TIME-VARYING RELATION BETWEEN CORPORATE GOVERNANCE AND EXPECTED STOCK RETURN

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A Dissertation Submitted in Partial
Fulfillment of the Requirements for the Degree of
Doctor of Philosophy (Business Administration)
School of Business Administration
National Institute of Development Administration
2018

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ABSTRACT

Title of Dissertation	TIME-VARYING RELATION BETWEEN CORPORATE GOVERNANCE AND EXPECTED STOCK RETURN
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Degree	Doctor of Philosophy (Business Administration)
Year	2018

This paper provides the following three novel findings to the literature. First, the effects of the corporate governance ratings on stock returns are inconstant, non-liner, and time-varying over the long-run. Second, by taking advantage of the time-varying characteristics of expected returns from the quality of corporate governance, an optimal investment strategy with adaptation of Markov switching model is developed. Third, incorporation of style switching strategy with value premium in recessions and momentum premium in expansions improves expected returns of portfolios sorted by the corporate governance ratings.

ACKNOWLEDGEMENTS

My utmost gratitude goes to my advisor, Dr.Kridsda Nimmanunta. I could not complete this dissertation paper without his valuable comments and suggestions.

I would like to thank NIDA for granting me a full scholarship for the Ph.D degree. I am now determined to give what I have got here back to the Thai society through education.

Yosuke Kakinuma

July 2019

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CHAPTER 1 INTRODUCTION

1.1 Time-Varying Expected Return from Corporate Governance

This study aims to analyze a time-varying relationship between corporate governance and expected stock returns. Based on an assumption that expected returns of portfolios sorted by the corporate governance rating are regime-dependent, my goal is to seek an optimal switching investment strategy that outperforms a simple buy-and-hold investment. The optimal investment strategy is further analyzed whether combing with value and momentum risk factors can improve the returns to investors. My motivation for this research stems from mixed results of the previous researches regarding the influence of the quality of firms' corporate governance on operating performance and valuation. It's intuitive to presume that good governance at a firm positively affects its operating profits and value creation to investors. This theory is in line with the conclusion of Gompers et al. (2003), Drobetz et al. (2004), Bebchuk et al. (2008), Ammann et al. (2011). On the contrary, Core et al. (2006) and Bhagat and Bolton (2008) claim that, while weak shareholder rights lead to a lower operating outcome and vice versa, they do not cause poor stock returns and governance measures are not correlated with future stock returns. Core et al. (2006) argue that a positive relationship between corporate governance and stock performance is rather period-specific, which

hints that expected returns from corporate governance is non-liner and a regime-switching model may be a better fit. The results of Bauer et al. (2003) also indicate that good corporate governance does not necessarily increase firm value, and depending on the tested year, the relationship can be negative. An opposing view for this time-varying relation is documented by Cremers and Nair (2005) who argue a complementary effect of internal and external governance on higher expected stock returns is consistent over time. Nonetheless, their claim is based on a 36-month moving average return, which is rather classified as a long-term investment. This study focuses on a behavior of stocks ranked by corporate governance in shorter periods of time, or more specifically on monthly basis.

Time-varying returns are captured by Markov-switching model, which the previous researches suggest its capability of fitting well-documented risk premiums such as size, value, and momentum. I hypothesize that the Markov-switching model is as well applicable to trace the relationship between corporate governance and its expected returns. Unstable, or time-varying stock returns can be attributable to a change in a macroeconomic environment. Following Chen, Roll, and Ross (1986) who argue that stock returns are not captured by a standard CAPM but rather by macroeconomic variables, numerous studies attempt to find out whether the excess returns from the size, value, and momentum are result of variations in economic conditions (Perez-quiros and Timmermann, 2000; Ammann and Verhofen, 2006; Black and McMillan, 2005; Ammann and Verhofen, 2006; Ozoguz, 2008; Gulen et al. 2011; Kim et al. 2014; Sarwar

et al. 2017). What their studies have in common is that the three risk premiums are indeed time-varying, and the stock returns' sensitivity to the macroeconomic variables depends on economic states or regimes which are identified by Markov Switching model. Introduced by Hamilton (1988), Markov switching model permits to shift from one regime to another and provides probabilities of such transitions (Sarwar et al. 2017). Publicly known variables such as interest rate at the time t-1 affect the state transition probabilities between period t-1 and t. Advantages of employing Markov switching model are that it provides flexible filter to extract the hidden regimes from observed data as well as characterizes the development of regimes shifts to the economic cycle (Chung et al. 2012).

The previous literatures point out that differences in the regimes are remarkably apparent in volatility. One is high variance regime which often overlaps with the period of economic recession announced by public entities such as NBER (the National Bureau of Economic Research) in the U.S.A. or OECD, while the other is low variance regime which is associated with expansion state. From the previous researches, two findings draw particular interest. The first is that value stocks are counter-cynical (Chen et al. 2008; Gulen et al. 2011) while momentum stocks are pro-cynical (Kim et al. 2014). In other words, value stocks do well during recession whereas momentum stocks excel during expansion. Value investing during bear markets and momentum investing during bull markets earn a superior performance (Ammann and Verhofen, 2006). The second is that macroeconomic variables impact on stock returns significantly more during

recession than during expansion, which is to say returns from the size, value, and momentum risk premiums are asymmetric between the two regimes. The coefficients of macroeconomic factors tend to be greater during recession. My particular interest in this model is its ability to capture signs of market upturn or downturn. If investors are able to detect the market downturn beforehand or in the early stage of worsening market conditions, they can prevent loss by switching their investment to safer assets such as government bonds. Likewise, if the model can help investors to foresee market recovery during the recession, they can allocate their funds more in stocks for potential capital gains.

1.2 Contribution of this paper

In this research, I provide the following three novel findings to the literature. First, I present that effects of the corporate governance ratings on stock returns are inconstant, non-liner, and time-varying. Second, based on the time-varying characteristic of expected returns from the quality of corporate governance, I seek an optimal investment strategy with switching between portfolios of different governance levels and risk-free short-term government bonds. Lastly, I combine risk factors of value and momentum with the governance ratings when forming portfolios which improves expected returns.

1.3 The Focus Market-Thailand

The focus of this study is the Thai market. According to the Stock Exchange of Thailand (SET), Thailand houses the second largest trading bourse in the Southeast Asia after Singapore. It also boasts of the highest average daily turnover in the region, representing high liquidity in the market, which is one of the key market developments for both domestic and foreign investors. With the creation of the ASEAN Economic Community (AEC) in 2015, the region is expected to play more important role in the world economy and receive much more attention from foreign investors. Although the further development of the Thai market is promising, it has in the past experienced a devastating financial crisis in 1997: The East Asian Financial Crisis. Zhuang et al. (2000) blames poor corporate governance in Asia as ones of causes of the crisis, and Alba, Claessens, and Djankov, (1998) argue that deficient firm-level governance practices were one of the crucial factors that led to the collapse of the Thai Baht. This prompted the government and private sectors to undertake necessary codes of practice and analyze the governance impact on financial outcome (Hodgson et al. 2011). Eventually, in 1999, the Thai Institute of Directorship Association (IOD) was established with an aim for promotion of professionalism in directorship, and in a collaboration with the SET and the Office of the Securities and Exchange Commission (SEC), it has published the Corporate Governance Report of Thai Listed Companies (CGR) since 2001. The CGR is based on the international governance standards set by the Organization for

Economic Cooperation and Development (OECD). This study employs the unique governance score given to each listed firm by the IOD.

CHAPTER 2 LITERATURE REVIEW

2.1 Corporate Governance in the Developed Markets

2.1.1 The U.S Market

One of the most often cited literatures on a link between corporate governance and stock returns is Gompers et al. (2003). The importance of this paper is that they pioneered a holistic approach by constructing the Governance Index, or alternatively called GIM Index after their initials, using 24 unique provisions that restrict or support shareholder rights. The provisions, for example, include Classified Boards that sets unevenly the terms and elections of directors, which ultimately enhances managers' power and weakens the shareholder rights. Also added in the index are Secrets Ballots that lets the third party to count proxy vote to keep management from knowing specific shareholders' choice, and Cumulative Voting that entitles shareholders one vote per share multiplied by number of directors on ballot, which benefits minority shareholders toward board representation. Thus, the GIM index is comprised of firm-level engagements for shareholder rights. The index ranges a score from 0 to 24, and firms with a score of more than 14 are classified to the Dictatorship portfolio, representing the weak shareholder protection whereas those with a score of less than 5 are grouped into the Democracy portfolio with the strong shareholder rights. From 1990 to 1999 with rebalancing in 1993, 1995, and 1998 when new information became available, after controlling the four-factor model (Fama and French, 1993; Carhart, 1997), monthly returns of the both value-weighted and equal-weighted Democracy portfolio with stocks

from the New York Stock Exchange (NYSE), the American Stock Exchange (AMEX), and the NASDAQ, outperformed the Dictatorship portfolio by 0.79% on average with statistical significance. The portfolio longing the Democracy stocks and shorting Dictatorship stocks still posts a significant return even after controlling industry returns. One result which closely relates to this research is that, when dividing the sample period in half, the returns of the long-short portfolio differ in the first and second half. The returns are still positive, yet they lose the statistical significance for the value-weighted portfolio for the both periods and in the second half for the equal-weighted portfolio. This suggests a non-liner or time-varying relationship between corporate governance and stock returns. The relation between corporate governance and operating performance measured by net profit margin, return on equity (ROE), and sales growth, also appears time-varying. The results of Fama-MacBeth (1973) regression on net profit margin shows the mean coefficient of the GIM index is significantly negative, meaning that firms with lower score of the GIM index, or the Democracy firms, generate higher a net profit margin. However, when examining the individual year of the tested period from 1991 to 1999, the GIM index loses statistical significance in most years, and the coefficient in the year of 1997 turns positive, which means the Dictatorship firms are more profitable than the Democracy firms in the particular year. The Fama-MacBeth (1973) regression on sales growth indicates a similar result to net profit margin. Although the mean coefficient of the GIM index is negative with statistical significance, the relationship between the GIM index and sales growth is not stable. The result of

regression on ROE signals a non-linear and volatile relationship the most prominently. The sign of the GIM coefficient changes 5 times during the 9-year period, and the mean coefficient is negative but not significant. That better-performed companies benefit investors with higher investment returns is a native but logical assumption. Thus, a non-linear relation between corporate governance and operating performance may lead to a similar relation between governance practices and stock return.

Since the GIM index is so influential that a number of researchers employed the index as a proxy for corporate governance. A high score on the GIM index, meaning a low level of shareholder rights and a greater degree of entrenched managerial power, aka the Dictatorship firm, is related to lower cash holdings (Harford et al, 2008), lower value of cash holdings (Dittmar and Mahrt-Smith, 2007), lower firm value with a control of a family ownership (Villalonga and Amit, 2006), lower profitability and firm value with a control of succession of family CEOs (Perez-Gozanlez, 2006), higher leverage ratio (John and Litov, 2010), and higher required rate of bond return in a presence of large institutional block holders (Cremers et al. 2007). On the other hand, there appears positive aspects of being a Dictatorship firm such as lower cost of debt financing (Klock et al. 2005).

Among the 24 provisions that consists of the GIM index, Bebchuk et al. (2008) identify 6 provisions that significantly explains the negative correlation with firm value and stock returns. They argue that the rest of 18 provisions are irrelevant. They label the index "the E-Index" (Entrenchment index). Their "less is more" approach is of importance

to both investors and corporate managers because it simply costs more to adapt numerous provisions. Of the many provisions, there is only a limited set of provision that constitutes real significance to the firms, whereas the other provisions provide marginal value creations or can be entirely irrelevant, and that results in worthless efforts for the firms. Shareholders' ultimate power rests in their voting power (Clark, 1986), but it can be constrained by predetermined arrangements. The E-index is consisted of six such constraints, namely Staggered Board, Limitation on Amending Bylaws, Limitation on Amending Charter, Supermajority to Approve Mergers, Golden Parachutes, and Poison Pill. First of all, Staggered Board ensures that only a fraction of board members is subject to reelection in each year. Consequently, shareholders are not able to replace the majority of directors in any given year. Because staggered board is so powerful and potent defenses against the controlling owners that its adverse effects are inevitable. Staggered board is negatively correlated with Tobin's Q (Bebchuk and Cohen, 2005) and stock returns (Faleye, 2007), and firms' announcement of demolishing staggered board induces positive stock returns (Guo, Kruse, and Nohel, 2008). The second to the fourth factors in the E-Index, which Limitation on Amending Bylaws, Limitation on Amending Charter, Supermajority to Approve Mergers, are all against anti-takeover provisions. These three provisions require more than a majority of shareholders to amend the corporate bylaws and the corporate charters, and to approve a merger. This places a significant limitation on shareholders' voting power, and shareholders naturally strongly oppose such provisions. The last two provisions, Poison Pill and Golden Parachute, are for takeover readiness. Poison pill is a tactic initiated by

the target company's boards, without an approval of the shareholders that intends to make its own shares financially unattractive and less desirable to the acquiring company. When a possible hostile takeover emerges, the target company issues new shares and offers to the existing shareholders at discount, and this leads to delusion of shares and makes the acquisition more difficult and expensive. An early research by Ryngaert (1988) reports that an announcement of the pill defense is followed by a decline in stock price. Golden Parachute grants the board members monetary compensation in the event of firing or resignation after a change in control. While golden parachute has a positive effect in a sense that managers are more willing to accept an acquisition, managers of low-valued firms who see a high possibility of being acquired may be searching for the lucrative packages for their own benefits (Bebchuk et al. 2014). The E-Index ranges from 0 to 6 with the number indicating a presence of the 6 provisions. The rest of 18 provisions that are in the GIM index but not in the E-Index are named the O-Index (Other Provisions Index). The data contains almost 90% of the US stock market capitalization and the study period spans from 1990 to 2002. The result shows that, after controlling Fama and French's 3-factor (1993) and momentum factor (Carhart, 1997) as well as industry returns, the E-Index exhibits more consistent than the GIM index and negatively correlates with the firms' Tobin's Q for the eleven consecutive years with statistical significance for 9 years. What's more, the magnitude of the negative correlation increases monotonically with the E-Index, meaning that as the score of the E-Index increases from 0 to the maximum of 6, the corresponding negative coefficients

become greater. The O-Index does not display explanatory power for Tobin's Q. The E-Index also appears to possess explanatory force for abnormal stock returns. The long-short portfolios, which are buying good governance stocks with the E-Index equal to 0 or/and 1 and selling bad governance firms with the E-Index ranging from 3 to 6, generate positive monthly returns in the tested period. The authors do not show the results for breakdown of shorter periods of time, but the positive alpha from the E-Index is statistically significant not only for the period tested in Gompers et al. (2003) but also for the extended period in the early the 2000s.

Scholars do not entirely support the theory of the positive relation between corporate governance and firm value. In fact, some claim an opposing view. While Bhagat and Bolton (2008) affirm that the GIM index and the E-Index are significantly related to the operating performance measured by ROA, the governance indices do not explain abnormal future stock returns. The contrasting result stems from the fact that they also consider the endogeneity of the relationship among corporate governance, performance, capital structure, and ownership structure, respectively measured by the governance index (the GIM and the E-indices), ROA, debt to asset ratio, and the CEO's stockownership. Once taking into account of a system of simultaneous relationship of the four variables above, the explanatory power of the governance index for stock return diminishes. Furthermore, Bhagat and Bolton (2008) insist that stock ownership of the board play a key role for corporate governance. The result indicates that the dollar ownership by the board members are positively related to operating performance, stock

returns, and Tobin's Q with statistical significance. After all, when the board becomes partial owners of the company, they have strong incentives to engage in surveillance mechanism to monitor important decisions such as investment policy and management compensation policy (Bhagat et al. 1999). Moreover, it is a simple and intuitive measurement, and thus less prone to measurement error and provides consistency for corporate government proxy.

Core et al. (2006) also admit that weak protection of shareholder rights, or high score on the GIM index, lead to lower operating performance. However, they deny a causal relationship between the weak shareholder rights and lower stock returns. Negative effects of being the Dictatorship firms are already predicted by analysts as a lower governance quality is associated with lower operating performance. Hence, there is no surprise on earning announcement. Moreover, the probability of being acquired, usually associated with high premium, is about the same for the firms with strong and weak shareholder rights. Thus, take-over probability is not attributed to excess stock returns. Finally, they conclude that the positive relationship between corporate governance and abnormal stock returns of Gompers et al. (2003) is period-specific, which is a promising remark for this study. From 1990 to 1999, the Democracy portfolio posts 23% return while the Dictatorship portfolio generates 14.1%. Nonetheless, from 2000 to 2003 during the Dotcom market crash, investors suffer negative 5.8% return by holding the Democracy whereas the Dictatorship portfolio surprisingly rewards investors with positive return of 4.3%. The reversal of stock returns between the

Democracy and the Dictatorship portfolios are consistent after controlling Fama and French's 3-factor (1993) and momentum factor (Carhart, 1997). This suggests that good corporate governance does not produce constant stock returns and the relationship between a quality of governance and stock returns is non-linear and time-varying.

2.1.2 Other Developed Markets

Studies on effects of corporate governance on firms' performance and value are not limited to the US market alone but also conducted on other developed markets, where governance measures other than the well-documented GIM index are employed. Drobetz et al. (2004) researched how corporate governance is linked to expected stock returns in the German market. They developed a broad corporate governance rating (CGR) based on a questionnaire sent out to the public firms in 2002. Compared to the GIM index which primarily focuses on takeover defenses, the CGR takes a more holistic approach (Black et al. 2003) and includes governance proxies such as transparency and auditing. Following Gompers et al. (2003), they form two distinct portfolios. One is the principal portfolio with a higher quality of governance and higher scores on the CGR. The other is the agent portfolio which consists of a weaker governance quality and lower scores on the CGR. A long-short portfolio, buying the principal portfolio and selling the agent portfolio, produces a significant positive alpha from 1998 to 2002 after a control of the Fama-French (1993) three-factor model. Nevertheless, looking at the sub-periods of the tested investment horizon, the principal portfolio underperformed the DAX 100 market index during the recession from 2000

to 2002. The DAX 100 comprises 100 largest market cap stocks and the firms that makes up of the principal portfolios tend to be larger. Therefore, the outperformance of the DAX 100 suggests larger firms with lower CGR generated higher returns in the period. This implies that inconstant relationship between corporate governance and stock returns is not limited to the US market but also other markets in the world.

Similar implication of the inconstant and time-varying relationship is documented by Bauer et al. (2004) in the UK and the European market as a whole. Using the comprehensive dataset provided by Deminor, a consultancy firm specializing shareholder interests and corporate governance, they analyzed whether better governance results in higher stock returns and improves firm values in Europe. Denoninor evaluates a wide range of governance criteria, approximately 300 different items, for most corporations included in the FTSE Eurotop 300. They first examine an excess return of a long-short portfolio of Gompers et al. (2003), buying good governance firms and shorting bad ones with zero initial investment, with the Carhart (1997) four-factor model. The long-short portfolios generate a positive alpha but without statistical significance both in the UK and European markets. The authors partly blame the insignificant alpha on small sample size. They had only 5 years of data while Gompers et al. (2003) were able to test for 10 years. Next, firm value measured by Tobin's Q is regressed on the corporate governance rating using Fama-Macbeth (1973) regression. The coefficients of corporate governance turn negative in some years in both the UK and European market, suggesting that firms with bad corporate governance are higher

in value than those with better governance ratings. The mean coefficients also lose significance for the both markets after adjusting industry and country. The regression result for operating efficiency approximated by net profit margin (NPM) and return on equity (ROE) is rather puzzling. In spite of Jensen and Meckling (1976) who argue better governed firms operate more efficiently and produce higher future cash flows, their result exhibits significantly negative mean coefficients for both NPM and ROE in the European market, and also negative mean coefficients for NPM and ROE in the UK market but without statistical significance. On the contrary to expectation, badly governed firms have a better operating outcome. Again, their result is based on only 5 years of the data, so perhaps the result can be caused by time-specific nature of effect of corporate governance.

Ammann et al. (2011) presents an international evidence that shows more stable effect of corporate governance on firm value. Their research includes 22 developed countries except the US market and is based on the sample size of 6,663 firm-year observations from 2003 to 2007. The corporate governance data is taken from the Governance Metrics International, and they construct indices with 64 provisions in the areas of Board Accountability, Financial Disclosure and Internal Control, Shareholder Right, Remuneration, Market for Control, and Corporate Behavior. The last group of the provisions, Corporate Behavior, also often termed as Corporate Social Responsibility (CSR) is a distinct feature of this dataset as few literatures considers CSR as a part of governance proxy. Also novel in the study is that, in addition to an equal-

weighted governance index, they construct another index by applying principal component analysis (PCA, Larcker et al. 2007), which condenses information attributable for governance quality and discloses hidden factor structure. As a result, the PCA-based index is consisted of 17 attributes, a significant reduction from the total 64 provisions. The fixed effects regressions of Tobin's Q indicate that the both equal-weighted and PCA-based governance indices are significantly positive. The coefficients of the equal-weight index remain positive for 4 out 5 individual years when tested year by year. When tested for each individual country instead of the whole 22 developed countries in the sample, the results are similar except for Japan where a unique cross-shareholding system, keiretsu, overpowers conventional corporate governance measures (Lins and Servaes, 1999; Clasessens et al. 2002). Furthermore, in consonance with Jo and Harjoto (2009), their CSR indices, which are constructed solely with the provisions of Corporate Behavior, significantly explain the increased firm value. Thus, in their study, the corporate governance demonstrates some degree of consistency of positive influence on firms' value. However, their time-series regression is from a stretch of only 5 years, which can be argued rather short.

2.2 Corporate Governance in the Emerging Market

Corporate governance may play a more important and crucial role in the emerging markets than in the developed markets. The emerging market is less mature, and thus the legal environment is not as rigid as in the developed countries. In fact, an

average level of corporate governance is lower in countries with weaker legal systems. In such business environment, a firm-level corporate governance can partially compensate incompetent laws and enforcement (Klapper and Love, 2004). Moreover, good corporate governance is valued higher in weaker legal states where such practice is rare and it appears to be a precious intangible asset for investors. One explanation for this is because, in countries with less investor protection, controlling shareholders tend to expropriate from minority shareholders (Nenova, 2003). With better governance practices, such expropriation can be prevented in some degree and the market values such firms more favorably (Klapper and Love, 2004). Durnev and Kim (2006) reasons that this effect of legal environment leads to a mixed result on the relation between firm valuation and corporate governance in the US market as the legal structure in the US is one of the strongest in the world.

Numerous researches on the relation between corporate governance and firm value in the emerging market are found. This includes Korea (Black et al. 2006); Turkey (Ararat et al. 2016); Russia (Black, 2001; Black et al. 2006), India, (Balasubramanian et al. 2010; Sakar et al. 2012); Hong Kong (Cheung et al. 2007, 2011; Lei and Song, 2012); and Ukraine (Zheka, 2006). Although the testing methodologies and the methods of governance index construction differ from one literature to another, the message is essentially alike: A good corporate governance positively impacts firm value and operating performance in the emerging markets. Nevertheless, none of these literatures points out time-varying characteristics of the relation between corporate governance

and its influence on returns for investors. Perhaps due to a lack of sufficient data, most researches in the developing market are based on single-year cross sectional data, which will not be able to expose any features that change over time. This study analyzes the relationship using time-series data to see how underlying economic states affect expected stock returns.

2.3 Corporate Governance in the Thai Market

There are several researches conducted on a relation between corporate governance and firm value in Thailand. The mixed results from these previous literatures suggest a non-linear relationship between firms' governance practice and added value creation. Kouwenberg (2006) studied an early stage of development of corporate governance in the Thai market where the the SET initiated a voluntary corporate governance code in 2002. The study provides an evidence that supports Klapper and Love (2004) and Durnev and Kim (2005) who propose that in a country with a weak legal environment, a firm-level corporate governance partially suffices ineffective regulation and implementation of laws, and it relates to the firm value positively and significantly. Thailand is regarded as an emerging market in the capital market and the judicial system still remains below the standard of developed countries (La Porta et al. 1998). The result of cross-sectional regression shows that voluntary adaption of corporate governance in the single year of 2002 possesses an explanatory power to increased firm values in the succeeding three years although the significance

drops in the third year. Within the voluntary codes, shareholder rights and board structure & independence are found to be the most related to the firm value. On the contrary, a study by Limpaphayom and Connelly (2004) indicates that corporate governance score and firm value is negatively related without statistical significance although their result is based on a smaller sample size than Kouwenberg (2006). A few extreme samples might have weakened and even misled the outcome of the study. Kouwenberg (2006) further argues that the Thai firms in 2002 did not maximize their firm values by opting for self-forcing governance and firm-level characteristics do not explain the differences in corporate governance. This is supported by Doidge et al. (2007) that weak firm-level governance is due to a high cost to accommodate better governance practices and lacking capital market infrastructure. The most determinative factor for firms' commitment for governance is country characteristics which include not only the investor protection rights enforced by the state but also the level of economic and financial development of the state. One of the most important advantages of having good corporate governance is access to external funds with better terms. However, firms in the emerging market, where the financial and economic development is not as advanced as the developed countries, find it less appealing to invest in the improvement of their own governance level because the benefit of having better governance practices for gaining lower costs of funds is rather limited. Kouwenberg's (2006) study is based on only one year of the data on the Thai firms' adaption of the

code, which can be subject to sample bias. This study aims to fill the cap by using a longer period of time-series data.

Hodgson et al. (2011) employ the corporate governance index by the Thai Institute of Directors (IOD) as a firm's governance measure and examine its significance to the various performing measures such as Tobin's Q, ROA, ROE, and stock returns. The sample data is the IOD's corporate governance report from 2001 to 2006. Their results affirm La Porta et al. (2002) and Black et al. (2006) who find corporate governance positively affects firm performance and valuation especially in the emerging market where investor protection is relatively weak. A zero-investment portfolio which long good governance stocks and short poor governance with rebalancing on the IOD's corporate governance announcement dates generate positive monthly returns for value-weighed portfolios and negative monthly returns for equal-weighted portfolios, both without statistical significance, after controlling the Fama-French (1993) three factors. The zero-investment portfolio's returns deteriorate in some periods, and the authors reason the investors' unawareness of added value of good corporate governance for the underperformance.

Including stocks with strong governance can hedge a market risk in the Thai market. Puksamatanan (2012) points out the firms with strong governance eases a market risk during a financial crisis. Fifty-week rolling returns of portfolios sorted by the IOD's governance score are regressed on the market return during the 2008 Lehman Shock Crisis. The result indicates that, while market beta of the weak governance portfolio

greatly increases, that of the good governance portfolio does not change much. After controlling Fama and French (1993) three factors plus Carhart (1997) momentum factor, the market beta during the crisis period turns significantly negative for the strong governance portfolio and significantly positive for the poor governance portfolio whose alpha also becomes significantly negative. This shows a resilient characteristic of firms with good governance practice against the worsening economy, whereas a vulnerability of poor governance firms become more apparent. The author further identifies significant negative alpha of the weak governance firms after controlling industry while the alpha of strong governance portfolios diminishes (Johnson et al. 2009). This explains that, after adjusting industry returns, owning stocks with poor governance scores deteriorates the portfolio returns. Nonetheless, purchasing firms with better governance scores does not lead to the abnormal returns.

Ownership structure plays an important role in corporate governance. Researchers have examined the effect of ownership structure on corporate governance in the Thai market and its value creation before the 1997 Asian Currency Crisis (Wiwattanakantang, 2001) and after the crisis (Connelly et al. 2012). The two papers before and after the crisis indicate opposite results, implying different playing fields for the Thai market. Wiwattanakantang (2001) argues that, based on the cross-sectional data in 1996, although controlling shareholders of the Thai companies fritter away their firms' assets for private benefits, their presence improves the performance of the firms. Controlling shareholders, defined as those who own over 25% of the shares under the Thai corporate law and possess sufficient power to significantly influence on the firms'

decision making, can pay out unreasonably high salaries and dividends at their own will. Nonetheless, the results confirm that having controlling shareholders in the Thai corporations increases the firms' accounting performance, which is in conformity with the evidence in the East Asia (Classens et al, 2000) but different from Cronqvist and Nilsson (2003). Implementation of pyramidal ownership does not affect the firms' performance or value. In spite of the abovementioned advantage of the controlling shareholders, when they also involve in the management, the firms' performance is negatively affected. This suggests that the controlling shareholders who take command of the firms are more likely to be extravagant. In terms of type of ownership, family-controlled firms post superior performance. While family is ill-famed for frequently setting policies for their self-benefits at the cost of other stakeholders of the firm, (La Porta et al, 1999), surveillance function among family members can contribute to lowering agency costs (Fama and Jensen, 1983; DeAngelo and DeAngelo, 1985). In addition, family members have rational motivation to better manage their firms because the survival of the firms are directly linked to their preservation of the wealth. Furthermore, family members possess excellent information on their firms due to the long-term relationship with the firms' top management (Smith and Amoako-Adu, 1999).

Influence of ownership structure on firms' performance and value becomes a different story after the 1997 crisis in Thailand. Using cross-sectional sample data in 2005, Connelly et al. (2012) argues that the good corporate governance significantly increases the firm value only when the firms' cash flow right is equal to the voting right,

which means an absence of pyramidal ownership structure. In other words, when a major shareholder of a firm, usually the firm's founding family, keep the voting power of the firm through a subsidiary or other family members, strong corporate governance does not yield a higher firm value (La Porta at el. 1999). Although the pyramidal ownership structure was not common among the Thai firms (Claessens et al, 2000) before the 1997 crisis, due to the need for additional funds, the founding families were forced to reduce their ownership in their firms. At the same time, in order for them to indirectly maintain the control of the companies, they employed the pyramidal ownership. The disappearance of explanatory power of corporate governance for firm value implies a misleading effort by the controlling owners with the pyramidal structure, who rather disguise their firms with better governance practices. However, in fact, it results in a disadvantage to other minor shareholders. Connelly et al (2012) shows two other important and interesting findings in regard to the ownership structure and the board independence. The first is that, in line with Lins (2003) and Perez-Gonzalez (2006) but in contradiction with Anderson and Reeb (2003) and Villalonga and Amit (2006), family controlled-firms in Thailand do not necessarily perform better than non-family corporations. Secondly, independent directors do not effectively increase firm value, which can be due to a fact that those independent directors are actually affiliated with related companies of the firm (Nam and Nam, 2004) where a long-standing personal relationship often contributes to the linkage.

Overall, the findings in the global markets and the Thai market in terms of corporate governance and its impact on a firm value are similar. Although the

measurement of governance practice differs from a market to another, better governance practice generally has positive influences on performance of a firm. There is increasing awareness toward the importance of corporations' sustainable growth in the global market when making investment decisions. This has led to construction of the Thailand Sustainability Investment (THIS) by the Stock Exchange of Thailand (SET) starting in 2016. Begging in August 2018, the SETTHIS (the Stock Exchange of Thailand Suitability Investment) index was launched with constituent firms that had met criteria in environmental, social and governance factors.

2.4 Regime Switching Model

2.4.1 Regime Switching Model with Size Factor

Perez-Quiros and Timmermann (2000) argue that small cap stocks with weaker financial strength are more strongly affected during recession when credit market gets tightened than big cap stocks which have larger assets and bigger collateral. Their results are consistent with the theory. Small firms exhibit the biggest asymmetry in returns and variations between recessions and expansions which are identified by Markov switching model. The sensitivity of small cap stocks' returns to the credit market measurement, namely interest rate, default spread, and money supply, becomes higher during economic downturn. They reason that small firms are less collateralized, which negatively affects firms' financial credit and leads to a weaker ability to raise external funds. This is especially prominent during the recessions and the indicators of the credit market such as interest rate become more influential to the small cap firms.

Their out-of-sample test on switching strategy between longing size-sorted portfolio when expected return is positive and T-bill when expected return is negative suggests that the strategy generates a higher risk-adjusted return, measured by Sharpe Ratio, than a simple buy-and-hold strategy. Moreover, the switching strategy's outperformance is apparent during the recession. The results reconfirm that the time-variation of risk premium over the economic cycle. Sawar, Mateus, and Todorovic (2016) find a similar result in the UK market. Size-sorted portfolio exhibit time-varying characteristics and average returns of small cap stocks change from positive in the expansion to negative in the recession. They explain that small firms are more likely to be low-duration firms with high leverage and cash flow problem. Therefore, when interest rate rises, it will limit small firms' external funding which is particularly problematic during downturns.

2.4.2 Regime Switching Model with Value Factor

Several academic papers report cyclical asymmetries of value premiums. Black and McMillan (2004, 2005), Amman and Verhofen (2006), Gulen, Xing, and Zhang (2011), Sarwar, Mateus, and Todorovic (2017) state that expected return of value stocks is time-varying, high during a high-volatility state which coincides with economic downturn and low during a low-volatility state occurs concurrent with economic expansion. Their result indicates that expected return of value stocks is substantially higher than growth stocks during the contraction period. Similar to the small stocks, macroeconomic variables put more significant influence on the value stocks during the recessions. Gulen, Xing, and Zhang (2011) report that a short-term interest rate

negatively affects value stocks more than growth stocks, and the magnitude of effects of the interest on the return is a lot bigger during the recession. In addition, default spread positively influences the value stocks and the impact is larger during the economic downturn. The likelihood ratio test strongly rejects the null hypothesis that coefficients of macroeconomic variables are equal across the two states. The study by Sawar, Mateus, and Todorovic (2016) on the UK market finds that, in addition to interest rate and default spread, GDP growth, term spread, and money supply also significantly affects the value stocks especially in the recession. Why are value stocks more likely to perform better during recession? Carlson, Fisher, and Gimmarino (2004) reason that value firms have higher operating leverage than growth firms. This implies that value stocks are more prone to negative shocks, which increases risk and expected returns of value stocks during economic downturn. Garcia-Feijoo and Jorgensen (2010) support this theory and identify positive correlation between degree of operating leverage and book-to-market, stock returns, and systematic risk. Zhang (2005) states that costly reversibility, which means that corporations bear greater cost in reducing than expanding the scale of assets, leads to a higher risk for value firms because of their inflexibility to adjust investment level to extenuate the negative shocks. During recessions, firms opt to disinvest productive assets. Nonetheless, value firms are less flexible than growth firms and, as a result, they are more negatively affected by worsening economic conditions.

2.4.3 Regime Switching Model with Momentum Factor

On the contrary to value premiums' countercyclical characteristics, expected momentum profits are procyclical (Chordia and Shivakumar, 2002; Cooper et al, 2004; Stivers and Sun, 2010). The study by Chordia and Shivakumar (2002) shows lagged macroeconomic variables that are related business cycles explain profits from momentum strategy. Furthermore, momentum strategy provides statistically significant positive return only during expansions but not in recessions. Kim et al (2014) fitted regime switching model to expected momentum return. Two of their main findings are momentum stocks' asymmetrical reactions to aggregate economic conditions and procyclical time-varying expected returns. During the expansion state identified by Markov switching model, winner stocks tend to have greater loadings on conditioning macroeconomic factors than loser stocks, whereas in the recession states, loser stocks are more affected. This implies riskiness of winner and loser stocks are different across economic states. The riskiness of winner stocks is higher during expansion states because of greater growth options measured by high market-to-book equity and market-to-book asset ratios. Winner stocks are more likely to have higher growth options. On the other hand, the riskiness of loser stocks is greater during recession due to an increased risk of leverage options proxied by high debt-to-equity and asset-to-equity ratios. Loser stocks tend to have higher leverage options. Thus, Kim et el (2014) arguer that growth and leverage option are underlying forces for the time-varying expected returns for momentum stocks. Ammann et al (2006) proposes that an investment strategy that longs values stocks during bear markets and momentum stocks during bull markets is promising. Their out-of-sample tests indicate that a strategy switching to value stocks in a recession regime, which is characterized by a high variance and low return, and to momentum stocks in an expansion regime with low variance and high

return, is superior to a simple buy-and-hold investment consisting of 50% value stocks and 50% momentum stocks. The mean returns as well as Sharpe ratios are higher for the switching strategy.

CHAPTER 3 DATA AND METHODOLOGY

3.1 Corporate Governance Rating by IOD

The sample universe of this study is all the stocks listed on the Stock Exchange of Thailand (SET) and the Market for Alternative Investment (MAI). The MAI is a marketplace for small firms who seek for afresh funds for growth opportunities. The corporate governance ratings are obtained from the Corporate Governance of Thai Listed Companies, an annual report published by the Thai Institute of Directors (IOD). The IOD examines each listed company on the SET and the MAI according to a predetermined set of governance criteria and scores them 0-100. There are five categories to be assessed: Rights of Shareholders, Equitable Treatment of Shareholders, Role of Stakeholders, Disclosure and Transparency, and Board Responsibilities. Based on the given governance score, corporate governance (CG) star is assigned as shown in Figure 3.1. Only the firms with 5 Stars (EXECELLENT), 4 Stars (VERY GOOD) and 3 CG Star (GOOD) are identified in the report and the other firms with 2 CG Stars (SATISFACTORY), 1 Star (PASS) and no Star are not disclosed. The sample period is from 2008 to 2015 for 8 years.

Score Range	Number of Logos	Description
90 – 100		Excellent
80 – 89		Very Good
70 – 79		Good
60 – 69		Satisfactory
50 – 59		Pass
Less than 50	No Logo Given	-

Figure 3.1 CG (Corporate Governance) Star by the IOD (Thai Institute of Directors)

Table 3.1 exhibits the number of companies which received the each of the ratings from the IOD in the period from 2008 to 2015. The Excellent category has the fewest firms every year while the number of firms which received the Very Good rating and the Good rating is somewhat comparable. In some years, those firms which received the Satisfactory or Below take up close to the half of the total companies assessed by the IOD. REITs (Real Estate Investment Trust), property funds, and infrastructure funds are excluded from the list.

Table 3.1 The Number of Firms by the CG Rating

The number of firms for each rating is obtained from the IOD's annual reports. The proportion of the number of firms in each category is shown in the parentheses.

Year	Excellent	Very Good	Good	Satisfactory or Below	Total
2008	22 (4%)	112 (22%)	169 (34%)	202 (40%)	505
2009	51 (10%)	130 (26%)	82 (16%)	241 (48%)	504
2010	67 (13%)	172 (33%)	132 (26%)	146 (28%)	517
2011	47 (9%)	141 (27%)	165 (31%)	169 (32%)	522
2012	59 (11%)	144 (27%)	162 (31%)	162 (30%)	527
2013	76 (14%)	163 (30%)	146 (27%)	160 (29%)	545
2014	30 (5%)	104 (18%)	168 (30%)	264 (47%)	566
2015	55 (9%)	155 (27%)	118 (20%)	253 (43%)	581

In order to examine the relationship between the CG star and stock returns, the following cross-sectional equation and time-series mean coefficient is tested with Fama-Macbeth (1973) regression (Gompers et al. 2003; Drobetz et al. 2004; Core et al. 2006 and others) and fixed effects regressions (Ammann et al.2011):

$$\check{R}_{i,t+2\ t+1} = \propto + \beta_1 CG_{it} + \beta_2\, LnASSETS_{it-1} + \beta_3 LEV_{it-1} + \beta_4 \frac{CAPEX}{ASSETS_{it-1}} + \beta_5 SALESG_{it-1} + \beta_6 ROA_{it-1} + \beta_7\, LnFIRMAGE_{it+1} + \beta_8\, BM_{it+1} + \varepsilon_t \quad (1)$$

where $\check{R}_{i,t+2\ t+1}$ is monthly geometric average return of stock $_i$ from January of year $_{t+1}$ to January of year $_{t+2}$, CG_{it} is CG star (ranging from 3 to 0) of stock $_i$ in year $_t$, $LnASSETS_{it-1}$ is the log of book value of assets (in thousands) of stock $_i$ in year $_{t-1}$, LEV_{it-1} is the ratio of total debt to assets of stock $_i$ in year $_{t-1}$, $\frac{CAPEX}{ASSETS_{it-1}}$ denotes the capital expenditure to assets of stock $_i$ in year $_{t-1}$, $SALESG_{it-1}$ is an average past 3-year sales growth rate of stock $_i$ in year $_{t-1}$, $_t$, ROA_{it-1} is return on assets for stock $_i$ in year $_{t-1}$, $LnFIRMAGE_{it+1}$ is the log of the number of years since the establishment for firm $_i$ in year $_{t+1}$, BM_{it+1} is book-to-market ratio of stock $_t$ in January of year $_{t+1}$, and ε_t is an error term. All the stock information is obtained from Thomson Reuters' Datastream.

The data from Datastream suffers from survivorship bias to some extent (Ince and Porter, 2006). Problems associated with Datastream include that stocks that have ceased to be traded due to bankruptcy or mergers and acquisitions are removed from the constituent lists of certain indices. I correct this issue by manually recovering stocks that are delisted from the constituent list of the SET and MAI index.

In the equation (1), CG ranges from 3 to 0. 3 is given to firms which receive the Excellent rating, 2 for the Very Good rating, 1 for Good, and 0 for all the other stocks which receive Satisfactory or below. The IOD releases the annual report in the last quarter of the year. In order for investors to have ample time to access the information as well as to avoid look-ahead bias, the newly-released CG rating is reflected in January of the following year. Thus, after the CG rating is published in year $_t$, the return of stock

is calculated from January in year $_{t,1}$ to January in year $_{t,2}$. In Thailand, all the listed companies are required to submit the year-end financial statements within three months from the end of the accounting period. Therefore, in January of year $_{t,1}$, all the accounting related information of year $_{t}$ is not available to the public. For this reason, in the regression analysis, the log of total assets, leverage ratio, capital expenditure-to-sales ratio, sales growth ratio, and return on assets are lagged one year. Book-to-Market is calculated by dividing market capitalization of a stock in January of year $_{t+1}$ by book value of the stock of year $_{t-1}$.

Prior researches indicate that that some firm-level characteristics are related to equity return and corporate governance. In order to avoid the likely extent of omitted variable bias, several control variables are included in the regression. The log of firms' total assets is included as a control variable because larger firms tend to have a higher rating on the governance level (Gompers et al, 2003; Drobetz et al, 2004). Large firms are more capable of absorbing costly expenses on improving governance practices. Moreover, bigger corporations get more exposure to the public. Hence, they have more incentives to retain a higher standard of corporate governance to prevent scandals as well as keep a good public image. Following Drobetz et al (2004), Black et al (2006), and Bebchuk et al (2008), firms' leverage ratio, measured by debt-to-assets ratio in this study, is controlled. Leverage possibly affects firms' governance practice (Black et al, 2006), and governance has an influence on firms' access to credit (Bhojraj and Sengupta, 2003). To control endogenous factor of growth opportunities, the past 3-years' sales growth

ratio is included in the equation. Drobetz et al (2004) writes that growth firms desire access to capital markets to raise additional funds to keep expanding their business. Thus, growth firms may find it optimal to improve their governance standards because higher governance practices lead to lower cost of capital. The level of capital expenditure, estimated by capital expenditure by total assets, is controlled as Gompers et al (2003) reports that firms with higher governance practices have higher capital expenditure. Return on assets, labeled as *ROA*, is proxy for profitability, which is likely to have direct effects on stock returns. Among other variables, ROA is more powerful measure of operating performance (Barber and Lyon, 1996). I add the log of firms' number of years listed on the market, labeled as *LnFIRMAGE*, to the control variables. (Bauer et al, 2003, and others) Governance practices of older firms are different from those of younger firms (Black et al, 2006). Most studies find that the coefficients of this variable to be negative because younger firms are more likely to grow faster (Ararat et al, 2016). Finally, book-to-market ratio (Fama and French, 1993) is included in the regression. This ratio remains as one of the most powerful explanatory factors for stock returns. Note that, size, measured by the market capitalization of a stock, is another important factor in Fama and French's 3-factor model (1993). Due to a high correlation with *LnAssets* (correlation coefficient is 0.84 with p-value of 0.000), size factor is not added to the equation (1) to avoid multicollinearity problem.

Table 3.2 reports descriptive statistics for all the variables for the full sample period between 2008 and 2015. The mean of the monthly geometric mean stock return

is positive at 1.60 while the median is 1.22. The maximums return is 12.84 while the minimum is -7.44. These suggest that stock returns in the sample period are skewed to the right, which is normal for stock return distribution. Although not reported in the table, the skewness of the stock return is 0.48. The mean CG score is 1.08 as only few firms receive the maximum score of 3. Among the all control variables, sales growth ratio shows the greatest cross-sectional variation with the standard deviation of 23.77. This might be due to the fact that the sample firms include small cap firms, of which some of those small firms' sales growth can be unpredictably high or low in some years.

Table 3.2 Descriptive Statistics
This table reports the mean, standard deviation, minimum, 1st quartile, median, 3rd quartile, maximum of all the variables in the equation (1). The data is from 2008 to 2015. Monthly Mean Stock Return, Leverage, Capital Expenditure to Assets, Average Sales Growth, Return on Assets are in percentage. Corporate Governance Rating is from 0 to 3.

Variables	Mean	SD	Min	Q1	Median	Q3	Max
Monthly Geometric Mean Stock Return ($\tilde{R}$)	1.60	3.27	-7.44	-0.43	1.22	3.44	12.84
Corporate Governance Rating (*CG*)	1.08	1.01	0.00	0.00	1.00	2.00	3.00
Log of Total Assets (*LnASSETS*)	15,15	1.73	6.91	13.95	14.88	16.07	21.76
Leverage (*LEV*)	24.24	0.26	0.00	2.00	20.27	39.61	584.10
Capital Expenditure to Assets ($\frac{CAPEX}{ASSETS}$)	5.73	8.45	0.00	0.85	2.97	7.16	90.60
Average 3-yr Sales Growth (*SALESG*)	8.24	23.77	-79.10	-1.87	6.15	14.26	267.20
Return on Assets (*ROA*)	5.96	10.55	-80.25	2.07	6.05	10.22	97.18
Log of Firm Age (*LnFIRMAGE*)	3.02	0.79	0.00	2.30	3.26	3.61	4.70

Variables	Mean	SD	Min	Q1	Median	Q3	Max
Book-to-Market (*BM*)	0.87	1.04	-8.33	0.45	0.78	1.23	5.00

Table 3.3 provides Persons correlations between CG score, average stock returns, and all the control variables in the equation (1). Two high correlations are easily noticeable. One is *CG* and *LnAssets* at 0.46, and the other is $\tilde{R}$ and *BM* at 0.30. The both correlations are strongly significant. In line with numerous previous literatures including Gompers et al (2003), larger corporations in Thailand tend to receive higher corporate governance score. This is not surprising as bigger firms have more incentives as well as resources to improve their governance level. Among the all the variables, stock return is correlated with significance only with Book-to-Market ratio. Corporate governance shows slight positive correlation with stock returns at 0.03 but with weak significance. Besides the assets size, *SALESG*, *ROA*, *LnFIRMAGE*, and *BM* show significant correlation with *CG*. In particular, *ROA* indicates a relatively high correlation with *CG* at 0.16.

Table 3.3 Person Correlation Matrix
Persons correlation coefficients are shown in the matrix. P-values for the coefficients are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively. $\tilde{R}$ is mothly geometric mean stock return, *CG* is corporate governance ratings, *LnASSETS* is log of assets, *SALESG* is an average past 3-year sales growth, $CAPEX/ASSETS$ is capital expenditure to assets, *ROA* is return on assets, *LnFIRMAGE* is log of firm age, and *BM* is book-to-market. The data is from 2008 to 2015.

	$\tilde{R}$	*CG*	*Ln ASSETS*	*LEV*	$\frac{CAPEX}{ASSETS}$	*SALESG*	*ROA*	*LnFIRMAGE*
CG	0.03 (0.070)							
LnASSETS	0.00 (0.761)	0.46*** (0.000)						
LEV	0.01 (0.380)	-0.02 (0.230)	0.13*** (0.000)					
$\frac{CAPEX}{ASSETS}$	-0.03 (0.085)	0.01 (0.480)	0.01 (0.673)	0.04* (0.016)				
SALESG	-0.02 (0.131)	0.06*** (0.000)	0.13*** (0.000)	0.04** (0.007)	0.08*** (0.000)			
ROA	0.02 (0.147)	0.16*** (0.000)	0.08*** (0.000)	-0.16*** (0.000)	0.13*** (0.000)	0.18*** (0.000)		
LnFIRMAGE	-0.04 (0.157)	0.10*** (0.000)	0.22*** (0.000)	-0.09*** (0.000)	-0.01 (0.388)	-0.03 (0.084)	0.00 (0.866)	
BM	0.30*** (0.000)	-0.04** (0.008)	-0.01 (0.734)	-0.05** (0.001)	-0.13*** (0.000)	-0.10*** (0.000)	-0.08*** (0.000)	0.05** (0.002)

3.2 Corporate Governance by Industry Group

There is always a possibility that a firm's corporate governance rating merely reflects an industry that the firm belongs to (Bebchuk et al, 2009). That is, it happens that better governance ratings are more common in certain industries that perform well by chance for some periods. Bauer et al. (2004) find that the relationship between firm value and corporate governance in the UK market gets insignificant when industry is controlled. In order to control industry effect, the following cross-sectional regression is tested and time-series mean coefficient is estimated using Fama-Macbeth (1973) regression and fixed-effects regression:

$$\check{R}_{i,t+2\,t+1} = \propto + \beta_1 CG_{it} + \beta_2\, LnASSETS_{it-1} + \beta_3 LEV_{it-1} + \beta_4 \frac{CAPEX}{ASSETS}_{it-1} + \beta_5 SALESG_{it-1} + \beta_6 ROA_{it-1} + \beta_7\, LnFIRMAGE_{it+1} + \beta_8\, BM_{it+1} + \beta_9\, ID_{it+1}\varepsilon_t \quad (2)$$

where all the variables are identical with the equation (1) except ID_{it} , which represents a vector of industry dummies, is added to the equation. The Industry Classification Benchmark (ICB) is employed for industry grouping. The ICB uses a system of 10 sectors. Using the ICB as an industry categorization tool is common in the research field of corporate governance. Amongst them are Acharya et al (2013), Mallin and Ow-Yong (2012), Humphrey et al (2012), and Chapple and Humphrey (2014).

Table 3.4 exhibits the number of firms by the CG ratings in the each of the ICB industry groups. The largest industry groups in Thailand are Industrial, Consumer Goods, and Financials, which collectively represents almost 60% of the market. By looking at the absolute number of the firms, of the three biggest industries, Financials always gets the most Excellent firms whereas Consumer Goods gets the fewest except the year 2008. The smallest industries are Oil & Gas, Telecommunications, and Utilities, which jointly accounts for approximately 5% of the market. Among the smallest industries, Oil & Gas in particular appears to receive good governance score.

Table 3.4 The Number of Firms by the CG rating by the Industry Group
The number of firms by the CG ratings in the each of the ICB (Industry Classification Benchmark) groups are shown in the table. The CG rating is obtained from the IOD's annual reports for the years from 2008 to 2015.

Year	Industry	Excellent	Very Good	Good	Satisfactory or Below	Subtotal
2008	Oil &Gas	3	2	2	5	12
	Basic Material	3	11	23	23	60
	Industrial	0	27	38	42	107
	Consumer Goods	2	16	36	48	102
	Health Care	0	1	8	10	19
	Consumer Services	1	13	24	28	66
	Telecommunications	1	1	1	2	5
	Utilities	2	1	3	4	10
	Financials	10	32	26	33	101
	Technology	0	8	8	7	23
	Total	22	112	169	202	505
2009	Oil &Gas	6	1	0	6	13
	Basic Material	6	10	12	33	61
	Industrial	7	25	25	52	109
	Consumer Goods	3	26	21	49	99
	Health Care	0	4	5	10	19
	Consumer Services	2	23	8	32	65
	Telecommunications	2	0	1	2	5
	Utilities	2	3	0	5	10
	Financials	19	32	8	41	100
	Technology	4	6	2	11	23
	Total	51	130	82	241	504
2010	Oil &Gas	6	2	0	6	14
	Basic Material	5	19	25	13	62
	Industrial	11	33	32	39	115
	Consumer Goods	5	35	28	30	98
	Health Care	1	5	9	4	19
	Consumer Services	7	26	14	20	67
	Telecommunications	2	1	0	2	5
	Utilities	2	5	0	3	10
	Financials	23	38	19	23	103
	Technology	5	8	5	6	24
	Total	67	172	132	146	517

Year	Industry	Excellent	Very Good	Good	Satisfactory or Below	Subtotal
2011	Oil &Gas	6	1	2	5	14
	Basic Material	2	15	28	19	64
	Industrial	6	29	37	44	116
	Consumer Goods	2	29	36	33	100
	Health Care	0	2	9	8	19
	Consumer Services	8	19	16	24	67
	Telecommunications	1	2	0	3	6
	Utilities	3	3	1	3	10
	Financials	17	34	27	23	101
	Technology	2	7	9	7	25
	Total	47	141	165	169	522
2012	Oil &Gas	5	2	3	3	13
	Basic Material	3	17	25	22	67
	Industrial	11	25	41	41	118
	Consumer Goods	3	33	30	37	103
	Health Care	0	3	6	9	18
	Consumer Services	8	19	19	22	68
	Telecommunications	3	1	0	2	6
	Utilities	3	4	1	2	10
	Financials	19	32	28	20	101
	Technology	4	8	9	4	25
	Total	59	144	162	162	527
2013	Oil &Gas	4	2	3	4	13
	Basic Material	7	16	21	23	67
	Industrial	13	35	39	40	127
	Consumer Goods	7	38	24	36	105
	Health Care	0	6	4	9	19
	Consumer Services	8	24	17	24	73
	Telecommunications	4	0	0	2	6
	Utilities	3	3	2	3	11
	Financials	24	32	28	15	99
	Technology	6	7	8	4	25
	Total	76	163	146	160	545

Year	Industry	Excellent	Very Good	Good	Satisfactory or Below	Subtotal
2014	Oil &Gas	5	0	5	5	15
	Basic Material	2	11	13	41	67
	Industrial	3	19	46	64	132
	Consumer Goods	1	19	38	50	108
	Health Care	0	1	6	13	20
	Consumer Services	3	18	22	35	78
	Telecommunications	1	2	1	2	6
	Utilities	1	3	5	5	14
	Financials	10	28	26	37	101
	Technology	4	3	6	12	25
	Total	30	104	168	264	566
2015	Oil &Gas	5	1	3	8	17
	Basic Material	3	15	9	40	67
	Industrial	9	40	20	65	134
	Consumer Goods	3	35	27	48	113
	Health Care	0	4	5	11	20
	Consumer Services	10	19	18	32	79
	Telecommunications	3	1	0	2	6
	Utilities	3	2	3	6	14
	Financials	15	32	29	30	106
	Technology	4	6	4	11	25
	Total	55	155	118	253	581

Table 3.5 summarizes the average CG score for each industry across the sample periods. T-stats between the industry mean and the population mean are also shown in the table. The Financials sector consistently scores higher than the population mean with significance across the sample periods while the Health Care industry receives lower than the population mean with significance in 5 years out of the total 8 years. Although statistically not significance, performance by the other industries appears to be consistent. For example, Oil & Gas always posts the mean score higher than the population. Basic Material performs lower than the population. This suggests that an

industry in which a firm operates business do affect corporate governance in Thailand. The t-test for the mean for the entire sample periods indicates that Oil & Gas, Utilities, Telecommunication, Financials, and Technology get higher CG score with significance whereas Basic Materials, Industrial, Consumer Goods, and Health Care underperform with significance.

Table 3.5 The Mean CG Score by the Industry Group
The mean CG ratings, which ranges from 3 to 0, for the different industry groups are shown. The industry classification is determined according to the ICB (Industry Classification Benchmark). The t-statistics for the hypothesis that mean score for an industry is equal to the population mean are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively.

Industry	Mean 2008	Mean 2009	Mean 2010	Mean 2011	Mean 2012
Oil &Gas	1.25	1.53	1.57	1.57	1.69
	(0.91)	(1.33)	(0.67)	(1.19)	(1.44)
Basic Material	0.90	0.81	1.25	1.00	1.01
	(-0.07)	(-1.29)	(-0.45)	(-1.23)	(-1.62)
Industrial	0.86	0.88	1.13	0.97	1.05
	(-0.64)	(-1.08)	(-1.82)	(-1.78)	(-1.55)
Consumer Goods	0.75*	0.82	1.15	1.00	1.01
	(-2.32)	(-1.65)	(-1.67)	(-1.50)	(-1.92)
Health Care	0.53*	0.68	1.15	0.68*	0.66*
	(-2.73)	(-1.58)	(-0.79)	(-2.87)	(-2.89)
Consumer Services	0.80	0.92	1.29	1.16	1.19
	(-1.06)	(-0.48)	(-0.08)	(0.29)	(0.01)
Telecommunications	1.2	1.4	1.6	1.16	1.83
	(0.50)	(0.61)	(0.42)	(0.07)	(1.07)
Utilities	1.1	1.2	1.6	1.60	1.80
	(0.50)	(0.52)	(0.78)	(1.18)	(1.69)
Financials	1.19**	1.29*	1.59**	1.44**	1.50**
	(2.79)	(2.58)	(2.68)	(3.13)	(3.06)
Technology	1.04	1.13	1.5	1.16	1.48
	(0.78)	(0.58)	(0.84)	(0.177)	(1.50)
All Firms	0.91	0.98	1.30	1.12	1.18

Industry	Mean 2013	Mean 2014	Mean 2015	Mean 2008-2015
Oil &Gas	1.46	1.33	1.17	1.44**
	(0.50)	(1.53)	(0.48)	(2.89)
Basic Material	1.10	0.61	0.71*	0.92***
	(-1.46)	(-1.98)	(-2.57)	(-3.71)
Industrial	1.16	0.70	0.94	0.96***
	(-1.35)	(-1.70)	(-0.82)	(-3.74)
Consumer Goods	1.15	0.73	0.93	0.94***
	(-1.38)	(-1.22)	(-0.95)	(-4.40)
Health Care	0.84*	0.40**	0.65	0.69***
	(-2.14)	(-3.16)	(-2.03)	(-6.10)
Consumer Services	1.21	0.85	1.08	1.06
	(-0.54)	(0.34)	(0.56)	(-0.27)
Telecommunications	2.00	1.33	1.83	1.55*
	(1.13)	(1.03)	(1.35)	(2.38)
Utilities	1.54	1.00	1.14	1.34*
	(0.71)	(0.68)	(0.37)	(2.17)
Financials	1.65***	1.10**	1.30**	1.38***
	(3.65)	(2.81)	(2.79)	(8.21)
Technology	1.60	0.96	1.12	1.25*
	(1.51)	(0.60)	(0.42)	(2.26)
All Firms	1.28	0.82	1.02	1.07

3.3 Markov Switching Model

In order to empirically examine the time-varying behavior of relationship between corporate governance and stock return, application of the Morkov swathing regression is suitable because it is capable of capturing the time-varying characteristics of stock returns across business cycles. I employ Perez-Quiros and Timmermann (2000) and Kim et al (2014) framework. Let r_t be the return of an asset at time t and let X_{t-1} be a vector of publically available information up to time t-1 used to forecast r_t. In the Markov swithcig model, all parameters including intercept, regression coefficients, and volatility of excess returns are assumed to be functions of a single latent state variable (S_t). Specifically,

$$r_t = \beta_{0,S_t} + \boldsymbol{\beta}'_{S_t} X_{t-1} + \varepsilon_t,\ \varepsilon_t \sim N(0, \sigma^2{}_{S_t}), \qquad (3)$$

where $N(0, {\sigma^2}_{S_t})$ denotes normal distribution with zero mean and variance ${\sigma^2}_{S_t}$. Supposing there are two states, or often called regimes in the literature, S_t = 1 and S_t = 2, then the coefficients and variances are either $(\beta_{0,S_1}, {\boldsymbol{\beta}'}_{S_1}, {\sigma^2}_{S_1})$ or $(\beta_{0,S_2}, {\boldsymbol{\beta}'}_{S_2}, {\sigma^2}_{S_2})$.

Markov switching model allows the risk and expected returns to vary across two states. Thus, it is necessary to specify how the underlying states develop over time. I make the common assumption that state transition probabilities follow a first-order Markov chain as follows:

$$p_t = P\ (S_t = 1 |\ S_{t-1} = 1,\ \boldsymbol{y}_{t-1}) = \ p(\ \boldsymbol{y}_{t-1}) \qquad (4)$$

$$1 - p_t = P\ (S_t = 2 |\ S_{t-1} = 1,\ \boldsymbol{y}_{t-1}) = \ 1 - \ p(\ \boldsymbol{y}_{t-1}) \qquad (5)$$

$$q_t = P\ (S_t = 2 |\ S_{t-1} = 2,\ \boldsymbol{y}_{t-1}) = \ q(\ \boldsymbol{y}_{t-1}) \qquad (6)$$

$$1 - q_t = P\ (S_t = 1 |\ S_{t-1} = 2,\ \boldsymbol{y}_{t-1}) = \ 1 - \ q(\ \boldsymbol{y}_{t-1}) \qquad (7)$$

where $\boldsymbol{y}_{t-1}$ is a vector of variables which are publicly available at time $t-1$ and influences the state transition probabilities between periods $t-1$ and t.

The two-state Markov switching model is estimated using maximum likelihood methods. Let $\theta = (\theta_1, \theta_2)$ be the vector of parameters that are estimated in the likelihood function. Suppose the probability density function of the return, conditional on being state *j*, is Gaussian:

$$f\ (r_t |\ \Omega_{t-1},\ S_t = j; \theta) = \frac{1}{\sqrt{2\pi\sigma_j^2}} \exp\left(-\frac{(r_t - \beta_{0j} - {\boldsymbol{\beta}'}_j X_{t-1})^2}{2\sigma_j^2}\right) \qquad (8)$$

for j = 1,2. The information Ω_{t-1} includes X_{t-1}, r_{t-1}, y_{t-1}, and lagged values of these variables. Then, the log-likelihood function is

$$L\ (r_t |\ \Omega_{t-1}; \theta) = \sum_{t=1}^{T} \log\ (\emptyset(\ r_t |\ \Omega_{t-1}; \theta))\,, \qquad (9)$$

where the density function $\emptyset(\ r_t |\ \Omega_{t-1}; \theta)$ is simply obtained by summing the probability-weighted state probabilities across the two sates:

$$\emptyset(r_t|\,\Omega_{t-1};\theta) = \sum_{j=1}^{2} f(r_t|\,\Omega_{t-1};\, S_t = j;\theta)\, Prob(S_t = j|\,\Omega_{t-1};\theta), \quad (10)$$

where $Prob(S_t = j|\,\Omega_{t-1};\theta)$ is the conditional probability of being in the state j at time t given information at time $t-1$. The condtional state probabilities can be deprived from the standard probabilities theorem:

$$Prob(S_t = i|\,\Omega_{t-1};\theta) = \sum_{j=1}^{2} Prob(S_t = i|\,S_{t-1} = j,\,\Omega_{t-1};\theta)\; Prob(S_{t-1} = j|\,\Omega_{t-1};\theta). \quad (11)$$

The conditional state probabilities, by Beyer's rule, can be expressed as

$$Prob(S_{t-1} = j|\,\Omega_{t-1};\theta) = \frac{f(r_{t-1}|\,S_t = j, X_{t-1},\, y_{t-1}, \Omega_{t-2};\theta) Prob(S_{t-1} = j|X_{t-1},\, y_{t-1}, \Omega_{t-2};\theta)}{\sum_{j=1}^{2} f(r_{t-1}|\,S_{t-1} = j, X_{t-1},\, y_{t-1}, \Omega_{t-2};\theta)\; Prob(S_{t-1} = j|X_{t-1},\, y_{t-1}, \Omega_{t-2};\theta)} \quad (12)$$

Glay (1996) shows that the equation (11) and (12) can be iterated recursively to obtain the state probabilities $Prob(S_t = i|\,\Omega_{t-1};\theta)$ and the parameters of the likelihood function. The variations in the state probabilities represents the presence of time-varying conditional expected return.

3.4 Portfolio Returns by the Corporate Governance Ratings

I construct four portfolios by pooling the stocks with the same group of the CG stars, namely EXCELLENT, VERY GOOD, GOOD, and POOR. EXCELLENT is 5 stars, VERY GOOD is 4 stars, GOOD is 3 stars, POOR is 2 stars or below. The publication timing of the IOD's reports varies year to year, but the reports are usually available to investor in the 4th quarter of the year. To make sure there is ample time for investors to know the CG star of each company, I rebalance the portfolios at the end of

January in the following year. I assume that returns from the portfolios are dependent on hidden economic regimes, which are estimated by a Markov-switching model. Following Perez-Quiros and Timmermann (2000) and others as well as for simplicity, I assume there are two regimes. The portfolio returns of four different CG level is modeled as follows:

$$r_{it} = \propto_i + \beta_{i1,st} TERM_{t-1} + \beta_{i2,st} DEF_{t-1} + \beta_{i3,st} \Delta M_{t-2} + \beta_{i4,st} DIV_{t-1} + \varepsilon_{it}\ ; \quad i = (EXCELLENT, VERY\ GOOD, GOOD, POOR) \tag{13}$$

where $r_{it} = (EXCELLENT_t, VERY\ GOOD_t, GOOD_t, POOR_t)$ is the (4 x 1) vector of four different governance level portfolio returns, and $S_t = \{1, 2\}$ represents regime 1 and regime 2. *TERM* is a term spread, difference between 10-year government bond and 1-month government bond. *DEF* is a default spread defined as difference in yield between Baa and Aaa corporate bond. ΔM is a 12-month log difference in money supply. ΔM is lagged by 2 months to allow for delay of availability of such information. *DIV* is a dividend yield of the market index (the SET index). ε is normally distributed error term with $(0, \sigma^2)$. All the data are obtained from Thomson Reuters' Datastream, the Bank of Thailand and the Thai Bond Market Association.

Interest rate is a key economic variable in other studies that employs Markov switching model (Perez-Quiros and Timmermann, 2000 and others), but it is dropped from the equation (13). This is because its high correlation with ΔM, with correlation coefficient of 0.73 and VIF (variance inflation factor) of 5.42, which poses a serious threat of multicollinearity. Masih and Masih (1996) points out that money supply

predominantly leads rather than lags interest rate in the Thai economy. The change in money supply proxies for liquidity in the economy and investment premiums. Higher returns are expected when there is a growth in money supply in the market. The money growth is also a measurement of monetary policy shock that affects aggregate economic conditions (Gullen et al. 2011).

Term spread can be considered as an indicator of economic conditions as well as risk premium. During expansions, due to a rapid growth of short-term interest, term spread decreases. On the other hand, it increases during recessions because short-term interest rate drops.

Default spread, or alternately often called credit spread, has been frequently used in the literature as an indicator of credit market conditions as well as a proxy for expected stock returns (Chen et al,1986; Keim and Stambaugh, 1986; Fama and French, 1988; Kandel and Stambaugh, 1990; Kashyap et al, 1994; Jagannathan and Wang, 1996; Chordia and Shivakumar, 2002). These prior researches suggest that default spread is generally positively correlated with future stock returns. Firms with higher corporate governance tend to have a better access to the external financial markets as they are more trustworthy to financial institutions. On the other hand, corporations with poorer governance practice have rather limited access to the financial market. Thus, higher default spread has more adverse effect on firms with poor corporate governance and it is associated with lower returns for firms with less CG stars.

Dividend yield is a popular vehicle to model expected stock returns (Keim and Stambaugh, 1986; Fama and French, 1988; Kandel and Stambaugh, 1990). Although dividend yield is not directly related to credit market, it proxies for time-variation in the unobservable risk premium (Kim et al, 2014). High dividend yield, which is low

stock prices relative to dividends, indicates high discount rates and higher expected returns. Summary statistics of each economic variables are reported in Table 3.6.

Table 3.6 Descriptive Statistics of Economic Variables
This table reports mean, standard deviation, minimum, 1st quartile, median, 3rd quartile, maximum of economic variables in the equation (3). *TERM* is a term spread defined as difference in interest rate between 10-year government bond and 1-month government bond. *DEF* is a default spread defined as difference in yield between Baa and Aaa corporate bond. ΔM is a money growth which is 12-month log difference in money supply. *DIV* is a dividend yield of the market index (the SET index) The period is from December 2008 to November 2016 for *Term, DEF, and Div*, and November 2008 to October 2016 for ΔM.

Variables	Mean	SD	Min	Q1	Median	Q3	Max
Term Spread ($TERM$)	1.38	0.80	-0.08	0.78	1.26	1.79	3.29
Default Spread (DEF)	1.45	0.32	0.89	1.19	1.44	1.72	2.30
Money Growth (ΔM)	8.02	3.40	3.58	5.28	7.19	10.13	16.10
Dividend Yield (Div)	3.45	0.71	2.58	3.02	3.27	3.66	6.45

Summary statistics of monthly returns of portfolios which are sorted by CG stars are presented in Table 3.7. The medium return of *EXCELLENT* portfolio is the highest and that of other portfolios gets lower monotonically as the corporate governance ratings get lower. In other words, decrease in CG stars appears to be associated with lower returns. *VERY GOOD* portfolio posts the highest mean return while *POOR* portfolio generates the lowest mean return. *EXCELLENT* portfolio is the most volatile with the largest standard deviation and the widest range between the maximum and minimum. All the portfolios are negatively skewed with kurtosis higher than 3, which implies non-normal distribution (Sarwar et al. 2016). P-values for Jarque-Bara

normality test, which tests for normal distribution, are statistically significant for *EXCELLENT* and *GOOD* portfolios. This means that null hypothesis is rejected and the distribution is non-normal. These suggest a possibility of time-varying characteristics of CG-sorted portfolio returns.

Table 3.7 Summary Statistics of Monthly Return of Corporate Governance-Sorted Portfolios

This table reports the mean, medium, maximum, minimum, standard deviation, skewness, and kurtosis of monthly returns of four Corporate Governance-Sorted Portfolios. Stocks are assigned to each portfolio based on the IOD's Corporate Governance Reports from 2008 to 2015. Portfolios are rebalanced in January of the following year after the report is published. The period of monthly portfolio returns is from January 2009 to December 2016. P-value of Jarque-Bera Normality test is also reported in the table. Null hypothesis of Jarque-Bera Normality test is that the data is normally distributed. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively.

Portfolio	*EXCELLENT* (5 Stars)	*VERY GOOD* (4 Stars)	*GOOD* (3 Stars)	*POOR* (2 Stars or Below)
Mean	1.959	2.234	1.892	1.443
Medium	2.447	2.408	2.339	1.724
Maximum	18.538	15.482	10.596	11.459
Minimum	-14.025	-11.550	-13.609	-12.793
Standard Deviation	5.007	4.704	4.544	4.802
Skewness	-0.215	-0.238	-0.696	-0.522
Kurtosis	4.180	3.822	3.932	3.211
P-value of Jarque-Bera Normality Test	0.04*	0.16	0.00**	0.10

Table 3.8 reports Pearson correlation coefficients between the variables in the equation (13). Dividend yield is the only independent variable that is correlated with the four portfolio returns with significance. The correlations with the portfolios are positive. Dividend yield also shows significantly positive correlation with term spread and change in money supply. Change in money supply significantly correlates with all the other independent variables, positively with term spread and dividend yield, and negatively with default spread with a relatively high correlation coefficient of -0.48. As high correlation among control variables causes multicollinearity, diagnostic tests are performed. The VIF (Variance Inflation Factor) and Tolerance are reported in Table 3.9. Very high VIF and very low Tolerance pose a thread of multicollinearity. As shown in Table 3.9, because the VIFs and tolerances for all the variables are less than 2 and more than 0.5 respectively, there should not be any concern for multicollinearity.

Table 3.8 Pearsons Correlation Matrix

Persons correlation coefficients are shown in the matrix. *R_EXCELLENT* is monthly returns of Excellent CG portfolio. *R_VERY GOOD* is monthly returns of Very Good CG portfolio. *R_GOOD* is monthly returns of Good CG portfolio. *R_POOR* is monthly returns of portfolio with stocks that receive 2 stars or below. *TERM* is a term spread defined as difference in interest rate between 10-year government bond and 1-month government bond. *DEF* is a default spread defined as difference in yield between Baa and Aaa corporate bond. ΔM is a money growth which is 12-month log difference in money supply. *DIV* is a dividend yield of the market index (the SET index). P-values for the coefficients are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively.

	Term	*Def*	ΔM	*Div*
R_EXCELLENT	0.13	0.06	0.06	0.38***
	(0.18)	(0.57)	(0.53)	(0.00)
R_VERY GOOD	0.18	0.09	-0.01	0.35***
	(0.08)	(0.39)	(0.91)	(0.00)

R_GOOD	0.15	0.02	-0.01	0.27**
	(0.14)	(0.86)	(0.91)	(0.00)
R_POOR	0.16	-0.11	0.10	0.22*
	(0.11)	(0.27)	(0.33)	(0.03)
Def	0.25*			
	(0.01)			
Δ*M*	0.27**	-0.48***		
	(0.00)	(0.00)		
Div	0.41***	0.16	0.22*	
	(0.00)	(0.11)	(0.02)	

Table 3.9 Multicollinearity Diagnostics

This table reports VIF (Variable Inflation Factor) and Tolerance for the independent variables in the equation (13). *TERM* is a term spread defined as difference in interest rate between 10-year government bond and 1-month government bond. *DEF* is a default spread defined as difference in yield between Baa and Aaa corporate bond. Δ*M* is a money growth which is 12-month log difference in money supply. *DIV* is a dividend yield of the market index (the SET index) The period is from December 2008 to November 2016 for *Term*, *DEF*, *and Div*, and November 2008 to October 2016 for Δ*M*.

	Term	*Def*	Δ*M*	*Div*
VIF	1.434	1.451	1.705	1.525
Tolerance	0.697	0.689	0.586	0.655

CHAPTER 4 RESULTS

4.1 Cross Sectional and Fama-Macbeth Regression Result

4.1.1 Regression on Corporate Governance

Table 4.1 reports the result of cross sectional regression and Fama-Macbeth (1973) regression. The CG rating of the 8-year time-series mean is positively significant while its cross-sectional significance is observable only in 2008 and 2010. In other words, in line with numerous previous literature (Gombers et al. 2003 and others), the CG ratings in the Thai market has a statistically positive impact on the stock returns on a long-term basis. However, when looking at individual years, it gets statistical significant only in 2 years out of 8 years. Although not significant, the coefficient of the CG ratings on the stock returns even becomes negative in 2013. In addition, the coefficients of the CG ratings are very small and less than 0.1 in 2009, 2012, and 2015, which implies immaterial impact on the stock returns. These results can be interpreted as the effect of CG ratings on the stock returns is inconsistent over the years and rather time-varying.

The time-series mean of book-to-market shows powerful impact on the stock return with strong significance. Book-to-market is significantly positive in 6 years out of 8 years in the cross-sectional regression. ROA is another independent variable that exhibits a significant time-series mean. Log of assets gets significant negative coefficients from 2011 to 2013 and its time-series mean is also negative without significance. This is perhaps because of Fama-French's (1992) size factor.

Table 4.1 Corporate Governance and Stock Returns

The following equation is tested with cross-sectional regression and time-series mean is tested with Fama-Macbeth (1973) regression model.

$$\tilde{R}_{i,t+2\,t+1} = \propto + \beta_1 CG_{it} + \beta_2\, LnASSETS_{it-1} + \beta_3 LEV_{it-1} + \beta_4 \frac{CAPEX}{ASSETS_{it-1}} + \beta_5 SALESG_{it-1} + \beta_6 ROA_{it-1} + \beta_7\, LnFIRMAGE_{it+1} + \beta_8\, BM_{it+1} + \varepsilon_t$$

$\tilde{R}$ is mothly geometric mean stock return, *CG* is corporate governance ratings ranging from 3 to 0, *LnASSETS* is log of assets, $CAPEX/ASSETS$ is capital expenditure to assets, *SALESG* is an average past 3-year sales growth, *ROA* is return on assets, *LnFIRMAGE* is log of firm age, and *BM* is book-to-market. The data is from 2008 to 2015. Standard error for the coefficients are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively.

Year	2008	2009	2010	2011	2012	2013	2014	2015	Time Series Mean
Constant	-2.878 (-1.85)	-1.387 (-1.00)	-1.290 (2.41)	5.899*** (3.37)	4.127** (3.15)	7.023*** (4.72)	-2.672 (-1.49)	0.960 (0.69)	1.044 (0.78)
CG	0.642** (3.22)	0.087 (0.58)	0.294* (1.95)	0.366 (1.76)	0.085 (0.56)	-0.003 (-0.02)	0.204 (0.99)	0.080 (0.57)	0.201** (3.13)
Ln ASSETS	0.245* (2.41)	0.145 (1.14)	0.023 (-0.25)	-0.297* (-2.41)	-0.288** (-3.12)	-0.254* (-2.44)	-0.126 (-1.04)	0.119 (1.30)	-0.031 (-0.40)
LEV	0.006 (0.88)	-0.006 (-1.01)	-0.001 (-0.26)	0.011 (1.37)	-0.000 (-0.01)	0.003 (0.52)	0.017* (2.09)	0.008 (1.35)	0.003 (1.26)
$\frac{CAPEX}{ASSETS}$	0.025 (1.15)	0.028 (1.11)	-0.011 (-0.53)	-0.010 (-0.47)	-0.021 (-1.03)	0.000 (0.05)	0.056** (2.69)	0.023 (1.00)	0.007 (0.96)
SALESG	-0.003 (-0.407)	-0.005 (-0.65)	0.001 (0.27)	0.018 (1.86)	-0.003 (-0.55)	0.027*** (3.83)	-0.023** (-2.69))	-0.002 (-0.38)	0.002 (0.45)
ROA	0.027 (1.58)	0.059** (3.22)	0.029* (2.02)	-0.009 (-0.46)	-0.012 (-0.91)	-0.011 (-0.68)	0.107*** (5.04)	0.027* (1.98)	0.028* (2.56)
Ln FIRMAGE	-0.096 (-0.56)	0.142 (0.88)	0.209 (1.25)	0.257 (1.06)	-0.044 (-0.22)	-0.513* (-2.23)	0.180 (0.64)	-0.864*** (-3.75)	-0.111 (-0.88)
BM	1.14*** (8.46)	0.969*** (5.53)	0.683** (3.10)	0.773* (2.52)	0.326 (1.06)	0.002 (0.45)	1.882*** (4.78)	1.398*** (5.70)	0.944*** (7.02)

4.1.2 Regression on Corporate Governance with Control of Industry Group

Table 4.2 presents the result of the same regression as Table 4.1 but with controlling industry group by including industry dummy variables. The industry category is in accordance with the Industry Classification Benchmark (ICB). There are actually 10 industry groups but the results for each industry dummy are omitted from this table. Even after the control of industry group, the result is similar to the one without control. The time-series mean of the CG ratings is positively significant whereas it is so only in 2008, the sole year out of 8 years, in the cross-sectional regression. In 2013, it is negative but without significance. The strong significance of the CG ratting's' time series mean statistically proves its positive impact on the stock returns in the long run. Nevertheless, its power for better returns disappears in the most of individual years.

Control of industry group does not deter Book-to-market and ROA from having positive effect on the stock returns. Book-to-market particularly demonstrates its potent influence with statistical significance in 7 out of 8 years.

Table 4.2 Corporate Governance and Stock Returns with Industry Dummies
The following equation is tested with cross-sectional regression and time-series mean is tested with Fama-Macbeth (1973) regression model.

$$\check{R}_{i,t+2\,t+1} = \propto + \beta_1 CG_{it} + \beta_2\, LnASSETS_{it-1} + \beta_3 LEV_{it-1} + \beta_4 \frac{CAPEX}{ASSETS_{it-1}} + \beta_5 SALESG_{it-1} + \beta_6 ROA_{it-1} + \beta_7\, LnFIRMAGE_{it+1} + \beta_8\, BM_{it+1} + \beta_9\, ID_{it+1} + \varepsilon_t$$

$\tilde{R}$ is mothly geometric mean stock return, *CG* is corporate governance ratings ranging from 3 to 0, *LnASSETS* is log of assets, $CAPEX/ASSETS$ is capital expenditure to assets, *SALESG* is an average past 3-year sales growth, *ROA* is return on assets, *LnFIRMAGE* is log of firm age, *BM* is book-to-market, *ID* is industry dummy variable. Industry grouping is according to the Industry Classification Benchmark (ICB). There are actually 10 industry groups but the results for each industry dummy is omitted from this table. The data is from 2008 to 2015. Standard error for the coefficients are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively.

Year	2008	2009	2010	2011	2012	2013	2014	2015	Time-Series Mean
Constant	-3.031 (-1.45)	-1.541 (-0.84)	-1.351 (-0.81)	4.355 (1.92)	4.905** (2.75)	6.503*** (3.41)	-2.973 (-1.30)	0.376 (0.20)	0.667 (0.502)
CG	0.603** (2.99)	0.111 (0.74)	0.278 (1.87)	0.270 (1.31)	0.101 (0.51)	-0.037 (0.81)	0.261 (1.27)	0.158 (1.15)	0.199*** (3.70)
Ln ASSETS	0.247* (2.02)	0.162 (1.52)	-0.001 (-0.01)	-0.284* (-2.24)	-0.309** (-3.12)	-0.269* (-2.54)	-0.074 (-0.58)	0.177 (1.84)	-0.019 (-0.22)
LEV	0.004 (0.61)	-0.005 (-0.71)	-0.001 (-0.26)	0.010 (1.30)	0.000 (0.06)	0.004 (0.65)	0.020* (2.34)	0.009 (1.47)	0.004 (1.59)
$\frac{CAPEX}{ASSETS}$	0.032 (1.44)	0.016 (0.64)	-0.001 (-0.08)	-0.011 (-0.50)	-0.018 (-0.86)	-0.004 (-0.27)	0.052* (2.46)	0.027 (1.13)	0.006 (1.01)
SALESG	-0.001 (-0.08)	-0.002 (-0.71)	-0.001 (-0.20)	0.013 (1.42)	-0.003 (-0.54)	0.022** (3.10)	-0.026** (-2.92)	0.003 (0.55)	0.001 (0.34)
ROA	0.022 (1.25)	0.054** (2.90)	0.033* (2.25)	0.011 (0.53)	-0.012 (-0.89)	-0.011 (-0.75)	0.105*** (4.89)	0.022 (1.69)	0.028** (4.78)
Ln FIRMAGE	-0.124 (-0.69)	0.228 (1.27)	0.162 (0.94)	0.277 (0.25)	-0.043 (-0.21)	-0.443 (-0.05)	-0.027 (-0.09)	-0.830*** (-3.60)	-0.117 (-1.01)
BM	1.067*** (7.41)	1.044*** (5.86)	0.662** (2.91)	1.032*** (3.37)	0.508 (1.57)	1.312*** (5.04)	1.967*** (4.83)	1.198*** (4.75)	1.01*** (8.66)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

4.1.3 Regression on Corporate Governance Dummy Variable

The regression in Table 4.1 employs the corporate governance score from 3 (Excellent) to 0 (Poor) as one of a parameter. However, the magnitude of the difference in the score might not evenly affect the stock returns. An increase in the rating from *Very Good* to *Excellent* and that from *Good* to *Very Good* are both 1 in numeric value. Nevertheless, the degree of influence on the stock returns cannot be assumed to be the equal. To solve this issue, dummy variables for each corporate governance ratings are used in the regression. The results are reported in Table 4.3.

The time-series mean of the dummy variables for *Excellent* and *Very Good* take positive significant coefficients whereas that for *Good* does not, suggesting that only CG ratings with *Very Good* or higher can lead to higher expected return. However, the dummy variables for these two highest CG ratings are not significant except 1 year in the cross-sectional regressions. There were two years that the dummy for *Excellent* gets negative coefficients without significance. The outcome confirms inconsistent influence of the CG ratings on the stock returns. Receiving a high score on the CG ratings does not always result in higher returns.

Besides the CG dummy variables, ROA and Book-to-market show significant positive coefficients in the time-series mean. The coefficient of BM is 0.946 with strong significance, which indicates powerful effect on stock return.

Table 4.3 Corporate Governance by Dummy Variable and Stock Returns
The following equation is tested with cross-sectional regression and time-series mean is tested with Fama-Macbeth (1973) regression model.

$$\begin{aligned}\check{R}_{i,t+2\ t+1} = \propto\ &+ \beta_1 Dummy_{Excellent_{it}} + + \beta_2 Dummy_{verygood_{it}} \\ &+ \beta_3 Dummy_{Good_{it}} + \beta_4\, LnASSETS_{it-1} + \beta_5 LEV_{it-1} \\ &+ \beta_6 \frac{CAPEX}{ASSETS_{it-1}} + \beta_7 SALESG_{it-1} + \beta_8 ROA_{,it-1} \\ &+ \beta_9\, LnFIRMAGE_{it+1} + \beta_{10}\, BM_{it+1} + \varepsilon_t\end{aligned}$$

$\tilde{R}$ is mothly geometric mean stock return, dummy variables take 1 or 0 according to CG rating of each stock, *LnASSETS* is log of assets, $CAPEX/ASSETS$ is capital expenditure to assets, *SALESG* is an average past 3-year sales growth, *ROA* is return on assets, *LnFIRMAGE* is log of firm age, BM is book-to-market. The data is from 2008 to 2015. Standard error for the coefficients are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively

Year	2008	2009	2010	2011	2012	2013	2014	2015	Time-Series Mean
Constant	-3.086	-1.545	-1.196	6.269***	4.671***	7.126***	-3.084	0.634	1.021
	(-1.93)	(-1.06)	(-0.91)	(3.39)	(3.35)	(4.99)	(-1.66)	(0.44)	(0.72)
Dummy_ Excellent	1.307	0.011	0.981*	1.130	0.212	-0.095	0.176	-0.174	0.419*
	(1.57)	(0.02)	(1.99)	(1.54)	(0.41)	(-0.17)	(0.22)	(-0.34)	(1.97)
Dummy_ Very Good	1.484***	0.320	0.508	0.640	0.075	0.014	0.596	0.385	0.469***
	(3.37)	(0.91)	(1.34)	(1.32)	(0.21)	(0.03)	(1.24)	(1.15)	(3.79)
Dummy_ Good	0.687	-0.044	0.313	0.069	-0.397	-0.192	0.368	-0.518	0.044
	(1.84)	(-0.11)	(0.81)	(0.15)	(-1.15)	(-0.47)	(0.91)	(-1.47)	(0.33)
Ln ASSETS	0.260*	0.160	0.014	-0.313*	-0.310**	-0.252*	-0.100	0.149	-0.025
	(2.23)	(1.53)	(0.16)	(-2.46)	(-3.25)	(-2.35)	(-0.81)	(1.58)	(-0.30)
LEV	0.006	-0.007	-0.001	0.011	-0.001	0.003	0.017*	0.009	0.003
	(0.79)	(-1.04)	(-0.26)	(1.34)	(-0.14)	(0.44)	(2.02)	(1.49)	(1.17)
$\frac{CAPEX}{ASSETS}$	0.025	0.028	-0.010	-0.011	-0.021	0.001	0.057**	0.025	0.007
	(1.13)	(1.12)	(-0.50)	(-0.51)	(-1.03)	(0.06)	(2.71)	(1.11)	(0.98)
SALESG	-0.002	-0.005	0.001	0.018	-0.027	0.026***	-0.024**	-0.001	0.002
	(-0.31)	(-0.69)	(0.25)	(1.90)	(-0.49)	(3.71)	(-2.72)	(-0.30)	(0.48)
ROA	0.025	0.059**	0.029*	-0.008	-0.050	-0.010	0.104***	0.026	0.027*
	(0.13)	(3.21)	(2.01)	(-0.41)	(-0.26)	(-0.67)	(4.86)	(1.91)	(2.55)
Ln FIRMAGE	-0.109	0.121	0.222	0.254	-0.050	-0.532*	0.176	-0.880***	-0.119
	(-0.63)	(0.69)	(1.31)	(1.05)	(-0.26)	(-2.28)	(0.62)	(-3.84)	(-0.93)
BM	1.143***	0.971***	0.678**	0.783*	0.365	1.097***	1.876***	1.390***	0.946***
	(8.39)	(5.52)	(3.06)	(2.54)	(1.18)	(4.19)	(4.76)	(5.68)	(7.26)

4.1.4 Regression on Corporate Governance Dummy Variables with Control of Industry Group

Table 4.4 reports the result of the same regression as Table 4.3 but with controlling industry group. The industry groups are controlled by using dummy variables. The results for industry dummy variables are omitted from the table. Controlling industry group does not alter the consequence of the regression. The time-series means for *Excellent* and *Very Good* dummies are positive with significance. This represents that higher CG ratings can contribute to higher expected stock return. In spite of the significant time-series means, the both *Excellent* and *Very Good* dummy variables lose its significance in the cross-sectional regressions for the individual years. The *Very Good* dummy gets the only significant coefficient in 2008. The *Excellent* dummy becomes negative in 2009 and 2013 without significance.

Table 4.4 Corporate Governance by Dummy Variable and Stock Returns with Industry Dummies

The following equation is tested with cross-sectional regression and time-series mean is tested with Fama-Macbeth (1973) regression model.

$$\begin{aligned}\tilde{R}_{i,t+2\ t+1} = \propto\ &+ \beta_1 Dummy_{Excellent_{it}} + + \beta_2 Dummy_{verygood_{it}} \\ &+ \beta_3 Dummy_{Good_{it}} + \beta_4\, LnASSETS_{it-1} + \beta_5 LEV_{it-1} \\ &+ \beta_6 \frac{CAPEX}{ASSETS_{it-1}} + \beta_7 SALESG_{it-1} + \beta_8 ROA_{,it-1} \\ &+ \beta_9\, LnFIRMAGE_{it+1} + \beta_{10}\, BM_{it+1} + \beta_{11}\, ID_{it+1} + \varepsilon_t\end{aligned}$$

$\tilde{R}$ is mothly geometric mean stock return, dummy variables take 1 or 0 according to CG rating of each stock, *LnASSETS* is log of assets, $CAPEX/ASSETS$ is capital expenditure to assets, *SALESG* is an average past 3-year sales growth, *ROA* is return on assets, *LnFIRMAGE* is log of firm age, *BM* is book-to-market, *ID* is industry dummy variable. Industry grouping is according to the Industry Classification Benchmark (ICB). There are actually 10 industry groups but the results for each industry dummy is omitted from this table. The data is from 2008 to 2015. Standard error for the coefficients are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively.

Year	2008	2009	2010	2011	2012	2013	2014	2015	Time-Series Mean
Constant	-2.966	-1.612	-1.336	4.473	5.465**	6.68***	-3.017	0.319	0.734
	(-1.41)	(-0.87)	(-0.79)	(1.95)	(2.99)	(3.38)	(-1.31)	(0.17)	(0.53)
Dummy_ Excellent	1.142	-0.008	0.903	0.742	0.173	-0.278	0.386	0.147	0.396*
	(1.34)	(-0.01)	(1.83)	(1.01)	(0.32)	(-0.51)	(0.47)	(0.291)	(2.23)
Dummy_ Very Good	1.418**	0.421	0.509	0.525	0.164	-0.005	0.698	0.479	0.485***
	(3.17)	(1.19)	(1.33)	(1.10)	(0.44)	(-0.01)	(1.45)	(1.46)	(4.66)
Dummy_ Good	0.677	-0.057	0.307	0.031	-0.400	-0.285	0.327	-0.379	0.042
	(1.80)	(-0.14)	(0.79)	(0.07)	(-1.14)	(-0.71)	(0.81)	(-1.10)	(0.34)
Ln ASSETS	0.256*	0.180	-0.005	-0.288*	-0.330**	-0.266*	-0.058	0.192*	-0.014
	(2.08)	(1.65)	(-0.05)	(-2.23)	(-3.24)	(-2.45)	(-0.45)	(1.98)	(-0.16)
LEV	0.004	-0.005	-0.001	0.010	-0.000	0.003	0.019*	0.010	0.004
	(0.52)	(-0.76)	(-0.25)	(1.27)	(-0.08)	(0.52)	(2.27)	(1.60)	(1.45)
$\frac{CAPEX}{ASSETS}$	0.031	0.016	-0.001	-0.012	-0.017	-0.004	0.052*	0.029	0.007
	(1.40)	(0.65)	(-0.06)	(-0.54)	(-0.82)	(-0.25)	(2.47)	(1.24)	(1.05)
SALESG	0.000	-0.003	-0.001	0.013	-0.002	0.021**	-0.026**	0.003	0.001
	(0.04)	(-0.42)	(-0.21)	(1.44)	(-0.48)	(2.94)	(-2.92)	(0.58)	(0.36)
ROA	0.020	0.055**	0.033*	0.011	-0.013	-0.011	0.103***	0.022	0.028**
	(0.04)	(2.90)	(2.24)	(0.57)	(-0.99)	(-0.74)	(4.77)	(1.68)	(2.89)
Ln FIRMAGE	-0.134	0.205	0.170	0.271	-0.039	-0.462*	-0.026	-0.839***	-0.123
	(-0.75)	(1.13)	(0.98)	(1.11)	(-0.19)	(-1.99)	(-0.09)	(-3.64)	(-1.05)
BM	1.058***	1.04***	0.658**	1.044***	0.549	1.325***	1.962***	1.201***	1.017***
	(7.32)	(5.84)	(2.88)	(3.39)	(1.69)	(5.08)	(4.80)	(4.77)	(8.94)
Industry Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

4.2 Fixed Effects Regression Results

4.2.1 Fixed Effects Regression on Corporate Governance

In the previous section, I compared the results of cross-sectional regressions and time-series mean to show that the effect of the CG ratings is not constant but rather time-varying. However, that assumption was made based on only 8 years of data, which is not sufficient enough to conclude the time-varying characteristics. Alternatively, I estimated parameters of the CG ratings using fixed effect regression and then compared the parameters by z-test for difference. Table 4.6 reports the results of the fixed effects regression. Z-test is conducted for a null hypothesis that there is no difference in coefficients between any pair of parameters.

The CG ratings in 2008, 2009, and 2010 are significantly positive while those in 2012 and 2013 are negative but not significant. Z-test confirms that the positive CG coefficient in 2008 is statistically different from that of the rest of the years, which shows distinctively strong influence on the stock returns. In a similar manner, the negative CG coefficients in 2012 and 2013 are statistically different from those from 2008 to 2011. The CG ratings in 2012 and 2013 had negative impact on stock returns and the negative parameters are different from those early four years. This indicates that the degree that the CG ratings affects the stock returns is non-liner and not stable over the years.

Table 4.5 Fixed Effects Regression of Stock Returns on Corporate Governance
The following equation is tested with fixed effect regression model.

$$\check{R}_{i,t+2\,t+1} = \propto + \beta_1 CG2008_i + \beta_2 CG2009_i + \beta_3 CG2010_i + \beta_4 CG2011_i + \beta_5 CG2012_i + \beta_6 CG2013_i + \beta_7 CG2014_i + \beta_8 CG2015_i + \beta_9 CG2008_i + \beta_{10} LnASSETS_{it-1} + \beta_{11} LEV_{it-1} + \beta_{12} \frac{CAPEX}{ASSETS}_{it-1} + \beta_{13} SALESG_{it-1} + \beta_{14} ROA_{it-1} + \beta_{15} LnFIRMAGE_{it+1} + \beta_{16} BM_{it+1} + \varepsilon_t$$

$\tilde{R}$ is mothly geometric mean stock return, *CG* is corporate governance ratings ranging from 3 to 0, *LnASSETS* is log of assets, $CAPEX/ASSETS$ is capital expenditure to assets, *SALESG* is an average past 3-year sales growth, *ROA* is return on assets, *LnFIRMAGE* is log of firm age, and *BM* is book-to-market. The data is from 2008 to 2015. Standard error for the coefficients are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively. Z-test is for a null hypothesis that there is no difference in coefficients. P-values are in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively.

Dependent Variable	Stock Returns	*Z-test for* Coefficients Difference	*CG2009*	*CG2010*	*CG2011*	*CG2012*	*CG2013*	*CG 2014*	*CG2015*
CG2008	0.784***		2.49**	1.91*	2.37**	4.07***	4.94***	3.02***	3.25***
	(4.96)		(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
CG2009	0.271*			-0.48	0.02	1.91*	2.73**	0.92	0.85
	(2.06)			(0.68)	(0.48)	(0.02)	(0.00)	(0.17)	(0.19)
CG2010	0.368*				0.48	2.25*	3.04**	1.33	1.28
	(2.47)				(0.31)	(0.01)	(0.00)	(0.09)	(0.09)
CG2011	0.265					1.77*	2.52**	0.84	0.76
	(1.76)					(0.03)	(0.00)	(0.19)	(0.22)
CG2012	-0.115						0.64	-0.94	-1.12
	(-0.75)						(0.26)	(0.82)	(0.86)
CG2013	-0.247							-1.64*	-1.89*
	(-1.81)							(0.95)	(0.97)
CG2014	0.086								-0.13
	(0.57)								(0.55)
CG2015	0.112								
	(0.84)								
LnASSETS	-0.015								
	(-0.43)								
LEV	0.003								
	(1.52)								

Dependent Variable	Stock Returns	*Z-test for* Coefficients Difference	*CG2009*	*CG2010*	*CG2011*	*CG2012*	*CG2013*	*CG 2014*	*CG2015*
$\frac{CAPEX}{ASSETS}$	0.007 (1.07)								
SALESG	0.002 (1.06)								
ROA	0.028*** (5.07)								
Ln FIRMAGE	-0.054 (-0.77)								
BM	1.029*** (13.84)								

4.2.2 Fixed Effects Regression on Corporate Governance with Control of Industry Group

Table 4.6 reports the same fixed effect regression as Table 4.5 but with controlling industry group. Controlling industry group does not change the result of the regression. The CG parameters from 2008 to 2010 are positive with significance. Those in 2012 and 2013 are negative but not significant. Z-test for difference in coefficients indicates that the positive CG parameter in 2008 is statistically different from all the other parameters. The negative CG coefficients in 2012 and 2013 are also statistically different from that from 2008 to 2011. Thus, the magnitude of influence on stock returns by the CG rating is inconsistent and rather time-varying.

Table 4.6 Fixed Effects Regression of Stock Returns on Corporate Governance with Industry Dummy Variables

The following equation is tested with fixed effect regression model.

$$\begin{aligned}\check{R}_{i,t+2\ t+1} =\propto\ &+\beta_1 CG2008_i\ +\beta_2 CG2009_i\ +\beta_3 CG2010_i\ +\beta_4 CG2011_i\\ &+\beta_5 CG2012_i\ +\beta_6 CG2013_i\ +\beta_7 CG2014_i\ +\beta_8 CG2015_i\\ &+\beta_9 CG2008_i+\beta_{10}\, LnASSETS_{it-1}+\ \beta_{11} LEV_{it-1}+\beta_{12}\frac{CAPEX}{ASSETS}_{it-1}\\ &+\beta_{13} SALESG_{it-1}+\ \beta_{14} ROA_{\mathrm{i}t-1}+\ \beta_{15}\, LnFIRMAGE_{it+1}\\ &+\ \beta_{16}\, BM_{it+1}+\ \beta_{17}\, ID_{it+1}+\varepsilon_t\end{aligned}$$

$\tilde{R}$ is mothly geometric mean stock return, *CG* is corporate governance ratings ranging from 3 to 0, *LnASSETS* is log of assets, $CAPEX/ASSETS$ is capital expenditure to assets, *SALESG* is an average past 3-year sales growth, *ROA* is return on assets, *LnFIRMAGE* is log of firm age, and *BM* is book-to-market, *ID* is industry dummy variable. Industry grouping is according to the Industry Classification Benchmark (ICB). There are actually 10 industry groups but the results for each industry dummy is omitted from this table. The data is from 2008 to 2015. Standard error for the coefficients are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively. Z-test is for a null hypothsis that there is no difference in coefficients. P-values are in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively.

Dependent Variable	Stock Returns	*Z-test for* Coefficients Difference	*CG2009*	*CG2010*	*CG2011*	*CG2012*	*CG2013*	*CG 2014*	*CG2015*
CG2008	0.796***		2.53**	2.00*	2.42**	4.13***	5.04***	3.27***	3.36***
	(5.05)		(0.00)	(0.02)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
CG2009	0.276*			-0.43	0.04	1.93*	2.81**	0.96	0.92
	(2.11)			(0.66)	(0.48)	(0.02)	(0.00)	(0.16)	(0.17)
CG2010	0.362*				0.44	2.23*	3.06**	1.31	1.30
	(2.44)				(0.32)	(0.01)	(0.00)	(0.09)	(0.09)
CG2011	0.268					1.78*	2.58**	0.86	0.82
	(1.78)					(0.03)	(0.00)	(0.19)	(0.20)
CG2012	-0.115						0.68	-0.93	-1.07
	(-0.74)						(0.24)	(0.82)	(0.85)
CG2013	-0.256							-1.68*	-1.89*
	(-1.87)							(0.95)	(0.97)
CG2014	0.085								-0.09
	(0.57)								(0.53)
CG2015	0.103								
	(0.78)								
LEV	0.004								
	(1.76)								

Dependent Variable	Stock Returns	*Z-test for* Coefficients Difference	*CG2009*	*CG2010*	*CG2011*	*CG2012*	*CG2013*	*CG 2014*	*CG2015*
$\frac{CAPEX}{ASSETS}$	0.005 (0.78)								
SALESG	0.002 (0.82)								
ROA	0.029*** (5.09)								
Ln FIRMAGE	-0.063 (-0.87)								
BM	1.099*** (14.39)								
Industry Dummies	Yes								

4.2.3 Fixed Effects Regression on Corporate Governance Dummy Variables

Instead of assigning score of 3 (*Excellent*) to 0 (*Poor*) in accordance with the CG rating in the regression, the regression in Table 4.7 employs dummy variable to avoid a bias that incremental increase in the CG rating affects the stock return evenly. The parameters for each CG dummy variable is estimated by fix effect regression, then z-test is conducted for the parameter difference. The results are presented in Table 4.7.

The *Excellent* dummies get positive significance in 2008 and 2010, and surprisingly, negative significance in 2013. Z-test for coefficient difference confirms that the parameter in 2008 is statistically different from that of the rest of years, except in 2010, perhaps because the both years get the positive significant coefficients. The negative parameter in 2013 differs significantly from that in 2008 to 2011. The contrast of the CG rating's effect on the stock return is an obvious sign of time-varying characteristics.

The result for the *Very Good* dummies is similar to the one for the *Excellent* dummies. The dummies from 2008 to 2010 are positively significant and those from 2012 and 2013 are negative but without significance. The parameter in 2008 is statistically different from every year in the sample. Although the parameters in 2009 and 2010 are also significantly positive, that in 2008 is still different from the two years, which means that the positive magnitude that the CG rating in 2008 affects stock returns is higher than the CG ratings in 2009 and 2010. This is also an indication of time-varying characteristics of the CG score. The negative coefficient in 2013 gets significant z-score when tested with the years from 2008 to 2011. This shows the negative effect on stock returns in 2013 is a distinctive and unique impact, which signals inconsistency of the CG rating's power.

The *Good* dummies represent weaker influence on stock returns. Only in 2008 gets the significant parameter. Z-test for coefficient difference reveals that the positive parameter in 2008 statistically differs from those in 2012, 2013, and 2015 which are all negative. The contrasting effect on stock returns is also evident in this class of the CG score.

Table 4.7 Fixed Effects Regression of Stock Returns on Corporate Governance by Dummy Variables

The following equation is tested with fixed effect regression model.

$$\begin{aligned}\check{R}_{i,t+2\ t+1} = \propto\ &+ \beta_1 Dummy_{Excellent2008} + \beta_2 Dummy_{Excellent2009} \\ &+ \beta_3 Dummy_{Excellent2010} + \beta_4 Dummy_{Excellent2011} \\ &+ \beta_5 Dummy_{Excellent2012} + \beta_6 Dummy_{Excellent2013} \\ &+ \beta_7 Dummy_{Excellent2014} + \beta_8 Dummy_{Excellent2015} \\ &+ \beta_9 Dummy_{Very\ Good2008} + \beta_{10} Dummy_{Very\ Good2009} \\ &+ \beta_{11} Dummy_{Very\ Good2010} + \beta_{12} Dummy_{Very\ Good2011} \\ &+ \beta_{13} Dummy_{Very\ Goodt2012} + \beta_{14} Dummy_{Very\ Good2013} \\ &+ \beta_{15} Dummy_{very\ Good2014} + \beta_{16} Dummy_{Very\ Good2015} \\ &+ \beta_{17} Dummy_{Good2008} + \beta_{18} Dummy_{Good2009} + \beta_{19} Dummy_{\ Good2010} \\ &+ \beta_{20} Dummy_{Good2011} + \beta_{21} Dummy_{Goodt2012} \\ &+ \beta_{22} Dummy_{Good2013} + \beta_{23} Dummy_{Good2014} \\ &+ \beta_{24} Dummy_{Good2015} + +\beta_{25}\ LnASSETS_{it-1} + \beta_{26} LEV_{it-1} \\ &+ \beta_{27} \frac{CAPEX}{ASSETS_{it-1}} + \beta_{28} SALESG_{it-1} + \beta_{29} ROA_{\mathrm{it-1}} \\ &+ \beta_{30}\ LnFIRMAGE_{it+1} + \beta_{31}\ BM_{it+1} + \varepsilon_t\end{aligned}$$

$\tilde{R}$ is mothly geometric mean stock return, dummy variables take 1 or 0 according to CG rating of each stock, *LnASSETS* is log of assets, $CAPEX/ASSETS$ is capital expenditure to assets, *SALESG* is an average past 3-year sales growth, *ROA* is return on assets, *LnFIRMAGE* is log of firm age, and *BM* is book-to-market. The data is from 2008 to 2015. Standard error for the coefficients are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively. Z-test is for a null hypothsis that there is no difference in coefficients. P-values are in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively.

Dependent Variable	Stock Returns	*Z-test for* Coefficients Difference	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Dummy_ Excellent 2008	2.120** (3.16)		1.81* (0.03)	1.19 (0.11)	1.71* (0.04)	3.14*** (0.00)	3.81*** (0.00)	2.65** (0.00)	2.42** (0.00)
Dummy_ Excellent 2009	0.628 (1.31)			-0.71 (0.76)	-0.04 (0.51)	1.67* (0.04)	2.41** (0.00)	1.14 (0.12)	0.73 (0.23)
Dummy_ Excellent 2010	1.124* (2.26)				0.64 (0.26)	2.33** (0.00)	3.10*** (0.00)	1.77* (0.03)	1.44 (0.07)
Dummy_ Excellent 2011	0.659 (1.25)					1.63 (0.05)	2.33** (0.00)	1.14 (0.12)	0.74 (0.22)
Dummy_ Excellent 2012	-0.553 (-1.06)						0.20 (0.41)	-0.40 (0.65)	-0.97 (0.83)
Dummy_ Excellent 2013	-0.959* (-2.13)							-0.97 (0.83)	-1.66* (0.95)
Dummy_ Excellent 2014	-0.237 (-0.407)								-0.09 (0.53)
Dummy_ Excellent 2015	0.132 (0.27)								
Dummy_ Very Good 2008	1.638*** (4.46)		1.97* (0.02)	1.76* (0.03)	2.00* (0.02)	3.36*** (0.00)	3.74*** (0.00)	2.21* (0.01)	2.55** (0.00)
Dummy_ Very Good 2009	0.654* (1.96)			-0.03 (0.51)	0.14 (0.44)	1.63 (0.05)	1.94* (0.02)	0.36 (0.35)	0.63 (0.26)
Dummy_ Very Good 2010	0.672* (1.66)				0.16 (0.43)	1.52 (0.06)	1.79* (0.03)	0.36 (0.35)	0.60 (0.27)
Dummy_ Very Good 2011	0.578 (1.52)					1.40 (0.08)	1.68* (0.04)	0.20 (0.41)	0.44 (0.32)
Dummy_ Very Good 2012	-0.198 (-0.49)						0.20 (0.41)	-1.21 (0.88)	-1.03 (0.85)
Dummy_ Very Good 2013	-0.310 (-0.84)							-1.47 (0.93)	-1.31 (0.90)
Dummy_ Very Good 2014	0.470 (1.24)								0.23 (0.40)
Dummy_ Very Good 2015	0.352 (1.02)								

Dependent Variable	Stock Returns	*Z-test for* Coefficients Difference	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Dummy_ Good 2008	0.795*		1.22	0.82	1.23	2.27*	2.32*	1.55	2.28*
	(2.43)		(0.11)	(0.20)	(0.10)	(0.01)	(0.01)	(0.06)	(0.01)
Dummy_ Good 2009	0.178			-0.31	-0.01	1.00	1.02	0.20	0.95
	(0.46)			(0.62)	(0.50)	(0.15)	(0.15)	(0.41)	(0.16)
Dummy_ Good 2010	0.355				0.29	1.27	1.28	0.52	1.23
	(0.84)				(0.38)	(0.10)	(0.09)	(0.29)	(0.10)
Dummy_ Good 2011	0.188					1.05	1.06	0.23	1.00
	(0.51)					(0.14)	(0.14)	(0.40)	(0.15)
Dummy_ Good 2012	-0.385						-0.01	-0.87*	-0.09
	(-0.95)						(0.50)	(0.80)	(0.53)
Dummy_ Good 2013	-0.377							-0.88	-0.08
	(-0.97)							(0.81)	(0.53)
Dummy_ Good 2014	0.073								0.81
	(0.22)								(0.20)
Dummy_ Good 2015	-0.332								
	(-0.90)								
Ln ASSETS	-0.005								
	(-0.15)								
LEV	0.003								
	(1.42)								
$\frac{CAPEX}{ASSETS}$	0.007								
	(1.08)								
SALESG	0.002								
	(1.07)								
ROA	0.028***								
	(4.97)								
Ln FIRMAGE	-0.062								
	(-0.89)								

BM	1.031***
	(13.81)

4.2.4 Fixed Effect Regression on Corporate Governance Dummy Variables with Control of Industry Group

Table 4.8 reports the same fix effect regression as Table 4.7 but with control of industry group. Like other results in this research, control of industry group has almost no impact on the result. The *Excellent* dummies get significant positive parameters in 2008 and 2010, and a significant negative parameter in 2013. Z-test for coefficient difference reasserts that the parameter in 2008 is statistically different from those in the other years except for the year 2010. This shows the influence of the CG rating in 2008 on stock return is particularly strong when compared to other years. The negative parameter in 2013 is statistically different from those from 2008 to 2011. These results prove that the effect of *Excellent* CG rating on stock return is not constant.

The *Very Good* dummies get significant positive coefficients from 2008 to 2010. The parameter in 2008 is especially influential that it is statistically different from those in the other years. This is also a sign of time-varying characteristic of the CG rating. The *Good* dummies get positive significance only in 2008. Z-test confirms that the parameter in 2008 is different from those in 2012, 2013, and 2015, which have all negative coefficients.

The fixed effect regression and z-test reveal that the CG ratings' impact on stock return differ from year to year. In 2008, the CG ratings had the biggest influence and the coefficients are larger than any other years, and the difference is statistically testified. On the other hand, the CG ratings in 2013 affects stock returns negatively and its difference from other years is also tested statistically. Thus, the CG ratings may have

a positive impact on a long-term basis, but when examined individual years, they can negatively affect expected return.

Table 4.8 Fixed Effects Regression of Stock Returns on Corporate Governance by Dummy Variables with Industry Dummy Variables
The following equation is tested with fixed effect regression model.

$$\begin{aligned}\check{R}_{i,t+2\ t+1} =\propto\ & + \beta_1 Dummy_{Excellent2008} + \beta_2 Dummy_{Excellent2009} \\ & + \beta_3 Dummy_{Excellent2010} + \beta_4 Dummy_{Excellent2011} \\ & + \beta_5 Dummy_{Excellent2012} + \beta_6 Dummy_{Excellent2013} \\ & + \beta_7 Dummy_{Excellent2014} + \beta_8 Dummy_{Excellent2015} \\ & + \beta_9 Dummy_{Very\ Good2008} + \beta_{10} Dummy_{Very\ Good2009} \\ & + \beta_{11} Dummy_{Very\ Good2010} + \beta_{12} Dummy_{Very\ Good2011} \\ & + \beta_{13} Dummy_{Very\ Goodt2012} + \beta_{14} Dummy_{Very\ Good2013} \\ & + \beta_{15} Dummy_{very\ Good2014} + \beta_{16} Dummy_{Very\ Good2015} \\ & + \beta_{17} Dummy_{Good2008} + \beta_{18} Dummy_{Good2009} + \beta_{19} Dummy_{\ Good2010} \\ & + \beta_{20} Dummy_{Good2011} + \beta_{21} Dummy_{Goodt2012} \\ & + \beta_{22} Dummy_{Good2013} + \beta_{23} Dummy_{Good2014} \\ & + \beta_{24} Dummy_{Good2015} + +\beta_{25}\ LnASSETS_{it-1} + \beta_{26} LEV_{it-1} \\ & + \beta_{27} \frac{CAPEX}{ASSETS_{it-1}} + \beta_{28} SALESG_{it-1} + \beta_{29} ROA_{it-1} \\ & + \beta_{30}\ LnFIRMAGE_{it+1} + \beta_{31}\ BM_{it+1} + \beta_{32}\ ID_{it+1}\ \varepsilon_t\end{aligned}$$

$\tilde{R}$ is mothly geometric mean stock return, dummy variables take 1 or 0 according to CG rating of each stock, *LnASSETS* is log of assets, $CAPEX/ASSETS$ is capital expenditure to assets, *SALESG* is an average past 3-year sales growth, *ROA* is return on assets, *LnFIRMAGE* is log of firm age, and *BM* is book-to-market, *ID* is industry dummy variable. Industry grouping is according to the Industry Classification Benchmark (ICB). There are actually 10 industry groups but the results for each industry dummy is omitted from this table. The data is from 2008 to 2015. Standard error for the coefficients are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively. Z-test is for a null hypothsis that there is no difference in coefficients. P-values are in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively.

Dependent Variable	Stock Returns	*Z-test for* Coefficients Difference	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Dummy_ Excellent 2008	2.231*** (3.32)		1.92* (0.02)	1.38 (0.08)	1.86* (0.03)	3.32*** (0.00)	3.99*** (0.00)	2.84** (0.00)	2.61** (0.00)
Dummy_ Excellent 2009	0.643 (1.34)			-0.62 (0.73)	0.00 (0.49)	1.74* (0.04)	2.49** (0.00)	1.25 (0.10)	0.83 (0.20)
Dummy_ Excellent 2010	1.077* (2.17)				0.58 (0.27)	2.31* (0.01)	3.09** (0.00)	1.79* (0.03)	1.44 (0.07)
Dummy_ Excellent 2011	0.595 (1.57)					1.66* (0.04)	2.36** (0.00)	1.19 (0.11)	0.78 (0.21)
Dummy_ Excellent 2012	-0.591 (-1.13)						0.58 (0.27)	-0.37 (0.64)	-0.95 (0.83)
Dummy_ Excellent 2013	-0.997* (-2.21)							-0.94 (0.82)	-1.64* (0.04)
Dummy_ Excellent 2014	-0.300 (-0.514)								-0.50 (0.69)
Dummy_ Excellent 2015	0.082 (0.17)								
Dummy_ Very Good 2008	1.627*** (4.44)		1.95* (0.02)	1.75* (0.03)	2.00* (0.02)	3.30*** (0.00)	3.75*** (0.00)	2.14* (0.01)	2.54** (0.00)
Dummy_ Very Good 2009	0.661* (1.99)			-0.02 (0.50)	0.13 (0.44)	1.59 (0.05)	1.98* (0.02)	0.32 (0.37)	0.65 (0.25)
Dummy_ Very Good 2010	0.672* (1.66)				0.13 (0.44)	1.47 (0.06)	1.82* (0.03)	0.31 (0.37)	0.60 (0.27)
Dummy_ Very Good 2011	0.595 (1.57)					1.38 (0.08)	1.74* (0.04)	0.17 (0.42)	0.48 (0.31)
Dummy_ Very Good 2012	-0.171 (-0.42)						0.28 (0.38)	-1.21 (0.88)	-0.98 (0.83)
Dummy_ Very Good 2013	-0.324 (-0.88)							-1.56 (0.94)	-1.33 (0.90)
Dummy_ Very Good 2014	0.500 (1.32)								0.29 (0.38)
Dummy_ Very Good 2015	0.349 (1.01)								
Dummy_ Good 2008	0.788* (2.42)		1.24 (0.10)	0.87 (0.19)	1.26 (0.10)	2.27* (0.01)	2.34** (0.00)	1.54 (0.06)	2.29* (0.01)
Dummy_ Good 2009	0.164 (0.42)			-0.28 (0.61)	-0.01 (0.50)	0.99 (0.15)	1.02 (0.15)	0.18 (0.42)	0.94 (0.17)

Dependent Variable	Stock Returns	*Z-test for* Coefficients Difference	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Dummy_ Good 2010	0.325 (0.77)				0.27 (0.39)	1.23 (0.10)	1.26 (0.10)	0.47 (0.31)	1.19 (0.11)
Dummy_ Good 2011	0.171 (0.46)					1.03 (0.15)	1.06 (0.14)	0.20 (0.41)	0.98 (0.16)
Dummy_ Good 2012	-0.391 (-0.96)						0.00 (0.49)	-0.88 (0.81)	-0.09 (0.53)
Dummy_ Good 2013	-0.394 (-1.02)							-0.91 (0.82)	-0.10 (0.54)
Dummy_ Good 2014	0.070 (0.21)								0.82 (0.20)
Dummy_ Good 2015	-0.340 (-0.92)								
Ln ASSETS	0.002 (0.07)								
LEV	0.004 (1.65)								
$\frac{CAPEX}{ASSETS}$	0.005 (0.79)								
SALESG	0.002 (0.81)								
ROA	0.028*** (5.01)								
Ln FIRMAGE	-0.068 (-0.94)								
BM	1.010*** (14.36)								
Industry Dummies	Yes								

4.2.5 Fixed Effect Regression on Corporate Governance Dummy Variables with Control of Industry Group and Market Return

In order to make sure that the result in the Table 4.8 is not affected by the movement of the market, another fixed effect regression is run as robustness test. The market return is deducted from the return of each stock, which represents the excess return over the whole market. The dependent variable is stock return minus the return of SET Index. Table 4.9 reports the result. The market return does not affect the time-varying effect of corporate governance on stock returns. All the coefficients obtained from the fix effect regression are almost the same as those in Table 4.8. Taking market return into account does not alter the results of z-test for coefficients difference. The CG rating in 2008 has significantly positive impact on stock return on all the CG ratings and their magnitude is statistically different from most of the other years. In 2013, the *Excellent* dummy gets a significantly negative coefficient and it is different in 5 years out of the total 7 years.

Table 4.9 Fixed Effects Regression of Stock Returns-Excess the Market on Corporate Governance by Dummy Variables with Industry Dummy Variables
The following equation is tested with fixed effect regression model.

$$\check{R}_{i,t+2\ t+1} - R_{marekt,t+2\ t+1} =$$
$$\propto + \beta_1 Dummy_{Excellent2008} + \beta_2 Dummy_{Excellent2009}$$
$$+ \beta_3 Dummy_{Excellent2010} + \beta_4 Dummy_{Excellent2011}$$
$$+ \beta_5 Dummy_{Excellent2012} + \beta_6 Dummy_{Excellent2013}$$
$$+ \beta_7 Dummy_{Excellent2014} + \beta_8 Dummy_{Excellent2015}$$
$$+ \beta_9 Dummy_{Very\ Good2008} + \beta_{10} Dummy_{Very\ Good2009}$$
$$+ \beta_{11} Dummy_{Very\ Good2010} + \beta_{12} Dummy_{Very\ Good2011}$$
$$+ \beta_{13} Dummy_{Very\ Goodt2012} + \beta_{14} Dummy_{Very\ Good2013}$$
$$+ \beta_{15} Dummy_{very\ Good2014} + \beta_{16} Dummy_{Very\ Good2015}$$
$$+ \beta_{17} Dummy_{Good2008} + \beta_{18} Dummy_{Good2009} + \beta_{19} Dummy_{\ Good2010}$$
$$+ \beta_{20} Dummy_{Good2011} + \beta_{21} Dummy_{Goodt2012}$$
$$+ \beta_{22} Dummy_{Good2013} + \beta_{23} Dummy_{Good2014}$$
$$+ \beta_{24} Dummy_{Good2015} + + \beta_{25}\ LnASSETS_{it-1} + \beta_{26} LEV_{it-1}$$
$$+ \beta_{27} \frac{CAPEX}{ASSETS_{it-1}} + \beta_{28} SALESG_{it-1} + \beta_{29} ROA_{\mathrm{it-1}}$$
$$+ \beta_{30}\ LnFIRMAGE_{it+1} + \beta_{31}\ BM_{it+1} + \beta_{32}\ ID_{it+1}\ \varepsilon_t$$

$\tilde{R}$ is monthly geometric mean stock return, R_{marekt} is monthly geometric mean return of SET index, dummy variables take 1 or 0 according to CG rating of each stock, *LnASSETS* is log of assets, $CAPEX/ASSETS$ is capital expenditure to assets, *SALESG* is an average past 3-year sales growth, *ROA* is return on assets, *LnFIRMAGE* is log of firm age, and *BM* is book-to-market, *ID* is industry dummy variable. Industry grouping is according to the Industry Classification Benchmark (ICB). There are actually 10 industry groups but the results for each industry dummy is omitted from this table. The data is from 2008 to 2015. Standard error for the coefficients are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively. Z-test is for a null hypothesis that there is no difference in coefficients. P-values are in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.001 level respectively.

Dependent Variable	Stock Returns	*Z-test for* Coefficients Difference	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Dummy_ Excellent 2008	2.046** (3.04)		1.67* (0.04)	1.10 (0.13)	1.62* (0.05)	3.08*** (0.00)	3.72*** (0.00)	2.85** (0.00)	2.34** (0.00)
Dummy_ Excellent 2009	0.664 (1.38)			-0.66 (0.74)	0.01 (0.49)	1.75* (0.04)	2.49** (0.00)	1.52 (0.06)	0.81 (0.20)
Dummy_ Excellent 2010	1.121* (2.26)				0.64 (0.26)	2.35** (0.00)	3.11*** (0.00)	2.10* (0.01)	1.46 (0.07)
Dummy_ Excellent 2011	0.655 (1.24)					1.65* (0.04)	2.34** (0.00)	1.45 (0.07)	0.75 (0.22)
Dummy_ Excellent 2012	-0.574 (-1.10)						0.57 (0.28)	-0.12 (0.54)	-0.98 (0.83)

Dependent Variable	Stock Returns	*Z-test for* Coefficients Difference	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Dummy_ Excellent 2013	-0.969* (-2.14)							-0.67 (0.74)	-1.66* (0.04)
Dummy_ Excellent 2014	-0.477 (-0.830)								-0.79 (0.78)
Dummy_ Excellent 2015	0.118 (0.24)								
Dummy_ Very Good 2008	1.766*** (4.83)		2.22* (0.01)	1.96* (0.02)	2.21* (0.01)	3.55*** (0.00)	4.01*** (0.00)	2.45** (0.00)	2.78** (0.00)
Dummy_ Very Good 2009	0.670* (2.01)			-0.04 (0.51)	0.13 (0.44)	1.59 (0.05)	1.99* (0.02)	0.38 (0.35)	0.62 (0.26)
Dummy_ Very Good 2010	0.694* (1.71)				0.17 (0.43)	1.50 (0.06)	1.85* (0.03)	0.39 (0.34)	0.61 (0.27)
Dummy_ Very Good 2011	0.600 (1.58)					1.38 (0.08)	1.73* (0.04)	0.22 (0.41)	0.45 (0.32)
Dummy_ Very Good 2012	-0.164 (-0.40)						0.28 (0.38)	-1.16 (0.87)	-1.00 (0.83)
Dummy_ Very Good 2013	-0.319 (-0.86)							-1.51 (0.93)	-1.36 (0.91)
Dummy_ Very Good 2014	0.478 (1.27)								0.21 (0.41)
Dummy_ Very Good 2015	0.368 (1.07)								
Dummy_ Good 2008	0.719* (2.18)		1.06 (0.14)	0.69 (0.24)	1.10 (0.13)	2.14* (0.01)	2.21* (0.01)	1.75* (0.04)	2.10* (0.01)
Dummy_ Good 2009	0.182 (0.63)			-0.29 (0.61)	0.01 (0.49)	1.04 (0.14)	1.07 (0.14)	0.55 (0.28)	0.94 (0.17)
Dummy_ Good 2010	0.349 (0.83)				0.31 (0.37)	1.28 (0.09)	1.32 (0.09)	0.83 (0.20)	1.20 (0.11)
Dummy_ Good 2011	0.174 (0.47)					1.05 (0.14)	1.08 (0.13)	0.55 (0.29)	0.98 (0.16)
Dummy_ Good 2012	-0.399 (-0.98)						0.00 (0.49)	-0.57 (0.71)	-0.14 (0.55)
Dummy_ Good 2013	-0.403 (-1.04)							-0.59 (0.72)	-0.15 (0.56)

Dependent Variable	Stock Returns	*Z-test for* Coefficients Difference	*2009*	*2010*	*2011*	*2012*	*2013*	*2014*	*2015*
Dummy_ Good 2014	-0.09 (-0.29)								0.44 (0.32)
Dummy_ Good 2015	-0.321 (-0.87)								
Ln ASSETS	-0.003 (-0.09)								
LEV	0.003 (1.24)								
$\frac{CAPEX}{ASSETS}$	0.006 (0.88)								
SALESG	0.001 (0.46)								
ROA	0.024*** (4.24)								
Ln FIRMAGE	-0.055 (-0.77)								
BM	1.064*** (13.82)								
Industry Dummies	Yes								

4.3 Markov Switching Model

4.3.1 Full-Sample Results

For a purpose of comparison between a simple OLS regression and Markov Switching regression, I first test the former. Table 4.10 reports the result of the multiple OLS regression on the CG-sorted portfolio returns. Only dividend yield gets the significance on *Excellent, Very Good, and Good* portfolio returns. None of the macroeconomic variables gets the significance on Poor portfolio returns. R-squared is

very small for all the portfolios, which suggests the model does not fit well for the CG-sorted portfolio returns. Also, as illustrated in Table 3.7, when the data is less likely to be normally distributed, the OLS has limitations as a method of estimation.

Table 4.10 Parameter Estimates of Multiple OLS Regression
The following OLS regression is tested:

$$r_{it} = \propto_i + \beta_{i1} TERM_{t-1} + \beta_{i2} DEF_{t-1} + \beta_{i3} \Delta M_{t-2} + \beta_{i4} DIV_{t-1} + \epsilon_{it}\ ;$$
$$i = (EXCELLENT, VERY\ GOOD, GOOD, POOR)$$

r is a monthly portfolio return, *TERM* is a term spread defined as difference in interest rate between 10-year government bond and 1-month government bond, *DEF* is a default spread defined as difference in yield between Baa and Aaa corporate bond. ΔM is a money growth which is 12-month log difference in money supply, and *DIV* is a dividend yield of the market index (the SET index) The period is from December 2008 to November 2016 for *Term, DEF, and Div*, and November 2008 to October 2016 for ΔM. T-statistics for the coefficients are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively.

Portfolios	*EXCELLENT*	*VERY GOOD*	*GOOD*	*POOR*
Constant	-6.505	-4.531	-1.667	-0.467
	(-1.83)	(-1.34)	(-0.49)	(-0.13)
$TERM_{t-1}$	-0.253	0.037	0.099	0.799
	(-0.35)	(0.05)	(0.14)	(1.11)
DEF_{t-1}	-0.368	-0.377	-0.130	-2.519
	(-0.20)	(-0.22)	(-0.77)	(-1.41)
ΔM_{t-2}	-0.07	-0.146	-0.159	0.015
	(-0.40)	(-0.827)	(-0.91)	(0.08)
DIV_{t-1}	2.879***	2.437**	1.904*	1.254
	(3.45)	(3.07)	(2.42)	(1.51)
R-Squared	0.109	0.090	0.042	0.042

Panel A in Table 4.11 presents the estimation results of the parameters by Markov switching model. Regime 1 is an economic expansion state which is

characterized by a higher return and less volatility. On the other hand, Regime 2 is a recession state which has a lower return and higher volatility (Gulen et al, 2011). This contrasting property between the regimes is prominent across all the portfolios. R-Squared is much higher when compared to the estimation by the OLS. Thus, regime-switching model better fits the CG-sorted portfolio returns. Unreported augmented Dickey Fuller tests reveal that it fails to reject the null hypothesis of nonstationarity during the recession states as in Kocasslan (2016). This is a possible cause for particularly high R-squared during the recessions. The CG-sorted portfolio returns in the recession regime do not possess mean-reverting properties.

The asymmetry between the regimes is noticeable in the parameters too. Except *Good* portfolio, term spread is positive in the expansion. It is positively significant for *Very Good* portfolio. In contrast, term spread is negative for *Excellent* and *Very Good* portfolios during the recession. Thus, term structure has a greater impact on stocks with better CG ratings. During expansions, term spread tends to decrease due to an increasing short-term interest. In spite of the increasing short-term rate, firms with higher CG ratings have better access for external funds, which enables them to invest in profitable projects. Therefore, the positive relationship between returns from better CG ratings and the term structure exists in the economic expansion. During recessions, term spreads become larger, and this adversely affects stock returns of the firms with good governance. This can be explained that, because of tightening credit approvals, firms with poor CG ratings have greater difficulty to access financial markets. Therefore, their risk becomes bigger and investors demand higher returns from those firms with poor governance.

The relationship between portfolio returns and default spread shows the asymmetry between the regimes as well. The parameters are positive, except *Good* portfolio, in the expansion whereas it is negative in the recession. The coefficient of *Poor* portfolio demonstrates that credit spread has strong negative effect in the recession. Firms with bad CG ratings have limited access to the financial market particularly during economic downturn. Therefore, increase in default spread has significant negative impact on their stock returns.

In the economic upturn, the parameters for growth in money supply are all positive while they are all negative in the downturn. Three out of the four portfolios get statistical significance in the both states. When money supply is increased, it generally has positive impact on stock return. During the recession, the government usually increases the money supply in the market to stimulate the economy, so the change in supply is positive. However, the effect on the stock return can be slow. The negative relationship during the recession indicates that falling stock prices and increasing money supply are occurring at the same time. When the effect from increased money supply gets gradually apparent, the economic state might be already out of recessions.

The parameters for divided yield exhibit distinct contrast between the two regimes too. They are all negative in the expansion whereas they are positive with strong significance in the recession. This can be explained that during economic downturn, investors perceive dividends as fixed income so that demand for high dividend-paying stocks increase. On the other hand, during expansions, investors are more likely to pursue capital gains so firms with high dividend payout are seen less attractive.

Overall, the results in Panel A of Table 4.11 show clear asymmetry between the two economic states. Also, this is an evidence that simple liner regression is unable to capture the returns from the CG ratings. Markov switching regression, which allows to estimate different parameters across the two regimes, is better fit because of non-liner, time-varying characteristics of the CG ratings' effect on stock return.

Panel B of Table 4.11 reports transition probabilities of the CG portfolios. All the portfolios show stickiness, meaning that they are more likely to stay in the same regime where they are at present. With a probability between 64 to 81 percent, they remain in the same regime.

Table 4.11 Parameter Estimates of Markov Switching Model
Panel A
The following Markov Switching model is estimated for the CG-sorted portfolio returns:

$$r_{it} = \propto_i + \beta_{i1,st} TERM_{t-1} + \beta_{i2,st} DEF_{t-1} + \beta_{i3,st} \Delta M_{t-2} + \beta_{i4,st} DIV_{t-1} + \epsilon_{it}\ ;$$
$$i = (EXCELLENT, VERY\ GOOD, GOOD, POOR)$$

r is a monthly portfolio return, *st* is the regime indicator, *TERM* is a term spread defined as difference in interest rate between 10-year government bond and 1-month government bond, *DEF* is a default spread defined as difference in yield between Baa and Aaa corporate bond. ΔM is a money growth which is 12-month log difference in money supply, and *DIV* is a dividend yield of the market index (the SET index) The period is from December 2008 to November 2016 for *Term, DEF, and Div*, and November 2008 to October 2016 for ΔM. T-statistics for the coefficients are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.001 level respectively.
Panel B
Transition probabilities between the two regimes are reported.

Panel A

	Portfolios	*EXCELLENT*	*VERY GOOD*	*GOOD*	*POOR*
Regime 1 (Expansion)	*Constant*	-2.634 (-0.76)	-0.116 (-0.05)	8.095* (2.50)	-4.711 (-0.82)

	Portfolios	*EXCELLENT*	*VERY GOOD*	*GOOD*	*POOR*
	$TERM_{t-1}$	1.001 (1.38)	1.439* (2.34)	-0.186 (0.38)	1.054 (1.15)
	DEF_{t-1}	2.263 (1.46)	3.842** (3.00)	-0.625 (-0.38)	1.370 (0.53)
	ΔM_{t-2}	0.591** (2.92)	0.542*** (3.79)	0.136 (0.94)	0.696* (2.10)
	DIV_{t-1}	-0.896 (-1.36)	-2.147*** (-3.87)	-1.301* (-2.49)	-0.698 (-0.49)
	Adjusted R-Squared	0.208	0.342	0.173	0.161
	Portfolio Return Mean	3.893	4.412	3.551	2.171
	Standard Deviation	2.824	2.661	2.309	3.811
Regime 2 (Recession)	*Constant*	-10.052 (-1.69)	-5.646 (-1.22)	-7.929 (-7.92)	7.49 (0.73)
	$TERM_{t-1}$	-0.726 (-0.85)	-0.211 (-0.250)	1.710 (0.79)	1.301 (0.77)
	DEF_{t-1}	-4.993 (-1.52)	-5.914* (-2.26)	-4.201 (-1.51)	-11.489* (-2.32)
	ΔM_{t-2}	-1.198*** (-4.49)	-0.900*** (-3.533)	-0.616* (-2.07)	-1.161 (-1.71)
	DIV_{t-1}	7.930*** (8.51)	6.590*** (6.94)	4.91*** (3.79)	4.787** (3.18)
	Adjusted R-Squared	0.654	0.522	0.427	0.478
	Portfolio Return Mean	-0.746	0.744	-0.152	0.281
	Standard Deviation	6.07	5.212	5.687	5.933

Panel B

Transition Probabilities

	EXCELLENT		*VERY GOOD*		*GOOD*		*POOR*	
	Regime 1	Regime 2	Regime 1	Regime 2	Regime 1	Regime 2	Regime 1	Regime 2
Regime 1	0.725	0.357	0.724	0.184	0.724	0.279	0.816	0.277
Regime 2	0.275	0.643	0.276	0.816	0.276	0.721	0.184	0.723

Figure 4-1 to 4-4 plots the monthly return of the CG-sorted portfolios. The shaded areas represent recessions identified by the Markov switching model. The characteristics of the recessions are low returns and high volatilities. Although the recession periods do not exactly overlap across the four portfolios, they appear to capture two major economic downturns. The first is caused by massive floods in 2011. The second is a pollical unrest in 2013 which ended up with a military coup. The both period experienced monthly portfolio losses as large as 10%.

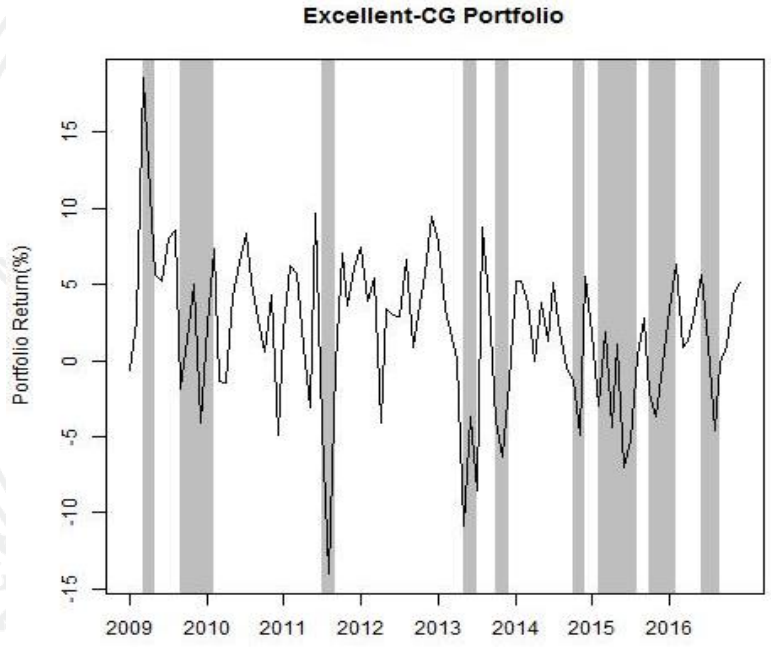

Figure 4.1Monthly Return of Excellent CG Portfolio
The data is from January 2009 to December 2016. The shaded area represents recession state.

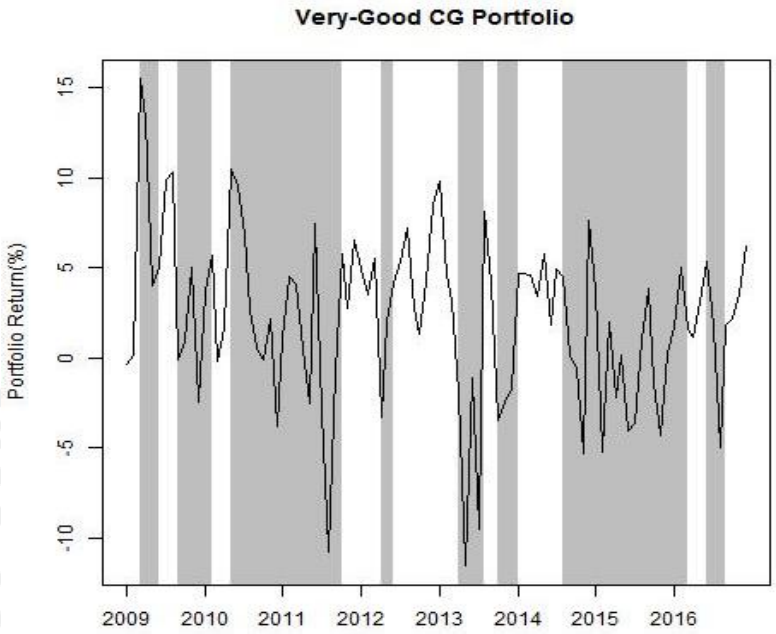

Figure 4.2 Monthly Return of Very Good CG Portfolio
The data is from January 2009 to December 2016. The shaded area represents recession state.

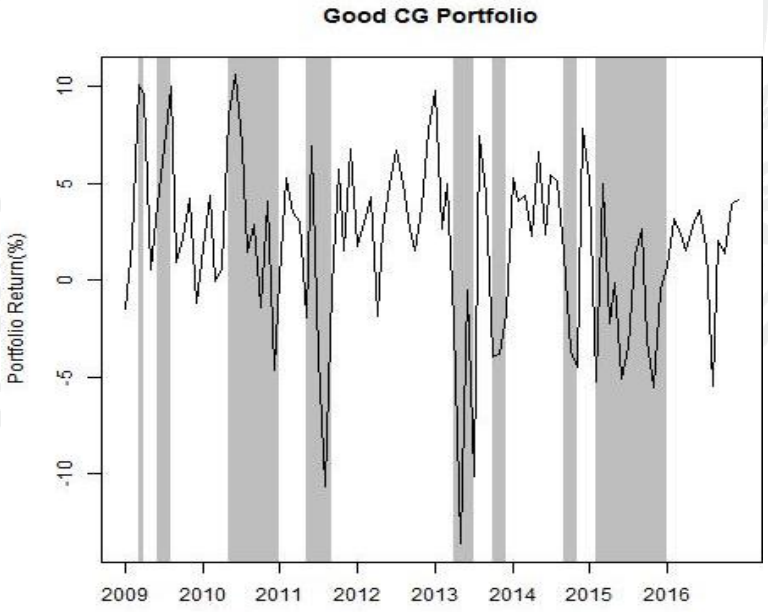

Figure 4.3 Monthly Return of Good CG Portfolio
The data is from January 2009 to December 2016. The shaded area represents recession state.

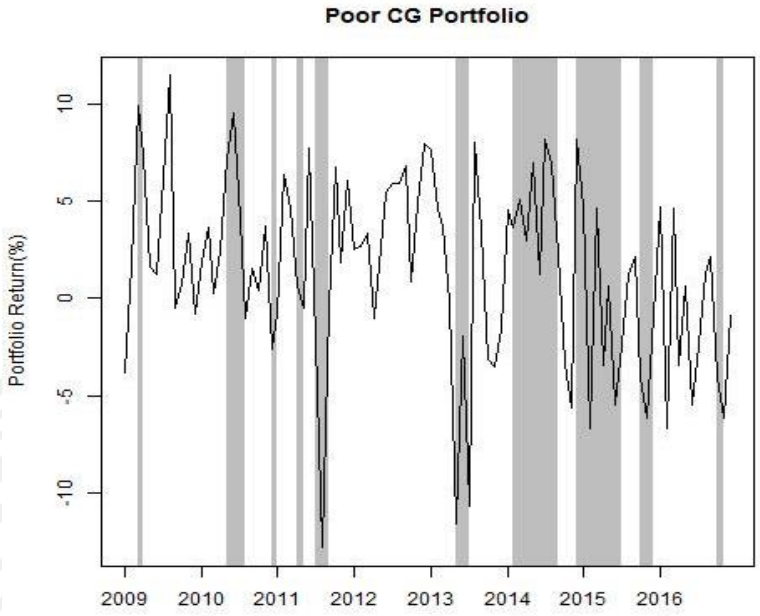

Figure 4.4 Monthly Return of Poor CG Portfolio
The data is from January 2009 to December 2016. The shaded area represents recession state.

To statistically examine the asymmetry between the two states, I conducted Wald test. A null hypothesis for the test is that the coefficients of the independent variables are equal across the two states. Table 4.12 reports the results. The null hypothesis is rejected for all four portfolios. This proves the switching model is statistically significant, implying that returns of the CG portfolios respond differently to the macro economic variables in expansions and recessions. These results are in line with Perez-Quiros and Timmermann (2000), Gulen et al (2011), Kim et al (2014), and Sarwar et al (2016).

Table 4.12 Wald Test
This table reports the Wald test values of Chi-squared distribution. The null hypothesis is that the coefficients of the explanatory variable are equal across the two states for the CG-sorted portfolios. P-values for chi-square statistics are in the in the parentheses. *, **, and *** indicate significant at 0.05, 0.01, and 0.0001 level respectively

	EXCELLENT	*VERY GOOD*	*GOOD*	*POOR*
Hypothesis H_0: $\beta_{i,j,(st=1)} = \beta_{i,j,(st=2)}$ *j=TERM, DEF,* ΔM*, DIV*	160.01*** (0.00)	399.33*** (0.00)	87.624*** (0.00)	127.55*** (0.00)

4.3.2 Out of Sample Test

In the previous sections, I have identified the presence of asymmetries in the CG-sorted portfolios and time-varying effect of the CG ratings on stock returns. By taking advantage of such characteristics, I test an arbitrage investment strategy. The entire data sample is 96 months and this is split into 48 in-sample months and 48 out-of-sample trading months. The in-sample data is from January 2009 to December 2012. Using the in-sample data, I forecast the return for January 2013. If the estimated return is positive, I invest in the portfolio in January 2013. If the estimated return is negative, then funds are invested in 1-month government treasury bill. This process is repeated until November 2016. Thus, the investment strategy is switching between the portfolios and short-term government bond, depending upon forecasted returns. The prediction of the next regime depends on the switching model's learning process of the past data. The past returns and volatilities as well as the persistence of the past positive and negative returns all affect the regime prediction. It sholed be noted that, although the average returns in the expansion retimes are higher than the those in the recession states, it is still possible to have negative returns in the expansions and positive returns in the recessions. Thus, my investment strategy does not solely depend on the forecasted succeeding regime but the investment decision is made based on the expected return which is estimated by the model given the forecasted regime using all the available information at the time.

The switching strategy is compared to the corresponding buy-and-hold strategy. The buy-and-hold strategy is holding the CG-sorted portfolios for the entire 96-month period. The risk-adjusted returns are compared between the two strategies by using Sharpe ratios. Transactions are also taken into account. Because there are costs associated with buying and selling stocks for the switching strategy, I include break-even transaction cost. This is the maximum transaction cost per trade that makes the Sharpe ratio of the switching strategy equal to that of the buy-and-hold strategy. The higher break-even transaction cost indicates better feasibility of the switching strategy (Sarwar et al, 2016).

Table 4.13 reports the result of the out-of-sample test. The result is divided into full out-of-sample period, which is 48 months from January 2013 to December 2016, and expansion and recession sub-periods. In the full out-of-sample period, except *Good* portfolio, switching strategy posts superior return to the buy-and-hold strategy. Sharpe ratios of the switching strategies are higher for *Excellent, Very Good,* and *Poor* portfolios. All the three portfolios generate higher returns with lower standard deviations with the switching strategy. Break-even transaction costs 0.376%, 1.549%, and 0.365% respectively. In Thailand, average transactions cost per trade at the most security firms stand at 0.15%. Therefore, the switching strategy is practicably feasible. Examination of the sub-period results reveals that it is during recessions that the switching strategy excels. In the recession, all four portfolios get higher Sharpe ratios with the switching strategy, while in the expansion, Sharpe ratios of the switching strategy are lower except *Poor* portfolio. This is due to the switching strategy's ability to shift to government bonds during the recession when lower returns and higher

volatilities are expected. Thus, the switching strategy can be a defensive investment during bear market.

Table 4.13 Out-of-Sample Trading Results
The buy-and-hold strategy is investing in the CG-sorted portfolios from January 2009 to December 2016. The switching strategy is switching between the CG-sorted portfolios and 1-month government bond. The in-sample period is from January 2009 to December 2012. From January 2013, a long-position is taken if the forecasted return is positive, otherwise the funds are invested in 1-month government bond.
The results are for the out-of-sample period from January 2013 to December 2016. Mean returns and standard deviations have been annualized. Break-even transaction costs are maximum costs per switch that an investor would incur that make the Shape ratio of the switching strategy equal to that of the buy-and-hold. Negative break-even transaction costs indicate that the Shape ratio of the switching strategy is lower than that of the buy-and-hold.

Portfolios	*EXCELLENT*		*VERY GOOD*		*GOOD*		*POOR*	
Trading Strategy	Buy-and-Hold	Switching	Buy-and-Hold	Switching	Buy-and-Hold	Switching	Buy-and-Hold	Switching
Full Sample								
Mean Return	5.479	8.409	12.737	19.772	0.921	0.061	-0.362	6.409
S.D. of Return	15.066	11.549	15.331	12.135	16.364	14.075	17.421	13.060
Sharpe Ratio	0.238	**0.564**	0.707	**1.473**	0.447	0.301	-0.129	**0.345**
No. of Switches		10		6		12		17
Break Even TC		0.376		1.549		Negative		0.365
Expansions								
Mean Return	44.324	37.147	65.455	61.809	63.101	43.356	5.399	10.115
S.D. of Return	8.302	7.585	7.699	8.412	7.388	8.693	14.449	10.097
Sharpe Ratio	5.096	4.631	8.240	7.108	8.281	4.767	0.241	0.812
Recessions								
Mean Return	-20.951	-12.679	-10.443	-0.000	-29.373	-23.451	-5.808	2.827
S.D. of Return	15.265	11.119	14.955	10.956	14.008	12.788	20.167	15.651
Sharpe Ratio	-1.489	-1.300	-0.820	-0.167	-2.232	-1.982	-0.380	0.006

Figure 4-5 to 4-8 exhibits visual representation of each CG portfolio's cumulative return. Straight line and dotted line indicate the cumulative returns of the buy-and-hold and switching strategy respectively. Shaded areas are the recession period identified by Markov swathing model. The switching strategy outperforms the buy-and-

hold investment except *Good* portfolio. The switching strategy of *Very Good* portfolio generates the highest cumulative return with over 800% in 8 years.

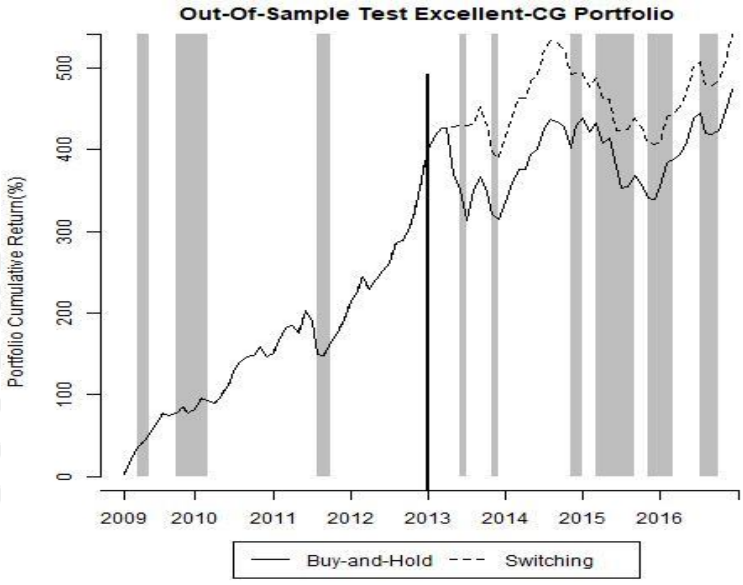

Figure 4.5 Excellent Portfolio Cumulative Return Buy-and-Hold vs Switching Strategy
Out-of-Sample period is from January 2013 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching strategy respectively. Shaded area represents recessions identified by Markov switching model.

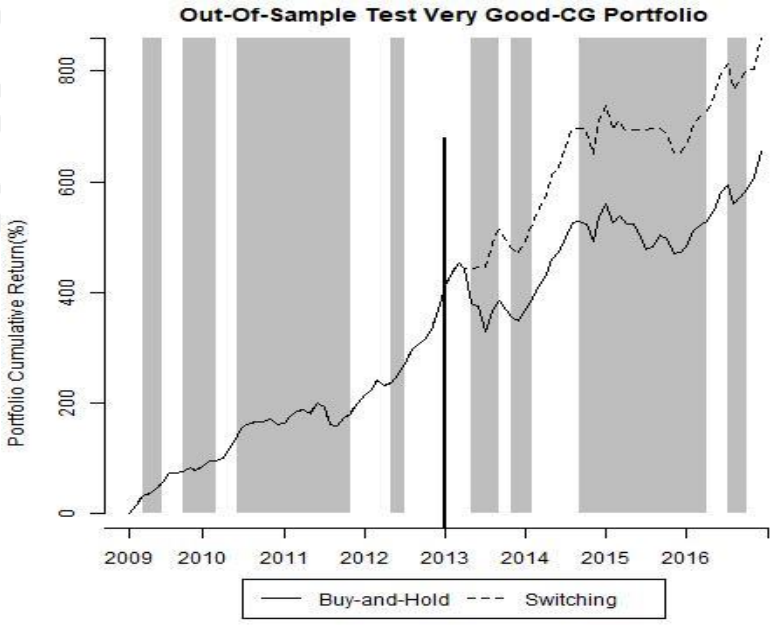

Figure 4.6 Very Good Portfolio Cumulative Return Buy-and-Hold vs Switching Strategy

Out-of-Sample period is from January 2013 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching strategy respectively. Shaded area represents recessions identified by Markov switching model.

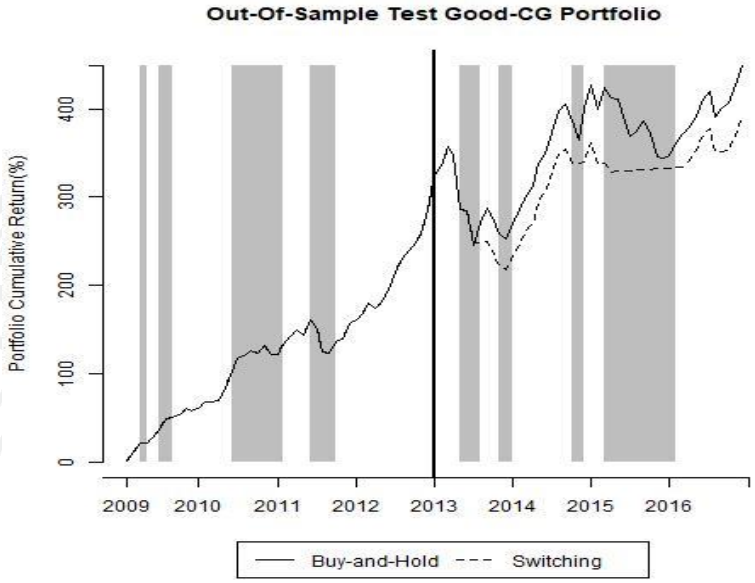

Figure 4.7 Good Portfolio Cumulative Return Buy-and-Hold vs Switching Strategy Out-of-Sample period is from January 2013 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching strategy respectively. Shaded area represents recessions identified by Markov switching model.

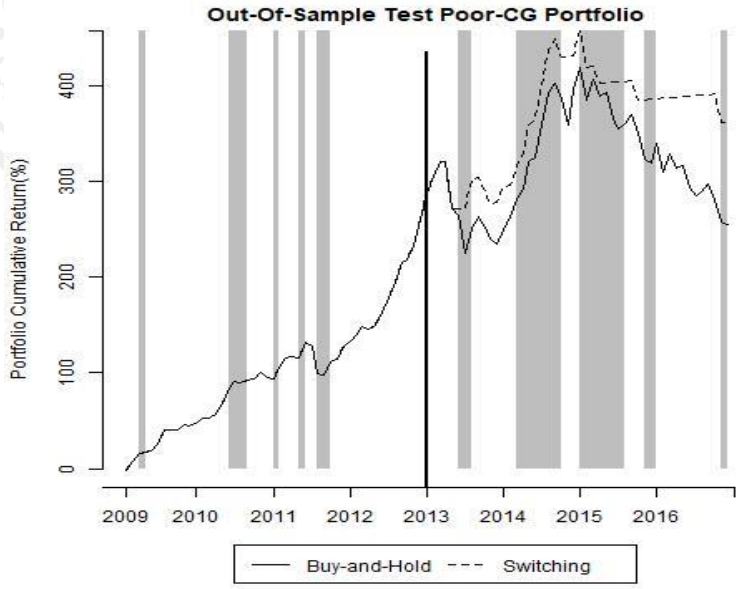

Figure 4.8 Poor Portfolio Cumulative Return Buy-and-Hold vs Switching Strategy

Out-of-Sample period is from January 2013 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching strategy respectively. Shaded area represents recessions identified by Markov switching model.

4.3.3 Out of Sample Test with Value and Momentum Factors

Previous researches suggest that value firms with high Book-to-Market (BM) stocks perform well during recessions (Black and McMillan, 2004, 2005; Amman and Verhofen, 2006; Gulen et al, 2011; Sarwar et al, 2017) and momentum stocks with recent past high returns show better performance during expansions (Chordia and Shivakumar, 2002; Cooper et al, 2004; Stivers and Sun, 2010; Kim et al, 2014). Value stocks are countercyclical to the economic conditions whereas momentum stocks are procyclical. I incorporate this finding into the switching strategy of the CG portfolios.

In the out-of-sample period between January 2013 and December 2016, because of the stickiness of the regime, the regime of the following month is assumed to be the same as the current regime. For example, the last month of the in-sample period is December 2012 and its regime is expansion. Then I assume the next month is also in the expansion state and I choose 30 momentum stocks with the highest returns from t-12 to t-2 from each CG-sorted portfolio. If the next month is forecasted as recession, then I select 30 value stocks with the highest BM. Thus, the switching strategy is switching between the styles of value and momentum within the same CG rating stocks.

The trading results are presented in Table 4.14. In the entire out-of-sample period, the switching strategy outperforms the buy-and-hold strategy in the all the CG classes. The risk-adjusted return of the switching strategy, measured by Sharpe ratio, is higher than that of buy-and-hold strategy. However, because of high frequency of switching between the two styles, transaction costs take up the extra returns in *Excellent* and *Very Good* portfolios. Break-even transaction cost for the two portfolios are only 0.097%

and 0.001% per trading respectively, which are not feasible in the real investing environment in Thailand. The switching strategy for *Good* and *Poor* portfolios also requires frequent switches but the high returns makes up for the transaction costs. Looking at the sub-period, the switching strategy beats the buy-and-hold in the all the CG classes during recessions with higher Sharpe ratios.

Table 4.14 Out-of-Sample Style Switching Trading Results
The buy-and-hold strategy is investing in the CG-sorted portfolios from January 2009 to December 2016. The switching strategy is switching between value and momentum stocks within each the CG-sorted portfolio. The in-sample period is from January 2009 to December 2012. From January 2013, 30 value stocks with the highest Book-to-Market are selected if recession is expected in the following month and 30 momentum stocks with the highest returns from t-12 to t-2 are selected if expansion is expected in the following month.
The results are for the out-of-sample period from January 2013 to December 2016. Mean returns and standard deviations have been annualized. Break-even transaction costs are maximum costs per switch that an investor would incur that make the Shape ratio of the switching strategy equal to that of the buy-and-hold. Negative break-even transaction costs indicate that the Shape ratio of the switching strategy is lower than that of the buy-and-hold.

Portfolios	*EXCELLENT*		*VERY GOOD*		*GOOD*		*POOR*	
Trading Strategy	Buy-and-Hold	Style Switch-ing	Buy-and-Hold	Style Switch-ing	Buy-and-Hold	Style Switch-ing	Buy-and-Hold	Style Switch-ing
Full Sample								
Mean Return	5.479	7.321	12.737	16.482	9.215	18.520	-0.362	15.773
S.D. of Return	15.066	15.813	15.331	20.270	16.364	18.749	17.421	20.355
Sharpe Ratio	0.238	**0.343**	0.707	**0.719**	0.447	**0.886**	-0.129	**0.681**
No. of Switches		17		15		19		21
Break Even TC		0.097		0.001		0.433		0.786
Expansions								
Mean Return	44.324	46.503	65.455	81.560	63.101	85.538	5.399	32.119
S.D. of Return	8.302	8.856	7.699	9.640	7.388	9.562	14.449	14.653
Sharpe Ratio	5.096	5.023	8.240	8.251	8.281	8.745	0.241	2.061
Recessions								
Mean Return	-20.951	-19.399	-10.443	-10.751	-29.373	-27.451	-5.808	1.449
S.D. of Return	15.265	16.493	14.955	21.219	14.008	15.861	20.167	24.603
Sharpe Ratio	-1.489	-1.284	-0.820	-0.592	-2.232	-1.832	-0.380	-0.0172

Figure 4-9 to 4-12 exhibits visual representation of each CG portfolio's cumulative return. The switching strategy posts higher cumulative returns in every CG class. In *Good* and *Poor* portfolios, the superior returns are remarkable in the final year of the out-of-sample period. This might be because of a selection of only 30 quality stocks with criteria of value and momentum for the switching strategy whereas there are more than 100 stocks in the buy-and-hold portfolios.

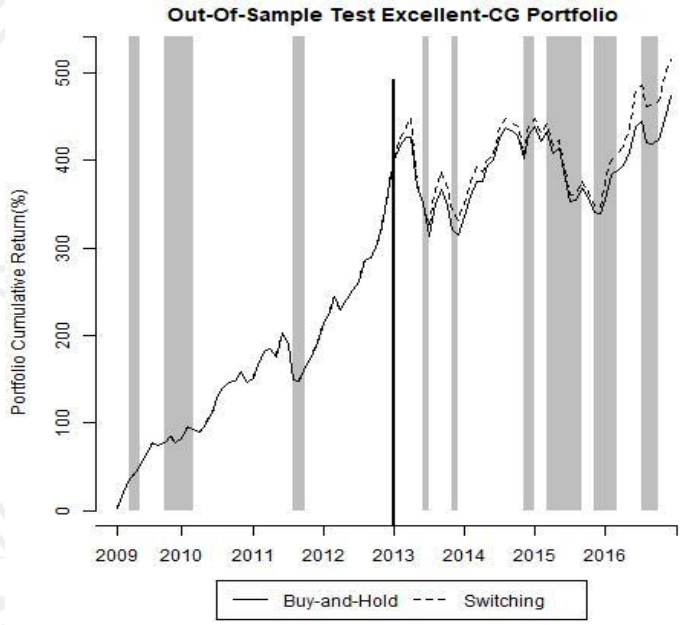

Figure 4.9 Excellent Portfolio Cumulative Return Buy-and-Hold vs Style Switching Strategy
Out-of-Sample period is from January 2013 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching style strategy between value and momentum respectively. Shaded area represents recessions identified by Markov switching model.

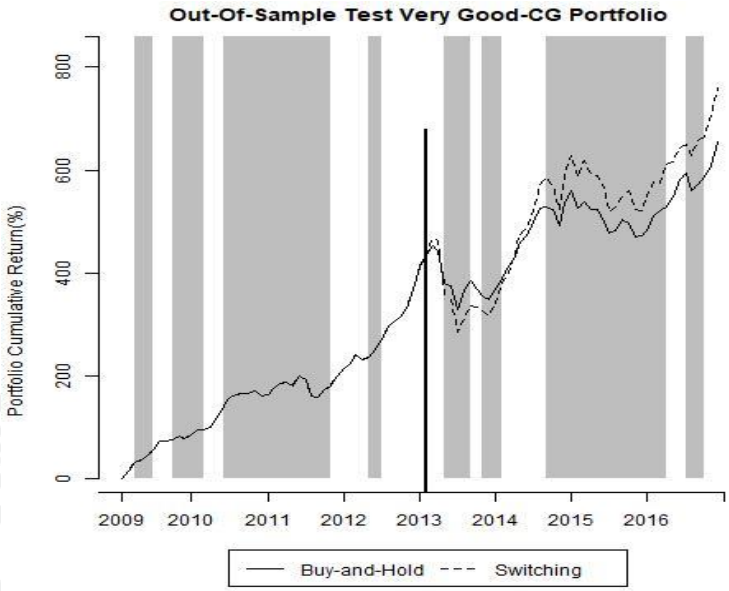

Figure 4.10 Very Good Portfolio Cumulative Return Buy-and-Hold vs Style Switching Strategy
Out-of-Sample period is from January 2013 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching style strategy between value and momentum respectively. Shaded area represents recessions identified by Markov switching model.

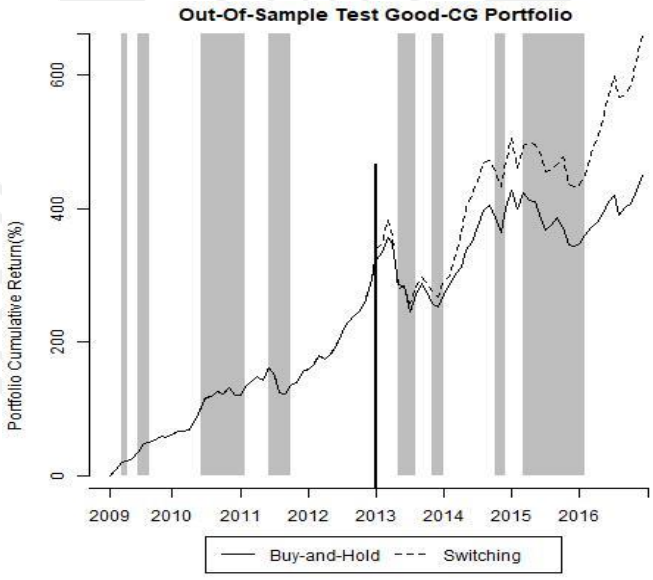

Figure 4.11 Good Portfolio Cumulative Return Buy-and-Hold vs Style Switching Strategy
Out-of-Sample period is from January 2013 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching style strategy between value and momentum respectively. Shaded area represents recessions identified by Markov switching model.

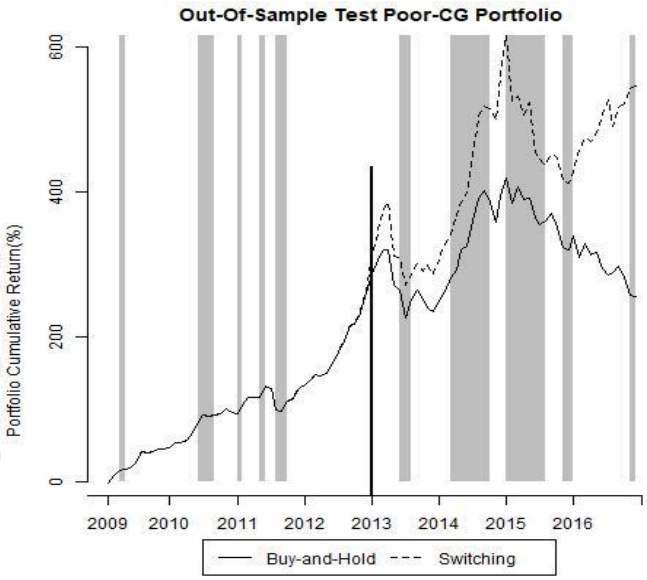

Figure 4.12 Poor Portfolio Cumulative Return Buy-and-Hold vs Style Switching Strategy
Out-of-Sample period is from January 2013 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching style strategy between value and momentum respectively. Shaded area represents recessions identified by Markov switching model.

4.3.4 Robustness Check-Shorter Out-of-Sample Test

The out-of-sample test in the previous section shows the overall positive result of the switching strategy. The outcome is based on the 48-month period staring from January 2013 which could be period-sensitive, or subject to look-ahead bias. To check the robustness of the switching strategy, I conduct another out-of-sample test with shorter period. The in-sample period is from January 2009 to June 2015 for 78 months and the out-of-sample period starts in July 2015 until December 2016 for 18 months. The trading rule for the switching strategy is the same as the previous section.

Table 4.15 reports the result. In the out-of-sample period, the switching strategy of the all the CG-sorted portfolios posts higher returns with lower standard deviations,

resulting a higher Sharpe ratio than the buy-and-hold strategy. The lowest break-even transaction costs of the four portfolios is 0.202% for *Excellent* portfolio, which is still feasible in the Thai market. The average trading cost per transaction is 0.15% in Thailand. In the sub-period, the both trading strategies get the similar results in the expansion, but it is during the recession that the switching strategy shows its advantage. The Sharpe ratios of the all portfolios are higher for the switching strategy in the economic downturn because of its ability to shits the funds to the government bond, which helps to reduce the volatility of the portfolio returns as well as protect from falling prices. The overall results prove that the outperformance of the switching strategy is not period sensitive.

Table 4.15 Out-of-Sample (Shorter Period) Trading Results
The buy-and-hold strategy is investing in the CG-sorted portfolios from January 2009 to December 2016. The switching strategy is switching between the CG-sorted portfolios and 1-month government bond. The in-sample period is from January 2009 to June 2015. From July 2015, a long-position is taken if the forecasted return is positive, otherwise the funds are invested in 1-month government bond.
The results are for the out-of-sample period from July 2015 to December 2016. Mean returns and standard deviations have been annualized. Break-even transaction costs are maximum costs per switch that an investor would incur that make the Shape ratio of the switching strategy equal to that of the buy-and-hold. Negative break-even transaction costs indicate that the Shape ratio of the switching strategy is lower than that of the buy-and-hold.

Portfolios	*EXCELLENT*		*VERY GOOD*		*GOOD*		*POOR*	
Trading Strategy	Buy-and-Hold	Switch-ing	Buy-and-Hold	Switch-ing	Buy-and-Hold	Switch-ing	Buy-and-Hold	Switch-ing
Full Sample								
Mean Return	12.944	15.425	16.655	17.012	8.574	9.136	-16,528	-5.948
S.D. of Return	11.730	10.079	11.079	8.946	10.724	7.470	12.634	6.358
Sharpe Ratio	0.982	**1.389**	1.374	**1.742**	0.666	**1.032**	-1.420	**-1.159**
No. of Switches		8		6		4		5
Break Even TC		0.202		1.549		0.542		0.332
Expansions								
Mean Return	36.657	36.657	27.359	23.641	20.207	15.672	-2.850	-5.510

Portfolios	*EXCELLENT*		*VERY GOOD*		*GOOD*		*POOR*	
Trading Strategy	Buy-and-Hold	Switch-ing	Buy-and-Hold	Switch-ing	Buy-and-Hold	Switch-ing	Buy-and-Hold	Switch-ing
S.D. of Return	5.710	5.710	10.846	8.372	9.179	6.604	12.706	6.824
Sharpe Ratio	6.168	6.168	2.391	2.653	2.043	2.152	-0.334	-1.012
Recessions								
Mean Return	0.044	3.665	4.531	9.224	1.764	5.171	-38.375	-6.818
S.D. of Return	13.426	11.223	11.216	9.800	11.629	8.093	14.449	10.097
Sharpe Ratio	-0.103	0.198	0.277	0.795	0.031	0.465	-5.522	-1.403

Figure 4-13 to 4-16 shows visual representation of each CG portfolio's cumulative return. Because of the shorter out-of-sample period, the cumulative returns do not greatly differ between the buy-and-hold and switching strategies although the switching strategy still manages to post higher returns in the all CG categories.

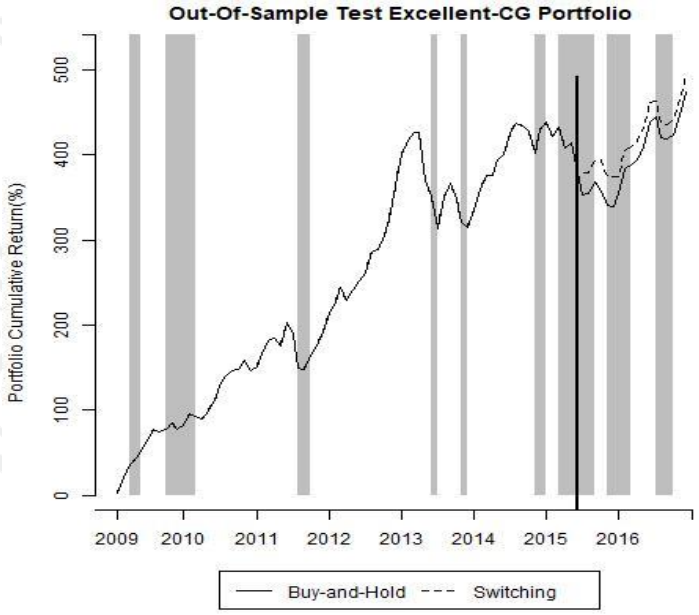

Figure 4.13 Excellent Portfolio Cumulative Return Buy-and-Hold vs Switching Strategy (Shorter Out-of-Sample Period)
Out-of-Sample period is from July 2015 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching strategy respectively. Shaded area represents recessions identified by Markov switching model.

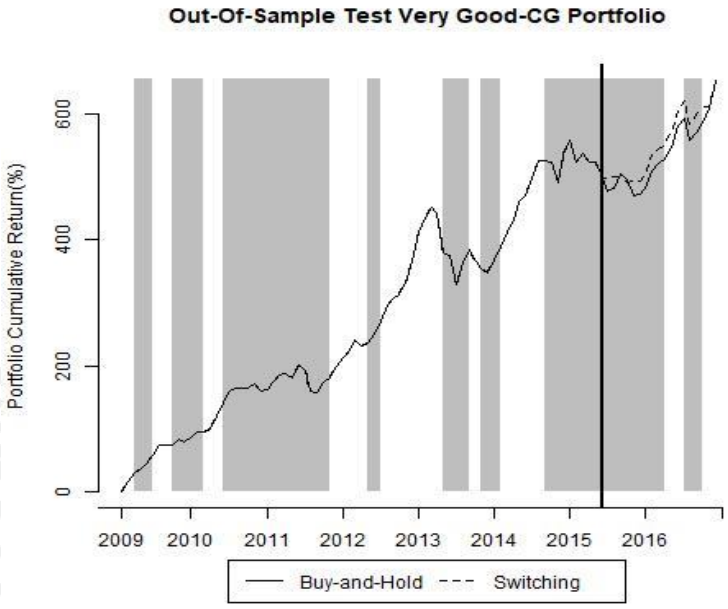

Figure 4.14 Very Good Portfolio Cumulative Return Buy-and-Hold vs Switching Strategy (Shorter Out-of-Sample Period)
Out-of-Sample period is from July 2015 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching strategy respectively. Shaded area represents recessions identified by Markov switching model.

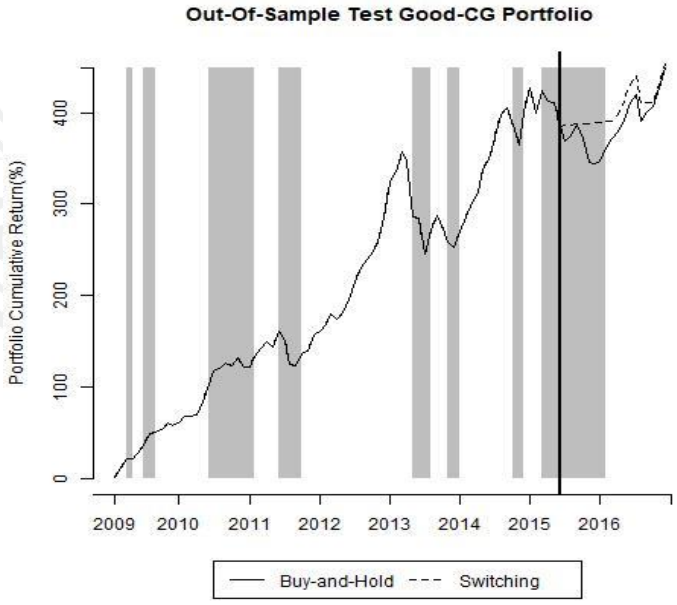

Figure 4.15 Good Portfolio Cumulative Return Buy-and-Hold vs Switching Strategy (Shorter Out-of-Sample Period)
Out-of-Sample period is from July 2015 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching strategy

respectively. Shaded area represents recessions identified by Markov switching model.

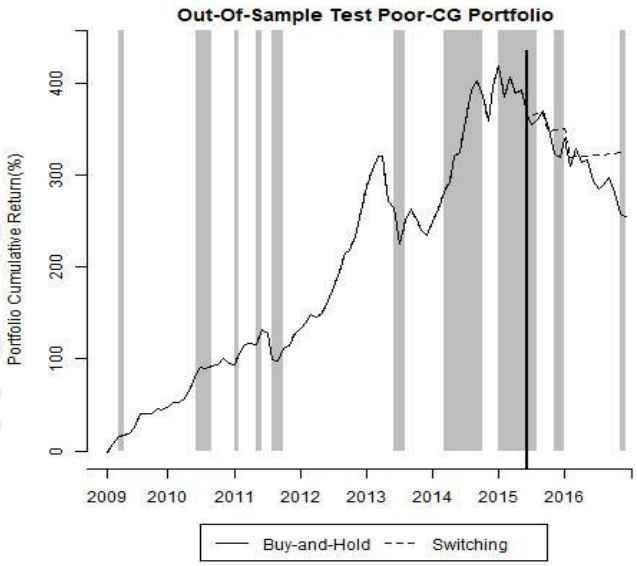

Figure 4.16 Poor Portfolio Cumulative Return Buy-and-Hold vs Switching Strategy (Shorter Out-of-Sample Period)
Out-of-Sample period is from July 2015 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching strategy respectively. Shaded area represents recessions identified by Markov switching model.

Table 4.16 presents the result of the shorter period out-of-sample test wish style switching strategy. The trading rule for the style switching strategy is to select 30 value stocks with the highest Book-to-Market if the next regime is expected to be a recession, and to select 30 momentum stocks with the highest returns from t-12 to t-2 if the next state is predicted to be an expansion. The switching strategy posts better risk-adjusted returns for all the CG-sorted portfolios with higher Sharpe ratio. High frequency switching results in more trading costs and the break-even transaction cost for the *Excellent* portfolio is only 0.030, which is not feasible. In the both expansion and recession sub-periods, the style switching strategy greatly outperforms the buy-and-hold strategy in the all portfolios except the *Excellent* portfolio in the recession. The

volatility of the portfolios is much greater for the switching strategy but the returns are also higher. The results show that the style switching strategy is not period sensitive.

Table 4.16 Out-of-Sample (Shorter Period) Style Switching Trading Results
The buy-and-hold strategy is investing in the CG-sorted portfolios from January 2009 to December 2016. The switching strategy is switching between value and momentum stocks within the CG-sorted portfolio. The in-sample period is from January 2009 to June 2015. From July 2015, 30 value stocks with the highest Book-to-Market are selected if recession is expected in the following month and 30 momentum stocks with the highest returns from t-12 to t-2 are selected if expansion is expected in the following month.
The results are for the out-of-sample period from July 2015 to December 2016. Mean returns and standard deviations have been annualized. Break-even transaction costs are maximum costs per switch that an investor would incur that make the Shape ratio of the switching strategy equal to that of the buy-and-hold. Negative break-even transaction costs indicate that the Shape ratio of the switching strategy is lower than that of the buy-and-hold.

Portfolios	*EXCELLENT*		*VERY GOOD*		*GOOD*		*POOR*	
Trading Strategy	Buy-and-Hold	Switch-ing	Buy-and-Hold	Switch-ing	Buy-and-Hold	Switch-ing	Buy-and-Hold	Switch-ing
Full Sample								
Mean Return	12.944	16.011	16.655	42.627	8.574	22.607	-16,528	17.035
S.D. of Return	11.730	14.568	11.079	19.260	10.724	16.580	12.634	17.583
Sharpe Ratio	0.982	**1.001**	1.374	**2.139**	0.666	**1.249**	-1.420	**0.887**
No. of Switches		9		8		4		8
Break Even TC		0.030		1.840		0.542		5.074
Expansions								
Mean Return	36.657	46.864	27.359	64.742	20.207	36.882	-2.850	38.372
S.D. of Return	5.710	12.867	10.846	23.823	9.179	17.456	12.706	17.045
Sharpe Ratio	6.168	3.530	2.391	2.657	2.043	2.032	-0.334	2.168
Recessions								
Mean Return	0.044	-0.154	4.531	32.709	1.764	6.839	-38.375	-16.275
S.D. of Return	13.426	14.400	11.216	17.286	11.629	15.543	7.214	15.481
Sharpe Ratio	-0.103	-0.109	0.277	1.809	0.031	0.346	-5.522	-1.145

Figure 4-17 to 4-20 exhibit the cumulative returns of the style switching strategy and buy-and-hold strategy for the four CG portfolios. Except the *Excellent* portfolio, the switching strategy's exponential growth in the out-of-sample period is recognizable.

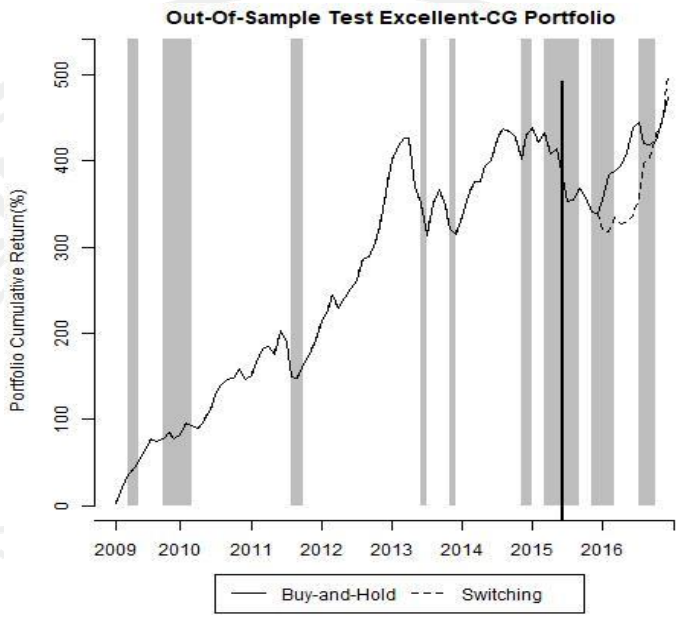

Figure 4.17 Excellent Portfolio Cumulative Return Buy-and-Hold vs Style Switching Strategy (Shorter Out-of-Sample Period)
Out-of-Sample period is from July 2015 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching strategy respectively. Shaded area represents recessions identified by Markov switching model.

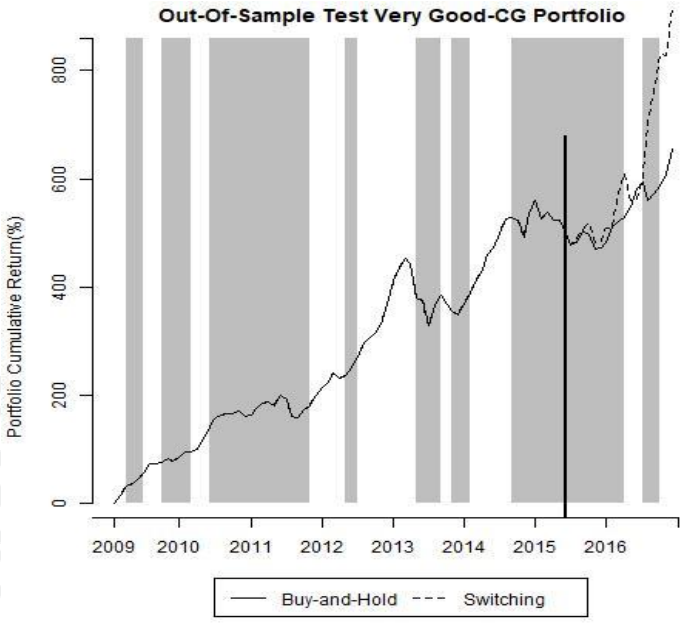

Figure 4.18 Very Good Portfolio Cumulative Return Buy-and-Hold vs Style Switching Strategy (Shorter Out-of-Sample Period)
Out-of-Sample period is from July 2015 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching strategy respectively. Shaded area represents recessions identified by Markov switching model.

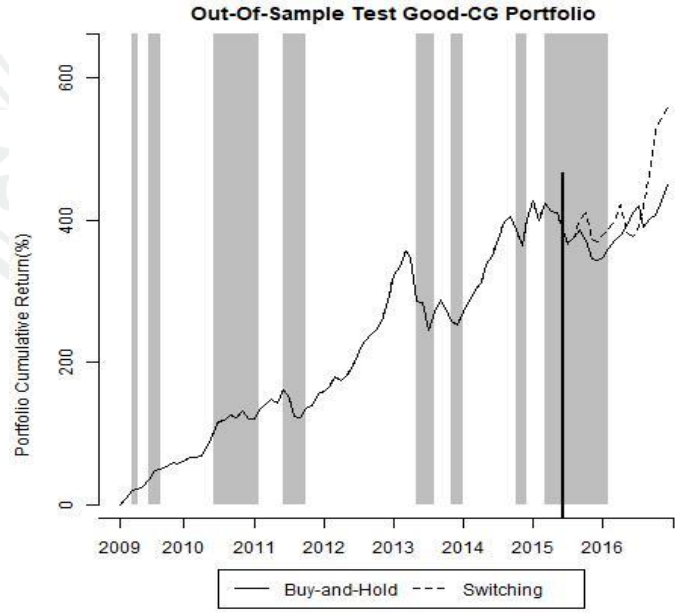

Figure 4.19 Good Portfolio Cumulative Return Buy-and-Hold vs Style Switching Strategy (Shorter Out-of-Sample Period)

Out-of-Sample period is from July 2015 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching strategy respectively. Shaded area represents recessions identified by Markov switching model.

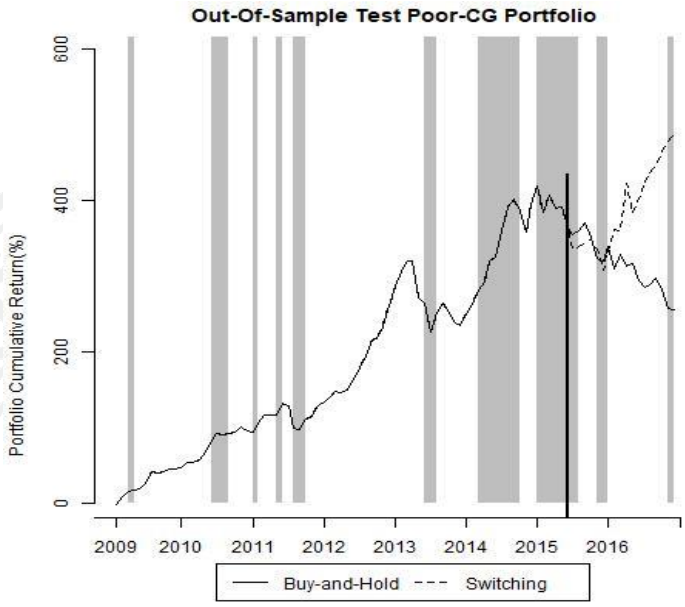

Figure 4.20 Poor Portfolio Cumulative Return Buy-and-Hold vs Style Switching Strategy (Shorter Out-of-Sample Period)
Out-of-Sample period is from July 2015 to December 2016. Straight line and dotted line represent the cumulative returns for the buy-and-hold and switching strategy respectively. Shaded area represents recessions identified by Markov switching model.

4.3.5 Robustness Check-Switching Timing

The out-of-sample test in the previous section is based on the Markov switching regression which requires the information of stock price at the end of month *t*. The decision to long the stocks or switch to the government bond for the following month, *t*+1, is also made on the last day of the month *t*. In the real world, this is not possible because the closing price is available only after the market is closed. To solve this issue, at the end of month *t*, the trading decision for the following month, *t*+1, is made based on the regression result of the month *t*-2. This enables investors to have sufficient time for decision making.

The result for the out-of-sample test based on this alternative trading rule is identical with Table 4.13. Even there is one-month lag for the switching decision, the outcome is not different from the one without the lag. The forecast for the regime of the month t+1 is the same by using information at the month of t and t-1. This should be because of the stickiness of the regime and the tendency of the current regime staying the same. As shown in Panel B of Table 4.10, the probabilities of remaining in the current regime is almost 70% for the all classes of CG portfolios. The result conforms that the superior performance of the switching strategy is free from look-ahead bias.

CHAPTER 5 CONCLUSION

Since Gompers et al. (2003) pioneered the field of the corporate governance index and its effect on increased firm value, a number of researches followed their suit. In general, the literature backs the notion that better corporate governance places positive impact on firm value. However, some scholars such as Core et al. (2006) argue that poor corporate governance does not necessarily cause lower stock returns. This research fills the gap and claims that the relationship between the corporate governance and its effect on stock returns is non-liner and time-varying.

First, the result of the cross-sectional regression and Fama-Macbeth (1973) regression reveals that, although the time-series parameter mean for the CG rating on stock returns is positive, the relationship is not constant across the tested individual years. The test for the coefficients difference further confirms that the effect of the governance ratings on the stock returns vary year from year. Controlling industry group makes no difference in the result.

Second, because of the non-linearity nature, the CG-sorted portfolio returns are better fitted with Markov switching model rather than simple OLS regression. The CG-sorted portfolio returns respond to the macroeconomic variables differently during economic expansions and recessions. The parameters of the metronomic variables show a clear asymmetry between the two regimes. The Wald test statistically confirms the asymmetry across the economic states. By taking advantage of the time-varying nature of the CG's effect on stock returns, I test an arbitrage investing strategy. My switching strategy between the CG portfolio and short-term government bond successfully

outperforms the buy-and-hold strategy in the out-of-sample period after taking account for the transaction cost.

Finally, with incorporation of counter-cyclical characteristics of value stocks (Black and McMillan, 2004, 2005; Amman and Verhofen, 2006; Gulen et al, 2011; Sarwar et al, 2017) and pro-cyclical characteristics of momentum stocks (Chordia and Shivakumar, 2002; Cooper et al, 2004; Stivers and Sun, 2010; Kim et al, 2014), I test another switching strategy with style rotation. From the CG-sorted portfolios, value stocks during recessions and momentum stocks during expansions are selected to form new CG-style portfolios. The out-of-sample sample test confirms that this style switching strategy also rewards investors with superior returns than the buy-and-hold investment. The robustness check affirms that my results are free from look-ahead bias. Changing the sample period or switching timing does not affect the outperformance of the switching strategy.

Limitation of this research includes rather insufficient dataset. Because the IOD started to regularly publish the CG ratings in Thailand only from 2008, this study is based on the sample for the 8 years. As the other researches in this field employ the data for as long as 30 years, the validity of this study would be enhanced if the results were drawn from wider range of raw data. In addition, my regression and switching model are tested on the Thai market, which is considered small and still immature from a perspective of international financial market. Thus, there is room for future study to test the same model on more fundamentally advanced markets. Lastly, this study can be extended by combining the CG ratings with sustainability factor. Starting in 2015, the SET annually announces the Thailand Sustainability Investment list, which includes

listed companies which meet environmental, social, and governance criteria. Adding this sustainability factor might improve the returns from the switching strategy.

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