. For this reason, this paper's construction of the main variable does not distinguish between effectiveness of busy

directors. Accordingly, this study does not present any specific criteria such as the NACD guidelines or CII's general governance policy requirements. However, specific criteria can be and were indeed presented in studies conducted abroad because the average of the number of additional directorships is at least two, so a person with two or more additional directorships can be defined as a “busy” director. However, the data used in this study showed that the average number of additional directorships is 1.36, which made it useless to classify them as “busy” and “multiple” directors.

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