ERASMUS UNIVERSITY ROTTERDAM

Erasmus School of Economics

Master Thesis Accounting and Control

"CEO Duality and Corporate Long-Termism"

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Date: 31-08-2020

Abstract

This thesis examines the effect of CEO duality (CEO which also holds the role as Chairman of the Board) on corporate long-termism. Using the final sample of 2,798 company-years observations made by U.S. companies during 2010 – 2019 period, I document that in general, CEO duality does create impact on corporate long-termism. Specifically, it negatively affects the research and development intensity, and conversely, it positively affects the level of capital expenditure. Two moderating effects included here are the proportion of independent directors and industry competitiveness measured by Herfindahl-Hirschman Index. The independent directors turn out to significantly weaken the association between CEO duality and research and development intensity, meanwhile for industry competitiveness, the higher the competition companies are into, they spend more on the capital expenditure and less on the research and development.

Keywords: CEO duality, Combined Leadership, R&D, Capital Expenditure, Industry Competitiveness, Independent Directors.

Contents

Introduction

A considerable amount of studies have provided inconclusive findings about the presence of CEO duality. Agency theory believes the combination role of CEO and Chairman of the Board is better not to be held by one person (Coles et al., 2001). Meanwhile, stewardship theory argues that CEO duality as a unity of command leads to better communication between executives and board members (Boyd et al., 2005). The inconclusive findings, generally, sourced from several studies which look at the association of CEO duality on companies' performance, acquisition completion or to the return announcement. However, in this thesis, I would aim to focus on the effect of CEO duality to the strategic decision making, especially for the long-term matters. Stated formally:

RQ: Does CEO Duality have an impact on corporate long-termism?

The next discussion would be why I focus on corporate long-termism. The main reason is because there have been many studies already discussed from the perspective of short-termism, for example, studies about how companies fulfil their quarter earnings target, the increasing number of dividends paid to the shareholders, the analysis of cumulative abnormal return for certain windows period, etc. Through this thesis, I would like to examine to what extent companies care about their long-term value creation. Tang and Greenwald (2016) mention in the article, when companies are transitioning to long-termism value creation, they can apply long-term metrics. Besides the sustainability measures, within these metrics, they also have financial measures – that are further used to support more environmental initiatives – consist of research and development, also capital expenditure; and then relate these two measures with the corporate governance mechanism. Likewise, Litt (2013) argues various environmental or sustainable activities are closely related to require research and development expense and/or capital expenditure. The results of his examination show that companies conducting long-term initiatives report higher levels of either research and development expenditure or capital expenditure. The initiatives consist of innovation in technology development, producing consumer and earth-friendly products, waste control, so on and so forth.

Taking all these reasons together, I came up with an idea of incorporating two moderating variables into this study. First is the proportion of independent directors, because I assume the independent directors would balance out the excess power owned by the CEOs. Also, having more independent directors is highly recommended for companies

following the enforcement of Sarbanes-Oxley Act of 2002. The second moderating variable is industry competitiveness which is relevant to be analyzed whether the presence of CEO duality would significantly improve long-termism depending on the companies are in the high or low competitive environment. By including these two moderating variables, I hope the findings would enrich the answer to the research question.

The final sample consists of 2,798 sample observations of U.S. companies which are categorized under S&P 500. The period taken is January 1, 2010 to December 31, 2019. Then, as the proxy for corporate long-termism, I use research and development intensity (*RDI*) and capital expenditure (*CAPEX*). I apply some multivariate regression model and also include the interaction of CEO duality to two moderating variables. The primary finding of this thesis indicates that CEO duality is negatively associated on *RDI* and positively associated on *CAPEX*. These results are in line with the literature of Kothari et al., (2002) which gives an explanation that companies tend to invest more on capital expenditure since R&D activities bring more uncertainty to future earnings. Furthermore, the proportion of independent directors is found to weaken the relation between CEO duality and corporate long-termism. This indicates the role of agency theory and Sarbanes-Oxley Act of 2002 which emphasize the importance of having independent directors on board to control the power owned by CEO duality in strategic decision making. Lastly, the industry competitiveness shows a negative coefficient on *RDI* level and positive coefficient on *CAPEX* level, especially between companies in low competitive industries. This indicates that CEO duality holds the role to improve the performance of companies so then they can also participate in the high market competition level.

This thesis contributes to the corporate governance literature by observing the role of CEO duality on strategic decision making, especially the corporate long-termism. I observe the effect of CEO duality in a specific sample and more recent period which extend what prior studies have done so far (Bravo & Reguera-Alvarado, 2017; Duru et al, 2016; Kim et al., 2009; Sheikh, 2018). Secondly, this study enriches the relevant research by examining the interaction effect between CEO duality and industry competitiveness to the prior studies of Sheikh (2018) and Zhang (2018). Last but not least, this study provides insights to its related theory – agency theory and stewardship theory – which again emphasize that no leadership structure is universal. Each company is unique and both a single and dual leadership structure has costs and benefits. In some situations, it could be supporting stewardship theory while in other situations, it can support agency theory. Thus, it leaves

room for future research to keep exploring the effect between CEO duality on various measures.

This study begins with an extensive review of prior literatures on CEO duality, corporate long-termism, governance mechanism and industry competitiveness; followed by the hypotheses development. Next, the sample selection process is provided as well as the empirical model and variable measurements. Lastly, the results are presented in the chapter 4 as well as the additional analysis, then leading to the conclusion of the study.

Literature Review and Hypothesis Development

This chapter begins by laying out the structural definition of CEO duality, its importance and why it is the central topic of this study. Moreover, what theories and prior literatures have discussed about dual leadership. Furthermore, it will go on to the measures of long-termism used in this paper, the moderating effect of having independent directors and also exploring the competition level between companies in the same industry. Eventually, all relevant hypotheses will be developed and described in the last part of this chapter.

CEO duality and its relevance

The term "CEO Duality" refers to someone who holds two roles in a company, as a Chief Executive Officer (CEO) and also a Chairman of the board. To simply give insights between the CEO and the Chairman, the table below contains the brief summary of different duties held by both roles:

Table 1. The Responsibilities between CEO and Chairman

	Responsibilities of the CEO	Responsibilities of the Chairman
General activities	- Main responsibility is to run the company's business. - Together with the executive team, the CEO is responsible to propose and develop the Company's goals and strategy, which should be discussed with the Board members. - Maintaining good communications with the Chairman and other board members about company's performance and current issues.	- Lead the board of directors and set the agendas. - Emphasize in discussing company's issues which related to the strategic, rather than routine issues. - Assure the board members receive accurate, timely and clear communications about the Company's performance or current challenges. - Propose the new membership of directors as well as lead the regular meeting.

	- Leading the communication with stakeholders, e.g. annual reports, press conference, announcements, etc. - Ensuring the Company complies with applicable laws and regulations.	- Chair the nomination committee, e.g. compensation committee, audit committee, etc.
Reporting	The CEO reports to the Board.	The Chairman reports to the Board of Directors

As reflected in the table 1, both roles are having huge responsibilities and influence within one company. This also one of the reasons why leadership structure still has been a popular topic among the practitioners and also academic researchers (Coles et al., 2001; Donaldson & Davis, 1991; Kim et al., 2009). Briefly, some prior studies believe that single leadership is more appropriate as it is able to separate the individual interest and avoid the CEO entrenchment (Boyd et al., 2005; Kim et al., 2009). Meanwhile, other studies support the CEO duality as unity of command and build more effective communications between executives and board members (Brickley et al., 1997). These pros and cons will be further explained in the following sub-chapters, but before doing so, it is interesting to see the trend of both CEO duality and non-duality within the U.S.

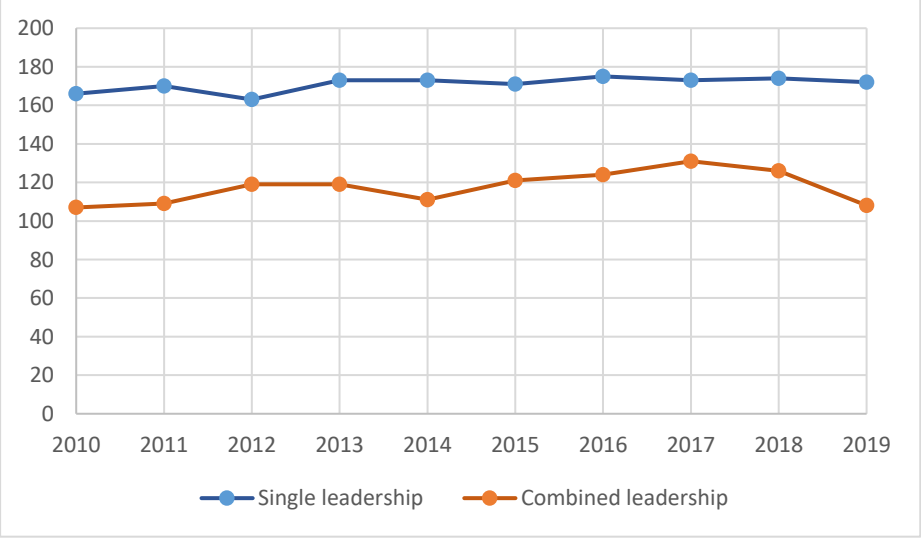

Figure 1. Trend of CEO Leadership's Structure

For the last ten years, the trend of dual leadership has still caught the attention between U.S companies under the S&P 500 Index. The figures below show the gap between companies who have CEO non-duality and CEO duality. This trend is generated from the

ExecuComp database by only including the CEOs of companies belonging to the S&P 500 Index and excluding the financial and also utility companies based on their SIC codes. The period taken is between 2010 until 2019. The number of companies that have their CEOs concurrently as the Chairman of the Board has slightly increased between 2014 until 2017, meanwhile, the CEO non-duality trend remains stable from the last ten years.

In line with the CEO duality trend in previous figures, it adds the relevance to this paper to further examine the roles of CEO duality in companies. Two contradicting theories that are closely related to this topic are agency theory and stewardship theory. According to the study provided by Jensen & Meckling (1979), agency theory clearly explains the separation between the principals (owners) and the agents (managers). This is important to align the interest of both parties which is maximizing the shareholders' returns. Furthermore, a number of studies suggest that agency theory against dual leadership as it promotes CEO entrenchment (Pfeffer & Pfeffer, 1981; Boyd et al., 2005; Kim et al., 2009). The CEO entrenchment occurs when the CEO puts their own self-interests ahead of the shareholders' or company's interests. Assuming that action potentially exists within the company, dual leadership could then confound the balance of powers between the CEO and the monitoring function by the board of directors which supposedly control management initiatives and actions (Boyd et al., 2005). For example, when the CEO has superior knowledge about the business compared to what each of directors have. As a result, CEO duality has incentives to capitalize or even manipulate the information during the board decision-making processes and hence might reduce the capability of board directors in providing effectiveness in monitoring functions. Overall, the agency theory highlights the downsides of having dual leadership. It is not consistent with the concept of checks and balance, it could potentially dominate the agenda of board meetings and eventually weaken the balance of power in top management.

In contrast to agency theory, stewardship theory argues that dual leadership brings benefits to the companies. The CEO, under this theory, is not seen as an opportunistic figure, instead they tend to perform their ability and do a good job for sake of good company performance. Donaldson and Davis (1991) also mention when the CEO has dual leadership, it is actually part of a self-actualizing process rather than implying opportunistic behaviour. This process could be achieved if the company was able to provide an effective organizational structure in which the executives could show to what extent they can achieve the performance they aspire (Donaldson & Davis, 1991). The structure needs to be clear as it facilitates the roles expectations according to a proper hierarchy lines, thus, with regards

to the role of the CEO, their position gives authority to show their ability and achieve remarkable performance. In order to achieve such high performance, stewardship theory suggests that dual leadership is the answer since power and ability are combined in one person (Donaldson & Davis, 1991). There is no room for doubt and the leadership is clearer and more consistent both to management and the board of directors.

As in line with Tribbett (2012), there is no exact answer when a company determines their leadership structure to be changed from non-duality to duality or the other way around. No "one-size-fits-all" approach can ever be applied for the CEO-Chairman issue as each company is unique with their own circumstances. The duties of CEOs alone, in essence, are not limited to major corporate decision-making but by also giving one more role, as Chairman at the same time, the concentrated position is likely adding more influence beyond the company performance (Adams et al., 2005). Thus, taking this reason, as well as the two main theories, prior studies and current trend of CEO duality, this paper would still be relevant to gain more insights about having CEO duality in the company.

The measures of corporate long-termism.

As I go through the prior literature, I have found two interesting terms: short-termism and long-termism. Short-termism can broadly be defined as a company's fixation on managing their short-term priorities by the urgent need to fulfil the quarterly earnings at the cost of long-term investment (Tang & Greenwald, 2016). Meanwhile, companies with long-termism have a tendency to focus their attention on long-term gains. In relation to the dual leadership further discussed in this paper, I assume such a decision to go for prioritizing the short- or long-term gains are managed by the ones in top management including the CEO. Moreover, to the best of my knowledge, the academic literature mostly relates the dual leadership with the corporate performance indicators rather than specifically seeing the effect on strategic decision making. Hence, it would be relevant to further see how this paper could cover the strategic decision making by companies which have dual leadership.

One survey from McKinsey in the early 2016 involved more than 1,000 C-level executives and board members from all different industries and positions all around the world. This survey raised similar questions in the same panel as asked in 2013's survey (Barton et al., 2016). The results show the increasing rate from 79% to 87% of pressure experienced by the top management in order to achieve strong performance within two

years or less. This pressure arises from the sentiment of the financial market that companies need to maximize their short-term results. In line with the survey's result, Lazonick (2014) captures the exceptional rise of share buybacks done by companies within the S & P 500 index during the period 2002-2012. In average, they used 54% of their earnings to buy their own stock, hence showing how companies turn their profit from investing in the future growth. Some justifications are then made by the buyback proponents, they argue that buying their own shares at an undervalued price actually shows their confidence in the company's future and by doing so, it is able to show their interests to the shareholders. However, in contrast to that, Barton et al., (2016) also note that in general, buybacks occur when a company is about to miss their earnings per share target, thus they decide to increase their stock price in the short time by doing buybacks, regardless of their impact in the long period.

Reflecting to this fact, this seems like the balance between short-term accountability and long-term value creation is a bit off the track. Barton & Wiseman (2014) argue that short-termism is actually underestimating the ability of companies to grow and by further consequences, it could potentially slow down the GDP growth, increasing the number of unemployment and lowering the return on investment for some stakeholders. Therefore, the emphasis of long-term mind-set is important and often become the highlight in some international forums for companies to shift their "shared-value" perspective into more "sustainable capitalism" (Barton & Wiseman, 2014).

The existing researches have much discussed the short-termism of the companies, meanwhile, the topic of long-termism has still left some gap for further studies to fill it in. Along with the growing literature, two indicators are chosen to represent long-termism: Research & Development Intensity (R&D Intensity) and Capital Expenditure Intensity (CAPEX Intensity).

Artz et al., (2010) found that the higher companies spend on R&D, it leads them to higher innovation capabilities as well as their firm value in the future. Moreover, some other literatures also agree that R&D Intensity is a sign of companies are willing to take risk regarding their position in competitive market whether it can be sign of long-term success but also not ignoring the low likelihood of success the project would be (Bravo and Reguera-Alvarado, 2017; Kothari et al., 2002; Lee & Marvel, 2009; Gentry & Shen, 2013).

The recent figure provided by the National Science Foundation (2019) shows the growing number of R&D spending which mainly comes from business sector performance within U.S. companies. Martin (2015) even claims the 2015's trend as the highest level of

R&D intensity (relative to percentage of GDP) along U.S. history. In 2015, the business sector provided $333.2 billion of funding for R&D or contributing to 67% of total R&D funding in the U.S. Moreover, the execution of those R&D funding reached $355.8 billion or 72% of total R&D performance in that country. By reflecting on this fact, it is presumably true that most U.S. companies nowadays are eager to invest their money and take risks in order to secure their position in the market as well as keep innovative. Shortly, Martin (2015) calls R&D intensity as one of the ways to see the company's value-creating investment process.

Aside from R&D Intensity, another long-term decision which companies regularly face is regarding the amount of capital spending or here is called capital expenditure (Chung, et al, 1998). Capital expenditure (CAPEX), in general, indicates the use of a company's resources. Litt (2013) mentions the reasons why companies invest considerable amounts of money on capital expenditures are to increase their firm performance and maintain the competitive advantage in the market. Besides that, Kothari et al., (2002) provide the reason why the capital expenditure is generally higher than R&D expenditure. They explain capital expenditure brings more certainty in terms of future earnings to the company.

The Census Bureau's Annual Capital Expenditures Survey (2019) reports the trend of CAPEX within non-farm industries among North American companies. In their 2019's report, it highlights the 22.5% increase of CAPEX between 2008 and 2017. The top five sectors which have dominated the increasing trends from 2008 and 2017 are including utilities (35.5%), manufacturing (16.5%), wholesale trade (34%), retail trade (25.4%) and transportation and warehousing (38.4%). In line with the trends of R&D spending, here we can summarize the urge of companies to strategically escalate their performance and maintain their position not only in the short period but also to be more sustainable for the long-term period.

The moderating role of independent directors and industry competitiveness.

In the first two sub-chapters we have discussed the benefits and costs of having dual leadership within companies, as well as the indicators of corporate long-termism. When we think about that, many of strategic decisions are generally decided by top management. Thus, it is recommended for companies to be careful of their composition of executives and also the ones sitting on the board of directors.

Consistent with the Sarbanes-Oxley Act of 2002 (SOX), the companies are encouraged to increase the roles of independent directors especially between public companies in the U.S. (Bargeron et al., 2010). Furthermore, the U.S. Securities and Exchange Commission also approved the proposition that the requirement of the majority board of directors needs to be independent directors according to the definition under the listing's standards. The listing's standards requires all NYSE's listing companies to have their audit, governance, and compensation committee be fully independent directors.

There is a large volume of published studies describing the role of independent directors. Macus (2008) highlights the communication between directors as the components of board effectiveness process to ultimately affect the firm performance. In specific, Armstrong et al., (2014) identify, although, gaining information and processing it are higher for more independent directors, companies' transparency rises with the higher number of independent directors, then leads to lowering the information costs within the firm and promotes the high-quality of accounting information.

As regards with CEO duality issues, having diversity in the board of directors is actually a solution. According to Core et al., (1999), the composition of board of directors consists of inside directors and some of the independent directors such as outside directors, grey outside directors, interlocked outside directors and busy outside directors. Having diverse characteristics in board of directors is expected to balance the power of the CEO duality in making decisions for both short-term and long-term firm profitability. Bebchuk et al., (2002) argue that the independent directors are able to increase the monitoring effectiveness since they are not part of a firm and confined to reputation, hence they could provide independent governance practices as long as they do not have long-term relationship with the CEO duality or other inside directors.

The second moderating role is industry competitiveness which is considered closely related to corporate long-termism. It has been mentioned several times in previous sub-chapters that when companies decide to set their budget more on R&D and also CAPEX, it could be a sign that companies want to secure its place in the market. Specifically, there are some prior studies investigating the importance of corporate governance on competitive industry.

One study from Zhang (2018) suggests the complementary relation between competition and governance when companies assign more power to their CEOs. Especially, when companies have strong governance inside high-competitive markets, the market reacts positively towards CEO Duality because they believe more effective

decision making can be made. As also noted by Chung, et al. (1998), CEO reputation is able to mitigate unfortunate stock price reactions when it comes to the announcement of capital investment. In their study, when companies have high free cash flow and small growth opportunities, the good reputation of the CEO will bring a new impression for investors, hence, it induces market reaction and ultimately affects the level of competitiveness.

Hypothesis development

CEO duality and corporate long-termism

Two main theories that have been discussed so far are the agency theory and stewardship theory. Agency theory emphasizes that the role of CEO and chairman of the board should be separated because it leads to opportunistic behaviour and sets aside the shareholders' interests. Conversely, stewardship theory supports this dual leadership as a form of unity of command from the CEOs. Thus, as this paper will further examine the relationship between CEO power and corporate long-termism, it is better to see what prior findings say about the effect of dual leadership to some organizational outcomes.

In general, the findings are still mixed and inconclusive. Some prior studies support the notion of having two management roles combined, whereas others prefer the separation of the CEOs and chairman in order not to have a single person dominate two positions (Chen et al., 2005; Coles et al., 2001; Dulewicz & Herbert, 2004). In addition, Core et al., (1999) examined the data from 495 observations between U.S. companies and concluded that companies with weaker corporate governance are positively associated with the greater agency problems, when at the same time the CEO who holds two roles is able to receive extra compensation.

A broader perspective has been explored by Chen & Chenge (2011) who argues that power within the company derives from the legitimate position which is the CEOs and their role is not only about the strategic development and its implementation, but also involves the major decision making activities in more comprehensive matters. Hence, the CEO power is presumably able to trigger the company's innovativeness which hopefully improves their position in the competitive market and increases their business performance. They further argue, by having the power centralized in the CEO, the high level of CEO's authority would influence the managers to be more confident and proactive towards innovative projects.

Considering all of these studies and also in line with stewardship theory, my point of view towards CEO duality tends to be positive as it is able to provide strong leadership and clearer goals to the company. In my opinion, when a person comes to such a huge position, they will not gamble their opportunity instead put the best effort out of it. Especially, if the chosen CEOs had started their career in the same company from junior level and climb up their way since then; or have been in several companies with good reputation, we can assume when they get opportunity to be CEO and Chairman, they would see it as their own accomplishment, satisfaction and even more willingness to maintain their reputation by acting under shareholders' interest (Brickley et al., (1997). Therefore, I would like to propose the first hypotheses, stated formally:

Hypothesis 1a. The power owned by CEO duality is positively associated with corporate long-termism.

Hypothesis 1b. The power owned by CEO duality is negatively associated with corporate long-termism.

Moderating variable: independent directors

Moreover in this study, one further interesting topic is how other components of corporate governance as suggested by Sarbanes-Oxley Act 2002 moderates the association between CEO duality and corporate long-termism. The primary interest in this paper is the monitoring role by the board of directors, especially the proportion of independent directors among the board members. Following the arguments in agency theory, the power of CEO in dual leadership to act opportunistically, at least, can be mitigated by the presence of independent directors or often called as non-executive directors (Kim et al., 2009). Independent directors, thus, are expected to be able to provide more critical insights and effectively monitor management risk-taking behaviour.

In contrast to earlier findings, Bravo & Reguera-Alvarado (2017) found that CEOs with combined leadership and long tenure tend to take risks especially when it is related to R&D spending. Desai et al., (2003) have also been able to show that under the dual leadership, independent directors have positively associated the acquisition completion. Moreover, in one research examining the association between independent and corporate diversification, Goodstein and Boeker (1991) suggest that a high proportion of independent directors – with no dual CEO – reduce the level of business diversification. They assume the vote of passive boards is going to have more

diversification which can be achieved if companies have one person as a CEO and also chairman of the directors.

Taken together with all this contrast evidence, I assume the presence of independent directors under dual leadership of CEOs could confront any CEO's behaviours either to take more initiative or step back from getting too ambitious concerning long-term decision making. Similar to the first and second hypotheses, I propose two predictions that independent directors are either diminishing or raising the relation between CEO duality and corporate long-termism. Later, we can also make the conclusion whether independent directors could be a "reminder" so the CEOs are not taking too much concern in making important strategic decisions or on the contrary, be a "motivator" so the CEOs would be more eager to take initiative on uncertain yet long-term beneficial decisions. Stated formally:

Hypothesis 2a. The relationship between CEO duality and corporate long-termism is diminished with board independence.

Hypothesis 2b. The relationship between CEO duality and corporate long-termism is raised with board independence.

Moderating variable: industry competitiveness

So far, most studies have focused on CEO duality and relate it with other indicators of corporate governance (e.g. independent directors, inside directors, gender, tenure, etc.). Meanwhile, much less is known about how CEO duality can be affecting corporate long-termism if the industry competitiveness is also taken into account.

Sheikh (2018) reviewed some literature and found that corporate governance and industry competitiveness may work as a substitute for companies with poor corporate governance. Both corporate governance and industry competitiveness are presumed to be able to mitigate the agency problems. Logically, strong corporate governance tends to have effective monitoring of the management which ultimately urges the management to focus on increasing the company's value. The reason why it is said it can be a substitute for companies with poor governance is in line with the findings that as corporate governance weakens, the firm performance decreases more in less competitive markets than in high competitive markets. Thus, by increasing corporate

governance, the companies would be able to also increase their companies' value even though they are under a less competitive market.

Considering the substitute relation between corporate governance and industry competitiveness, this can be misinterpreted as if the companies in highly competitive industries do not need to have strong corporate governance. Thus, through extending the prior literature, Zhang (2018) incorporated agency theory and stewardship theory into his study and found the complementary relation between corporate governance and market competitiveness. To be specific, he evaluates the market reaction towards the announcement of CEO duality. When companies add more roles to the CEO (also as a Chairman), there is an increase in management efficiency and subsequently, this benefit is positively associated with the complexity and competitiveness of the product in the market where companies operate. Nonetheless, only companies with strong governance are able to capture this benefit as they add more roles to their CEOs. However, at the same time those companies need to continuously monitor and mitigate the additional agency problem that potentially could arise from CEO duality.

In view of all that has been mentioned so far, I propose that when companies are in the highly competitive market or industries, that kind of situation would constantly push companies especially the top management to work more effectively and efficiently. The CEO needs to make quick decisions but at the same time maintain companies' position in the market. Thus, stated formally, the third hypotheses are:

Hypothesis 3a. The high industry competitiveness strengthens the association between CEO duality and corporate long-termism.

Hypothesis 3b. The high industry competitiveness weakens the association between CEO duality and corporate long-termism.

Methodology

In this chapter, I would like to discuss the empirical model used for each hypothesis and also derive the sample selection from the database used in this paper. The further information of each variable and Libby boxes are provided in the Appendix B and Appendix C.

Sample selection

The sample used for this study consists of U.S. companies under Standard & Poor's 500 Index. This region is selected upon its similarities in corporate governance regulation. Furthermore, the financial and governance information from these companies are obtained between fiscal year 2010 and 2019. I took all the information through three databases: Compustat, BoardEx and Execucomp – by using WRDS.

The sample selection starts with identifying the CEO role in the Execucomp databases. That database provides "CEOANN" and "EXECDIR" variables to facilitate the researchers obtaining information about the person with the CEO's role and the ones who hold dual leadership, respectively. Moreover, I also exclude the companies within financial and utility industries due to their difference in capital structure, operations, and its governance. After extracting the main CEO information from Execucomp, the financial information is found in the Compustat database. Since this paper aims at examining the effect of CEO duality on corporate long-termism, it is important to find the data of research and development expenditure and capital expenditure, as well as other control variables needed. To combine the samples from ExecuComp, CUSIP identifier is used to merge the information with the Compustat database. The last database used in this study is the BoardEx. In this database, I obtain the governance information such as the board size (BSIZE), the proportion of independent directors (INDEPDIR), the proportion of inside directors (INSIDER) and eventually I managed to merge all three databases and yield to 2,803 observations.

Table 2.
Sample selection process.

Details	**Number of observations**
Company-year observations in ExecuComp with identified-CEO role	19,015
Less: Company-year observations outside S&P 500 Index	(14,244)
Less: Company-year observations from financial and utility industries	(1,611)
Less: Company-year observations with insufficient financial data in CompuStat	(319)
Less: Company-year observations with unavailable governance data in BoardEx	(43)
Company-year observations in final sample	2,798

The final number of observations is derived step-by-step according to the information on the table above. For the financial data, it is important to ensure the availability of research and development expense, as well as the capital expenditure, since both of those expenses are the dependent variables in this study. Furthermore, the most recent year included is fiscal year 2019 and this final number of observations is further used to examine all the Hypothesis 1, 2, and 3.

Empirical model

The two dependent variables of this study are Research & Development Intensity (RDI) and Capital Expenditure (CAPEX). RDI is calculated by dividing total research and development expenses with total annual sales or revenue (Chen & Chenge, 2011). Similarly, CAPEX is the ratio of capital expenditure divided by total sales or revenues. The information related to these two ratios are found using Compustat (WRDS) database.

To test the first hypothesis about CEO Power and its effect on corporate long-termism, I use the dummy variable to represent the power of CEO. The value of 1 meaning that one person has both roles as the CEO and also as the Chairman of the Board of Directors, and zero value otherwise (Chen & Chenge, 2011; Coles et al., 2001). The CEO duality (DUAL), therefore, reflects the power owned by the CEOs which presumably is higher than the power owned by CEOs in single leadership companies. Once the samples were extracted, I regress using following model in which the variable of interest is the β_1 :

$$RDI_{i,t} = \alpha + \beta_1 DUAL_{i,t} + \beta_2 Control\_variables_{i,t} + \varepsilon_{i,t}$$
$$CAPEX_{i,t} = \alpha + \beta_1 DUAL_{i,t} + \beta_2 Control\_variables_{i,t} + \varepsilon_{i,t}$$

Following the first OLS regression, the moderating variable is now included in the model to see whether proportion of the independent directors (and later, the industry competitiveness) would strengthen or weaken the association between CEO duality and corporate long-termism. The role of board members, itself, can be classified into two major categories: dependent directors and independent directors (Chen & Chenge, 2011). Dependent directors or known as inside directors are the executives who own key positions within the company, for example CEOs and CFOs. In contrast to that, independent (outside) directors are those who are not employed by the company in the current period and neither having a strong relationship with someone inside the top executives. The information about the number of independent directors is found through the BoardEx database by only including the non-executive directors for companies under S&P 500. The proportion of independent directors (INDEPDIR) is defined by the number of independent directors divided by total number of directors. Once the proportion is set, the second regression model is provided with β_3 as the variable of interest:

$$RDI_{i,t} = \alpha + \beta_1 DUAL_{i,t} + \quad _2 INDEPDIR_{i,t} + \quad _3 \quad _{i,t} + \beta_4 Control\_variables_{i,t} + \varepsilon_{i,t}$$

$$CAPEX_{i,t} = \alpha + \beta_1 DUAL_{i,t} + \quad_2 \quad_{i,t} + \quad_3 \quad_{i,t} + \beta_4 Control\_variables_{i,t} + \varepsilon_{i,t}$$

Furthermore, the measure of industry competitiveness is represented by using Herfindahl-Hirschman Index (HHI). This index has been widely-known and is defined as follows (Zhang, 2018):

$$HHI_{j,t} = \sum_{i=1}^{N_j} S_{ijt}^2$$

The sigma defines the sum of squared market share of company *i* within industry *j* in year *t*. Market share is calculated as total company's sales to total industry sales. By reflecting on my samples, I use 2-digit SIC classification to identify the industries and build a new dataset for calculating the index. I also exclude the missing and negative value of sales. In addition, Zhang (2018) recommends to multiply the HHI by -1 (further to be called as *revHHI* variable), so then the interpretation of the results would be easier and more straight-forward as a high value of *revHHI* also indicates the high level of competition. If the *revHHI* variable has already set up, the third hypotheses can be tested using the regression model as defined below:

$$RDI_{i,t} = \alpha + \beta_1 DUAL_{i,t} + \beta_2 HHI_{i,t} + \beta_3 DUAL * HHI_{i,t} + \beta_4 Control\_variables_{i,t} + \varepsilon_{i,t}$$

$$CAPEX_{i,t} = \alpha + \beta_1 DUAL_{i,t} + \beta_2 HHI_{i,t} + \beta_3 DUAL * HHI_{i,t} + \beta_4 Control\_variables_{i,t} + \varepsilon_{i,t}$$

The predictive validity framework "Libby Boxes" for each hypothesis is attached in Appendix B as well as the details of variable definitions are listed in Appendix C.

Control variables

Most literature about CEO duality uses similar control variables to account for industry and firm-specific characteristics in order to obtain more fruitful insights later in their findings (Kim, et al., 2009; Zhang, 2018). Therefore, nine controls variables related to the dependent variable are used in this study: the CEO age and gender, number of directors on board, the proportion of inside directors, company size and industry as well as other financial performance measures. All governance data is mainly found in the ExecuComp and Boardex database, meanwhile financial information is found through the Compustat database.

The variable of *CEO's age* and *gender* are taken into account, as it is known to influence the decision making process by the CEOs (Duru et al., 2016). The younger the CEOs usually yield to more long-term decisions made. Moreover, *the CEO gender* variable is a dummy variable which equals to one if the EO is female and zero otherwise.

The *board size* is included, since it has responsibilities to monitor the CEO's performance. The composition of the board directors is also important whether the executives (*insiders*) dominate the board or the independent (*outsiders*) directors. All the information related to the board directors are obtained through the BoardEx by identifying the role name.

Next, larger firms are presumably having more resources available to be invested into research and development activities, and further on, it depends on in which industry those companies operate. Thus, *company size* and *company industry* are relevant to be accounted for as control variables in this study. *Company size* is calculated as the natural logarithm of a company's total assets and the *company industry* equals one if they are categorized as a manufacturing company and zero if it belongs to other industries. To know whether the company is a manufacturing company or not, I identify them by using the two digits of SIC codes.

To control the willingness of a company to invest in research and development or spend more in the capital expenditure, the return on asset (*ROA*) variable is included. This control variable represents one of the financial performance indicators which measured the net income divided by total assets of the firm, known as return on asset ratio (Cheng, 2014). In addition to that, the *leverage* is also calculated by dividing the total debt to total assets. This ratio is used to control the effects regarding the spending of a company's capital structure. Lastly, the *litigation* risk is classified based on companies' SIC code and equals to one if the companies are categorized having high-litigation risk. The list of SIC codes with high litigation risks are mentioned in the Appendix C.

Results

Descriptive Statistics

Compared to prior studies, the number of observations is smaller in terms of the existence of research and development expenses and the number of capital expenditure. Besides that, as mentioned in the previous chapter, the sample selection is focusing on the S&P 500 index by also excluding the financial and utility companies. For the measures of

corporate long-termism, the mean (median) of research and development intensity is 0.108 (0.15) while the mean (median) value of capital expenditure is 0.08 (0.042). Both the measures are consistent with prior research (Kim et al., 2009; Duru et al., 2016; Sheikh, 2018). In general, most of the companies are having single leadership, with 41.2% being in the combined leadership (CEO duality).

Furthermore, sample companies have on average 87.1% of their board seats filled with independent directors and 13% with inside directors. The HHI has mean value of 0.150; which indicates the companies included in the sample are generally conducting their business within a highly competitive market.

Table 3 also reports the descriptive statistics for all the control variables. The companies in the sample tend to be large companies with a mean (median) value of 9.39 (9.26); calculated by the natural logarithm of total assets. The average of *ROA* is 7.9%; leverage is 0.28 (0.26); and 28.9% of the sample companies are exposed with high litigation risk.

Table 3
Descriptive Statistics.

	N	Mean	25th percentile	Median	75th percentile	Standard Deviation
DUAL	2,798	0.412	0	0	1	0.492
RDI	2,798	0.052	0	0.008	0.063	0.088
CAPEX	2,798	0.065	0.020	0.035	0.059	0.117
INDEPDIR	2,798	0.871	0.857	0.889	0.909	0.064
revHHI	2,798	-0.150	-0.191	-0.041	-0.012	0.228
AGE	2,798	56.948	53	57	61	6.358
GENDER	2,798	0.040	0	0	0	0.196
BSIZE	2,798	2.426	2.303	2.485	2.565	0.182
INSIDEDIR	2,798	0.130	0.909	0.111	0.143	0.065
SIZE	2,798	9.390	8.537	9.261	10.209	1.229
FINDUSTRY	2,798	0.575	0	1	1	0.494
ROA	2,798	0.079	0.044	0.076	0.115	0.065
LEV	2,798	0.276	0.152	0.259	0.373	0.178
LIT	2,798	0.289	0	0	1	0.453
RDI missing	2,798	0.423	0	0	1	0.494

In table 4, the Pearson correlation between all variables is presented. The research and development intensity is significant and negatively correlated with the presence of the CEO duality, meanwhile capital expenditure is positively correlated with the CEO duality. As

one of the moderating variables, the proportion of independent directors is positively correlated when the companies have CEO duality. Larger companies tend to have CEO duality, have lower research and development expenses but distribute higher capital expenditure. They also tend to expand the number of independent directors compared to the number of inside directors. In general, the correlations between other control variables is consistent with prior studies.

Table 4
Correlation Matrix.

	DUAL	RDI	CAPEX	INDEPDIR	revHHI	AGE	GENDER	BSIZE	INSIDE DIR	SIZE	FINDU STRY	ROA	LEV	LIT	RDI Missing
DUAL	1.000														
RDI	-0.0546**	1.000													
CAPEX	0.027	-0.006	1.000												
INDEPDIR	0.137**	-0.046**	-0.045**	1.000											
revHHI	-0.014	0.261**	0.098**	-0.007	1.000										
AGE	0.115**	-0.106**	0.031	-0.078**	-0.074**	1.000									
GENDER	0.014	-0.019	-0.030	0.045**	0.028	0.004	1.000								
BSIZE	0.028	-0.148**	-0.117**	0.270**	-0.144**	0.046**	0.089**	1.000							
INSIDEDIR	-0.138**	0.044**	0.044**	-0.993**	0.008	0.078**	-0.045**	-0.267**	1.000						
SIZE	0.136**	-0.080**	0.073**	0.244**	-0.233**	0.071**	0.115**	0.469**	-0.242**	1.000					
FINDUSTRY	0.142**	0.157**	-0.194**	0.136**	0.176**	-0.023	0.047**	0.097**	-0.136**	0.050**	1.000				
ROA	-0.028	-0.037	-0.172**	-0.130**	0.047**	0.052**	0.018	-0.051**	0.129**	-0.172**	0.037	1.000			
LEV	0.037	-0.144**	-0.014	0.209**	-0.061**	0.079**	-0.003	0.168**	-0.208**	0.161**	0.036	-0.149**	1.000		
LIT	-0.099**	0.345**	-0.066**	-0.038**	0.060**	-0.048**	0.063**	-0.021	0.037	0.072**	-0.087**	0.146**	-0.058**	1.000	
RDI missing	-0.108**	-0.504**	0.104**	-0.133**	-0.256**	0.089**	-0.067**	-0.028	0.133**	-0.079**	-0.500**	-0.008	-0.022	-0.039**	1.000

The ** indicates significance at $p < 0.05$ with two-tailed t-tests. Sample period is 2010 – 2019. Variables are defined in the Appendix B.

Regression results

To provide an initial results of the CEO duality effect on corporate long-termism, I run the OLS regressions and the results are presented in Table 5. Regression (1) and (3) represent the regression accommodating only CEO duality variables and both dependent variables (*RDI* and *CAPEX*) without any control variables. The result shows significant effect of CEO duality on research and development intensity at 1% significance level; indicates that combined leadership reduces the amount of expense related to research and development. On the other hand, the CEO duality positively affects the number of capital expenditures by 0.6% but the influence is not as significant as research and development.

Next, regression (2) and (4) provide results that include the control variables and it is consistent with the first two regressions. Test results of Hypothesis 1 provide evidence where companies adopting CEO duality show lower levels of corporate long-termism in which the *RDI* significantly decreases to 1.1% and *CAPEX* increases by 0.6%. These results are similar with the findings discussed in Kim & Buchanan (2008), Damak & Halioui (2016) and Duru et al., (2016).

Moreover, some control variables provide the effects on corporate long-termism. One of them is the number of directors on board (*BSIZE)*. For both dependent variables, board size is negative and significantly affects the *RDI* and *CAPEX* by 4.1% and 32.6%, respectively. This suggests when the board size increases by 1 unit, they can influence the management for not spending too much on *RDI* and *CAPEX* to the certain percentage coefficient mentioned in the table 5. The coefficient of *ROA* is -0.175 and -0.310, which is both significant at 1% level, indicating that it plays an important role in affecting both research and development as well as capital expenditure of the company. This control variable is included to see how much companies are willing to invest for the long-term period and yet the higher the *ROA* the lower the willingness of the company in long-term investment through *RDI* and *CAPEX*.

It is good to be mentioned here that the proportion of independent directors (*INDEPDIR*) and inside directors (*INSIDEDIR*) have not been put in the regression models to test hypothesis 1. The *INDEPDIR* is discussed in the next regression model as the first moderating effect for this study. Therefore, when *INDEPDIR* is included in the model, I also examine the effect of *INSIDEDIR*, as one of the control variables.

Table 5
Analysis of the effects of CEO Duality on corporate long-termism.

Variables	Research & Development Intensity		Capital Expenditure Intensity	
	(1)	(2)	(3)	(4)
CEO duality	-0.010***	-0.011***	0.006	0.006
	(0.003)	(0.003)	(0.004)	(0.004)
CEO age		0.001		0.001
		(0.001)		(0.001)
CEO gender		-0.025***		-0.012
		(0.007)		(0.011)
Board size		-0.041***		-0.106***
		(0.008)		(0.013)
Firm size		-0.007***		0.013***
		(0.001)		(0.002)
Firm industry		-0.008***		-0.044***
		(0.003)		(0.004)
Return on assets		-0.175***		-0.267***
		(0.021)		(0.033)
Leverage		-0.066***		-0.031
		(0.008)		(0.012)
Litigation risk		0.065***		-0.019***
		(0.003)		(0.005)
RDI (CAPEX) missing		-0.095***		-0.117
		(0.003)		(0.077)
constant	0.056***	0.286***	0.062***	0.294***
	(0.002)	(0.021)	(0.002)	(0.085)
Year controls	Yes	Yes	Yes	Yes
Observations	2,798	2,798	2,798	2,798
Adj. R-squared	0.003	0.425	0.001	0.126

This table is an overview of the two regressions without and with control variables. The independent variables are tested on the dependent variable using OLS regression. Two dependent variables used here are the research and development intensity and capital expenditure. The definitions of each variable are provided in Appendix C. Standard errors are shown in parentheses. ***, **, * define the statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively.

The first set of regression models has examined the role of CEO duality on corporate long-termism without considering any specific role of the board members. In Table 6, the results summarize how independent directors contribute an important role in deciding the amount of *RDI* and *CAPEX* within companies.

As regards research and development, when companies have CEO duality and independent directors in their top management, the coefficient of *RDI* shows negative and significant results. This indicates the presence of independent directors are diminishing the power of CEO duality towards long-term decision by 7.7% with only 10% significant level. This result is somewhat counterintuitive as one of my hypotheses predicted the independent directors would strengthen the relation of CEO duality and corporate long-termism. I also assumed before, that independent directors would have contradictory results with coefficient *INSIDEDIR.* However, in relation to research and development intensity, both *INSIDEDIR* and *INDEPDIR* are negatively affecting the dependent variable.

Similarly, the interaction coefficient between CEO duality and independent directors also negatively affects the capital expenditure intensity, although it is not shown as significant as the effect on *RDI*. This argues that the presence of independent directors drives the CEO duality not to invest more than 6.4% in capital expenditure – 1.3% lower than the percentage on *RDI*. Hence, these results support Hypothesis 2a.

Furthermore, to relate these results to the theory discussed in the previous two chapters, the prior studies have shown mixed evidence as well as in this study, depends on which indicators are used for measuring corporate long-termism. In detail, when the proportion of independent directors is not taken into account, the results tend to align with agency theory on deciding the amount of *RDI* level (supports Hypothesis 1b) and more to stewardship theory when it comes to *CAPEX* (supports Hypothesis 1a). However, when the proportion of independent directors as well as inside directors incorporate into the model, both the coefficient of duality show positive signs whilst it provides negative coefficient in the interaction term, which indicates the necessity of having more independent directors on board. Theoretically, when I firstly reflect on the results in Table 6, I would say stewardship theory holds a bigger role as the positive coefficient appears on both *RDI* and *CAPEX*. However, looking at the relatively high effect of having independent directors (-0.656 on *RDI* and -0.454 on *CAPEX*), the results accommodate the agency theory which demands companies to have more independent directors in order to monitor the top management. I would also support the findings of Kothari, et al., (2002) which suggests that capital expenditure brings more certainty towards the future earnings compared to research and development expenditure. This potentially be the reason why CEO duality tends to invest more in *CAPEX* and also the reason why the coefficient of interaction term is higher on *RDI* level.

Table 6.
The moderating effect of independent directors

Variables	Research & Development Intensity		Capital Expenditure Intensity	
	(5)	(6)	(7)	(8)
CEO duality	0.055	0.058	0.116*	0.081
	(0.048)	(0.040)	(0.067)	(0.065)
INDEPDIR	-0.032	-0.656	-0.053	-0.454
	(0.030)	(0.538)	(0.042)	(0.879)
Duality x INDEPDIR	-0.073	-0.077*	-0.124	-0.064
	(0.057)	(0.045)	(0.076)	(0.075)
CEO age		-0.001		0.001
		(0.000)		(0.000)
CEO gender		-0.024***		-0.011
		(0.007)		(0.010)
Board size		-0.036**		-0.101***

		(0.008)		(0.013)
Inside director		-0.610		-0.413
		(0.528)		(0.864)
Firm size		0.007***		0.013***
		(0.001)		(0.002)
Firm industry		-0.008***		-0.043***
		(0.003)		(0.004)
Return on assets		-0.180***		-0.272***
		(0.020)		(0.034)
Leverage		-0.061***		-0.027**
		(0.008)		(0.012)
Litigation risk		0.065***		-0.019***
		(0.003)		(0.005)
RDI (CAPEX)		-0.096***		-0.117
missing		(0.003)		(0.077)
constant	0.084***	0.924*	0.108***	0.730***
	(0.027)	(0.536)	(0.036)	(0.880)
Year controls	Yes	Yes	Yes	Yes
Observations	2,798	2,798	2,798	2,798
Adj. R-squared	0.004	0.427	0.003	0.126

This table is an overview of four regressions to test the moderating effect of independent directors on the relation between CEO duality and corporate long-termism. Two dependent variables used here are the research and development intensity and capital expenditure. The definitions of each variable are provided in Appendix C. Standard errors are shown in parentheses. ***, **, * define the statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively.

Following the first moderating variable, I analyse the effect of industry competitiveness on the association between CEO duality and corporate long-termism. Regression model (9) and (11) provide results without any control variables, and model (10) and (11) does include control variables. Column (10) shows coefficient for interaction (*Duality x HHI*) is negative (-2.30%) and significant at 5% level, suggesting the more competitive the industry where companies conduct their business; having CEO duality contributes to the decreasing level of research and development intensity. Meanwhile, it is different for capital expenditure. Instead, having dual leadership among highly competitive markets increases the level of capital expenditure for 5% significantly. Similar to the arguments in the first moderating variable, the higher the level of industry competitiveness where companies operate in, those companies which led by CEO duality tend to invest more in capital expenditure rather than the research and development area (Kothari, et al., 2002).

Table 7.
The moderating effect of industry competitiveness

Variables	Research & Development Intensity		Capital Expenditure Intensity	
	(9)	(10)	(11)	(12)
CEO duality	-0.016***	-0.014***	0.010*	0.012**
	(0.004)	(0.003)	(0.005)	(0.005)
revHHI	0.116***	0.044***	0.041***	0.067***
	(0.009)	(0.007)	(0.012)	(0.012)
Duality x revHHI	-0.040***	-0.023**	0.026	0.050***
	(0.002)	(0.012)	(0.020)	(0.019)
CEO age		-0.001		0.001
		(0.000)		(0.000)
CEO gender		-0.027***		-0.016
		(0.007)		(0.011)
Board size		-0.039***		-0.101***
		(0.008)		(0.013)
Firm size		-0.005***		0.016***
		(0.001)		(0.002)
Firm industry		-0.009***		-0.053***
		(0.003)		(0.004)
Return on assets		-0.173***		-0.263***
		(0.020)		(0.033)
Leverage		-0.065***		-0.028**
		(0.007)		(0.012)
Litigation risk		0.063***		-0.023***
		(0.003)		(0.005)
RDI (CAPEX)		-0.090***		-0.128*
missing		(0.003)		(0.077)
constant	0.074***	0.267***	0.069***	0.268***
	(0.002)	(0.021)	(0.003)	(0.084)
Year controls	Yes	Yes	Yes	Yes
Observations	2,798	2,798	2,798	2,798
Adj. R-squared	0.073	0.433	0.010	0.152

This table is an overview of four regressions to test the moderating effect of industry competitiveness on the relation between CEO duality and corporate long-termism. Two dependent variables used here are the research and development intensity and capital expenditure. The definitions of each variables are provided in Appendix C. Standard errors are shown in parentheses. ***, **, * define the statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively.

To get a deeper insight of the moderating effect (*revHHI*), I separate the industry competitiveness level into two categories: high and low competition. Firstly, I checked the median level of the *revHHI* variable which is -0.041. Next, I make two different datasets to differentiate the companies which either belong to the high competition group (*revHHI* < -0.041) and low competition group (*revHHI* > -0.041). The dataset of high competition consists of 1,393 observations; meanwhile the low competition group has 1,405 company-year observations.

Further step is to apply the similar regression model from Table 7 to the new datasets. The variable of interest, in this model, is the interaction between CEO duality and industry competitiveness. Table 8 reports results from those specifications. Surprisingly, the

moderating effect seems stronger to be perceived for companies under low competition level with both showing significant results over 1% level. Both signs and significance are consistent with prior regression; negative for *RDI* and positive for *CAPEX*. The coefficient on the interaction between CEO duality and industry competitiveness equals to -1.275 on research and development intensity. Meanwhile, the coefficient is 0.345 for capital expenditure. Furthermore, it seems that combined leadership is more necessary and able to create significant value of long-termism when companies are in a low competitive industry. The motivation to drive companies to get a better position at the market is potentially the reason why the combined role of CEO also as a Chairman is implied between companies in a low competition market (Duru, et al., 2016; Sheikh, 2018).

In a high competition group, the coefficients on the interaction of duality and industry competitiveness are not statistically significant although it has similar signs as in the low competition market. Another interesting result also notes the significant coefficients of duality in low competition groups compare to the non-significant coefficient in high competitive companies. Again, this could be evidence that CEO duality is perceived to be important for companies under a low competitive market.

Table 8.
CEO duality and corporate long-termism: High- and Low- competition.

Variables	Research & Development Intensity		Capital Expenditure Intensity	
	High Competition	Low Competition	High Competition	Low Competition
CEO duality	-0.002	-0.035***	0.004	0.024*
	(0.003)	(0.008)	(0.007)	(0.013)
revHHI	0.021***	2.501***	0.046***	0.187
	(0.005)	(0.326)	(0.011)	(0.526)
Duality x HHI	-0.010	-1.275***	0.032	0.345**
	(0.009)	(0.424)	(0.018)	(0.688)
CEO age	-0.001	-0.001	0.001**	0.001
	(0.000)	(0.001)	(0.001)	(0.000)
CEO gender	-0.031***	0.012	-0.014	0.001
	(0.005)	(0.014)	(0.010)	(0.024)
Board size	-0.016**	-0.041***	-0.084***	-0.105***
	(0.007)	(0.014)	(0.014)	(0.022)
Firm size	0.009***	0.011***	0.019***	0.025***
	(0.001)	(0.004)	(0.002)	(0.006)
Firm industry	0.007**	-0.021***	-0.047***	-0.064***
	(0.003)	(0.005)	(0.005)	(0.007)
Return on assets	0.021	-0.217***	-0.165***	-0.304***
	(0.019)	(0.032)	(0.040)	(0.053)
Leverage	-0.020***	-0.100***	-0.028**	-0.028
	(0.006)	(0.013)	(0.014)	(0.020)
Litigation risk	0.037***	0.080***	-0.027***	-0.022***
	(0.003)	(0.005)	(0.006)	(0.007)
RDI (CAPEX)	-0.042***	-0.118***	-0.137***	-0.107
missing	(0.003)	(0.006)	(0.085)	(0.127)
constant	0.015	0.216***	0.185	0.206

	(0.020)	(0.040)	(0.096)	(0.141)
Year controls	Yes	Yes	Yes	Yes
Observations	1,393	1,405	1,393	1,405
Adj. R-squared	0.436	0.471	0.175	0.145

This table is an overview of four regressions to test the moderating effect of industry competitiveness on the relation between CEO duality and corporate long-termism. The median level used as the basis of the high- and low- competitive company is -0.041. Two dependent variables tested here are the research and development intensity and capital expenditure. The definitions of each variable are provided in Appendix C. Standard errors are shown in parentheses. ***, **, * define the statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively.

Robustness check

In this section, I carry out the difference-in-difference method. This method is chosen in order to examine the effect of the CEO duality on corporate long-termism once companies decided to change their leadership structure. Besides that, by having both treatment and control group, later on, it would provide a more robust identification, clear causal effect of both dependent and independent variable which hopefully be able to overcome the endogeneity problems within this study (Bertrand et al., 2004; Fredriksson & de Oliveira, 2019).

I use different datasets with smaller sizes of observations. Two datasets consist of treatment and control groups. The treatment group has information on companies that shift their leadership structure from single to dual leadership; and the control group consists of the companies that persist with having single leadership during the period taken for this study. When I go through the sample observations, I find most of the selected companies shift their leadership structure in 2016. There is no specific reason found in the prior studies or news that can motivate the shifting trend in 2016. Despite any reason, I decide the year 2016 as my adoption year of CEO duality for this diff-in-diff test. Eventually, I have 802 sample observations for both treatment and control groups. I also ensure those companies included have complete financial and governance information for three years prior- and three years after the changes of CEO leadership structure.

Table 9 presents the information for the CEO duality adopting companies to those of non-adopting companies pre- and post-adoption. The examination focuses on the means value. Panel A examines Research and Development Intensity (*RDI*). Comparing the *RDI* for companies with combined leadership, the mean of *RDI* was 0.0417 before adoption and slightly increased to 0.0418 after shifting the leadership structure. *RDI* also increased in the companies that stick with single leadership, from 0.0636 in the pre-period to 0.0655 in the post-period. The 0.0019 increase in *RDI* between pre- and post- period in single leadership companies is a little higher than the 0.0001 increase in the companies with CEO

duality. Panel B examines capital expenditure intensity (*CAPEX*). The mean of *CAPEX* for companies with combined leadership was 0.1442 before the adoption year and increased to 0.1542 following the leadership changes, representing an increase of 0.01. Companies with single leadership also experience the increase of *CAPEX*, albeit by smaller amounts, from 0.1328 pre-period and 0.1406 post-period. The results for both *RDI* and *CAPEX* in Table 9 are in line with the results in main regression which essentially refer to the decreasing of *RDI* (-0.0018) and increasing of *CAPEX* (0.0022) due to having CEO duality.

Table 9.

Company-level regressions of RDI and CAPEX

Panel A: Research Development Intensity (RDI)

		Single leadership	Combined leadership	Difference
		(I)	(II)	(II) – (I)
Pre-Adoption	(I)	0.0636	0.0417	-0.0219
Post-Adoption	(II)	0.0655	0.0418	-0.0237
Difference	(II)-(I)	0.0019	0.0001	-0.0018

Panel B: Capital Expenditure Intensity (CAPEX)

		Single leadership	Combined leadership	Difference
		(I)	(II)	(II) – (I)
Pre-Adoption	(I)	0.1328	0.1442	0.0114
Post-Adoption	(II)	0.1406	0.1542	0.0136
Difference	(II) – (I)	0.0078	0.0100	0.0022

This table provides the results of difference-indifference analysis of the change in research and development intensity (*RDI*) and capital expenditure intensity (*CAPEX*) following the shifting of single to dual leadership. *RDI* and *CAPEX* are as defined in the Appendix C. All continuous variables are winsorized at the 1st and 99th percentile. The (II) – (I) shows the differences in *RDI* and *CAPEX* following the shifting of leadership structure and the rightmost column shows the difference-in-difference estimator.

Table 10 presents the results using an entire sample of company-years observations using the treatment and control group built for this robustness check. Two moderating variables from the main regression are also included here: independent directors (*INDEPDIR*) in the Panel A and industry competitiveness (*revHHI*) in Panel B. Three pairwise interaction terms (*DUAL* × moderating effect), (*DUAL* × *POST*), (*DUAL* × *POST* × moderating variable) to account for the possible moderating effects on corporate long-termism.

Panel A shows the results from OLS regression of CEO Duality on dependent variable, *RDI* (1) / *CAPEX* (2) with moderating variable, *INDEPDIR*. In general, the

results on this expanded model suggest that the conclusions regarding the moderating effect of board independence are in line with the main regression in Table 6 and Table 7. For RDI, the coefficient of *DUAL* is positive and not as high as the main regressions' result (0.003 vs 0.058). In line with that, the result of the interaction *DUAL* × *POST* × *INDEPDIR* presents the negative association, which indicates that the role of independent directors on board weakens the power of CEO duality on research and development intensity by 4.8%. In addition to that, the coefficient of independent directors, itself, also appeared to be significant at 1% level, on *RDI*, compared to the proportion of inside directors (*INSIDEDIR*). The results of control variables indicate a negative association between *RDI* and the CEO's age (*CEOAGE*), CEO's gender (*CEOGENDER*), number of directors (*BSIZE*), the proportion of inside directors on board (*INSIDEDIR*), the firm industry (*FINDUSTRY*), return on assets (*ROA*), and level of leverage (*LEV*). The results show a positive association between *RDI* and firm size (*SIZE*) and litigation risks (*LIT*). For *CAPEX*, the CEO duality remains positive, with a coefficient of 0.076. The interaction of CEO duality, post-period, and independent directors; is found to be negative on *CAPEX* and is lower compared to the coefficient on *RDI*. These results give further confidence that more independent directors on board with CEO duality are associated with demanding lower levels of corporate long-termism; both towards the research and development matters and capital expenditure. Differences between coefficient signs of control variables in Panel A are found in CEO's age and litigation risk, the rest of control variables hold the same sign effects.

Table 10.

Full sample regression analysis of the RDI following the combined leadership

Independent variable	(1) RDI		(2) CAPEX	
	Coef.	Std. error	Coef.	Std. error
Panel A: Moderating variable – INDEPDIR				
DUAL	0.003	0.136	0.076	0.057
POST	-0.043	0.052	0.012	0.011
INDEPDIR	-0.401***	0.144	-0.070	0.038
DUAL × INDEPDIR	-0.088	0.085	-0.110*	0.066
DUAL × POST	-0.005	0.017	0.029	0.078
DUAL × INDEPDIR × POST	-0.048	0.104	-0.036	0.008
CEOAGE	-0.001	0.000	0.001	0.000
CEOGENDER	-0.028**	0.012	-0.011	0.008
BSIZE	-0.045**	0.020	-0.025**	0.011

INSIDEDIR	-0.085***	0.029	-0.042	0.027
SIZE	0.011***	0.002	0.005***	0.002
FINDUSTRY	-0.068***	0.006	-0.011***	0.004
ROA	-0.126***	0.040	-0.091***	0.028
LEV	-0.127***	0.016	-0.011	0.011
LIT	0.107***	0.006	-0.008**	0.004
CONSTANT	0.403***	0.075	0.112**	0.044
N	802		802	
Adj. R^2	0.415		0.046	
Panel B: Moderating variable – HHI				
DUAL	-0.025***	0.007	0.026***	0.005
POST	0.037	0.051	0.013	0.011
REVHHI	0.169***	0.025	0.049***	0.012
DUAL × HHI	-0.096*	0.056	0.028*	0.016
DUAL × POST	0.003	0.010	0.002	0.007
DUAL × HHI × POST	-0.043**	0.076	0.010**	0.018
CEOAGE	-0.001	0.000	0.001	0.000
CEOGENDER	-0.035***	0.012	-0.013	0.008
BSIZE	-0.012	0.017	-0.029***	0.011
SIZE	-0.005*	0.002	0.007***	0.002
FINDUSTRY	-0.061***	0.006	-0.010***	0.004
ROA	-0.131***	0.039	-0.092***	0.027
LEV	-0.115***	0.015	-0.001	0.010
LIT	0.100***	0.005	-0.006	0.004
CONSTANT	0.198***	0.042	0.103***	0.027
N	802		802	
Adj. R^2	0.438		0.067	

This table provides the results of OLS regression of CEO duality on *RDI* and *CAPEX* level including both the moderating variable; independent directors and industry competitiveness. The OLS regression is done using the new sample observation for robustness check. The *RDI, CAPEX, INDEPDIR* and *revHHI* are explained in the Appendix C. All continuous variables are winsorized at the 1st and 99th percentile. A regression includes industry fixed effects and year fixed effects. ***, **, * define the statistical significance based on two-sided tests at the 1%, 5%, and 10% level, respectively.

Panel B reports the regression results using the moderating variable, industry competitiveness. Overall, the industry competitiveness is seen to bring stronger effect on the association between CEO duality and corporate long-termism. Regarding the effect on *RDI* level, the coefficient of *DUAL* is negative and significant (-0.025), meanwhile it is positive and significant on *CAPEX* level (0.026). The industry competitiveness (*revHHI*) also perceived to play a big role in determining the corporate long-termism, with 16.9% on *RDI* and 4.9% on *CAPEX* level. The incorporation of *revHHI* into the interaction between *DUAL* and *POST* holds the negative association on *RDI* and positive

association on *CAPEX*. This argues as higher the competition level is, the companies with CEO duality reduce their *RDI* by 4.3% and conversely, increase *CAPEX* by 1.0% in the post-period when they shift their leadership structure. To sum up, the results in Panel B supports the result in the main regression on Table 7.

Conclusions

In this study, I investigate whether CEO duality affects corporate long-termism. Both agency theory and stewardship theory are incorporated in this study. Using an extensive set of literatures and its inconclusive findings, I first hypothesize that CEO duality can be positively or negatively associated with corporate long-termism following stewardship theory and agency theory, respectively. Two dependent variables used to represent the corporate long-termism are research and development intensity, as well as capital expenditure intensity. Subsequently, by applying a constructed regression model, I find that CEO duality is positively associated with research and development intensity, and negatively associated with capital expenditure intensity. Following the first hypothesis, I incorporate two moderating effects: proportion of independent directors and industry competitiveness. The interaction coefficient between CEO duality and independent directors shows negative association, which then confirms hypothesis 2a and rejects hypothesis 2b. Lastly, the second moderating variable of industry competitiveness weakens the association between CEO duality and research and development intensity, but strengthens the association on capital expenditure. This again confirms the mixed findings about the effect of CEO duality on corporate long-termism; negatively affect the research and development and positively influence the capital expenditure level. These results are robust when I run the difference in difference method. I specifically run the regression model to the sample observations which shift their leadership structure from single to combined leadership. In general, the results show the level of RDI and CAPEX are less affected by the CEO duality compared to the coefficient we get in the main regression with the sample of companies who already have CEO duality since the beginning period taken for this study.

This study contributes to existing literature in several ways. First, agree with Kim et al., (2009) and Duru et al., (2016), the proportion of independent directors remains important to control the excess power owned by the CEO duality. Although, I firstly assume the independent directors would motivate CEO duality towards the long-termism, but the findings here show independent directors play as a reminder or “brake” in terms

of not carelessly spending too much on *RDI* or *CAPEX*. Next, this study extends the knowledge of how CEO duality's effect on corporate long-termism can be influenced by industry competitiveness. Moreover, the samples taken here are under S&P 500 which consist of relatively high competitive companies.

There are several limitations to this research that leaves room to be explored in the future research. First, I rely exclusively on U.S. companies. Thus, the inclusion of samples from cross-countries would enrich the findings as they have different set of economics, corporate governance mechanisms, legal contexts, and so on. Second, given only two indicators for corporate long-termism, it may be inappropriate to draw strong conclusions only from those two indicators. It opens to other long-termism indicators such as free cash flows from operations, analysts' forecasts, profit margin, etc. Lastly, the calculation of industry competitiveness, in this study, is measured using two-digits of SIC codes. Hence, when the future research is able to pull out a larger number of samples, the industry competitiveness can be calculated using 3-digits of SIC codes to get more specific information.

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APPENDICES

APPENDIX A – Table and Figure of R&D Intensity in the U.S.

Source: (National Science Foundation, 2019)

TABLE 4-1

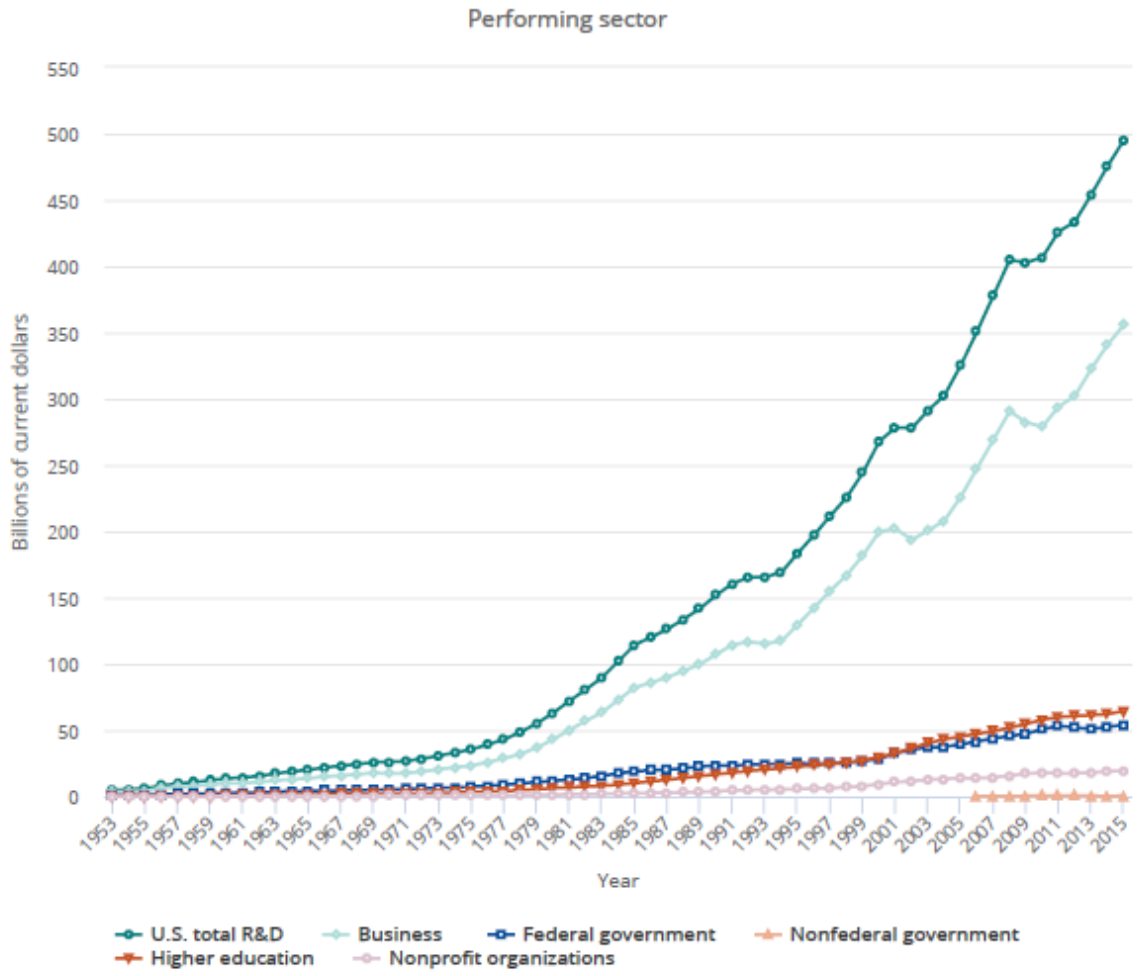
U.S. R&D expenditures, by performing sector and source of funds: 2008–15

(Millions of current and constant 2009 dollars)

Sector	2008	2009	2010	2011	2012	2013	2014	2015[a]
Current $millions								
All performing sectors	404,773	402,931	406,580	426,160	433,619	453,964	475,426	495,144
Business	290,680	282,393	278,977	294,092	302,251	322,528	340,728	355,821
Federal government	45,649	47,572	50,798	53,524	52,144	51,086	52,687	54,322
Federal intramural[b]	29,839	30,560	31,970	34,950	34,017	33,406	34,783	35,673
FFRDCs	15,810	17,013	18,828	18,574	18,128	17,680	17,903	18,649
Nonfederal government	491	606	691	694	665	620	583	610
Higher education	52,054	54,909	58,084	60,089	60,896	61,546	62,354	64,653
Other nonprofit organizations[c]	15,898	17,452	18,030	17,762	17,663	18,185	19,075	19,738
All funding sources	404,773	402,931	406,580	426,160	433,619	453,964	475,426	495,144
Business	258,016	246,610	248,124	266,421	275,717	297,167	318,382	333,207
Federal government	117,615	125,765	126,617	127,015	123,838	120,130	118,363	120,933
Nonfederal government	4,221	4,295	4,302	4,386	4,158	4,244	4,214	4,280
Higher education	11,738	12,056	12,262	13,104	14,300	15,378	16,217	17,334
Other nonprofit organizations[c]	13,184	14,205	15,275	15,235	15,607	17,045	18,250	19,390

FIGURE 4-1

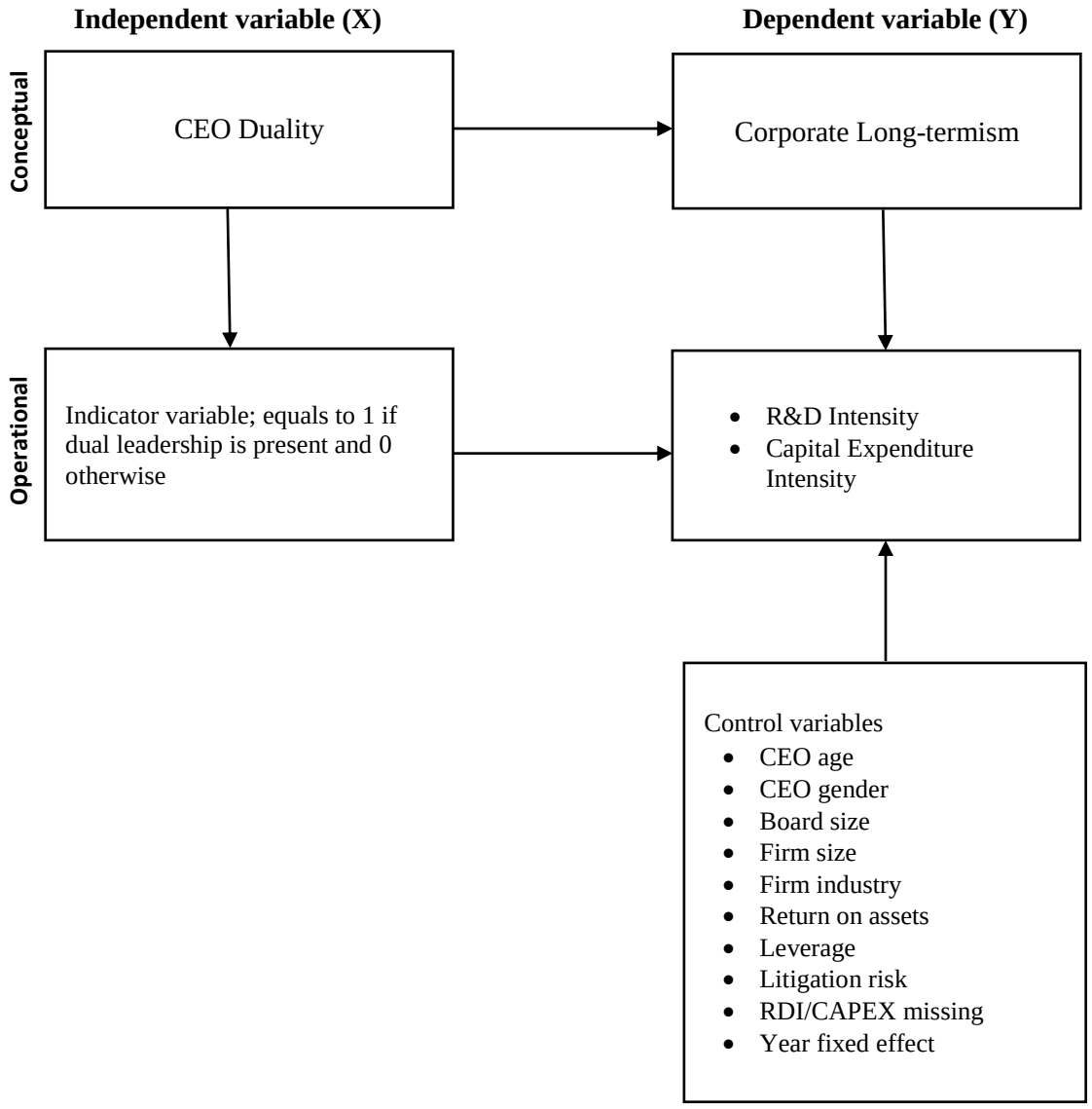
U.S. R&D, by performing sector and source of funds: 1953–2015



APPENDIX B – LIBBY BOXES

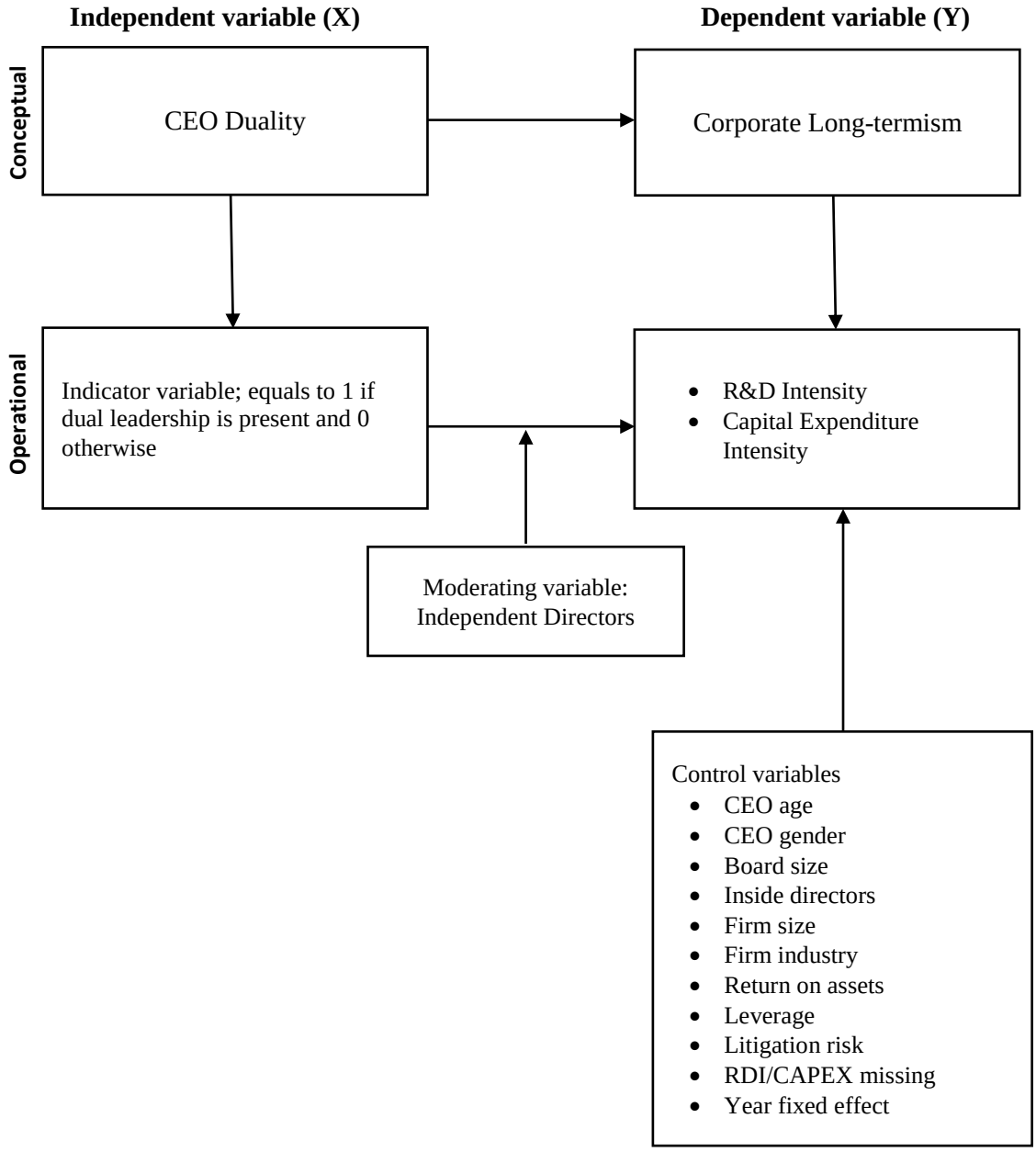
Hypothesis 1a. *The power owned by CEO duality is positively associated with corporate long-termism.*

Hypothesis 1b. *The power owned by CEO duality is negatively associated with corporate long-termism.*



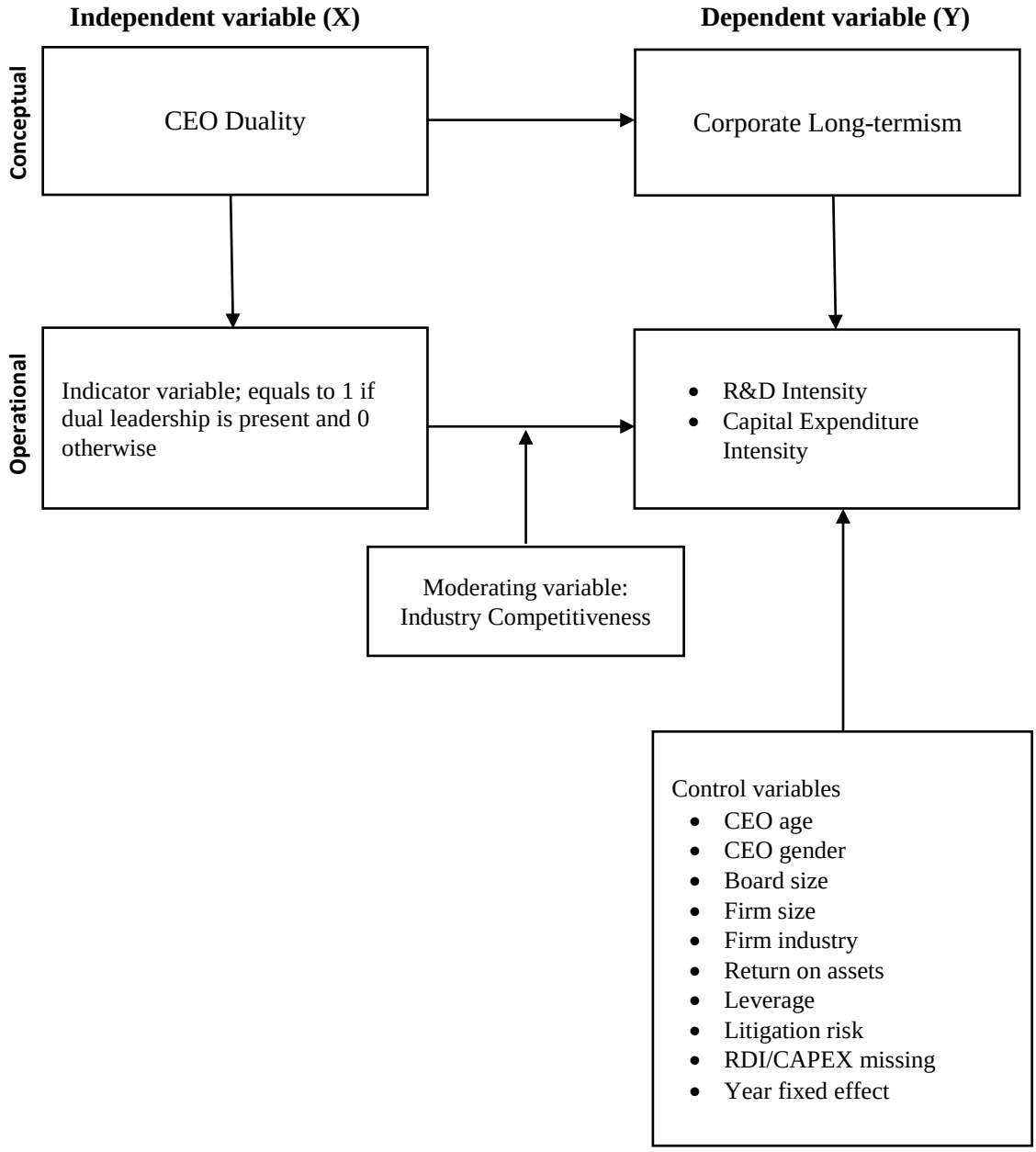
Hypothesis 2a. *The relationship between CEO duality and corporate long-termism is diminished with board independence.*

Hypothesis 2b. *The relationship between CEO duality and corporate long-termism is raised with board independence.*



Hypothesis 3a. *The high industry competitiveness strengthens the relation between CEO duality and corporate long-termism.*

Hypothesis 3b. *The high industry competitiveness weakens the relation between CEO duality and corporate long-termism.*



APPENDIX C – VARIABLE OF DEFINITIONS

Variables	Variable name	Measurement	Database
R&D Intensity	RDI	R&D Expenditure divided by lagged revenue	COMPUSTAT
CEO Duality	DUAL	Indicator variable; 1 if the CEO is also served as chairman of the boards, 0 otherwise	BOARDEX
Independent directors	INDEPBOARD	The proportion of independent directors scaled by total directors	BOARDEX
Industry competitiveness	HHI	Sum of squared market share of company	COMPUSTAT
CEO age	CEOAGE	The number of CEO's age	BOARDEX
CEO gender	CEOGENDER	Indicator variable; 1 if the CEO is female and 0 for male.	BOARDEX
Board size	BSIZE	The total number of board members	BOARDEX
Inside directors	INSIDEBOARD	The proportion of inside directors scaled by total directors	BOARDEX
Firm size	FSIZE	Log transformation of total assets	COMPUSTAT
Firm industry	FINDUSTRY	Indicator variable; 1 if the company are in manufacturing industry, 0 for other industries	COMPUSTAT
Return on assets	ROA	Net income divided by average total assets	COMPUSTAT
Leverage	LEV	Total debt scaled by total assets	COMPUSTAT
Litigation risk	LIT	Indicator, = 1 if the firm is a member of an industry with high litigation risk (SIC Codes with 2833-2836, 3570-3577, 3600-3674, 5200-5961, or 7370), and 0 otherwise	COMPUSTAT
RDI missing	RDImissing	Indicator variable; 1 if the RDI is missing and 0 otherwise	COMPUSTAT
CAPEX missing	CAPEXmissing	Indicator variable; 1 if the CAPEX is missing and 0 otherwise	COMPUSTAT
Year	Year	Fixed effect.	COMPUSTAT