Board of Directors' Share Ownership and Financial Reporting Quality

Master Thesis
Erasmus School of Economics, Erasmus University Rotterdam

Abstract
This thesis investigates the relation of the alignment of interests between board of directors and shareholders and the quality of financial reporting. More specifically, this thesis examines the association between board of directors' share ownership and the financial reporting quality. The main purpose of directors' share ownership is to align directors' interests and shareholders' interests, and so the board of directors could act in the best interest of the shareholders. Directors' share ownership could mitigate agency cost problem and provide incentives for directors to prevent earnings management or other management opportunistic behaviours. This thesis measures financial reporting quality by using discretionary accruals, earnings persistence, accounting restatements, internal control weaknesses. The independent variable directors' share ownership is generated by by using a natural logarithm of the dollar value of common stock owned by the median directors. This thesis finds that directors' share ownership has a statistically significant negative relation with discretionary accruals. Furthermore, directors' share ownership has a statistically significant positive relation with earnings persistence. On the contrary, this thesis finds that directors' share ownership has no statistically significant relation with accounting restatements and internal control weaknesses. Accordingly, this thesis concludes that directors' share ownership could improve financial reporting quality.

Keywords:
Directors' share ownership, financial reporting quality, discretionary accruals, earnings persistence, accounting restatements, internal control weaknesses.

MSc Accounting and Finance
Name   : Yosephine Riant Handayani
Student number   : 443861
Supervisor   : Dr. Alex Klein
Second reader   : Dr. Ying Gan
Date   : ....

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-Trust in the Lord with all your heart and lean not on your own understanding; in all your ways submit to him, and he will make your paths straight.- Proverbs 3:5-6

Rotterdam, ...
Yosephine Riant Handayani Pintarrie

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Chapter 1. Introduction

The purpose of this thesis is to examine the relation of the alignment of interests between board of directors and shareholders and the quality of financial reporting. More specifically, this thesis will investigate the association between board of directors' share ownership and the financial reporting quality and attempt to answer the following research question:

"Does board of directors' share ownership affect the financial reporting quality?"

Providing an answer to this research question is important because prior studies show that board of directors should own sufficient shares in their firms. The main purpose of directors' share ownership is to align directors' interests and shareholders' interests, and so the board of directors could act in the best interest of the shareholders. Conflict of interests between board of directors and shareholders could diminish board of directors' monitoring function to constrain management's aggressive financial reporting practices (McConvill & Bagaric, 2004). On the contrary, after accounting scandal of Enron, Worldcom, and Typo, U.S. government issued SOX Act 2002 to reform the accounting practice in public firms and to protect the investor's interest. It has great impact on the roles of board of directors in the firms, especially the independence of the board of directors. Regarding the independence of the board of directors, prior studies show that directors' share ownership could diminish the independence of the directors. Consequently, directors are more likely to agree with opportunistic behaviour of the management (Magilke, Mayhew, & Pike, 2009).

The association between directors' share ownership and the financial reporting quality is not clear because this topic is still under-researched and the results are inconclusive. Most of prior studies investigate the relation between directors' share ownership and firms performance. However, there is not many studies that investigate the impact of directors' share ownership on the financial reporting quality. Thus, this thesis aims to provide insight into this debate, whether directors need to be shareholders in the firm, by giving sufficient empirical evidence on the benefits of director's share ownership, especially its association with improvement of financial reporting quality.

This thesis proposes that larger director's share ownership will decrease discretionary accruals, accounting restatements, and internal control weaknesses, and also increase earnings persistence. Consistent with the prediction of the first hypothesis, this thesis finds that directors' share ownership reduces discretionary accruals. Furthermore, consistent with the prediction of

the second hypothesis, this thesis finds that directors' share ownership improves earnings persistence. On the contrary, this thesis findings does not support the predictions of the third and fourth hypotheses. Regarding the relation between directors' share ownership and accounting restatements, this thesis finds that directors' share ownership is not statistically significant related to accounting restatements. Moreover, this thesis finds that there is no statistically significant relation between directors' share ownership and internal control weaknesses. However, there is a limitation in the empirical analysis for third and fourth hypotheses, that is potential selection bias. Following the findings of first and second hypotheses, this thesis suggests that directors' share ownership could bring positive impact on the financial reporting quality.

The findings of this thesis contribute to studies about the association between directors' share ownership and financial reporting quality. Prior studies that investigate the association between directors' share ownership and financial reporting quality focus on using accruals quality as a measurement of financial reporting quality (i.e. Pergola & Joseph, 2011; Athanasakou & Olsson, 2015). However, previous studies do not consider other financial reporting quality measures in investigating the impact of directors' share ownership on financial reporting quality. This thesis aims to contribute by using discretionary accruals, earnings persistence, accounting restatements, internal control weaknesses as variables to measure financial reporting quality and investigates its relation with directors' share ownership.

The results of this thesis should be relevant for shareholders who need information about the effective way to align the interests of shareholders and board of directors. Hence, directors could be motivated to improve the financial reporting quality of their firms, because the quality of financial reporting will affect shareholders' decision making. This thesis results also should be relevant for regulators who aim to create regulation to improve the responsibilities of board of directors in the firms.

The relevant data is available from Wharton Research Data Services system. Firm year-level accounting data to calculate discretionary accruals, earning persistence, and book value per share variables are available in Compustat Fundamentals Annual database. Directors and corporate governance data are available in Institutional Shareholder Services (formerly RiskMetrics). Restatement data are available in Audit Analytics Non Reliance Restatement. Internal control weakness data are available in Audit Analytics SOX 404 Internal Controls. The sample observation is North America public firms from year 2002 to 2015.

The rest of this thesis is organized as follows. Chapter 2 presents the literature review, defines the important concepts used in this thesis, and also the hypotheses development.

Chapter 3 explains the research design and gives a description of the sample set that is used in this thesis. Chapter 4 reports the empirical results from the data analyses. Finally, chapter 5 concludes the findings and provides the implications and limitations of this thesis, including recommendations for future research.

Chapter 2. Literature Review & Hypothesis Development

This chapter discusses relevant studies concerning board of directors' share ownership and financial reporting quality. First, this thesis will provide introduction about board of directors' share ownership, and discuss the pros and cons of directors' share ownership. This discussion will provide clear explanation why directors should own shares in their firms and why should not? Second, this thesis will provide explanation and studies about financial reporting quality. The last part of this chapter will provide the hypotheses development by using all the relevant findings from prior studies.

2.1. Board of Directors' Share Ownership

   2.1.1. Directors' Share Ownership Guidelines
       ACCA Global (2016) explains that board of directors are appointed by shareholders to act on behalf of shareholders to run the day to day affairs of the business. Therefore, board of directors have to act in the best interest of the shareholders (ACCA Global, 2016). Regarding directors' share ownership, O'Toole and Outlaw (2016) publish a report investigating trends in directors' share ownership in Fortune 100 companies for fiscal year 2012, 2013, 2014. This report shows that nearly 90% firms in Fortune 100 companies disclose their directors' share ownership guidelines and policies. Accordingly, McConvill and Bagaric (2004) suggest that directors' share ownership is an effective way to align the interests of directors and shareholders and to mitigate the agency cost problem. The firms also establish accumulation periods of ownership, ranged from one to ten years, in the ownership guidelines. 84.3% firms require directors to fulfil their share ownership requirement within five years after they become directors in the firms.

       Share ownership guidelines normally regulate the minimum and maximum directors' shareholdings, specifically directors must hold share that is equal in value to a multiple of their annual retainer (annual director's compensation), a fixed dollar value of shares or a fixed number of shares. In general, directors' share ownership targets differ in all firms, but these targets have increased for the past three years. Particularly, the median value of directors' share ownership overall for Fortune 100 companies increased from $400,000 in 2012 to $500,000 in 2014, which indicates that firms require a greater interests and financial alignment between directors and shareholders (O'Toole & Outlaw, 2016).

This thesis is related to literature on the advantages and disadvantages of directors' share ownership. Previous studies investigated the impact of directors' share ownership on various relevant subjects, such as the impact of directors' share ownership on firm performance, its relation on financial reporting quality, and its effect on independence of the board. The results of these studies are mixed and inconclusive (i.e. Farrer & Ramsay, 1998; McConvill & Bagaric, 2004; Magilke, Mayhem, & Pike, 2009; Pergola & Joseph, 2011; Bhagat & Bolton, 2013; Athanasakou & Olsson, 2015).

2.1.2. Why directors should be the shareholders in their firms?

There are two main theories why directors should have share ownership in their firms. The first theory is agency cost reduction theory. Jensen and Meckling (1976) explain that the agency cost could happen when there is a separation between ownership (shareholders as principals) and control (directors as agents). The agents should act on behalf of the principals' interests and the agents have authority to run the firms. However, in most cases the principals and the agents have different interests and both parties are utility maximizers. There is a possibility that the agents will not always act in the best interest of the principals. Hence, it leads to the agency cost problem. Jensen and Meckling (1976) propose that agents should have equity ownership in their firms to maximize firms value and to mitigate agency cost problem. Accordingly, agency cost reduction theory explains that directors' share ownership can resolve agency cost problem (Farrer & Ramsay, 1998).

To mitigate agency cost problem, it is necessary to align the interests of shareholders and directors. Shareholders provide certain incentives for directors, and so directors will not make decisions that would harm shareholders or to ensure that directors will receive right compensation if they act on the best interest of shareholders. McConvill and Bagaric (2004) propose that directors' interests should align with shareholder's interests to solve agency cost problem and to have better corporate management. It means directors need to have sufficient ownership and they become the shareholders in the firms. Consequently, directors are less likely to behave opportunistically because they are the owners of the firms (McConvill & Bagaric, 2004).

Regarding the sufficient level of directors' share ownership, study by Farrer and Ramsay (1998) shows that an increasing of directors' share ownership up to 5% will increase shareholders' return. However, when directors own share ownership more than

5%, shareholders' return decreases to lower level. Another study by McConnell and Servaes (1990) finds a strong positive relation between directors' share ownership and firms performance at a low levels (up to 5%) of directors' share ownership. However, at high levels of directors' share ownership (above 5%), the relation between directors' share ownership and firms performance is negative. Accordingly, these studies indicate that the optimal percentage for directors' share ownership is up to 5% (McConnell & Servaes, 1990; Farrer & Ramsay, 1998).

The second theory is incentive theory. Incentive theory explains that share ownership provide sufficient incentives for directors to make sure that the firms perform well. When directors have share ownership in their firms, their interests and shareholders' interests will be aligned and their personal wealth is related to the firm wealth. Therefore, they have incentives to ensure that the firms perform well (Farrer & Ramsay, 1998). When directors act as shareholders, directors are more likely to protect shareholders' interests from management opportunistic behaviour. Stronger shareholders protection will limit management personal incentives to manage accounting earnings and cover up the real firms performance. Accordingly, it implies better firms performance and higher financial reporting quality (Leuz, Nanda, & Wysocki, 2003).

Prior studies show positive impact of directors' share ownership and support the explanation of incentive theory and agency cost reduction theory (i.e. McConvill & Bagaric, 2004; Bhagat & Thokes, 2011; Bhagat & Bolton, 2013; Bos, Pendleton, & Toms, 2013; Athanasakou & Olsson, 2015). Several studies investigate the relation between directors' share ownership and firms performance show that there is a positive relation between directors' share ownership and firms performance. Larger shares owned by directors lead to better firms performance (Bhagat & Thokes, 2011; Bhagat & Bolton, 2013). However, other studies, researching the impact of directors' share ownership on the firm performance, find curvilinear relation between directors' share ownership and firms performance. It implies that directors' share ownership could improve the firm performance only at the low level of share ownership, but then firm performance declines as the directors' share ownership increase to higher level of ownership (McConnell & Servaes, 1990; Farrer & Ramsay, 1998).

Previous studies investigate the association between directors' share ownership and financial reporting quality as well. These studies measure financial reporting quality by using accruals models. They found positive relation between directors' share ownership and accruals quality. Directors' share ownership could mitigate management

discretionary accruals, and it implies that financial reporting quality improves with sufficient share ownership by directors (Bos, Pendleton, & Toms, 2013; Athanasakou & Olsson, 2015).

2.1.3. Why directors should not be the shareholders in their firms?

Aside from positive impact of directors' share ownership above, previous studies also show the negative impact of directors' share ownership. Directors should not have share ownership in their firms because the share ownership will undermine directors' independence. Studies prove that directors' share ownership improves the firm performance. However, this performance enhancement can be influenced by short term incentives that arise from directors' share ownership. Share ownership could provide directors with personal incentives to agree with management opportunistic behaviour, and thus it can boost stock price and short term performance (Rose, Mazza, Norman, & Rose, 2013).

McConvill and Bagaric (2004) explain that in the corporate governance context, the concept of directors' independence mainly means that there is no relationship between directors and firms management which could influence directors' independent judgment and decision for the firms. However, the main purpose of directors' share ownership is to align the interests of directors and shareholders. Directors are appointed by the shareholders to act on behalf of the shareholders to run the business activities in their firms (ACCA Global, 2016). Accordingly, directors have to represent the shareholders' interests, and thus sufficient share ownership by directors is necessary (McConvill & Bagaric, 2004). Referring to explanation in the previous section, studies show that the optimal percentage for directors' share ownership is up to 5%, because directors' share ownership more than 5% bring more negative impact than positive impact to the firms performance (McConnell & Servaes, 1990; Farrer & Ramsay, 1998).

In their study, Farrer and Ramsay (1998) find that firm performance decreases on a certain level of share ownership. They claim that decreasing firm performance might be caused by the negative impact of directors' share ownership. Directors who own shares in their firms would be more risk averse and conservative in running their firms, and so it will depress the shareholders return. Other than that, when directors hold very high percentage of shares in their firms, they have bigger voting power and bigger ability to control the firms. Consequently, it leads to lower monitoring ability by other shareholders or stock market. It also makes directors more entrenched even if the firms perform poorly.

In this case, the directors and shareholders' interests may not be aligned if the share ownership is too high. In this study, share ownership diminishes directors' independence. Farrer and Ramsay (1998) suggest that the main purpose of directors' share ownership can be achieved if directors have relatively moderate share ownership.

Prior studies also investigate the impact of directors' share ownership on the objectivity of directors (i.e. Magilke, Mayhem, & Pike, 2009; Pergola & Joseph, 2011). Study by Magilke, Mayhem, and Pike (2009) finds that directors' share ownership diminishes directors' objectivity. Furthermore, directors who own shares in their firms prefer biased financial reporting, either overly aggressive reporting or overly conservative reporting. Pergola and Joseph (2011) examine the relation between directors' share ownership and corporate governance on financial reporting quality. They found negative relation between directors' share ownership and accruals quality. The results show that directors have strong personal incentives to fulfil their own interests without fear of sanction or removal when they have share ownership in their firms, either small percentage or high percentage of share ownership. Consequently, directors are more likely to support earnings management and it causes lower earnings quality. They suggest that firms need to have strong corporate governance mechanism to counter the negative impact of directors' share ownership.

2.2. Financial Reporting Quality

The main objective of financial reporting is to provide information that is useful to present and potential investors, creditors, and others in making investment, credit, and similar resource allocation decisions (Financial Accounting Standards Board [FASB], 2006). Therefore, it is very important for the firms to produce high quality financial reporting. Financial reporting quality can be assessed when it meets the two fundamental qualitative characteristics (i.e. relevance and faithful representation) and four enhancing qualitative characteristics (i.e. comparability, verifiability, timeliness and understandability) (International Accounting Standards Board [IASB], 2015).

Healy and Wahlen (1999) assert that high quality financial reporting is financial reporting that is able to deliver the real condition and private information of the firms. Accordingly, accounting standards setters and regulators need to allow firms managers to exercise their judgment in financial reporting. Study by Ball and Brown (1968) shows that managers have better private information and knowledge of real condition and performance of the firms, and if they can convey it to the stakeholders, the firms value will be higher or lower, depending on

the information that the managers hold. However, managers could use this judgment freedom to do opportunistic behaviour or earnings management. Consequently, the financial reporting quality is low, not reliable, and do not reflect the real condition of the firms (Healy & Wahlen, 1999).

Many studies try to examine the financial reporting quality because of its importance (i.e. Dechow, 1994; Dechow & Dichev, 2002; Callen, Livnat, & Segal, 2006; Doyle, Ge, & McVay, 2007; Dechow, Ge, & Schrand, 2010). These studies use different proxies to measure financial reporting quality because it is quite difficult to establish the most appropriate proxy. These proxies focus on different underlying construct, different decision usefulness, and different circumstances. However, these financial reporting quality measures are contingent and influenced by firm's fundamental performance (Dechow, Ge, & Schrand, 2010). Following Dechow, Ge, and Schrand (2010), this thesis investigates the research question by using four proxies of financial reporting quality, specifically accruals model (Dechow, Sloan, & Sweeney, 1995), earnings persistence (Dechow & Dichev, 2002), accounting restatement (Callen, Livnat, & Segal, 2006), and internal control weaknesses (Doyle, Ge, & McVay, 2007).

2.2.1. Accrual Models

Mostly, prior studies measure financial reporting quality by using accrual models (i.e. Dechow, 1994; Dechow & Dichev, 2002; Larcker, Richardson, & Tuna, 2007; Chen, Lin, & Lin, 2008; Dechow, Ge, & Schrand, 2010; Athanasakou & Olsson, 2015). Accrual models could be a better measure of financial reporting quality because it has ability to reduce timing and matching problems of cash flows recognition in earnings (Dechow, 1994). Accrual models measure financial reporting quality by examining the earnings management. Earnings management occurs when managers use judgement in financial reporting and in structuring transactions to alter financial reports to either mislead some stakeholders about the underlying economic performance of the company or to influence contractual outcomes that depend on reported accounting numbers. (Healy & Wahlen, 1999, p.368).

Schipper and Vincent (2003) explain that financial reporting quality is measured by accrual models by using three ways, that is change in total accruals, direct estimation of abnormal (discretionary) accruals using accounting fundamentals, and direct estimation of accruals to cash relations. First, changes in total accruals show earnings management if some portion of accruals are non-manipulated and constant over time.

Second, direct estimation of abnormal (discretionary) accruals uses accounting fundamentals measures earning management by regressing total accruals on accounting fundamentals. The residuals of this regression are considered as earnings management. Dechow, Sloan, and Sweeney (1995) claim that accounting fundamentals, specifically revenues after accounts receivables, and property, plant equipment, are determinant of nondiscretionary accruals. Study by Ayers, Jiang, and Yeung (2006) indicates that managers usually manage their earnings by using discretionary accruals. Furthermore, they show that there is a positive relation between discretionary accruals and earnings management in order to beat the earnings benchmark. Dechow, Sloan, and Sweeney (1995) in their study explain that direct estimation of abnormal (discretionary) accruals using accounting fundamentals model proposes that high discretionary accruals indicate low accruals quality and low earnings quality. Hence, low earnings quality implies low financial reporting quality.

Third, Schipper and Vincent (2003) explain that in direct estimation of accruals to cash relations model earnings management is the residuals of the regression of changes in working capital on previous period, current period, and future period of cash flows. However, direct estimation of accruals to cash relations model does not consider the difference between nondiscretionary accruals and discretionary accruals (Dechow & Dichev, 2002)

2.2.2. Earnings Persistence

Previous studies by Dechow and Dichev (2002), Schipper and Vincent (2003), Dechow, Ge, and Schrand (2010) also use earnings persistence as a proxy of financial reporting quality. Earnings persistence means that earnings are sustainaible, more permanent, and less transitory (Schipper & Vincent, 2003). Nichols and Wahlen (2004), and Frankel and Litov (2009) assume that earnings information is valuable when earnings are permanent and sustainable (earnings persistence) because current earnings numbers provide expected future earnings and can serve as a substitute for cash flow prediction by shareholders. Dechow and Dichev (2002) investigate the relation between earnings persistence and accruals quality. They measure earnings persistence by using the coefficient value in the regression of future earnings on current earnings, and then examine the relation between earnings persistence coefficient and the accruals quality. They find a strong positive relation between accruals quality and earnings persistence. Hence, earnings persistence also can be a good proxy for financial reporting quality. In

earning persistence model, high earnings persistence implies high financial reporting quality (Dechow & Dichev, 2002; Schipper & Vincent, 2003).

2.2.3. Accounting Restatements

Another measurement that is used by prior studies to measure financial reporting quality is accounting restatements (i.e. Callen, Livnat, & Segal, 2006; Larcker, Richardson, & Tuna, 2007; Dechow, Ge, & Schrand, 2010). Callen, Livnat, and Segal (2006) explain that there are three reasons why shareholders assume accounting restatements as negative signals. First, it indicates a possibility that the financial statements do not report in accordance with accounting principles or that there might be accounting errors in the financial statements. Second, it could signify earnings management or managers' opportunistic behaviour to increase reported earnings and short term profits. Third, accounting restatements also can be a good signal that the firms have significant managerial problems. Thus, accounting restatements also imply lower financial reporting quality (Dechow, Ge, & Schrand, 2010). Study by Hirschey, Smith, and Wilson (2015) examines the relation between corporate governance, accounting restatements and financial reporting credibility. This study finds that firms with higher governance quality will discover accounting irregularities and accounting restatements more timely. Hirschey, Smith, and Wilson (2015) assert shareholders believe that financial reporting is more credible and valuable in the firms with higher governance quality because high quality corporate governance practice could mitigate accounting restatements. Accordingly, these results indicate that accounting restatements can be a good proxy for financial reporting quality (Larcker, Richardson, & Tuna, 2007; Hirschey, Smith, & Wilson, 2015).

2.2.4. Internal Control Weaknesses

Prior studies begin to exercise internal control weaknesses as a measure of financial reporting quality after the publication of SOX Act 2002. (i.e. Doyle, Ge, & McVay, 2007; Ashbaugh-Skaife, Collins, Kinney, & LaFond, 2008; Dechow, Ge, & Schrand, 2010; Costello & Moerman, 2011). SOX Act 2002 requires firms managers to compile management's assessment of the effectiveness of the internal control structures and procedures in the annual report. Moreover, public accountant must verify this assessment report (Dechow, Ge, & Schrand, 2010). Studies by Doyle, Ge, and McVay (2007) and Ashbaugh-Skaife et al. (2008) try to investigate the relation between internal control

weaknesses and financial reporting quality measures, such as accruals quality, accounting restatements, and earning persistence. They find that firms with stronger internal control weaknesses have lower accruals quality, higher discretionary accruals, higher accounting restatement, and lower earnings persistence. These results imply that internal control weaknesses also can be a reliable proxy of financial reporting quality (Doyle, Ge, & McVay, 2007; Ashbaugh-Skaife et al., 2008).

2.3. Hypothesis Development

The proponents of directors' share ownership mechanism argue that directors' share ownership is an effective mechanism to align the interests of directors and shareholders (McConvill & Bagaric, 2004; Bhagat & Thokes, 2011; Bhagat & Bolton, 2013; Bos, Pendleton, & Toms, 2013; Athanasakou & Olsson, 2015). This mechanism will provide better incentives for directors to act in the best interest of the shareholders, especially to improve the firms performance and to monitor managers' performance. Directors are more likely to protect shareholders' interests and disagree with management opportunistic behaviour, such as earnings management. Furthermore, when directors own shares in their firms, they become the shareholders and they will act as the owners of their firms. Accordingly, directors' share ownership could mitigate agency cost problem that arises from separation between ownership and control (Farrer & Ramsay, 1998; McConvill & Bagaric, 2004).

In contrast, the opponents of directors' share ownership mechanism argue that directors' share ownership could diminish the independence of the directors because it means that directors' interests are also related to the firm interests (Magilke, Mayhem, & Pike, 2009; Pergola & Joseph, 2011; Rose, et al., 2013). Directors will have personal incentives to boost stock price and short term performance of their firms. In this case, directors are more likely to support management opportunistic behaviour. In practice, many firms have stock ownership guidelines and require their directors to hold specific share ownership. Therefore, it shows that the firms and shareholders believe that directors' share ownership will bring more positive impact than negative impact to the firms.

Prior studies by Bos, Pendleton, and Toms (2013) and Athanasakou and Olsson (2015) indicate that directors' share ownership have positive impact on the quality of financial reporting because it could motivate directors to prevent earnings management practices. On the contrary, studies by Magilke, Mayhem, and Pike (2009) and Pergola and Joseph (2011) signify that directors' share ownership mechanism aggravates financial reporting quality because it diminishes directors' independence. Therefore, whether or not directors' share ownership will

improve the financial reporting quality is an empirical question. According to prior studies, this thesis infers that directors' share ownership will improve financial reporting quality (Bos, Pendleton, & Toms, 2013; Athanasakou & Olsson, 2015).

Following Dechow, Ge, and Schrand (2010), this thesis will measure financial reporting quality by using discretionary accruals, earnings persistence, accounting restatements, and internal control weaknesses. Therefore, the hypotheses are stated as follows:

Ha1: There is a negative relation between directors' share ownership and discretionary accruals.

Ha2: There is a positive relation between directors' share ownership and earnings persistence.

Ha3: There is a negative relation between directors' share ownership and accounting restatements.

Ha4: There is a negative relation between directors' share ownership and internal control weaknesses.

Chapter 3. Research Design

This chapter discusses the research design that is used in this thesis to investigate the hypotheses. Firstly, this part will present the predictive validity framework of this thesis. Then, this part will explain how to measure directors' share ownership as an independent variable and financial reporting quality as a dependent variable. Hereafter, the control variables that are used in the regression models will be considered. This part will provide a clarification of the necessity to add these variables to the regression models. Next, the sample details will be discussed. Finally, the regression models that will be tested will be presented. The link between these models and the hypotheses will be explained.

3.1. The Predictive Validity Framework

The predictive validity framework (Libby Boxes) is presented in the following figure 1 to show how the conceptual relation is examined in this thesis will be operationalized in the research design.
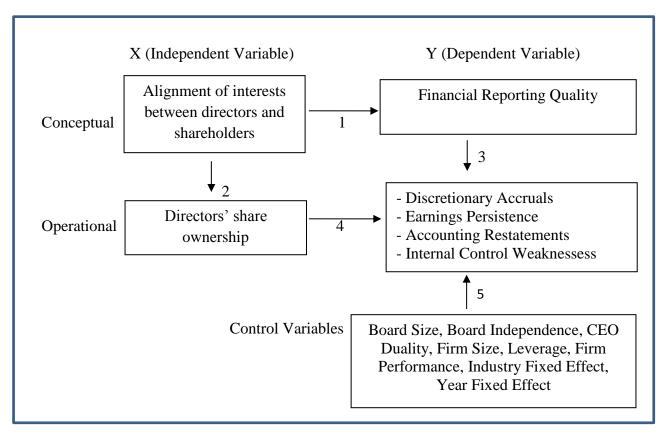
Figure 1: Predictive Validity Framework

3.2. Measuring Independent Variable

To measure the alignment of interests between directors and shareholders, this thesis uses variable directors' share ownership (Dir_Own) (McConvill & Bagaric, 2004). Following study by Bhagat and Bolton (2013), this thesis measures directors' share ownership by using a natural logarithm of the dollar value of common stock owned by the median directors. Bhagat and Bolton (2013) focus on the dollar value of ownership instead of the percentage of ownership because the dollar value of ownership serves as a direct and better measure of directors incentives. Study by Milanovic (1999) proposes that the median voters are the ones who will strongly influence the voting decision. Consistent with Milanovic (1999), this thesis also focus on the median directors because the median directors are assumed to have capability to influence the board of directors' decision. Particularly, the directors' share ownership is calculated by multiplying the book value per share and common stock owned by the median directors, and then generating natural logarithm of directors' share ownership (Bhagat & Bolton, 2013).

3.3. Measuring Dependent Variable

The dependent variable in this thesis is financial reporting quality. Financial reporting quality is measured by four proxies, specifically discretionary accruals, earnings persistence, accounting restatements, and internal control weaknesses.

3.3.1. Discretionary Accruals

Following study by Chen, Lin, and Lin (2008), this thesis uses a cross-sectional version of Modified Jones Model by Dechow et al. (1995) to measure discretionary accruals. In this Modified Jones Model, Chen et al. (2008) control the firms' prior year performance, because firms performance also influences earnings management behaviour. Accordingly, this thesis computes discretionary accruals as follows:

$$DiscAccr_t = TA_t - [\phi_1(\frac{1}{Assets_{t-1}}) + \phi_2(\Delta\ Revenue_t - \Delta\ AR_t) + \phi_3 PPE_t + \phi_4 ROA_{t-1}]$$

(1)

where:

$DiscAccr_t$ = discretionary accruals

TA_t = total accruals (earnings before extraordinary items minus net cash flow from operations)

$\Delta\,Revenue_t$ = change in net revenue

$\Delta\,AR_t$ = change in net accounts receivable

PPE_t = net property, plant, equipment

ROA_{t-1} = the rate of prior year return on total assets (net income divided by total assets)

TA_t, $\Delta\,Revenue_t$, $\Delta\,AR_t$, PPE_t are scaled by lagged total assets ($Assets_{t-1}$)

In this model, the value of discretionary accruals will be zero when the firms do not engage in earnings management.

3.3.2. Earnings Persistence

Following study by Dechow and Dichev (2002), this thesis measures earnings persistence is calculated by regressing future earnings on current earnings for each portfolio. The coefficient value of this regression is called earnings persistence. Furthermore, this is the regression model of earnings persistence:

$$Earn_{t+1} = \alpha + \delta_1 Earn_t + \gamma_t \qquad (2)$$

Where:

$Earn_{t+1}$ = future earnings

$Earn_t$ = current earnings

δ_1 = the coefficient value of earnings persistence

Following Sivaramakrishnan and Yu (2008), this thesis estimates an equation (2) by using rolling ten-year windows regression for each firm-year.

3.3.3. Accounting Restatements

Following Larcker et al. (2007), this thesis uses dummy variable accounting restatements (AccRestate) equal to 1 if firms report an accounting restatement related to the fiscal year (or a subsequent fiscal period), and 0 otherwise. This thesis includes accounting rule (GAAP/FASB) application failure restatements, or financial fraud, irregularities and misrepresentations restatements, or material accounting and clerical application error restatements as accounting restatements.

3.3.4. Internal Control Weaknesses

Following Doyle et al. (2007), this thesis measures internal control weaknesses by using dummy variable material weaknesses (MtrWeak) equal to 1 if firms report material weaknesses of internal control, and 0 otherwise.

3.4. Control Variables

3.4.1. Board Size, Board Independence, CEO Duality

This thesis controls for corporate governance variables because prior studies show that corporate governance is related to the financial reporting quality (e.g. Ching, Firth, & Rui, 2006; Larcker et al., 2007; Athanasakou & Olsson, 2015). This thesis considers that board size, board independence, and CEO duality, as corporate governance proxies, could affect the financial reporting quality. According to study by Yermack (1996), small size board of directors are more effective for the firms. This study finds a negative relation between the size of the board of directors and firms market value. The size of the boards of directors is also negatively related to the firms' operating efficiency and profitability. Smaller size of the board of directors could deliver faster decision making, thus smaller boards are more likely to remove the firms' executives in the periods of poor performance. Furthermore, this study also shows that shareholders prefer smaller size of the board of directors. Ching et al. (2006) find that there is a positive relation between board size and earnings management. It implies that financial reporting quality is lower when the firms have bigger board size. However, study by Larcker et al. (2007) finds that board size is positively related to financial reporting quality. Accordingly, board size is related to financial reporting quality, even though previous studies show ambiguous results.

Regarding board independence, Beasley (1996) finds that firms with higher percentages of outside directors have lower earnings management and accounting fraud than firms with lower percentage of outside directors. Higher percentages of independent directors could mitigate management opportunistic behaviour and improve the quality of financial reporting. Study by Klein (2002) finds that higher percentages of outside directors are positively related to accruals quality. This study suggests that the more independent of the board of directors from the firm's management or CEOs, the board of directors could have a better monitoring function and could prevent earnings management. Therefore, board independence could improve the quality of financial reporting.

Consistent with the previous studies, this thesis considers that CEO duality could affect financial reporting quality. Studies find that earnings management and fraudulent financial reporting are more likely occurring in the firms with CEO duality. CEO, who becomes chairman of the boards, has greater influence and control in the boards' decision making, particularly decision that is related to earnings, firms performance, and financial reporting. It provides opportunity for the CEOs to fulfil their personal interests and to exercise earnings management (Davidson III, Jiraporn, Kim & Nemec, 2004; O'Connor Jr., Priem, Coombs, & Gilley, 2006). Therefore, CEO duality could diminish financial reporting quality.

3.4.2. Firm Size, Leverage, Firm Performance, Industry Fixed Effect, Year Fixed Effect

Previous studies show that firms characteristics, specifically firm size, leverage, firm performance, and industry type, could influence financial reporting quality variable. Therefore, firm size, leverage, firm performance, and industry type variables are included as control variables in this thesis. According to Beest, Braam, and Boelens (2009), firm size and industry type are significantly associated to financial reporting quality. This study finds a positive relation between firm size and financial reporting quality. Following Athanasakou and Olsson (2015), this thesis measures firm size by calculating natural logarithm of total assets. Industry type is generated by using industry fixed effect based on firms SIC code.

Studies show that firms leverage level and debt covenants are related to managers' decision to exercise earnings management. These results indicate that leverage level could influence financial reporting quality (Graham, Harvey, & Rajgopal, 2004; Healy & Wahlen, 1999). Hence, this thesis controls for leverage level in the regression model. Following Athanasakou and Olsson (2015), the leverage ratio is generated from total liabilities divided by total assets. According to study by Graham et al. (2004), another factor that could motivate earnings management is firm performance. Sometimes managers will manage their earnings to meet firms performance benchmark. Thus, firms performance could affect financial reporting quality, and so firm performance variable is included as a control variable. Firm performance is generated from earning per share (EPS) (Farrer & Ramsay, 1998; Graham et al., 2004).

The purpose of including year fixed effect variable in the research model is to capture any outcome differences that happen over time and that is not associated to other

explanatory variables. Prior studies show that financial reporting quality is improving over time because standard setters and regulators always improve the accounting standards and financial reporting standards (Leuz et al., 2003; Beest et al., 2009). Therefore, this thesis includes year fixed effect as a control variable.

3.5. Regression Model

To test for Ha1 that predicts that there is a negative relation between directors' share ownership and discretionary accruals, the following base regression specification is formulated:

$$DiscAccr_{i,t} = \beta_0 + \beta_1 Dir\_Own_{i,t} + \beta_2 BoardSize_{i,t} + \beta_3 BoardIndependence_{i,t} + \beta_4 CEODuality_{i,t} + \beta_5 FirmSize_{i,t} + \beta_6 Leverage_{i,t} + \beta_7 FirmPerformance_{i,t} + \beta_8 Industry_{i,t} + \beta_9 Year_{i,t} + \varepsilon_{i,t} \quad (3)$$

To test for Ha2 that predicts that there is a positive relation between directors' share ownership and earnings persistence, the following base regression specification is formulated:

$$EarnPersist_{i,t} = \beta_0 + \beta_1 Dir\_Own_{i,t} + \beta_2 BoardSize_{i,t} + \beta_3 BoardIndependence_{i,t} + \beta_4 CEODuality_{i,t} + \beta_5 FirmSize_{i,t} + \beta_6 Leverage_{i,t} + \beta_7 FirmPerformance_{i,t} + \beta_8 Industry_{i,t} + \beta_9 Year_{i,t} + \varepsilon_{i,t} \quad (4)$$

To test for Ha3 that predicts that there is a negative relation between directors' share ownership and accounting restatement, the following base regression specification is formulated:

$$AccRestate_{i,t} = \beta_0 + \beta_1 Dir\_Own_{i,t} + \beta_2 BoardSize_{i,t} + \beta_3 BoardIndependence_{i,t} + \beta_4 CEODuality_{i,t} + \beta_5 FirmSize_{i,t} + \beta_6 Leverage_{i,t} + \beta_7 FirmPerformance_{i,t} + \beta_8 Industry_{i,t} + \beta_9 Year_{i,t} + \varepsilon_{i,t} \quad (5)$$

To test for Ha4 that predicts that there is a negative relation between directors' share ownership and internal control weaknesses, the following base regression specification is formulated:

$$MtrWeak_{i,t} = \beta_0 + \beta_1 Dir\_Own_{i,t} + \beta_2 BoardSize_{i,t} + \beta_3 BoardIndependence_{i,t} +$$
$$\beta_4 CEODuality_{i,t} + \beta_5 FirmSize_{i,t} + \beta_6 Leverage_{i,t} + \beta_7 FirmPerformance_{i,t} +$$
$$\beta_8 Industry_{i,t} + \beta_9 Year_{i,t} + \varepsilon_{i,t} \quad (6)$$

3.6. Sample Data

This thesis obtains all the data from Wharton Research Data Services system that are available for Erasmus University students. Firm year-level accounting data to calculate discretionary accrual, earning persistence, book value per share, firm size, leverage, and firm performance are available in Compustat Fundamentals Annual database. Directors and corporate governance data are available in Institutional Shareholder Services (formerly RiskMetrics). Restatement data are available in Audit Analytics Non Reliance Restatements. Internal control weakness data are available in Audit Analytics SOX 404 Internal Controls.

The sample observation is North America public firms. The sample period will start in 2002 because in this year roles of board of directors received great attention from shareholders and other stakeholders after the accounting scandals in the U.S and publication of SOX Act 2002. The sample will run up to the year 2015 because of the data availability in all databases.

   3.6.1.   Sample Collection

Variable of directors' share ownership (Dir_Own) is assembled based on merging of num_of_shares (shares held by directors) data from Institutional Shareholder Services and bkvlps (book value per share) data from Compustat. Variable of discretionary accruals is generated from data of at (assets-total), csho (common shares outstanding), epsfx (earnings per share diluted-excluding extraordinary items), ni (net income), oancf (operating activities-net cash flow), ppent (property, plant, equipment-total net), rect (receivables-total), revt (revenue-total) in Compustat. Earnings persistence (EarnPersist) variable is generated by using ni (net income) data from Compustat. Variable of accounting restatement (AccRestate) is generated by combining data of res_accounting, res_fraud, res_cler_err (res clerical errors) from Audit Analytics Non Reliance

Restatements. Variable of material weaknesses (MtrWeak) is generated by using count_weak (count weaknesses) data from Audit Analytics SOX 404 Internal Controls.

This thesis acquires data for variable board size, board independence, and CEO duality from Institutional Shareholder Services database. Board size is generated by counting the total director of each firm by using cusip and fiscal year. Board independence is calculated by using classification data (board affiliation: E-employee, L-linked, I-independent). CEO duality is generated by combining data employment_ceo and employment_chaiman. Data for variable firm size, leverage, and firm performance are acquired from Compustat by using data of at (assets-total), lt (liabilities-total), and epsfx (earnings per share diluted-excluding extraordinary items).

3.6.2. Sample Preparation

The last process to create a complete observational sample is to merge all different datasets from different databases into one dataset. Cusip code and year are utilized in the merging process to match the observation data across different databases. After merging, the missing values are removed from the final dataset. Finally, winsorizing is applied to manage the outliers or extreme values of observations rather than dropping these extreme values. Winsorizing is necessary because it can adjust the outliers to less extreme values in order to prevent the outliers to influence the result of the statistical test. Table 1 presents the sample selection process from the raw data to the final sample.

Table 1: Sample Selection Process

Selection Criteria	Observations (Firm-Year)
Total observations with available directors' share ownership data from 2002 to 2015	192,826
Less:	
Decreasing of observations after calculating common stock owned by the median directors	-172,258
Decreasing of observations after merging with database of book value per share	-2,296
Decreasing of observations after merging with firm-year level accounting data and board of directors characteristics variables and after deleting all the missing values	-3,652
Final Sample	**14,620**

Chapter 4. Empirical Results and Analysis

This chapter presents the empirical results of the regression model to test the hypotheses and to answer the research question. Firstly, the descriptive statistics provide the number of observations and the values of the total samples, including the mean, median, standard deviation, maximum, and minimum values of all variables. This chapter also provides Spearman correlation test, which is used to analyze the inter-correlation between the variables. The second part of this chapter is the multivariate analysis by conducting OLS regression and logistic regression and there is also the regression result tables, followed by an analysis of the results in order to see whether the directors' share ownership has a significant impact on the financial reporting quality.

4.1. Descriptive Statistics

Table 2 presents the descriptive statistics of each variable over the year 2002 to 2015. It contains total observation of the sample, mean, standard deviation, minimum, and maximum values for each variable. The mean and the standard deviation of the variables provide information on how the variables are distributed and whether there are abnormal values. Dependent variables to proxy financial reporting quality are DiscAccr, EarnPersist, AccRestate, and MtrWeak. Dir_Own is the independent variable, while BoardSize, BoardIndependence, CEODuality, FirmSize, Leverage, and FirmPerformance are the control variables in the regression model.

Table 2 shows that the total observations of each variable are around 14,620, except for variables EarnPersist, AccRestate, and MtrWeak. The mean of DiscAccr and EarnPersist are -0.484 and 0.584 respectively. AccRestate and MtrWeak are dummy variables, thus the mean shows that 7.7% of the observations exercise the accounting restatement and 2.6% of the observations have material internal control weaknesses. On average, the median of directors in the firms have share ownership worth US$ 12.98 (value after natural logarithm).

Table 2: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min.	Max.
DiscAccr	14620	-0.484	0.421	-10.796	5.256
EarnPersist	14611	0.584	0.506	-1.017	1.914
AccRestate	14589	0.077	0.266	0	1
MtrWeak	14589	0.026	0.159	0	1
Dir_Own	14620	12.981	1.156	1.987	21.099
BoardSize	14620	2.177	0.242	1.099	3.136
BoardIndepence	14620	0.758	0.134	0	1
CEODuality	14620	0.269	0.444	0	1
FirmSize	14620	7.697	1.559	2.638	13.589
Leverage	14620	0.499	0.199	0.026	0.999
FirmPerformance	14620	1.628	3.599	-59.160	138.880

4.2. Spearman Correlation Test

This section provides the Spearman correlation test to measure the linear correlation between two continuous or ordinal variables. The results of Spearman correlation coefficients can range in value from −1 to +1, where value -1 denotes negative correlation, value 0 denotes random or no correlation, and value +1 denotes positive correlation. Table 5 presents the results of Spearman correlation test for all variables in the regression model, i.e. DiscAccr, EarnPersist, AccRestate, MtrWeak, Dir_Own, BoardSize, BoardIndependence, CEODuality, FirmSize, Leverage, FirmPerformance. Table 5 shows two values for each correlation result, the value in the first row is the correlation coefficient value, that consist of the correlation sign and coefficient value, while the value in the second row is the p-value or the statistical significance of the correlation.

According to the results in the table 3, variable Dir_Own has positive correlation with EarnPersist and negative correlation with DiscAccr, AccRestate, and MtrWeak. Hence, these results are consistent with the prediction of the hypotheses and prior studies, asserting that directors' share ownership is related to the financial reporting quality, particularly directors' share ownership will improve financial reporting quality measures. Furthermore, the correlations between independent variable and dependent variables are statistically significant, except for the correlation between Dir_Own and DiscAccr, and the correlation between Dir_Own and Acc_Restate.

Table 3 also indicates that dependent variables DiscAccr and EarnPersist have a statistically significant correlation with the independent variable and all control variables, except for the correlation between DiscAccr and Dir_Own, and the correlation between EarnPersist and BoardSize. The dependent variable MtrWeak shows a statistically significant correlation with the independent variable and several control variables, such as BoardSize, FirmSize, and FirmPerformance. However, dependent variable AccRestate shows statistically insignificant correlation with independent variables and only has statistically significant correlation with control variables BoardSize, Leverage, and FirmPerformance. Furthermore, all control variables also have significant correlation with the independent variable Dir_Own.

Table 3: Spearman Correlation

	DiscAccr	EarnPersist	AccRestate	MtrWeak	Dir_Own	BoardSize	Board Independence	CEODuality	FirmSize	Leverage	Firm Performance
DiscAccr	1.000										
EarnPersist	-0.089 ***	1.000									
	0.000										
AccRestate	0.035 ***	-0.029 ***	1.000								
	0.000	0.000									
MtrWeak	0.039 ***	-0.017 *	0.271 ***	1.000							
	0.000	0.039	0.000								
Dir_Own	-0.014	0.019 *	-0.011	-0.025 **	1.000						
	0.091	0.019	0.182	0.003							
BoardSize	-0.079 ***	0.014	-0.017 *	-0.048 ***	-0.029 ***	1.000					
	0.000	0.093	0.041	0.000	0.000						
BoardIndependence	0.041 ***	-0.086 ***	-0.005	-0.004	-0.123 ***	0.215 ***	1.000				
	0.000	0.000	0.514	0.612	0.000	0.000					
CEODuality	0.075 ***	0.072 ***	0.013	0.001	-0.096 ***	0.023 **	-0.218 ***	1.000			
	0.000	0.000	0.114	0.907	0.000	0.006	0.000				
FirmSize	-0.128 ***	0.029***	-0.009	-0.072 ***	0.174 ***	0.597 ***	0.274 ***	-0.027 ***	1.000		
	0.000	0.000	0.238	0.000	0.000	0.000	0.000	0.001			
Leverage	-0.102 ***	-0.049 ***	0.043 ***	-0.003	-0.213 ***	0.395 ***	0.238 ***	0.033 ***	0.504 ***	1.000	
	0.000	0.000	0.000	0.756	0.000	0.000	0.000	0.000	0.000		
FirmPerformance	-0.234 ***	0.137 ***	-0.081 ***	-0.077 ***	0.102 ***	0.277 ***	0.153 ***	-0.064 ***	0.397 ***	0.134 ***	1.000
	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

This table presents the Spearman correlation between all variables.

First row shows the Spearman correlation coefficient.

Second row shows the level of statistical significance (*,**,*** Indicates significance at the 5%, 1%, and 0.1% levels).

4.3. Multivariate Analysis

This section presents results from the regression analyses to examine all the hypotheses. This thesis examines Ha1 and Ha2 by using ordinary least squares (OLS) multiple regression, while logistic regression will be conducted to examine Ha3 and Ha4. OLS regression is applied when the dependent variable is continuous variable, while logistic regression is applied when the dependent variable is categorical variable (i.e. binary variable). By investigating these four hypotheses, this thesis will try to answer the research question whether directors' share ownership has specific impact to the financial reporting quality. Does directors' share ownership improve the financial reporting quality?

4.3.1. Directors' Share Ownership and Discretionary Accruals

The first hypothesis investigates the relation between directors' share ownership and discretionary accrual. This hypothesis predicts that directors' share ownership will reduce discretionary accruals in the firms. Therefore, Ha1 states that there is a negative relation between directors' share ownership and discretionary accruals.

Table 4 provides the results of OLS regression analysis to test the first hypothesis. The dependent variable is DiscAccr and independent variable is Dir_Own. Control variables of BoardSize, BoardIndependence, CEODuality, FirmSize, Leverage, FirmPerformance are included in the regression analysis between Dir_Own and DiscAccr in order to see whether the relation between Dir_Own and DiscAccr is also affected by those control variables. Table 4 shows that regression of column (1) does not include all the control variables, while regression of column (2) includes all the control variables. In general, the results of regression (1) and (2) signify that directors' share ownership is negatively related to discretionary accruals.

According to the results of regression (1), variable Dir_Own has a negative and statistically significant relation with variable DiscAccr (coef. = -0.013, p-value = 0.000). The adjusted R-squared in the regression (1) is 0.002, and it means that the independent variable Dir_Own has very small ability to explain the variability of the dependent variable DiscAccr. Furthermore, it implies that Dir_Own has minor contribution to DiscAccr and there are many other independent variables that have bigger impact on the DiscAccr. These findings of regression (1) signify that, despite the low adjusted R-squared, there is a negative and statistically significant relation between Dir_Own and DiscAccr. However, this regression model is not able to predict clearly whether or not dependent variable DiscAccr will decrease because of independent variable Dir_Own.

Therefore, in the regression (2) control variables are included in the regression model to improve the adjusted R-squared value. The results of regression (2) show that adjusted R-squared is 0.505, higher than the adjusted R-squared value in regression (1). It indicates that the combination of independent variable Dir_Own and control variables have better ability to explain the variability of dependent variable DiscAccr. Furthermore, the results of regression (2) show that Dir_Own and DiscAccr have significant negative relation even after including the control variables (coef. = -0.008, p-value = 0.000). According to the results of regression (2), almost all the control variables significantly affect the relation between Dir_own and DiscAccr, except for control variable FirmSize. Control variables BoardSize, BoardIndependence, and Leverage have positive relation with DiscAccr, while CEODuality and FirmPerformance have negative relation with DiscAccr. Consequently, after including control variables, the coefficient value of Dir_Own in regression (2) is lower than the one in regression (1) but variable Dir_Own still have statistically significant negative relation with variable DiscAccr. According to the results of regression (2), every 1% increase in directors' share ownership is associated with 0.008% decrease in discretionary accruals. This coefficient is quite small, but regression (2) have bigger ability to explain the impact of directors' share ownership on discretionary accruals than regression (1).

These findings support the prediction of Ha1, claiming that directors' share ownership has a negative relation with discretionary accruals. It indicates that directors' share ownership will reduce discretionary accruals in the firms.

Table 4: Relation between Directors' Share Ownership and Discretionary Accruals

$$DiscAccr_{i,t} = \beta_0 + \beta_1 Dir\_Own_{i,t} + \beta_2 BoardSize_{i,t} + \beta_3 BoardIndependence_{i,t}$$
$$+ \beta_4 CEODuality_{i,t} + \beta_5 FirmSize_{i,t} + \beta_6 Leverage_{i,t}$$
$$+ \beta_7 FirmPerformance_{i,t} + \beta_8 Industry_{i,t} + \beta_9 Year_{i,t} + \varepsilon_{i,t}$$

					DiscAccr				
	Coef.		t-statistic	p-value		Coef.		t-statistic	p-value
Variable		(1)					(2)		
Constant	-0.309	***	-9.00	0.000		-0.501	***	-6.64	0.000
Dir_Own	-0.013	***	-5.00	0.000		-0.008	***	-3.62	0.000
BoardSize						0.063	***	5.17	0.000
BoardIndependence						0.142	***	7.21	0.000
CEODuality						-0.019	*	-2.37	0.018
FirmSize						0.002		0.79	0.431
Leverage						0.049	***	3.19	0.001
FirmPerformance						-0.020	***	-18.93	0.000
R-squared	0.002					0.517			
Adj. R-squared	0.002					0.505			
Observations	14,620					14,620			
Industry fixed effect	No					Yes			
Year fixed effect	No					Yes			

*,**,*** Indicates significance at the 5%, 1%, and 0.1% levels,

respectively (two-tailed tests) for the regression specification.

Dir_Own is the independent variable and DiscAccr is the dependent variable.

BoardSize, BoardIndependence, CEODuality, FirmSize, Leverage, FirmPerformance are the control variables

Regression (1) does not include the control variables, Regression (2) includes the control variables.

4.3.2. Directors' Share Ownership and Earnings Persistence

The second hypothesis investigates the relation between directors' share ownership and earnings persistence. This hypothesis predicts that directors' share ownership will improve earnings persistence in the firms. Therefore, Ha2 states that there is a positive relation between directors' share ownership and earnings persistence.

Table 5 provides the results of OLS regression analysis to test the second hypothesis. The dependent variable is EarnPersist and independent variable is Dir_Own. Control variables of BoardSize, BoardIndependence, CEODuality, FirmSize, Leverage, FirmPerformance, are included in the regression analysis between Dir_Own and EarnPersist in order to see whether the relation between Dir_Own and EarnPersist is also affected by those control variables. Table 5 shows that regression of column (1) does not include all the control variables, while regression of column (2) includes all the control variables. In general, the results of regression (1) and (2) signify that directors' share ownership is positively related to earnings persistence.

According to the results of regression (1), variable Dir_Own has a positive and statistically significant relation with variable EarnPersist (coef. = 0.013, p-value = 0.001). The adjusted R-squared in the regression (1) is 0.001, and it means that the independent variable Dir_Own has very small ability to explain the variability of the dependent variable EarnPersist. Furthermore, it implies that Dir_Own has minor contribution to EarnPersist and there are many other independent variables that have bigger impact on the EarnPersist. These findings of regression (1) signify that, despite the low adjusted R-squared, there is a positive and statistically significant relation between Dir_Own and EarnPersist. However, this regression model is not able to predict clearly whether or not dependent variable EarnPersist will increase because of independent variable Dir_Own.

Therefore, in the regression (2) control variables are included in the regression model to improve the adjusted R-squared value. The results of regression (2) show that adjusted R-squared is 0.147, higher than the adjusted R-squared value in regression (1). It indicates that the combination of independent variable Dir_Own and control variables have better ability to explain the variability of dependent variable EarnPersist. Furthermore, the results of regression (2) show that Dir_Own and EarnPersist have a significant positive relation even after including the control variables (coef. = 0.014, p-value = 0.002). According to the results of regression (2), almost all the control variables significantly affect the relation between Dir_own and EarnPersist, except for control variables BoardSize and CEODuality. Control variables BoardIndependence and

Leverage have a negative relation with EarnPersist, whereas FirmSize and FirmPerformance have positive relation with EarnPersist. Consequently, the coefficient value of Dir_Own in regression (2) has changed after including control variables, but variable Dir_Own still have statistically significant positive relation with variable EarnPersist. According to the results of regression (2), every 1% increase in directors' share ownership is associated with 0.014% increase in earnings persistence. This coefficient is quite small, but regression (2) have bigger ability to explain the impact of directors' share ownership on discretionary accruals than regression (1).

These findings support the prediction of Ha2, claiming that directors' share ownership has a positive relation with earnings persistence. It indicates that directors' share ownership will improve earnings persistence in the firms.

Table 5: Relation between Directors' Share Ownership and Earnings Persistence

$$
\begin{aligned}
EarnPersist_{i,t} &= \beta_0 + \beta_1 Dir\_Own_{i,t} + \beta_2 BoardSize_{i,t} + \beta_3 BoardIndependence_{i,t} \\
&+ \beta_4 CEODuality_{i,t} + \beta_5 FirmSize_{i,t} + \beta_6 Leverage_{i,t} \\
&+ \beta_7 FirmPerformance_{i,t} + \beta_8 Industry_{i,t} + \beta_9 Year_{i,t} + \varepsilon_{i,t}
\end{aligned}
$$

		EarnPersist						
	Coef.		t-statistic	p-value	Coef.		t-statistic	p-value
Variable		(1)				(2)		
Constant	0.414	***	8.32	0.000	0.294	*	2.05	0.041
Dir_Own	0.013	***	3.43	0.001	0.014	**	3.09	0.002
BoardSize					0.022		0.96	0.339
BoardIndependence					-0.116	**	-3.08	0.002
CEODuality					-0.010		-0.64	0.523
FirmSize					0.016	***	3.64	0.000
Leverage					-0.095	***	-3.21	0.001
FirmPerformance					0.024	***	12.00	0.000
R-squared	0.001				0.168			
Adj. R-squared	0.001				0.147			
Observations	14,611				14,611			
Industry fixed effect	No				Yes			
Year fixed effect	No				Yes			

*,**,*** Indicates significance at the 5%, 1%, and 0.1% levels,

respectively (two-tailed tests) for the regression specification.

Dir_Own is the independent variable and EarnPersist is the dependent variable.

BoardSize, BoardIndependence, CEODuality, FirmSize, Leverage, FirmPerformance are the control variables

Regression (1) does not include the control variables, Regression (2) includes the control variables.

4.3.3. Directors' Share Ownership and Accounting Restatements

The third hypothesis investigates the relation between directors' share ownership and accounting restatements. This hypothesis predicts that directors' share ownership will diminish accounting restatements in the firms. Therefore, Ha3 states that there is a negative relation between directors' share ownership and accounting restatements.

Table 6 provides the results of logistic regression analysis to test the third hypothesis. The dependent variable is AccRestate and independent variable is Dir_Own. Control variables of BoardSize, BoardIndependence, CEODuality, FirmSize, Leverage, FirmPerformance, are included in the regression analysis between Dir_Own and AccRestate in order to see whether the relation between Dir_Own and AccRestate is also affected by those control variables. Table 6 shows that regression of column (1) does not include all the control variables, while regression of column (2) includes all the control variables, except for industry fixed effect. In general, the results of regression (1) and (2) signify that there is no relation between directors' share ownership and accounting restatements.

The results of regression (1) show that variable Dir_Own is not significantly related to variable AccRestate (coef. = -0.037, p-value = 0.187). Furthermore, regression (2) shows that board characteristic variables (i.e. BoardSize, BoardIndependence, CEODuality) do not significantly affect the relation between Dir_Own and AccRestate. On the contrary, firm characteristic variables (i.e. FirmSize, Leverage, FirmPerformance) significantly affect the relation between Dir_Own and AccRestate. Consequently, the results of regression (2) also indicate that Dir_Own has no significant relation with AccRestate (coef. = 0.054, p-value = 0.094) even after the control variables are included in the regression analysis. Variables that have statistically significant impact on accounting restatements are the firm characteristic variables (i.e. FirmSize, Leverage, FirmPerformance).

Table 6 also shows that the values of Pseudo R2 for both regression (1) and (2) are very small, specifically 0.0002 for Pseudo R2 of regression (1) and 0.0365 for Pseudo R2 of regression (2). In the regression (2) control variables are included in the regression model, but it does not improve the ability of Dir_Own to explain AccRestate. These results signify that the independent variable Dir_Own is not able to explain the variability of dependent variable AccRestate. Accordingly, these findings show that the regression model to test Ha3 is not able to predict and detect the relation between Dir_Own and AccRestate.

These findings do not support the prediction of Ha3, claiming that directors' share ownership has a negative relation with accounting restatements. The results indicate that there is no relation between directors' share ownership and accounting restatements.

Table 6: Relation between Directors' Share Ownership and Accounting Restatement

$$AccRestate_{i,t} = \beta_0 + \beta_1 Dir\_Own_{i,t} + \beta_2 BoardSize_{i,t} + \beta_3 BoardIndependence_{i,t}$$
$$+ \beta_4 CEODuality_{i,t} + \beta_5 FirmSize_{i,t} + \beta_6 Leverage_{i,t}$$
$$+ \beta_7 FirmPerformance_{i,t} + \beta_8 Industry_{i,t} + \beta_9 Year_{i,t} + \varepsilon_{i,t}$$

	AccRestate					
	Coef.		p-value	Coef.		p-value
Variable	(1)			(2)		
Constant	-2.004	***	0.000	-3.074	***	0.000
Dir_Own	-0.037		0.187	0.054		0.094
BoardSize				-0.251		0.132
BoardIndependence				-0.235		0.384
CEODuality				0.051		0.673
FirmSize				-0.068	*	0.024
Leverage				1.388	***	0.000
FirmPerformance				-0.123	***	0.000
Pseudo R2	0.0002			0.0365		
Observations	14,589			14,589		
Industry fixed effect	No			No		
Year fixed effect	No			Yes		

*,**,*** Indicates significance at the 5%, 1%, and 0.1% levels,

respectively (two-tailed tests) for the regression specification.

Dir_Own is the independent variable and AccRestate is the dependent variable.

BoardSize, BoardIndependence, CEODuality, FirmSize, Leverage, FirmPerformance are the control variables

Regression (1) does not include the control variables, Regression (2) includes the control variables.

4.3.4. Directors' Share Ownership and Internal Control Weaknesses

The fourth hypothesis investigates the relation between directors' share ownership and internal control weaknesses. This hypothesis predicts that directors' share ownership will mitigate internal control weaknesses in the firms. Therefore, Ha4 states that there is a negative relation between directors' share ownership and internal control weaknesses.

Table 7 provides the results of logistic regression analysis to test the fourth hypothesis. The dependent variable is MtrWeak and independent variable is Dir_Own. Control variables of BoardSize, BoardIndependence, CEODuality, FirmSize, Leverage, FirmPerformance, are included in the regression analysis between Dir_Own and MtrWeak in order to see whether the relation between Dir_Own and MtrWeak is also affected by those control variables. Table 6 shows that regression of column (1) does not include all the control variables, while regression of column (2) includes all the control variables, except for industry fixed effect.

The results of regression (1) show that variable Dir_Own has a statistically significant negative relation with MtrWeak (coef. = -0.117, p-value = 0.011). Regression (2) shows that board characteristic variables (i.e. BoardSize, BoardIndependence, CEODuality) do not significantly affect the relation between Dir_Own and MtrWeak. On the contrary, firm characteristic variables (i.e. FirmSize, Leverage, FirmPerformance) significantly affect the relation between Dir_Own and MtrWeak. Accordingly, the results of regression (2) indicate that there is no relation between Dir_Own and MtrWeak (coef. = 0.042, p-value = 0.450) even after the control variables are included in the regression analysis.

These results imply that actually directors' share ownership has no impact on the internal control weaknesses in the firms. The results of regression (1) support the prediction of Ha4 and show a significant negative relation between directors' share ownership and internal control weaknesses. However, after the control variables are considered in the regression (2), the results indicate that directors' share ownership has no relation with internal control weaknesses. Variables that have statistically significant impact on internal control weaknesses are the firm characteristic variables (i.e. FirmSize, Leverage, FirmPerformance).

Furthermore, Table 7 also shows that the values of Pseudo R2 for both regression (1) and (2) are very small, specifically 0.0018 for Pseudo R2 of regression (1) and 0.1025 for Pseudo R2 of regression (2). In the regression (2) control variables are included in the regression model, but it does not improve the ability of Dir_Own to explain MtrWeak.

These results signify that the independent variable Dir_Own is not able to explain the variability of dependent variable MtrWeak. Accordingly, these findings show that the regression model to test Ha4 is not able to predict and detect the relation between Dir_Own and MtrWeak.

Consequently, these findings do not support the prediction of Ha4, claiming that directors' share ownership has a negative relation with internal control weaknesses. The results denote that there is no relation between directors' share ownership and internal control weaknesses.

Table 7: Relation between Directors' Share Ownership and Internal Control Weaknesses

$$MtrWeak_{i,t} = \beta_0 + \beta_1 Dir\_Own_{i,t} + \beta_2 BoardSize_{i,t} + \beta_3 BoardIndependence_{i,t} \\ + \beta_4 CEODuality_{i,t} + \beta_5 FirmSize_{it} + \beta_6 Leverage_{i,t} \\ + \beta_7 FirmPerformance_{i,t} + \beta_8 Industry_{i,t} + \beta_9 Year_{i,t} + \varepsilon_{i,t}$$

	MtrWeak					
	Coef.		p-value	Coef.		p-value
Variable	(1)			(2)		
Constant	-2.103	***	0.000	-1.331		0.168
Dir_Own	-0.117	*	0.011	0.042		0.450
BoardSize				-0.344		0.218
BoardIndependence				0.352		0.446
CEODuality				-0.040		0.825
FirmSize				-0.377	***	0.000
Leverage				1.339	***	0.000
FirmPerformance				-0.146	***	0.000
Pseudo R2	0.0018			0.1025		
Observations	14,589			11,466		
Industry fixed effect	No			No		
Year fixed effect	No			Yes		

*,**,*** Indicates significance at the 5%, 1%, and 0.1% levels,

respectively (two-tailed tests) for the regression specification.

Dir_Own is the independent variable and MtrWeak is the dependent variable.

BoardSize, BoardIndependence, CEODuality, FirmSize, Leverage, FirmPerformance are the control variables

Regression (1) does not include the control variables, Regression (2) includes the control variables.

4.4. Further Discussion about Relation between Directors' Share Ownership and Financial
    Reporting Quality

The research question in this thesis is "Does board of directors' share ownership affect the financial reporting quality?". By using four proxies to measure financial reporting quality (i.e. discretionary accruals, earnings restatement, accounting restatements, internal control weaknesses), this thesis attempts to answer that research question. Prior studies signify that lower discretionary accruals, higher earnings persistence, lower accounting restatements, and lower internal control weaknesses imply high financial reporting quality (Dechow, Sloan, & Sweeney, 1995; Dechow & Dichev, 2002; Callen, Livnat, & Segal, 2006; Doyle, Ge, & McVay, 2007).

The regression results in section 4.3 show main findings of the relation between directors' share ownership and four proxies of financial reporting quality. In general, the results of this empirical analysis are mixed. First, directors' share ownership has a statistically significant negative relation with discretionary accruals. This finding supports the prediction of Ha1 and is aligned with prior studies argue that directors' share ownership could diminish earnings management practices in the firms, that is proven by lower discretionary accruals. Lower discretionary accruals mean higher financial reporting quality (Bos, Pendleton, & Toms, 2013; Athanasakou & Olsson, 2015). Second, directors' share ownership has a statistically significant positive relation with earnings persistence. This finding is consistent with the prediction of Ha2, but there is no prior study that investigates the relation between directors' share ownership and earnings persistence. However, prior studies assert that when accruals quality is high, earnings persistence is also high, and it means high financial reporting quality (Dechow & Dichev, 2002). Therefore, this finding implies that directors' share ownership could improve the financial reporting quality, considering the positive relation between directors' share ownership and earnings persistence.

The results of regression analysis Ha1 and Ha2 indicate that directors' share ownership could bring positive impact to the firms, in this case is the improvement of financial reporting quality. These findings support the statements of agency cost reduction theory and incentive theory. The agency cost problem arises when principals (shareholders) and agents (directors) have different personal interests and both parties are utility maximizers. Agency cost reduction theory explains that directors' share ownership will be able to align directors' interests and shareholders' interest, thus it could mitigate the agency cost problem (Jensen & Meckling, 1976). Incentive theory explains that when directors have share ownership in their firms, their interests and shareholders' interests will be aligned and their personal wealth is related to firms

wealth. Therefore, they have incentives to ensure that the firms perform well, and directors are more likely to prevent earnings management and other management opportunistic behaviours (Farrer & Ramsay, 1998). Accordingly, directors' share ownership may be considered as the most effective way to align directors' interests and shareholders' interests.

On the contrary, the third finding indicates that there is no statistically significant relation between directors' share ownership and accounting restatements. This finding does not support the prediction of Ha3. The last finding in this thesis also shows that there is no statistically significant relation between directors' share ownership and internal control weaknesses. This finding does not support the prediction of Ha4. In addition, there is no prior study that investigates the relation between directors' share ownership and accounting restatements, or the relation between directors' share ownership and internal control weaknesses. Therefore, it is quite difficult to find the possible explanation regarding the relation between directors' share ownership and those two independent variables (i.e. accounting restatements and internal control weaknesses).

This thesis finds relative similar results for relation between directors' share and both accounting restatements and internal control weaknesses, because accounting restatements and internal control weaknesses have similar concept under indicator of earnings mistatements concept (Dechow, Ge, & Schrand, 2010). Study by Muramiya and Takada (2010) shows internal control weaknesses are related to accounting restatements. They show that firms with internal control weaknesses have more possibility to issue financial highlights with higher errors and innacurate information. Consequently, firms with internal control weaknesses are more likely to restate their financial statements. One possible explanation why this thesis could not find find statistically significant relation between directors' share ownership and accounting restatements is because low ability of independent variable, directors' share ownership, to capture and explain the variability of dependent variables, accounting restatements and internal control weaknesses. As can be seen in results of table 6 and table 7, the Pseudo R^2 of regression model of Ha3 and Ha4 are very small even after control variables are included in the regression model. It implies that actually there are other variables that have better ability to affect the accounting restatements and internal control weaknesses.

Prior study by Erickson, Hanlon, and Maydew (2006) shows that there is no statistically significant relation between executives' share ownership and financial restatements. Study by Doyle, Ge, and McVay (2007) tries to explain the determinants of internal control weaknesses as a financial reporting quality measure. They find that internal control weaknesses are statistically significant determined by firms specific characteristics factors, such as firm size,

firm age, firm financial health, financial reporting complexity, firm growth, and firm restructuring charges. On the contrary, they find that internal control weaknesses are not statistically significant determined by corporate governance factors, such as board of directors, audit committee, directors and executives compensation, directors education. Accordingly, consistent with studies by Erickson, Hanlon, and Maydew (2006) and Doyle, Ge, and McVay (2007), this thesis indicates that accounting restatements and internal control weaknesses are not related to directors' share ownership, because accounting restatements and internal control weaknesses are more related to firms speficic characteristic factors (i.e. firm size, leverage, firm performance).

Chapter 5. Conclusions

This chapter presents the summary of the research question, hypotheses, and empirical analysis findings. Accordingly, conclusions are established to answer the research question. Afterward, this chapter will discuss the contributions of this thesis to the existing studies and the implications to the key stakeholders of this study. Finally, the limitations of this thesis and recommendations for future research are provided.

5.1. Summary and Conclusion

This thesis aims to examine the relation of interests alignment between board of directors and shareholders and the quality of financial reporting. Specifically, this thesis examines the relation between board of directors' share ownership and the financial reporting quality in order to answer the following research question: "Does board of directors' share ownership affect the financial reporting quality?".

Directors' share ownership is considered as the most effective way to align directors' interests and shareholders' interests. Therefore, it could mitigate the agency cost problem (Jensen & Meckling, 1976; McConvill & Bagaric, 2004). Share ownership also provides sufficient incentives for directors to ensure the firms perform well. Their interests and shareholders' interests will be aligned and their personal wealth is related to the firms wealth (Farrer & Ramsay, 1998). Consequently, it leads to better financial reporting quality. However, another point of view assumes that directors' share ownership mechanism will impair directors' independence. Therefore, it leads to higher earnings management or other management opportunistic behaviours and lower financial reporting quality (Rose et al., 2013).

To answer the research question, this thesis proposes four hypotheses. The first hypothesis is that there is a negative relation between directors' share ownership and discretionary accruals. To test this hypothesis, this thesis performs OLS regression analysis between independent variable Dir_Own and dependent variable DiscAccr. The results show that Dir_Own has a statistically significant negative relation with DiscAccr. Hence, the findings support the prediction of Ha1. However, the value of adjusted R-squared in this regression model is quite small, thus directors' share ownership has only small impact to mitigate discretionary accruals. Directors' share ownership has a better ability to explain its negative impact on the discretionary accruals after control variables are included in the regression model.

The second hypothesis is that there is a positive relation between directors' share ownership and earnings persistence. To test the second hypothesis, this thesis also performs

OLS regression analysis between independent variable Dir_Own and dependent variable EarnPersist. The results of this regression analysis show positive and statistically significant relation between Dir_Own and EarnPersist. Therefore, the findings also support the prediction of Ha2. However, similar to regression model of Ha1, the value of adjusted R-squared in the regression model of Ha2 is also quite small. Therefore, directors' share ownership has small impact to improve earnings persistence. Directors' share ownership has bigger positive impact on the earnings persistence after control variables are included in the regression model.

On the contrary, the findings of regression analysis Ha3 do not support the prediction of Ha3. Ha3 proposes that directors' share ownership and accounting restatement have negative relation. Ha3 is examined by using logistic regression analysis between independent variable DirOwn and dependent variable AccRestate. The results indicate that there is no statistically significant relation between directors' share ownership and accounting restatements. Moreover, the value of Pseudo R2 in the regression model of Ha3 is quite small. Hence, the findings imply that the regression model of Ha3 is not able to predict and detect the relation between directors' share ownership and accounting restatements.

Similar to the findings of regression analysis Ha3, the results of regression analysis Ha4 also do not support the prediction of Ha4. Ha4 predicts that directors' share ownership is negatively related to internal control weaknesses. To test this hypothesis, logistic regression analysis between independent variable Dir_Own and dependent variable MtrWeak is applied. The results of this regression analysis suggest that there is no statistically significant relation between directors' share ownership and internal control weaknesses. In addition, the value of Pseudo R2 in the regression model of Ha4 is also quite small. Consequently, the findings signify that the regression model of Ha4 is not able to predict and detect the relation between directors' share ownership and internal control weaknesses.

According to the findings of Ha1, Ha2, Ha3, and Ha4, the effects of directors' share ownership on the financial reporting quality are mixed. It depends on the measures of financial reporting quality. The findings of Ha1 and Ha2 signify that directors' share ownership could bring positive impact to the firms and it could improve financial reporting quality. The findings are consistent with agency cost reduction theory and incentive theory. However, the findings of Ha3 and Ha4 indicate that directors' share ownership and financial reporting quality have no statistically significant relation.

Finally, this thesis concludes that directors' share ownership has purposes to align directors' interests and shareholders' interest and provides directors with sufficient incentives to prevent management opportunistic behaviours. Therefore, it implies that directors' share

ownership brings positive impact to the financial reporting quality. This thesis does not draw a conclusion based on findings of Ha3 and Ha4 because variables accounting restatements and internal control weaknesses, as proxies of financial reporting quality, have concerns of potential selection bias. This thesis will explain more regarding potential selection bias concerns of variables accounting restatements and internal control weaknesses in the limitations section.

5.2. Contributions

The findings of this thesis contribute to studies about the association between directors' share ownership and financial reporting quality. Prior studies that investigate the association between directors' share ownership and financial reporting quality focus on using accruals quality as a measurement of financial reporting quality (i.e. Magilke, Mayhem, & Pike, 2009; Pergola & Joseph, 2011; Bos, Pendleton, & Toms, 2013; Athanasakou & Olsson, 2015). However, these studies do not consider other financial reporting quality measures in investigating the impact of directors' share ownership on financial reporting quality. This thesis aims to contribute by using discretionary accruals, earnings persistence, accounting restatements, internal control weaknesses as variables to measure financial reporting quality and investigates its relation with directors' share ownership.

By using discretionary accruals and earnings persistence as proxies of financial reporting quality, this thesis provides evidence that directors' share ownership could improve financial reporting quality. However, this thesis could not find statistically significant relation between directors' share ownership and accounting restatements. This thesis also finds that directors' share ownership is not statistically significant related to internal control weaknesses.

The findings of this thesis should be relevant for shareholders who need information about the effective way to align the interests of shareholders and board of directors. Hence, directors could be motivated to improve the financial reporting quality of their firms, because the quality of financial reporting will affect shareholders' decision making. This thesis results also should be relevant for regulators who aim to create regulation to improve the responsibilities of board of directors in the firms.

5.3. Limitations and Recommendations

This thesis faces several limitations. The first limitation is the potential selection bias (endogeneity) concern in the using of variables accounting restatements to identify financial reporting quality. To measure accounting restatements, this thesis includes accounting rule (GAAP/FASB) application failure restatements, or financial fraud, irregularities and

misrepresentations restatements, or material accounting and clerical application error restatements as accounting restatements. However, the restatements data might include restatements required due to unintentional bookkeeping errors and restatements of immaterial or economically insignificant amounts (Dechow, Ge, & Schrand, 2010). This restatements data could be a noisy proxy for intentional accounting restatements. Therefore, it is necessary for future research to control for restatements required due to unintentional bookkeeping errors and restatements of immaterial or economically insignificant amounts.

The second limitation is the potential selection bias (endogeneity) concern in the using of variables internal control weaknesses to identify financial reporting quality. This thesis generates internal control weaknesses by using material weaknesses disclosures. However, material weaknesses disclosures are affected by firms managers and auditors incentives to disclose these internal control weaknesses. Moreover, sometimes it is more straightforward to find the relation between auditor incentives and internal control weaknesses than to find the relation between directors' share ownership and internal control weaknesses (Dechow, Ge, & Schrand, 2010). Hence, it is also necessary for future research to control for auditor incentives in the regression model.

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