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Corporate Governance and Conglomerate Diversification Strategy – Evidence from Vietnam

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"Life is like riding a bicycle. To keep your balance you must keep moving."

(Albert Einstein)

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Pécs, 22nd May 2017.

Nguyen Thi Xuan Trang

DECLARATION OF ORIGINALITY

I, the undersigned, solemnly declare that this dissertation is **my own original work**. I have clearly referenced all sources (both from printed and electronic sources) in the text in accordance with international requirements of copyright.

Pécs, 22nd May 2017.

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ABSTRACT

This research mainly examines the impacts of internal corporate governance mechanisms, including interest alignment devices and control devices, on the unrelated diversification level in Vietnam, a developing country in Asia and find out how agency theory can be used to explain the effects. Additionally, the moderation of free cash flow on these relationships and the effectiveness of diversification strategy to firm value in case of Vietnam are also tested. The study is based on a balanced panel data set of 70 listed companies in both stock markets, Ho Chi Minh Stock Exchange and Ha Noi Stock Exchange, in Vietnam in the years 2007 – 2014, which gives 560 observations in total.

The results showed that if the interest alignment device was increasing executive ownership for CEOs, the extent of diversification would be reduced. In the meanwhile, the link between unrelated diversification level and executive stock option, another interest alignment device, could not be confirmed. For three control devices (level of blockholder ownership, board composition, and separation of the position between a CEO and a board chairman), the study found a positive connection between blockholder ownership and diversification, and insignificant relations between Board composition or Duality in position and the conglomerate diversification level statistically. Interestingly, the agency theory could not be used to explain the relationship between corporate governance and diversification in case of Vietnam because there were no statistical evidences to assert the negative relationship between unrelated diversification level and firm value through Tobin's q at 5% significant level. The main reason might be that from 2007 to 2014, the average diversification level for each listed firm in Vietnam was quite low, less than 0.2. Thus, diversifying into new industries that were rather different from the core industries could bring not only challenges but also opportunities for the firms in this country in the era of globalization. Additionally, this study discovered a negative link between State ownership and diversification and there was no difference on the effect of each internal corporate governance mechanism on diversification level of a firm between high and low free cash flow.

The research makes several invaluable contributions to the current literature on relationships among corporate governance, firm diversification, and value of diversified firms.

Firstly, this research can be considered as a contribution to the related topic with an example of Vietnam, a developing country in Asia. Secondly, the research results continue to prove the fact that there is no unification in the results showing the relationships between corporate governance mechanisms and corporate diversification in literature. Thirdly, it seems to be the second research that follows the study of Castaner & Kavadis (2013) on the moderation of free cash flow to the effects of corporate governance on diversification. Moreover, it supports the argument that the agency theory is not always suitable to use in explaining the relations between corporate governance and diversification. Finally, the research makes a theoretical contribution to the topic of the effectiveness of conglomerate diversification strategy. It is suggested that it will be important for a firm to catch the maximum threshold of diversification level so that it can prevent counter-productive effects of the conglomerate diversification strategy.

In addition to invaluable contributions to the current literature on this topic, the research also can be a useful reference for not only investors, managers but also for policy makers in Vietnam. As far as the author knows, this study is the first one exploring the relations among corporate governance, diversification and firm value in Vietnam where the topics related to effectiveness of corporate governance mechanisms to public companies has been more and more attractive to researchers since the default of Vietnam Shipbuilding Industry Group (Vinashin) in 2010 happened and the Circular No. 121/2012/TT-BTC on 26th July, 2012 of Vietnamese Ministry of Finance was issued with regulations on corporate governance applicable to lists firms in this country.

CHAPTER 1: INTRODUCTION

1.1 Research background

Over the past three decades, the relationship between corporate governance and diversification has been studied in different countries as well as periods by various authors such as Amihud & Lev (1981), Denis et al. (1997), Collin & Bengtsson (2000), Singh et al. (2004), Jiraporn et al. (2006), Goranova et al. (2007), Kim & Chen (2010), Lien & Li (2013) and Castaner & Kavadis (2013). Until now this topic is still attractive to researchers because of its importance to corporations when they have to face strong national and international competition in the context of globalization today.

Diversification strategy is a corporate strategy that a firm pursues through diversifying its business portfolio to allow revenue smoothing between different business lines (Castaner & Kavadis, 2013). The term of diversification has appeared since 1957 in the study of Ansoff (1957). He suggested that diversification is one of product – market strategies for business growth in which there is a combination of both market development and product development with new requirements of skills, techniques and facilities. Developing from the diversification definition of Ansoff (1957), a large number of subsequent researchers, such as Amit & Livnat (1988), Berger & Ofek (1995), Anderson et al. (2000), Wheelen & Hunger (2006), Kim & Chen (2010), and Lien & Li (2013) continued to divide diversification into two different categories including *related diversification* and *unrelated diversification. Related diversification*, or *concentric diversification*, happens when a firm expands its activities to related industries based on its current competitive position together with available bases (such as product knowledge, manufacturing capabilities or marketing skills). In the meanwhile, *unrelated diversification* strategy consists of diversifying a firm's business portfolio through participating in new industries that are unrelated to its core industries. *Unrelated diversification* can be called with different names: *conglomerate diversification* or *pure-financial diversification.*

In terms of the effectiveness of diversification strategy, it seems to be not a good strategy for the firm because there have been much more researches proving its disadvantages

on not only firm performance but also firm value than researches disagreeing with these disadvantages or affirming its benefits; and it is noticeable that unrelated diversification was proved to have more negative effects on firm value than related diversification. In fact, it is undeniable that high diversification level and weak corporate governance were important causes leading to the collapse of Enron Corporation in the United States in 2001. Therefore, several researches studied direct or indirect relationship between corporate governance and diversification in order to investigate whether good corporate governance can prevent firms from engaging in conglomerate diversification strategy.

In Vietnam, a typical example for the consequence of highly unrelated diversification that arose from poor corporate governance was the default of Vietnam Shipbuilding Industry Group (Vinashin) in 2010. It can be seen as a disaster for the economy of Vietnam. It showed the weaknesses in the management of Vietnamese government. It reduced the image of Vietnam in the international business market when all Vietnam's credit ratings were downgraded according to Moody's Investors Service, Standard & Poor's and Fitch Ratings (Hookway & Tudor, 2010). Furthermore, it retarded sea economic development of Vietnam as well increased the cost burdens for related organizations in the economy.

Vinashin was established in the year of 2006 after re-arranging Vietnam Shipbuilding Industry Corporation that was set up in 1996 with a mission: to make Vietnam become a country which would be strong at shipbuilding industry not only in Asia but also in the world. Vinashin adopted parent - subsidiary model. Specifically, this group comprised a parent corporation in the form of a single-member limited liability company in which the Government held 100% charter capital and 15 subsidiary corporations (Minh Phuong, 2013).

In the period from 2006 to 2008 when the world economy as well as in Vietnam economy were growing rapidly, Vinashin did not hesitate to invest in several different sectors in addition to the main task (building new ships and repairing old ships) by setting up nearly 200 subsidiaries in all over the country. The lines of business it took part in could be related or unrelated to the main task. At that time, it became the most diversified group in Vietnam with a huge range of sectors, from producing steel, cement, constructing industrial parts to providing insurance, banking or aviation services or even assembling motorcycles (Huyen Thu, 2013).

The consequence of this diversification strategy was that Vinashin was affected considerably when the global economic crisis in 2008-2009 happened. Many projects could not be implemented due to the retreat of foreign investors or cancellation of contract from business partners. Another reason for the difficulties Vinashin confronted in this period was insufficient skills or poor management capacity in corporate governance of the group. Above all, the most important reason resulting in the default of Vinashin was that moral hazard problems occurred in this group when the executives took self-interested actions through running several inefficient and wasteful projects such as the investments on Lash Song Gianh fleet, Binh Dinh Star ship, Hoa Sen ship, Bach Dang Giang ship, Red River power plant and Cai Lan power plant (Ta Van Ho, 2012). However Vinashin deliberately provided dishonest financial statements over the periods; and this fraud was concealed until Government Inspectorate disclosed inspection results of Vinashin in July 2010.

As reported by the Government Inspectorate sent the Prime Minister, at the end of 2009, total assets of Vinashin reached to more than 102,500 billion VND. After excluding the internal debt, the total value of assets was nearly 92,600 billion VND. However total liabilities of Vinashin at that time was more than 86,700 billion VND including 750 million USD from Vietnamese government bonds, domestic and international bank debts, and corporate debts. Thus, total actual equity of Vinashin was only 5.900 billion VND that accounted for less than 7% of its total assets **(**Ngoc Ha & Vu Diep, 2013**).** The actual lost of Vinashin in 2009 was closely 5,000 billion VND that was more than 3,300 billion VND compared with the amount it stated in its financial statements (Minh Phuong, 2013). The default of Vinashin was officially revealed. On 1st November 2011, Vinashin was sued by Dutch-owned Elliott VIN Netherlands BV for a loan of 600 million USD that Vinashin received in 2007 but could not afford to pay (Minh Phuong, 2013).

To the year of 2013, Vinashin was reorganized and transferred back into Shipbuilding Industry Corporation (SBIC) as its original name in 1996 on the word of the Decision No. 3287/QĐ-BGTVT on 21st October 2013 of Vietnamese Transportation Ministry. Consistent with this decision, 234 subsidiaries and affiliates of Vinashin were re-arranged and 165 of these 234 companies were sold, were dissolved or went bankrupt. At the time of establishment, SBIC consisted of one parent company and only 8 subsidiaries with four main lines of business (building new ships, equipment and floating facilities; repairing, reforming

ships, equipment and floating facilities; consulting, designing ships and floating facilities; and recycling, dismantling old ships) and five other lines of business directly related to the main ones such as exploiting seaports, inland waterway ports, docks, piers, constructing shipyards or making structural steel. Restructuring Shipbuilding Industry Group (Vinashin) into Shipbuilding Industry Corporation (SBIC) in 2013 was considered to be a necessary attempt to rebuild the shipbuilding industry of Vietnam.

Contrary to the situation of Vinashin, Vietnam Dairy Products Joint Stock Company (its abbreviated name: Vinamilk) has achieved a remarkable success owing to its good corporate governance and reasonable diversification strategies. Vinamilk was established in 1976 under the name of Southern Coffee-Dairy Company, a state-owned company in Vietnam; then in 2003 it was transformed into a joint stock company with its official name, *Vietnam Dairy Products Joint Stock Company*, and to the year of 2006, it was listed on Ho Chi Minh Stock Exchange with the stock code: VNM.

Since the time when Vinamilk became a joint stock company, it always emphasized on the importance of corporate governance to protect the interests of its shareholders. In the first ASEAN Corporate Governance Conference and Awards hosted in Manila, Philippines in November 2015, Vinamilk was recognized as a publicly listed company possessing the best corporate governance in Vietnam when it was in the first rank of the top 3 publicly listed companies with the highest ASEAN Corporate Governance Scorecards (ACGS) in this country as presented in the report of ASEAN Capital Markets Forum (ACMF) (Thu Ngan, 2015).

Regarding the application of diversification strategy, Vinamilk proved that it focused more on concentric diversification than conglomerate diversification. After reviewing published annual reports of Vinamilk from 2006 to 2014, it is found that the main business line generating revenue and profit for the company was production and distribution of diary products such as liquid milk, powdered milk, yoghurt and beverages. Moreover Vinamilk also developed the field of raising cattle in order to provide fresh milk as a kind of raw material for manufacturing its dairy products. In 2007, the total number of national subsidiaries, joint ventures and associates was only four. They were Vietnam Dairy Cow One Member Limited Company, Lam Son Dairy One Member Limited Company, International Real Estate One

Member Limited Company, and Sabmiller Vietnam Joint Venture. Among them, only one subsidiary, that was International Real Estate One Member Limited Company, was responsible for housing business, real estate brokerage and leasing, warehouse and dock leasing that were unrelated to its core industries. However until 2014, this subsidiary was liquidated. In 2014 Vinamilk had six subsidiaries and two associates not only from Vietnam but also from foreign countries, but all of them merely were involved in its core business fields.

It is undeniable that owing to a strong corporate governance system and a really good design of diversification strategy, Vinamilk has grown over time. In 2015 Nikkei Asian Review put Vinamilk into a list of top 100 valuable enterprises in Asia with its market capitalization reaching to above 6.6 billion USD on 25th November 2015 (Minh Tri, 2015); and in the following year, Vietnam was the first time to have an opportunity to place a company in Fab 50 when Vinamilk was recorded as one of 50 Asia's best big public companies with its market value and sales being 9.2 billion USD and 1.8 billion USD respectively (Koppisch & Murphy, 2016).

The apparent failure of Vietnam Shipbuilding Industry Group (Vinashin) compared with the overwhelming success of Vietnam Dairy Products Joint Stock Company (Vinamilk) proved the significance of diversification strategy in a corporation. It affect substantially on the existence as well as the growth of the firm. It can create opportunities for the firm to grow rapidly. In the meanwhile, it can also push the corporation to the brink of bankruptcy as the case of Vinashin. Thus, the firms should be very cautious in applying this strategy. Furthermore, weak internal corporate governance in Vinashin was the most important reason for executives in the firm to engage in financial diversification towards their self-interests. This fact draws attention to the importance of figuring out the unrelated diversification levels of firms in Vietnam as well as exploring the effects of corporate governance on diversification in this emerging market.

1.2 Research motivation

This research mainly investigates the effects of internal corporate governance mechanisms on the unrelated diversification level based on a balanced panel data set of listed firms in Vietnam, a developing country in Asia. In addition, the moderation of free cash flow

on these relations and the effectiveness of diversification strategy to firm value are also tested. Internal corporate governance mechanisms are divided into two categories: interest alignment devices and control devices. Agency theory is considered as a basic theory to explain these relations.

There are four main motivations for conducting this research. Firstly, although there have been several different authors researching on the impact of corporate governance on diversification strategy, there was still no unification in results showing the relationships between corporate governance mechanisms and corporate diversification. For example, while Denis et al. (1997) found the negative relationship between managerial ownership and diversification, the study of Kim & Chen (2010) supported the positive effect of managerial ownership on diversification. Therefore, this study tries to examine the relations between internal corporate governance mechanisms and conglomerate diversification in Vietnam. Hopefully, it is a contribution to elucidate these relations that remain controversial nowadays.

Secondly, the default of Vietnam Shipbuilding Industry Group (Vinashin) in 2010 is a typical example to illustrate that executives in the firm abused bad corporate governance to implement pure-financial diversification strategy at a large scale that destroyed the firm's value. In the meanwhile, the continuous success of Vietnam Dairy Products Joint Stock Company (Vinamilk) over time might result from a strong corporate governance system together with low levels of unrelated diversification the company pursued. This fact motivates the author to investigate the relationships between internal corporate governance mechanisms and conglomerate diversification level in order to reach general conclusions in case of Vietnam.

Additionally, Castaner & Kavadis (2013) seem to be the first researchers on these relationships with the moderation of free cash flow through developing the ideas of Jensen (1986) when he realized the role of free cash flow as the availability of financial resources in creating opportunities for managers to fund non-value creating projects rather than projects serving shareholders' interests. The research of Castaner & Kavadis (2013) was conducted on a sample of 59 publicly traded corporations in France, a developed country. This was the main reason why this paper also wished to test how free cash flow moderated the corporate

governance's effect on diversification in Vietnam, an emerging market, and find out whether there were any differences in comparison with the findings of Castaner & Kavadis (2013).

Finally, because most previous studies discovered the ineffectiveness of diversification strategy, specially of unrelated diversification strategy, such as Morck et al. (1990), Comment & Jarrell (1995), Lang & Stulz (1994), Berger & Ofek (1995), Amihud & Lev (1999) and Martin & Sayrak (2003). Thus, in order to check the effectiveness of conglomerate diversification strategy in case of Vietnam, the author also tests the relationship between unrelated diversification level and firm value of listed companies in the research.

1.3 Research objective

- Research idea: Examine the relationships between internal corporate governance mechanisms and unrelated diversification
- Research question: Does good internal corporate governance prevent conglomerate diversification strategy?
- Subsidiary objectives:

a. What are the relationships between internal corporate governance mechanisms and unrelated diversification level?

b. How does free cash flow moderate the effects of internal corporate governance mechanisms on diversification?

c. How agency theory can be used to explain these relations?

d. Is unrelated diversification strategy good or bad to firm value?

1.4 Research design and methodology

1.4.1 Data sources

The sampling frame was listed firms on the stock markets in Vietnam. In Vietnam, there are two stock markets namely Ho Chi Minh Stock Exchange (HOSE) that was originally established in 2000, and Ha Noi Stock Exchange (HNX) that started operating in 2005. Therefore, the author tried to find out companies that published their annual reports as well as financial statements from 2007 to 2014 continuously. The data were mainly collected from three sources: websites of two stock markets, HOSE (http://www.hsx.vn) and HNX (http://www.hnx.vn), and the website of BIDV Securities Company (BSC)

(https://www.bsc.com.vn). The initial sample was 134 listed firms from both stock markets. However, because 64 companies presented incomplete data about corporate governance in their annual reports, the final sample yielded a balanced panel data set consisting of 70 firms with the total 560 firm-year observations.

1.4.2 Research models

Three main regression models are built in the research. In particular, one model contains *Firm diversification* as a dependent variable and explanatory variables without interaction terms between corporate governance and free cash flow dummy. Another model is similar to the first one but interactions are added into the model. Lastly, *Firm value* is the dependent variable in the third model to test the relationship between diversification level and firm value. It is noticeable that when analyzing the panel data, the intercept of each model will be adjusted in accordance with the estimation method applied (Pooled OLS regression, Fixed effects model or Random effects model).

1.4.3 Method of data analysis

This study relies on a balanced panel data set with 560 observations during the period from 2007 to 2014. Different kinds of software such as Excel 2010, IBM SPSS Statistics 22 and Stata 12.0 are used to describe the data. Among these software packages, Stata 12.0 is the main package for analyzing data. Because the nature of dataset is balanced panel, three different estimation methods: Pooled OLS regression, Fixed effects model (FEM) including both *Least squares dummy variable (LSDV) estimato*r and *Fixed effects (within- group) estimator*, and Random effects model (REM) are employed thanks to the support of Stata 12.0. After that, various tests such as F test, Hausman test, Modified Wald test, Wooldridge test and Endogeneity test are applied to explore the most suitable models.

1.5 Research structure

The research comprises six chapters. Chapter 1 outlines background, motivation, objective, methodology and structure of the research topic. Chapter 2 encompasses a review of the relevant literature on agency theory, diversification strategy, corporate governance and internal corporate governance mechanisms. A discussion of previous empirical studies on the

relationship between corporate governance and diversification as well as the effectiveness of diversification are also mentioned in this chapter. Chapter 3 continues to review measurements of corporate governance and diversification that previous researches applied; thenceforth, four hypotheses are developed. Chapter 4 provides a brief overview of regulations on industrial taxonomy as well as corporate governance in Vietnam. Moreover, the disclosure of information concerning industrial taxonomy of listed firms in Vietnam is also investigated in this chapter. Chapter 5 is the chapter for research design and research methodology. It presents data sources, describes how to get the actual sample from the target population, and mentions research models, definitions as well as measurements of all used variables. Detailed steps together with methods of analyzing data are also shown in this chapter. Chapter 6 consists of two parts: variable description and analysis. The part of variable description provides a statistical description of all features: diversification level, firm value, corporate governance mechanisms, free cash flow, and main financial characteristics in the relation with diversification level on the selected sample of listed firms in Vietnam. Next, the part of analysis shows specific steps in applying different methods and techniques to test the determinants of diversification level and the effect of diversification on firm value of listed firms in Vietnam. Finally, chapter 7 gives a summary of the whole research and conclusions in relation to the research questions. Furthermore, the limitations of the research and suggestions for future researches are discussed in this last chapter as well.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

This chapter firstly presents basic information about agency theory, corporate governance together with internal corporate governance mechanisms, and diversification strategy. Secondly it reviews previous studies on the relationship between corporate governance and diversification as well as the link between diversification and firm value.

2.2 Agency theory

In the year of 1973, Ross mentioned on the principal's problem in agency theory. He defined the existence of an agency relationship when there are contractual arrangements between one party, designated as the principal, and the other, designated as the agent such as the relationship between employer and employee or between the state and the governed. In this relationship, the problem of the principal is that how to monitor actions of the agent due to asymmetric information among participants. Finally, he found that the class of payoff structures would play a quite important role in not only solving the principal's problem but also leading to Pareto efficiency in which a weighted sum of utilities is maximized. This study of Ross (1973) is a basic one for researches on the agency relationship afterwards.

Similar to Ross (1973), Jensen & Meckling (1976) defined "*an agency relationship* as a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision making authority to the agent". In addition, they found that this agency relationship forces the appearance of *agency costs* that include monitoring expenditures, bonding expenditures and residual loss. Whereas the principals must cover monitoring costs to limit the self-interested actions of the agent, the agent needs to bear bonding costs to guarantee that his or her actions will be towards the best interests of the principals. Residual loss was considered as a reduction in the welfare of the principals due to the divergence between the real decisions of the agent and optimal decisions maximizing the benefits of the principals despite incurring monitoring and bonding costs (Jensen & Meckling, 1976).

After that, agency theory has been applied in various fields of research such as accounting, economic, finance, marketing, political science, organizational behavior and sociology (Eisenhardt, 1989). For example, Brigham & Gapenski (1997) suggested that in financial management, *an agency relationship* between stockholders, called *principals*, and managers, called *agents* happens when *principals* employ *agents* and empower them to manage daily activities. This relationship leads to potential conflicts of interest, called *agency conflicts*, between these two subjects because managers will not receive all the benefits of wealth they created; conversely, they can share expenses of their perquisite consumption with non-management shareholders. Therefore, managers might have incentives to take actions without reaching the goal of shareholder wealth maximization. This fact increases the possibility of *moral hazard* problems where agents take self-interested actions that principals could not observe. From that, *agency costs* such as costs of monitoring actions of agents, costs of designing organizational structure, and opportunity costs because of restrictions to contribution of agents to shareholder wealth, are inevitable to principals if they want to decrease potential agency conflicts and moral hazard problems. One noticeable thing is that shareholders need to find specific mechanisms with optimal amount of agency costs to encourage managers to maximize the stock price of the firm (Brigham & Gapenski, 1997).

2.3 Corporate governance and internal corporate governance mechanisms

The term "corporate governance" appeared in the late 1970s and early 1980s. A quite large definition of corporate governance was suggested by Burton (1981): "Corporate governance is a broad concept that encompasses a wide range of decisions made within the modern corporation. These decisions include determining overall policy, specifying operating and employment goals, and implementing those goals through daily managerial decisions". After that, several authors narrowed this definition; for example "corporate governance is the process of supervision and control intended to ensure that company's management acts in accordance with the interests of shareholders" (Parkinson, 1994), "corporate governance deals with the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment" (Schleifer and Vishny, 1997), or corporate governance is "a set of mechanisms through which outside investors protect themselves against expropriation by the insiders" (La Porta et al., 2000). Today the definition of corporate governance from the

Organization for Economic Cooperation and Development (OECD) is used popularly. OECD (1999, 2004) described corporate governance as "a set of relationships between a company's management, its board, its shareholders and other stakeholders. Corporate governance also provides the structure through which the objectives of the company are set, and the means of attaining those objectives and monitoring performance are determined".

According to the agency theory, a strong internal corporate governance system should consist of both interest alignment devices and control devices.

Interest alignment devices are stock-based compensation schemes to align the interests between the principles and the agents that can reduce agency costs and avoid agency conflicts (Demetz, 1983). Empirical researches used different forms of interest alignment devices such as setting up executive compensation payouts in the same direction with the improvement of firm performance (Salama & Putnam, 2013; Castaner & Kavadis, 2013), giving executives stock options (Goranova et al., 2007; Castaner & Kavadis, 2013), or allowing executives to own a large amount of shares in the firm (Hill & Snell, 1988; Denis et al., 1997; Singh et al., 2004; Goranova et al., 2007; Kim & Chen, 2010; Castaner & Kavadis, 2013).

Regarding the control devices, their main purpose is to monitor self-interested actions of the agents or prevent moral hazard problems. Agency theorists argued that blockholders can be the subjects assuming this control role because they have both the incentives and the power to ensure efficient managing of the firm from executives (Bethel & Liebeskind, 1993). Several authors (for example, Hill & Snell (1988), Bethel & Liebeskind (1993), Denis et al. (1997), Singh et al. (2004), Samaha et al. (2012), Castaner & Kavadis (2013)) put this idea into practice by using the blockholder ownership as a variable representing a control device of corporate governance. However, the efficiency of the control role of the blockholders as per the argument of the agency theorists may need to be re-tested in various ownership structures of the corporations when La Porta et al. (1999) discovered the differences in corporate ownership around the world according to five types of ultimate owners (a family, the State, a widely held corporation, a widely held financial institution, or miscellaneous owner).

Additionally, board independence also plays important role in preventing self-interested actions of the agents as the board of directors assumes the role of guardian of stockholder welfare (Fama & Jensen, 1983). The corporate governance mechanisms concerning the board

independence might be rising the number of outside non-executive directors in the board composition (Beatty & Zajac, 1994; Singh et al., 2004; Goranova et al., 2007; Kim & Chen, 2010; Samaha et al., 2012; Castaner & Kavadis, 2013), separating the position as well as roles of a CEO and a board chairman (Goranova et al., 2007, Samaha et al., 2012), or establishing audit committees (Samaha et al., 2012).

2.4 Diversification strategy

Ansoff (1957) suggested four types of product – market strategies for business growth, namely *market penetration, market development, product development* and *diversification* (Figure 1). Thus, according to this author, diversification strategy is applied when there is a combination of both market development and product development with new requirements of skills, techniques and facilities.

Figure 1: Product – market strategies

<table>
<tr><td>MARKETS
PRODUCT LINE</td><td>μ_0</td><td>μ_1</td><td>μ_2</td><td>……..</td><td>μ_m</td></tr>
<tr><td>π_0</td><td>MARKET Penetration</td><td colspan="4">MARKET DEVELOPMENT</td></tr>
<tr><td>π_1</td><td rowspan="4">PRODUCT DEVELOPMENT</td><td colspan="4" rowspan="4">DIVERSIFICATION</td></tr>
<tr><td>π_2</td></tr>
<tr><td>…</td></tr>
<tr><td>π_n</td></tr>
</table>

(Source: Ansoff, 1957)

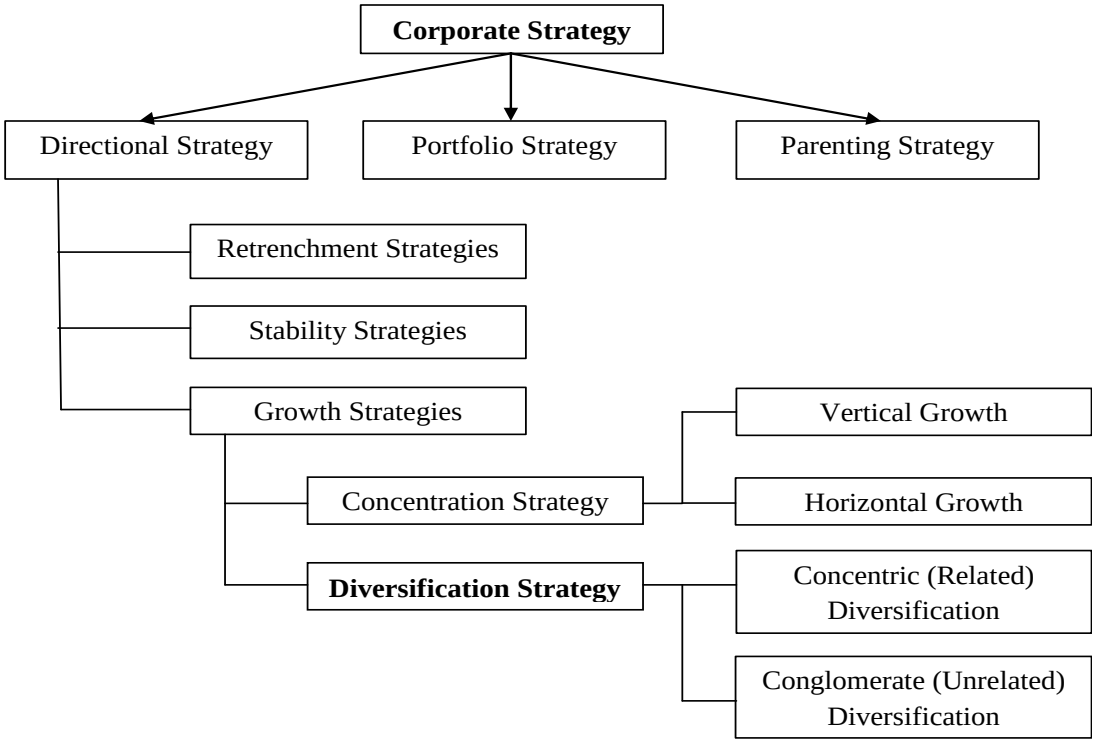
Ramanujam & Varadaraja (1989) agreed with above definition of diversification when they mentioned in their research that diversification is "the entry of a firm or business unit into new lines of activity, either by processes of internal business development or acquisition, which entail changes in its administrative structure, systems, and other management processes".

Developing from the diversification definition of Ansoff (1957), a large number of subsequent researchers, such as Amit & Livnat (1988), Berger & Ofek (1995), Anderson et al. (2000), Kim & Chen (2010), and Lien & Li (2013), continued to divide diversification into two different categories including *related diversification* and *unrelated diversification.* For

example, Berger & Ofek (1995) suggested that unrelated diversification is applied in a multi-segment firm when the firm has two or more segments with various two-digit Standard Industrial Classification (SIC) codes; on the contrary, if all segments of the firms are in the same two-digit SIC code, it means that the firm is working out related diversification strategy.

Figure 2 is used to show the position of diversification strategy in different forms of corporate strategy as opinions of Wheelen & Hunger (2006). Wheelen & Hunger (2006) defined ***corporate strategy*** as "a strategy that states a company's overall direction in terms of its general attitude toward growth and the management of its various business and product lines". They suggested that corporate strategy is shown by three specific strategies, namely ***directional strategy*** indicating overall orientation of the firm, ***portfolio strategy*** determining industries and/or markets in which the firm operates, and ***parenting strategy*** demonstrating management manner in coordinating activities and sharing resources among product lines and business units. Next, *directional strategy* can follow three different orientations (***growth, stability,*** or ***retrenchment***). According to this classification, ***diversification strategy*** will be a particular corporate strategy from ***growth strategies*** that belong to *directional strategy*.

Figure 2: Diversification strategy – a specific corporate strategy for a firm's survival and success



(Source: based on Wheelen & Hunger, 2006)

While with *concentration strategy*, the firm only focuses on exploring in one industry because of its growth potentiality, it tends to apply *diversification strategy* to access other industries when the current industry becomes mature. A company following the concentration strategy needs to make a choice between *vertical growth* and *horizontal growth*. The vertical growth happens when the company assumes functions of other members in its supply chain like a supplier or a distributor so that it can lower costs, enhance quality of inputs or establish relationships with customers. In the meanwhile, the horizontal growth mentions on introducing present products to other markets and/or increasing the range of products in the existing market. Each type of growth results in different degree of integration depending on ownership of the value chain in case of vertical growth or ownership to obtain access to other markets as to horizontal growth. Regarding to *diversification strategy*, it can be *related* or *concentric* if the firm expands its activities to related industries based on its current competitive position together with available bases (such as product knowledge, manufacturing capabilities or marketing skills), or be *unrelated* or *conglomerate* when the firm diversifies into new industries that are unrelated to its core industries.

One noticeable thing is that all these growth strategies can be implemented by either internal means as spreading out operations domestically and globally, or external ones such as mergers, acquisitions, or strategic alliances (Wheelen & Hunger, 2006).

In addition, diversification can be also classified into: industrial diversification and global diversification by some authors such as Jiraporn et al. (2006) and Salama & Putnam (2013). Jiraporn et al. (2006) collected 1862 U.S. firm-year observations in 1993, 1995 and 1998 from Research Insight COMPUSTAT Industrial Segment file (CIS) and the Geographic Segment file (CGS), and they categorized diversification into four various regimes (*Focused, Only Industrially Diversified, Only Globally Diversified,* and *Both Industrially and Globally Diversified*) depending on the number of segments a firm reported in the CIS file together with the report on foreign sales in the CGS file (Figure 3). It can been from Figure 3 that according to Jiraporn et al. (2006), global diversification in a firm would happen whenever the firm had at least one business segment operating outside the home country. Being more updated than the study of Jiraporn et al. (2006), Salama & Putnam (2013) used a sample, consisting of 5985 U.S. firm-year observations from 2002 to 2006, collected from COMPUSTAT and the Corporate Library databases. Salama & Putnam (2013) also called a

firm a globally diversified one if it had at least one foreign segment, but its total foreign sale needed to be greater than zero.

Figure 3: Global and industrial diversification classification

		Industrial Diversification	
		Single – segment	**Multi – segment**
Global Diversification	**Domestic**	Single – segment Domestic (SD) *Focused*	Multi – segment Domestic (MD) *Only industrially diversified*
	Global	Single – segment Global (SG) *Only globally diversified*	Multi – segment Global (MG) *Both industrially and globally diversified*

Source: Jiraporn et al. (2006)

2.5 Relationship between corporate governance and diversification

2.5.1 Direct relationship between corporate governance and diversification

There have been several researches on the relationship between corporate governance and diversification. Table 1 lists previous researches on this relationship with information of sample and chosen periods. It can be seen from the Table 1 that most studies were done in developed countries; few researches such as the studies of Kim & Chen (2010) and of Lien & Li (2013) were conducted in advanced emerging markets (Korea and Taiwan respectively). Table 2 is established to show prior findings on the relationships between each interest alignment device or control device and diversification under the explanation of agency theory. Table 2 shows that there was still no unification among results. Some results supported the argument based on agency theory, but some results did not support. For example, while Denis et al. (1997) found the negative relationship between managerial ownership and diversification that was suitable with the explanation from agency theory, the study of Kim & Chen (2010) supported the positive effect of managerial ownership on diversification that was contrary to the argument based on the agency theory.

Table 1: A list of previous researches on the relationship between corporate governance and diversification strategy

Paper	Sample	Period
Amihud & Lev (1981)	309 largest industrial U.S. firms	A ten-year period from 1961 to 1970
Hill & Snell (1988)	94 U.S enterprises in research-intensive industries	In 1980
Denis et al. (1997)	933 U.S. firms	At year-end 1984
Collin & Bengtsson (2000)	72 listed Swedish companies	From 1988 to 1990
Singh et al. (2004)	777 large U.S. corporations	Over the two-year period between 1995 and 1997
Jiraporn et al. (2006)	1862 firm-year observations in the U.S.	1993, 1995 and 1998
Goranova et al. (2007)	231 U.S. firms	From 1994 to 1999
Kim & Chen (2010)	377 listed corporations in Korea	From 1999 to 2005
Castaner & Kavadis (2013)	59 publicly traded French corporations	From 2000 to 2006
Lien & Li (2013)	205 Taiwanese firms	From 1999 to 2003

(Source: own creation)

Table 2: A summary of previous research results on the relationship between corporate governance and diversification

Corporate governance devices	Corporate governance characteristics	Relationship with the extent of diversification	Author	Support agency theory
Interest alignment devices	Management stockholdings	Negative	Hill & Snell (1988)	Yes
	Managerial ownership	Negative	Denis et al. (1997)	Yes
	Inside ownership	Positive	Singh et al. (2004)	No

	Managerial ownership	Not associate	Goranova et al. (2007)	No
	Managerial ownership	Positive	Kim & Chen (2010)	No
	CEO variable compensation	Positive (At high levels of free cash flow)	Castaner & Kavadis (2013)	No
Control devices	Blockholder ownership	Negative	Denis et al. (1997)	Yes
	Management control	Positive	Amihud & Lev (1981)	Yes
	Finance group	Negative	Collin & Bengtsson (2000)	Yes
	Institutional ownership	Positive	Singh et al. (2004)	No
	Strength of shareholder rights	Negative	Jiraporn et al. (2006)	Yes
	Board size	Positive	Kim & Chen (2010)	No
	Outside director ratio	No statistical significance	Kim & Chen (2010)	No
	Institutional ownership	No statistical significance	Kim & Chen (2010)	No
	Chairman/CEO non-duality	Negative (At high levels of free cash flow)	Castaner & Kavadis (2013)	Yes
	Proportion of independent directors	Positive (At low levels of free cash flow)	Castaner & Kavadis (2013)	No
	Ownership concentration	Negative (At low levels of free cash flow) (Weak significant level)	Castaner & Kavadis (2013)	Yes
	Controlling family ownership	Positive	Lien & Li (2013)	No
	Domestic bank ownership	Negative	Lien & Li (2013)	Yes

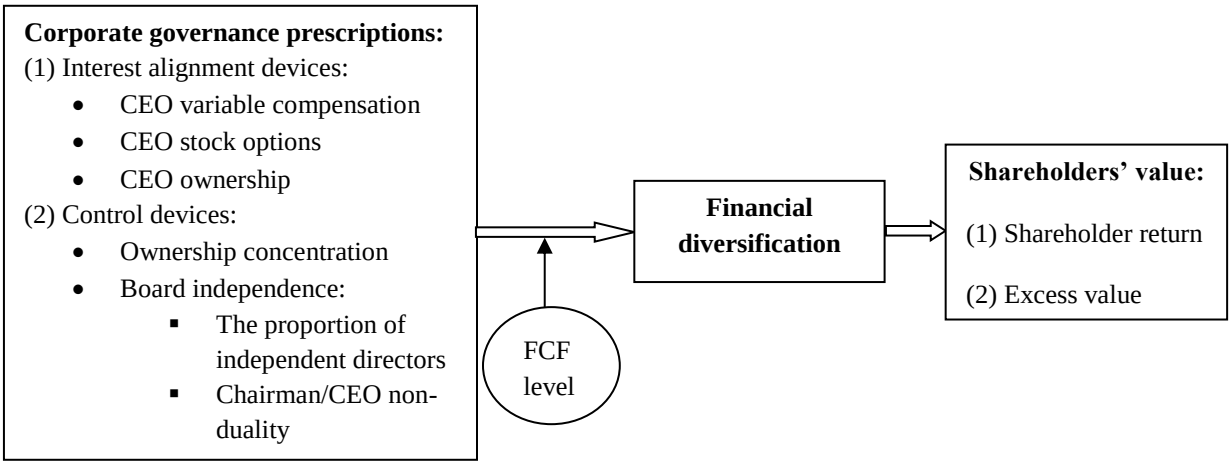
(Source: own creation)

2.5.2 Relationship between corporate governance and diversification with the moderation of free cash flow

Jensen (1986) suggested that when a firm has substantial free cash flow, its payout policies might create severe conflicts of interest between shareholders and managers that lead to non-value-maximizing projects undertaken by the managers.

Developing from this idea of Jensen (1986), Castaner & Kavadis (2013) studied on the interrelationship among corporate governance, financial diversification and shareholders' value with the moderation of free cash flow based on a sample of 59 publicly traded corporations in France from 2000 to 2006 as the illustration in the Figure 4. They realized that financial diversification was a bad corporate strategy because it reduced shareholder return and firm value. However, only some control devices, namely *Chairman/CEO non-duality* and *Ownership concentration*, could reduce financial diversification under the influence of free cash flow levels. Specifically, the former control device decreased financial diversification when free cash flow was high whereas the latter control device lowered it at low levels of free cash flow. On the contrary, financial diversification would be increased not only by *independent directors* at low levels of free cash flow, but also by one of interest alignment devices, *variable compensation*, when free cash flow was high. Thus it was suggested that free cash flow regulated the effect of corporate governance on financial diversification.

Figure 4: Research idea of Castaner & Kavadis (2013)



(Source: own creation)

2.6 Effectiveness of diversification strategy

In terms of the effectiveness of diversification strategy, it seems to be not a good strategy for the principals because there have been much more researches proving its disadvantages on firm performance and firm value than researches disagreeing with these disadvantages or affirming its benefits.

Amit & Livnat (1988) realized that diversified firms generally made lower profits than undiversified counterparts. Similarly, Hoskisson et al. (1993) found statistically significant negative relations between diversification strategy and various accounting measures of performance (Return on assets, Return on equity and Return on sales). Subsequently, several studies also discovered its negative effects on stock valuation through Tobin's q-ratio (Lang & Stulz, 1994), operating profitability (Berger & Ofek, 1995), abnormal stock returns (Comment & Jarrell, 1995) and firm value (Anderson et al., 2000, Jiraporn et al., 2006, Hoechle et al., 2012 or Castaner & Kavadis, 2013).

It is noticeable that unrelated diversification was proved to have more negative effects on firm value than related diversification. There were several researchers exploring drawbacks of conglomerate diversification strategy. Rumelt (1982) divided into seven strategic diversification categories (*Single business, Dominant vertical, Dominant constrained, Dominant linked-unrelated, Related constrained, Related linked* and *Unrelated business*) and he/she tested the relationship between diversification strategy and profitability of U.S. firms for the period 1955-1974 according to this classification. Finally, it was found that the group of unrelated business was the least profitable group among seven categories. Although Amit & Livnat (1988) asserted advantages of pure-financial diversification in reducing operating risk as well as increasing financial leverage for the firms, they found that these advantages were accompanied by lower profitability than undiversified firms. Morck et al. (1990) found the negative relationship between unrelated acquisitions and stock prices in 1980s. After that, results of Berger & Ofek (1995) showed that unrelated-diversified firms incurred more value loss or diversification discount than related-diversified firms. Furthermore, after reviewing a large number of previous studies, Amihud & Lev (1999) found that, in most cases, conglomerate mergers reduced the value of the company due to agency costs that resulted from conflict of interests between the principals and agents. In 2012,

Hoechle et al. published a research about the reason for this negative relationship. Their research was based on a sample of U.S. companies covering the period 1996 to 2005 and they found an increase in diversification discount from 16% to 21% after adding governance variables as regression controls in panel data models. Thus, they argued that the negative effect of unrelated diversification on firm value could be partly attributed to poor corporate governance in the firms. This opinion was consistent with the findings of Gleason et al. (2012) and Salama & Putnam (2013). Gleason et al. (2012) realized that the value destruction of diversifying acquisitions happened only when there was a lack of strong boards or external monitoring. In the meanwhile, Salama & Putnam (2013) supported the relationship between poor quality of corporate governance and negative financial consequences attributable to global diversification.

Regarding industrial diversification and global diversification, the negative relationship between the extent of firm diversification and firm value was also confirmed by Jiraporn et al. (2006) for *only industrially diversified* firms and *both industrially and globally diversified* ones when they examined the connections among corporate governance, strength of shareholder rights, probability to diversify and firm value based on 1862 firm-year observations in the US during the years of 1993, 1995 and 1998.

Nevertheless, there were some opposite opinions in comparison with above arguments on the helpfulness of diversification strategy. Villalonga (2004) proved that diversification, on the average, did not destroy firm value. In addition, some authors supported the positive relationship between diversification and corporate value. For example, Campa & Kedia (2002) proposed that if a firm actually pursued a diversification strategy, firm value would be enhanced thanks to this strategy. Then Kim & Chen (2010) found a significantly positive effect of business diversification on corporate value when they used the data of 377 listed corporations on the Korea Exchange from 1999 to 2005. Interestingly, the research of Lien & Li (2013) indicated that a diversification strategy contributed positively to performance until a certain amount of the diversification level. After that amount, a further increase in diversification level would lead to reduce return of the firm.

2.7 Chapter summary

This chapter is considered as a literature review dealing with agency theory, internal corporate governance system, diversification, and the interrelationships among corporate governance mechanisms, diversification strategy and firm value. Measurements for corporate governance, diversification, and the value of diversified firms from literature will be entered into details in the next chapter.

CHAPTER 3: DESCRIPTION OF POTENTIAL MEASURES AND HYPOTHESES DEVELOPMENT

3.1 Introduction

This chapter will go into further detail on how to measure corporate governance as well as diversification that previous researchers applied in their studies. After that, on the basic of an overview on these potential measures and the arguments of agency theory, hypotheses will be developed.

3.2 Description of potential measures

Corporate governance and diversification are qualitative terms. Therefore, in order to measure corporate governance or diversification, researchers normally used quantitative indicators and proxy measurements to reflect their different angles. Table 3 and table 5 summarize various observed variables being utilized as potential measures for corporate governance and diversification from literature review.

3.2.1 Potential measures for corporate governance

In terms of corporate governance, in order to evaluate whether a corporate governance system of a firm is good or not, this research focuses on the firm's internal corporate governance mechanisms. Internal corporate governance mechanisms are expected to be good or strong if there are a large number of interest alignment devices as well as control devices established in the corporation to either align the interests between the shareholders and the managers, or monitor self-interested actions of the executives. Whereas *executive stock options*, *executive ownership*, and *executive compensation* were examples for interest alignment devices, control devices would consist of *blockholder ownership*, *board composition*, *duality in position*, and *audit committee*.

Interestingly, there have been no official rules indicating how to measure these interest alignment devices or control devices. Table 3 shows that researchers could measure different dimensions of each device through various proxy measurements. For instance, concerning *executive stock options*, an interest alignment device, while Goranova et al. (2007) measured value of executive stock options scaled by market value of the firm, Castaner & Kavadis

(2013) used a dichotomous variable to determine the existence of stock options in a given year; or as to *executive compensation*, whereas Castaner & Kavadis (2013) noticed the ratio of variable compensation over total executive compensation, Salama & Putnam (2013) calculated the ratio of compensation committee size to board size, and compensation committee number of meetings.

Furthermore, in front of a same variable among a range of preceding studies, authors used different formulas to measure that variable. The case of *executive ownership* is one illustrated example (Table 3). In order to estimate executive ownership, Hill & Snell (1988), Goranova et al. (2007) and Castaner & Kavadis (2013) computed the ratio of shares owned by only managers or officers to total shares outstanding; in the meanwhile, Denis et al. (1997), Singh et al. (2004) and Kim & Chen (2010) added the number of shares owned by directors or board members to the numerator of the ratio. Another example is the way to measure *blockholder ownership*, a control device. There were different proxy measurements for blockholder ownership such as the percentage of stock owned by the largest owner (Castaner & Kavadis, 2013), held in blocks of 0.2 percent or greater (Hill & Snell, 1988), or belonging to holders with at least 5 percent of the firm's shares (Bethel & Liebeskind, 1993; Denis et al., 1997; Singh et al., 2004; and Goranova et al., 2007).

One positive finding is that most authors had proxy variables in common for either *board composition* or *duality in position*. *Board composition* was measured in the ratio of number of outside directors to total number of registered directors by several researchers such as Beatty & Zajac (1994), Singh et al. (2004), Goranova et al. (2007), Kim & Chen (2010), Samaha et al. (2012) and Castaner & Kavadis (2013). About *duality in position*, both Goranova et al. (2007) and Samaha et al. (2012) used a dummy variable coded as 1 if the CEO and the chairman are the same, and coded as 0 otherwise.

Lastly, applying the research findings of Bradbury (1990) on the link between voluntary audit committees and the size of the board of directors and intercorporate ownership, Samaha et al. (2012) regarded *audit committee* as one of corporate governance attributes. A dummy variable was utilized in the study of Samaha et al. (2012) with the value of 1 if an audit committee exists in the firm and of 0 otherwise (Table 3).

Table 3: Potential measures for corporate governance

Variables	Proxy variables	Purposes	
Executive stock options (Goranova et al., 2007; Castaner & Kavadis, 2013)	Value of CEO's stock options, measured by market value of firm (Goranova et al., 2007)	Show extent to establish interest alignment devices	Demonstrate that how good internal corporate governance mechanisms are
	A dichotomous measure = 1 when CEO had stock options in a given year and 0 otherwise. (Castaner & Kavadis, 2013)		
Executive ownership (Denis et al., 1997; Singh et al., 2004; Goranova et al., 2007; Kim & Chen, 2010; Castaner & Kavadis, 2013)	Natural log of percentage of common voting stock held by management (Hill & Snell, 1988)		
	Percentage ownership of officers and directors (Denis et al., 1997)		
	Percentage of total equity held by executives and board members (Singh et al., 2004)		
	Percentage of shares outstanding owned by the CEO (Goranova et al., 2007)		
	Ratio of shares owned by directors to total shares outstanding (Kim & Chen, 2010)		
	Percentage of stock held by CEO (Castaner & Kavadis, 2013)		
Executive compensation (Salama & Putnam, 2013; Castaner & Kavadis, 2013)	Ratio of compensation committee size to board size; Compensation committee number of meetings (Salama & Putnam, 2013)		
	Ratio of variable compensation over total CEO compensation (Castaner & Kavadis, 2013)		
	Percentage of shares in holding of 0.2 percent or greater (Hill & Snell, 1988)		
	Percentage of outstanding common voting shares held by blockholders who owned 5 percent or more of the firm's common shares		

Blockholder ownership (Hill & Snell, 1988; Bethel & Liebeskind, 1993; Denis et al., 1997; Singh et al., 2004; Samaha et al., 2012; Castaner & Kavadis,2013)	(Bethel & Liebeskind, 1993)	Show effectiveness of control devices	
	Percentage of shares of blockholders who held of at least 5 percent of the firm's shares (Denis et al., 1997)		
	Percentage of total stock held by stakeholders having 5% or more equity in firm (Singh et al., 2004)		
	A measure aggregates only ownership stakes representing at least 5 percent ownership in the firm (Goranova et al., 2007)		
	Percent of shares owned by blockholders – shareholders whose ownership ≥ 5% of total number of shares issued (Samaha et al., 2012)		
	Percentage of stock owned by the largest owner (Castaner & Kavadis, 2013)		
Board composition (Beatty & Zajac, 1994; Singh et al., 2004; Goranova et al., 2007; Kim & Chen, 2010; Samaha et al., 2012; Castaner & Kavadis, 2013)	Ratio of number of outside directors to total directors (Beatty & Zajac, 1994)		
	Ratio of board independents, Ratio of board insiders (Singh et al., 2004)		
	Ratio of outside directors serving on the board (Goranova et al., 2007)		
	Outside director ratio (number of outside directors divided by number of registered directors) (Kim & Chen, 2010)		
	Ratio of the number of non-executive directors to the total number of the directors (Samaha et al., 2012)		
	Proportion of independent directors who are outside non-CEO directors (Castaner & Kavadis, 2013)		
Duality in position	A dummy variable coded as 1 if CEO also		

(Goranova et al., 2007, Samaha et al., 2012)	serves as chairperson of the firm's board and 0 otherwise (Goranova et al., 2007)		
	A dummy variable = 1 if company's CEO serves as a board chairman, 0 otherwise (Samaha et al., 2012)		
Audit committee (Samaha et al., 2012)	A dummy variable = 1 if there is an audit committee, 0 otherwise (Samaha et al., 2012)		

(Source: own creation)

3.2.2 Potential measures for diversification

Table 4 shows characteristics of various measures of diversification summarized by Sambharya (2000). Sambharya (2000) indicated that there were two popular approaches for measuring diversification. The first approach was called the business count approach that used objective indicators such as Berry Herfindahl index explored by Montgomery (1982), Entropy measure suggested by Palepu (1985), or two-dimensional measures of Varadarajan and Ramanujam (1987) based on broad and mean narrow spectrum diversity (BSD and MNSD). The second one was the strategic approach with more subjective assessments on the relatedness between business units. This approach was illustrated with Rumelt's classification scheme dividing a business into four categories (single business, dominant business, related business, and unrelated business) based on specialization ratio, related ratio, and vertical ratio (Sambharya, 2000). Sambharya (2000) realized that there was no existence of the best measurement because each measure of diversification had its own strengths as well as weaknesses. For example, although the measure of Berry Herfindahl index has simplicity as its great strength, it is not suitable when the researchers would like to investigate the differences across business groups. In this case, Rumelt's classification scheme proves to be a better choice even though this method is time consuming, requires more information from different sources, and is still uncertain about its reliability. Being similar to the approach of Varadarajan and Ramanujam (1987), though it is simple and easy to measure and compute broad and mean narrow spectrum diversity, its validity and reliability is still in a doubt.

Table 4: Characteristics of Various Measures of Diversification summarized by Sambharya (2000)

Measure/Authors	Formula/Description	Strengths	Weaknesses
Modified Berry Herfindahl index (Montgomery,1982)	Diversification = 1 - $\frac{\sum P_i^2}{(\sum P_i)^2}$ Pi: percentage of the firm's total sales that are in market i	Easy to compute	Does not measure relatedness between different groups at both 2- and 4-digit SIC levels
Entropy (Palepu,1985)	DT = DR + DU In which, DR = $\sum_{j=1}^{M} DR_j P^j$; $DR_j = \sum P_i^j \ln(\frac{1}{P_i^j})$ DU = $\sum_{j=1}^{M} P^j \ln(\frac{1}{P^j})$ M: number of industry groups P^j: share of j[th] group sales in the total sales of the firm P_i^j: share of the segment i of group j in the total sales of the group	- Captures diversification across product groups (related) and within product groups (unrelated). - Computes the amount of Total Diversification (DT), and its components: Related Diversification (DR) and Unrelated Diversification (DU)	- Relies on accuracy of 10-K reports. - Requires sales data at 4-digit level. - Information available only for 10 largest product segments. - Computation is complex.
Rumelt's classification (Rumelt,1974; Wrigley, 1970)	Based on: (i) specialization ratio; (ii) direction of diversification; and (iii) vertical ratio A 4-category classification scheme: (1) single business; (2) dominant business; (3) related business; (4) unrelated business.	- Conceptual rigor - Relies on insight in the firm's history and behavior to determine its utilization of strength, core skills, and its diversification objectives.	- Subjective - Reliability is questionable - Tedious, time consuming, and requires extensive information on firm from various sources.

Broad and narrow spectrum diversity (Varadarajan and Ramanujam, 1987)	- Broad spectrum diversity (BSD) is defined as the number of 2-digit SIC codes in which a firm operates. - Mean narrow spectrum diversity (MNSD) is defined as the number as the 4-digit SIC codes a firm participates in divided by the number of 2-digit SIC categories the firm operates in.	Simple and easy to measure and compute	Validity and reliability is questionable.

(Source: Sambharya, 2000)

From the 2000s onwards, empirical researches related to diversification showed three major trends for potential measurements of diversification as shown in Table 5. The most popular trend was examining the extent of industrial diversification. Sambharya (2000) summarized different ways to measure industrial diversification level; however, it can be seen from Table 5 that most authors in empirical investigations applied Berry-Herfindahl Index or Entropy Index. While Amit & Livnat (1988), Kim & Chen (2010) chose the former, the latter was selected by Lien & Li (2013). Goranova et al. (2007) used both these kinds of index in their research. There were also some studies applying measures with a bit difference from others. For instance, White (2004) suggested to determine levels of industrial diversification (very low, low, moderate, high, very high) based on the contribution of the dominant business unit in the firm in terms of its revenue; or Castaner & Kavadis (2013) measured financial diversification by a correlation between the yearly values of the industry-level sales among each pair of two-digit SIC industries in which a firm was involved in.

The second trend was testing the existence of industrial diversification. Some authors such as Anderson et al. (2000), Jiraporn et al. (2006) and Hoechle et al. (2012) checked whether industrial diversification existed in the firm by counting the number of unrelated segments the firm had. They used a dummy variable labelled by the value 1 if the firm was an industrially diversified one that had more than one segment with different first two digits of

Standard Industrial Classification (SIC) codes or different three digits of North American industry classification system (NAICS) codes, and by the value 0 otherwise.

Lastly, global diversification was examined by Jiraporn et al. (2006) and Salama & Putnam (2013). Both these researches asserted a firm as a globally diversified one if it had at least one foreign segment and had any foreign sales. Moreover, Salama & Putnam (2013) calculated the ratio of foreign sales to total sales in order to determine the level of global diversification.

Table 5: Potential measures for diversification

Purpose for measurements	**Proxy variable**	**Author(s)**
Examine the existence of industrial diversification	A dummy variable =1 if a firm was an industrially diversified one that operated in more than one segment in COMPUSTAT Industrial Segment (CIS) database, and 0 otherwise	Anderson et al. (2000), Jiraporn et al. (2006)
	A dummy variable =1 if a firm was an industrially diversified one that reported more than one business segment with different three-digit North American industry classification system (NAICS) codes, and 0 otherwise	Hoechle et al. (2012)
Examine the extent of industrial diversification	An ordinal variable with 5 categories: very low, low, moderate, high, very high	White (2004)
	Berry-Herfindahl Index	Amit & Livnat (1988), Goranova et al. (2007), Kim & Chen (2010)
	Entropy Index	Goranova et al. (2007), Lien & Li (2013)
	Financial diversification is measured by correlation between the yearly values of the industry-level sales among each pair of two-digit SIC industries in which a firm operated	Castaner & Kavadis (2013)

Explore the existence and the level of global diversification	A dummy variable =1 if a firm was a globally diversified one that reported foreign sales in COMPUSTAT Geographic Segment (CGS) file	Jiraporn et al. (2006)
	Three specific measures: (1) GDM1: a dummy variable to classify a firm as globally diversified if it has at least one foreign segment and has any foreign sales (2) GDM2: a dummy variable to classify a firm as globally diversified if it has at least one foreign segment and foreign sales ratio greater than 10% (3) GD%: the ratio of foreign sales to total sales	Salama & Putnam (2013)

(Source: own creation)

3.3 Hypotheses development

Two first hypotheses are made on the basic of the assumption about the ineffectiveness of conglomerate diversification strategy as the arguments of most previous researches. If we argue based on the agency theory with this assumption, good corporate governance should reduce diversification in the firm in order to avoid agency costs and increase shareholder value or firm value. In the meanwhile, a strong internal corporate governance system is normally represented by a large extent to which interest alignment devices as well as control devices are established. Thus, the unrelated diversification level is expected to be reduced more when the firm uses more interest alignment devices or more control devices because at this time, the interests between the principles and the agents would be more aligned, agency conflicts would be resolved, moral hazard problems would be prevented, and managers would be less likely to take value-reducing actions.

Hypothesis 1 and Hypothesis 2 are presented as follows:

Hypothesis 1: The more interest alignment devices are used, the lower the extent of conglomerate diversification will be.

In other words, the extent of diversification will be reduced when either more stock options are granted to executives or executive ownership is increased.

Hypothesis 2: The more control devices are applied, the lower the extent of conglomerate diversification will be.

Entering into details, the firm is expected to be less diversified when one of following situations happens: blockholders seize higher ownership, there is a larger number of independent directors in the Board of Directors of the firm, or the board independence becomes higher owing to the separation of positions between a board chairman of the Board of Directors and a CEO of the Executive Committee.

An interesting exploration of Castaner & Kavadis (2013) was the moderation of free cash flow in the impact of corporate governance on financial diversification when they tested the interrelationship among corporate governance, financial diversification and shareholders' value in France. Specifically, they found that the influence of corporate governance prescriptions (interest alignment devices and control devices) on financial diversification could be different according to the level of free cash flow (high or low). Castaner & Kavadis (2013)'s research seems to be the first empirical one affirming this role of free cash flow, an availability of financial resources. Their finding was proved to be consistent with the circumstance of France; however, whether it is still true in other nations or not. Therefore, the next hypothesis is set in this study:

Hypothesis 3: The effect of each internal corporate governance mechanism on diversification level of a firm is different between high and low free cash flow.

The last hypothesis (Hypothesis 4) is put forward to test the effectiveness of conglomerate diversification strategy. Most researches proved the ineffectiveness of this strategy because its negative effect on firm financial performance such as profitability (Rumelt, 1982; Amit & Livnat, 1988; Hoskisson et al., 1993; and Berger & Ofek, 1995), abnormal stock returns (Comment & Jarrell, 1995) or cumulative abnormal return of acquisitions (Gleason et al., 2012) as well as firm value that was measured by or reflected in Tobin's q–ratio (Lang & Stulz, 1994), stock price (Morck et al., 1990), revenue based excess value (Anderson et al., 2000; Jiraporn et al., 2006; Hoechle et al., 2012; and Castaner & Kavadis, 2013), excess value based on assets, or excess value based on both sales and assets (Hoechle et al., 2012).

As regards explanations for the ineffectiveness of this conglomerate diversification strategy, poor corporate governance was asserted by several authors (for example: Amihud & Lev (1999), Hoechle et al. (2012), Gleason et al. (2012) and Salama & Putnam (2013)) as a popular reason. It was argued that when a firm had an extremely high unrelated diversification level, normally it would have a weak corporate governance system with growing conflicts of interests between the principals and the agents. In that kind of company, managers would have incentives to take self-interested actions ignoring the benefits of shareholders; thus, agency costs would increase over time. That was the reason why the firm financial performance and firm value would reduce considerably.

From above empirical evidences and arguments, this study desires to test whether unrelated diversification is indeed a value-destroying strategy. Hypothesis 4 is formed as follows:

Hypothesis 4: The higher unrelated diversification level of a firm is, the lower the firm value becomes.

3.4 Chapter summary

This chapter summarized different potential measurements that can be used to measure corporate governance and diversification. It can be realized that corporate governance could be measured through its mechanisms (interest alignment devices and control devices); whereas, diversification could be tested on the aspect of the existence or applied level of industrial and/or global diversification. Depending on factual circumstance of listed firms in Vietnam as well as the amount of related information of the companies in the sample available for the subsidiary objectives of the study, suitable measures will be selected and shown in Chapter 5.

The chapter also presented four hypotheses in accordance with arguments of the agency theory, features of internal corporate governance mechanisms and the formulation of diversification strategy. It is noticeable that these four hypotheses can be examined for different subjects in various countries; and this study will test these hypotheses using the data in Vietnam, a developing country in Asia.

CHAPTER 4: INDUSTRIAL TAXONOMY AND REGULATIONS ON CORPORATE GOVERNANCE IN VIETNAM

4.1 Introduction

As regards industrial diversification, it is essential to pick up signals in recognizing a corporation to be in concentric or conglomerate diversification. In general, conglomerate or unrelated diversification happens when a firm operates in more than one segment or one division coded by two digits in Standard Industrial Classification (SIC) system of the United States or in International Standard Industrial Classification of All Economic Activities (ISIC) of the United Nations. Thus, the purpose of this chapter is to introduce industrial taxonomy in Vietnam so that readers can see the signals to realize whether a Vietnamese company is unrelated diversified or not. In addition, as La Porta et al. (2000) mentioned, in order to understand corporate governance, the legal approach containing laws and their enforcement is a productive way. Therefore, regulations on corporate governance in Vietnam are also introduced in this chapter.

Particularly, this chapter firstly summarizes the development of three main industrial taxonomies in the world. Then, it reviews regulations on industrial taxonomy in Vietnam and indicates the similarities as well as differences between industrial taxonomy in Vietnam and industrial taxonomies that are popular in the world. Thirdly, because the sample in the study is listed firms on stock markets, this study also finds out the disclosure of information related to industrial taxonomy of listed companies in Vietnam. Lastly, this chapter lists regulations on corporate governance in Vietnam that affect features of corporate governance in this country.

4.2 Popular industrial taxonomies in the world

Nowadays, there are three main industrial taxonomies applied in the world. The first industrial taxonomy is Standard Industrial Classification (SIC) that was established by the U.S. Government in 1937 and was then replaced by North American Industrial Classification System (NAICS) issued by the Governments of the United States, Mexico, and Canada in 1997. NAICS has been updated three times with new versions (NAICS 2002, NAICS 2007 and NAICS 2012) until now. The second taxonomy adopted by the United Nations is

International Standard Industrial Classification of All Economic Activities (ISIC) released in 1948 and revised over time. The forth revision of ISIC (ISIC, Rev.4) issued in 2008 is still valid today. Lastly, the third one is Global Industry Classification Standard (GICS) introduced by Standard & Poor's and MSCI in 1999 with the purpose of creating a global standard for classifying listed firms into various sectors and industries. GICS structure has been updated and changed every year since 2002 together with the development of global investment environment. The details of history and development of these main industrial taxonomies are illustrated in Figure 5.

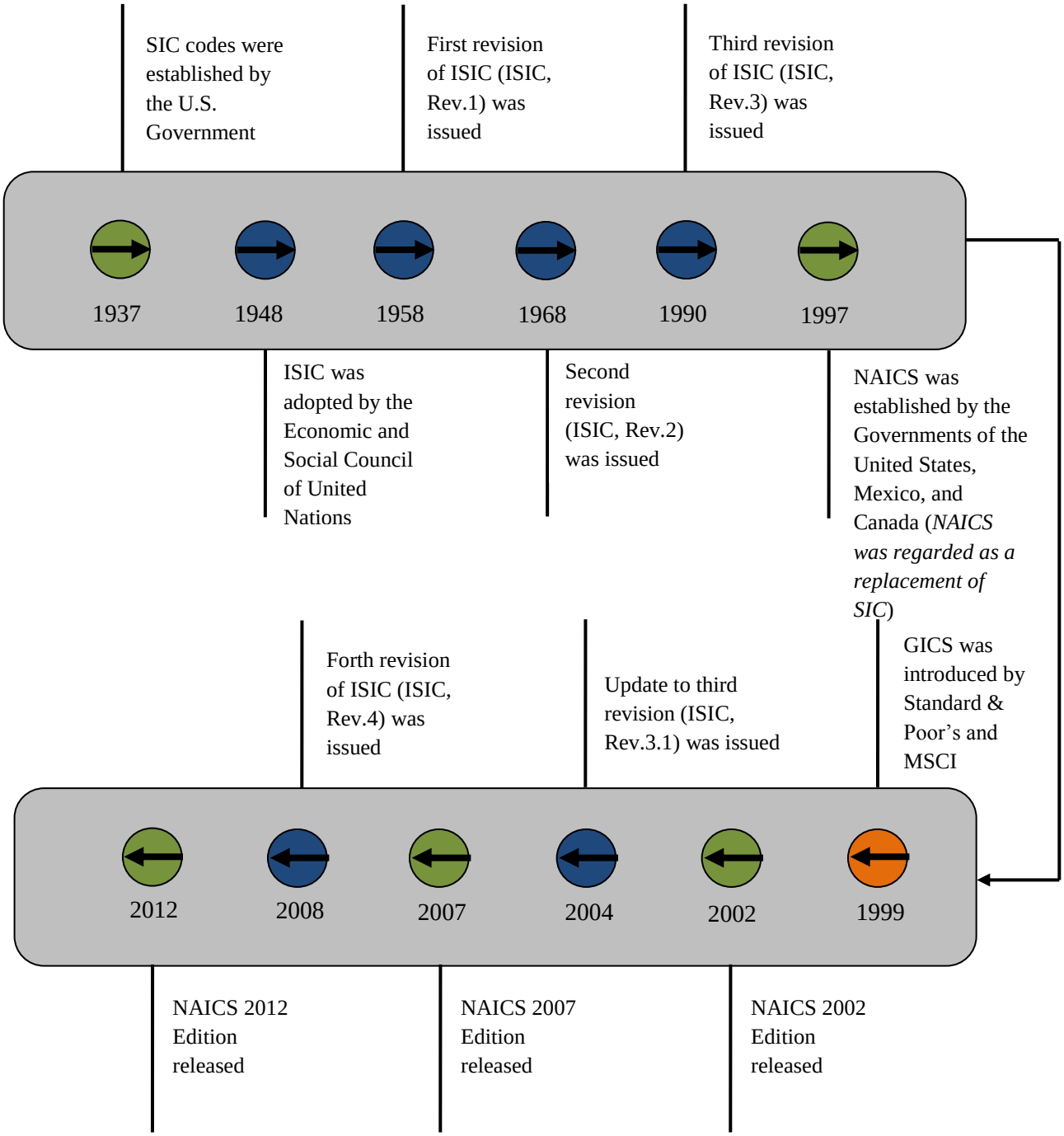
4.3 Industrial taxonomy in Vietnam

4.3.1 Regulations on industrial taxonomy in Vietnam

In case of Vietnam, on 23rd January 2007 Vietnam issued an official document related to industrial taxonomy in this country. That was the decision No. 10/2007/QĐ-TTg of the Prime Minister about announcing the system of industries in Vietnam. Following this decision, on 10th April 2007 the Ministry of Planning and Investment of Vietnam gave the decision No. 337/QĐ-BKH on issuing regulations of contents in the system of industries in Vietnam. These two documents are still effective today.

According to regulations of above documents, industrial taxonomy in Vietnam shows the similarities with International Standard Industrial Classification of All Economic Activities (ISIC) Revision 4 when it also includes 21 sections that are called *Branch level 1* as well, coded alphabetically from A to U, and further classified in details into 88 divisions or *Branch level 2* through codes of two digits. Table 6 shows industrial classifications as stated by ISIC Rev. 4 and by decisions No. 10/2007/QĐ-TTg along with No. 337/QĐ-BKH on the system of industries in Vietnam, Table 7 presents specific names of 21 sections and Table 8 illustrates divisions coded by 2 digits of sections A and B in the industrial taxonomy of Vietnam. A full list of 88 divisions corresponding to these 21 sections can be seen in Appendix 1.

Figure 5: Development of three main industrial taxonomies in the world



SIC – Standard Industrial Classification

NAICS – North American Industrial Classification System

ISIC – International Standard Industrial Classification of All Economic Activities

GICS – Global Industry Classification Standard

(Source: own creation based on information from three websites: http://siccode.com/en/, http://unstats.un.org/unsd/default.htm, and https://www.msci.com/gics)

Table 6: ISIC Rev. 4 and Industrial taxonomy in Vietnam

	ISIC Rev. 4	Industrial taxonomy in Vietnam
Number of sections (branches level 1) with alphabetic codes	21	21
Number of divisions (branches level 2) coded by 2 digits	88	88
Number of groups (branches level 3) coded by 3 digits	238	242
Number of classes (branches level 4) coded by 4 digits	419	437
Number of sub-classes (branches level 5) coded by 5 digits	0	642

(Source: own creation)

Table 7: A system of 21 sections in the industrial taxonomy of Vietnam

Level 1	**BRANCH**
A	Agriculture, Forestry and Fishing
B	Mining and quarrying
C	Manufacturing
D	Electricity, gas, steam and air conditioning supply
E	Water supply; sewerage, waste management and remediation activities
F	Construction
G	Wholesale and retail trade; repair of automobiles, motors, motorbikes and other motor vehicles
H	Transportation and storage
I	Accommodation and food service activities
J	Information and communication
K	Financial, banking and insurance activities
L	Real estate activities
M	Professional, scientific and technical activities
N	Administrative and support service activities
O	Activities of the Communist Party, of political-societal organizations; public administration, defence, and compulsory social security activities

P	Education and Training
Q	Human health and social work activities
R	Arts, entertainment and recreation
S	Other service activities
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use
U	Activities of extraterritorial organizations and bodies
Total: 21	

(Source: Decision No. 10/2007/QĐ-TTg of the Prime Minister on 23rd January 2007)

Table 8: An illustration of divisions coded by 2 digits of sections A and B in the industrial taxonomy of Vietnam

Level 1	Level 2	BRANCH
A		**Agriculture, Forestry and Fishing**
	01	Agriculture and related services activities
	02	Forestry and related services activities
	03	Fishing and aquaculture
B		**Mining and quarrying**
	05	Mining of coal and lignite
	06	Extraction of crude petroleum and natural gas
	07	Mining of metal ores
	08	Other mining and quarrying
	09	Mining support service activities

(Source: Decision No. 10/2007/QĐ-TTg of the Prime Minister on 23rd January 2007)

It can be seen from Table 6 that ISIC Rev. 4 and the Industrial taxonomy of Vietnam have the same way to recognize whether a firm is in unrelated diversification or not by considering whether the firm operates in more than one division coded by 2 digits or not. However, in terms of related diversification, there are a few differences between these two classification systems. The number of groups and classes in the industrial taxonomy of Vietnam is a bit larger than that in ISIC Rev. 4. In particular, there are 242 groups and 437 classes in the industrial taxonomy of Vietnam compared with 238 and 419 respectively in ISIC Rev. 4. This difference may result from the fact that Vietnamese government wanted to create a more detailed categorization in accordance with economic development of Vietnam. For example,

there is a more detailed taxonomy in the division No. 45 "Sale, repair of automobiles, motors, motorbikes and other motor vehicles" in Vietnam in comparison with that in ISIC Rev. 4 (Table 9).

Table 9: A detailed categorization of Division No.45

ISIC Rev. 4	Industrial taxonomy of Vietnam
Division 45: Wholesale and retail trade and repair of motor vehicles and motorcycles	*Division 45*: Sale, repair of automobiles, motors, motorbikes and other motor vehicles
Group 451: Sale of motor vehicles	*Group 451*: Sale of automobiles and other motor vehicles
Class 4510: Sale of motor vehicles	*Class 4511:* Wholesale of automobiles and other motor vehicles *Class 4512*: Retail of small automobiles (automobiles with 12 or less seats) *Class 4513*: Agency for automobiles and other motor vehicles

(Source: ISIC Rev. 4 & Decision No. 10/2007/QĐ-TTg of the Prime Minister on 23rd January 2007)

Furthermore, in the industrial taxonomy of Vietnam, classes continue to be divided into sub-classes coded by 5 digits. This does not exist in ISIC Rev. 4. For instance, Table 10 illustrates sub-classes in the section of Construction in Vietnam.

Table 10: A detailed classification in the section of Construction according to industrial taxonomy of Vietnam

F					Construction
	41	410	4100	41000	Construction of buildings
	42				Civil engineering
		421	4210		Construction of roads and railways
				42101	Construction of railways
				42102	Construction of roads
		422	4220	42200	Construction of utility projects
		429	4290	42900	Construction of other civil engineering projects

	43				Specialized construction activities
		431			Demolition and site preparation
			4311	43110	Demolition
			4312	43120	Site preparation
		432			Electrical, plumbing and other construction installation
			4321	43210	Electrical installation
			4322		Plumbing, heat and air-conditioning installation
				43221	Plumbing installation
				43222	Heat and air-conditioning installation
			4329	43290	Other construction installation
		433	4330	43300	Building completion and finishing
		439	4390	43900	Other specialized construction activities

(Source: Decision No. 10/2007/QĐ-TTg of the Prime Minister on 23rd January 2007)

4.3.2 Disclosure of information concerning industrial taxonomy of listed companies in Vietnam

In Vietnam, there has been no unification in disclosing information on industrial taxonomy of listed companies.

Although Decision No. 10/2007/QĐ-TTg of the Prime Minister in Vietnam indicated specific codes for sub-classes, classes, groups, divisions as well as sections, this code system is in fact used only when a company registers its industries with the Planning and Investment Department in the city or province where it will operate or is operating. For example, in the 4th registration for changing business activities of Ha Noi – Hai Phong Beer Joint Stock Company (Stock code: BHP) on 7th August 2013, its business activities were listed with respective codes as the following table:

Table 11: Registered industries of BHP from 7th August 2013

No.	Name of industry	Code
1	Water collection, treatment and supply	36000 (Main)
2	Producing bottled mineral water and pure water	11041
3	Cargo road transport	4933
4	Hotels	55101

5	Restaurants, food shops, food booths	56101
6	Producing alcoholic and non-alcoholic beverages: beer, wine and soft drinks	Does not match with any codes in the system of industries in Vietnam

(Source:http://biahaiphong.vn/news/business-news/thong-bao-thay-d%E1%BB%95i-gi%E1%BA%A5y-ch%E1%BB%A9ng-nh%E1%BA%ADn-dang-ky-kinh-doanh.html)

In the meanwhile, two stock markets (Ho Chi Minh Stock Exchange and Ha Noi Stock Exchange) have followed industrial taxonomies that are different from regulations of the Decision No. 10/2007/QĐ-TTg of the Prime Minister. Ho Chi Minh Stock Exchange has adopted Global Industry Classification Standard (GICS) for industry classification on this stock market through 10 sectors (Energy, Materials, Industrials, Consumer Discretionary, Consumer Staples, Health Care, Financials, Information Technology, Telecommunication Services, and Utilities). Nevertheless, HOSE has not presented detailed codes of GICS for each listed firm. It only determines which sector among above 10 sectors the firm should be in. For instance, information on business fields of Ho Chi Minh City Infrastructure Investment Joint Stock Company (Stock code: CII) is recorded on HOSE as the following summarized table.

Table 12: Basic information of Ho Chi Minh City Infrastructure Investment Joint Stock Company on HOSE

CII - Ho Chi Minh City Infrastructure Investment Joint Stock Company	
ISIN CODE	VN000000CII6
FIGI CODE	BBG000PM3W81
Industrial sector	Industrials | Transportation
Market capitalization (VND)	6,258,610,175,000
Listing volume (Share)	260,154,407
Outstanding volume (Share)	250,344,497

(Source: http://www.hsx.vn)

To Ha Noi Stock Exchange (HNX), it does not follow any code system of any industrial taxonomy. For example, when introducing basic information of a listed company on this stock market, the part of business fields is displayed in the way of listing all activities the firm participates in. The following brief table is illustrated for basic information of Song Da 6 Joint Stock Company (Stock code: SD6) displayed on HNX.

Table 13: Basic information of Song Da 6 Joint Stock Company (SD6)

Company's name	**Song Da 6 Joint Stock Company (SD6)**
Trading Registration License	4400135552
Product/Main Services	Construct hydropower works, transportation, technical infrastructure, post office and other constructions
Market capitalization (VND)	347,716,110,000
Listing volume (Share)	34,771,611
Outstanding volume (Share)	34,771,611

(Source: http://www.hnx.vn)

This fact leads to difficulties for the author in collecting data related to industrial or product diversification of listed corporations in Vietnam. In order to guarantee the unification of data on diversification during the period from 2007 to 20014, this study chooses the data on detailed revenue for each industry that is described in Notes to the Consolidated Financial Statements in each year of each listed company. According to Decision No. 15/2006/QD-BTC on issuing business accounting system of the Minister of Finance in Vietnam on 20th March, 2006, in the annual Notes to the Consolidated Financial Statements, total revenue needs to be particularized for three fields comprising Selling products or goods, Providing services, and Construction. Thus, Consolidated Financial Statements being issued from 2007 afterwards complied with the provisions of this decision; and in reality, if a firm sells not only products but also goods, it usually discloses revenue separately between Manufacturing and Wholesale or Retail Trade. Table 14 demonstrates details of revenue in various fields of CII and SD6 in the year of 2014.

Table 14: Revenue of CII and SD6 in 2014

Stock code	**Stock market**	**Revenue in Year 2014**			
		Manufacturing	**Wholesale Trade and/or Retail Trade**	**Service**	**Construction**
CII	HOSE	0	68,200,030,984	590,603,317,741	1,967,323,191,939
SD6	HNX	371,783,281,137	2,816,971,383	4,530,367,077	919,990,880,310

(Source: Notes to the Consolidated Financial Statements of CII and SD6 at the end of 2014)

These is the reason why this study will determine diversification level of listed companies in Vietnam based on the details of revenue in four various industries, namely *Manufacturing, Wholesale Trade and/or Retail Trade, Service,* and *Construction* that are collected from annual Notes to the Consolidated Financial Statements between 2007 and 2014.

4.4 Regulations on corporate governance in Vietnam

Until now there have been three official documents concerning regulations on corporate governance in Vietnam. In particular, they were Decision No. 12/2007/QD-BTC dated 13th March, 2007 of the Minister of Finance on issuing Regulations on Corporate Governance applicable to companies listed on the Stock Exchange or Securities Trading Center, Decision No. 15/2007/QD-BTC dated 19th March, 2007 of the Minister of Finance on issuing the Model Charter applicable to companies listed on the Stock Exchange or Securities Trading Center, and Circular No. 121/2012/TT-BTC dated 26th July, 2012 of the Ministry of Finance issuing regulations on corporate governance applicable to public companies. Among these documents, the Circular No. 121/2012/TT-BTC took effect from 17th September, 2012 and replaced previous regulations involving both Decision No. 12/2007/QD-BTC and Decision No. 15/2007/QD-BTC. This circular issued regulations for each subject of corporate governance including shareholders and shareholders' meeting, members of board of directors, and members of board of inspection. Moreover, it emphasized that public companies must disclose information about the corporate governance in the Annual Meeting of Shareholders and in the Annual Report of the company in accordance with the law on securities and stock market. For that reason, most information related to corporate governance in this study is collected from the annual reports of the listed firms in Vietnam.

4.5 Chapter summary

This chapter presents industrial taxonomy, factual disclosure of information concerning industrial taxonomy of listed firms and regulations on corporate governance in Vietnam. It is realized that industrial taxonomy in Vietnam is rather similar to International Standard Industrial Classification of All Economic Activities (ISIC) Revision 4 that was adopted by the United Nations when both of them include 21 sections and 88 divisions in their classification systems. There are only a few differences in the number of groups, classes

and sub-classes that reflect related diversification. In terms of disclosure, it can be seen that there is no unification in disclosing information on industrial taxonomy of listed firms between two stock markets: HOSE and HNX. Moreover the listed companies, themselves, did not record revenue or assets according to the code system of Decision No. 10/2007/QĐ-TTg of the Prime Minister on 23rd January 2007. Therefore, this study will base on information about revenue of four sectors (Manufacturing, Wholesale Trade and/or Retail Trade, Service, and Construction) from annual Notes to the Consolidated Financial Statements to determine the firms' diversification levels. Lastly, according to regulations on disclosing information regarding corporate governance in Vietnam, this study will collect most variables as proxies for corporate governance from the annual reports of listed companies.

CHAPTER 5: RESEARCH DESIGN AND RESEARCH METHODOLOGY

5.1 Introduction

This chapter is a chapter devoted to research design and research methodology. Firstly, a sample description is presented to describe the selected sampling frame, different sources for collecting the data and specific steps to transform from target population to actual sample in the research. Secondly, research models and measurements of 12 variables (Firm diversification, Firm value, Executive stock options, Executive ownership, Blockholder ownership, Board composition, Duality in position, Free cash flow, Firm accounting performance, Firm size, Firm leverage, and State ownership) are pointed out before displaying methods for analyzing data.

5.2 Sample description

5.2.1 Sampling frame

In order to select a sampling frame in accordance with the research objectives, it is important to have an overview of economic development in Vietnam at the beginning.

After more than 100 years for resistance wars against France and America, Vietnam officially unified the whole country in the year of 1975. From this time, Vietnam's revolutionary moved to a new phase – the period when the country went towards socialism. However, during ten years from 1976 to1986, Vietnam faced a serious economic crisis when it followed a centrally planned economy with the domination of state-owned enterprises and discouragement of competition. Thus, in the Sixth Congress of the Vietnamese Communist Party in December 1986, Vietnam emphasized on implementing a comprehensively renewal policy for the country, particularly in terms of the innovation in economic thinking, in order to transform the economic system from *a centrally controlled command economy* to *a socialist-oriented market economy*. The period 1986-2000 can be called as the era of *Renovation* (*Doi Moi*) of Vietnam with the its integration into the regional economy; for example it became a member of the Association of Southeast Asean Nations (ASEAN) in 1995, of the Asia-Europe Meeting (ASEM) in 1996 or of the Asia-Pacific Economic Cooperation Forum (APEC) in 1998. In this period, the Vietnamese government also passed a number of laws such as Law

on Foreign Investment in 1987, Law on State Enterprises in 1995, and Law on Enterprises (for limited liability companies and joint-stock ones, partnerships and private enterprises) in 1999.

From 2000 afterwards that can be called as the era of *Economic Development*, Vietnamese State put emphasis on building an independent and autonomic economy on the basis of mobilizing internal resources and actively integrating into the international economy, as well as on implementing industrialization and modernization of the country in the development of the socialist-oriented market economy. This content was mentioned in Resolution No. 51/2001/QH10 on amending and supplementing some articles of the Constitution of the Socialist Republic of Vietnam in 1992. While Constitution of the Socialist Republic of Vietnam in 1992 asserted the role of administration of the State in the development of economy in the 15th article, this role was not stated in the Resolution No. 51/2001/QH10. This showed that Vietnamese State really wanted to encourage competition or establish a competitive economy in the forthcoming development of the country.

With the target of internationally economic integration in the period of *Economic Development*, in November 2005 Vietnamese National Assembly promulgated Enterprise Law No. 60/2005/QH11 that was applied for enterprises of all economic sectors when it replaced the previous laws on State Enterprises together with the Law on Enterprises No. 13/1999/QH10 in 1999. This new enterprise law took effect from July 2006; however, it was conjunctively replaced by Enterprise Law No. 68/2014/QH13 that was valid from 01 July 2015. Moreover, in the year of 2007, Vietnamese Minister of Finance announced the Decision No. 12/2007/QD-BTC on issuing Regulations on Corporate Governance applicable to companies listed on the Stock Exchange or Securities Trading Center. Therefore, the chosen sampling frame of this study is listed firms on the stock markets in Vietnam during the period from 2007 to 2014 that is suitable with the appearance and effectiveness of Enterprise Law No. 60/2005/QH11.

5.2.2 Data sources

In Vietnam there are two stock markets namely Ho Chi Minh Stock Exchange (HOSE) that was originally established in 2000, and Ha Noi Stock Exchange (HNX) that started operating in 2005. The data are collected directly from these two stock markets

(http://www.hsx.vn and http://www.hnx.vn). In addition, in case the data are not available on the websites of these two stock markets, the author will collect the data from other sources such as BIDV Securities Company (BSC) (https://www.bsc.com.vn), Vietstock Company (http://vietstock.vn), FPT Securities Joint Stock Company (FPTS) (http://ezsearch.fpts.com.vn) or from the website of each listed company.

5.2.3 Description of the sample design

Nonprobability sampling based on judgment is applied in this research. The sequence of choosing suitable companies can be described into the following steps:

Step 1: Collect necessary available data including stock codes, names of the listed firms and dates when they took part in the stock markets on HOSE or HNX on January 27th 2015. This time is chosen in order to guarantee that selected firms have operated in the stock markets in Vietnam until January 27th 2015.

Step 2: Marking companies that were listed from the year of 2006 onwards. The purpose of this step is to find out companies that were able to publish annual reports from 2007 to 2014 continuously.

From this step, it was found that there were 134 listed firms, that consists of 74 firms on HOSE and 60 firms on HNX, having listing dates from 2006 onwards

Step 3: Eliminate firms that did not publish enough annual reports from 2007 to 2014 or did not present complete data about corporate governance in their annual reports during this period.

After eliminating, the final sample was 70 firms in which 48 from HOSE and 22 from HNX. Basic information (Stock code, Name of company, Listing date, amount of Market capitalization, Listing registration volume of stock, and Outstanding volume of stock) of these 70 companies in the actual sample is shown in detail in Appendix 2.

The transformation from target population to actual sample can be illustrated in Figure 6:

Figure 6: The transformation from target population to actual sample in the research

(Source: own creation)

5.3 Prerequisites for selecting proper measurements in case of Vietnam

Among different potential measurements for corporate governance and diversification as mentioned in Chapter 3, this study will select measurements satisfying two conditions. The first prerequisite is that the availability of related data in the factual circumstance of listed firms in Vietnam during the period 2007 – 2014. The period from 2007 to 2014 is the time when Vietnamese enterprises complied with government regulations on firms' characteristics, corporate governance, and diversification promulgated in 2005 and 2007. The regulations might be too new for companies to understand and satisfy all their articles. This leaded to the fact that a large number of listed companies did not publish enough annual reports and/or not present complete data about corporate governance in their annual reports over this period. Therefore, it was extremely difficult for the author to collect the data concerning corporate governance and diversification of listed enterprises in Vietnam. The author had to read Annual Reports as well as Audited Consolidated Financial Statements one by one of each company in each year from 2007 to 2014. Next, the second condition is that the popularity of the measurements. A chosen measure should be also applied by several prior researches because the popularity can be considered as a signal of its reliability.

These two prerequisites are the reasons why the author can not use *Executive compensation* variable and *Audit committee* variable representing internal corporate governance mechanisms in this research.

Regarding *Executive compensation*, one difficulty in collecting this kind of data is that information about total compensation including Salary, Bonus and Allowance for executives in the majority of listed companies in Vietnam was only published frequently from 2012 to 2014; there was a lack of this data between 2007 and 2011. For that reason, *Executive compensation* is not involved in the models of this research.

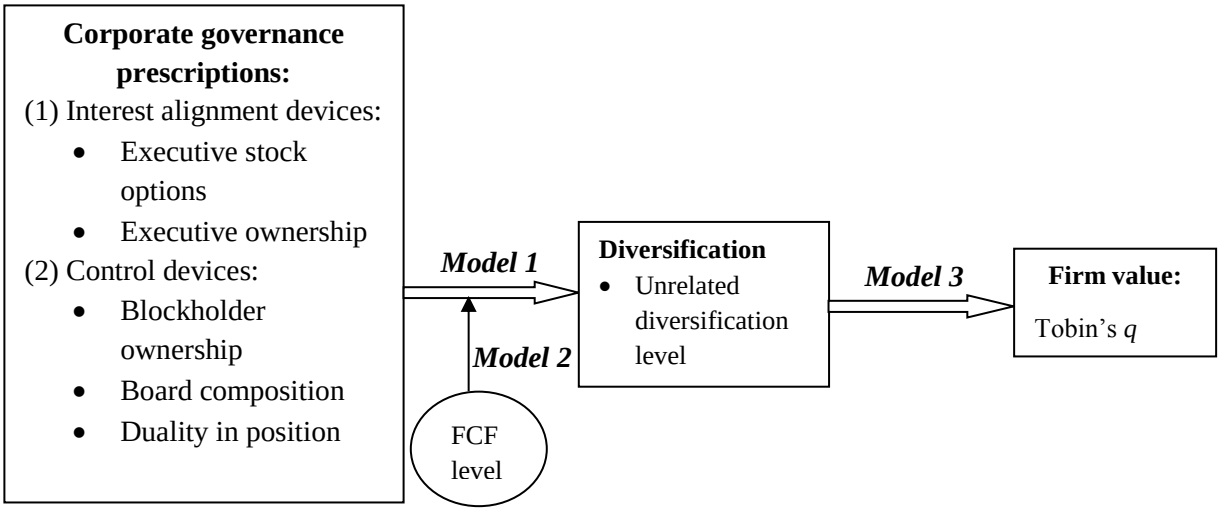
About *Audit committee*, because the establishment of audit committees is not compulsory to public companies in Vietnam, until now only a few companies have formed audit committees voluntarily in their organizational structures when they realized the importance of this type of committee to strategic management role of Board of Directors. For example, although Ha Do Group Joint Stock Company was established in 1990, equitized in 2004, and officially listed on Ho Chi Minh Stock Exchange in 2010, it have just formed an audit committee on 20th March 2017. Furthermore, among 70 listed firms in the sample of this research, no firms had audit committees in their organizational designs. Only one company, Refrigeration Electrical Engineering Corporation (stock code: REE), set up an internal audit subcommittee with similar roles and responsibilities to an audit committee under the direction of its Board of Management. Hence, this study does not use the *audit committee* variable in research models that is different from the study of Samaha et al. (2012).

The selection of appropriate measures for firm value and firms' characteristics also follows the above prerequisites. The following part will state specific variables being selected to represent corporate governance, diversification, firm value and firms' characteristics in the research.

5.4 Research models and Variables

The idea of the relationships among corporate governance, diversification and firm value in the research are illustrated in the Figure 7. From that, three models with the total of 12 variables are established.

Figure 7: Research idea



(Source: own creation)

5.4.1 Research models

Three main models are built in this research. Model 1 and Model 2 are functions of diversification level and Model 3 is of firm value.

Model 1 uses Corporate governance attributes (Executive stock options, Executive ownership, Blockholder ownership, Board composition and Duality in position), Availability of resource (Free cash flow) and Firm-specific control variables (Firm accounting performance, Firm size, Firm leverage and State ownership) to determine Firm diversification level. Model 2 is similar to Model 1 but interactions between free cash flow dummy and corporate governance variables are added into this model to test whether Free cash flow moderates the influence of corporate governance mechanisms on diversification level. Then, Model 3 also comprises Corporate governance attributes (Executive stock options, Executive ownership, Blockholder ownership, Board composition and Duality in position), Availability of resource (Free cash flow) and Firm-specific control variables (Firm accounting performance, Firm size, Firm leverage and State ownership) after adding Firm diversification level in order to test the impact of diversification level on firm value.

Three models can be written as the following equations:

Model 1 (Firm Diversification Equation without interactions):

$$Firm\ Diversification\ level_{it} =$$
$$\beta_{0it} + \beta_1 \text{Executive stock options}_{it} + \beta_2 \text{Executive ownership}_{it} +$$
$$\beta_3 \text{Blockholder ownership}_{it} + \beta_4 \text{Board composition}_{it} + \beta_5 \text{Duality in position}_{it} +$$
$$\beta_6 \text{Free cash flow Dummy}_{it} + \beta_7 \text{Firm accounting performance}_{it} + \beta_8 \text{Firm size}_{it} +$$
$$\beta_9 \text{Firm leverage}_{it} + \beta_{10} \text{State ownership}_{it} + u_{it}$$

$$FDiv_{it} = \beta_{0it} + \beta_1 ESO_{it} + \beta_2 EXO_{it} + \beta_3 BLKO_{it} + \beta_4 BCOM_{it} + \beta_5 DUAL_{it} +$$
$$\beta_6 FCFDum_{it} + \beta_7 ROA_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} StaO_{it} + u_{it}$$

Where i represents the cross-section unit, t stands for the time

$i = 1,2, \ldots,70; \quad t = 2007,2008,..,2014$

and the error term (u_{it}) is assumed to follow the normal distribution with zero mean and constant variance: $u_{it} \sim N(0, \sigma^2)$

Model 2 (Firm Diversification Equation with interactions):

$$Firm\ Diversification\ level_{it} =$$
$$\beta_{0it} + \beta_1 \text{Executive stock options}_{it} + \beta_2 \text{Executive ownership}_{it} +$$
$$\beta_3 \text{Blockholder ownership}_{it} + \beta_4 \text{Board composition}_{it} + \beta_5 \text{Duality in position}_{it} +$$
$$\beta_6 \text{Free cash flow Dummy}_{it} + \beta_7 \text{Firm accounting performance}_{it} + \beta_8 \text{Firm size}_{it} +$$
$$\beta_9 \text{Firm leverage}_{it} + \beta_{10} \text{State ownership}_{it} +$$
$$\beta_{11} (\text{Free cash flow Dummy x Executive stock options})_{it} +$$
$$\beta_{12} (\text{Free cash flow Dummy x Executive ownership})_{it} +$$
$$\beta_{13} (\text{Free cash flow Dummy x Blockholder ownership})_{it} +$$
$$\beta_{14} (\text{Free cash flow Dummy x Board composition})_{it} +$$
$$\beta_{15} (\text{Free cash flow Dummy x Duality in position})_{it} + u_{it}$$

$$FDiv_{it} = \beta_{0it} + \beta_1 ESO_{it} + \beta_2 EXO_{it} + \beta_3 BLKO_{it} + \beta_4 BCOM_{it} + \beta_5 DUAL_{it} +$$
$$\beta_6 FCFDum_{it} + \beta_7 ROA_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} StaO_{it} + \beta_{11} FCFESO_{it} +$$
$$\beta_{12} FCFEXO_{it} + \beta_{13} FCFBLKO_{it} + \beta_{14} FCFBCOM_{it} + \beta_{15} FCFDUAL_{it} + u_{it}$$

Where i represents the cross-section unit, t stands for the time

$i = 1,2, \ldots,70; \quad t = 2007,2008,..,2014$

and the error term (u_{it}) is assumed to follow the normal distribution with zero mean and constant variance: $u_{it} \sim N(0, \sigma^2)$

Model 3 (Firm Value Equation):

$$Firm\ value_{it} = \beta_{0it} + \beta_1 Firm\ Diversification\ level_{it} + \beta_2 \text{Executive stock options}_{it} + \beta_3 \text{Executive ownership}_{it} + \beta_4 \text{Blockholder ownership}_{it} + \beta_5 \text{Board composition}_{it} + \beta_6 \text{Duality in position}_{it} + \beta_7 \text{Free cash flow Dummy}_{it} + \beta_8 \text{Firm accounting performance}_{it} + \beta_9 \text{Firm size}_{it} + \beta_{10} \text{Firm leverage}_{it} + \beta_{11} \text{State ownership}_{it} + u_{it}$$

$$Tobinsq_{it} = \beta_{0it} + \beta_1 FDiv_{it} + \beta_2 ESO_{it} + \beta_3 EXO_{it} + \beta_4 BLKO_{it} + \beta_5 BCOM_{it} + \beta_6 DUAL_{it} + \beta_7 FCFDum_{it} + \beta_8 ROA_{it} + \beta_9 SIZE_{it} + \beta_{10} LEV_{it} + \beta_{11} StaO_{it} + u_{it}$$

Where i represents the cross-section unit, t stands for the time

$i = 1,2, \ldots,70; \quad t = 2007,2008,..,2014$

and the error term (u_{it}) is assumed to follow the normal distribution with zero mean and constant variance: $u_{it} \sim N(0, \sigma^2)$

5.4.2 Variables

There are different types of variables used in the research. In particular, there are 1 dependent variable, 5 independent variables, 1 moderator, and 4 control variables in Model 1 while Model 3 comprises 1 dependent variable, 6 independent variables, and 5 control variables. Actually, Model 2 is the Model 1 after adding 5 interaction terms. Table 15 summarizes all types of variables corresponding to their significance.

Table 15: A summary of all types of variables being utilized in the study corresponding to their significance

Significance		Observed variable	Abbreviation	Type of variables	In model
Diversification level		Firm diversification	FDiv	Dependent variable	1, 2
				Independent variable	3
Firm value		Tobin's *q*	Tobinsq	Dependent variable	3
Internal corporate governance	The extent to establish interest alignment devices	- Executive stock options - Executive ownership	ESO EXO	Independent variables	1, 2, 3
	Effectiveness of control devices	- Blockholder ownership - Board composition - Duality in position	BLKO BCOM DUAL		
Availability of resources		Free cash flow	FCFDum	Moderator	1, 2
				Control variable	3
Firm characteristics		- Firm accounting performance (Return on assets) - Firm size - Firm leverage - State ownership	ROA SIZE LEV StaO	Control variables	1, 2, 3

(Source: own creation)

5.4.2.1 Firm diversification

In accordance with data availability of industrial classifications published by listed firms in Vietnam during the periods from 2007 to 2014, this research chooses **Modified Berry Herfindahl index** that was suggested by Montgomery (1982) to measure the level of unrelated diversification. This measurement is similar to the researches of Amit &Livnat(1988), Goranova et al. (2007) and Kim & Chen (2010).

Formula of Modified Berry Herfindahl index:

Firm Diversification = $1 - \frac{\sum P_i^2}{(\sum P_i)^2}$

where Pi: proportion of the segment i's sales to total sales

Therefore, in order to calculate Modified Berry Herfindahl index, the author collected information on sales of four sections (Manufacturing, Wholesale Trade and/or Retail Trade, Service, and Construction) of each company from 2007 to 2014. These data were collected from Audited Consolidated Financial Statements of each year published by each firm. For instance, the Table 16 shows collected sales (in VND) of the first ten companies in alphabetical order on Ho Chi Minh Stock Exchange (HOSE) in 2007, and respective Firm Diversification levels calculated for each firm according to Modified Berry Herfindahl Indexes. The closer the index of a firm is to 1 (or 0), the more diversified (or concentrated) the firm is.

Table 16: Modified Berry Herfindahl Indexes based on segment sales of ten Vietnamese listed firms on HOSE in 2007

No.	Stock code	Year 2007				FDiv
		Manufacturing	Wholesale Trade and/or Retail Trade	Service	Construction	
1	ABT	349,968,699,822	78,819,899,958	315,473,271	0	0.301
2	AGF	1,059,396,762,017	185,413,859,625	1,500,599,442	0	0.255
3	BMC	112,729,350,511	0	0	0	0.000
4	BMP	665,077,939,691	15,152,989,810	0	0	0.044
5	BT6	236,047,123,643	180,577,290,817	0	273,309,653,363	0.658
6	CII	0	394,546,271	177,029,853,118	0	0.004

7	CLC	753,840,346,865	59,219,406,081	888,551,116	0	0.137
8	COM	0	2,074,495,217,840	8,836,249,895	4,609,839,007	0.013
9	CYC	166,209,849,884	0	0	0	0.000
10	DHA	98,129,970,845	0	3,222,419,542	0	0.062

(Source: own collection)

5.4.2.2 Firm value

When measuring the value of a diversified firm, most researchers, such as Anderson et al. (2000), Jiraporn et al. (2006), Hoechle et al. (2012), Salama & Putnam (2013), Castaner & Kavadis (2013) adopted *excess value* that was firstly mentioned in the study of Berger & Ofek (1995). Berger & Ofek (1995) defined *excess value* as "the natural logarithm of the ratio of a firm's actual value to its imputed value". They suggested that the actual value of the firm was the total book value of debt plus market value of equity, and the imputed value was the sum of the imputed values of all segments in the firm. However, the ways to calculate each segment's imputed value could be different among various multipliers (Table 17). When the results came out, positive (negative) excess value would indicate that diversification enhanced (reduced) the value of the firm.

Table 17: Imputed value of each segment according to three types of multipliers

Using multipliers	Each segment's imputed value
Asset multiples	Equal to the segment's assets multiplied by its industry median capital-to-assets ratio
Sales multiples	Equal to the segment's sales multiplied by its industry median capital-to-sales ratio
EBIT multiples	Equal to the segment's EBIT multiplied by its industry median capital-to-EBIT ratio

(Source: based on Berger & Ofek, 1995)

As mentioned in part 3.3.2, because there was no unification in disclosing information on industrial taxonomy of listed firms when comparing the disclosure of the firms themselves with the release of each stock market (HOSE or HNX), the author could not have the industrial data of each segment (Manufacturing, Trade, Service or Construction) during the period from 2007 to 2014. Thus, in steads of using the imputed value, the author replaces

imputed value in the denominator into book value of total assets of the firm. In other words, this study utilizes Tobin's *q* to measure firm value instead of excess value in previous researches. This measurement is in accord with that of Lang & Stulz (1994), Kim & Chen (2010) and Lien & Li (2013).

Malkiel (1979) defined Tobin's *q* as the ratio between market value and book value or replacement/ reproduction cost of the same asset or group of assets based on the study of Tobin (1969). Following this definition, this research calculated Tobin's *q* as the following formulation:

$$\text{Tobin's } q_t = \frac{\text{(Number of outstanding shares in year t * Closing price of shares on the last trading day of the year t) + Total liabilities at end of year t}}{\text{Total assets at end of year t}}$$

The data on the number of outstanding shares, total assets and total liabilities are collected from Annual Reports together with Audited Consolidated Financial Statements of firms from 2007 to 2014. Regarding Closing price of shares on the last trading day, this information is gathered from published data by the BIDV Securities Company (BSC) (https://www.bsc.com.vn/).

5.4.2.3 Variables as proxies of corporate governance mechanisms

a. Executive stock options

One of interest alignment devices to lessen agency problems due to interest conflicts between the principle and the agent is granting stock options to CEOs as a part of their salary (Goranova et al., 2007; Castaner & Kavadis, 2013). When Goranova et al. (2007) studied the relationship between managerial ownership and diversification, they considered *CEO's stock options* as a control variable in their models. *CEO's stock options* was a proxy for incentive compensation and measured by the market value of the company. However, their results showed a statistically non-significant positive relationship between CEO's stock options and total diversification that was scaled by Berry-Herfindahl index. After that, the role of *CEO stock options* variable was changed in the study of Castaner & Kavadis (2013) into an independent variable because these authors wanted to check the effect of corporate governance on financial diversification. At this time, *CEO stock option* was a dichotomous

measure in order to show that whether the board offer stock options to the CEO. Castaner & Kavadis (2013) expected the positive impact of this variable on financial diversification with the availability of high FCF. However, finally they found that regardless of free cash flow level, this interest alignment device had a non-significantly positive effect on financial diversification. This result was similar to the findings of Goranova et al. (2007)'s study in case of without the moderation of FCF although a different method to measure the extent of diversification was applied.

Following the research of Castaner & Kavadis (2013), this study use Executive stock options (ESO) being a dummy variable with the value 1 if the executives had stock options in the year t. Otherwise its value will be equal to 0. Although previous researches showed non-significant evidences about the relationship between stock options and diversification, according to agency theory this study expects that the firm where executives receive stock options may become less diversified than the one in which there are no stock options for its managers because granting stock options to managers may prevent interest conflicts between the principals and the agents.

b. Executive ownership

Another interest alignment device for the firm is providing a large amount of shares for its executives (Denis et al., 1997; Singh et al., 2004; Goranova et al., 2007; Kim & Chen, 2010; Castaner & Kavadis, 2013). Mentioning on managerial ownership, some authors calculated percentage of shares owned by both managers and members of Board of Directors such as Denis et al. (1997), Kim & Chen (2010) or Singh et al. (2004). However, because this study concentrates on the agents who manage the firms directly, executive ownership is measured by the proportion of stock held by only executives in the Executive Committee. This measurement is similar to that of Hill & Snell (1988), Goranova et al. (2007) and Castaner & Kavadis (2013).

Until now there have been various results on the relationship between managerial ownership and diversification. While the research results of Hill & Snell (1988) and Denis et al. (1997) supported the negative relationship between these variables with arguments supporting agency theory, Singh et al. (2004) and Kim & Chen (2010) provide evidences about the positive relation between inside ownership and diversification. In the meanwhile,

Goranova et al. (2007) called more future researches on this relationship because they found that levels of managerial ownership in one time period did not affect subsequent changes in diversification level when they did research on a longitudinal data from 1994 to 1999. Additionally, when Castaner & Kavadis (2013) checked this relationship with the moderation of FCF, their result was also statistically non-significant. Nevertheless because this study chooses agency theory as a basic theory to explain determinants of diversification level, it supports the idea of Hill & Snell (1988) and Denis et al. (1997). When Denis et al. (1997) tested this relationship based on a sample of 933 U.S. firms in 1984, negative relations were found at statistically significant levels to all five measurements of diversification (Fraction with Multiple Segments, Number of Segments, Number of SIC Codes, Asset-Based Herfindahl Index, and Revenue-Based Herfindahl Index). They argued that according to agency cost hypothesis, at the time managers receive more equity ownership, they also incur higher costs related to value-reducing actions like diversification. Therefore, managers are less likely to adopt this strategy in case they have high equity ownership stakes. Furthermore, high ownership firms may be smaller or younger ones that operate in industries with smaller information asymmetries and fewer chances to expand into new lines of business.

Supporting the arguments of Denis et al. (1997), the author expects the negative relationship between executive ownership and the extent of diversification in case of Vietnam.

c. Blockholder ownership

As previously mentioned in literature review part of corporate governance, in accordance with the explanation of agency theory, the main purpose of control devices in an internal corporate governance system to monitor self-interested actions of the agents or prevent moral hazard problems. Increasing ownership concentration may be one of these control devices.

In order to measure ownership concentration, this study follows the most popular approach from prior researches such as studies of Bethel & Liebeskind (1993), Denis et al. (1997), Singh et al. (2004), Goranova et al. (2007) or Samaha et al. (2012). Specifically, blockholder ownership will be measured by the percent of shares owned by large shareholders who hold directly or indirectly 5% or more of total votable shares issued by the listed

organization in the year t as the definition in Securities Law No. 70/2006/QH 11 on 29th June 2006 of Vietnamese National Assembly.

The influence of ownership concentration on diversification in the researches of Hill & Snell (1988) and Denis et al. (1997) was negative. Denis et al. (1997) argued that outside blockholders served as valuable monitors who would prevent diversification strategy to bring more benefits to the firm. Hill & Snell (1988) also supported this negative relationship in research-intensive industries because they realized that when stockholders were weak, managers would prefer diversification strategies which enable them to maximize their utility in these industries. Thus, be consistent with previous researches, this study anticipates that the higher blockholder ownership is, the less diversified the firm is.

d. Board composition

Determining a suitable board composition to ensure board independence is one of control devices in corporate governance.

In agreement with the measurement of board composition from most other studies (Beatty & Zajac, 1994; Singh et al., 2004; Goranova et al., 2007; Kim & Chen, 2010; Samaha et al., 2012 and Castaner & Kavadis, 2013), the author measures board composition as the ratio of the number of independent directors to the total number of registered directors in the year t. Circular No. 121/2012/TT-BTC providing regulations on corporate governance applicable to public companies promulgated by Vietnamese Ministry of Finance on 26th July 2012 indicated an independent director as a member of the Board of Directors satisfying all the following requirements. He/she needs to be non-executive, does not have any family relationships with General Director, Deputy Director, Chief Accountant or other managers appointed by the Board of Directors, is not a large shareholder or is related to large shareholders, is not a member of the Board of Directors of subsidiaries, associated companies, or controlled companies, does not work in organizations providing legal advisory services or auditing the company in two most recent years, and is not the partner or related to the partner conducting transactions with total annual value equal to or greater than 30% of the total revenue or total value of goods and services purchased in two most recent years.

On the basic of agency theory, this study continues to predict a negative relationship between board composition and diversification because independent directors play a crucial role in monitoring self-interest actions of the managers.

e. Duality in position

The next control device is separating the positions of a board chairman and a CEO in order to increase board independence. The author creates a dichotomous measure for *duality in position* as in the researchs of Goranova et al. (2007) and Samaha et al. (2012). *Duality in position* is attributed 1 when a company's CEO serves as a board chairman in a given year and 0 otherwise in this study.

If agency theory is used to explain the relationship between CEO duality and diversification, it is expected that the separation in the chairman and CEO positions is likely to reduce diversification level because at that time, the board independence is high and the chairman will become a valuable monitor to actions of the agents. This might prevent managers from implementing diversification strategy that may push up agency costs in the firm. The result of Goranova et al. (2007) on this relation was consistent with above explanation when they found statistically significant evidences about the positive impact of CEO non-duality on total diversification that was measured by the Berry-Herfindahl Index. After that, Castaner & Kavadis (2013) continued to confirm this positive link in firms having substantial free cash flow. From that, it is expected in this study that CEO non-duality will have a positive effect on diversification level or there will be a negative relationship between CEO duality and diversification.

All information related to above corporate governance variables will be collected from Annual reports of firms.

5.4.2.4 Free cash flow

When analyzing the relationships between ownership and governance characteristics with the degree of diversification that was measured by the Herfindahl index, Singh et al. (2004) put *free cash flow* variable in models with the role of a control variable. Being different from the opinion of Singh et al. (2004), Castaner & Kavadis (2013) consider free cash flow as the availability of financial resources moderating the effects of corporate

governance devices (interest alignment devices and ownership control ones) on financial diversification. Therefore, in the research of Castaner & Kavadis (2013), *free cash flow* was in the role of a moderator in their models.

This study follows the way to measure free cash flow (FCF) of both Singh et al. (2004) and Castaner & Kavadis (2013), but assumes the role of a moderator for FCF as Castaner & Kavadis (2013). FCF is defined as Net cash flow from operating activities after deducting both Cash Dividends and Capital Expenditures.

In particular, FCF (in VND) = Net cash flow from operating activities − Cash Dividends − Capital Expenditures.

Information on Net cash flow from operating activities, Cash Dividends, or Capital Expenditures is collected from Audited Consolidated Financial Statements of each listed company during the period from 2007 to 2014.

One noticeable thing is that FCF will be calculated before one year when diversification level is tested. For example, when the author wish to test determinants of subsequent diversification of Vietnam Dairy Products Joint Stock Company (Stock code: VNM) in 2014, FCF of this firm will be calculated in the year of 2013. In fact, the value of FCF can be negative in case the firm has negative Net cash flow from operating activities or Operating Cash Flow can not compensate for Cash Dividends as well as Capital Expenditures. Thus this study generates a dummy variable (FCFDum) to represent level of free cash flow (high or low). FCFDum will take on the value 1 if free cash flow is greater than zero and 0 otherwise.

5.4.2.5 Variables related to firm's characteristics

a. Firm accounting performance

All control variables in this study reflect firm characteristics. The first firm feature in the relation with the extent of diversification is firm accounting performance. Most researchers such as Amit & Livnat (1988), Hoskisson et al. (1993), Bergh (1997), Bergh & Lawless (1998), Anderson et al. (2000), Ramaswamy et al. (2002), Goranova et al. (2007), Kim & Chen (2010), or Salama & Putnam (2013) used return on assets (ROA) to be a proxy

for financial performance of the company. This study is not an exception. Return on assets (ROA) in this research is measured as Net income divided by Average assets. Specifically,

$$\text{Return on assets (ROA) in the year (t-1)} = \frac{\text{Net income in year (t-1)}}{\text{Average assets of year (t-1) and year (t-2)}}$$

Because the diversification level in this year may be impacted by firm accounting performance last year, ROA in the year (t-1) will be calculated in corresponding to the degree of diversification in the year t. The data on Net income and Total assets are collected from Consolidated Income Statement and Consolidated Balance Sheet of firms in Vietnam.

b. Firm size

The next firm characteristic is Firm size. There have been different ways to measure firm size, for example, Natural logarithm of total assets (Denis et al., 1997; Anderson et al., 2000; Campa & Kedia, 2002; Ramaswamy et al., 2002; Singh et al., 2004; Villalonga, 2004; Jiraporn et al., 2006; Gleason et al., 2012; or Salama & Putnam, 2013), Natural logarithm of sales (Hill & Snell, 1988; Collin & Bengtsson, 2000; Wright et al., 2002; or Castaner & Kavadis, 2013), and logarithm of the number of employees (Hoskisson et al., 1993). In case of Vietnam, Decree No. 56/2009/NĐ-CP promulgated by Vietnamese Government on 30th June 2009 indicated one of two criteria, either total assets or the number of average employees yearly for distinguishing micro, small, and medium enterprises. Among these two criteria, the former is more preferential than the latter. Thus, this study chooses Natural logarithm of total assets to become a proxy for firm size. Total assets of each firm can be found on its annual Consolidated Balance Sheet.

c. Firm leverage

Firm leverage is also one of firm characteristics that might have an effect on diversification as in the results of Singh et al. (2004), Goranova et al. (2007), and Castaner & Kavadis (2013). Being similar to other researches (Amit & Livnat, 1988; Singh et al., 2004; Kim & Chen, 2010; and Salama & Putnam, 2013), firm leverage is defined as the ratio of total debt to total assets in this study. Information on total debt and total assets are gathered from annual Consolidated Balance Sheet of each listed company.

d. State ownership

Delios et al. (2008) found the existence of a positive relationship between government ownership and product diversification in China because the government in China might want to not only support the growth of large conglomerates through industry policy, but also create more opportunities for loss-making enterprises and reduce unemployment. Because the path of economic development of Vietnam has shown similar features to that of China, this study regards State ownership as a control variable in testing the relationships between corporate governance mechanisms and diversification level in Vietnam, and measure State ownership as the proportion of shares owned by Vietnamese State to the total number of shares issued at given year. The levels of State ownership in each firm during the periods from 2007 to 2014 are collected from Annual reports.

5.5 Method of data analysis

Because the dataset in the research is a balanced panel data and dependent variables such as firm diversification (FDiv) and Tobin's *q* (Tobinsq) are scale variables, three regression methods consisting of Pooled OLS regression, Fixed effects model and Random effects model, are, in turn, applied for Model 1, 2 and 3 thanks to *Stata 12.0*. Among these three methods, Fixed effects model is divided into two techniques: *least squares dummy variable (LSDV) estimator* and *fixed effects (within- group) estimator*. After that, F test and Hausman test are used to find out the most preferable method to each model. While F test is used to check whether the Fixed effects model is better than the Pooled OLS regression, the purpose of Hausman test is to examine whether Random effects model is more proper than Fixed effects model by comparing the coefficient estimates of Random effects model with those of Fixed effects model. After choosing which method is the most appropriate for each model to report the results, different tests will be applied to check multicollinearity, heteroscedasticity, autocorrelation and endogeneity in the model. Books of Wooldridge (2009), Gujarati (2011), Hill et al. (2011) and working paper of Park (2011) are invaluable sources of reference for the methodology applied in this study.

5.6 Chapter summary

In summary, research design and research methodology were presented clearly in this chapter. Some important points are that the final sample in this study is 70 listed companies from both stock markets (HOSE and HNX), and the data of each firm are collected during the period from 2007 to 2014. Table 18 gives a summary of all proxy variables utilized in this study with necessary information about their measurement scales, their similarity to the measures in previous researches, and various reliable sources to collect the data.

Moreover, expected relations between corporate governance characteristics and firm diversification in this research are summarized in the table 19. These anticipated relationships will be tested in the next chapter.

Table 19: Predicted relations between corporate governance characteristics and diversification level in this study

Corporate governance devices	**Corporate governance characteristics**	**Anticipated relation with the extent of diversification**	**Support agency theory**
Interest alignment devices	Executive stock option (ESO)	Negative	Yes
	Executive ownership (EXO)	Negative	Yes
Control devices	Blockholder ownership (BLKO)	Negative	Yes
	Board composition (BCOM)	Negative	Yes
	Duality in position (DUAL)	Negative	Yes

(Source: own creation)

Table 18: A summary of 12 used proxy variables in case of Vietnam

No.	Variables	Proxy Variables	Measurement Scales	Consistent with authors	Source to collect data
1	Firm diversification	FDiv = $1 - \frac{\sum P_i^2}{(\sum P_i)^2}$ where Pi: proportion of the segment i's sales to total sales	Ratio	Amit & Livnat (1988), Goranova et al. (2007) and Kim & Chen (2010)	Audited Consolidated Financial Statements of firms from 2007 to 2014
2	Firm value	Tobinsq = (Number of outstanding shares in year t * Closing price of shares on the last trading day of the year t) + Total liabilities at end of year t / Total assets at end of year t	Ratio	Lang & Stulz (1994), Kim & Chen (2010) and Lien & Li (2013)	- Annual Reports together with Audited Consolidated Financial Statements of firms from 2007 to 2014 - Published data by BIDV Securities Company
3	Executive stock options	ESO = 1 if the executives had stock options in the year t, and 0 otherwise	Nominal	Castaner & Kavadis (2013)	Annual reports of firms from 2007 to 2014
4	Executive ownership	EXO = Percentage of shares owned by the executives to the total number of shares issued in the year	Ratio	Hill & Snell (1988), Goranova et al. (2007) and Castaner & Kavadis (2013)	Annual reports of firms from 2007 to 2014

		t			
5	Blockholder ownership	BLKO = Percentage of shares owned by the blockholders, who are shareholders with total ownership equal to or greater than 5% of total number of shares issued, in the year t	Ratio	Bethel & Liebeskind (1993), Denis et al. (1997), Singh et al. (2004), Goranova et al. (2007) or Samaha et al. (2012).	Annual reports of firms from 2007 to 2014
6	Board composition	BCOM = Ratio of the number of independent directors to the total number of registered directors in the year t	Ratio	Beatty & Zajac (1994), Singh et al. (2004), Goranova et al. (2007), Kim & Chen (2010), Samaha et al. (2012) and Castaner & Kavadis (2013)	Annual reports of firms from 2007 to 2014
7	Duality in position	DUAL = 1 if company's CEO serves as a board chairman in the year t, and 0 otherwise	Nominal	Goranova et al. (2007) and Samaha et al. (2012)	Annual reports of firms from 2007 to 2014
8	Free cash flow	FCFDum =1 if its value is greater than zero, and 0 otherwise Where FCF (in VND) = Net cash flow from operating activities − Cash Dividends − Capital Expenditures FCF is calculated in the year (t-1)	Ordinal	Singh et al. (2004) and Castaner & Kavadis (2013) (in terms of the way to measure FCF)	Audited Consolidated Financial Statements of firms from 2007 to 2014
9	Firm	Return on assets (ROA) in the year	Ratio	Amit & Livnat (1988), Hoskisson et al.	Consolidated Income

	accounting performance	(t-1) = Net income in year (t-1) / Average assets of year (t-1) and year (t-2)		(1993), Bergh (1997), Bergh & Lawless (1998), Anderson et al. (2000), Ramaswamy et al. (2002), Goranova et al. (2007), Kim & Chen (2010), or Salama & Putnam (2013)	Statements and Consolidated Balance Sheets of firms from 2007 to 2014
10	Firm size	SIZE = Natural logarithm of total assets at the year (t-1)	Ratio	Denis et al., 1997; Anderson et al., 2000; Campa & Kedia, 2002; Ramaswamy et al., 2002; Singh et al., 2004; Villalonga, 2004; Jiraporn et al., 2006; Gleason et al., 2012; or Salama & Putnam, 2013	Consolidated Balance Sheets of firms from 2007 to 2014
11	Firm leverage	LEV = Ratio of total debt to total assets in the year (t-1)	Ratio	Amit & Livnat, 1988; Singh et al., 2004; Kim & Chen, 2010; and Salama & Putnam, 2013	Consolidated Balance Sheets of firms from 2007 to 2014
12	State ownership	StaO = Percentage of shares owned by Vietnamese State to the total number of shares issued at year t	Ratio	Delios et al. (2008)	Annual Reports of firms from 2007 to 2014

(Source: own creation)

CHAPTER 6: EMPIRICAL RESULT AND ANALYSIS

6.1 Introduction

This chapter provides a main description for all 12 variables in three models and presents a detailed analysis to test the relationships between corporate governance and diversification as well as between diversification and firm value based on a panel data sample of 70 companies listed on the HOSE and HNX in Vietnam. In the part of variable description, after presenting overall descriptive statistics, this study surveys diversification level, firm value, corporate governance mechanisms, free cash flows together with main financial characteristics in the relation with diversification level of listed firms in Vietnam. In the part of analysis, three regression methods (Pooled OLS regression, Fixed effects model and Random effects model) are in turn used to test the determinants of diversification level of listed firms in Vietnam, the moderation of free cash flow on the relationships between corporate governance mechanisms and diversification, and the effect of diversification on firm value. After that, different tests are applied to select the most suitable model for each couple of relationship.

6.2 Variable description

6.2.1 Overall descriptive Statistics

Table 20 presents descriptive statistics of all variables used in the research. The more detailed description of each variable will be provided in next parts.

Table 20: Overall descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Firm diversification	560	0.164	0.184	0	0.664
Tobin's *q*	560	1.271	0.951	0.338	14.007
Executive stock options	560	0.498	0.500	0	1
Executive ownership	560	0.041	0.070	0	0.623
Blockholder ownership	560	0.490	0.203	0	0.8782
Board composition	560	0.210	0.210	0	1
Duality in position	560	0.325	0.469	0	1
Free cash flow dummy	560	0.380	0.486	0	1

Firm accounting performance (Return on Assets)	560	0.087	0.091	-0.332	0.575
Firm size	560	26.941	1.301	24.086	30.761
Firm leverage	560	0.471	0.212	0.040	0.924
State ownership	560	0.294	0.208	0	0.791

(Source: Stata 12.0 Output File)

6.2.2 Survey diversification level of listed companies on stock markets in Vietnam

It can be seen from Table 20 that on the average, diversification level of listed firms in Vietnam was quite low at 0.164. The maximum level of diversification was 0.664. However among 560 observations, there were 136 observations with the extent of diversification at zero. This might be a good sign for Vietnam's economy with high concentration in business lines of shareholding companies.

This study collects the findings on the sample mean of unrelated diversification level from previous researchers who also used Berry Herfindahl index to calculate the extent of diversification in various countries (Table 21). It is found that the differences in unrelated diversification level among countries were not significant although the studies were conducted in various periods. The finding shows that concentric diversification strategy was more preferable than conglomerate one not only in Vietnam but also in other nations.

Table 21: A survey of diversification level from different researches

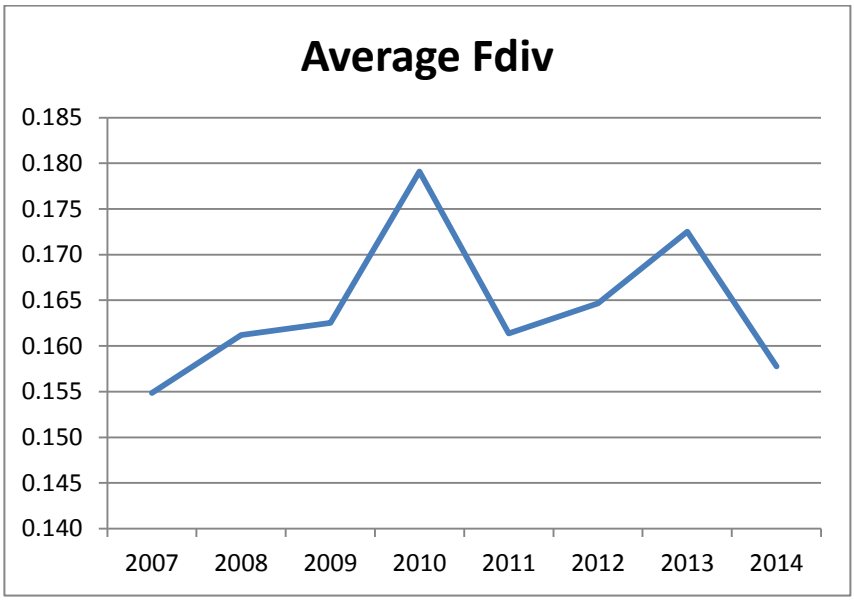
Country	Mean of unrelated diversification level	Period	Source
United States	0.48	1980	Amit &Livnat(1988)
United States	0.25	From 1994 to 1999	Goranova et al. (2007)
Korea	0.1831	From 1999 to 2005	Kim & Chen (2010).
Vietnam	0.164	From 2007 to 2014	**This study**

(Source: own collection)

When looking at the trend of diversification level in Vietnam in Figure 8, it is shown that there was only a minor fluctuation in the average diversification level in the range from

0.155 to 0.179 over 8 years from 2007 to 2014. Hence, the average diversification level in Vietnam was quite stable over time.

Figure 8: Trend of average diversification level from 2007 to 2014 in Vietnam



	Average FDiv
Mean	0.164246
Standard Error	0.002805
Median	0.161943
Standard Deviation	0.007933
Range	0.024257
Minimum	0.154857
Maximum	0.179114
Sum	1.313971
Count	8

(Source: own creation thanks to Excel 2010)

One interesting thing is that Chart 1 shows the unevenness of average diversification levels among 70 companies. If we choose the mean of diversification level from total sample (0.164) as a standard level, while 30 companies had diversification levels greater than the mean, the remaining 40 companies having diversification levels less than the mean. Also, as can be seen from Table 22 that among 70 listed companies in the sample, few companies showed unchanged or nearly unchanged trends in the level of diversification over the periods from 2007 to 2014. In particular, these firms are the 3rd, 9th, 14th, 23rd, 33rd, 35th, 37th, 38th, 43rd, 49th, 64th, 67th and 68th ones with diversification extents roughly equal to zero.

Chart 1 also reveals that there were only three companies with 8-year average diversification levels greater than 0.5. Specifically, Beton 6 Corporation (stock code: BT6 on HOSE) and Song Da 7 Joint Stock Company (stock code: SD7 on HNX) had the same 8-year average diversification level at 0.567. The average extent of diversification of CII Bridges And Roads Investment Joint Stock Company (stock code: LGC on HOSE) was slightly lower at 0.545.

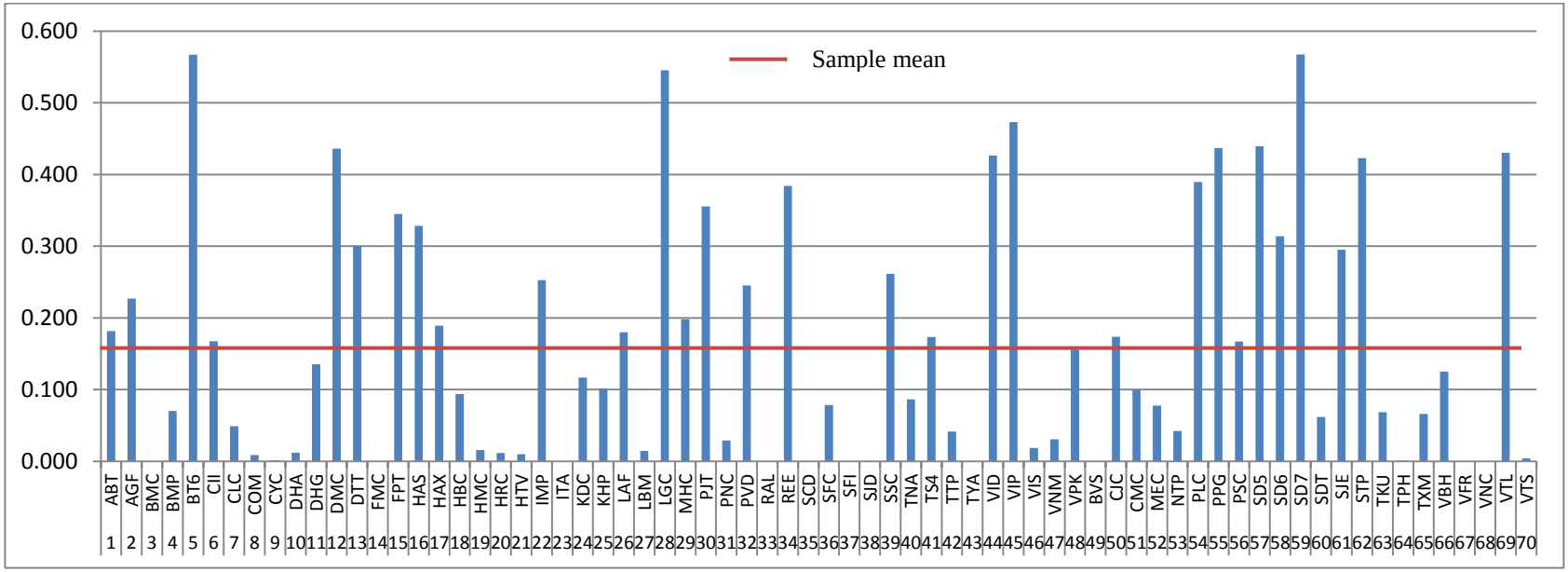
Table 22: Descriptive statistics of diversification levels for 70 companies in the sample

Company		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Total sample		ABT	AGF	BMC	BMP	BT6	CII	CLC	COM	CYC	DHA	DHG	DMC	DTT	FMC	FPT
Mean	0.164	0.182	0.227	0.000	0.070	0.567	0.167	0.049	0.009	0.002	0.012	0.135	0.436	0.300	0.000	0.345
Standard Deviation (SD)	0.184	0.116	0.042	0.000	0.046	0.054	0.189	0.041	0.003	0.003	0.022	0.031	0.063	0.196	0.000	0.067
Minimum	0.000	0.001	0.184	0.000	0.001	0.493	0.000	0.020	0.006	0.000	0.000	0.100	0.337	0.026	0.000	0.234
Maximum	0.664	0.361	0.286	0.000	0.137	0.658	0.438	0.137	0.015	0.006	0.062	0.195	0.501	0.501	0.000	0.417
Company		16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Total sample		HAS	HAX	HBC	HMC	HRC	HTV	IMP	ITA	KDC	KHP	LAF	LBM	LGC	MHC	PJT
Mean	0.164	0.328	0.189	0.094	0.016	0.011	0.010	0.253	0.000	0.117	0.101	0.180	0.015	0.545	0.198	0.356
SD	0.184	0.102	0.052	0.050	0.012	0.015	0.018	0.108	0.000	0.103	0.021	0.207	0.032	0.073	0.208	0.147
Minimum	0.000	0.209	0.113	0.058	0.004	0.000	0.000	0.114	0.000	0.012	0.066	0.000	0.000	0.435	0.000	0.065
Maximum	0.664	0.465	0.274	0.213	0.037	0.037	0.042	0.426	0.000	0.278	0.125	0.499	0.091	0.664	0.490	0.499
Company		31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Total sample		PNC	PVD	RAL	REE	SCD	SFC	SFI	SJD	SSC	TNA	TS4	TTP	TYA	VID	VIP
Mean	0.164	0.029	0.245	0.000	0.384	0.000	0.079	0.000	0.000	0.261	0.087	0.173	0.042	0.001	0.427	0.473
SD	0.184	0.038	0.091	0.000	0.090	0.000	0.068	0.000	0.000	0.135	0.089	0.187	0.033	0.001	0.073	0.025
Minimum	0.000	0.000	0.132	0.000	0.207	0.000	0.015	0.000	0.000	0.120	0.027	0.011	0.000	0.000	0.356	0.437
Maximum	0.664	0.089	0.412	0.000	0.481	0.000	0.184	0.000	0.001	0.476	0.247	0.499	0.076	0.002	0.554	0.502
Company		46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Total sample		VIS	VNM	VPK	BVS	CJC	CMC	MEC	NTP	PLC	PPG	PSC	SD5	SD6	SD7	SDT
Mean	0.164	0.019	0.031	0.156	0.000	0.174	0.099	0.078	0.042	0.389	0.437	0.167	0.440	0.314	0.567	0.062

SD	0.184	0.027	0.011	0.122	0.000	0.043	0.197	0.054	0.029	0.033	0.043	0.081	0.086	0.083	0.062	0.027
Minimum	0.000	0.000	0.016	0.040	0.000	0.112	0.013	0.004	0.000	0.332	0.355	0.099	0.285	0.189	0.484	0.019
Maximum	0.664	0.062	0.055	0.402	0.000	0.235	0.583	0.166	0.070	0.441	0.499	0.318	0.535	0.417	0.633	0.104
Company		61	62	63	64	65	66	67	68	69	70					
Total sample		SJE	STP	TKU	TPH	TXM	VBH	VFR	VNC	VTL	VTS					
Mean	0.164	0.295	0.423	0.068	0.001	0.066	0.125	0.000	0.000	0.430	0.004					
SD	0.184	0.059	0.104	0.042	0.004	0.075	0.037	0.000	0.000	0.070	0.004					
Minimum	0.000	0.214	0.232	0.020	0.000	0.006	0.091	0.000	0.000	0.322	0.000					
Maximum	0.664	0.376	0.498	0.141	0.010	0.228	0.195	0.000	0.000	0.502	0.012					

(Source: own creation thanks to Excel 2010)

Chart 1: 8-year average diversification levels of 70 companies in the sample

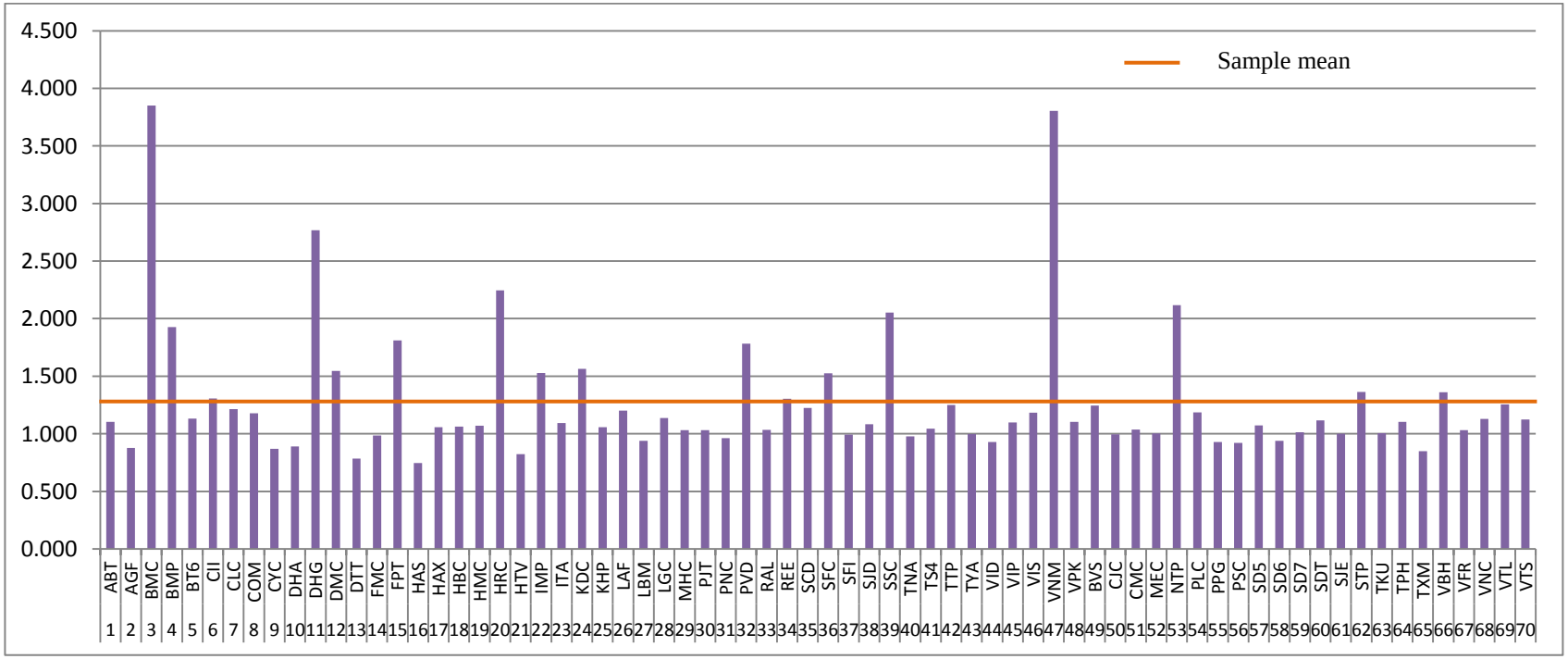


(Source: own creation thanks to Excel 2010)

6.2.3 Survey firm value of listed companies in Vietnam

Firm value in this research is measured by Tobin's *q* ratio. Chart 2 illustrates 8-year average Tobin's *q* ratios of 70 listed firms in the sample. It can be seen from Chart 2 and Table 20 that market value of total assets in most companies was larger than their book value when 8-year average Tobin's *q* ratios of more than 50 firms were larger than 1 and the average Tobin's *q* for each company was 1.271. This implies that approximately 70% of the companies in the sample were over-valued. These firms were successful in recovering their replacement costs of assets. This might be a good signal for not only current shareholders but also potential investors who intend to invest in Vietnamese stock markets. It also creates incentives for entrepreneurs to make new investment.

Chart 2: 8-year average Tobin's *q* ratios of 70 listed firms in Vietnam



(Source: own creation thanks to Excel 2010)

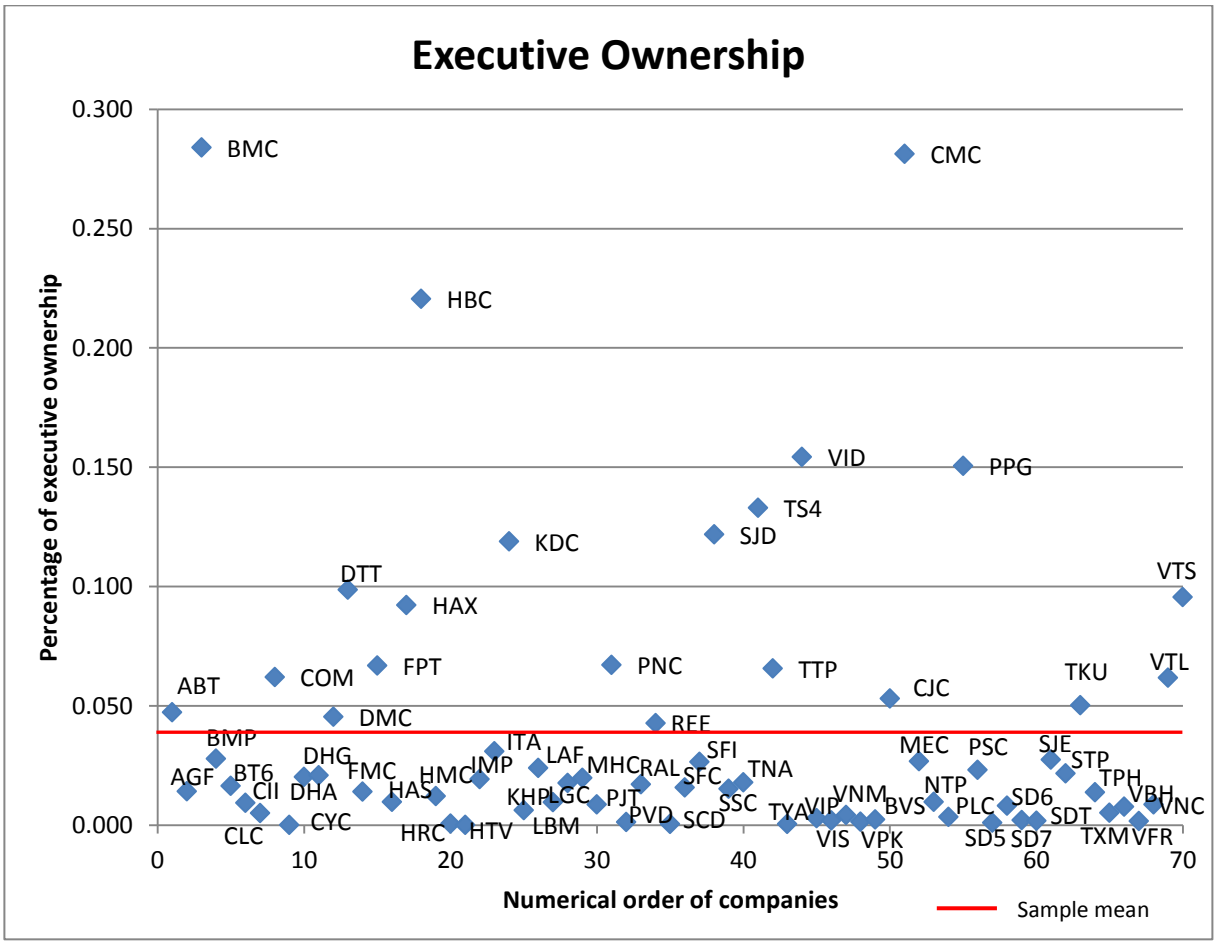
One noticeable thing is that growth opportunities of two companies, Binh Dinh Minerals Joint Stock Company (stock code: BMC) and Vietnam Dairy Products Joint Stock Company (stock code: VNM) were much higher than those of other firms in the sample with 8-year average Tobin's *q* ratios over 3.8.

6.2.4 Survey corporate governance mechanisms, free cash flows, and main financial characteristics in the relation with diversification level of listed firms in Vietnam

6.2.4.1 Corporate governance mechanisms

The first corporate governance feature is *Executive ownership*. It can be seen from the Table 20 that the average executive ownership for each observation in the sample was 0.041. The highest percentage of executive ownership was nearly 65% and the lowest was zero.

Chart 3: 8-year average executive ownership of 70 listed firms in Vietnam

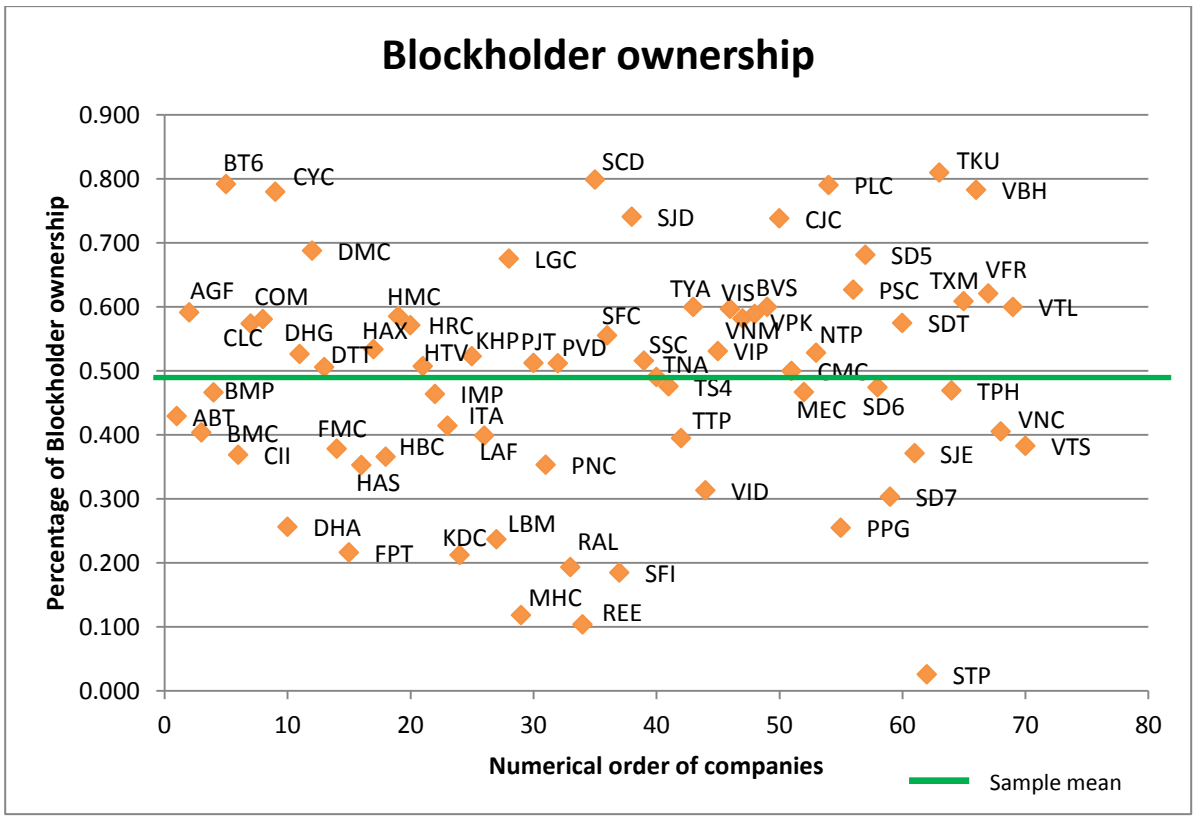


(Source: own creation thanks to Excel 2010)

Interestingly, when looking at the 8-year average executive ownership of 70 listed firms in the Chart 3, it is realized that the majority of firms limited the ownership of their executives by providing the number of shares to the executives less than 5% of the total issued shares.

The second corporate governance mechanism is *blockhoder ownership*. Table 20 indicates that the average blockholder ownership in Vietnam was quite high, at 49 percent of the total issued shares and the highest level could reach to around 88%. Chart 4 shows that there was not a clear trend in 8-year average blockholder ownership of 70 listed firms in the sample. The total number of firms with high blockholder ownership (that was equal to or higher than 50%) was more than that with low blockholder ownership only 4 units (37 companies in comparison with 33 ones).

Chart 4: 8-year average blockholder ownership of 70 listed firms in Vietnam

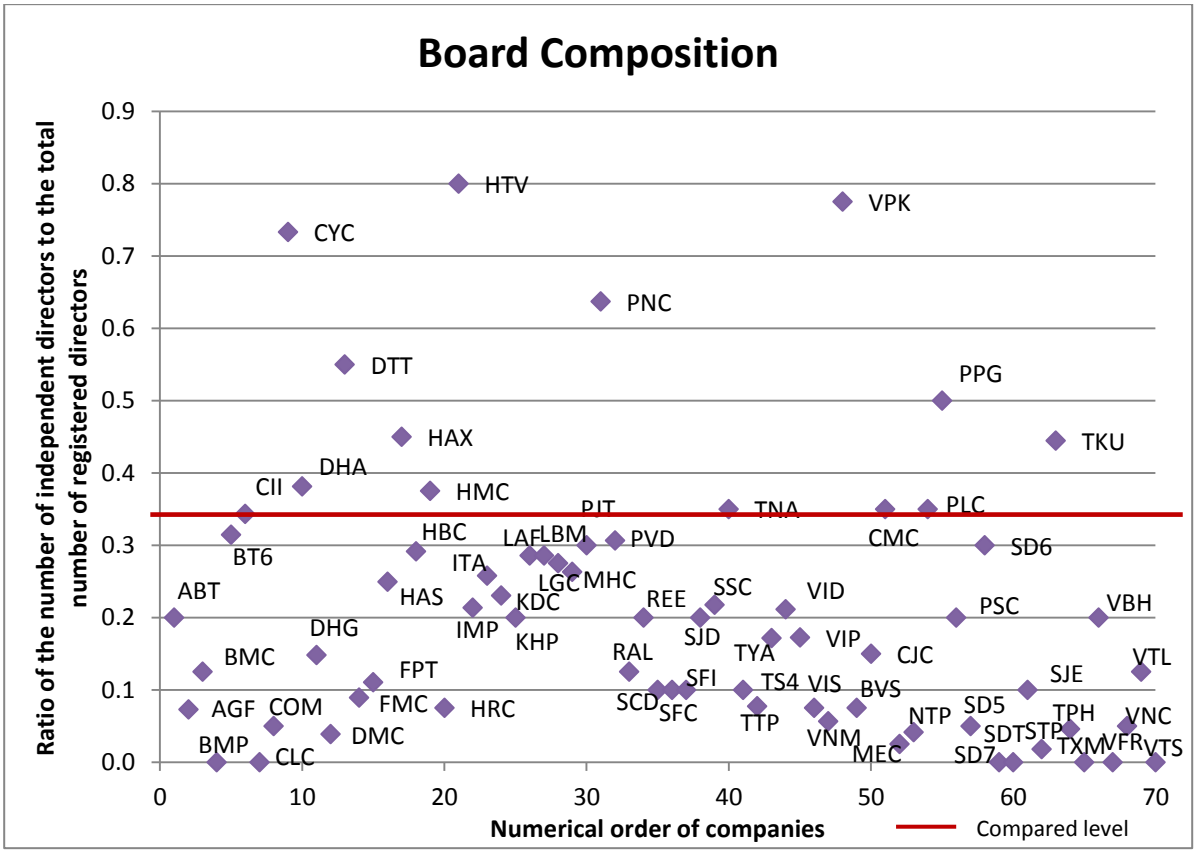


(Source: own creation thanks to Excel 2010)

Next is *board composition*. The average board composition for each observation was 21% (Table 20). It means that among 5 registered directors in the board, on the average, there was only one independent director. It can also be seen from Chart 5 that most firms had the number of independent directors less than one-third of the total number of directors in their

boards, only few firms such as HTV, CYC, VPK or PNC had this proportion greater than 0.33. This fact proves that although Circular No. 121/2012/TT-BTC promulgated by Vietnamese Ministry of Finance mentioned that at least one-third of the total members in the Board of Directors must be independent, most listed firms did not comply with this regulation.

Chart 5: 8-year average board composition of 70 listed firms in Vietnam

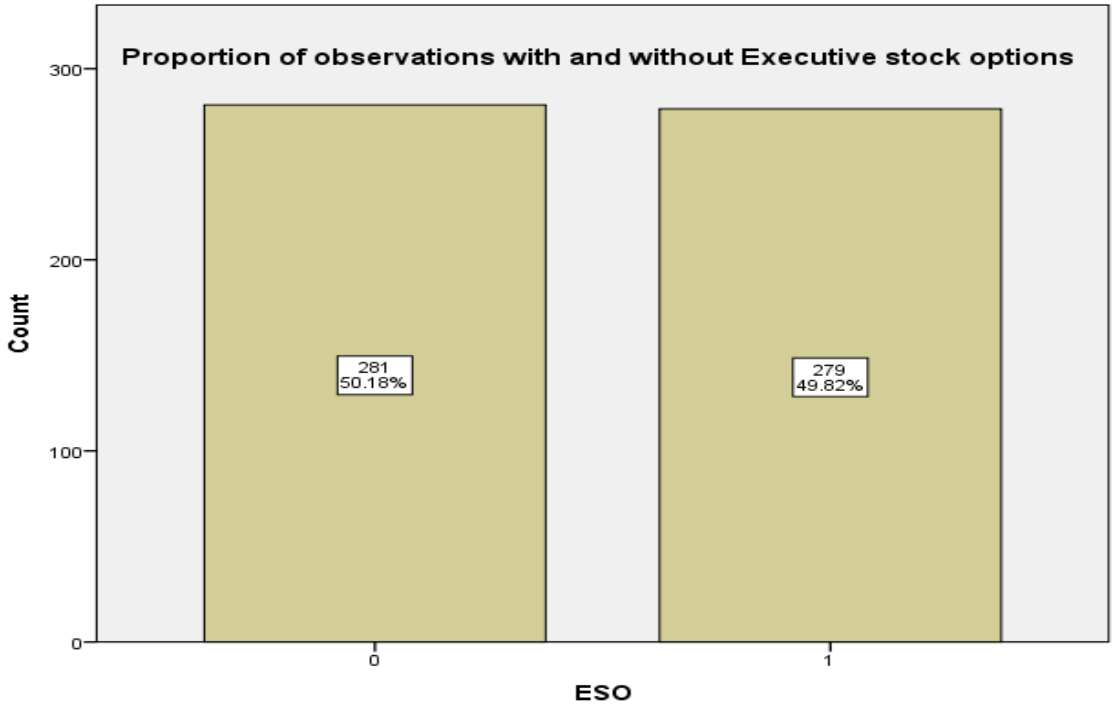


(Source: own creation thanks to Excel 2010)

With regard to *Executive stock options* and *Duality in position*, Figure 9 and Figure 10 illustrate the proportions of observations according to the existence of executive stock options and CEO duality respectively. It can be seen from these figures that whereas the proportions of observations with and without Executive stock options were similar (279 and 281 in correspondence with 49.82% and 50.18%), there was a considerable difference between the number of observations with duality in position and that with non-duality in position (182 compared with 378). This proves that most listed companies in Vietnam preferred the separation of the CEO position from the role of the chairman. In particular, 67.50% of the

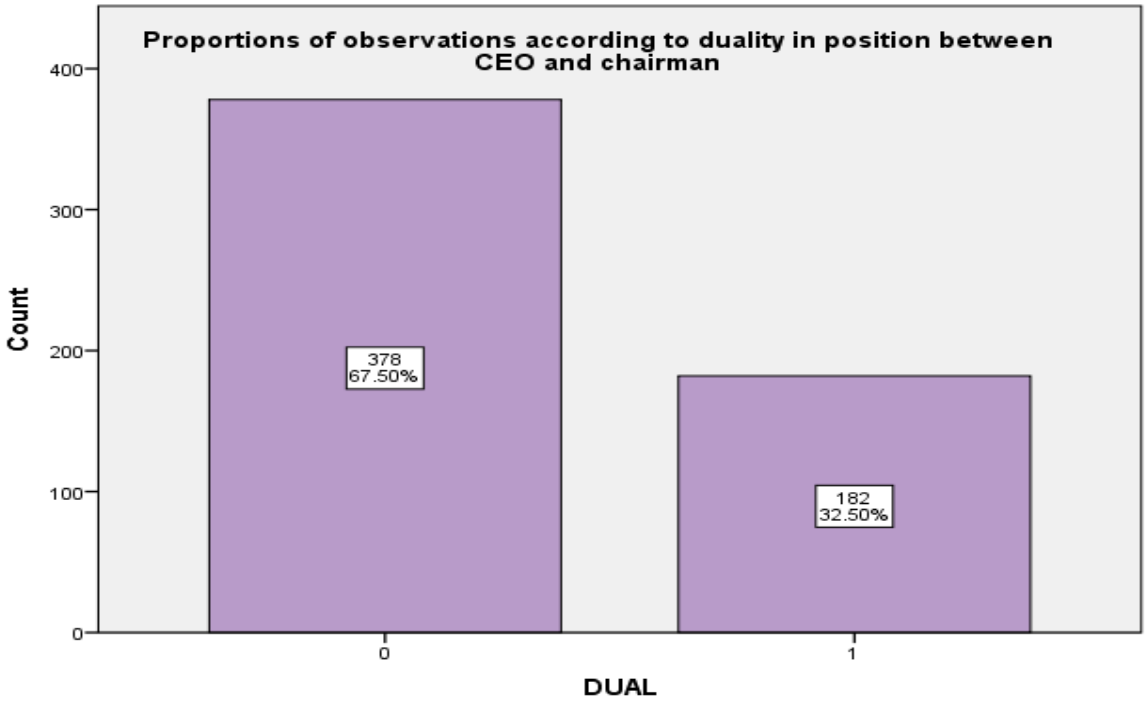
observations had non-duality in position. The firms might be aware of the importance of this separation in order to promote board independence.

Figure 9: A survey on Executive stock options from 560 observations in the sample



(Source: own creation thanks to IBM SPSS Statistics 22)

Figure 10: A survey on Duality in position from 560 observations in the sample



(Source: own creation thanks to IBM SPSS Statistics 22)

6.2.4.2 Free cash flow

Table 23: A description of free cash flow in the relation with corporate governance mechanisms

FCF	High (with positive values)		Low (with negative values)	
FCFDum	1		0	
No. of Obs.	213		347	
ESO	1	0	1	0
No. of Obs.	102	111	177	170
Average FDiv	0.161	0.146	0.168	0.175
EXO	<0.05	>=0.05	<0.05	>=0.05
No. of Obs.	160	53	273	74
Average FDiv	0.147	0.172	0.174	0.159
BLKO	<0.5	>=0.5	<0.5	>=0.5
No. of Obs.	89	124	157	190
Average FDiv	0.159	0.149	0.178	0.166
BCOM	< 1/3	>= 1/3	< 1/3	>= 1/3
No. of Obs.	161	52	251	96
Average FDiv	0.137	0.203	0.17	0.174
DUAL	1	0	1	0
No. of Obs.	63	150	119	228
Average FDiv	0.114	0.169	0.139	0.188

(Source: own creation thanks to Excel 2010)

Table 23 gives a description of free cash flow in the relation with corporate governance mechanisms. Free cash flow dummy (FCFDum) is supposed to be a moderator to the relationship between corporate governance and diversification in this research. Table 23 shows that in the sample, there were more observations with low free cash flow than those with high free cash flow (347 observations in comparison with 213 ones). This means that net cash flow from operating activities of several observations could not offset the dividends as well as capital expenditures. Also, it is noticeable that there were no significant differences in the trends of observation frequency according to various corporate governance features between high and low cash flow in the sample. For instance, there were fewer observations

with high executive ownership (that was greater than or equal to 5%) or with highly independent board composition (that had the ratio of the number of independent directors to the total number of registered directors larger than or equal to 33%) in both cases (high and low free cash flow). Similarly, in both situations (high and low free cash flow), there were more observations with high blockholder ownership (that was higher than or equal to 50%) or with non-duality in positions of the CEO and the chairman. To executive stock options, the observation frequency of this feature was quite even between without and with stock options. This fact was seen in case of not only high but also low free cash flow.

6.2.4.3 Firm characteristics

Firm characteristics controlled in the study are Profitability, Firm size, Firm leverage and State ownership. A detailed description of these features is shown in Table 24.

Regarding firm accounting performance, it can be seen from the Table 24 that on the average, the profitability ratio of each firm was closely 9%. Additionally, 57.5% was the highest return of assets during the period from 2007 to 2014 and among 70 corporations, Binh Dinh Minerals Joint Stock Company (stock code: BMC) achieved highest profitability with the 8-year average return on assets at 34.1%.

Next is about firm size. The 8-year average firm size was in the range from 1,815,113 USD to 454,931,785 USD and the average size of a firm was 22,491,725 USD in term of total assets. Interestingly, at the end of 2014, total assets of Vietnam Dairy Products Joint Stock Company (stock code: VNM) reached to more than 1 billion USD, the highest figure among 560 observations.

Concerning firm leverage, the description in the Table 24 shows that the firms in Vietnam tried to balance their liabilities with their equity as the average ratio of total debt to total assets for each company was around 47%. The lowest ratio of leverage during the period from 2007 to 2014 was 4% while the highest proportion was 92.4%.

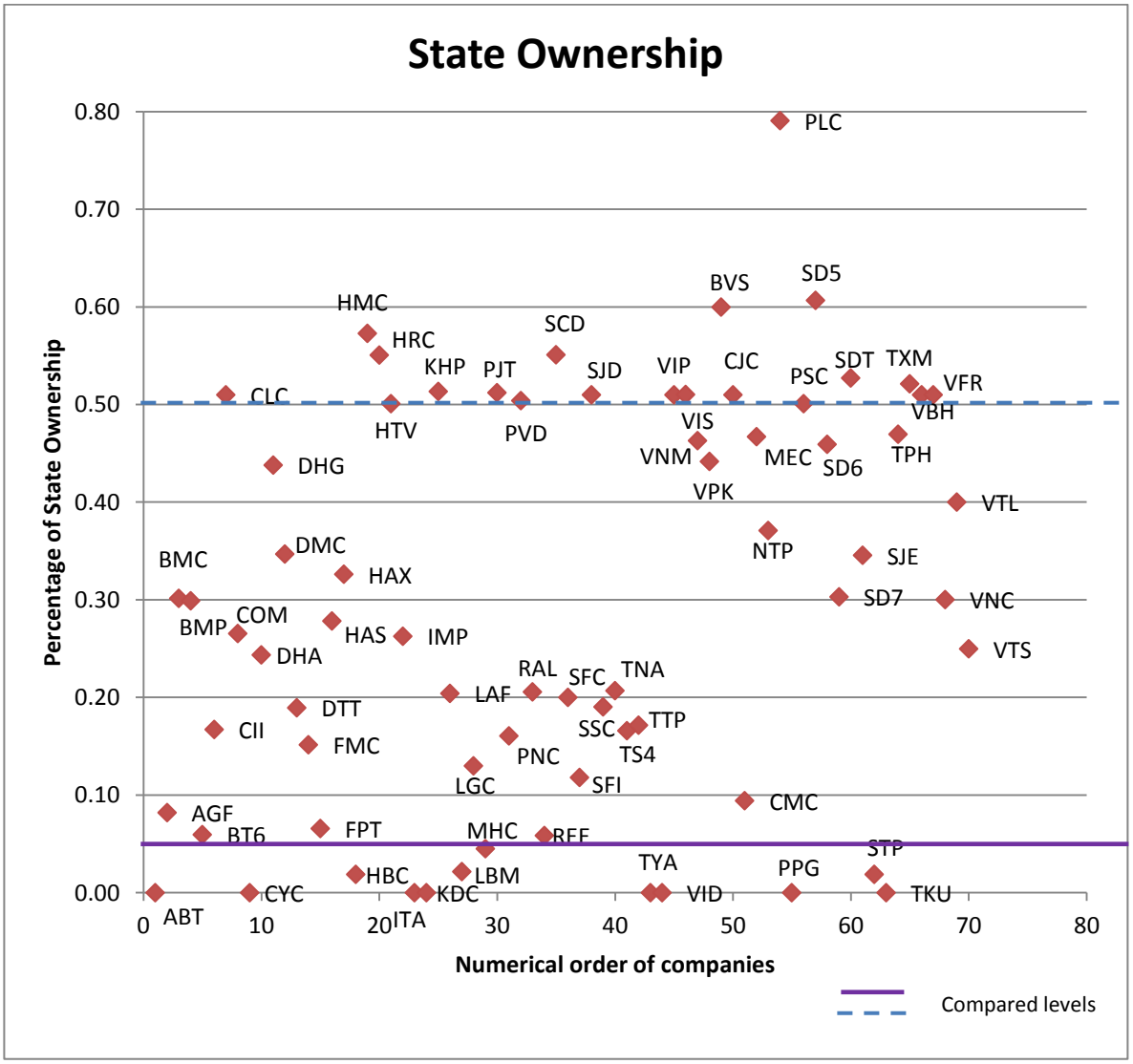
Table 24: A statistical description of firm characteristics in the sample

Variable	Obs.	Mean	Std. Dev.	Min	Max
Return on Assets (ROA) (in %)	560	0.087	0.091	-0.332	0.575
8-year average ROA (in %)	70	0.087	0.070	0.002	0.341
Firm size (assumed to be equal to *a*)	560	26.941	1.301	24.086	30.761
Firm size in VND (= e^a)	560	501,565,477,933	4	28,868,012,928	22,873,496,542,223
Firm size in USD *(Used exchange rate: 1 USD = 22,300 VND*)	560	22,491,725	0.0002	1,294,530	1,025,717,334
8-year average firm size (assumed to be equal to *b*)	70	26.941	1.227	24.424	29.948
8-year average firm size in VND (= e^b)	70	501,565,477,933	3.411	40,477,010,180	10,144,978,805,024
8-year average firm size in USD *(Used exchange rate: 1 USD = 22,300 VND*)	70	22,491,725	0.0002	1,815,113	454,931,785
Firm leverage (in %)	560	0.471	0.212	0.040	0.924
8-year average firm leverage (in %)	70	0.471	0.190	0.111	0.832
State ownership (in %)	560	0.294	0.208	0	0.791
8-year average state ownership (in %)	70	0.294	0.206	0	0.791

(Source: own creation thanks to Excel 2010)

The final feature is State ownership. It can be seen from Table 24 and Chart 6 that Vietnamese State was the large stockholder in the majority of listed firms in Vietnam because most companies had the 8-year average state ownership from 5% onwards and the average percentage of shares owned by Vietnamese State for each firm was 29.4%. Furthermore, this proportion in nearly one-third of the firms was greater than or equal to 50% and the highest ratio belonged to Petrolimex Petrochemical Joint Stock Company (stock code: PLC) that was listed on Ha Noi Stock Exchange with 79.1% during 8 years from 2007 to 2014.

Chart 6: 8-year average State ownership of 70 listed firms in Vietnam



(Source: own creation thanks to Excel 2010)

6.3 Correlation among variables

Correlation among variables in the sample is illustrated in Table 25.

Table 25: Correlation matrix for the entire sample

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Firm diversification	1.00											
2. Executive stock options	0.01	1.00										
3. Executive ownership	-0.05	0.18***	1.00									
4. Blockholder ownership	-0.03	-0.08^{+}	-0.11**	1.00								
5. Board composition	0.02	-0.04	0.11**	0.06	1.00							
6. Duality in position	-0.13**	0.06	0.31***	-0.13**	0.02	1.00						
7. Free cash flow Dummy	-0.05	-0.03	0.05	0.07	-0.02	-0.05	1.00					
8. Firm accounting performance (Return on assets)	-0.15***	0.12**	0.03	-0.08*	-0.2***	0.16***	0.06	1.00				
9. Firm size	0.08^{+}	0.18***	-0.14**	0.00	-0.1*	-0.07^{+}	-0.1*	0.05	1.00			
10. Firm leverage	0.15***	-0.00	-0.1*	0.15***	-0.04	-0.19***	-0.01	-0.44***	0.18***	1.00		
11. State ownership	-0.09*	-0.05	-0.3***	0.44***	-0.18***	-0.20***	0.05	0.09*	-0.00	0.12**	1.00	
12. Tobinsq	-0.08^{+}	0.12**	0.18***	-0.00	-0.15***	0.19***	0.08^{+}	0.49***	0.02	-0.16***	0.11**	1.00

N = 560, $^{+}$ $p \leq 0.10$; * $p \leq 0.05$; ** $p \leq 0.01$; *** $p \leq 0.001$

(Source: own creation thanks to Stata 12.0)

It can be seen from the Table 25 that although most of the correlation coefficients are significant at 5% level, they are all not too high at less than 0.5. The considerably high correlation coefficients are coefficients representing the correlation between Tobinsq and previous firm accounting performance (at 0.49), between State ownership and Blockholder ownership (at 0.44) and between Firm leverage and Firm accounting performance (at – 0.44). However all these coefficients are still lower than 0.5. Therefore, it is unnecessary to remove any variable from the models.

6.4 Test the determinants of diversification levels of listed firms in Vietnam

6.4.1 Applying different methods for testing

In order to find out the determinants of diversification level, and in particular, the effects of internal corporate governance mechanisms on the extent of diversification, three regression methods consisting of Pooled OLS regression, Fixed effects model and Random effects model as referred in Wooldridge (2009), Gujarati (2011) and Hill et al. (2011), are, in turn, applied for Model 1and Model 2 in this research.

Model 1: $$FDiv_{it} = \beta_{0it} + \beta_1 ESO_{it} + \beta_2 EXO_{it} + \beta_3 BLKO_{it} + \beta_4 BCOM_{it} + \beta_5 DUAL_{it} + \beta_6 FCFDum_{it} + \beta_7 ROA_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} StaO_{it} + u_{it} \quad (1.1)$$

Model 2: $$FDiv_{it} = \beta_{0it} + \beta_1 ESO_{it} + \beta_2 EXO_{it} + \beta_3 BLKO_{it} + \beta_4 BCOM_{it} + \beta_5 DUAL_{it} + \beta_6 FCFDum_{it} + \beta_7 ROA_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} StaO_{it} + \beta_{11} FCFESO_{it} + \beta_{12} FCFEXO_{it} + \beta_{13} FCFBLKO_{it} + \beta_{14} FCFBCOM_{it} + \beta_{15} FCFDUAL_{it} + u_{it} \quad (2.1)$$

6.4.1.1 Pooled OLS regression

Firstly, the author pools all 560 observations (70*8) and establishes a pooled OLS diversification function that neglects the dual nature of time series and cross-sectional data.
It is assumed that all intercepts of Model 1 would be equal to a certain constant or:

$$\beta_{011} = \beta_{012} = \cdots = \beta_{021} = \beta_{022} = \cdots = \beta_{031} = \cdots = \beta_0$$

Therefore, Model 1 can be written as followings:

$$FDiv_{it} = \beta_0 + \beta_1 ESO_{it} + \beta_2 EXO_{it} + \beta_3 BLKO_{it} + \beta_4 BCOM_{it} + \beta_5 DUAL_{it} + \beta_6 FCFDum_{it} + \beta_7 ROA_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} StaO_{it} + u_{it} \quad (1.2)$$

Where i represents the cross-section unit, t stands for the time

$i = 1,2,\ldots,70; \quad t = 2007,2008,..,2014$

and the error term (u_{it}) is assumed to follow the normal distribution with zero mean and constant variance: $u_{it} \sim N(0, \sigma^2)$

Used command sentence in *Stata 12.0*:

reg FDiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO

Pooled OLS regression result is illustrated in the Table 26

Table 26: Pooled OLS regression result of diversification function without interactions

Source	SS	df	MS	Number of obs = 560
Model	1.115	10	0.111	F(10, 549) = 3.42
Residual	17.907	549	0.033	Prob > F = 0.000
Total	19.022	559	0.034	R-squared = 0.059
				Adj R-squared = 0.042
				Root MSE = 0.181

FDiv	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ESO	0.005	0.016	0.31	0.757	-0.026	0.036
EXO	-0.089	0.122	-0.73	0.466	-0.328	0.150
BLKO	-0.013	0.043	-0.30	0.761	-0.097	0.071
BCOM	-0.002	0.038	-0.06	0.953	-0.078	0.073
DUAL	-0.043	0.018	-2.45	0.015	-0.078	-0.009
FCFDum	-0.013	0.016	-0.80	0.427	-0.044	0.019
ROA	-0.174	0.100	-1.74	0.083	-0.370	0.023
SIZE	0.006	0.006	1.04	0.301	-0.006	0.019
LEV	0.080	0.042	1.90	0.058	-0.003	0.163
StaO	-0.106	0.045	-2.37	0.018	-0.194	-0.018
_cons	0.025	0.168	0.15	0.881	-0.305	0.355

(Source: Stata 12.0 Output File)

Assuming that pooling of the data is valid, the results show that DUAL and StaO have significant negative impact on the extent of diversification at less than 5% significance level. When we increase the significance level to 10%, two more regressor variables show their impact on FDiv with negative direction (ROA) and positive impact (LEV).

Similar to Model 1, this method assumes the intercept of Model 2 to be a constant. Model 2 is rewritten as the following equation:

$$FDiv_{it} = \beta_0 + \beta_1 ESO_{it} + \beta_2 EXO_{it} + \beta_3 BLKO_{it} + \beta_4 BCOM_{it} + \beta_5 DUAL_{it} + \beta_6 FCFDum_{it} + \beta_7 ROA_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} StaO_{it} + \beta_{11} FCFESO_{it} + \beta_{12} FCFEXO_{it} + \beta_{13} FCFBLKO_{it} + \beta_{14} FCFBCOM_{it} + \beta_{15} FCFDUAL_{it} + u_{it} \quad (2.2)$$

Used command sentence:

reg FDiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO FCFESO FCFEXO FCFBLKO FCFBCOM FCFDUAL

The result of OLS pooled regression for above function is shown in Table 27.

Table 27: Pooled OLS regression result of diversification function with interactions

Source	SS	df	MS	Number of obs = 560		
Model	1.439	15	0.096	F(15, 544) = 2.97		
Residual	17.583	544	0.032	Prob > F = 0.0001		
Total	19.022	559	0.034	R-squared = 0.0756		
				Adj R-squared = 0.0502		
				Root MSE = 0.17978		
FDiv	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
ESO	-0.004	0.020	-0.21	0.834	-0.043	0.035
EXO	-0.190	0.167	-1.14	0.257	-0.519	0.139
BLKO	0.033	0.051	0.64	0.524	-0.068	0.133
BCOM	-0.071	0.046	-1.53	0.126	-0.162	0.020
DUAL	-0.033	0.022	-1.50	0.133	-0.077	0.010
FCFDum	-0.007	0.051	-0.13	0.895	-0.108	0.094
ROA	-0.177	0.100	-1.77	0.078	-0.373	0.020
SIZE	0.006	0.006	1.01	0.313	-0.006	0.019
LEV	0.085	0.042	2.02	0.044	0.002	0.168
StaO	-0.108	0.045	-2.42	0.016	-0.196	-0.020
FCFESO	0.021	0.032	0.63	0.528	-0.043	0.084
FCFEXO	0.164	0.235	0.70	0.486	-0.298	0.626
FCFBLKO	-0.116	0.080	-1.45	0.148	-0.273	0.041
FCFBCOM	0.194	0.078	2.50	0.013	0.042	0.346
FCFDUAL	-0.017	0.036	-0.48	0.633	-0.087	0.053
_cons	0.027	0.169	0.16	0.875	-0.304	0.358

(Source: Stata 12.0 Output File)

It can be seen that FCFBCOM, StaO and LEV show significant impacts on diversification at 5% level. In the meanwhile, the relationship between ROA and FDiv is weakly significant at 10%.

6.4.1.2 Fixed effects model (FEM)

This method takes account of cross-section heterogeneity by permitting the intercept to vary across individuals. At this time, Model 1 and Model 2 are written as the following equations:

$$FDiv_{it} = \beta_{0i} + \beta_1 ESO_{it} + \beta_2 EXO_{it} + \beta_3 BLKO_{it} + \beta_4 BCOM_{it} + \beta_5 DUAL_{it} + \beta_6 FCFDum_{it} + \beta_7 ROA_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} StaO_{it} + u_{it} \quad (1.3)$$

$$FDiv_{it} = \beta_{0i} + \beta_1 ESO_{it} + \beta_2 EXO_{it} + \beta_3 BLKO_{it} + \beta_4 BCOM_{it} + \beta_5 DUAL_{it} + \beta_6 FCFDum_{it} + \beta_7 ROA_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} StaO_{it} + \beta_{11} FCFESO_{it} + \beta_{12} FCFEXO_{it} + \beta_{13} FCFBLKO_{it} + \beta_{14} FCFBCOM_{it} + \beta_{15} FCFDUAL_{it} + u_{it} \quad (2.3)$$

Where intercepts β_{0i} are called **fixed effects** reflecting individual-specific characteristics or individual heterogeneity but these characteristics are assumed to be time-invariant.

Two methods, including *Least squares dummy variable (LSDV) estimator* and *Fixed effects (within-group) estimator,* will be considered for estimating the above FEMs.

a. Least squares dummy variable (LSDV) estimator

As this method takes into account the individual heterogeneity between 70 listed companies, 70 differential intercept dummies are introduced in the models. The equations (1.3) and (2.3) are rewritten as bellow:

$$FDiv_{it} = \beta_{01} D_{1i} + \beta_{02} D_{2i} + \beta_{03} D_{3i} + \cdots + \beta_{0,70} D_{70i} + \beta_1 ESO_{it} + \beta_2 EXO_{it} + \beta_3 BLKO_{it} + \beta_4 BCOM_{it} + \beta_5 DUAL_{it} + \beta_6 FCFDum_{it} + \beta_7 ROA_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} StaO_{it} + u_{it} \quad (1.4)$$

$$FDiv_{it} = \beta_{01} D_{1i} + \beta_{02} D_{2i} + \beta_{03} D_{3i} + \cdots + \beta_{0,70} D_{70i} + \beta_1 ESO_{it} + \beta_2 EXO_{it} + \beta_3 BLKO_{it} + \beta_4 BCOM_{it} + \beta_5 DUAL_{it} + \beta_6 FCFDum_{it} + \beta_7 ROA_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} StaO_{it} +$$

$$\beta_{11}FCFESO_{it} + \beta_{12}FCFEXO_{it} + \beta_{13}FCFBLKO_{it} + \beta_{14}FCFBCOM_{it} + \beta_{15}FCFDUAL_{it} + u_{it} \quad (2.4)$$

Where D_{1i} = 1 for the 1st company, 0 otherwise; D_{2i} = 1 for the 2nd company, 0 otherwise; D_{3i} = 1 for the 3rd company, 0 otherwise; and so on

Applied command sentence to equation (1.4):

reg FDiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO **d1-d70**, noconstant

The result is summarized in Table 28. A full result is shown in Appendix 3

Table 28: Abridged regression result of diversification function without interactions according to FEM using LSDV estimator

Source	**SS**	**df**	**MS**
Model	31.1	80	0.389
Residual	3.03	480	0.006
Total	34.129	560	0.061

Number of obs = 560
F(80, 480) = 61.59
Prob > F = 0.0000
R-squared = 0.9112
Adj R-squared = 0.8964
Root MSE = 0.07945

FDiv	**Coef.**	**Std. Err.**	**z**	**P>|z|**	**[95% Conf. Interval]**	
ESO	0.014	0.008	1.69	0.091	-0.002	0.030
EXO	-0.425	0.097	-4.37	0.000	-0.616	-0.234
BLKO	0.084	0.034	2.46	0.014	0.017	0.150
BCOM	-0.045	0.036	-1.28	0.203	-0.115	0.025
DUAL	-0.007	0.012	-0.61	0.542	-0.031	0.016
FCFDum	0.003	0.008	0.34	0.735	-0.013	0.018
ROA	-0.005	0.060	-0.08	0.934	-0.123	0.113
SIZE	0.001	0.008	0.16	0.871	-0.014	0.017
LEV	-0.016	0.036	-0.46	0.649	-0.088	0.055
StaO	-0.224	0.092	-2.45	0.015	-0.404	-0.044
d1	0.147	0.216	0.68	0.497	-0.277	0.570
d2	0.170	0.221	0.77	0.442	-0.264	0.604
…	…	…	…	…	…	…
d70	0.043	0.205	0.21	0.833	-0.359	0.445

(Source: Stata 12.0 Output File)

It can be seen from the Table 28 that three factors including EXO, BLKO and StaO correlate with FDiv at significant levels less than 0.05. At significant level of 0.1, there is a positive relationship between ESO and FDiv.

Similarly, used command sentence to the equation (2.4):

reg FDiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO FCFESO FCFEXO FCFBLKO FCFBCOM FCFDUAL **d1-d70**, noconstant

Table 29 displays the abridged result. A full regression result of diversification function with interactions according to FEM using LSDV estimator is displayed in Appendix 4.

Table 29: Abridged regression result of diversification function with interactions according to FEM using LSDV estimator

Source	SS	df	MS	Number of obs = 560
Model	31.115	85	0.366	F(85, 475) = 57.68
Residual	3.015	475	0.006	Prob > F = 0.0000
Total	34.129	560	0.061	R-squared = 0.9117
				Adj R-squared = 0.8959
				Root MSE = 0.07967

FDiv	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ESO	0.011	0.010	1.11	0.267	-0.009	0.031
EXO	-0.488	0.116	-4.21	0.000	-0.715	-0.260
BLKO	0.077	0.038	2.04	0.041	0.003	0.152
BCOM	-0.055	0.038	-1.47	0.141	-0.129	0.018
DUAL	-0.008	0.014	-0.56	0.575	-0.035	0.019
FCFDum	-0.022	0.024	-0.89	0.376	-0.070	0.026
ROA	-0.004	0.060	-0.06	0.953	-0.122	0.115
SIZE	0.001	0.008	0.16	0.871	-0.015	0.017
LEV	-0.015	0.037	-0.41	0.680	-0.087	0.057
StaO	-0.240	0.093	-2.59	0.010	-0.422	-0.058
FCFESO	0.005	0.015	0.35	0.728	-0.025	0.036
FCFEXO	0.111	0.116	0.96	0.340	-0.117	0.338
FCFBLKO	0.021	0.038	0.56	0.578	-0.054	0.097
FCFBCOM	0.028	0.037	0.75	0.454	-0.045	0.101
FCFDUAL	0.003	0.018	0.15	0.883	-0.032	0.037
d1	0.154	0.217	0.71	0.479	-0.273	0.581
d2	0.178	0.223	0.80	0.425	-0.260	0.615
…	…	…	…	…	…	…
d70	0.055	0.206	0.27	0.789	-0.349	0.460

(Source: Stata 12.0 Output File)

Table 29 indicates that relationships between EXO, BLKO or StaO and FDiv are also admitted at significant levels less than 0.05.

b. Fixed effects (within- group) estimator

In this method, variables are expressed in terms of deviation from individual means.

$$FDiv_{it} = \beta_{0i} + \beta_1 ESO_{it} + \beta_2 EXO_{it} + \beta_3 BLKO_{it} + \beta_4 BCOM_{it} + \beta_5 DUAL_{it} + \beta_6 FCFDum_{it} + \beta_7 ROA_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} StaO_{it} + u_{it}$$

$$\rightarrow \overline{FDiv_i} = \beta_{0i} + \beta_1 \overline{ESO_i} + \beta_2 \overline{EXO_i} + \beta_3 \overline{BLKO_i} + \beta_4 \overline{BCOM_i} + \beta_5 \overline{DUAL_i} + \beta_6 \overline{FCFDum_i} + \beta_7 \overline{ROA_i} + \beta_8 \overline{SIZE_i} + \beta_9 \overline{LEV_i} + \beta_{10} \overline{StaO_i}) + \bar{u}_i$$

$$\rightarrow FDiv_{it} - \overline{FDiv_i}$$
$$= \beta_1(ESO_{it} - \overline{ESO_i}) + \beta_2(EXO_{it} - \overline{EXO_i}) + \beta_3(BLKO_{it} - \overline{BLKO_i}) + \beta_4(BCOM_{it} - \overline{BCOM_i}) + \beta_5(DUAL_{it} - \overline{DUAL_i}) + \beta_6(FCFDum_{it} - \overline{FCFDum_i}) + \beta_7(ROA_{it} - \overline{ROA_i}) + \beta_8(SIZE_{it} - \overline{SIZE_i}) + \beta_9(LEV_{it} - \overline{LEV_i}) + \beta_{10}(StaO_{it} - \overline{StaO_i}) + (u_{it} - \bar{u}_i)$$

where a bar over a variable represents its average value over 8 years

From that, the model 1 can be transformed into the following model:

$$\widetilde{FDiv_{it}} = \beta_1\widetilde{ESO_{it}} + \beta_2\widetilde{EXO_{it}} + \beta_3\widetilde{BLKO_{it}} + \beta_4\widetilde{BCOM_{it}} + \beta_5\widetilde{DUAL_{it}} + \beta_6\,\widetilde{FCFDum_{it}} + \beta_7\,\widetilde{ROA_{it}} + \beta_8\,\widetilde{SIZE_{it}} + \beta_9\,\widetilde{LEV_{it}} + \beta_{10}\,\widetilde{StaO_{it}} + \tilde{u}_{it} \quad (1.5)$$

The above model shows that the fixed effects (within-group) estimator rejects all variation **between** companies and uses only variation over time **within** a firm. It is noticeable that this model does not contain the fixed or individual effect intercept term β_{0i}. However, when using fixed effects software command of Stata 12.0 to calculate within group estimators of the diversification function, this fixed effect intercept term is computed automatically. This reported constant term will be equal to the average of the estimated coefficients on the cross section dummy variables in the FEM using LSDV estimator.

Used command sentence:

xtreg FDiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO, **fe**

The achieved result is presented in Table 30.

Interestingly, estimates for coefficients and the sum of squared errors in this method are identical to those in the FEM using LSDV estimator because mathematically two models in these two methods are identical.

Table 30: Regression result of diversification function without interactions according to Fixed effects (within- group) estimator

Fixed-effects (within) regression			Number of obs = 560
Group variable: Id			Number of groups = 70
R-sq: within = 0.0708			Obs per group: min = 8
between = 0.0063			avg = 8.0
overall = 0.0132			max = 8
			F(10,480) = 3.66
corr(u_i, Xb) = -0.1362			Prob > F = 0.0001

FDiv	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
ESO	0.014	0.008	1.690	0.091	-0.002	0.030
EXO	-0.425	0.097	-4.370	0.000	-0.616	-0.234
BLKO	0.084	0.034	2.460	0.014	0.017	0.150
BCOM	-0.045	0.036	-1.280	0.203	-0.115	0.025
DUAL	-0.007	0.012	-0.610	0.542	-0.031	0.016
FCFDum	0.003	0.008	0.340	0.735	-0.013	0.018
ROA	-0.005	0.060	-0.080	0.934	-0.123	0.113
SIZE	0.001	0.008	0.160	0.871	-0.014	0.017
LEV	-0.016	0.036	-0.460	0.649	-0.088	0.055
StaO	-0.224	0.092	-2.450	0.015	-0.404	-0.044
_cons	0.184	0.217	0.850	0.397	-0.242	0.610
sigma_u	0.170					
sigma_e	0.079					
rho	0.822	(fraction of variance due to u_i)				
F test that all u_i=0: F(69, 480) = 34.16 Prob > F = 0.0000						

(Source: Stata 12.0 Output File)

Next, interactions are added into the equation (1.5) in order to test whether FCFDum moderates the influence of corporate governance on diversification level.

The equation (1.5) is transformed as follows:

$$\widetilde{FDiv}_{it} = \beta_1 \widetilde{ESO}_{it} + \beta_2 \widetilde{EXO}_{it} + \beta_3 \widetilde{BLKO}_{it} + \beta_4 \widetilde{BCOM}_{it} + \beta_5 \widetilde{DUAL}_{it} + \beta_6 \widetilde{FCFDum}_{it} + \beta_7 \widetilde{ROA}_{it} + \beta_8 \widetilde{SIZE}_{it} + \beta_9 \widetilde{LEV}_{it} + \beta_{10} \widetilde{StaO}_{it} + \beta_{11} \widetilde{FCFESO}_{it} + \beta_{12} \widetilde{FCFEXO}_{it} + \beta_{13} \widetilde{FCFBLKO}_{it} + \beta_{14} \widetilde{FCFBCOM}_{it} + \beta_{15} \widetilde{FCFDUAL}_{it} + \tilde{u}_{it} \quad (2.5)$$

The command sentence when adding interactions into the model:

xtreg FDiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO FCFESO FCFEXO FCFBLKO FCFBCOM FCFDUAL, **fe**

The results are shown in Table 31.

There are evidences from Table 31 to suggest that there are relationships between diversification level and three explanatory variables (EXO, BLKO and StaO) at the significant level of 0.05.

Table 31: Regression result of diversification function with interactions according to Fixed effects (within- group) estimator

Fixed-effects (within) regression				Number of obs =	560
Group variable: Id				Number of groups =	70
R-sq: within = 0.0754					
between = 0.0079				Obs per group: min =	8
overall = 0.0153				avg =	8.0
				max =	8
corr(u_i, Xb) = -0.1402				F(15,475) =	2.58

					Prob > F = 0.0010	
FDiv	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf. Interval]**	
ESO	0.011	0.010	1.11	0.267	-0.009	0.031
EXO	-0.488	0.116	-4.21	0.000	-0.715	-0.260
BLKO	0.077	0.038	2.04	0.041	0.003	0.152
BCOM	-0.055	0.038	-1.47	0.141	-0.129	0.018
DUAL	-0.008	0.014	-0.56	0.575	-0.035	0.019
FCFDum	-0.022	0.024	-0.89	0.376	-0.070	0.026
ROA	-0.004	0.060	-0.06	0.953	-0.122	0.115
SIZE	0.001	0.008	0.16	0.871	-0.015	0.017
LEV	-0.015	0.037	-0.41	0.680	-0.087	0.057
StaO	-0.240	0.093	-2.59	0.010	-0.422	-0.058
FCFESO	0.005	0.015	0.35	0.728	-0.025	0.036
FCFEXO	0.111	0.116	0.96	0.340	-0.117	0.338
FCFBLKO	0.021	0.038	0.56	0.578	-0.054	0.097
FCFBCOM	0.028	0.037	0.75	0.454	-0.045	0.101
FCFDUAL	0.003	0.018	0.15	0.883	-0.032	0.037
_cons	0.196	0.219	0.90	0.370	-0.233	0.626
sigma_u	0.170					
sigma_e	0.080					
rho	0.821	(fraction of variance due to u_i)				
F test that all u_i=0: F(69, 475) = 33.27 Prob > F = 0.0000						

(Source: Stata 12.0 Output File)

6.4.1.3 The Random effects model (REM) or Error components model (ECM)

Similar to the FEM, it is assumed that all individual differences are captured by the intercept parameters (β_{0i}). However, while the individual differences are fixed in the fixed-effects dummy variable model, they are treated to be random ones because individuals in the sample were selected accidentally. At this time, β_{0i} is divided into two parts involving β_0 that is population average and ε_i representing random individual differences from the population average and being called **random effects.**

Model 1 is transferred into the following equation:

$$FDiv_{it} =$$

$$\beta_0 + \beta_1 ESO_{it} + \beta_2 EXO_{it} + \beta_3 BLKO_{it} + \beta_4 BCOM_{it} + \beta_5 DUAL_{it} + \beta_6 FCFDum_{it} +$$

$$\beta_7 ROA_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} StaO_{it} + (u_{it} + \varepsilon_i) \quad (1.6)$$

It is assumed that the random effects (ε_i) have zero mean, are uncorrelated among individuals, and have a constant variance:

$$E(\varepsilon_i) = 0, cov\left(\varepsilon_i, \varepsilon_j\right) = 0 \;\; i \neq j, var(\varepsilon_i) = \sigma_\varepsilon^2$$

From that, equation (1.6) can be written as follows:

$$FDiv_{it} = \beta_0 + \beta_1 ESO_{it} + \beta_2 EXO_{it} + \beta_3 BLKO_{it} + \beta_4 BCOM_{it} + \beta_5 DUAL_{it} + \beta_6 FCFDum_{it} + \beta_7 ROA_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} StaO_{it} + \omega_{it} \quad (1.7)$$

Where Composite error term $(\omega_{it}) =$ Cross − section error component (ε_i) + Combined time series and cross − section error component (u_{it})

Utilized command sentence:

xtreg FDiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO**, re**

The results are shown in Table 32.

Table 32: Regression result of diversification function without interactions according to REM

Random-effects GLS regression					Number of obs =	560
Group variable: Id					Number of groups =	70
R-sq: within = 0.0700					Obs per group: min =	8
between = 0.0105					avg =	8.0
overall = 0.0180					max =	8
					Wald chi2(10) =	36.18
corr(u_i, X) = 0 (assumed)					Prob > chi2 =	0.0001
FDiv	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf. Interval]**	
ESO	0.014	0.008	1.690	0.091	-0.002	0.030
EXO	-0.403	0.093	-4.310	0.000	-0.586	-0.220
BLKO	0.076	0.033	2.310	0.021	0.011	0.140
BCOM	-0.040	0.034	-1.180	0.237	-0.106	0.026
DUAL	-0.011	0.012	-0.910	0.361	-0.034	0.012
FCFDum	0.002	0.008	0.280	0.776	-0.013	0.017
ROA	-0.017	0.059	-0.280	0.779	-0.132	0.099
SIZE	0.002	0.007	0.240	0.810	-0.012	0.016
LEV	-0.002	0.035	-0.060	0.953	-0.070	0.066
StaO	-0.198	0.069	-2.870	0.004	-0.333	-0.063
_cons	0.162	0.195	0.830	0.406	-0.220	0.544
sigma_u	0.171					
sigma_e	0.079					
rho	0.822	(fraction of variance due to u_i)				

(Source: Stata 12.0 Output File)

Next contents are the transformed equation, command sentence and result after taking interactions into account.

Equation (2.1) is modified as follows according to REM:

$$FDiv_{it} = \beta_0 + \beta_1 ESO_{it} + \beta_2 EXO_{it} + \beta_3 BLKO_{it} + \beta_4 BCOM_{it} + \beta_5 DUAL_{it} + \beta_6 FCFDum_{it} + \beta_7 ROA_{it} + \beta_8 SIZE_{it} + \beta_9 LEV_{it} + \beta_{10} StaO_{it} + \beta_{11} FCFESO_{it} + \beta_{12} FCFEXO_{it} + \beta_{13} FCFBLKO_{it} + \beta_{14} FCFBCOM_{it} + \beta_{15} FCFDUAL_{it} + \omega_{it} \quad (2.6)$$

Command:

xtreg FDiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO FCFESO FCFEXO FCFBLKO FCFBCOM FCFDUAL, **re**

Table 33 shows the regression results under the above command sentence.

Table 33: Regression result of diversification function with interaction terms according to REM

Random-effects GLS regression				Number of obs =	560	
Group variable: Id				Number of groups =	70	
R-sq: within = 0.0743				Obs per group: min =	8	
between = 0.0135				avg =	8.0	
overall = 0.0216				max =	8	
				Wald chi2(15) =	38.11	
corr(u_i, X) = 0 (assumed)				Prob > chi2 =	0.0009	
FDiv	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf. Interval]**	
ESO	0.011	0.010	1.06	0.288	-0.009	0.031
EXO	-0.460	0.113	-4.09	0.000	-0.681	-0.240
BLKO	0.071	0.037	1.94	0.053	-0.001	0.143
BCOM	-0.051	0.036	-1.43	0.152	-0.122	0.019
DUAL	-0.011	0.013	-0.84	0.398	-0.038	0.015
FCFDum	-0.021	0.024	-0.87	0.382	-0.069	0.026
ROA	-0.016	0.059	-0.26	0.792	-0.132	0.101
SIZE	0.002	0.007	0.24	0.809	-0.012	0.016
LEV	0.001	0.035	0.03	0.973	-0.067	0.070
StaO	-0.206	0.069	-3.00	0.003	-0.340	-0.071
FCFESO	0.006	0.015	0.41	0.682	-0.024	0.036
FCFEXO	0.102	0.115	0.88	0.376	-0.124	0.328
FCFBLKO	0.017	0.038	0.44	0.661	-0.058	0.092
FCFBCOM	0.034	0.037	0.93	0.355	-0.038	0.107
FCFDUAL	0.003	0.018	0.16	0.873	-0.032	0.038
_cons	0.171	0.195	0.87	0.382	-0.212	0.554
sigma_u	0.164					
sigma_e	0.080					
Rho	0.808	(fraction of variance due to u_i)				

(Source: Stata 12.0 Output File)

It can be seen from Table 32 and Table 33 that both cases (without and with interactions) show the impacts of EXO, StaO and BLKO on FDiv at 5% level of significance.

6.4.2 Analysis and findings on the relationship between corporate governance mechanisms and unrelated diversification level in Vietnam

Table 34 summarizes the results of determinants of diversification level of listed firms in Vietnam during the periods from 2007 to 2014 according to three methods (Pooled OLS, FEM and REM) in case of without interactions in the models.

Table 34: A summary of results on determinants of diversification level according to three methods (Pooled OLS, FEM and REM)

	Pooled OLS	**FEM**	**REM**
ESO	0.005 (0.016)	0.014 (0.008)*	0.014 (0.008)*
EXO	-0.089 (0.122)	-0.425 (0.097)***	-0.403 (0.093)***
BLKO	-0.013 (0.043)	0.084 (0.034)**	0.076 (0.033)**
BCOM	-0.002 (0.038)	-0.045 (0.036)	-0.040 (0.034)
DUAL	-0.043 (0.018)**	-0.007 (0.012)	-0.011 (0.012)
FCFDum	-0.013 (0.016)	0.003 (0.008)	0.002 (0.008)
ROA	-0.174 (0.100)*	-0.005 (0.060)	-0.017 (0.059)
SIZE	0.006 (0.006)	0.001 (0.008)	0.002 (0.007)
LEV	0.080 (0.042)*	-0.016 (0.036)	-0.002 (0.035)
StaO	-0.106 (0.045)**	-0.224 (0.092)**	-0.198 (0.069)***
No. of observations	560	560	560
* p<0.1; ** p<0.05; *** p<0.01			

(Source: Stata 12.0 Output File)

Because estimates for coefficients and the sum of squared errors in the FEM using LSDV estimator are identical to those in Fixed effects (within-group) estimator. They are presented in the same column of FEM.

In order to find out the most appropriate model among three above models, F test and Hausman test will be applied (Park, 2011).

Firstly, **F test** is used to find out whether the FEM using LSDV estimator is better than the pooled OLS model. Pooled OLS model is considered as a restricted version of FEM because it neglects the heterogeneity effects.

H_0: $\beta_{02} = \beta_{03} = \cdots = \beta_{0,70} = 0$

H_1: At least one intercept dummy (from β_{02} to $\beta_{0,70}$) exists in the model

$$F = \frac{(R_{ur}^2 - R_r^2)/g}{(1 - R_{ur}^2)/(n-k)}$$

In which: R_{ur}^2, R_r^2 are coefficients of determination of unrestricted and restricted model respectively

g is the number of imposed restrictions in the restricted model

n is the number of observations in the sample

k is the number of parameters estimated in the unrestricted model

R_{ur}^2 = 0.911 R_r^2 = 0.059 g = 69

n = 560 k = 80

$$F = \frac{(0.911 - 0.059)/69}{(1 - 0.911)/(560 - 80)} = 66.595$$

5% critical value of F(g, n-k) is 1.325

F (69, 480)

As F = 66.595 > 1.325, H_0 is rejected (at 5% level of significance)

Thus it can be concluded that the FEM using LSDV estimator is better than the Pooled OLS model.

Secondly, we apply **Hausman test** to test whether REM is appropriate by comparing the coefficient estimates from the REM to those from the FEM in order to guarantee that there is no correlation between the cross-section error component (ε_i) and any regressor in the REM. Results are presented in Figure 11. Non-significant p-value in Figure 11 indicates that Ho is accepted. It means that Hausman test in this case supports REM rather than FEM.

Figure 11: Hausman test for diversification function without interactions

hausman FE RE

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) FE	(B) RE		
ESO	0.014	0.014	0.000	0.001
EXO	-0.425	-0.403	-0.022	0.027
BLKO	0.084	0.076	0.008	0.009
BCOM	-0.045	-0.040	-0.005	0.011
DUAL	-0.007	-0.010	0.003	0.003
FCFDum	0.002	0.002	0.000	0.001
ROA	-0.005	-0.017	0.012	0.012
SIZE	0.001	0.002	-0.001	0.004
LEV	-0.016	-0.002	-0.014	0.011
StaO	-0.224	-0.198	-0.026	0.060

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 6.01

Prob>chi2 = **0.8147**

(Source: Stata 12.0 Output File)

However in order to reach the final decision for a suitable model with efficient and consistent estimators to read the results, the author continues to test heteroscedasticity and autocorrelation of both models. The first test is for heteroscedasticity and autocorrelation of REM.

Used command: xttest1

The result is revealed in Figure 12:

All zero p-values in Figure 12 indicate that the REM exists both heteroscedasticity and autocorrelation. In order to eliminate these heteroscedasticity and autocorrelation problems for the REM, cross-sectional time-series FGLS regression is used with the following Stata command:

xtgls Fdiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO, panels (hetero) corr(ar1)

Table 35 shows the results from the above command of **xtgls** in *Stata 12.0.*

Figure 12: Tests' results for the error component model

Fdiv[Id,t] = Xb + u[Id] + v[Id,t]
v[Id,t] = lambda v[Id,(t-1)] + e[Id,t]
Estimated results:

	Var	sd = sqrt(Var)
Fdiv	0.034029	0.1844704
e	0.006312	0.0794461
u	0.029223	0.1709485

Tests:

Random Effects, Two Sided:
ALM(Var(u)=0) = 758.79 Pr>chi2(1) = 0.0000

Random Effects, One Sided:
ALM(Var(u)=0) = 27.55 Pr>N(0,1) = 0.0000

Serial Correlation:
ALM(lambda=0) = 27.35 Pr>chi2(1) = 0.0000

Joint Test:
LM(Var(u)=0,lambda=0) = 1240.28 Pr>chi2(2) = 0.0000

(Source: Stata 12.0 Output File)

Table 35: Results from running Cross-sectional time-series FGLS regression for Firm diversification function

Coefficients: generalized least squares
Panels: heteroskedastic
Correlation: common AR(1) coefficient for all panels (0.8171)

Estimated covariances = 70
Estimated autocorrelations = 1
Estimated coefficients = 11

Number of obs = 560
Number of groups = 70
Time periods = 8
Wald chi2(10) = 17.45
Prob > chi2 = 0.0651

Fdiv	**Coef.**	**Std. Err.**	**z**	**P>|z|**	**[95% Conf. Interval]**	
ESO	0.006	0.004	1.5	0.134	-0.002	0.015
EXO	-0.044	0.060	-0.74	0.461	-0.162	0.073
BLKO	0.017	0.027	0.63	0.529	-0.036	0.070
BCOM	-0.030	0.024	-1.25	0.211	-0.076	0.017
DUAL	-0.006	0.008	-0.71	0.479	-0.021	0.010
FCFDum	0.006	0.004	1.54	0.124	-0.002	0.013
ROA	-0.031	0.033	-0.94	0.348	-0.096	0.034
SIZE	0.010	0.005	2.1	0.035	0.001	0.020
LEV	0.031	0.021	1.48	0.138	-0.010	0.071
StaO	-0.059	0.040	-1.47	0.141	-0.138	0.020
_cons	-0.176	0.131	-1.34	0.179	-0.433	0.081

(Source: Stata 12.0 Output File)

One noticeable finding after eliminating heteroscedasticity and autocorrelation problems is that the model becomes invalid at 5% significance level when its Wald chi-square value of 17.45 with a corresponding *p* value greater than significance level (Table 35).

Next, the author tests heteroscedasticity and autocorrelation of FEM owing to Modified Wald test and Woolridge test respectively.

Used command in Stata for Modified Wald test: **xttest3**

Figure 13 shows the result from the above command:

Figure 13: Modified Wald test for diversification function without interactions

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (70)  =  7.3e+05
Prob>chi2 =     0.0000
```

(Source: Stata 12.0 Output File)

It can be seen from Figure 13 that the model exists heteroscedasticity because p-value is less than significance level (5%).

Next, Woolridge test is done though the following command:

xtserial Fdiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO

Its result is illustrated in Figure 14

Figure 14: Wooldridge test for diversification function without interactions

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
   F(  1,     69) =     2.902
         Prob > F =     0.0929
```

(Source: Stata 12.0 Output File)

Although p-value is greater than 5%, it is still not high enough to ensuring the non-existence of autocorrelation in panel data of the model. The p-value of 0.0929 proves that the model still has first-order autocorrelation at 10% level of significance.

Thus, to be conservative, a regression with Driscoll-Kraay standard errors will be run to control both heteroscedasticity and autocorrelation problems as the suggestion Hoechle (2007).

Stata command:

xtscc Fdiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO, fe lag (1)

Received results from *Stata 12.0* are presented in Table 36:

Table 36: Results from running regression with Driscoll-Kraay standard errors for Firm diversification function

Regression with Driscoll-Kraay standard errors Method: Fixed-effects regression Group variable (i): Id maximum lag: 1				Number of obs = 560 Number of groups = 70 F(10, 7) = 1039.46 Prob > F = 0.0000 within R-squared = 0.0708		
Fdiv	**Coef.**	**Drisc/Kraay Std. Err.**	**t**	**P>|t|**	**[95% Conf. Interval]**	
ESO	0.014	0.009	1.57	0.161	-0.007	0.035
EXO	-0.425	0.042	-10.11	0.000	-0.524	-0.325
BLKO	0.084	0.015	5.46	0.001	0.047	0.120
BCOM	-0.045	0.046	-0.98	0.360	-0.155	0.064
DUAL	-0.007	0.012	-0.61	0.563	-0.036	0.021
FCFDum	0.003	0.007	0.36	0.729	-0.014	0.020
ROA	-0.005	0.033	-0.15	0.886	-0.084	0.074
SIZE	0.001	0.005	0.27	0.797	-0.010	0.013
LEV	-0.016	0.025	-0.67	0.524	-0.075	0.042
StaO	-0.224	0.043	-5.24	0.001	-0.325	-0.123
_cons	0.184	0.136	1.35	0.218	-0.137	0.505

(Source: Stata 12.0 Output File)

About results expose that FEM with coefficients from Regression with Driscoll-Kraay standard errors is valid when its F value is 1039.46 with a corresponding *p* value of 0.0000. This is the reason why the author selects this model to explain relationships among variables.

In summary, a comparison between FEM and REM for Firm diversification function is illustrated in Table 37.

Table 37: A comparison between FEM and REM for Firm diversification function

	FEM	**REM**
Hausman test	**Not** support	Support
Heteroscedasticity	Exist	Exist
Autocorrelation	Exist	Exist
After correcting Heteroscedasticity and Autocorrelation	Model is valid at 5% significant level (Regression with Driscoll-Kraay standard errors F(10, 7) = 1039.46 Prob > F = 0.0000)	Model is **not** valid at 5% significant level (Cross-sectional time-series FGLS regression Wald chi2(10) = 17.45 Prob > chi2 = 0.0651)

(Source: own creation)

Although REM was supported by Hausman test, it became invalid at 5% significance level after correcting heteroscedasticity and autocorrelation problems. In the meanwhile, after correcting these diagnostics, FEM became valid at 5% significance level. Therefore, the author will explain the results related to the determinants of diversification levels of Vietnamese listed firms according to the **result regression with Driscoll-Kraay standard errors from Fixed effect model**.

It can be seen from Table 36 that among 10 regressor variables, only three explanatory variables (EXO, BLKO, and StaO) have statistically significant coefficients at less than 5% level of significance. Among them, there is a negative strong relationship between Executive ownership (EXO) and Firm diversification (FDiv) with the coefficient around – 0.4 at less than 0.01 significance level. This indicates that the predicted diversification level is estimated to decrease by about 0.4 for each 1 percent increase in executive ownership, holding constant the effect of the other regressors. State ownership also correlates with the extent of diversification negatively but at a lower level as the correlation coefficient is nearly -0.2 at the significant level of under 0.05. This coefficient implies that a 1 percent decrease in state ownership is predicted to increase diversification level by roughly 0.2 in case all other explanatory variables remain unchanged. On the other hand, there is a positive relation between Blockhoder ownership (BLKO), a control device of corporate governance, and diversification level as its coefficient is 0.084 at significance level less than 0.05. The

coefficient means that holding constant other variables, on the average, each 1 percent increase in blockholder ownership is expected to be associated with an increase of 0.084 in diversification level.

As a result, among five considered corporate governance mechanisms (Executive stock options, Executive ownership, Blockholder ownership, Board composition and Duality in position), only two factors (Executive ownership and Blockholder ownership) had significant effects on diversification level in opposite directions at 5% level of significance. Specifically, the higher the proportion of managerial ownership was, the lower the diversification level became. Nevertheless, the higher the percentage of blockholder ownership was, the more diversified the firm was. For three remaining corporate governance features, there were no evidences to support the relationships between Executive stock options, Board composition or CEO duality and the extent of diversification. Therefore, in case of Vietnam, **Hypothesis 1** would be accepted only if the interest alignment device is increasing executive ownership; and **Hypothesis 2** would be rejected for all control devices of corporate governance.

6.4.3 Analysis and findings on the moderation of free cash flow on the relationship between corporate governance and diversification in Vietnam

Table 38 shows a summary of results on determinants of diversification level under the moderation of free cash flow according to three methods (Pooled OLS, FEM and REM). Similar to the situation of without interactions, we apply F test and Hausman test to explore which method is the best among three methods (Pooled OLS, FEM, and REM) in case of adding interactions into the models.

Table 38: A summary of results on determinants of diversification level under the moderation of free cash flow according to three methods (Pooled OLS, FEM and REM)

	Pooled OLS	**FEM**	**REM**
ESO	-0.004 (0.020)	0.011 (0.010)	0.011 (0.010)
EXO	-0.190 (0.167)	-0.488 (0.116)***	-0.460 (0.113)***
BLKO	0.033 (0.051)	0.077 (0.038)*	0.071 (0.037)*

BCOM	-0.071 (0.046)	-0.055 (0.038)	-0.051 (0.036)
DUAL	-0.033 (0.022)	-0.008 (0.014)	-0.011 (0.013)
FCFDum	-0.007 (0.051)	-0.022 (0.024)	-0.021 (0.024)
ROA	-0.177 (0.100)*	-0.004 (0.060)	-0.016 (0.059)
SIZE	0.006 (0.006)	0.001 (0.008)	0.002 (0.007)
LEV	0.085 (0.042)**	-0.015 (0.037)	0.001 (0.035)
StaO	-0.108 (0.045)**	-0.240 (0.093)**	-0.206 (0.069)***
FCFESO	0.021 (0.032)	0.005 (0.015)	0.006 (0.015)
FCFEXO	0.164 (0.235)	0.111 (0.116)	0.102 (0.115)
FCFBLKO	-0.116 (0.080)	0.021 (0.038)	0.017 (0.038)
FCFBCOM	0.194 (0.078)**	0.028 (0.037)	0.034 (0.037)
FCFDUAL	-0.017 (0.036)	0.003 (0.018)	0.003 (0.018)
No. of observations	560	560	560
* p<0.1; ** p<0.05; *** p<0.01			

(Source: Stata 12.0 Output File)

Firstly, F test is done

H_0: $\beta_{02} = \beta_{03} = \cdots = \beta_{0,70} = 0$

H_1: At least one intercept dummy (from β_{02} to $\beta_{0,70}$) exists in the model

R^2_{ur} = 0.912 R^2_r = 0.076 g = 69

n = 560 k = 85

$$F = \frac{(R^2_{ur} - R^2_r)/g}{(1 - R^2_{ur})/(n-k)} = \frac{(0.912 - 0.076)/69}{(1 - 0.912)/(560 - 85)} = 65.399$$

5% critical value of F(g, n-k) is 1.326

F (69, 475)

As F = 65.399 > 1.326, H_0 is rejected (at 5% level of significance)

This test proves that the FEM using LSDV estimator is more suitable in estimating diversification level in the sample of Vietnam than the pooled OLS model.

Next step is Hausman test (Figure 15).

Non-significant p-value from Hausman test indicates that the random effects estimates should be used because the model satisfies random effects assumptions.

Figure 15: Hausman test for diversification function with interactions

hausman FE RE, sigmamore

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) FE	(B) RE		
ESO	0.011	0.011	0.000	0.001
EXO	-0.488	-0.460	-0.028	0.028
BLKO	0.077	0.071	0.006	0.010
BCOM	-0.055	-0.051	-0.004	0.011
DUAL	-0.008	-0.011	0.003	0.003
FCFDum	-0.021	-0.021	-0.000	0.002
ROA	-0.004	-0.016	0.012	0.012
SIZE	0.001	0.001	-0.000	0.004
LEV	-0.015	0.001	-0.016	0.011
StaO	-0.240	-0.206	-0.034	0.063
FCFESO	0.005	0.006	-0.001	0.001
FCFEXO	0.111	0.102	0.009	0.013
FCFBLKO	0.021	0.017	0.004	0.003
FCFBCOM	0.028	0.034	-0.006	0.003
FCFDUAL	0.003	0.003	-0.000	0.002

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(15) = (b-B)'[(V_b-V_B)^(-1)](b-B)

= 17.76

Prob>chi2 = **0.2756**

(Source: Stata 12.0 Output File)

However, one interesting finding is that FEM and REM showed similar results on the determinants of diversification level of listed companies on Vietnamese stock market (Table 38). Despite we select which model, all five interaction terms between free cash flow dummy and five internal corporate governance mechanisms (FCFESO, FCFEXO, FCFBLKO, FCFBCOM and FCFDUAL) are insignificant statistically at the 0.1 level of significance.

Furthermore, a Wald test of block exclusion of interaction terms is utilized to test whether the coefficients for five interactions are simultaneously equal to zero.

At this time, used Stata command:

test FCFESO FCFEXO FCFBLKO FCFBCOM FCFDUAL

And the result is received from Stata as follows (Figure 16)

P-value of 0.0766 indicates that the null hypothesis (Coefficients for five interactions are simultaneously equal to zero), would be accepted at 5% significance level.

Figure 16: Wald test for diversification function with interactions

```
test FCFESO FCFEXO FCFBLKO FCFBCOM FCFDUAL
         ( 1)  FCFESO           = 0
         ( 2)  FCFEXO           = 0
         ( 3)  FCFBLKO          = 0
         ( 4)  FCFBCOM          = 0
         ( 5)  FCFDUAL          = 0
       F(  5,   544) =    2.00
            Prob > F =    0.0766
```

` (Source: Stata 12.0 Output File)

To sum up, all evidences of analysis reveal that the effect of each internal corporate governance mechanism on diversification of a listed firm in Vietnam is expected to be not impacted by the level of free cash flow, high or low. **Hypothesis 3** would be rejected in this case.

6.5 Test the effect of diversification on firm value of listed firms in Vietnam

6.5.1 Applying different methods for testing

Steps to test the impact of diversification on firm value are similar to those to check determinants of diversification level. Three methods (Pooled OLS regression, Fixed effects model and Random effects model) suggested by Wooldridge (2009), Gujarati (2011) and Hill et al. (2011) for panel data will be applied one by one for Model 3.

Model 3:

$$Tobinsq_{it} = \beta_{0it} + \beta_1 FDiv_{it} + \beta_2 ESO_{it} + \beta_3 EXO_{it} + \beta_4 BLKO_{it} + \beta_5 BCOM_{it} + \beta_6 DUAL_{it} + \beta_7 FCFDum_{it} + \beta_8 ROA_{it} + \beta_9 SIZE_{it} + \beta_{10} LEV_{it} + \beta_{11} StaO_{it} + u_{it} \quad (3.1)$$

6.5.1.1 Pooled OLS regression

Model 3 is rewritten as the following equation under this method:

$$Tobinsq_{it} = \beta_0 + \beta_1 FDiv_{it} + \beta_2 ESO_{it} + \beta_3 EXO_{it} + \beta_4 BLKO_{it} + \beta_5 BCOM_{it} + \beta_6 DUAL_{it} + \beta_7 FCFDum_{it} + \beta_8 ROA_{it} + \beta_9 SIZE_{it} + \beta_{10} LEV_{it} + \beta_{11} StaO_{it} + u_{it} \quad (3.2)$$

Where i represents the cross-section unit, t stands for the time

$i = 1,2, \ldots,70; \quad t = 2007,2008,..,2014$

and the error term (u_{it}) is assumed to follow the normal distribution with zero mean and constant variance: $u_{it} \sim N(0, \sigma^2)$

Used Stata command:

reg Tobinsq FDiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO

Regression results are shown in Table 39.

Table 39 shows that the relationship between diversification level and firm value is statistically non-significant with p-value higher than 10%.

Table 39: Pooled OLS regression result of firm value function

rce	**SS**	**df**	**MS**		Number of obs = 560	
Model	152.775	11	13.889		F(11, 548) = 21.59	
Residual	352.515	548	0.643		Prob > F = 0.0000	
Total	505.29	559	0.904		R-squared = 0.3024	
					Adj R-squared = 0.2883	
					Root MSE = 0.802	
Tobinsq	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf. Interval]**	
FDiv	0.117	0.190	0.620	0.537	-0.255	0.489
ESO	0.058	0.071	0.810	0.415	-0.082	0.197
EXO	2.424	0.541	4.480	0.000	1.361	3.487
BLKO	0.057	0.191	0.300	0.766	-0.318	0.431
BCOM	-0.228	0.171	-1.330	0.183	-0.563	0.108
DUAL	0.191	0.079	2.420	0.016	0.036	0.346
FCFDum	0.078	0.071	1.100	0.274	-0.062	0.217
ROA	4.989	0.446	11.190	0.000	4.113	5.865
SIZE	0.008	0.028	0.300	0.761	-0.046	0.063
LEV	0.271	0.188	1.440	0.152	-0.099	0.641

StaO	0.541	0.199	2.720	0.007	0.150	0.932
_cons	0.104	0.746	0.140	0.889	-1.361	1.570

(Source: Stata 12.0 Output File)

6.5.1.2 Fixed effects model (FEM)

The intercept of Model 3 is modified in accordance with the FEM that only permits individual-specific characteristics.

$$Tobinsq_{it} = \beta_{0i} + \beta_1 FDiv_{it} + \beta_2 ESO_{it} + \beta_3 EXO_{it} + \beta_4 BLKO_{it} + \beta_5 BCOM_{it} + \beta_6 DUAL_{it} + \beta_7 FCFDum_{it} + \beta_8 ROA_{it} + \beta_9 SIZE_{it} + \beta_{10} LEV_{it} + \beta_{11} StaO_{it} + u_{it} \quad (3.3)$$

The FEM can be divided into two methods, consisting of *least squares dummy variable estimator* and *fixed effects (within-group) estimator*.

a. Least squares dummy variable (LSDV) estimator

To this method, 70 differential intercept dummies are introduced in Model 3. The equation (3.3) is rewritten as bellow:

$$Tobinsq_{it} = \beta_{01} D_{1i} + \beta_{02} D_{2i} + \beta_{03} D_{3i} + \cdots + \beta_{0,70} D_{70i} + \beta_1 FDiv_{it} + \beta_2 ESO_{it} + \beta_3 EXO_{it} + \beta_4 BLKO_{it} + \beta_5 BCOM_{it} + \beta_6 DUAL_{it} + \beta_7 FCFDum_{it} + \beta_8 ROA_{it} + \beta_9 SIZE_{it} + \beta_{10} LEV_{it} + \beta_{11} StaO_{it} + u_{it} \quad (3.4)$$

Where D_{1i} = 1 for the 1st company, 0 otherwise; D_{2i} = 1 for the 2nd company, 0 otherwise; D_{3i} = 1 for the 3rd company, 0 otherwise; and so on.

Stata command in this case:

reg Tobinsq FDiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO d1-d70, noconstant

Regression results are abridged in Table 40. A full result is displayed in Appendix 5. It can be seen from Table 40 that the correlation coefficient of FDiv and Tobinsq is 0.492 with p-value at 0.188. Thus, the link between diversification and firm value is realized to be statistically insignificant by this method.

Table 40: Abridged regression result of firm value function according to FEM using LSDV estimator

Source	SS	df	MS	Number of obs = 560
Model	1207.361	81	14.906	F(81, 479) = 35.21
Residual	202.769	479	0.423	Prob > F = 0.0000
Total	1410.130	560	2.518	R-squared = 0.8562
				Adj R-squared = 0.8319
				Root MSE = 0.65063

Tobinsq	**Coef.**	**Std. Err.**	**z**	**P>|z|**	**[95% Conf. Interval]**	
FDiv	0.492	0.374	1.320	0.188	-0.242	1.227
ESO	-0.017	0.068	-0.260	0.798	-0.150	0.116
EXO	5.363	0.812	6.600	0.000	3.767	6.958
BLKO	0.366	0.280	1.310	0.192	-0.185	0.917
BCOM	0.226	0.292	0.780	0.439	-0.347	0.799
DUAL	-0.023	0.098	-0.230	0.816	-0.215	0.169
FCFDum	0.077	0.063	1.220	0.224	-0.047	0.200
ROA	2.351	0.492	4.780	0.000	1.384	3.318
SIZE	-0.781	0.065	-11.930	0.000	-0.910	-0.652
LEV	1.659	0.296	5.600	0.000	1.077	2.242
StaO	3.113	0.754	4.130	0.000	1.631	4.595
d1	20.671	1.766	11.710	0.000	17.201	24.141
d2	21.009	1.810	11.610	0.000	17.454	24.565
…	…	…	…	…	…	…
d70	17.919	1.675	10.700	0.000	14.628	21.211

(Source: Stata 12.0 Output File)

b. Fixed effects (within- group) estimator

In this method, variables are expressed in terms of deviation from individual means.

$$Tobinsq_{it} = \beta_{0i} + \beta_1 FDiv_{it} + \beta_2 ESO_{it} + \beta_3 EXO_{it} + \beta_4 BLKO_{it} + \beta_5 BCOM_{it} + \beta_6 DUAL_{it} + \beta_7 FCFDum_{it} + \beta_8 ROA_{it} + \beta_9 SIZE_{it} + \beta_{10} LEV_{it} + \beta_{11} StaO_{it} + u_{it}$$

$$\rightarrow \overline{Tobinsq_i} = \beta_{0i} + \beta_1 \overline{FDiv_i} + \beta_2 \overline{ESO_i} + \beta_3 \overline{EXO_i} + \beta_4 \overline{BLKO_i} + \beta_5 \overline{BCOM_i} + \beta_6 \overline{DUAL_i} + \beta_7 \overline{FCFDum_i} + \beta_8 \overline{ROA_i} + \beta_9 \overline{SIZE_i} + \beta_{10} \overline{LEV_i} + \beta_{11} \overline{StaO_i}) + \bar{u}_i$$

$$\rightarrow Tobinsq_{it} - \overline{Tobinsq_i} = \beta_1 (FDiv_{it} - \overline{FDiv_i}) + \beta_2 (ESO_{it} - \overline{ESO_i}) + \beta_3 (EXO_{it} - \overline{EXO_i}) + \beta_4 (BLKO_{it} - \overline{BLKO_i}) + \beta_5 (BCOM_{it} - \overline{BCOM_i}) + \beta_6 (DUAL_{it} - \overline{DUAL_i}) + \beta_7 (FCFDum_{it} - \overline{FCFDum_i}) + \beta_8 (ROA_{it} - \overline{ROA_i}) + \beta_9 (SIZE_{it} - \overline{SIZE_i}) + \beta_{10} (LEV_{it} - \overline{LEV_i}) + \beta_{11} (StaO_{it} - \overline{StaO_i}) + (u_{it} - \bar{u}_i)$$

where a bar over a variable represents its average value over 8 years

The model 3 can be transformed into the following model:

$$\widetilde{Tobinsq_{it}} = \beta_1 \widetilde{FDiv_{it}} + \beta_2 \widetilde{ESO_{it}} + \beta_3 \widetilde{EXO_{it}} + \beta_4 \widetilde{BLKO_{it}} + \beta_5 \widetilde{BCOM_{it}} + \beta_6 \widetilde{DUAL_{it}} + \beta_7 \widetilde{FCFDum_{it}} + \beta_8 \widetilde{ROA_{it}} + \beta_9 \widetilde{SIZE_{it}} + \beta_{10} \widetilde{LEV_{it}} + \beta_{11} \widetilde{StaO_{it}} + \tilde{u}_{it} \quad (3.5)$$

In *Stata 12.0*, the following Stata command is used:

xtreg Tobinsq FDiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO, fe

Results are shown in Table 41.

Table 41: Regression result of firm value function according to Fixed effects (within- group) estimator

Fixed-effects (within) regression					Number of obs =	560
Group variable: Id					Number of groups =	70
R-sq: within = 0.3773						
between = 0.0132					Obs per group: min =	8
overall = 0.0140					avg =	8.0
					max =	8
corr(u_i, Xb) = -0.8471					F(11,479) =	26.39
					Prob > F =	0.0000
Tobinsq	**Coef.**	**Std. Err.**	**T**	**P>|t|**	**[95% Conf. Interval]**	
FDiv	0.492	0.374	1.320	0.188	-0.242	1.227
ESO	-0.017	0.068	-0.260	0.798	-0.150	0.116
EXO	5.363	0.812	6.600	0.000	3.767	6.958
BLKO	0.366	0.280	1.310	0.192	-0.185	0.917
BCOM	0.226	0.292	0.780	0.439	-0.347	0.800
DUAL	-0.023	0.098	-0.230	0.816	-0.215	0.169
FCFDum	0.077	0.063	1.220	0.224	-0.047	0.200
ROA	2.351	0.492	4.780	0.000	1.384	3.318
SIZE	-0.781	0.065	-11.930	0.000	-0.910	-0.652
LEV	1.659	0.296	5.600	0.000	1.077	2.242
StaO	3.113	0.754	4.130	0.000	1.631	4.595
_cons	19.867	1.777	11.180	0.000	16.377	23.358
sigma_u	1.377					
sigma_e	0.651					
rho	0.817	(fraction of variance due to u_i)				
F test that all u_i=0: F(69, 479) = 5.13 Prob > F = 0.0000						

(Source: Stata 12.0 Output File)

Regression results from Table 41 indicate that the relationship between diversification level and firm value is also rejected in this situation.

6.5.1.3 The Random effects model (REM) or error components model (ECM)

The intercept of Model 3 is moderated with the appearance of the *random effects* (ε_i).

$$Tobinsq_{it} = \beta_0 + \beta_1 FDiv_{it} + \beta_2 ESO_{it} + \beta_3 EXO_{it} + \beta_4 BLKO_{it} + \beta_5 BCOM_{it} + \beta_6 DUAL_{it} + \beta_7 FCFDum_{it} + \beta_8 ROA_{it} + \beta_9 SIZE_{it} + \beta_{10} LEV_{it} + \beta_{11} StaO_{it} + (u_{it} + \varepsilon_i) \quad (3.6)$$

Or

$$Tobinsq_{it} = \beta_0 + \beta_1 FDiv_{it} + \beta_2 ESO_{it} + \beta_3 EXO_{it} + \beta_4 BLKO_{it} + \beta_5 BCOM_{it} + \beta_6 DUAL_{it} + \beta_7 FCFDum_{it} + \beta_8 ROA_{it} + \beta_9 SIZE_{it} + \beta_{10} LEV_{it} + \beta_{11} StaO_{it} + \omega_{it} \quad (3.7)$$

Where Composite error term $(\omega_{it}) =$ Cross − section error component (ε_i) + Combined time series and cross − section error component (u_{it})

And the random effects (ε_i) are assumed to have zero mean, are uncorrelated among individuals, and have a constant variance:

$$E(\varepsilon_i) = 0, cov\left(\varepsilon_i, \varepsilon_j\right) = 0 \;\; i \neq j, var(\varepsilon_i) = \sigma_\varepsilon^2$$

Used Stata command:

xtreg Tobinsq FDiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO, **re**

Table 42 shows the result from the above command.

Table 42: Regression result of firm value function according to REM

Random-effects GLS regression				Number of obs =	560	
Group variable: Id				Number of groups =	70	
R-sq: within = 0.1377				Obs per group: min =	8	
between = 0.5832				avg =	8.0	
overall = 0.2946				max =	8	
				Wald chi2(11) =	181.46	
corr(u_i, X) = 0 (assumed)				Prob > chi2 =	0.0000	
Tobinsq	**Coef.**	**Std. Err.**	**t**	**P>|t|**	**[95% Conf.**	**Interval]**
FDiv	0.103	0.221	0.470	0.641	-0.330	0.536
ESO	0.039	0.072	0.540	0.589	-0.102	0.180
EXO	2.870	0.605	4.740	0.000	1.684	4.056
BLKO	-0.004	0.213	-0.020	0.985	-0.422	0.414
BCOM	-0.266	0.195	-1.360	0.174	-0.648	0.117
DUAL	0.190	0.086	2.220	0.026	0.022	0.358
FCFDum	0.083	0.071	1.180	0.239	-0.055	0.221
ROA	4.644	0.469	9.900	0.000	3.725	5.564
SIZE	-0.037	0.032	-1.130	0.258	-0.100	0.027
LEV	0.398	0.211	1.890	0.059	-0.015	0.812
StaO	0.673	0.236	2.850	0.004	0.210	1.135
_cons	1.281	0.874	1.470	0.143	-0.433	2.995
sigma_u	0.183					
sigma_e	0.651					
rho	0.073	(fraction of variance due to u_i)				

(Source: Stata 12.0 Output File)

It can be seen from Table 42 that the regression result also does not support the effect of diversification level on firm value with p-value much larger than 10%.

6.5.2 Analysis and findings on the relationship between diversification level and firm value in Vietnam

Table 43 summarizes regression results on determinants of firm value according to three methods (Pooled OLS, FEM and REM).

Table 43: A summary of results on determinants of firm value according to three methods (Pooled OLS, FEM and REM)

	Pooled OLS	**FEM**	**REM**
FDiv	0.117 (0.190)	0.492 (0.374)	0.103 (0.221)
ESO	0.058 (0.071)	-0.017 (0.068)	0.039 (0.072)
EXO	2.424 (0.541)***	5.363 (0.812)***	2.870 (0.605)***
BLKO	0.057 (0.191)	0.366 (0.280)	-0.004 (0.213)
BCOM	-0.228 (0.171)	0.226 (0.292)	-0.266 (0.195)
DUAL	0.191 (0.079)**	-0.023 (0.098)	0.190 (0.086)**
FCFDum	0.078 (0.071)	0.077 (0.063)	0.083 (0.071)
ROA	4.989 (0.446)***	2.351 (0.492)***	4.644 (0.469)***
SIZE	0.008 (0.028)	-0.781 (0.065)***	-0.037 (0.032)
LEV	0.271 (0.188)	1.659 (0.296)***	0.398 (0.211)*
StaO	0.541 (0.199)***	3.113 (0.754)***	0.673 (0.236)***
_cons	0.104 (0.746)	19.867 (1.777)***	1.281 (0.874)
No. of observations	560	560	560
R^2	0.302	0.377 (within)	0.295 (overall)

(Source: Stata 12.0 Output File)

F test and Hausman test are applied to find out the model as per which method should be most preferable.

Firstly, **F test** is done.

H_0: $\beta_{02} = \beta_{03} = \cdots = \beta_{0,70} = 0$

H_1: At least one intercept dummy (from β_{02} to $\beta_{0,70}$) exists in the model

R^2_{ur} = 0.856 R^2_r = 0.302 g = 69

n = 560 k = 81

$$F = \frac{(R^2_{ur} - R^2_r)/g}{(1 - R^2_{ur})/(n-k)} = \frac{(0.856 - 0.302)/69}{(1 - 0.856)/(560 - 81)} = 26.708$$

In which: R^2_{ur}, R^2_r are coefficients of determination of unrestricted and restricted model respectively

g is the number of imposed restrictions in the restricted model

n is the number of observations in the sample

k is the number of parameters estimated in the unrestricted model

5% critical value of F(g, n-k) is 1.325

F (69, 479)

As F = 26.708 > 1.325, H_0 is rejected (at 5% level of significance)

Thus it can be concluded that the FEM using LSDV estimator is better than the pooled OLS model.

Secondly, **Hausman test** is applied to test whether estimators of both REM and FEM are consistent or not (Figure 17).

Because p-value in Figure 17 is really low, we reject null hypothesis that the difference between the estimators is zero at the 1% level of significance. Thus, the author will uses **estimators of the FEM** in order to do further analysis for testing possible problems of the model.

Figure 17: Hausman test for firm value function

hausman FE RE

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) FE	(B) RE		
FDiv	0.492	0.103	0.389	0.302
ESO	-0.017	0.039	-0.056	0.000
EXO	5.363	2.870	2.493	0.541
BLKO	0.365	-0.004	0.369	0.182
BCOM	0.226	-0.266	0.492	0.217
DUAL	-0.023	0.190	-0.213	0.047
FCFDum	0.077	0.083	-0.006	0.000
ROA	2.351	4.644	-2.293	0.149
SIZE	-0.781	-0.037	-0.744	0.057
LEV	1.659	0.398	1.261	0.208
StaO	3.113	0.672	2.441	0.716

b = consistent under Ho and Ha; obtained from xtreg

B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(11) = (b-B)'[(V_b-V_B)^(-1)](b-B) = 154.21

Prob>chi2 = **0.0000**

(V_b-V_B is not positive definite)

(Source: Stata 12.0 Output File)

With the purpose of guaranteeing estimators to be best and unbiased, the author will test multicollinearity, heteroscedasticity, autocorrelation and endogeneity of the FEM for firm value.

Regarding multicollinearity, it can be seen from the Table 25 of Correlation matrix for the entire sample that when Tobinsq was a dependent variable, there were 11 regressors with 55 pairwise correlations among explanatory variables. Because all correlation coefficients were not less than 0.05, the multicollinearity problem seems to be avoidable in the chosen FEM.

Next is about heteroscedasticity. Modified Wald test is used to check whether heteroscedasticity exists in FEM. In this test, the null hypothesis is that homoscedasticity exists in the model.

Used command: **xttest3**

The result is shown in Figure 18.

Figure 18: Modified Wald test for firm value function

```
Modified Wald test for groupwise heteroskedasticity
in fixed effect regression model

H0: sigma(i)^2 = sigma^2 for all i

chi2 (70)  =  13239.83
Prob>chi2 =     0.0000
```

(Source: Stata 12.0 Output File)

Because p-value is 0.000, the null hypothesis is rejected. Therefore it can be concluded that the chosen model exists heteroscedasticity.

The next problem in panel data analysis is autocorrelation. This problem is checked by Wooldridge test through *Stata 12.0*.

Used command: **xtserial** Tobinsq FDiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO

Figure 19 shows the result.

Figure 19: Wooldridge test for firm value function

```
Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
   F(  1,     69) =     65.693
         Prob > F =     0.0000
```

(Source: Stata 12.0 Output File)

With p-value lower than 0.05, null hypothesis of this test is rejected or it is proved that there is first-order autocorrelation in panel data.

Because both heteroscedasticity and autocorrelation exists in the chosen FEM, the author will run regression with Driscoll-Kraay standard errors to produce standard error estimates that are robust to disturbances being heteroscedastic and auto-correlated with moving average lag 1 as suggestion of Hoechle (2007).

Stata command:

xtscc Tobinsq FDiv ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO, fe lag(1)

Results from *Stata 12.0*:

Table 44: Results from running regression with Driscoll-Kraay standard errors for firm value function

Regression with Driscoll-Kraay standard errors Method: Fixed-effects regression Group variable (i): Id maximum lag: 1				Number of obs = 560 Number of groups = 70 F(11, 7) = 28.95 Prob > F = 0.0000 within R-squared = 0.3773	
Tobinsq	**Coef.**	**Drisc/Kraay Std. Err.**	**t**	**P>|t|**	**[95% Conf. Interval]**
FDiv	0.492	0.330	1.490	0.180	-0.289 1.273
ESO	-0.017	0.052	-0.330	0.750	-0.141 0.107
EXO	5.363	2.997	1.790	0.117	-1.723 12.449
BLKO	0.366	0.216	1.690	0.134	-0.145 0.877
BCOM	0.226	0.186	1.210	0.264	-0.214 0.667
DUAL	-0.023	0.058	-0.390	0.706	-0.160 0.115
FCFDum	0.077	0.078	0.980	0.358	-0.108 0.261
ROA	2.351	1.242	1.890	0.100	-0.587 5.289
SIZE	-0.781	0.153	-5.110	0.001	-1.142 -0.420
LEV	1.659	0.454	3.650	0.008	0.585 2.734
StaO	3.113	1.827	1.700	0.132	-1.207 7.434
_cons	19.867	3.272	6.070	0.001	12.131 27.604

(Source: Stata 12.0 Output File)

The regression result from Table 44 also shows insignificant relationship between diversification level and firm value at 5% level of significance.

The last problem of panel data analysis is endogeneity. It is necessary to check whether diversification level (FDiv) is an endogenous regressor or not. This study runs two-stage least squares (2SLS) regression with *change of CEO* in the role of an instrumental variable. The variable *change of CEO* appeared in the research of Goranova et al. (2007) as a control variable when they examined the relationship between managerial ownership and diversification. In this study, *change of CEO* is a dummy variable being equal to 1 if CEO of a firm in a given year was different from CEO in the previous year. Otherwise it is attributed 0.

Stata command:

xtivreg2 Tobinsq ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO (FDiv = CEO) , fe first endog(FDiv)

Result from *Stata 12.0*:

Table 45: Two-stage least squares (2SLS) regression results for firm value function

IV (2SLS) estimation
Estimates efficient for homoscedasticity only
Statistics consistent for homoscedasticity only

		Number of obs	= 560
		F(11, 479)	= 8.30
		Prob > F	= 0.0000
Total (centered) SS	= 325.6530429	Centered R2	= -0.9703
Total (uncentered) SS	= 325.6530429	Uncentered R2	= -0.9703
Residual SS	= 641.6180277	Root MSE	= 1.144

Tobinsq	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
FDiv	12.528	35.950	0.350	0.727	-57.934	82.989
ESO	-0.185	0.516	-0.360	0.719	-1.196	0.825
EXO	10.475	15.333	0.680	0.495	-19.578	40.527
BLKO	-0.640	3.044	-0.210	0.834	-6.606	5.326
BCOM	0.773	1.710	0.450	0.651	-2.580	4.125
DUAL	0.065	0.313	0.210	0.836	-0.549	0.679
FCFDum	0.045	0.145	0.310	0.754	-0.239	0.330
ROA	2.411	0.884	2.730	0.006	0.678	4.144
SIZE	-0.797	0.124	-6.410	0.000	-1.040	-0.553
LEV	1.858	0.789	2.350	0.019	0.311	3.404
StaO	5.812	8.170	0.710	0.477	-10.200	21.825

Underidentification test (Anderson canon. corr. LM statistic): 0.164
Chi-sq(1) P-val = 0.6856

Weak identification test (Cragg-Donald Wald F statistic): 0.160
Stock-Yogo weak ID test critical values: 10% maximal IV size 16.38
15% maximal IV size 8.96
20% maximal IV size 6.66
25% maximal IV size 5.53
Source: Stock-Yogo (2005). Reproduced by permission.

Sargan statistic (overidentification test of all instruments): 0.000
(equation exactly identified)

-endog- option:
Endogeneity test of endogenous regressors: 0.355
Chi-sq(1) P-val = 0.5514
Regressors tested: FDiv

Instrumented: FDiv
Included instruments: ESO EXO BLKO BCOM DUAL FCFDum ROA SIZE LEV StaO
Excluded instruments: Change of CEO

(Source: Stata 12.0 Output File)

In the Table 45, the first important test is the Sargan-Hansen test. It is an over-identification test of all instruments. In this test, the null hypothesis is that the instrumental variable (*change of CEO)* is a valid instrument that is uncorrelated with the error term. Because p-value is 0.000, null hypothesis is rejected. This shows that the instrumental

variable (*change of CEO)* is not a valid instrument for the analysis. Langrange Multiplier test is the second essential test. It is an under-identification test of whether the equation is under-identified when admitting the correlation between the instrumental variable (*change of CEO)* and the endogenous regressor (FDiv). Under this test, p-value (0.686) indicates the acceptance of null hypothesis. This means that the instrumental variable (*change of CEO)* is not relevant in this case. Thus, *change of CEO* is irrelevant and invalid instrument.

Furthermore, the purpose of endogeneity test in Table 45 is to examine whether *Diversification level (FDiv)* is an endogenous regressor or not. Null hypothesis of this test is that FDiv can be treated as an exogenous variable. The result from the Table 45 shows that we should accept the null hypothesis because of high p-value (0.551). This finding creates more confidence for the author on the results in the Table 44.

To sum up, this research did not find the significant relationship between unrelated diversification level and firm value at 5% level of significance when the correlation coefficient of FDiv and Tobinsq was 0.492 with p-value at 0.18 (Table 44). **Hypothesis 4** would be also rejected in this study.

Although insignificant p-value existed, this positive correlation coefficient raises the doubt about the negative effect of conglomerate diversification on firm value as several authors mentioned in the literature. Thus, this study continues to run regression for two sets of data. The first set of data consists of 30 companies having 8-year average diversification levels greater than the average diversification level of total beginning sample (0.164). The second set comprises 40 remaining companies corresponding to 320 observations with low 8-year average diversification levels. Three regression methods (Pooled OLS regression, FEM and REM) are applied for each set of data to test the effect of diversification on firm value. The results are shown in the Table 46.

Clearly, it can be seen that although all p-values are insignificant, the correlation coefficient of FDiv and Tobinsq changes from positive direction in the sample of 40 firms with low diversification level to negative direction in case of companies with high diversification level. This change happened in all three applied methods. This proves that the negative impact of unrelated diversification on firm value seems to be true only when

unrelated diversification reaches to a certain level. In this study, the direction of its effect changed when diversification level was over the sample mean (0.164).

Table 46: Regression results on the relationship between diversification and firm value for two set of data (30 firms with high diversification levels and 40 firms with low ones)

FDiv → Tobinsq	**Case 1: Firms with low diversification level**			**Case 2: Firms with high diversification level**		
	Pooled OLS	**FEM**	**REM**	**Pooled OLS**	**FEM**	**REM**
Coef.	0.893	2.288	1.108	-0.189	-0.348	-0.257
Std. Err.	0.792	0.885	0.855	0.256	0.315	0.275
p-value	0.260	0.010	0.195	0.461	0.271	0.350
Number of obs	320	320	320	240	240	240

(Source: own creation thanks to Stata 12.0)

6.6 Chapter summary

This chapter was divided into two parts. The first part described in depth 12 variables (Firm diversification, Tobin's *q*, Executive stock options, Executive ownership, Blockholder ownership, Board composition, Duality in position, Free cash flow dummy, Firm accounting performance (Return on Assets), Firm size, Firm leverage and State ownership).

There were some noticeable features discovered in the research. Firstly, the average diversification level of listed firms in Vietnam was rather low at less than 0.2 and was quite stable over time during 8 years from 2007 to 2014 although in terms of cross section, there was unevenness in 8-year average diversification levels among 70 companies. This might be a good signal for Vietnam's economy with high concentration in business lines of listed companies. Interestingly, it was found that concentric diversification strategy was also more preferable than conglomerate one in other nations such as the United States or Korea. Secondly, more than 70% of total companies in the sample were over-valued with 8-year average Tobin's *q* ratios larger than 1. This feature can emphasize the attractiveness of Vietnamese stock markets to potential investors. Lastly, regarding corporate governance mechanisms, this study found that most firms limited the proportion of executive ownership below 5% and preferred the separation of the CEO position from the role of the chairman.

This shows that the firms in Vietnam might be aware of the importance of preventing agency conflicts between the agents and the principals. However, the majority of firms had the number of independent directors less than one-third of the total number of directors in their boards. This leads to some doubts about the true effectiveness of control devices of corporate governance in the firms in Vietnam.

The second part was finding out the relationships between corporate governance mechanisms and unrelated diversification level without and with the moderation of free cash flow as well as the effect of diversification on firm value through different regression techniques for panel data in the sample.

The results showed that only two considered corporate governance mechanisms had effects on diversification levels in opposite directions: negative to Executive ownership and positive to Blockholder ownership. Therefore, in case of Vietnam, it is expected that in order to reduce diversification level of shareholding firms, the principals should create conditions for increasing managerial ownership, or decreasing blockholder ownership in the firms. Additionally, there were no evidences to confirm this moderation of free cash flow on the relations between corporate governance and diversification in this country.

In terms of the impact of diversification on firm value, this study did not find the significant relation between unrelated diversification level and firm value at 5% level of significance. However the negative direction of the correlation coefficients of firm diversification and Tobin's *q* to the sample of 30 firms with high diversification levels (that are greater than 0.164) can be a good reference for future researches. The researches afterwards can retest this relationship in periods different from the period 2007 - 2014 or through a larger sample size than that in this study.

CHAPTER 7: SUMMARY AND CONCLUSION

7.1 Introduction

This chapter firstly summarizes main ideas the author discovered throughout the dissertation that consist of corporate governance characteristics, applied level of conglomerate diversification strategy, relationships between corporate governance mechanisms and unrelated diversification level, and the effectiveness of conglomerate diversification strategy in Vietnam. After that, it highlights its substantial contributions to the current state of this topic, and also indicates its limitations and directions for future researches.

7.2 Summary

7.2.1 Summary of corporate governance characteristics of listed companies in Vietnam

In Vietnam, one noticeable and important feature of the ownership setting of listed companies is that Vietnamese State exists in the role of a large shareholder in a majority of firms. It is not surprising when the average blockholder ownership of listed firms in the sample was really high (at 49 percent of the total shares), when there were more than two third of these companies where Vietnamese State was one of the blockholders, and when the average percentage of shares owned by Vietnamese State for each firm was 29.4%. This fact results from characteristics of the economic development in Vietnam. With the target of internationally economic integration in the era of economic development, the process of equitization was extended more and more in Vietnam from the year of 2000 onwards after its first presentation in mid-1992. However it was argued that this process had a lot of inadequacy during the time it happened. Most equitized State-owned enterprises were small enterprises and still let the State possess a controlling share (Sjöholm, 2006 and Nguyen Duc Do, 2016). It is undeniable that these problems constrained economic growth in Vietnam because the growth rate of State sector was proved to be much lower than most other sectors such as private sector and foreign investment sector (Table 47).

Because State ownership exists in the ownership structure of the majority of listed companies in Vietnam, corporate governance systems of the firms will be affected. The principals in the firms with large State ownership usually have psychological dependence on the State; they think that whatever they do will receive the support for the State. That is the

reason why the principals in these companies are expected to make decisions towards protecting their own interest through increasing control devices in corporate governance system to monitor self-interested actions of the agents or prevent moral hazard problems rather than adding devices to align their interest with the interest of the agents. This expectation is confirmed by the results about corporate governance features of Vietnamese listed companies during the period from 2007 to 2014 in the sample.

Table 47: Growth rate of economic sectors in Vietnam during the period 2005-2015 (%)

	2005	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**Average**
Total	7.55	6.98	7.13	5.66	5.40	6.42	6.24	5.25	5.42	5.98	6.68	6.24
State sector	7.37	6.17	5.91	4.36	3.99	4.64	4.79	5.80	4.76	4.05	5.37	5.20
Non-public sector	6.03	5.29	6.03	5.82	6.63	7.08	7.93	6.01	4.73	5.85	6.32	6.15
Collective sector	3.98	3.51	3.32	3.01	2.85	3.32	4.83	4.38	4.63	4.58	5.97	3.96
Private sector	14.01	14.85	15.73	10.97	9.43	8.46	8.44	8.02	6.05	6.75	8.42	10.10
Individual sector	4.63	3.30	3.92	4.79	6.40	7.27	8.21	5.77	4.45	5.80	5.97	5.50
Foreign investment sector	13.22	14.33	13.04	7.85	4.81	8.07	7.69	7.42	7.86	8.45	10.71	9.40

(Source: General Statistics Office of Vietnam cited in Nguyen Duc Do, 2016)

First of all, interest alignment devices of corporate governance, including *Executive ownership* and *Executive stock options*, were not favored by most listed companies. The study results showed that most firms in the sample limited the ownership of the executives by providing the number of shares to the executives less than 5% of the total issued shares in order to avoid the situation that the managers would abuse their power to pursue value-reducing strategies. In addition, the *Stock options* tool seems to be not applied popularly with the role of an interest alignment device of corporate governance to align the interests between the principals and the agents in listed firms in Vietnam when the proportion of observations with Executive stock options in the sample was almost similar to that without Executive stock options.

Contrarily, most listed companies in Vietnam put an emphasis on control devices of corporate governance. They preferred the separation of the CEO position from the role of the chairman to promote board independence. Furthermore, they allowed blockholder ownership reaching at very high levels (greater than 50 percent of total shares).

However one shortcoming of internal corporate governance system of listed firms in Vietnam might be the less conformity of regulations governing corporate governance from listed firms in the article of independent directors. Although the Circular No. 121/2012/TT-BTC of Vietnamese Ministry of Finance regulated that at least one-third of the total members in the Board of Directors must be independent, most listed firms in the sample did not comply with this regulation. This results in a doubt about the effectiveness of this control device in the firms.

7.2.2 Summary of applied level of conglomerate diversification strategy and firm value, measured by Tobin's *q*, of listed companies in Vietnam

On the average, diversification level of Vietnamese listed firms in the sample was quite low at less than 0.2. Only three among 70 companies had unrelated diversification level greater than 0.5. Moreover this figure was rather stable over time when it fluctuated in a small range between 0.155 and 0.180 during 8 years from 2007 to 2014. This shows a good signal for Vietnam's economy with high concentration in business lines of listed shareholding companies. The firms preferred concentric diversification strategy to conglomerate diversification strategy. Interestingly, this fact seems to similar to the United State in the period 1994 – 1999 or Korea over the years from 1999 to 2005 when the extents of unrelated diversification calculated by Berry Herfindahl index were also relatively low (0.25 and 0.1831 correspondingly) (Table 21).

In terms of firm value, measured by Tobin's *q*, of listed companies in Vietnam, it can be seen that nearly 70% of the companies in the sample were over-valued with 8-year average Tobin's *q* ratios larger than 1; and the average Tobin's *q* for each company was 1.271. This might be a good signal promising the potential growth of Vietnam's economy and encouraging new investments from entrepreneurs.

Unfortunately, one discovered disadvantage was that there has been no unification in disclosing information on industrial taxonomy of listed companies in Vietnam. Different sources (Decision No. 10/2007/QĐ-TTg of the Prime Minister, Ho Chi Minh Stock Exchange – HOSE and Ha Noi Stock Exchange - HNX) have different classifications. This leaded to difficulties for researchers who wanted to investigate the application of diversification strategy of Vietnamese corporations according to a unified industrial taxonomy compared with the popular industrial taxonomies in the world. Thus, in order to create an integrated business environment, decision-makers of HOSE and HNX should change their current industrial taxonomies for listed firms towards the classification as Decision No. 10/2007/QĐ-TTg of the Prime Minister regulated.

7.2.3 Summary of confirmation of hypotheses in the research

Two tables (Table 48 and Table 49) are created to light up main results of the study.

Table 48: Confirmation of hypotheses in the study

Hypothesis	Accept/Reject
Hypothesis 1: The more interest alignment devices are used, the lower the extent of conglomerate diversification will be	- Accept if the interest alignment device is increasing executive ownership - Reject if the interest alignment device is providing stock options
Hypothesis 2: The more control devices are applied, the lower the extent of conglomerate diversification will be	Reject
Hypothesis 3: The effect of each internal corporate governance mechanism on diversification level of a firm is different between high and low free cash flow	Reject
Hypothesis 4: The higher unrelated diversification level of a firm is, the lower the firm value becomes	Reject

(Source: own creation)

Table 49: Comparison between anticipated relations and results in the study

Relation between				**Anticipated**	**Actual**
Diversification level		and	Firm value through Tobin's *q*	Negative	Not significant
Corporate governance		and	diversification	Negative	Negative / Positive / Not significant depending on the type of interest alignment device or control device
Corporate governance devices	Corporate governance characteristics				
Interest alignment devices	*Executive stock option (ESO)*	*and*	*diversification*	*Negative*	*Not significant*
	Executive ownership (EXO)	*and*	*diversification*	*Negative*	*Negative*
Control devices	*Blockholder ownership (BLKO)*	*and*	*diversification*	*Negative*	*Positive*
	Board composition (BCOM)	*and*	*diversification*	*Negative*	*Not significant*
	Duality in position (DUAL)	*and*	*diversification*	*Negative*	*Not significant*

(Source: own creation)

Among four hypotheses, the testing result of Hypothesis 4 seems to be most noticeable in this study. Hypothesis 1, 2 and 3 were established based on the support of agency theory and the assumption that unrelated diversification is indeed a value-reducing strategy as the arguments of several previous researchers such as Berger & Ofek (1995), Amihud & Lev (1999) or Martin & Sayrak (2003). However, in fact, when testing on a sample of listed firms in Vietnam during the period from 2007 to 2014, there were no statistical evidences to assert the negative relationship between unrelated diversification level and firm value through Tobin's *q* at 5% significant level. Hypothesis 4 is rejected. The reason may be that during

these periods, unrelated diversification levels of listed companies were too low with the average diversification level for each company at 0.164. With such low levels of unrelated diversification at the present, it may be not absolutely bad, or even good, for the firms if they decide to be diversified more into new unrelated industries. Therefore, agency theory can not be used to explain the relationship between corporate governance and diversification in case of Vietnam currently because we are not sure about non-benefits of unrelated diversification strategy.

Returning to the first three hypotheses, the acceptance or rejection of Hypothesis 1 depends on which interest alignment device the firm applied. The results show that if the interest alignment device is increasing executive ownership for CEOs, this hypothesis will be accepted. Nonetheless, it will be rejected when considering stock options as an interest alignment device.

Regarding Executive ownership (EXO), a negative relationship between executive ownership and diversification level was found in the research that is consistent with previous empirical studies in the U.S. of Hill & Snell (1988) and of Denis et al. (1997). The higher the percentage of managerial ownership becomes, the less likely managers are to pursue conglomerate diversification strategy. It can be explained that executives are responsible for managing the firm according to the tasks that the Board of Directors assigned in limitative resources such as capital and labor resources; so they would know perfectly well about the strengths as well as weaknesses of the company. They might understand that if they make investments in various unrelated business fields under a limitation of resources, it will be hard for them to succeed in assigned tasks. Therefore, executives would tend to prefer concentration strategy and concentric diversification strategy to conglomerate diversification strategy. This trend is more confirmed when managers receive higher ownership because at that time, their benefits are more attached to the benefits of the whole company.

Considering Executive stock options (ESO), the research found an insignificant relationship between executive stock options and diversification level at 5% level of significance. This result is consistent with the researches' results of Goranova et al. (2007) in the U.S. and Castaner & Kavadis (2013) in France. In general, the *Stock options* tool was not applied popularly in listed firms in Vietnam. This might be the reason why this tool could not fulfil its role as a corporate governance mechanism influencing diversification levels of the firms.

Hypothesis 2 is not supported for all three control devices: level of blockholder ownership (BLKO), board composition (BCOM), and separation in duality in position (DUAL) in this study because a positive connection between blockholder ownership and diversification, and insignificant relations between two other control devices (Board composition and Duality in position) and the extent of diversification were realized at 0.05 level of significance.

Before mentioning the link between blockholder ownership and diversification, the author will analyze the effect of State ownership (StaO) on diversification because among 70 listed companies, Vietnamese State was one of the blockholders in 54 firms during eight years, from 2007 to 2014. This study discovered the negative relationship between State ownership and diversification. Holding other explanatory variables constant, when State ownership rose by 1 percent, the diversification level was expected to decrease by around 0.2 at less than 0.05 level of significance. This result is opposite to the suggestion of Delios et al. (2008) when they argued that Chinese government preferred product diversification to give loss-making corporations more opportunities as well as to keep down unemployment in China. Contrary to the circumstance of China, State enterprises in Vietnam might be very cautious about expanding their business and product lines. A negative connection between State ownership and Diversification showed that in order to avoid risks, firms had a large amount of shares owned by the State tended to adopt other growth strategies such as vertical growth, horizontal growth or concentric diversification instead of conglomerate diversification strategy.

Interestingly, blockholder ownership affected diversification level positively in the sample of Vietnam. On the average, the blockholder ownership in each firm accounted for 49 percent of the total shares whereas the percentage of State ownership was 29.4. This fact reflected that beside the State, there were other types of large shareholders in firms such as individual and institutional investors. These large shareholders took risks by confronting moral hazard problems as favoring unrelated diversification strategy. Perhaps they expected to the growth of the firms through this strategy in the future in a developing market like Vietnam.

Next proxy of control device is Board composition (BCOM). Similar to the researches of Singh et al. (2004), Kim & Chen (2010) and Goranova et al. (2007), this study found the statistically non-significant affect of board composition on diversification. In terms of the

remaining variable reflecting the effectiveness of control devices on diversification, Duality in position (DUAL), it was found that although Goranova et al. (2007) and Castaner & Kavadis (2013) proposed positive impact of CEO duality on total diversification, there were no evidences to confirm this relationship in this research because p-values in the models were all larger than 0.1.

As regards Hypothesis 3, all coefficients of five interaction terms (FCFESO, FCFEXO, FCFBLKO, FCFBCOM and FCFDUAL) in Model 2 were insignificant at 0.05 level, and Wald test proved that the coefficients for these five interactions could be simultaneously equal to zero, would be accepted at 5% significance level. Thus, there were no evidences to support the argument that at high free cash flow, the effect of each internal corporate governance mechanism on diversification level was different from that at low free cash flow. Hypothesis 3 is also rejected in the study.

7.2 Conclusion

In conclusion, this research concentrated on the relationships between internal corporate governance mechanisms and diversification level in Vietnam. From the research's results, it is expected that in order to reduce diversification level of shareholding firms in Vietnam, the principals can increase ownership of executives, decrease blockholder ownership, or rise the shares the State owned in the firms. Interestingly, the agency theory could not be used to explain the relationship between corporate governance and diversification in case of Vietnam because we were not sure about disadvantages of conglomerate diversification strategy. From 2007 to 2014, the average diversification level for each listed firm in Vietnam was quite low, less than 0.2. Thus, diversifying into new industries that are rather different from the core industries can bring not only challenges but also opportunities for the firms in this country in the current era of globalization. Furthermore, when looking at the negative direction of the correlation coefficients of firm diversification and Tobin's q to the sample of 30 firms with high diversification levels in comparison with positive correlation coefficients in the sample of 40 firms with low extent of diversification, it is recommended that implementing conglomerate diversification strategy of a company should be revised when unrelated diversification level reaches to a certain maximum amount that will make this strategy become counter-productive as the expectation of the principals.

The research makes several invaluable contributions to the current literature on relationships among corporate governance, firm diversification, and value of diversified firms.

Firstly, the link between corporate governance and diversification has been studied in some developed countries such as the U.S., Sweden and France, or in few advanced emerging markets like Korea and Taiwan. This research can be considered as a contribution to the related topic with an example of Vietnam, a developing country in Asia.

Secondly, there was no unification in the results showing the relationships between corporate governance mechanisms and corporate diversification among previous studies (Table 2). This research continues to contribute to this non-unification when its results were also different from most prior studies. Table 50 shows a comparison of research results in this study versus in earlier ones. These dissimilarities can be explained by the differences in socio-political-economic conditions between different nations as well as the differences in selected measurements for variables from researchers.

Thirdly, it seems to be the second research that follows the study of Castaner & Kavadis (2013) on the moderation of free cash flow to the effects of corporate governance on diversification. Unfortunately, this moderation was not confirmed statistically in this study. This calls for studies afterwards continuing this research topic in other countries so that a general conclusion can be drawn in the future.

Moreover, it proves a fact that the agency theory is not always suitable to use in explaining the relations between corporate governance and diversification. Among prior studies on the effects of corporate governance mechanisms on diversification, some authors supported the application of the agency theory but some others did not. For example, while Denis et al. (1997) used the agency theory to explain the negative impact of managerial ownership on diversification, Kim & Chen (2010) ignored the theory to this relationship because of a positive connection they found; or in the study of Goranova et al. (2007), they could not support the agency theory to an insignificant link between board composition and diversification. In case Vietnam in the research, the agency theory could not be used to explain the relationship between corporate governance and diversification because despite a negative effect of executive ownership on the extent of diversification being discovered in

listed firms in Vietnam, in-effectiveness of conglomerate diversification strategy did not confirmed.

Table 50: A comparison of research results in this study versus in previous studies

Dependent variable	Independent variable	Relationship	Country	Source
Diversification level	Managerial ownership	Negative	U.S	Hill & Snell (1988)
		Negative	U.S.	Denis et al. (1997)
		Positive	U.S.	Singh et al. (2004)
		Positive	Korea	Kim & Chen (2010)
		Negative	**Vietnam**	**This study**
	Executive stock options	Not significant	U.S	Goranova et al. (2007)
		Not significant	France	Castaner & Kavadis (2013)
		Not significant	**Vietnam**	**This study**
Diversification level	Blockholder ownership	Negative	U.S	Hill & Snell (1988
		Negative	U.S.	Denis et al. (1997)
		Not significant	U.S.	Singh et al. (2004)
		Positive	**Vietnam**	**This study**
	Board composition	Not significant	U.S.	Singh et al. (2004)
		Not significant	U.S.	Goranova et al. (2007)
		Not significant	Korea	Kim & Chen (2010)
		Positive (At low levels of free cash flow)	France	Castaner & Kavadis (2013)
		Not significant	**Vietnam**	**This study**
	Duality in position	Positive	U.S.	Goranova et al. (2007)
		Positive (At high levels of free cash flow)	France	Castaner & Kavadis (2013)
		Not significant	**Vietnam**	**This study**
Firm value	Diversification level	Negative	U.S.	Berger & Ofek (1995)
		Negative	U.S.	Amihud & Lev (1999)
		Negative	U.S.	Martin & Sayrak (2003)
		Not significant	**Vietnam**	**This study**

(Source: own creation)

Finally, the research makes a theoretical contribution to the topic of the effectiveness of conglomerate diversification strategy. Although most previous studies supported that unrelated diversification strategy was a value-reducing strategy, an insignificant relationship between diversification level and firm value, measured by Tobin's *q*, was found in this study. However, one noticeable exploration was that the correlation coefficient of the extent of diversification and Tobin's *q* changed from positive direction in the sample of the firms with low diversification level to negative direction in case of companies with high diversification level. Achieved results were rather similar to the study of Lien & Li (2013) when they realized that a diversification strategy contributed positively to performance of Taiwanese firms until the diversification level reached to its peak; over this peak, the effect would be negative. From the evidences of this research and of Lien & Li (2013), it is suggested that there would be a certain level of unrelated diversification at which the direction of the effect would change from positive to negative. Hence, it would be important for a firm to catch this maximum level so that it can prevent counter-productive effects of the conglomerate diversification strategy.

In addition to invaluable contributions to the current literature on this topic, the research also can be a useful reference for not only investors, managers but also for policy makers in Vietnam. As far as the author knows, this study is the first one exploring the relations among corporate governance, diversification and firm value in Vietnam where the topics related to effectiveness of corporate governance mechanisms to public companies has been more and more attractive to researchers since the default of Vietnam Shipbuilding Industry Group (Vinashin) in 2010 happened and the Circular No. 121/2012/TT-BTC on 26th July, 2012 of Vietnamese Ministry of Finance was issued with regulations on corporate governance applicable to lists firms in this country.

It is noticeable that the research results can be helpful for all types of investors including individual, institutional and state investors, or domestic and foreign investors, who are interested in business environment of Vietnam. They can have an overview of diversification levels as well as corporate governance features of listed companies in Vietnam during the period from 2007 to 2014. Additionally, the investors and managers can understand the determinants of diversification level and particularly, the relations between corporate governance and diversification. From that, the investors or stockholders will be able to reach

wise decisions in order to minimize agency costs and maximize their own benefits; and the managers can identify the purposes of the principals when these principals adjust diversification levels through internal corporate governance mechanisms.

The research results may be also important to policy makers in Vietnam as well. Vietnamese State was the large stockholder in the majority of listed firms. Thus the development of stock markets in Vietnam will mainly depend on State management. If the State does not manage effectively, other circumstances that are similar to the default of Vinashin will repeat. Hence, Vietnamese State should be very cautious in approving large-scale projects to the firms with high State ownership. Moreover, policy makers can realize less conformity of regulations governing corporate governance from listed firms in the article of independent directors when most firms had the number of independent directors less than one-third of the total number of directors in their boards. For that reason, policy markets should impose stricter sanctions for the firms that does not comply with the regulations on corporate governance as stated in the Circular No. 121/2012/TT-BTC with the aim of protecting outside investors in Vietnamese financial market.

7.3 Research Limitations and Future Research

In addition to obtained values, this study also has limitations. Firstly, because unavailability of data on CEO compensation, one of important interest alignment devices, during the periods from 2007 to 2014, the author could not assess the influence of CEO compensation on diversification of listed firms. Secondly, the study chose only one method to measure diversification level due to lack of information. Further researches should apply various ways to measure diversification such as Entropy (Palepu, 1985), Rumelt's classification (Rumelt, 1974) or Broad and narrow spectrum diversity (Varadarajan and Ramanujam, 1987) to test whether the findings will change when the measurement of diversification varies. Finally, the sample size of this research was 70 listed companies over the periods 2007 – 2014. This sample was not too large among the total of 134 listed firms that have listing dates from 2006 onwards. Thus, forthcoming researches can re-test similar relationships among corporate governance, diversification and firm value in other sampling frames. For instance, non-listed shareholding companies in Vietnam can be selected or the

new sample frame will be listed firms during the period from 2015 to 2020 when the new Enterprise Law No. 68/2014/QH13 takes effect.

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APPENDIX

Appendix 1: A list of 21 sectors and 88 divisions according to industrial taxonomy in Vietnam

Level 1	Level 2	BRANCH
A		**Agriculture, Forestry and Fishing**
	01	Agriculture and related services activities
	02	Forestry and related services activities
	03	Fishing and aquaculture
B		**Mining and quarrying**
	05	Mining of coal and lignite
	06	Extraction of crude petroleum and natural gas
	07	Mining of metal ores
	08	Other mining and quarrying
	09	Mining support service activities
C		**Manufacturing**
	10	Manufacture of food products
	11	Manufacture of beverages
	12	Manufacture of tobacco products
	13	Manufacture of textiles
	14	Manufacture of wearing apparel
	15	Manufacture of leather and related products
	16	Manufacture of wood and of products of wood and cork, except for beds, wardrobes, tables, chairs; manufacture of articles of straw and plaiting materials
	17	Producing paper and paper products
	18	Printing and reproduction of recorded media
	19	Manufacture of coke and refined petroleum products
	20	Manufacture of chemicals and chemical products
	21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
	22	Manufacture of rubber and plastics products
	23	Manufacture of other non-metallic mineral products
	24	Manufacture of basic metals
	25	Manufacture of fabricated metal products, except machinery and equipment
	26	Manufacture of computer, electronic and optical products
	27	Manufacture of electrical equipment

	28	Manufacture of machinery and equipment n.e.c.
	29	Manufacture of motor vehicles, trailers and semi-trailers
	30	Manufacture of other transport equipment
	31	Manufacture of beds, wardrobes, tables, chairs
	32	Other manufacturing
	33	Repair and installation of machinery and equipment
D		**Electricity, gas, steam and air conditioning supply**
	35	Electricity, gas, steam and air conditioning supply
E		**Water supply; sewerage, waste management and remediation activities**
	36	Water collection, treatment and supply
	37	Sewerage
	38	Waste collection, treatment and disposal activities; materials recovery
	39	Remediation activities and other waste management services
F		**Construction**
	41	Construction of buildings
	42	Civil engineering
	43	Specialized construction activities
G		**Wholesale and retail trade; repair of automobiles, motors, motorbikes and other motor vehicles**
	45	Sale, repair of automobiles, motors, motorbikes and other motor vehicles
	46	Wholesale trade, except of automobiles, motors, motorbikes and other motor vehicles
	47	Retail trade, except of automobiles, motors, motorbikes and other motor vehicles
H		**Transportation and storage**
	49	Land transport and transport via pipelines
	50	Water transport
	51	Air transport
	52	Warehousing and support activities for transportation
	53	Postal and courier activities
I		**Accommodation and food service activities**
	55	Accommodation
	56	Food and beverage service activities
J		**Information and communication**
	58	Publishing activities

	59	Motion picture, video and television program production, sound recording and music publishing activities
	60	Programming and broadcasting activities
	61	Telecommunications
	62	Computer programming, consultancy and related activities
	63	Information service activities
K		**Financial, banking and insurance activities**
	64	Financial service activities, except insurance and pension funding
	65	Insurance, reinsurance and pension funding, except compulsory social security
	66	Other financial activities
L		**Real estate activities**
	68	Real estate activities
M		**Professional, scientific and technical activities**
	69	Legal and accounting, and auditing activities
	70	Activities of head offices; management consultancy activities
	71	Architectural and engineering activities; technical testing and analysis
	72	Scientific research and development
	73	Advertising and market research
	74	Other professional, scientific and technical activities
	75	Veterinary activities
N		**Administrative and support service activities**
	77	Leasing activities of machines, equipment (without operator); of household or personal tools; of intangible non-financial assets
	78	Employment activities
	79	Travel agency, tour operator, reservation service and related activities
	80	Security and investigation activities
	81	Services to buildings and landscape activities
	82	Office administrative, office support and other business support activities
O		**Activities of the Communist Party, of political-societal organizations; public administration, defence, and compulsory social security activities**
	84	Activities of the Communist Party, of political-societal organizations; public administration, defence, and compulsory social security activities
P		**Education and Training**
	85	Education and Training

Q		**Human health and social work activities**
	86	Human health activities
	87	Residential care activities
	88	Social work activities without accommodation
R		**Arts, entertainment and recreation**
	90	Creative, arts and entertainment activities
	91	Libraries, archives, museums and other cultural activities
	92	Lottery, gambling and betting activities
	93	Sports activities and amusement and recreation activities
S		**Other service activities**
	94	Activities of membership organizations
	95	Repair of computers and personal and household goods
	96	Other personal service activities
T		**Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use**
	97	Activities of households as employers of domestic personnel
	98	Undifferentiated goods- and services-producing activities of private households for own use
U		**Activities of extraterritorial organizations and bodies**
	99	Activities of extraterritorial organizations and bodies
Total: 21	**Total: 88**	

(Source: Decision No. 10/2007/QĐ-TTg of the Prime Minister on 23rd January 2007)

Appendix 2: Basic information of 70 selected firms in the sample from two stock markets in Viet Nam
(Data were updated until 27th September 2015)

No.	Stock code	Stock market	Name of company	Listing date	Market capitalization (VND)	Listing registration volume (Share)	Outstanding volume (Share)
1	ABT	HOSE	Bentre Aquaproduct Import And Export Joint Stock Company	12-Jun-2006	592,108,735,500	14,107,207	11,497,257
2	AGF	HOSE	Angiang Fisheries Import & Export Joint Stock Company	26-Apr-2002	497,540,000,000	28,109,743	28,109,743
3	BMC	HOSE	Binh Dinh Minerals Joint Stock Company	12-Dec-2006	195,803,554,000	12,392,630	12,392,630
4	BMP	HOSE	Binh Minh Plastics Joint Stock Company	12-Jun-2006	4,957,154,320,000	45,478,480	45,478,480
5	BT6	HOSE	Beton 6 Corporation	12-Apr-2002	194,661,945,000	32,993,550	32,993,550
6	CII	HOSE	Hochiminh City Infrastructure Investment Joint Stock Company	24-Feb-2006	4,721,258,915,400	212,439,138	202,629,138
7	CLC	HOSE	Cat Loi Joint Stock Company	18-Oct-2006	484,841,710,000	13,103,830	13,103,830
8	COM	HOSE	Materials Petroleum Joint Stock Company	12-May-2006	543,644,178,000	14,120,628	14,120,628
9	CYC	HOSE	Chang Yih Ceramic Joint Stock Company	21-Jun-2006	28,948,560,000	1,990,530	9,046,425
10	DHA	HOSE	Hoa An Joint Stock Company	12-Apr-2004	256,040,621,000	15,119,946	15,061,213
11	DHG	HOSE	DHG Pharmaceutical Joint Stock Company	1-Dec-2006	5,694,697,725,000	87,164,330	86,941,950
12	DMC	HOSE	Domesco Medical Import Export Joint Stock Corporation	4-Dec-2006	1,031,152,564,200	26,713,797	26,713,797
13	DTT	HOSE	Do Thanh Technology Corporation	6-Dec-2006	63,580,000,000	8,151,820	8,151,820
14	FMC	HOSE	Sao Ta Foods Joint Stock Company	20-Oct-2006	484,000,000,000	20,000,000	20,000,000
15	FPT	HOSE	FPT Corporation	21-Nov-2006	17,845,471,953,600	397,531,640	397,449,264
16	HAS	HOSE	HACISCO Joint Stock Company	18-Dec-2002	38,220,000,000	8,000,000	7,800,000
17	HAX	HOSE	Hang Xanh Motors Service Joint Stock Company	13-Dec-2006	122,277,859,000	11,116,169	11,116,169
18	HBC	HOSE	Hoa Binh Construction & Real Estate Corporation	22-Nov-2006	1,252,910,517,600	74,578,007	74,578,007
19	HMC	HOSE	Ho Chi Minh City Metal Corporation	28-Nov-2006	172,200,000,000	21,000,000	21,000,000
20	HRC	HOSE	Hoa Binh Rubber Joint Stock Company	22-Nov-2006	1,082,608,396,800	24,165,366	24,165,366
21	HTV	HOSE	Ha Tien Transport Joint Stock Company	7-Dec-2005	201,600,000,000	10,080,000	10,080,000

22	IMP	HOSE	Imexpharm Corporation	15-Nov-2006	1,189,542,750,600	28,942,646	28,942,646
23	ITA	HOSE	Tan Tao Investment and Industry Corporation	11-Jan-2006	4,359,070,648,400	838,424,849	838,282,817
24	KDC	HOSE	Kinh Do Corporation	18-Nov-2005	5,620,351,269,900	256,653,397	235,161,141
25	KHP	HOSE	Khanh Hoa Power Joint Stock Company	8-Dec-2006	484,620,681,600	41,551,296	40,051,296
26	LAF	HOSE	Long An Food Processing Export Joint Stock Company	11-Dec-2000	195,882,652,700	14,728,019	14,728,019
27	LBM	HOSE	Lam Dong Mineral and Building Material Joint Stock Company	30-Nov-2006	150,913,750,000	8,500,000	8,157,500
28	LGC	HOSE	CII Bridges and Roads Investment Joint Stock Company	29-Nov-2006	4,262,090,306,500	192,854,765	192,854,765
29	MHC	HOSE	MHC Joint Stock Company	31-Dec-2004	433,772,608,000	27,110,908	27,110,788
30	PJT	HOSE	Petrolimex Joint Stock Tanker Company	11-Dec-2006	96,273,418,200	10,817,238	10,817,238
31	PNC	HOSE	Phuong Nam Cultural Joint Stock Corporation	21-Jun-2005	146,870,000,000	11,040,241	10,799,351
32	PVD	HOSE	Petrovietnam Drilling & Well Service Corporation	15-Nov-2006	12,216,564,090,900	348,466,259	348,050,259
33	RAL	HOSE	Rangdong Light Source and Vacuum Flask Joint Stock Company	23-Oct-2006	550,850,000,000	11,500,000	11,500,000
34	REE	HOSE	Refrigeration Electrical Engineering Corporation	18-Jul-2000	6,888,135,475,200	269,070,539	269,067,792
35	SCD	HOSE	Chuong Duong Beverages Joint Stock Company	12-Nov-2006	360,299,700,000	8,500,000	8,477,640
36	SFC	HOSE	Sai Gon Fuel Joint Stock Company	16-Jun-2004	256,153,873,200	11,291,459	11,234,819
37	SFI	HOSE	Sea & Air Freight International	8-Dec-2006	300,881,790,800	10,833,089	10,823,086
38	SJD	HOSE	Can Don Hydro Power Joint Stock Company	11-Dec-2006	1,191,377,985,000	45,999,150	45,999,150
39	SSC	HOSE	Southern Seed Corporation	29-Dec-2004	730,123,699,500	14,992,367	14,930,955
40	TNA	HOSE	Thien Nam Trading Import Export Corporation	4-May-2005	299,990,100,000	8,000,000	7,999,736
41	TS4	HOSE	Seafood Joint Stock Company No4	1-Jul-2002	149,279,824,200	16,160,646	16,051,594
42	TTP	HOSE	Tan Tien Plastic Packaging Joint Stock Company	9-Nov-2006	736,718,465,000	14,999,998	13,517,770
43	TYA	HOSE	Taya (Vietnam) Electric Wire And Cable Joint Stock Company	12-Feb-2005	264,974,133,000	5,578,493	27,892,014
44	VID	HOSE	Vien Dong Investment Development Trading Corporation	12-Jul-2006	214,391,242,800	25,522,767	25,522,767
45	VIP	HOSE	Viet Nam Petroleum Transport Joint Stock Company	9-Nov-2006	614,336,640,000	63,993,400	63,993,400
46	VIS	HOSE	Viet Nam – Italy Steel Joint Stock Company	7-Dec-2006	359,307,912,600	49,220,262	49,220,262

47	VNM	HOSE	Viet Nam Dairy Products Joint Stock Company	28-Dec-2005	121,214,079,198,000	1,200,662,193	1,200,139,398
48	VPK	HOSE	Vegetable Oil Packing Joint Stock Company	16-Nov-2006	204,000,000,000	8,000,000	8,000,000
49	BVS	HNX	Bao Viet Securities Joint Stock Company	18-Dec-2006	953,287,328,400	72,233,937	72,218,737
50	CJC	HNX	Central Area Electrical Mechanical JSC	14-Dec-2006	56,000,000,000	2,000,000	2,000,000
51	CMC	HNX	CMC Investment JSC	11-Dec-2006	20,524,725,000	4,561,050	4,561,050
52	MEC	HNX	Song Da Mechanical - Assembling Joint Stock Company	14-Dec-2006	43,316,000,000	7,735,000	7,735,000
53	NTP	HNX	Tien Phong Plastic JSC	11-Dec-2006	2,912,735,465,000	61,973,095	61,973,095
54	PLC	HNX	Petrolimex Petrochemical Corporation -JSC	27-Dec-2006	2,755,197,000,600	80,798,839	80,797,566
55	PPG	HNX	Phu Phong Corporation	20-Dec-2006	12,706,560,000	7,342,500	7,059,200
56	PSC	HNX	Petrolimex Saigon Transportation and Service JSC	29-Dec-2006	71,280,000,000	7,200,000	7,200,000
57	SD5	HNX	Song Da No. 5 JSC	27-Dec-2006	410,797,598,400	25,999,848	25,999,848
58	SD6	HNX	Song Da No 6 JSC	25-Dec-2006	452,030,943,000	34,771,611	34,771,611
59	SD7	HNX	Songda 7 JSC	27-Dec-2006	99,000,000,000	9,000,000	9,000,000
60	SDT	HNX	Song Da No 10 JSC	14-Dec-2006	606,798,816,200	42,732,311	42,732,311
61	SJE	HNX	Song Da No. 11 JSC	14-Dec-2006	307,312,593,000	11,553,105	11,553,105
62	STP	HNX	Song Da Industry Trade Joint Stock Company	9-Oct-2006	45,498,750,000	7,000,000	6,066,500
63	TKU	HNX	Tung Kuang Industrial JSC	26-Jun-2006	300,355,730,000	4,151,325	30,035,573
64	TPH	HNX	Hanoi Textbooks Printing JSC	15-Dec-2006	28,456,275,000	2,015,985	1,897,085
65	TXM	HNX	Vicem Gypsum and Cement Joint Stock Company	11-Dec-2006	64,400,000,000	7,000,000	7,000,000
66	VBH	HNX	Viettronics Binh Hoa JSC	29-Dec-2006	40,310,000,000	2,900,000	2,900,000
67	VFR	HNX	Transport and Chartering Corporation	28-Dec-2006	178,500,000,000	15,000,000	15,000,000
68	VNC	HNX	Vinacontrol Group Corporation	21-Dec-2006	314,986,800,000	10,499,955	10,499,560
69	VTL	HNX	Thang Long Wine JSC	14-Jul-2005	71,550,000,000	2,700,000	2,700,000
70	VTS	HNX	Viglacera Tuson JSC	20-Sep-2006	15,200,000,000	2,000,205	2,000,000

(Source: http://www.hsx.vn/, http://www.hnx.vn)

Appendix 3: Full regression result of diversification function without interactions according to FEM using LSDV estimator

Source	SS	df	MS
Model	31.1	80	0.389
Residual	3.03	480	0.006
Total	34.129	560	0.061

Number of obs = 560
F(80, 480) = 61.59
Prob > F = 0.0000
R-squared = 0.9112
Adj R-squared = 0.8964
Root MSE = 0.07945

FDiv	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ESO	0.014	0.008	1.69	0.091	-0.002	0.030
EXO	-0.425	0.097	-4.37	0.000	-0.616	-0.234
BLKO	0.084	0.034	2.46	0.014	0.017	0.150
BCOM	-0.045	0.036	-1.28	0.203	-0.115	0.025
DUAL	-0.007	0.012	-0.61	0.542	-0.031	0.016
FCFDum	0.003	0.008	0.34	0.735	-0.013	0.018
ROA	-0.005	0.060	-0.08	0.934	-0.123	0.113
SIZE	0.001	0.008	0.16	0.871	-0.014	0.017
LEV	-0.016	0.036	-0.46	0.649	-0.088	0.055
StaO	-0.224	0.092	-2.45	0.015	-0.404	-0.044
d1	0.147	0.216	0.68	0.497	-0.277	0.570
d2	0.170	0.221	0.77	0.442	-0.264	0.604
d3	0.127	0.217	0.59	0.558	-0.299	0.553
d4	0.074	0.227	0.33	0.745	-0.373	0.521
d5	0.507	0.218	2.33	0.020	0.080	0.935
d6	0.154	0.230	0.67	0.502	-0.297	0.606
d7	0.092	0.223	0.41	0.681	-0.347	0.530
d8	0.010	0.217	0.05	0.963	-0.416	0.436
d9	-0.049	0.209	-0.23	0.815	-0.460	0.362
d10	0.035	0.216	0.16	0.871	-0.389	0.459
d11	0.170	0.233	0.73	0.465	-0.287	0.627
d12	0.439	0.223	1.97	0.049	0.001	0.876
d13	0.338	0.205	1.65	0.100	-0.065	0.741
d14	-0.009	0.217	-0.04	0.967	-0.434	0.417
d15	0.341	0.240	1.42	0.157	-0.131	0.813
d16	0.344	0.212	1.62	0.106	-0.073	0.760
d17	0.242	0.209	1.16	0.248	-0.169	0.653
d18	0.141	0.224	0.63	0.529	-0.299	0.582
d19	0.090	0.229	0.39	0.696	-0.360	0.539
d20	0.053	0.227	0.23	0.816	-0.393	0.499
d21	0.081	0.218	0.37	0.712	-0.348	0.510
d22	0.251	0.222	1.13	0.257	-0.184	0.687
d23	-0.055	0.233	-0.23	0.815	-0.513	0.404
d24	0.112	0.231	0.49	0.628	-0.342	0.567
d25	0.156	0.227	0.69	0.491	-0.290	0.603
d26	0.190	0.213	0.89	0.372	-0.228	0.608
d27	-0.012	0.206	-0.06	0.954	-0.418	0.394
d28	0.506	0.209	2.42	0.016	0.095	0.917
d29	0.188	0.210	0.89	0.372	-0.225	0.602
d30	0.414	0.214	1.93	0.054	-0.007	0.836
d31	0.069	0.212	0.33	0.745	-0.348	0.486
d32	0.289	0.246	1.17	0.241	-0.195	0.772

d33	0.005	0.223	0.02	0.982	-0.432	0.443
d34	0.386	0.235	1.64	0.101	-0.075	0.847
d35	0.031	0.219	0.14	0.886	-0.399	0.462
d36	0.054	0.210	0.26	0.797	-0.358	0.466
d37	-0.011	0.214	-0.05	0.958	-0.431	0.408
d38	0.079	0.229	0.35	0.731	-0.371	0.529
d39	0.241	0.213	1.13	0.259	-0.178	0.659
d40	0.085	0.213	0.40	0.688	-0.333	0.504
d41	0.197	0.214	0.92	0.358	-0.223	0.617
d42	0.051	0.220	0.23	0.816	-0.382	0.484
d43	-0.073	0.215	-0.34	0.733	-0.496	0.350
d44	0.441	0.215	2.05	0.041	0.019	0.863
d45	0.516	0.233	2.22	0.027	0.058	0.973
d46	0.060	0.231	0.26	0.796	-0.395	0.515
d47	0.049	0.250	0.20	0.845	-0.442	0.540
d48	0.214	0.214	1.00	0.319	-0.207	0.634
d49	0.051	0.234	0.22	0.828	-0.409	0.511
d50	0.225	0.217	1.04	0.299	-0.201	0.652
d51	0.182	0.201	0.91	0.366	-0.212	0.576
d52	0.122	0.221	0.55	0.583	-0.313	0.557
d53	0.050	0.228	0.22	0.825	-0.397	0.498
d54	0.488	0.241	2.03	0.043	0.015	0.962
d55	0.470	0.205	2.29	0.022	0.067	0.872
d56	0.217	0.213	1.02	0.308	-0.201	0.636
d57	0.495	0.229	2.16	0.031	0.044	0.945
d58	0.356	0.224	1.59	0.113	-0.084	0.796
d59	0.584	0.226	2.59	0.010	0.141	1.028
d60	0.096	0.230	0.42	0.676	-0.355	0.548
d61	0.323	0.221	1.46	0.144	-0.110	0.756
d62	0.399	0.206	1.94	0.053	-0.006	0.804
d63	0.012	0.213	0.06	0.955	-0.406	0.430
d64	0.047	0.205	0.23	0.817	-0.355	0.450
d65	0.103	0.216	0.48	0.632	-0.321	0.528
d66	0.154	0.204	0.75	0.451	-0.246	0.554
d67	0.032	0.224	0.14	0.886	-0.407	0.471
d68	0.007	0.212	0.03	0.973	-0.409	0.423
d69	0.479	0.207	2.32	0.021	0.073	0.886
d70	0.043	0.205	0.21	0.833	-0.359	0.445

(Source: Stata 12.0 Output File)

Appendix 4: Full regression result of diversification function with interactions according to FEM using LSDV estimator

Source	SS	df	MS
Model	31.115	85	0.366
Residual	3.015	475	0.006
Total	34.129	560	0.061

Number of obs = 560
F(85, 475) = 57.68
Prob > F = 0.0000
R-squared = 0.9117
Adj R-squared = 0.8959
Root MSE = 0.07967

FDiv	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
ESO	0.011	0.010	1.11	0.267	-0.009	0.031
EXO	-0.488	0.116	-4.21	0.000	-0.715	-0.260
BLKO	0.077	0.038	2.04	0.041	0.003	0.152
BCOM	-0.055	0.038	-1.47	0.141	-0.129	0.018
DUAL	-0.008	0.014	-0.56	0.575	-0.035	0.019
FCFDum	-0.022	0.024	-0.89	0.376	-0.070	0.026
ROA	-0.004	0.060	-0.06	0.953	-0.122	0.115
SIZE	0.001	0.008	0.16	0.871	-0.015	0.017
LEV	-0.015	0.037	-0.41	0.680	-0.087	0.057
StaO	-0.240	0.093	-2.59	0.010	-0.422	-0.058
FCFESO	0.005	0.015	0.35	0.728	-0.025	0.036
FCFEXO	0.111	0.116	0.96	0.340	-0.117	0.338
FCFBLKO	0.021	0.038	0.56	0.578	-0.054	0.097
FCFBCOM	0.028	0.037	0.75	0.454	-0.045	0.101
FCFDUAL	0.003	0.018	0.15	0.883	-0.032	0.037
d1	0.154	0.217	0.71	0.479	-0.273	0.581
d2	0.178	0.223	0.80	0.425	-0.260	0.615
d3	0.141	0.218	0.65	0.519	-0.288	0.570
d4	0.088	0.230	0.38	0.702	-0.363	0.539
d5	0.516	0.220	2.35	0.019	0.085	0.948
d6	0.166	0.232	0.71	0.475	-0.290	0.621
d7	0.108	0.225	0.48	0.632	-0.335	0.550
d8	0.024	0.219	0.11	0.912	-0.406	0.455
d9	-0.044	0.211	-0.21	0.835	-0.459	0.371
d10	0.045	0.217	0.21	0.836	-0.382	0.472
d11	0.185	0.235	0.79	0.430	-0.275	0.646
d12	0.451	0.225	2.01	0.046	0.009	0.893
d13	0.351	0.207	1.70	0.090	-0.055	0.758
d14	-0.001	0.218	-0.00	0.997	-0.430	0.428
d15	0.350	0.242	1.45	0.148	-0.125	0.826
d16	0.356	0.214	1.66	0.097	-0.064	0.775
d17	0.262	0.211	1.24	0.217	-0.154	0.677
d18	0.161	0.227	0.71	0.479	-0.284	0.606
d19	0.104	0.231	0.45	0.652	-0.349	0.558
d20	0.068	0.229	0.30	0.765	-0.381	0.518
d21	0.096	0.220	0.44	0.663	-0.336	0.528
d22	0.265	0.224	1.18	0.238	-0.176	0.705
d23	-0.046	0.236	-0.19	0.846	-0.509	0.417
d24	0.121	0.233	0.52	0.605	-0.337	0.579
d25	0.172	0.229	0.75	0.453	-0.278	0.622
d26	0.201	0.214	0.94	0.350	-0.221	0.622

d27	-0.004	0.208	-0.02	0.984	-0.414	0.405
d28	0.516	0.211	2.45	0.015	0.101	0.930
d29	0.195	0.212	0.92	0.357	-0.221	0.612
d30	0.430	0.216	1.98	0.048	0.004	0.855
d31	0.085	0.214	0.40	0.692	-0.336	0.506
d32	0.304	0.248	1.22	0.221	-0.184	0.791
d33	0.013	0.224	0.06	0.954	-0.428	0.454
d34	0.393	0.237	1.67	0.097	-0.071	0.859
d35	0.047	0.221	0.21	0.833	-0.387	0.481
d36	0.066	0.212	0.31	0.754	-0.349	0.482
d37	-0.001	0.215	-0.00	0.998	-0.424	0.422
d38	0.088	0.231	0.38	0.703	-0.366	0.542
d39	0.252	0.215	1.17	0.241	-0.170	0.674
d40	0.095	0.215	0.44	0.657	-0.326	0.517
d41	0.210	0.216	0.97	0.331	-0.214	0.635
d42	0.063	0.222	0.28	0.777	-0.374	0.500
d43	-0.062	0.217	-0.29	0.776	-0.489	0.365
d44	0.445	0.216	2.06	0.040	0.020	0.870
d45	0.533	0.235	2.27	0.024	0.071	0.994
d46	0.075	0.234	0.32	0.749	-0.384	0.534
d47	0.063	0.252	0.25	0.802	-0.432	0.559
d48	0.226	0.216	1.05	0.295	-0.198	0.651
d49	0.067	0.236	0.28	0.778	-0.397	0.530
d50	0.241	0.219	1.10	0.272	-0.189	0.671
d51	0.191	0.202	0.94	0.346	-0.207	0.589
d52	0.136	0.223	0.61	0.542	-0.302	0.575
d53	0.061	0.229	0.27	0.789	-0.389	0.512
d54	0.507	0.243	2.08	0.038	0.029	0.984
d55	0.477	0.207	2.31	0.021	0.071	0.883
d56	0.232	0.215	1.08	0.280	-0.190	0.654
d57	0.508	0.231	2.20	0.028	0.054	0.962
d58	0.370	0.226	1.64	0.102	-0.074	0.814
d59	0.594	0.228	2.61	0.009	0.147	1.041
d60	0.110	0.232	0.48	0.634	-0.345	0.566
d61	0.337	0.222	1.52	0.130	-0.100	0.774
d62	0.404	0.208	1.94	0.053	-0.004	0.812
d63	0.020	0.214	0.09	0.926	-0.402	0.441
d64	0.065	0.206	0.31	0.754	-0.341	0.470
d65	0.121	0.218	0.55	0.581	-0.308	0.549
d66	0.169	0.206	0.82	0.411	-0.235	0.573
d67	0.046	0.226	0.21	0.838	-0.397	0.490
d68	0.021	0.213	0.10	0.922	-0.398	0.440
d69	0.493	0.209	2.36	0.019	0.082	0.903
d70	0.055	0.206	0.27	0.789	-0.349	0.460

(Source: Stata 12.0 Output File)

Appendix 5: Full regression result of firm value function according to FEM using LSDV estimator

Source	SS	df	MS	Number of obs = 560
Model	1207.361	81	14.906	F(81, 479) = 35.21
Residual	202.769	479	0.423	Prob > F = 0.0000
Total	1410.130	560	2.518	R-squared = 0.8562
				Adj R-squared = 0.8319
				Root MSE = 0.65063

Tobinsq	**Coef.**	**Std. Err.**	**z**	**P>|z|**	**[95% Conf. Interval]**	
FDiv	0.492	0.374	1.320	0.188	-0.242	1.227
ESO	-0.017	0.068	-0.260	0.798	-0.150	0.116
EXO	5.363	0.812	6.600	0.000	3.767	6.958
BLKO	0.366	0.280	1.310	0.192	-0.185	0.917
BCOM	0.226	0.292	0.780	0.439	-0.347	0.799
DUAL	-0.023	0.098	-0.230	0.816	-0.215	0.169
FCFDum	0.077	0.063	1.220	0.224	-0.047	0.200
ROA	2.351	0.492	4.780	0.000	1.384	3.318
SIZE	-0.781	0.065	-11.930	0.000	-0.910	-0.652
LEV	1.659	0.296	5.600	0.000	1.077	2.242
StaO	3.113	0.754	4.130	0.000	1.631	4.595
d1	20.671	1.766	11.710	0.000	17.201	24.141
d2	21.009	1.810	11.610	0.000	17.454	24.565
d3	20.198	1.775	11.380	0.000	16.711	23.686
d4	21.249	1.861	11.420	0.000	17.591	24.906
d5	20.666	1.794	11.520	0.000	17.142	24.190
d6	21.666	1.883	11.510	0.000	17.966	25.366
d7	19.056	1.828	10.420	0.000	15.463	22.649
d8	20.009	1.775	11.270	0.000	16.520	23.497
d9	19.985	1.714	11.660	0.000	16.616	23.354
d10	20.010	1.767	11.330	0.000	16.539	23.482
d11	21.763	1.906	11.420	0.000	18.017	25.509
d12	20.273	1.831	11.070	0.000	16.675	23.870
d13	18.740	1.685	11.120	0.000	15.429	22.050
d14	20.055	1.773	11.310	0.000	16.570	23.540
d15	22.970	1.972	11.650	0.000	19.094	26.845
d16	19.166	1.741	11.010	0.000	15.745	22.586
d17	18.352	1.716	10.690	0.000	14.980	21.724
d18	20.366	1.837	11.090	0.000	16.757	23.975
d19	19.132	1.875	10.200	0.000	15.448	22.817
d20	20.416	1.859	10.980	0.000	16.764	24.068
d21	18.844	1.789	10.530	0.000	15.329	22.358
d22	20.978	1.819	11.530	0.000	17.404	24.552
d23	23.001	1.911	12.040	0.000	19.246	26.756
d24	22.606	1.895	11.930	0.000	18.881	26.330
d25	19.379	1.861	10.410	0.000	15.722	23.037
d26	19.629	1.743	11.260	0.000	16.204	23.054
d27	19.953	1.691	11.800	0.000	16.630	23.276
d28	19.558	1.722	11.360	0.000	16.174	22.941
d29	20.191	1.725	11.710	0.000	16.802	23.581
d30	18.188	1.763	10.310	0.000	14.723	21.653

d31	19.462	1.739	11.190	0.000	16.045	22.880
d32	21.966	2.018	10.890	0.000	18.002	25.930
d33	20.587	1.824	11.290	0.000	17.003	24.170
d34	22.522	1.927	11.690	0.000	18.736	26.309
d35	18.720	1.793	10.440	0.000	15.197	22.243
d36	19.860	1.718	11.560	0.000	16.483	23.236
d37	19.953	1.749	11.410	0.000	16.516	23.390
d38	19.016	1.874	10.150	0.000	15.332	22.698
d39	20.609	1.746	11.800	0.000	17.178	24.041
d40	19.469	1.745	11.160	0.000	16.040	22.897
d41	19.376	1.754	11.050	0.000	15.929	22.823
d42	20.627	1.805	11.430	0.000	17.081	24.174
d43	20.926	1.763	11.870	0.000	17.462	24.391
d44	19.818	1.766	11.220	0.000	16.347	23.289
d45	19.965	1.916	10.420	0.000	16.200	23.730
d46	19.813	1.896	10.450	0.000	16.089	23.538
d47	24.416	2.048	11.920	0.000	20.392	28.440
d48	18.422	1.755	10.500	0.000	14.974	21.871
d49	20.417	1.916	10.660	0.000	16.652	24.181
d50	17.777	1.779	9.990	0.000	14.280	21.273
d51	17.694	1.645	10.760	0.000	14.462	20.926
d52	18.772	1.813	10.350	0.000	15.209	22.335
d53	21.031	1.865	11.280	0.000	17.367	24.695
d54	18.813	1.982	9.490	0.000	14.918	22.709
d55	18.835	1.687	11.170	0.000	15.520	22.149
d56	17.917	1.747	10.260	0.000	14.484	21.349
d57	18.813	1.886	9.970	0.000	15.107	22.520
d58	19.167	1.838	10.430	0.000	15.555	22.779
d59	20.155	1.862	10.820	0.000	16.496	23.814
d60	19.685	1.883	10.450	0.000	15.985	23.386
d61	19.304	1.810	10.660	0.000	15.747	22.861
d62	20.252	1.695	11.950	0.000	16.921	23.582
d63	20.455	1.741	11.750	0.000	17.034	23.877
d64	17.598	1.677	10.490	0.000	14.302	20.894
d65	18.215	1.770	10.290	0.000	14.737	21.693
d66	17.942	1.669	10.750	0.000	14.664	21.221
d67	19.228	1.830	10.500	0.000	15.631	22.824
d68	19.409	1.733	11.200	0.000	16.003	22.815
d69	17.718	1.704	10.400	0.000	14.369	21.067
d70	17.919	1.675	10.700	0.000	14.628	21.211

(Source: Stata 12.0 Output File)