



LUND UNIVERSITY
School of Economics and Management

Impacts of corporate governance on firm performance

Empirical study of listed Singaporean companies

by

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May 2017

Master's Program in International Strategic Management

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Acknowledgement

First and foremost, we would like to thank our supervisor Amalia Foukaki for her great support and useful feedback throughout the time of writing the thesis. Furthermore, we really appreciate our families and friends, who always encouraged and cheered us up. Last but not least, a lot of love and thanks to Lund University for providing us with a chance to be a part of your long and vibrant history.

Nhung Hong Vu & Thuy Nguyen,

Lund, May 2017

Abstract

This study aims to investigate the relationship between corporate governance and financial performance of listed Singaporean companies. We collect the data from 137 listed companies for the period of four years from 2013 to 2016. In this research, corporate governance is driven by a wide range of variables, which include the dual role CEO, board size and board independence. Besides, the financial performance is measured by three different methods, which include return on asset, return on equity and Tobin's Q. Our findings show that there is an inverse association between board size and firm performance, however, we do not find any significant relationships between board dependence, CEO duality and company financial performance.

Keywords: corporate governance, firm performance, listed companies, Singapore

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1 Introduction

1.1 Research Background

According to Tricker (2015, p.4), corporate governance is seen as “the way power is exercised over corporate entities”. It consists of the board activities of the enterprise and its relationships with the shareholders, with the managers as well as with other legitimate stakeholders. The scholar also points out the differences between corporate governance and executive management. While executive management takes charge of running the corporation, the corporate governance ensures that the corporate “is running in the right direction and being run well” (Tricker, 2015, p.4). Hence, the board of directors is generally in charge of the enterprise’s decisions and its financial performance. The relationship between corporate governance and financial performance, which is one of the most appealing and controversial issues, has received a lot of attention from many different countries over the world, especially after the Asian Financial Crisis 1997 (Nguyen and Nguyen, 2016). Furthermore, the Global Financial Crisis starting in 2007 has greatly affected the economies of many countries, raised further concerns about corporate governance policy and practice (Tricker, 2015; Nguyen and Nguyen, 2016). It also added further strands to the question about whether or not improving corporate governance system would result in the increase in the financial performance of the firm (Nguyen and Nguyen, 2016). Williamson (1988) and Bhagat and Bolton (2008) argue that while good corporate governance has a positive impact on the firm performance, weak corporate governance shakes the confidence of investors as well as prevents outside investment (Vo and Nguyen, 2014). Love (2011 cited in Nguyen and Nguyen, 2016) points out that the studies concerning the correlation between corporate governance and firm performance are separated into two different groups. On the one hand, the author argues that law-finance multidisciplinary studies focus on how the country-level differences in legal characteristics and features of corporate governance affect corporate governance system and financial performance of firms. On the other hand, **he** states that there are studies that mainly concentrate on the modeling of the correlation between corporate governance and firm performance at firm level in an individual country or in cross-country situations. The researcher also emphasizes the fact that most of the empirical studies, which conduct on this strand, yield inconclusive results.

In this study, we would like to select the second strand, which focuses on a single country, namely Singapore to be the target of the research. There are several reasons why we choose Singapore for our study. First of all, Singapore is known for the best corporate governance system among the East Asia-Pacific and OECD countries, which is always aware of worldwide corporate governance standards and the ability to adapt such standards to enterprises of different sizes and resources (CLSA, 2010 cited in Nguyen et al., 2014; Nguyen and Nguyen, 2016; Yip and Tan, n.d.). Thus, in comparison with other countries of Association of Southeast Asian Nations (ASEAN) region, Singapore scores the highest average points of corporate governance (Chuanrommanee and Swierczek, 2007 cited in Nguyen et al., 2014). Moreover, the survey carried out by Credit Lyonnais Securities Asia (2012 cited in Nguyen et al., 2014) reports that Singapore is ranked in the top of Asian countries in terms of corporate governance practices. Secondly, most of the previous studies on corporate governance and financial performance of firms mainly focus on developed countries such as the US, the UK, Germany and France (Nguyen and Nguyen, 2016). Then, it would be more interesting to do research in case of an Asian country, which experienced significant changes in the code of corporate governance during the period from 2001 to 2012. Besides, although the Singaporean legal and corporate governance system is greatly based on Western jurisdictions, there are several significant differences in terms of the institutional environment between Singapore and other Western countries (Nguyen et al., 2014), including:

- (i) Singapore has a high ownership concentration, however, there is a strong protection of the rights of minority shareholders (Kimber et al., 2005; Mak and Li, 2001; Witt, 2012; World Bank, 2013 cited in Nguyen et al., 2014)
- (ii) Singapore is a typical example for Asian market, which has a weak market for corporate control (Mak, 2007; Mak and Li, 2001; Phan and Yoshikawa, 2004; Witt, 2012 cited in Nguyen et al., 2014).
- (iii) The government takes part in the business sector as a significant block holder (Ang and Ding, 2006; Kimber et al., 2005; Mak, 2007; Witt, 2012 cited in Nguyen et al., 2014).

Finally, as Singapore is famous for a high transparency in corporate governance and holds the 5th place in the least corrupt country in the world (Ministry of Foreign Affairs of Singapore, n.d), the research could provide a better understanding of the impact of the internal corporate governance structure on the listed companies in Singapore, and serve as a guideline for other

less developed countries in the region with the aim of improving their corporate governance practices on company performance.

1.2 Research Purpose

The purpose of this study is to examine whether or not the corporate governance structure of Singapore would affect the listed firms' financial performance. To achieve this purpose, there are several questions that need to be answered:

1. To what extent do the different parts of corporate governance such as dual role of CEO, board independence and board size have an impact on firm performance measured by ROA, ROE, Tobin's Q?
2. Would the findings of this study support the classical corporate governance theories and be similar to the previous empirical studies that use the same methodologies for other countries?

1.3 Outline of the Thesis

The study would consist of six chapters:

Chapter 1 provides an introduction of the research background, the research question and the research outline

Chapter 2 presents an overview of the definitions of corporate governance and the corporate governance system in Singapore

Chapter 3 presents the theoretical framework for the research and previous empirical findings about the correlation between some different components of corporate governance and financial performance

Chapter 4 provides details about how the study would be conducted

Chapter 5 presents the data analysis and discussion of our empirical findings

Chapter 6 concludes the findings of the thesis and research limitations as well as makes suggestions for future study

2 Overview

2.1 Definitions of corporate governance

According to Claessens and Yurtoglu (2013, cited in Nguyen and Nguyen, 2016), the definitions of corporate governance are divided into two types as either “narrow” or “broad”. The narrow set of definitions, which could be used in studies on corporate governance within a single country, concentrates on the internal mechanisms of corporate governance in ascertaining firm performance and maximizing shareholders’ benefits (Claessens and Yurtoglu, 2013, cited in Nguyen and Nguyen, 2016). The most typical definition is provided by Shleifer and Vishny (1997, p.737) as follows: “the ways in which suppliers of finance to corporations assure themselves of getting a return on their investment”. Similarly, the Cadbury Committee (1992, para. 2.5) also defines corporate governance as a “system by which companies are directed and controlled”. On the contrary, the broad cluster of definitions focuses on the external institutional environment affecting the firm (Claessens and Yurtoglu, 2013, cited in Nguyen and Nguyen, 2016). This is suitable for cross-national comparative analysis on corporate governance in order to examine how the country-level differences in specific characteristics would influence the behavioral features of firms, shareholders and stakeholders (Claessens and Yurtoglu, 2013 cited in Nguyen and Nguyen, 2016). The Organization for Economic and Development (OECD) describes corporate governance as follows:

Corporate governance involves 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 (OECD, 2004, p.11).

This definition presents that corporate governance is not only concerned about the internal mechanism of corporate governance structure and shareholders’ profit, but also takes into account the external mechanism of corporate governance and stakeholders’ interests (Nguyen and Nguyen, 2016).

In the scope of this study, the authors would like to consider the characteristics of board size, board independence and CEO duality to be the most important internal corporate governance mechanisms for further analysis within an individual country.

2.2 Corporate Governance in Singapore

According to Koh and Yip (n.d), Singapore is seen as one of the countries has the best corporate governance in Asia as well as in the world. Nevertheless, as a young country, Singapore had to figure out how to develop its economy while assuring appropriate governance in the corporate, public and social sectors (Koh and Yip, n.d). The corporate governance system in Singapore has developed in tandem with the development of the country. The scholars point out two important key drivers that play an important role in the development of corporate governance of Singapore are vision and crises. Therefore, in 1967, the root of Companies' legislation in Singapore – the Companies Act became effective. Then, the Monetary Authority of Singapore was founded in 1970. In 1997, the Monetary Authority of Singapore set up a strategic view to make Singapore become a major financial centre (Koh and Yip, n.d). Also, in the same year, the Investment Management Association of Singapore was established to initiate the development of investment and fund management industry in Singapore. However, due to the Asian Financial crisis occurring at this time, the strategic view of Monetary Authority of Singapore had to be reviewed and some private sector-led committees were formed to reevaluate the existing system. As a result, there had been very important regulatory changes in the Companies Act and the establishment of Singapore's first Code of Corporate Governance in 2001 (Koh and Yip, n.d). According to Witt (n.d), the main provisions regulating the Singaporean listed companies consist of the Companies Act (1994 Revised Edition), the Securities and Futures Act (2002 Revised Edition) and other listing requirements issued by the Singapore Exchange Ltd. Since September 1, 2007, the Monetary Authority of Singapore and the Singapore Exchange Ltd have supervised the implementation of the Code. As reported by Witt (n.d), there are two different types of exchange market in Singapore with different listing requirements, which are Mainboard and Catalist. Those listed companies on the Mainboard are required to have at least two independent directors while those on the Catalist must have at least one (Witt, n.d.). In May 2012, a revised Code of Corporate Governance was issued by the Monetary Authority of Singapore with the aim of addressing the problems, which provoked the Global Financial Crisis (Singapore

Management University, 2014). The major changes involve many important features of corporate governance (Singapore Management University, 2014). For example, the composition of listed companies' Board of Directors, with the role of independent directors gaining prominence and holding no more than 10% of shares. In case the Chairman and the CEO are not separate, independent directors must account for half the board instead of one-third standard (Singapore Management University, 2014). In addition, the Singaporean Code of Corporate Governance (2005) also states that the board should be in charge of taking into account the appropriate board size on the basis of the nature and scope of the company operations for the effective decision-making process.

Due to being affected by cultural factors, high level of immigration and the multi-ethnic features of the population, Singapore has a restricted extent of social cohesiveness (Witt, n.d). Moreover, as Singapore used to be a British Colony, its legal system is based on common law (Nguyen and Nguyen, 2016). This significantly affects the development of the market economy and business sector of this country (Koh and Yip, n.d; Nguyen and Nguyen, 2016). Furthermore, one of the most noticeable features of the Singaporean corporate governance is that it has a high ownership concentration with the government and families playing the role as block-holders (Claessens et al., 2000 cited in Witt, n.d). Besides, Singapore has a weak market for corporate control due to an inactive take-over market (Nguyen and Nguyen, 2016). In terms of the board structure, boards of directors in Singapore are a single tier, which is in line with Anglo-Saxon tradition (Teen, 2005). According to Tan (n.d), this type of board is composed of both executive and non-executive directors, who are appointed and nominated by the company's shareholders. This makes it different from the two-tier board model, which includes a board of supervisors being responsible for control decisions and a board of directors being in charge of managerial decisions (Nguyen and Nguyen, 2016). One of the main advantages of being on one board is that the non-executive directors do not have to depend on the executive directors for having direct access to information (Tan, n.d). The researcher also argues that the participation of outside directors in the decision-making process potentially results in better decisions in a single tier board structure. The "comply or explain" principle is followed in the Code of Corporate Governance in Singapore (Witt, n.d). This means that publicly listed companies can voluntarily comply with the code, however, they are required to disclose their corporate governance practices and report any divergences from the code of corporate governance, which must be explained in the annual reports (Nguyen and Nguyen, 2016).

Table 2.1 Summary of corporate governance system in Singapore

No	Criteria	Characteristics
1	Type of corporate governance system	Mix between family-based and government-based system
2	Board system	One tier: executive and non executive board
3	Legal system	The companies Act is influenced by the Anglo-American pattern
4	External market for corporate control	Rather weak
5	Ownership concentration	High
6	Corporate governance approach	Voluntary
7	Corporate governance practice	Very good

Source: Nguyen and Nguyen, 2016

3 Literature Review

According to Vo and Nguyen (2014, p.1), the major concerns of corporate governance are related to “the structures and processes for the business directions and management of firms”. Thus, they claim that it concentrates on the relationships between company’ controlling system, shareholders, stakeholders and functions of board of directors. They conclude that board of directors is seen as the most important factor in corporate governance, which affects the whole business and owners’ interests. Agency theory and stewardship theory are two important perspectives that provide a significant insight into the functions of the board in terms of size and independence as well as the functions of the CEO on firm performance. In this study, we would like to explain into details how these theories guide us to explore the correlations between corporate governance and financial performance of firms. Then, an in-depth analysis of the previous empirical studies on the association of corporate governance and firm performance is performed to support for our hypotheses.

3.1 Agency Theory

This theory plays an essential role to explain the functions of board directors on company performance (Vo and Nguyen, 2014). This view is supported by Zahra and Pearce (1983, p.301) as follows: “agency approach is among the most recognized in research on contribution of boards”. It is argued that shareholders have lost their effective control when the size of company has grown and professional managers who have the specialized knowledge with regard to company’s operations will take over the control (Muth and Donaldson, 1998). Davis et al. (1997) also state that agency perspective refers to the conflicting interests occurring between the principal as owners and the agent as managers. The scholars point out that while the agents run firms for their self-interests, the principals has the intention of maximizing the shareholders’ interests in the long term. Moreover, due to the separation of corporate ownership, managers would have significant freedom and powers to pursue their own objectives (Muth and Donaldson, 1998). In some cases, their own targets could be conflicting with those of shareholders and the aim of maximizing the principal’ wealth would be missed (Masson, 1971 cited in Zahra and Pearce, 1989). As a result, board of directors becomes the representatives of shareholders’ interests and acts as a mechanism to

control the firm (Zahra and Pearce, 1989; Muth and Donaldson, 1998). In the view of agency theory, the managers could not be trusted to act in the interests of shareholders, so they must be controlled by the board (Muth and Donaldson, 1998). Thus, the contribution that the board could bring to company performance is to reduce agency costs which are caused by “non-compliance of executives with established goals and procedures, by articulating shareholders’ objectives and focusing the attention of key executives on company performance, and through strategic decision making and control” (Zahra and Pearce, 1989, p. 301). Zahra and Pearce (1989) mention four significant attributes of board, which include composition, characteristics, decision process and structure. The scholars state that agency theory pays a lot of attention to the board decision-making process concerning board’s performance and its monitoring function in reducing agency costs, but it places a minimum on the involvement of boards in the strategic contribution. In addition, they claim that agency theorists also place a high premium on the control task and the internal control is the most important. Besides, market-based measures are primarily used to assess financial performance and determine the organization’s value (Zahra and Pearce, 1989).

According to Muth and Donaldson (1998), it is critical that boards of directors have to be independent from management influence with the aim of obtaining maximum performance. Indeed, the authors argue that independent boards could have a positive impact on company performance. On the contrary, the firm would experience a negative performance if the independence of the board is compromised (Muth and Donaldson, 1998). The study of Fama and Jensen (1983 cited in Muth and Donaldson, 1998) strengthens the view that it is vital to separate the initiation and implementation of decision from the ratification and monitoring of decisions. Two proxies for board incentives mentioned by Hillman and Dalziel (2003) are board independence and director compensation. They emphasize that boards, which are mainly formed of insiders or those outsiders who are not completely independent from management influence, have less incentive to supervise management because of the dependence on the CEO. It is believed that those directors would not stand for shareholders when their interests are contradictory with those of management (Hillman and Dalziel, 2003). Hence, boards primarily consist of outside and independent directors are believed to monitor better because of their incentive (Hillman and Dalziel, 2003). Pfeffer (1972 cited in Vo and Nguyen, 2014) argues that the proportion of outside directors could make firms appeal to cheap external capital, which affects firm performance by cost reduction. In terms of board size, agency theorists are in favor of smaller boards because they could help to speed up the

decision-making process, increase the effectiveness of communication and coordination as well as reduce the probability of free-rider behaviors (Jensen, 1993; Yermack, 1996 cited in Leong et al., 2015).

3.2 Stewardship Theory

Stewardship theory provides an opposing view about the structuring of effective boards, which clarifies the role of managers as steward rather than “the entirely self-interested rational economic man of agency theory” (Muth, Donaldson, 1998, p.5). Therefore, the scholars argue that: “While agency perspective roots in the field of economics and finance, examines the structures of capitalism and finds only self-interested behavior, stewardship theory reorganizes a range of non-financial motives for managerial behavior” (Muth, Donaldson, 1998, p.6). In the view of stewardship theory, managers are thought to be interested in obtaining high performance and using their power to act in the interests of shareholders (Donaldson and Davis, 1991 cited in Muth and Donaldson, 1998). Thus, they have many different behaviors and reasons beyond self-interest, which explains why the contradictory objectives do not exist in the separation of ownership from control. Then, blanket controls would not be the solution to help improve firm performance or to protect shareholders’ interests (Muth and Donaldson, 1998). Davis et al. (1997 cited in Zahra and Pearce, 1989) also support the view by claiming that the relationship between the interests of managers and shareholders are on the basis of psychological and sociological approach. Therefore, there is a mixture of the interests of individuals and organizations with the aim of achieving maximum performance and the trade-off for self-interest does not exist because of the consistency in benefits of both managers and shareholders (Zahra and Pearce, 1989). The scholars also clarify another considerable difference between agency theory and stewardship theory, while the former uses market value to measure extrinsic satisfaction, the latter is concerned with intrinsic satisfaction such as reputation, achievement and reputation. It is believed that the interests of the managers could be met if they act for the benefits of shareholders in order to achieve high performance (Zahra and Pearce, 1989). Moreover, stewardship theory also concentrates on the characteristics of board composition, which affects the firm performance greatly rather than the monitoring and control functions (Zahra and Peace, 1989). Muth and Donaldson (1998) argue for this view by stating that the board consists primarily of insiders would be preferred because of their professional expertise, profound knowledge and

commitment to the company. Indeed, shareholders could gain maximum profit when control is conducted effectively by management (Muth and Donaldson, 1998).

3.3 Previous Empirical Studies

3.3.1 CEO duality and firm performance

Although several studies argue that the separation of the CEO and chairman would create a better corporate governance system, it is still questioned whether or not the board would become a better monitor and could increase firm's value (Abdullah, 2004).

It is argued that CEO duality would lead to maximum firm performance because it allows explicit leadership to formulate and implement strategy (Stoeberl and Sherony, 1985; Anderson and Anthony, 1986 cited in Baliga et al., 1996). Therefore, the scholars explain that non-duality would: (1) increase the conflicting actions and expectations of management and the board (Alexander et al., 1993 cited in Baliga et al., 1996); (2) create the potential competition between the chairman and the CEO; (3) cause confusion due to the presence of two public representatives, (4) restrict innovation and intrapreneurship of the CEO if he thinks that the board "will perennially second guess his or her actions" (Baliga et al., 1996, p. 42). The advocates of the CEO duality also suggest that combining these two roles provide a clear focus for objectives and operations while the separation of the CEO and the chairman would create more costs than benefits, especially for larger firms (Brickley et al., 1997 cited in Abdullah 2004).

In contrast, those argue against CEO duality indicate that duality would: (1) constrain board independence and reduces the possibility that the board can properly execute its oversight and governance role (Lorsch and MacIver, 1989; Fazel and Louie, 1990; Dobrzynski, 1991; Millstein, 1992 cited in Baliga et al., 1996), (2) "signal the absence of separation of decision management and decision control... the organization suffers in the competition for survival" (Fama and Jensen, 1983, p.314); (3) insecure directors would feel risky to be honest when they have to provide assessment on financial performance, which results in structural drift in the long-run (Carver, 1990 cited in Baliga et al., 1996). On the basis of agency theory, CEO duality would hamper the board from performing its monitoring role because of a compromising impaired board (Donaldson and Davis, 1991 cited in Nguyen et al., 2014).

Furthermore, it is greatly believed that the power of monitoring function would be abused for CEO's self-interests. In order to resolve this problem, Daily et al. (2004 cited in Nguyen, et al., 2014) suggest that CEO non-duality would lead to better monitoring results. This view is strongly supported by Fama and Jensen (1983 cited in Nguyen et al, 2014), who believe that CEO non-duality would reduce agency problems by diffusing and separating managerial functions from control functions. Abdullah (2004) also points out several drawbacks of CEO duality. He indicates that when a person holding both positions of chairman and CEO; the board's ability in monitoring and controlling management would be diminished due to a lack of independence and conflicting interests. He also claims that the separation of the chairman and the CEO would reduce the power of the CEO and strengthen the board's intensity to perform its oversight function. Thus, the board would have greater freedom to evaluate the performance of the CEO and executives, as well as provides unaffiliated judgment. Moreover, the monitoring function of the board would be seriously damaged when an individual person holding both the CEO and chairman of the board. This leads to a significant impact on the board incentive to make sure that executive directors will conduct value-increasing operations (Abdullah, 2004). Rechner (1989 cited in Abdullah, 2004) argues that the weakest corporate governance is the one that the board primarily consists of insider directors and the CEO is also the chairman of the board. When a firm is properly dominated by one person, the role of outside unaffiliated directors becomes "hypothetical" and the structure is seen as a rubber stamp board – a board is not able to protect the interests of all shareholders while the CEO taking overall control (Rechner, 1989 cited in Abdullah, 2004).

Empirical studies examining the link between CEO duality and firm performance are few and their findings present mixed results (Baliga et al., 1996; Bhagat and Bolton, 2009 cited in Nguyen et al., 2014). Some studies show that this relationship is positive or insignificant while others find that it is a positive or significant correlation (Donaldson and Davis, 1991; Laing and Weir, 1999 cited in Nguyen et al., 2014). It is due to many different methods being used such as accounting based or market-based measures of performance (Bhagat and Bolton, 2009 cited in Nguyen et al., 2014). For example, while they saw a negative association with ROA, they also found out a positive relation with Tobin's Q.

The research of Boyd (1995 cited in Vo and Nguyen, 2014) testing agency theory and stewardship theory suggests that "the effect of chair directors on firm performance is different across various environments" (Vo and Nguyen, 2014, p.3). The study of Baliga et al. (1996)

illustrates that there is no considerable difference in performance when duality status is changed. In addition, firm performance does not present a considerable difference in terms of duality and non-duality in the long-term. Although they can see some changes in the managerial process caused by duality, it does not create more assets in order to affect financial performance of firms (Baliga et al., 1996 cited in Vo and Nguyen, 2014). They suggest that focusing on a single variable of the relationship between corporate governance and financial performance such as duality does not improve the firm performance due to the high complexity and correlation of determinants. Indeed, the researchers point out that:

The finding of no significant difference in the operating performance suggests that a duality status change (especially going from duality to non-duality) is more a variant of the 'scapegoating phenomenon' and a symbolic way of 'signaling' that the board is effectively exercising its governance role, than an effective way of motivating fundamental changes in firm performance (Gamson and Scotch, 1964; Pfeffer, 1981 cited in Baliga et al., 1996).

Nevertheless, the scholars also agree that it may take longer than their observed two-year measurement to realize significant impact on firm performance as a result of changes in strategies and programs. Berge and Smith (1918 cited in Abdullah 2004) also support the view that there is no considerable difference in a wide range of financial indicators between firms having structure of CEO duality and those of non-CEO duality. Thus, considerable costs of separation would come from "...the incomplete transfer of company information and confusion over who is in charge of running the company" (Goodwin and Seow, 2000, p.43). Consequently, this would hinder the performance of the firm's financial indicators and make the decision process run slower (Abdullah, 2004).

Meanwhile, if an individual person is responsible for both tasks, he or she could understand what decisions would help to improve company performance (Abdullah, 2004). This view is backed by the study of Rechner and Dalton (1991 cited in Abdullah, 2004), which presents that firms having structure of CEO duality achieves better performance consistently than those with CEO non-duality. The research conducted by Vo and Nguyen (2014) also further supports the view of stewardship theory, which reports the role of CEO duality in improving firm performance. In contrast, several studies examining the impact of the separation of CEO and chairman, shows that agency problems are higher when a person is in charge of two tasks (Brown and Caylor, 2004). The studies of Yermack (1996) and Brown and Caylor (2004)

presents that firms are more valuable when the CEO and chairman are separate. The research of Fich and Shivdasani (2004 cited in Brown and Caylor, 2004) on 100 firms during the period of 2 years from 1997 to 1999, show that firms gained greater profit and higher market value to its book value with director stock option plans.

This study proposes the hypothesis as follows:

❖ ***H1: There is a significant relationship between CEO Duality and firm performance***

3.3.2 Board size and firm performance

Several studies concentrating on the influence of board size on company performance have mixed results. Thus, Dalton et al. (1999 cited in Nguyen et al., 2014) shows that board size is one of the most important features of board functionality, however, they found out that the scholars could not reach to a consensus about whether or not board size has an impact on firm performance.

It is argued that agency theory expects a negative correlation between board size and firm performance (Jensen, 1993 cited in Nguyen et al., 2014). There are two primary sources of the board-size effect: an increase in the problems of communication and coordination when board increases its size, and the reduced ability of the board in controlling management, which causes agency problems due to the separation of control and management (Yermack, 1996; Jensen, 1983 cited in Eisenberg et al., 1998). It is greatly believed that coordination, communication and decision-making process of large board would be slower and more complicated than that of smaller ones (Jensen, 1993; Lipton and Lorsch, 1992; Yermack, 1996 cited in Eisenberg et al., 1998). Jensen (1993, cited in Wang et al., 2013) indicates that larger boards would cause less candid discussions about managerial performance and reduce the board's ability to oppose CEO control. Therefore, the scholar emphasizes in his study as follows: "when boards get beyond seven or eight people they are less likely to function effectively and are easier for the CEO to control" (Jensen, 1993, p. 865). Yermack (1996, p. 210) also supports this view by stating that "CEO performance incentives provided by the board through compensation and the threat of dismissal operate less strongly as board size increases". He points out that there is an inverse correlation between board size and several accounting measures of profitability. Hence, limiting board size is believed to improve firm performance because the benefits of larger boards from increased monitoring are outweighed

by the poorer communication and decision-making of larger groups (Lipton and Lorsch, 1992; Jensen, 1993 cited in Bown and Caylor, 2004). Furthermore, Yermack (1996) strongly claims that decreasing board size is a strong preference for those who search for improving firm performance. He argues that some additional evidence shows that companies with small boards could achieve the highest market value. Besides, he also states that several results of operating efficiency and profitability present a negative correlation with board size over time within companies. Stock returns of a set of companies show significant changes in board size, which indicates that investors react negatively when the boards become larger and positively when the boards reduce their size (Yermack, 1996). Similarly, Eisenberg et al. (1998) report that firms having small board size would achieve higher returns on investment in comparison with their peers.

Board size has several implications for board independence. According to Shaw (1981, cited in Muth and Donaldson, 1998), a smaller board may be easily influenced and controlled because of potential social unity, meanwhile, a larger board will require the CEO to spend more time and effort to gain consensus when dealing with a particular situation. Thus, the board's independence is increased when the board is large, which makes the influence of the CEO on the board be diminished. As a result, it would be harder for the CEO to aim for dominating the board (Muth and Donaldson, 1998). Anderson et al. (2004 cited in Brown and Caylor, 2004, p.6) also claims that the cost of debt is lower for large boards because the creditors may assume that those firms "having more effective monitors of their financial accounting processes". Some evidence is found to support for larger boards. The research of Chaganti et al. (1985 cited in Muth, Donaldson 1998) on the correlation between board size and bankruptcy argues that unsuccessful firms in their sample tend to have smaller boards than successful ones. They suggest that larger boards would be more independent of management, which explains for the correlation between larger boards and higher performance.

The scholars also have different views about the size of an effective board. Jensen (1993 cited in Mak and Kusnadi, 2005) argues that boards having more than seven to eight members seem to be less effective because of problems in communication, coordination and decision-making. He also claims that this size of board is more likely to be greatly influenced by the CEO. Nevertheless, the research of Bhagat and Black (1999) states that that an effective board is between seven to nine members, while Brown and Caylor (2004) shows that companies

whose boards are between about six to 15 members, have higher returns on equity and higher net profit margin than those with different sizes. The research of Lipton and Lorsch (1992) is consistent with Bhagat and Black (1999), which suggests that limiting the board size to ten people would improve performance, with a favored size of eight or nine. It is strongly believed that the benefits of increasing the board size would be outweighed by the costs such as “slower decision-making, less candid discussion of managerial performance and biases against risk-taking” (Yermack, 1996, p. 186).

The empirical findings yield some mixed results. According to Nguyen et al. (2014), while several scholars believe it is a positive correlation between board size and firm performance (e.g Beiner et al., 2006), others report an inverse relationship (e.g Mak and Kusnadi, 2005; Yermack, 1996). Kiel and Nicholson (2003 cited in Finegold et al., 2007)’s research on Australian companies shows a positive correlation between firm size and firm performance for the three year average of Tobin’s Q. The studies of Daily and Dalton (1993) and Walsh and Seward (1990) also indicate that those firms having larger boards gain better financial performance (Finegold et al., 2007). Besides, Denis and Sarin (1999, cited in Finegold et al., 2007) show that market-adjusted returns are improved in firms having more directors on board. Additionally, Dalton et al. (1999 cited in Finegold et al., 2007) argue that adding more directors on the board would help firms to improve their financial performance. They suggest that this conclusion is true for firms of all size, but the impact of board size on performance was higher in smaller companies.

Nevertheless, there is a wide range of evidence consistent with the finding of a negative correlation between board size and firm value (Yermack, 1996). The scholar states that financial measures and market value of firms with smaller boards are improved significantly. He suggests that when board changes its size from small to medium, the largest proportion of lost value would take place. Nevertheless, he could not find any evidence, which supports the hypothesis that companies adjust board size as a consequence of past performance. He also claims that financial measures of profitability and operating efficiency tend to decline when board becomes larger. Besides, the performance incentives for CEO decided by board such as compensation and risk of dismissal could be reduced when board size increases (Yermack, 1996). DeAndres et al. (2005 cited in Finegold et al., 2007)’s research on the US companies concluded that there is a negative correlation between board size and firm performance measured by 12-month equity market to book value. Furthermore, the empirical findings of

Yermack (1996), Eisenberg et al. (1998) greatly support this view that large boards correlate with lower firm value measured by Tobin's E. In the study of Mak and Kusnadi (2005) about Singaporean and Malaysian firms, it is found out that there is a negative relationship between board size and firm value, which could be generalized to environments with various corporate governance system. This is compatible with the empirical findings of Yermack (1996) and Eisenberg et al. (1998) for the US market. Research in organizational behavior also reflects that large boards are less likely to be effective than small groups in decision-making (Hackman, 1990 cited in Mak and Kusnadi, 2005). In addition, large groups cost more in terms of directors' remuneration and have a tendency of adding more directors instead of replacing existing ones (Mak and Kusnadi, 2005). In the research conducted by Eisenberg et al. (1997 cited in Vo and Nguyen, 2014) on 900 small and mid-sized Finnish firms, the researchers find that there is a negative relationship between board size and return on assets and operating margin. Additionally, the study of Eisenberg et al. (1998) presents that there is a negative relationship between board size and profitability in small firms with small boards. Also, problems concerning communication and coordination could be found in smaller boards and firms. Moreover, the scholars also suggest that the optimal board size is different according to firm size.

The following hypothesis is proposed:

❖ ***H2. There is a significant relationship between board size and firm performance***

3.3.3 Board independence and firm performance

According to agency theory, board of directors is formed to monitor the management and protect the shareholders' interests because of the separation and management causing agency problems and cost, which results in the conflicting interests between managers and shareholders (Jensen and Meckling, 1976 cited in Wu and Li, 2015; Mallette and Fowler, 1992; Fama and Jensen 1983 cited in Abdullah 2004). Board independence would decrease agency cost and expropriation and increase effective monitoring, which results in a higher firm performance (Fama and Jensen, 1983; Brickely et al., 1994 cited in Saibaba 2013). Therefore, Wu and Li (2015) argue that the composition of board has a significant influence on the quality of board monitoring. Unaffiliated directors are believed to have incentive to perform their monitoring functions and not collude with CEOs at the expense of shareholders' wealth because they are more independent of management and more likely to protect their

reputation in the external market for their services (Fama, 1980; Fama and Jensen 1983 cited in Wu, Li 2015; Nguyen et al., 2014).

Dahya et al. (2008 cited in Saibaba 2013) claim that the global trend towards greater board independence is based on the assumption that outside directors would make better decisions and enhance the monitoring function. Many regulatory authorities in various countries have also emphasized the importance of board independence and require more seats for unaffiliated directors, such as the Sarbanes-Oxley Act of 2002 in the US and the Cadbury Report of 1992 in the UK (Wu and Li 2015). The studies of You et al. (1986), Agrawal and Knoeber (1996), Denis and Sarin (1997) support the view about greater board independence and argue that adding more independent directors would help firms to gain above-average stock price returns (Saibaba, 2013). Morck (2010 cited in Saibaba, 2013) indicates that unaffiliated directors are more virtuous and reasonable in their approach. Besides, it is argued that managers would have less opportunity to gain self-interests at the expense of shareholders if the board monitors management effectively (Nicholson and Kiel, 2007 cited in Nguyen et al., 2014). Consequently, the shareholders would gain more benefits. Daily et al. (2003 cited in Nguyen et al., 2014) point out that outside directors could bring critical resources for the firms and a higher fraction of outside directors would lead to higher firm performance. Hence, Fama and Jensen (1983 cited in Abdullah 2004) illustrate some critical advantages of outside directors. For example, they could provide the firm with a wide range of expertise and specific skills that are favorable for the management in terms of the direction and strategies of the corporate. This also helps to strengthen the board functions of ratifying and monitoring management decisions (Abdullah, 2004). As a result, the performance of the management and the shareholders' wealth are predicted to increase (Abdullah, 2004). Duchin et al. (2010 cited in Wu and Li, 2015) presents three views on the impact of board independence on firm performance, which are the "window dressing" view, the "entrenchment view" and the "optimization" view. The "window dressing" view implies that corporate governance would not be improved when adding more friendly unaffiliated directors who are chosen by the managers. The "entrenchment view" means that managers are required to appoint outside directors who are truly independent, hence, this would enhance monitoring function of the board. The "optimization" view states that adding more outside directors would lead to a less effective board and diminish company performance. In the research of Wu and Li (2015) on the association between outside directors and the occurrence of corporate events in the Chinese market, their findings are consistent with the "entrenchment" view, which states that

increasing the outside directors could improve firm performance by “reducing the probability of violation and the chances of connected transactions source” (Wu and Li, 2015, p.326).

Nevertheless, due to the information asymmetry between the outside directors and the CEOs, the increasing of unaffiliated directors would be less effective (Jensen, 1993 cited in Wu and Li 2015). For instance, the CEO could control the content and timing of the information provided to the board, which leads to the reduction of monitoring quality of the directors. Moreover, the CEO could choose the directors who might be unaffiliated by the law, but not indeed independent of the CEO. As a result, those unaffiliated directors could not perform their monitoring functions to serve the shareholders’ interests (Romano, 2005 cited in Wu and Li 2015). According to Defond et al. (2005), Fich (2005) and Yermack (2006), the performance of outside directors could be potentially affected because they do not have sufficient knowledge of the business or finance that is vital to ensure high quality of monitoring and ratifying (Wu and Li, 2015). Those advocates of stewardship theory argue that independent directors would cause the ineffectiveness of board monitoring and reduce firm’s financial performance (Yermack 1996, Klein 1998, Hermalin and Weisback, 2000 and Caselli and Gatti 2007 cited in Saibaba 2013). Perry (1995 cited in Abdullah 2004) also suggests that the unaffiliated outside directors may cause a negative impact on the board cohesiveness in terms of decision-making process and monitoring of management, which will not help to improve firm performance although the board mainly consists of outside directors.

The empirical findings on the relationship between firm performance and board independence are mixed. However, evidence tends to support the impact of outside directors on firm performance (Abdullah, 2004). The reason is that outside directors who are supposed to be independent of management, were “appointed for their business acumen, wide commercial experience or contacts in the government or industry” (Reay, 1994, p. 74). The study of Wu and Li (2015) clarifies the effectiveness of adding more outside directors by assessing the overall quality of board monitoring, which leads to better firm performance. This could be measured by reducing the probability of those events that cause the decrease in firm valuation. For example, the researchers show that there are three types of events, which include financial statement fraud, asset misappropriation and auditor’s negative opinion on firm’s financial report. They indicate that there is a positive relationship between an increase in board independence and firm performance measured by either in accounting return (ROA) or in stock market return. Thus, adding more independent directors would increase firm

performance and improve corporate governance because of high quality of board monitoring (Wu and Li, 2015). Furthermore, the empirical result of Mura (2007 cited in Singhchawla et al., 2011) clarifies that there is a positive relationship between the proportion of outside directors and firm performance in a large panel dataset of UK during the period from 1991 to 2001. Choi et al. (2007 cited in Singhchawla et al., 2011) also report that non-executive directors in Korean firms have a positive impact on their financial performance. Similarly, the result of the study of Singhchawla et al. (2011) shows that there is a positive effect of the proportion of outside directors on firm performance as they could monitor management action actively. This finding is consistent with the evidence on US companies given by Rosenstein and Wyatt (1990); on UK firms given by Mura (2007); and on large Australian firms given by Bonn (2004) and Bonn et al. (2004 cited in Singhchawla et al., 2011). Baysinger and Butler (1985 cited in Yermack, 1996) and Jackling and Johl (2009, cited in Saibaba 2013) also support the view that firm performance would be improved when boards consist of more outside directors. Besides, Rosenstein and Wyatt (1990 cited in Yermack, 1996) claim that investors react more positively to the appointments of outsiders. At the same time, the studies of Baysinger and Butler (1985), Hermalin and Weisbach (1991), MacAvoy et al. (1983), and Mehran (1995) show that the percentage of unaffiliated directors in 1970 associates with 1980 return on equity (Bhagat and Black, 1999). It is more likely due to the fact that more independent directors added to the board resulted in higher performance. However, Baysinger and Butler (1985 cited in Vo and Nguyen, 2014) emphasize on the advantages of both inside and outside directors. The outside directors could provide with a wide range of different skills and expertise while the inside directors would make better decisions. Thus, it is a mixture of inside and outside directors, which improve financial performance (Baysinger and Butler, 1985 cited in Vo and Nguyen, 2014). The research of Klein (1998 cited in Vo and Nguyen, 2014) shows that inside directors play an important role in increasing stock return.

In contrast, some studies suggest that adding more independent directors would cause worse firm performance. Yermack (1996 cited in Bhagat and Black, 1999) indicates that there is a significant negative correlation between proportion of unaffiliated directors and Tobin's q in an ordinary least square regression but there is no significant relationship between board structure and other performance measures. Anderson et al. (1998 cited in Bhagat and Black, 1999) also show a significant negative relationship between proportion of unaffiliated directors and price/sales ratio for single line firms. It is caused by the nature of appointments of outside directors who do not work as full-time employees, do not hold any significant

shares and have the limited time commitment that lead to the board consisting of weal outside directors (Koontz, 1967; Conyon and Peck, 1998 cited in Abdullah 2004). Therefore, their incentive and contribution to monitoring management could be low. Moreover, the empirical findings of Klein (1998), Agrawal and Knoeber(1996), Yermack(1996) report that there is a negative correlation between the proportion of independent directors and firm performance (Abdullah, 2004).

On the basis of agency theory, Hermalin and Weibach (1991 cited in Vo and Nguyen, 2014) claim that there is no correlation between board composition and firm performance and both inside and outside directors influence firm performance equitably. Furthermore, each firm has its own optimal board composition so it would be difficult to suppose that there is a significant relationship between board structure and firm performance. The studies of Mehran (1995), Klein (1998), Dalton et al.. (1998),Vafeas and Theodorou (1998) and Laing and Weir (1999) could not find any evidence about a significant performance association between proportion of outside directors and company's financial performance (Singhchawla et al., 2011). This may be due to the fact that outside directors do not have sufficient expertise on companies' specific operations (Klein, 1998 cited in Singhchawla et al., 2011). In addition, the empirical findings of Fosberge (1989 cited Abdullah, 2004) find out that there is no major difference between firms whose boards are mainly comprised of outside directors and those whose boards are not dominated by outsiders. The research of Agral and Koneber (1996 cited in Bhagat and Black, 1999) also supports this view by stating that there is no significant association between proportion of outside directors and Tobin'q. The empirical finding of Saibaba (2013) is consistent with the results of Kaur and Gill (2008) and Lange and Sahu (2008), which claims that the proportion of independent directors is not important in firm valuation.

The following hypothesis is proposed:

- ❖ ***H3: There is a significant relationship between board independence and firm performance***

4 Research and Methodology

4.1 Research Approach

The objective of this research is to study the relationship of various corporate governance mechanisms and performance of the listed Singaporean firms. In order to test the hypotheses presented above, the quantitative approach with panel data will be adopted. In the next section, the methodology of data collection will be discussed then the rationale of variables selection is also presented. After summarizing the final data, the model and step-by-step quantitative approach will be well argued to provide a comprehensive understanding. Finally, the findings will be interpreted in the context of Singaporean system as well as being in a comparison with previous studies. In each part, summarizing tables will be utilized to deliver the key take-aways

4.2 Data Collection Method

This study covers the industrial and services active Singaporean companies listed in the Singaporean Exchange (SGX), which provides full financial information for the period from 2013 to 2016. This time series is chosen with an intention of testing the impacts of Singaporean corporate governance reforms and adjusted code in 2012 on firm performance. Also, for the purpose of eliminating the unexpected effects in one year and avoiding capturing only snapshot of companies' performance as well as creating better illustration of companies' restructure and transformations, the study collects data range observing the behavior of each company for four years instead of a single year.

As a first step, the list of active companies listed in SGX is obtained from SandP Capital IQ. There are two main sources of companies in the SGX: the financial sector and the non-financial one. Due to unique features in terms of accounting standards of financial sector which make them incompatible with the non-financial ones and may distort the findings of the study, companies falling into this sector will be excluded from the sample. Therefore, the full list is filtered out without financial institutions, banks, insurance companies and real estate investment trusts. Based on the shorted list, only companies with complete annual reports

ranging from 2013 to 2016 and having available data under the study are included in the sample. In addition, the study covers the firms adopting the Singaporean Code of Corporate Governance in 2012 only, which aligns with our purpose of investigating the effectiveness of this policy reforms and their impacts on companies' performance.

The data used in this study is collected from two sources: the SandP Capital IQ database and the Annual Reports of the Singaporean companies. The SandP Capital IQ database provides the full financial data needed to estimate performance of all the companies in the sample. However, regarding to the data presenting corporate governance structure, manual method of collection is adopted from the annual reports of the companies. The reports provide full information regarding the list of board of directors with the detailed description of their title and their roles in the companies as well as the code of corporate governance that they follow. In order to avoid human errors during the input process of data from the annual reports, entries are double checked by the researchers.

Our final sample includes 137 companies, which are distributed among the industries as follows:

Table 4.1 Summary of sample distribution

Sector	Industry	No. of firms in SGX	Share of population	Sample
Industrial	Industrials	96	53%	51
	Consumer Discretionary	42	38%	16
	Information Technology	40	40%	16
	Real Estate	53	23%	12
	Consumer Staples	26	54%	14
	Materials	22	27%	6
Services	Energy	23	48%	11
	Healthcare	10	50%	5
	Utilities	5	40%	2
	Telecommunication Services	5	80%	4
Total		322		137

Source: summarized by the authors from Capital IQ Database

As being evident from the summary table of data collection, the final sample is well diversified among the industries in Singapore. All the representatives of each industry contributed to the final sample with a proper distribution, in which the number of companies belonging to the Industrial sector constitutes the greatest proportion of the whole sample while those in Telecom services and Utilities sectors account for only marginal part. This proportional distribution would enhance the representativeness of the sample and limit the bias towards a specific industry. The total number of 137 observations can also be considered to be a reliable sample with relatively high confidence level.

4.3 Variables

In order to test the hypotheses outlined in Chapter 3, it is necessary to develop testable proxy variables. The development of proxy variables is not straightforward, as made evident by the wide variety of proxy variables used in the previous literature. All the variables in our models are based on previous literature and in order not to exclude variables that may have explanatory implications reflecting the performance of firms over a period; we chose to include more than one variable proxy for performance measuring. There are three types of variables, including dependent variables, independent variables and control variables.

4.3.1 Dependent variables

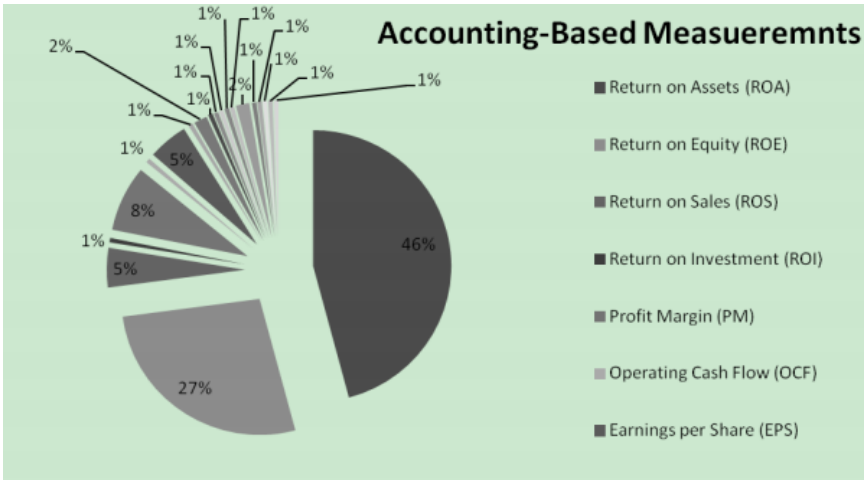
Historically, different measurements have been used to examine the firm performance in various studies. The most popular variables for financial situation of firms include ROA, ROE and Tobin's Q (Al-Matari et al., 2014). These measures can be categorized into two groups: accounting-based and market-based. While the former group evaluates the current financial health of the firm most effectively, the latter one takes into account the value of the companies under investors' perception about potential growth (Investopedia, 2017).

Market-based variables

Tobin's Q is the most popular proxy for market-based firm performance, which was adopted in a number of studies (Yermack, 1996; Weir et al., 2002; Mak and Kusnadi, 2005; Vo and Nguyen, 2014). According to the report by Al-Matari et al., (2014), 78% of papers studying the effects of corporate governance on firm performance used Tobin's Q as the variable for

market-based performance. This measurement has the feature of forward-looking and reflection of investors' expectation concerning the firm's growth prospects (Al-Matari et al., 2014). The ratio is interpreted in a way that a high Q shows firm's future potentiality and success in leveraging its investment to develop the company that is valued more in the market compared to its book value (Al-Matari et al., 2014).

Figure 4.3.1 Market-based measurements in corporate governance studies



Source: Al-Matari et al., 2014

The ratio was first proposed by Brainard and Tobin (1968 cited in Vo and Nguyen, 2014) with the original formula:

$$Q = \frac{\text{market value of outstanding stock} + \text{market value of debt}}{\text{replacement of all production capacity}}$$

In recent years, Tobin's Q ratio is modified (Bhagat and Bolton, 2008 cited in Vo and Nguyen, 2014) as follow:

$$Q = \frac{\text{Total asset} + \text{market value of equity} - \text{book value of equity} - \text{deferred tax}}{\text{Total assets}}$$

This calculation approach has the benefits in terms of data availability, therefore would be adopted in this study.

Accounting variables

Regarding accounting base, ROA (return on asset) and ROE (return on equity) are two most popular ratios in previous studies when it comes to firm performance (Yermack, 1996; Weir at al., 2002; Kiel and Nicholson, 2003; Vo and Nguyen, 2014). As can be illustrated by the

graph, ROA and ROE account for the highest proportions in previous research with 46% and 17% respectively (Al-Matari et al., 2014).

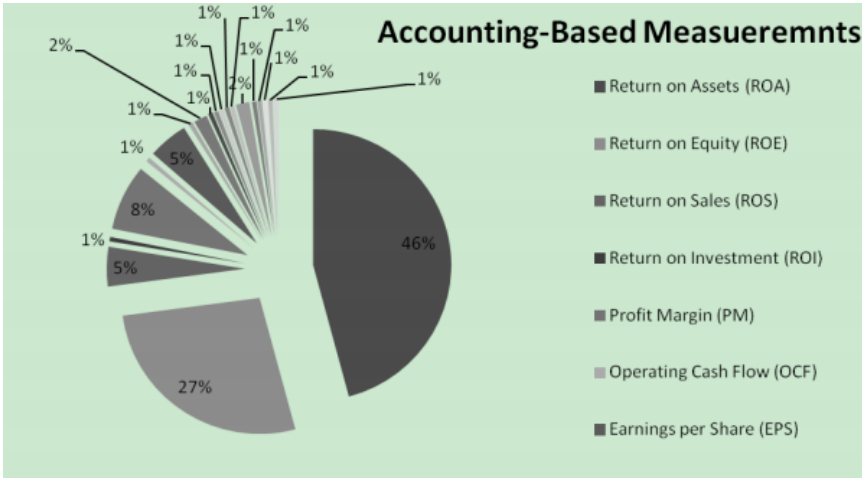
Return on assets is an indicator of how profit a company is or how efficient is the management as using its assets to generate earning, and is sometimes referred to as Return on Investment (Investopedia, 2017). It is calculated by dividing a company's net income by its total assets:

$$\text{Return on Assets (ROA)} = (\text{Net Income}) / (\text{Total Assets})$$

Return on Equity measures the profit of the company by revealing how much profit the company generates regarding to the amount of the money invested by the investors. It is calculated by dividing a company's net income by its total equity (Investopedia, 2017). It is also known as:

$$\text{Return on Equity (ROE)} = (\text{Net Income}) / (\text{Total Equity})$$

Figure 4.3.2 Accounting-based measurements in corporate governance studies



Source: Al-Matari et al., 2014

4.3.2 Independent variables

For corporate governance, in this study, board composition, board structure and CEO characteristic are used as proxies. The relevant information is extracted from the annual reports of listed companies.

Regarding CEO characteristic: CEO-chairman duality is evaluated by using binary variables

in which one is for the case CEO serves as chairman and zero otherwise. Regarding board of directors' structure and composition, the study investigates two proxies including board size and board independence. For board size, the total number of directors serving in the board within a fiscal year is counted and treated as a variable. For board independence, the independent level of board is measured by the ratio between a number of independent members and the total members in the board (Vo and Nguyen, 2014). According to Singaporean Code of Corporate Governance (2012), independent directors are defined as:

An "independent" director is one who has no relationship with the company, its related corporations, its 10% shareholders or its officers that could interfere, or be reasonably perceived to interfere, with the exercise of the director's independent business judgment with a view to the best interests of the company (Monetary Authority of Singapore, 2012, p.4).

4.3.3 Control variables

According to Zahra and Pearce (1989 cited in Vo and Nguyen, 2014), firm size is a crucial factor when examining the relationship between corporate governance and firm performance because of the fact that the characteristics of board and management team are usually correlated to size of firm. As a result, firm size has become a common control variable in various studies (Vo and Nguyen, 2014). In this study, sales and total asset turnover are used as proxies for control variables.

Table 4.2 Summary of variables selection

Variables	Definition	Measurement
Dependent variables		
<i>Q</i>	Tobin's	$\frac{\text{Total asset} + \text{market value of equity} - \text{book value of equity} - \text{deferred tax}}{\text{Total assets}}$
<i>ROA</i>	Return on assets	$\frac{\text{Earning after tax}}{\text{Total assets}}$
<i>ROE</i>	Return on equity	$\frac{\text{Earning after tax}}{\text{Total equity}}$
Independent variables		
<i>CEODUL</i>	CEO duality	<i>Coded "1" if CEO is also chairman and "0" for other case</i>
<i>SIZE</i>	Board size	<i>Total number of board of directors</i>
<i>INDE</i>	Board independence	<i>Proportion of independent members over total members</i>
Control variables		

<i>SALE</i>	Firm size	<i>Total net sales of the company</i>
<i>TURNOVER</i>	Asset turnover	$\frac{\text{Net sales}}{\text{Total assets}}$

4.4 Methodology

This empirical study follows the panel data approach. According to Brooks (2008), panel data analysis (also longitudinal data or cross-sectional time series analysis) is adopted in cases where dataset comprise both time series and cross-sectional elements, specifically studying multiple subjects (for example firms) over a number of time periods. In our study, two kinds of information are presented as follows: a) the cross-sectional information reflected in the different variables representing specific features of Singaporean firms under the study and b) the time series (four-year period) information reflected in the changes within the studied firms over time. There are broadly two classes of panel data analysis approaches that can be employed: fixed effects estimation and random effects estimation (Brooks, 2008).

4.4.1 Fixed Effects Estimation

Letting i denote the cross-sectional unit and t the time period, we can consider a panel data model with k observed explanatory variables as:

$$y_{it} = \beta_1 x_{it1} + \beta_2 x_{it2} + \dots + \beta_k x_{itk} + a_i + u_{it}, \quad t = 1, 2, \dots, T. \quad (1)$$

In the above model, the variable a_i captures all unobserved, time-constant factors that affect y_{it} . The model in equation (1) is called unobserved effects model or a fixed effects model. The error u_{it} is often called the idiosyncratic error or time-varying error, because it represent unobserved factor that change over time and affect y_{it} (Wooldridge, 2009).

Regarding estimation of the parameters of interest β_j given panel data framework, one possibility is pooling all cross-sectional and time series data without distinguishing them and use OLS for estimation (Wooldridge, 2009). However, in order for pooled OLS to produce a consistent estimator of β_j , the model should satisfy assumption that the unobserved effect, $v_{it} = a_i + u_{it}$, is uncorrelated with x_{itj} . Even if the idiosyncratic error u_{it} is uncorrelated

with x_{itj} , pooled OLS is biased and inconsistent if a_i and x_{itj} are correlated (Wooldridge, 2009).

Correlation between a_i and explanatory variables is a common case of panel data. Another possibility to obtain consistent estimation of β_j but still allow the existence of correlation between v_{it} and explanatory variables is to use fixed effects or first difference models. The criterion to choose between these two models is whether there is serial correlation in idiosyncratic errors u_{it} . If u_{it} are serial uncorrelated, fixed effects estimator is more appropriate than first difference. In nature, fixed effects estimator is obtained by applying OLS to time-demeaned transformation on the data, while first difference estimator is by applying OLS to differenced data. For both models, the key to make their estimator consistent is strict exogeneity assumption (Wooldridge, 2009).

4.4.2 Random Effects Estimation

Consider the same unobserved effects model mentioned above:

$$y_{it} = \beta_1 x_{it1} + \beta_2 x_{it2} + \dots + \beta_k x_{itk} + a_i + u_{it}, \quad t = 1, 2, \dots, T.$$

While using fixed effects or first difference, the goal is to eliminate a_i because it is thought to be correlated with one or more x_{itj} . But supposing that a_i is uncorrelated with each explanatory variable in all time periods, using such transformations to eliminate a_i results in inefficient estimators (Wooldridge, 2009).

The model above becomes a random effects model when we assume that the unobserved effect a_i is uncorrelated with each explanatory variable.

$$\text{Cov}(x_{itj}, a_i) = 0, \quad t = 1, 2, \dots, T; j = 1, 2, \dots, k.$$

Defining the composite error term as $v_{it} = a_i + u_{it}$, we can see that since a_i is in the composite error in each time period, the v_{it} are serially correlated across time. The random effects estimator is, in essence, a generalized least squares (GLS) estimator that takes into account this serial correlation.

$$\text{Corr}(v_{it}, v_{is}) = \frac{\sigma_a^2}{\sigma_a^2 + \sigma_u^2}, t \neq s \quad (2)$$

in which: $\sigma_a^2 = \text{Var}(a_i)$ and $\sigma_u^2 = \text{Var}(u_{it})$

If there is no serial correlation, $\sigma_a^2 = 0$ (no unobserved effect); the regressors satisfy strict exogeneity; and u_{it} is non-autocorrelated and homoscedastic, then pooled OLS and random effects models will both be efficient. If $\sigma_a^2 > 0$ and with same assumption of strict exogeneity, non-autocorrelation and homoscedasticity, random effect model is more efficient. Therefore, the most common criteria to choose between two models is to test $H_0: \sigma_a^2 = 0$ which is available in Lagrange multiplier test by Breusch and Pagan (1980).

4.4.3 Choosing between Fixed Effects and Random Effects Model

An important consideration when choosing between random effects and fixed effects approach is that whether a_i are correlated with x_{itj} . Hausman (1978) proposes a test on this issue, which in general involves comparing one estimator which is consistent regardless of whether the null hypothesis is not true or not, to another estimator which is only consistent under the null hypothesis (Greene, 2007). The idea is that one uses the random effects estimates unless the Hausman test rejects hypothesis a_i are uncorrelated with x_{itj} .

5 Data Interpretation

5.1 Descriptive Analysis

The analysis starts with the descriptive statistics examining the preliminary features of the data. Table 5.1 presents the data summary for 548 observations over four year (2012-2016) with main measures such as mean, median, maximum, minimum, standard deviation, skewness, kurtosis for all independent, dependent and control variables under the study.

Table 5.1 Descriptive results

	ROA	ROE	TOBINCQ	DUAL	INDE	SIZE	SALES	TURNOVER
Mean	2.887418	7.498108	1.268139	0.330292	51.47398	7.135036	1232.884	0.817274
Median	2.850000	7.395000	0.978196	0.000000	50.00000	7.000000	179.3000	0.708000
Maximum	24.90000	492.5000	8.633732	1.000000	91.66667	17.00000	85816.10	4.310000
Minimum	-50.20000	-380.7000	0.355224	0.000000	14.28571	4.000000	0.001000	0.000000
Std. Dev.	6.039979	37.77277	0.938724	0.470748	14.21402	2.047876	6365.341	0.707416
Skewness	-2.188701	2.392510	3.787575	0.721673	0.504606	1.140570	10.83202	1.987094
Kurtosis	20.94699	81.57271	22.31741	1.520812	3.199965	4.647406	130.8446	8.529872
Jarque-Bera	7792.012	141488.3	9830.786	97.52677	24.16899	180.7839	383910.1	1058.865
Probability	0.000000	0.000000	0.000000	0.000000	0.000006	0.000000	0.000000	0.000000
Sum	1582.305	4108.963	694.9402	181.0000	28207.74	3910.000	675620.3	447.8660
Sum Sq. Dev.	19955.30	780449.9	482.0180	121.2172	110515.0	2294.007	2.22E+10	273.7389
Observation	548	548	548	548	548	548	548	548

Regarding the CEO duality ratio, as can be seen from the table, mean of the sample is around 0.3. This result is aligned with the finding of Nguyen and Nguyen (2016), in which mean for duality ratio in Singapore is 0.35. This finding indicates that a majority of companies in Singapore follows the mechanism of role separation between CEO and Chairman. In other words, although Singapore Code of Corporate Governance has the feature of “comply or explain”, most of the companies choose to comply with recommended regulation.

In terms of independence level, the average percentage of total number of independent directors over the whole board is around 51%. The company with the highest independence ratio has up to 92% of independent directors representing in the board while the one with

smallest level has only 14% of independence constitution. This result is relatively compatible with the findings in the study of Nguyen and Nguyen (2016), whose result for independence ratio is around 61%. The finding that half of the directors in the board are independent in average could be explained by the regulations in the revised code 2012, which states that independent directors have to make up at least one-third of the board and this number should be increased to half of the board in case of CEO duality (Monetary Authority of Singapore, 2012). This statistic also indicates the strong element of independence in Singaporean corporate governance structure, which contributes to the high transparency index in this country.

With regard to board size, the average number of director in the management board is about seven. This result is quite similar to the findings of Mak and Kusnadi (2005) and Nguyen and Nguyen (2016), who both have the same number of seven directors in terms of board size. The range for the board size, however, is rather large with the lower and upper limit are four and seventeen respectively. Although there is no specific range of number of directors as stated in the Code, it is still recommended that the company should take into account the nature of business operations on decision of board size in order to facilitate effective decision making and more importantly the size should not be too large to be unwieldy (Monetary Authority of Singapore, 2012). As suggested by Jensen (1983) and Lipton and Lorsh (1992), the optimal number for board size should be seven to eight and the upper limit should not be over ten directors. Therefore, as this recommendation, the average Singaporean rate is up to the suggested standard but, as our statistics, appropriate 6% of the sample companies still have much higher size than the recommended one (more than ten directors in the board). This indicates that, in general, Singaporean companies are featured by small and medium-sized boards. The large size choice could be arise from a different rationale: some specific features of the firm itself such as firm size, firm age or management preference or the perspective of getting more diversified skills and expertise for the board.

The mean value for ROA and ROE are 2.9 and 7.5 respectively, which indicates high performance in the sample. However, the ratios are far different among companies with wide range between min and max values. Tobin's Q is also reported at 1.2 in average, which implies that Singaporean firms are creating value for investors.

5.2 Pairwise Correlation

Pairwise Correlation analysis is used to test the problem of multicollinearity which may arise among independent variables. Specifically, this problem occurs when two or more independent variables are highly correlated with each other, which may distort the results of regression (Hair et al., 2010). In other words, high correlation between independent variables could bring about unreliable findings. Table 5.2 exhibits the correlation matrix explaining how the independent variables under the study are correlated with each other.

Table 5.2 Pairwise Correlation results

	DUAL	INDE	SIZE	SALES	TURNOVER
DUAL	1.000000				
INDE	-0.066096	1.000000			
SIZE	-0.213230	-0.008981	1.000000		
SALES	-0.106285	0.126895	0.346002	1.000000	
TURNOVER	-0.034402	-0.041011	-0.072030	0.367762	1.000000

As being illustrated in the table, all the statistics are below 0.8, which is a critical level for considering the multicollinearity problem (Hair et al., 2010). Therefore, in this analysis, there is no multicollinearity among the variables. As can be seen, the highest correlation is between sales and turnover ratios with positive relationship. It is understandable because both imply size and profitability of the companies and those with higher sales tend to have higher turnover ratio. Also, the correlation between size and sales is relatively high with the level of approximately 0.35. This relationship could be explained that firms with high revenues and bigger business scope tend to have correspondingly larger board size to manage. In addition, it is found that both duality and independence element are negatively related to size of the board. In this case, the larger the board is, the more likely that CEO and Chairman are not sitting in the same position. Therefore, the duality tendency seems more popular in small-sized companies. Also, the large board does not necessarily have higher independence level compared to the smaller ones because in this study, it shows the inverse trend even though the correlation ratio is so marginal. Finally, the negative relationship is also found between duality and independence level, which indicates that the companies adopting the separation of role between CEO and Chairman also design a high independent board. However, the statistic is so small (-0.06) that it is highly skeptical to firmly conclude this relationship.

5.3 Regression Analysis

For each dependent variable, tests for random and fixed effects would be implemented in order to identify the most appropriate model.

Regarding testing the relationship between ROA and independent variables, firstly, Hausman test would be applied with the following hypotheses:

H_0 : Random effects in model is appropriate

H_1 : Fixed effects in model is appropriate

As stated in the results (Appendix A), p-value is less than 0.05 which indicates that the null hypothesis is rejected. Then we continue to determine whether the fixed effects exist by running redundant fixed effects tests. The different redundant fixed effects are employed for:

- (1) Restricting the cross-section effects to zero
- (2) Restricting the period effects to zero
- (3) Restricting both types of fixed effects to zero.

According to the results (Appendix B), p-values are zero in the cases (1) and (3) while is much bigger than 0.05 (significant level) in the case (2). Hence, we can conclude that only the restriction of period effects is supported and there are fixed effects in the data. To estimate the cross-section data with fixed effects, we have introduced two methods: Fixed Effect and First Differencing Model. The key to choose between them is whether the idiosyncratic error is serially uncorrelated or not. We conduct an estimation of the differenced idiosyncratic errors on its lagged one period to determine this criterion (Appendix C). It shows that there is substantial negative serial correlation in the differenced idiosyncratic errors, which means there is not very substantial, positive serial correlation in the idiosyncratic errors at level. We can conclude that the Fixed Effect model is better. This model is run with White cross-section coefficient variance method to remove heteroscedasticity error (Appendix D).

For ROE case, we also use Hausman test to check the correlation between random effects and explanatory variable. The obtained p-values is 0.0631 (Appendix E) is significantly bigger than significant level 0.05, so random effects model is preferable. Then Lagrange Multiplier

(LM) test by Breusch – Pagan (Appendix F) is used to check for the presence of the unobserved random effect in the data. This test helps decide between a random effects regression and a simple OLS regression. The null-hypothesis of the LM-test is that variances across companies are zero, which means there is no significant difference across companies or no panel effect in the data. The results (Appendix G) demonstrate that we can reject the null hypothesis, or the random effects exist in the data. The result of random effect estimation for ROE is shown in Appendix 7.

For Tobin’s Q, the p-values in Hausman test is 0.4177 which is much bigger than significant level. Preceding the same testing steps as in ROE case, we use random effects estimation for Tobin’s Q (Appendix K).

Table 5.3 Summary of results for impacts of corporate governance on firm performance

	Expected sign	ROA		ROE		Tobin’s Q	
		Coefficient	p-value	Coefficient	p-value	Coefficient	p-value
Intercept		-7.204364**	0.0207	-34.67190***	0.0008	0.718053***	0.0053
<i>DUAL</i>	-	-0.747933	0.1920	0.017894	0.9934	-0.130948	0.1718
<i>INDE</i>	+	-0.000601	0.9730	-0.078300	0.5788	0.000537	0.8927
<i>SIZE</i>	-	-0.343556	0.1314	-5.099649**	0.0000	-0.055718***	0.0009
<i>SALES</i>		-0.000230**	0.0400	-0.000868***	0.0012	-1.27E-05**	0.0035
<i>TURNOVER</i>		10.03546***	0.0000	13.31028***	0.0000	0.224893***	0.0051
Number of obs.		548		548		548	
R-squared		0.708836		0.053798		0.020038	

Note: The table shows panel data analysis models examining the relationship between corporate governance mechanism and firm performance. Coefficients which differ significantly from zero at less than the 0.01 level are marked with three asterisks, those less than the 0.05 level are marked with two asterisks while those significant at the 0.10 level are marked with one asterisk. *DUAL* is a dummy variable presenting CEO duality, in which 1 is for the case CEO and Chairman is the same person and 0 otherwise. *INDE* variable is denoted for percentage of independent directors of the total directors in the board. *SIZE* presents for the total number of directors in the board. *SALES* is calculated by the total revenue of the company in a fiscal year. *TURNOVER* is the ratio of net sales over total asset.

5.4 Interpretation of findings

5.4.1 CEO Duality hypothesis

As shown in the table 5.3, the CEO duality is not statistically supported with insignificant p-value in all three dependent variables. The results are also mixed among three performance ratio: while there is negative relationship in duality and ROA/Tobin's Q, ROE is positively related to CEO duality. These results are aligned with the findings of different studies in Singapore context. Nguyen and Nguyen (2016), for example, also get insignificantly statistical findings when it comes to testing the relationship between firm performance (Tobin's Q) and role duality. However, this result is not consistent with different studies proving the relationship existing between the two. Pi and Timme (1993 cited in Che Haat, 2010) claim in their study that the separation of CEO and Chairman shows higher Return on Assets and cost efficiency ratios. Yermack (1996) also finds the relationship between separation of the two functions and price-to-book multiples.

Our finding would not be in favor of either agency theory or stewardship theory. On the one hand, agency theory assumes that the mechanism in which different persons serve as CEO and Chairman should be a good governance practice for shareholders' interests because it could facilitate the monitoring and control process of top management when assuring that not too much power is put in only one hand (Koufopoulos et al., 2010). On the other hand, stewardship theory proposes a different perspective against the CEO separation, reasoning that this role duality could simplify the management process and accelerate the decision-making as well as establish a uniform command (Koufopoulos et al., 2010). In the case of Singapore context, we found neither statistically significantly positive nor negative relationship to be in favor of either theory. The possible explanation for this unrelated finding is the characteristics of Singaporean corporate governance structure. As discussed in the descriptive results, majority of Singaporean companies follow the separation of role system. Also, for the companies with CEO duality, the independence element has to be at least half of the board as stated in the Code of Corporate Governance (2012). This characteristic of high independence level in the board could serve as the moderating factor for the impact of CEO duality on firm performance (Duru et al., 2016). According to Duru et al. (2016), the statistically significant negative relationship between the two is found only in the case of companies with small proportion of independent directors in the board. In their robustness test, these impacts are mitigated to a degree that they eventually disappear and even turn out to be positive as the independence level increases further. This vigilant structure allows the board to control more effectively with little concern over agency problems. In addition, with high transparency level, especially in terms of information availability and publishing, the

associated problems related to agency and stewardship theories are minimized in the Singaporean market.

In addition, according to the studies of Faleve (2007); Hermalin and Weisbach (1998); Raheja, (2005), due to the endogenous features in the choice of leadership structure of the board, the results on the relationship between duality and firm performance are often ambiguous as a result of endogeneity problems, which consequently makes it hard to identify a causal relationship between the two (Duru et al., 2016). Consistent with these findings, Linck, Netter and Yang (2008 cited in Duru et al., 2016) also report that firm performance is not driven by CEO duality.

5.4.2 Board size hypothesis

The results illustrate that there is a negative relationship between board size and firm performance in all measurements of firm value, in which the statistical significance presents at more than 99% level of confidence in ROE and Tobin's Q. These findings are consistent with those of the studies focused on Singapore context by Nguyen and Nguyen (2016) as well as by Mak and Kusnadi (2005), who all conclude the negative relationship between board size and Tobin's Q of firms. Compared to studies in other countries, our empirical findings are also aligned with the results of Yermack (1996) and Eisenberg et al. (1998), who studied the sample of US and Finnish firms respectively and claim that large boards are associated with lower value of firms (both as measured by Tobin's Q).

Our findings support the agency theory in the way that larger board size is less effective than the smaller one especially when it comes to the communication process and candid discussions of managerial performance as well as biases against risk-taking therefore may diminish firms' value (Yermack, 1996). Although proponents of resource dependence may argue the benefits of larger board in terms of more diversified skills and expertise, the cost of slower decision making and face-value board meeting may overweight in this case. However, the more critical question is how large the board is to be considered to be "too large". Jensen (1993) suggests the optimal size should be around seven to eight directors and greater number may negatively affect group dynamics and damage board performance. Holding a relatively similar perspective, Lipton and Lorsch (1992 cited in Yermack, 1996) propose an upper limit of ten in the board with the preferred size of eight or nine. In the case of Singapore, our descriptive findings also indicate an average number of seven to eight regarding board size,

which should be the optimal one to utilize the impacts of diversified sources of skills and manageable group. However, we also find the upper limit of the sample is 14, which is far higher than the recommended size. These companies, as statistically significant inverse relationship, might fail to establish an effective board to create values both in accounting and market measurement. While we hold a critical view about the argument that the number of directors constituting the board may arise endogenously as a function of other variables such as firm size or CEO's preference, the significant results still implies the potential impacts of board size on Singaporean firm's performance.

5.4.3 Board independence hypothesis

The regression results show that the presence of independent directors on boards is insignificantly associated with firm value in Singapore market. The results are also mixed among different performance measurements. While the relationship is negative between independence level and accounting value measured by ROA and ROE, this level is positively related with market value by Tobin's Q. In other words, higher number of independent directors in the board does not improve book value or profitability of the firm but may enhance its potentiality and growth in the eyes of outside investors. This result is consistent with the findings by Nguyen and Nguyen (2016), who also found no statistically significant relationship between independence element and firm performance in Singapore. Explaining for these findings, Campell and Minguex-Vera (2008 cited in Nguyen and Nguyen, 2016) state that the monitoring role of independent directors plays a more critical part as internal corporate governance mechanism in the countries where the external corporate governance mechanisms such as policies and regulations are under-developed and non-transparent. In these markets, according to Campell and Minguex-Vera (2008 cited in Nguyen and Nguyen 2016), if independent and non-executive boards have no real power and play a vague role, the board will be eroded under no effective monitoring system, allowing the opportunists to pursue perks at their self-interests. Therefore, in Singaporean market, which is characterized by an advanced institutional environment and transparent corporate governance regulations system, the role of independence elements in the board does not necessarily imply a profound reform and make much difference for firm value under investors' perspectives.

Also, the finding supports the argument that companies may include non-executive directors in the board for legitimacy purpose rather than improvement of firm performance (DiMag and

Powell, 1983 cited in Nguyen and Nguyen, 2016). In other words, some companies might increase independence elements in their board merely in order to show that they strictly comply with the law and thus may not necessarily have benefits on firm performance (DiMag and Powell, 1983 cited in Nguyen and Nguyen, 2016). As being claimed in the study by Wang and Oliver (2009 cited in Fuzi et al., 2016), mere compliance with Code of Corporate Governance for independence level is not enough if the monitoring power of such directors are jeopardized by some tactics. For example, the executive director might “appoint someone that has had experience in passive board, irrelevant background or without knowledge to challenge the executive powers” (Fuzi et al., 2016, p.464), therefore the surveillance function of independent directors might not be exercised properly as it is meant to be. In this case, this mechanism has no relationship or even deteriorating impacts on firm performance.

6 Conclusion, research limitations and suggestions for further studies

6.1 Conclusion

This study investigates the impacts of corporate governance mechanisms on firm performance in Singapore market. Since the Asian financial crisis in 1997, major reforms in corporate governance and institutional systems in this region have been witnessed. Singapore is one of the countries implementing drastic changes in improving their governance system with amended regulations to complete the Code of Corporate Governance. Being regarded as the best example of an advanced and highly developed governance environment in the region, Singapore is not, however, the focused subject of studies about corporate governance especially compared to the body of research in Western markets. Using the sample of 137 firms listed on SGX covering the period from 2013 to 2016, our research studies the relationship between some critical aspects of corporate governance including the CEO duality; the board independence and the board size with firm performance, which is measured in both accounting ratios (ROA and ROE) and market-value ratio (Tobin's Q). Approaching by Ordinary Least Square regression with panel data and robustness test for random or/and fixed effects embedded in the models to, the results show no statistical significance in the case of CEO duality and board independence on firm performance but negatively significant relationship between board size and firm performance specifically with ROE and Tobin's Q. These findings are consistent with those of previous studies in Singapore, which have specific features of corporate governance system explaining for the results. High level of transparency and independence as required by regulations; clear role division; efficient monitoring system as well as advanced and highly developed governance system are some of the most critical features of this market accounting for less profound impacts of CEO duality and board independence on firm value creation. Our findings, therefore, do not support agency theory and stewardship theory in this sense. However, when it comes to the impact of board size, our results are in favor the agency theory in the way that smaller board is more efficient than the big ones especially regarding communication and decision processes. Although our study could not examine the optimal size for the most effective board, the descriptive results show that majority of Singapore companies have the board constituted by around seven to eight

directors, which are the preferred number for board size in well known studies by Lipton and Lorsch (1992) and Jensen (1993). In general, the study contributes to the existing body of corporate governance research in terms of providing a new insight into a quite new market in Asian region, which is highest-ranked country regarding efficiency of governance mechanism. the important finding of our study is that this good-example performance is not driven by two classical governance structures, which should, under agency and stewardship theory, have positive impacts on firm performance. therefore, the implication here is that following a suggested code in terms of structure may not be enough to guarantee an effective monitoring and surveillance functions of the board. The benefits from the choice of board size, on the other hand, might imply the efficiency of a dynamic group with small to medium number of directors.

Considering the practical implications for our research, the results deliver some important takeaways for the management team, companies, government and law makers and other markets in the region. Firstly, the study provides the comprehensive insights into Singapore market with its notable features of corporate governance systems. By testing these features in relation with firm performance under the classical theories such as agency theory, stewardship theory as well as in comparison with previous studies, our research could be an important framework for management team in the companies to refer to when assessing the effectiveness of their governance systems. In addition, providing a comprehensive understanding about one of the most advanced corporate governance markets, this study could serve the guideline for other less developed countries in the region seeking a good case for their reforms in corporate governance practices in order to gain positive impacts on firm performance. However, from the findings of our study, we could also argue that the formality of following the regulation regarding governance structure is not necessarily deliver a positive impacts on the bottom line of a firm, reflecting by the results that two classical mechanisms (CEO duality and board independence) are not supported by the statistics. Therefore, we recommend that, in line with suggested structures, regulations regarding governance practices are equally critical in assuring the efficient monitoring system.

6.2 Research Limitations

Regarding scope of the study, because of time constraints, our research is limited when

focusing on some of the important aspects of corporate governance mechanisms, including CEO duality, board size and board independence while leaving out other equally critical points such as board diversity, committees, ownership structure, etc. Also, our selected period only covers four fiscal years from 2013 to 2016, which would not make much sense in panel data model and long-term study implications. More importantly, it should be emphasized that our study only focuses on the impacts of corporate governance structures rather than the real practices. For corporate governance mechanisms to be effective in monitoring management, the practices are argued to be more important than the structures themselves (Mak and Kusnadi, 2005). For example, according to Mak and Kusnadi (2005), a board which has supposed-to-be optimal structural attributes still unlikely functions effectively if they do not hold regular and fruitful meetings and the independent directors are somehow only independent in form rather than in substance. However, even being aware of these limitations, due to data availability and difficult access and measurements, existing body of research in corporate governance mostly focus on structures rather than practices.

In addition, considering the fact that the characteristics of corporate governance structures might arise endogenously due to specific features of each firms, our model still limited in terms of restraining these factors and including important controlling variables, and therefore the findings have limited power in practical implications for firms and policy makers.

6.3 Suggestions for further studies

This study has some suggestions for future research. First of all, it is due to the highly persistent characteristics of corporate governance structure variables, the four-year data in this study may not provide a thorough explanation of the dynamic feature of corporate governance - financial performance correlation (Nguyen et al., 2014). Thus, Wintoki et al. (2012 cited in Nguyen et al., 2014) suggest that a longer time set of data would enhance future research and help researchers to solve the problem concerning the highly constant change of corporate governance structure variables. Because Singapore experienced significant changes in the code of corporate governance in 2012 while our research focuses on a four-year phase from 2013 to 2016, this opens the door to future study for a longer period to examine comprehensively the relationship between corporate governance and firm performance during, before and after the changes. Secondly, there are three observable corporate

governance structures are examined in the research, which consist of CEO duality, board size and board independence on a sample of 137 listed companies. Thus, we suggest that this research could be broadened on a larger sample in order to evaluate more accurately the comprehensive picture of the effects of corporate governance practices on firms' financial performance.

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Appendix A

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	43.979667	5	0.0000

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
DUAL	-0.747933	0.402375	2.006744	0.4168
INDE	-0.000601	0.017507	0.001238	0.6068
SIZE	0.343556	0.692453	0.065832	0.1739
SALES	-0.000230	-0.000233	0.000000	0.9746
TURNOVER	10.035463	4.502427	0.796420	0.0000

Appendix B

Redundant Fixed Effects Tests

Equation: Untitled

Test cross-section and period fixed effects

Effects Test	Statistic	d.f.	Prob.
Cross-section F	5.822490	(136,403)	0.0000
Cross-section Chi-square	595.591934	136	0.0000
Period F	0.730607	(3,403)	0.5342
Period Chi-square	2.972364	3	0.3959
Cross-Section/Period F	5.764139	(139,403)	0.0000
Cross-Section/Period Chi-square	599.866521	139	0.0000

Appendix C

Dependent Variable: RESID_DROA

Method: Panel Least Squares

Date: 05/21/17 Time: 17:48

Sample (adjusted): 2015 2016

Periods included: 2

Cross-sections included: 137

Total panel (balanced) observations: 274

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID_DROA(-1)	-0.456401	0.043354	-10.52737	0.0000
R-squared	0.288244	Mean dependent var		0.135282
Adjusted R-squared	0.288244	S.D. dependent var		5.135966
S.E. of regression	4.332989	Akaike info criterion		5.774035
Sum squared resid	5125.520	Schwarz criterion		5.787222
Log likelihood	-790.0429	Hannan-Quinn criter.		5.779328
Durbin-Watson stat	1.665149			

Appendix D

Dependent Variable: ROA
 Method: Panel Least Squares
 Date: 04/24/17 Time: 16:36
 Sample: 2013 2016
 Periods included: 4
 Cross-sections included: 137
 Total panel (balanced) observations: 548
 White cross-section standard errors & covariance (d.f. corrected)
 WARNING: estimated coefficient covariance matrix is of reduced rank

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-7.204364	3.101675	-2.322733	0.0207
DUAL	-0.747933	0.572353	-1.306769	0.1920
INDE	-0.000601	0.017753	-0.033871	0.9730
SIZE	0.343556	0.227252	1.511788	0.1314
SALES	-0.000230	0.000111	-2.060685	0.0400
TURNOVER	10.03546	2.205255	4.550704	0.0000

Effects Specification

Cross-section fixed (dummy variables)

R-squared	0.708836	Mean dependent var	2.887418
Adjusted R-squared	0.607717	S.D. dependent var	6.039979
S.E. of regression	3.782990	Akaike info criterion	5.717233
Sum squared resid	5810.273	Schwarz criterion	6.833092
Log likelihood	-1424.522	Hannan-Quinn criter.	6.153362
F-statistic	7.009937	Durbin-Watson stat	2.516874
Prob(F-statistic)	0.000000		

Appendix E

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	10.462415	5	0.0631

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
DUAL	-5.636366	0.017894	84.819836	0.5393
INDE	-0.426630	-0.078300	0.052359	0.1279
SIZE	2.642333	5.099649	2.784123	0.1408
SALES	-0.000206	-0.000868	0.000000	0.3452
TURNOVER	24.958232	13.310278	33.670671	0.0447

Appendix F

Lagrange multiplier (LM) test for panel data

Date: 05/21/17 Time: 17:05

Sample: 2013 2016

Total panel observations: 548

Probability in ()

Null (no rand. effect) Alternative	Cross-section One-sided	Period One-sided	Both
Breusch-Pagan	221.5022 (0.0000)	0.079975 (0.7773)	221.5821 (0.0000)
Honda	14.88295 (0.0000)	0.282798 (0.3887)	10.72380 (0.0000)
King-Wu	14.88295 (0.0000)	0.282798 (0.3887)	2.466193 (0.0068)
SLM	15.30555 (0.0000)	0.720151 (0.2357)	-- --
GHM	-- --	-- --	221.5821 (0.0000)

Appendix G

Dependent Variable: ROE
 Method: Panel EGLS (Cross-section random effects)
 Date: 04/24/17 Time: 16:40
 Sample: 2013 2016
 Periods included: 4
 Cross-sections included: 137
 Total panel (balanced) observations: 548
 Swamy and Arora estimator of component variances
 White cross-section standard errors & covariance (d.f. corrected)
 WARNING: estimated coefficient covariance matrix is of reduced rank

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-34.67190	10.29188	-3.368860	0.0008
DUAL	0.017894	2.148188	0.008330	0.9934
INDE	-0.078300	0.140949	-0.555522	0.5788
SIZE	-5.099649	1.115234	4.572718	0.0000
SALES	-0.000868	0.000266	-3.260424	0.0012
TURNOVER	13.31028	1.380479	9.641785	0.0000

Effects Specification		S.D.	Rho
Cross-section random		26.52056	0.5380
Idiosyncratic random		24.57774	0.4620

Weighted Statistics			
R-squared	0.053798	Mean dependent var	3.152421
Adjusted R-squared	0.045069	S.D. dependent var	25.27747
S.E. of regression	24.70128	Sum squared resid	330703.2
F-statistic	6.163287	Durbin-Watson stat	2.084822
Prob(F-statistic)	0.000014		

Unweighted Statistics			
R-squared	0.094218	Mean dependent var	7.498108
Sum squared resid	706917.7	Durbin-Watson stat	1.287083

Appendix H

Correlated Random Effects - Hausman Test

Equation: Untitled

Test cross-section random effects

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	4.985244	5	0.4177

Cross-section random effects test comparisons:

Variable	Fixed	Random	Var(Diff.)	Prob.
DUAL	-0.155718	-0.130948	0.029717	0.8857
INDE	-0.000933	0.000537	0.000017	0.7235
SIZE	0.009504	0.055718	0.000917	0.1269
SALES	-0.000005	-0.000013	0.000000	0.5480
TURNOVER	0.350481	0.224893	0.011471	0.2410

Appendix I

Lagrange multiplier (LM) test for panel data

Date: 05/21/17 Time: 18:05

Sample: 2013 2016

Total panel observations: 548

Probability in ()

Null (no rand. effect) Alternative	Cross-section One-sided	Period One-sided	Both
Breusch-Pagan	397.9405 (0.0000)	0.070388 (0.7908)	398.0109 (0.0000)
Honda	19.94845 (0.0000)	-0.265307 (0.6046)	13.91808 (0.0000)
King-Wu	19.94845 (0.0000)	-0.265307 (0.6046)	2.668210 (0.0038)
SLM	20.41368 (0.0000)	0.092075 (0.4633)	-- --
GHM	-- --	-- --	397.9405 (0.0000)

Appendix K

Dependent Variable: TOBINQ
 Method: Panel EGLS (Cross-section random effects)
 Date: 04/24/17 Time: 16:42
 Sample: 2013 2016
 Periods included: 4
 Cross-sections included: 137
 Total panel (balanced) observations: 548
 Swamy and Arora estimator of component variances
 White cross-section standard errors & covariance (d.f. corrected)
 WARNING: estimated coefficient covariance matrix is of reduced rank

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.718053	0.256686	2.797393	0.0053
DUAL	-0.130948	0.095703	-1.368277	0.1718
INDE	0.000537	0.003980	0.134957	0.8927
SIZE	-0.055718	0.016721	3.332272	0.0009
SALES	-1.27E-05	4.33E-06	-2.935616	0.0035
TURNOVER	0.224893	0.079901	2.814663	0.0051

Effects Specification		S.D.	Rho
Cross-section random		0.782201	0.7076
Idiosyncratic random		0.502783	0.2924

Weighted Statistics			
R-squared	0.020038	Mean dependent var	0.388020
Adjusted R-squared	0.010998	S.D. dependent var	0.505564
S.E. of regression	0.502776	Sum squared resid	137.0088
F-statistic	2.216580	Durbin-Watson stat	1.574468
Prob(F-statistic)	0.051352		

Unweighted Statistics			
R-squared	0.039453	Mean dependent var	1.268139
Sum squared resid	463.0010	Durbin-Watson stat	0.769613